Conspicuous consumption in the sub-Saharan Africa

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Abstract

Status competitions amongst workers often explain the income distribution better than the permanent income or productivity models. The current study looks for instances of status competitions within communities in developing countries, focusing on sub-Saharan African countries where recent large-scale urban migrations and proliferation of industrial products has occurred amidst social upheavals. The goal of this study is twofold. First, it comments on changes in status competitions in response to proliferation of industrial products, changing family characteristics, regional effects and social interaction levels. Second, it compares the effect of advertising and marketing on consumption in the developed world with the emergence of new social scarcities in the developed world - arguing that the socio-political environment of the developing world has done little to curtail or encourage status competitions at local levels. The extends the framework provided by Fred Hirsch who had discussed the increasing effect of advertising and "congestion" related to positional consumption in the post-war redistribution. The contention of the study is that physical scarcity in the developing countries does not rule out social scarcity and that the status competitions and positional consumption - which are identified by observed differences in prices and availability in the study - must be considered for a better understanding of urban migration patterns and consumption pressures.

Part I

A Background on Conspicuous Consumption

1 Social Scarcities and Status competitions

Economists have long explored relative prosperity as a determinant of personal happiness. A challenge to the rational expectations theory appears when despite being richer in absolute terms, a young adult in a poor urban neighborhood in the developed world may be unhappier than the elite in many developing countries. Discussing necessities in this context of relative poverty, Sen, for example, points out that the television is a need for the school education of a British child in a way it isn't for a Tanzanian child[37]. In Sen's view, the resolution of relative poverty is a problem different resolving absolute poverty in the developing world.

The current study emphasises on the necessity of resolving relative poverty - if not for the evasive goals of happiness then for the risk-aversions and social inequity that severe economic inequalities can bring. Taking a centrist position on this debate[14], Robert H Frank had argued in a provocative work that competitions for status are ingrained in our hormones. Exploring incomes amongst professors competing for grants - he noted that neither the Permanent Income model nor the productivity models explains the distribution of income. What offers a better explanation is the presence of status competition among the professors[14].

Focusing primarily on post-war developments in the Western society, Fred Hirsch had given similar forewarnings of the effects of intensifying status competitions [22, 16]. In modern society, Hirsch argued, the needs have expanded manifolds since the time when Adam Smith's invisible hand was known to work. In Europe of eighteenth century, the rich could pursue their interests while the poor gained mobility in exchange of their participation. Through immense success of capitalism by the twentieth century however, this exchange was no longer appealing[38, 36]. In the absence of social mobility to offer for exchange, the distribution of resources was to occur through status competitions - a post-war process where positional goods and advertisement had a major role to play.

While Hirsch does seem to engage in some prophetism as he warns of rationing of living spaces and other public goods through status competitions, there are two key phenomena that are relevant to the mechanics of status competitions - **scarcity** and **congestion**. With physical scarcity of goods largely conquered (food and amenities), scarcity appears largely social in the developed countries. More commercialization leads to more scarcities and more competitions - hence congestion for goods provides a measure of the degree of social scarcity.

The difference between physical and social scarcities seems unclear in this analysis - not only because it is a difficult classification problem in practice but also because, according to Hirsch, the boundary between physical and social scarcity can get blurred by the positional goods creating a market for

themselves. In context of the developing world, the creation of scarcity through "overuse" (which Hirsch stresses as the engine of social scarcity) is less relevant as the congestion for goods is less often for status needs (physical scarcities are severe in the developing world). That said, with recent developments in the underdeveloped world we are more likely to see a mixed effect of commercialization and physical scarcities with an increasing effect of status competitions. The distinction between physical and social scarcity is less relevant in this regard.

Frank's interpretation of social scarcity is a relevant extension to the model of status competitions. In this model, social interaction amongst participants is a proxy of congestion. Focusing primarily on income distribution, Frank's axiomatic claim - that in the absence of monopolies, corporations cannot survive by rewarding talent alone and are thus compelled to depend on status competitions for income distribution - provides a microeconomic illustration of social scarcity (wherein attributes such as workplace safety get overpriced because of status maximization goals). The role of social interaction is equally relevant in the developing countries where industrial development and societal competitions have interacted and clashed very recently(See Section4.2).

2 Social Scarcity in Africa

Like Schumpeter, Hirsch had also viewed industrial revolution as a legacy of liberal capitalism - a race amongst the middle classes to achieve the higher social positions once held by the feudal elite[22, 36]. Developments of the last century in Africa and Asia bear similarity to this phenomenon where a new working class has clashed with feudal and colonial systems of the century before. The growing status competitions amongst the nascent working classes have been a subject of sociological study. In India of the 1950s, this competition was termed as Sanskritization when erstwhile lower classes emulated higher social classes with newly acquired economic freedoms[39] .

The status competitions as well as the collective defense of non-positional goods[1] in the developing world has hardly followed the route of Georgian England. The industrial class in the countries is small in size and poor in absolute terms. The problems of extreme poverty have remained largely unresolved in large swathes of Asia and Africa.

It would be inaccurate though to draw wide conclusions based on economic poverty. The administrative successes and stabilities of post-colonial governments are varied and have depended largely on the extent of agrarian empires that had existed before. The extractive administrative frameworks of Ottoman or Moghul empires, for example, could be adapted well by European colonists in Asian

[1] Both Hirsch and Frank have argued for policy control of status competitions for positional goods. Hirsch summarizes the problems of controlling distribution as an "adding-up problem" [sic] - where a group of individuals fail to pursue a common goal (e.g. defence of public goods or safety) as it isn't broken down into individual responsibilities ("when everyone stands on tiptoes, no one sees better")[22].

countries when compared to the administrative units (much as the political boundaries themselves) created in sub-Saharan Africa.

Despite regional differences, the political landscape of Asian and African economies is dominated by effects of decolonization - a process that encompasses the loosely similar post-war political voices in Asia and Africa aspiring to establish nation-states. While centralization was attempted for decades in both Asia and Africa - often curtailing local-level status competitions and individual freedoms alike - their limited reach and success has prevented the institutional expression of status competitions. It remains to be seen whether countries under conflict have higher degrees of status competitions or not, but there is little doubt that government-driven resettlements and urban movements are intertwined with the dynamics of status competitions. The competitions that may have otherwise been limited to tribal or local levels have just started expanding to urban settlements[27]. The study of urban vs rural communities in Africa (see section 4.1) - esp in the context of Base of the Pyramid (BoP) initiatives is of particular interest. The next section discusses the political economy of a few sub-Saharan African countries in the context of status competitions.

3 Political Economy and Status Competitions

3.1 Nigeria

Differential access to education because of varied successes of missionary education has created regional disparities in current education levels between North and South of Nigeria. North has had a higher Islamic influence and the uniformity desired by the post-colonial government had initial challenges.

The participation of native authority had been an essential past of British rule - where the market forces had been left relatively untouched. The wage labour surviving on the peasantry was a trend that continued well into the post-colonial era. With the movements of African socialism, the power of merchant class became limited. In more recent decades, when MNCs could have brought more power to a working middle class, their presence didn't change the state of capital being controlled by a small minority - an environment where only the state monopolized industries and the informal sector seem to have expanded[43].

While the BoP initiatives may not have created sufficient base for entrepreneurs, they have revived a focus on education and expanded the market for industrial goods. An average of 42% workforce in Nigeria have secondary education or higher. Upto 28% of those in mere survival activities have a secondary school certificate, and 12% have post-secondary qualifications [29]. Newly urbanized indigenous tribes and newly educated classes have taken up jobs that had earlier required a much lower level of education. The crowding hardly resolves the underlying problems with the economy - as the formal sector is in doldrums. The state of economy, rapid population rise and the resulting

migration from rural areas has given rise to conditions where social scarcities may thrive[29].

3.2 Tanzania

Tanzania was no less than an epicentre for the African socialism movements. In 1974, it was even interested in Mozambique to assist in liberation movements. Planned economy seemed the way forward under influence of Nyrere. However, once the political independence was achieved, the membership of nationalist parties declined and soon the separation of civil service from political institutions became less important.

The reduction of private sector didn't experience much opposition under leadership of Nyrere. With lack of support from workers and ban of producer-consumer societies, inconsistencies surfaced in the socialist model. The industrial sector also suffered because of import subsidies. The approach of ISI (import substituting industrialization) led to oversubsidizing when capital flows had to be adjusted to prevent starvation. The rent-seeking in bureaucracy and usage of a capital-intensive technology soon resulted in oversubsidizing across sectors, overreliance on capital for development and a consequent decline in capacity utilization of the industry[28].

Instead of relying on industrialization, Tanzanians seem to have moved to a subsistence through cultivation approach. Only public officials have had the advantage in becoming entrepreneurs and even though imports could have improved the Tanzanian exchange rate - the problems around corruption have always posed limitations to trade reforms in Tanzania (particularly in the energy sector)[28]. With state regulated economy having had no ways to expand, the growth of parallel economy has been unavoidable. The parallel illegal markets that expanded in the Tanzania in late 1980s and 1990s as well as the rampant corruption has produced a disconnect between parallel markets and the protectionist trade policy.

Firms from South Africa and China have increasingly participated in Tanzania in the more recent past. Conflicts often develop between miners and SA migrant labour - while many Tanzanians are sent to South Africa for training[35]. The sociological conflicts arising in Tanzania continue to impose limits to trade - making the infrastructure problems and need for reforms severe in Tanzania. Electricity is only available to 10% of the population (10% of their household income of users of electricity in rural countries is spent on its bill). The use of internet communications is higher in Tanzania than in Africa's average but access to finance is low (albeit rising) for the private sector. Quality of life differs significantly between urban and rural regions and the size of the informal sector (60%) is significant[1]. We intend to explore the differences in social scarcities between urban and rural areas to commend on the effect of local political economies on consumption .

3.3 Angola

Angola achieved independence from Portugal in 1975, after which the competition between different movements that were vying to lead the country descended into civil war. The Popular Movement for the Liberation of Angola (MPLA), a Marxist-oriented group that included urban intellectuals, nominally led the country[20]. Similar to the other post-colonial developments, state-controlled companies were to thrive. Sonagol, the state oil company, seems to play a quasi-fiscal role according to economists from the Western economies. The economy's dependence on oil revenues also makes economic diversification difficult[20]. Business with China is booming and it could be interesting to look at proliferation of industrial goods in Angola.

3.4 Kenya

The politics in Kenya often appears to be an equilibrium of multiple ethnicities - where clan dynamics are of significant importance. When resettlement was attempted under Kenyatta's leadership, the non-Kikuyu population was quick to express their discontent. Other attempts at nationalization - taking control of foods sales and establishment of purchase centres - have met with similar disappointments.

The economic data recorded (by surveys like IRS) had severe shortcomings that led to overstated improvements in household rights, womens' conditions and the overall health of economy. The prevalence of small-scale independent works and lack of support offered to them has not been addressed either by the socialist governments or the growing private sector[34].

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4 Characteristics of Social Scarcity in Developing countries

The outreach and resources of the governmental institutions in the developing world are limited and a large industrial sector at the scale of China has been out of reach for most African countries[4]. The small-scale private enterprise - which forms the majority of non-agrarian workforce in sub-Saharan Africa - receives little governmental assistance. The expansion of informal economy has thus continued and the migration to urban areas multiplied. Urban migration is often seen as a necessary phase of urbanization which is followed by the competition between industrial and agricultural sectors for labour and food [19]. The side-effect of this development we're concerned with is the complex interaction between tribal identities and economic developments.

On one hand education has become part of a healthy competition (e.g. with investments from South Africa and Western countries in Tanzania) - attempting to homogenize identities with expansion in trade and the kind of mobility where indigenes displace the non-indigenes and the newly educated

displace the less numerous previous workforce. On the other hand, new entrepreneurial energies and consumerism instilled through BoP initiatives can magnify status competitions[12]. The political institutions with limited control risk letting business initiatives constrain themselves to the informal sector and to increasing demands alone (particularly in micro-credit and mass education areas). The deeper problems of poverty, unemployment and economic exclusion may thus be left unaddressed by a distribution through status competitions [29][2].

4.1 Urban Migration

The dynamics of urban migration can serve as a field-study of consumption patterns for the context of this note. A flight to urban areas is often an escape from despondent circumstances as well as an opportunity of improbable social mobilities. A model where migrants move for rational expectations seems rather inadequate. In the developing economies, cities provide a range of products that are entirely absent from the agrarian rural settings. It is expected that the microdynamics of migration to urban centres would be signaled through consumption pressures for positional goods in the rural areas. Overcrowding and massive informal sectors in the urban can also indicate possibly irrational obsessions with industrial goods and a lifestyle with global appeal.

4.2 Economic and Spatial Exclusion

The choice of a signaling product is driven by particular socio-cultural circumstances, including among other things - the perceived hierarchies in the society. While studying the effect of **social interaction** on income distribution, Frank measures the degree of status competitions by observing social interaction[14] - which is likely to lead to more competition and thus more signaling needs. This is quite relevant in the urban settlements of developed countries where lower status individuals are huddled together and are likely to have more signaling needs[14]. In the developing economies, it is possible to argue that more interaction in the early phase of urbanization can allow physical needs to ensure that the different group identities stick together (purportedly more so when the countries under question have toyed with socialism and rural utopias). A study on the effect of social interaction in status competitions for non-positional goods can help determine the effectiveness of government programs and possible motivations for consumption control.

The consumption differences between more economically excluded societies vs less excluded societies can provide some insight into the extent to which physical scarcity can matter in the chosen consumer group. The differences between consumption of signaling products between physically or

[2]This too could be viewed as an instance of Hirschian adding-up problem.

economically excluded regions and more connected urban centres can help us understand the effect of social interaction.

4.3 Positional Consumption

The classification of a signaling product is a non-trivial exercise - but in simple terms, a signaling product indicates status to the immediate surroundings. However, if only the rich could afford electricity in a society, electricity is hardly a signaling product. While some consumers may indeed get their signaling needs fulfilled by using electricity (and thus pay a higher budget share), the equilibrium consumption values can easily shift when a higher supply is provided (more electrical power plants or cheaper alternative energy would reduce the budget share). In the case of conspicuous consumption, the budget share is less susceptible to increased supply. Higher budget shares are needed for signaling needs despite the availability of cheaper alternatives. Hirsch considers "overuse" as a criterion for this selection i.e. when individuals use a commodity too much, its signaling qualities decline (electricity is not sensitive to overuse and hence not a signaling product).

In the Hirschian terminology, electricity is in fact a direct physical scarcity. It follows that the rich spending more on electricity is beneficial for society - since it can potentiallly fund employment and other opportunities (including expansion of power plants) - putting the invisible hand to work. In the world where Hirsch had lived, however, conspicuous consumption became relevant only after the differences between the rich and poor were reduced to a level that the exchange could not be made lucrative to the poor any more. In other words, the price of luxuries exceeded the opportunity cost to the rest of the society[3]. So although the status competitions had been there for a long time, their importance in allocation of income become relevant only when the physical scarcities had been conquered in the Western societies. Developing countries, having followed their own paths in achieving goals of nationalism have had a different experience. Although social scarcity does not seem so relevant to the conditions in sub-Saharan Africa (where the physical scarcity is stark), the formation of monetary and governmental institutions has created an environment where status competitions can cause the distribution of resource out of favour with Adam Smith's principles. That the marketable goods create a market of their own is after all a maxim equally relevant to the developing countries.

[3] To quote from Wicksteed, trinkets could be turned into bread[42]

5 Measuring Status Competition in a Developing Economy

To measure positional consumption one can either split the consumer basket into positional and non-positional items or assign a positional parameter (visibility etc.) to every commodity in the basket. In this study, the criterion of classification (or assignment of such a parameter to every item) is inspired by the Hirsch's notion of congestion - which causes physical or social scarcities. The difference between physical and social scarcities is not considered relevant (a clarification on the notion of scarcity is provided in a later section). The simplest criterion employed in classification of items is the difference in prices (wherever available) of the same item. For items that are physical scarce, the price differences between commodities is less likely (although still possible due to distribution and storage costs involved). On the other hand, every product where price differences exist is a potential signaling product that can create congestion. As a positional product can create a market of its own, the marginal effect of a new product of over time can provide a further test for signaling capability.

A comparison of a spatially or economically excluded area with with denser urban areas provides further insights on status competitions. We test whether the proxies of social interaction (family members etc.) have an impact on status competitions (there are many products that have a likely to have signaling effects but for which number of family members is not statistically significant).

If consumption pressures are explained by the level of urbanization, population density and interaction (family members etc.) then we can arrive at the determinants of conspicuous consumption in the developing countries. Just the way investing in modernization of agricultural sector (instead of investing more in industrial employment) has a significant impact on decreasing of informal -sector[13], addressing consumption pressures for industrial goods can have a positive impact on migration pressures and reduction of informal sectors. More details on measures of scarcity are provided in a later section.

Part II

A summary of studies on conspicuous consumption

6 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 [4] - 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 [5]).

Even when the ideas of conspicous consumption have been revived in works of Ireland[23] or Arrow, Dasgputa [3], 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[23] where consumers attempt to maximise a combined utility of visible (public) and non-visible (private) consumption[6]. 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[21] using this model involved surveying a few hundreds of respondents asking them - quite literally - just how visible every item is for a typical consumer [23].

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

[4] "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."[41]

[5] "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".[41]

[6] 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.

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 of exploits identified by Veblen is however still relevant in the developing markets[7]. In its original sense, conspiciuous consumption is an ecological concern and plays within the realms of sociology[8]. 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 [9].

In both the developed and developing worlds, conspicuous consmption is driven by scarcity and competition ([22, 14]). 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.

7 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 con-

[7]"No class of society, not even the most abjectly poor, forgoes all customary conspicuous consumption[41].

[8]"Increased mobility of the members has also added to the facility with which a "social confirmation" can be attained within the class."[41]

[9]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[25]. Khamis et al find that the Muslims spend less on visible consumption items when compared to Hindus of same economic standing[26].

sumer 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 ([26],[24]). 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)[10]. The visibility index computed from survey responses was found to have a significant predictive power for total expenditure elasticity.[11] . 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 developed world works[21] . Many studies have relied on the basket defined by Charles et al[14][5]. 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)[31]. Friehe-Mechtel used several definitions of the visibility basket to study the robustness of their results[15]. 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[25].

The need for a survey to measure visibility of items in the basket is however necessary when conducting similar studies in developing world countries[15]. Visibility is a socio-cultural judgment

[10]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?" [21]. 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.

[11]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 ([23]). Using an individual's sensitivity to social status signals in the model, they use a utility function $U = (1-a)f(v,w) + af(\hat{v},\hat{w})$ (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 $e_v = \frac{dv}{dy} \cdot \frac{y}{v} = a((1+\beta)\frac{v}{y} - \beta)^{-1}$.

[14]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[5].

[15]Khamis et al[26] 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

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[25]	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[5]	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[15]	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[26]	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[31]	Regression with demograpic and time controls	US CEX (expenditure survey)	Clothing (including shoes) from the US CEX categories (Table 1)
Heffetz[21]	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[24]	2SLS with Gini-Index as control variable and household assets as instrument for permanent income control (total expenditure)[12]	14 2005 Indian Human Development Survey (IHDS)[13]	Basket identified by Khamis et al

Table 2: Critieria of Conspicuous Consumption in surveyed literature

- 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([8]) - 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[17]. 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:

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

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 1) 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[24] (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

consumption categories in the IHDS. An item is associated with higher income if more than 20% of respondents reported 2,3,4 or 5.

	Controls	Black	Coloured
I	No Controls ($R^2 = .05$)	-1.03	-0.91
II	Income Controls ($R^2 = .26$)	0.37	0.30
III	Log Expenditure ($R^2 = 0.41$)	0.74	0.46
IV	2SLS Regression ($R^2 = \{0.41, 0.41\}$)	{0.62,0.71}	{0.41,0.43}
VI	2SLS Regression with Demographics ($R^2 = \{0.41, 0.41\}$)	{0.36,0.47}	{0.19,0.24}

Table 3: Results from regressing ln(visible_consumption) against respective set of control variables

by Charles et al.[5] 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).

8 Comparing conspicuous consumption in developing and developed economies

8.1 South Africa - Income and Expenditure Survey[25]

A study by Kaus([25]) considers a black-dummy and coloured-dummy in regression of visible consumption against demographic, time, permanent income and household characterisitcs. Starting with no controls(I)[16][17] (with black-dummy and coloured-dummy), the coefficients for coloured and black are negative (i.e. black and coloured social groups spend less on visible consumption than the white population). However, these coefficients flip signs after adding income controls(II)[18] .

The coefficients for black and coloured groups are even higher when expenditure is added(III)[19]. The endogeneity of total expenditure requires instrumentation - Kaus uses instruments suggested by Charles, Roussanov and Hurst - including positive-income-dummy, cube-of-income-level, dummies for under-secondary-education, secondary-eduation and degree-education. Kaus then performs two 2SLS regressions - one with income controls and total-expenditure as control variables[20] and the other with education-dummies as control variables (while still using instruments)[21]. The instrumentation thus performed (Specification IV in Table 3) results in lower coefficients for the black and coloured dummies

[16] `lm(lnvis~black_dummy+coloured_dummy)`

[17] Regressors and instruments in implementaiton of ivreg in R-toolbox AER are specified in a formula with two parts on the right-hand side. The specification - used in this note - can be either of the form - `y ~ ex + en | ex + in` or as `y ~ ex + en | . - en +in` (where `ex` is the set of exogenous variables, `en` is the set of endogenous variables and `in` the set of instruments) . The latter is the notation used throughout in this section.

[18] `lm(lnvis~black_dummy+coloured_dummy+ lninc)` - where lninc is log(income_household_head). Notice that only log of income level is found significant when used along side with income-level-cubic and income level.

[19] `lm(lnvis~black_dummy+coloured_dummy+ lninc+lnpinc)` - where lnpinc is log of total expenditure (which itself is a proxy for permanent income)

[20] `ivreg(lnvis~black_dummy+coloured_dummy+ lninc+ lnpinc | . - lnpinc + cbinc + lsecd + secd + degree)` - where lsecd,secd and degree are education dummies and cbinc is income-level-cubic.

[21] `ivreg(lnvis~black_dummy+coloured_dummy+ lnpinc +lsecd | . - lnpinc + cbinc+lninc +incpsv)`

	Controls	Black	Coloured
I	No Controls ($R^2 = .07$)	-0.22	-0.16
II	Income Controls ($R^2 = 0.09$)	-0.18	-0.14
III	Log Expenditure ($R^2 = 0.16$)	-0.10	-0.10
IV	2SLS Regression ($R^2 = \{0.14, 0.16\}$)	{-0.15,-0.10}	{-0.12,-0.10}
V	2SLS Regression with year-dummies ($R^2 = 0.14, 0.16$)	{-0.16,-0.10}	{-0.13,-0.10}
VI	2SLS Regression with Demographics ($R^2 = \{0.17, 0.17\}$)	{-0.16,-0.12}	{-0.11,-0.09}

Table 4: Results from regressing ln(visible_consumption) against respective set of control variables for years 2005 and 2010

for both regressions.

When demographic params are added(VI), the coefficients are further lowered (without changing R^2 a lot) - for both types of regressions [22].

The first-change of sign when income controls are added implies that after accounting for income of household head, the coloured and black groups spend more on visible consumption. Total expenditure is not a perfect proxy of permanent income - which justifies instrumentation. After resolving these endogeneity concerns - with a regression of visible expenditure as dependent variable and total-expenditure as one of the control variables - the signs are revised - although R^2 does not change a lot. Adding demographic controls to the 2SLS regression - shows significance of age, urban/rural area and family size - but coefficients are still not lowered significantly. This confirms that coloured and black social groups spend a rather disprportionate amount on visible consumption. Kaus paper is interested in testing whether the rise in average group income reduces the visible consumption. The regression considers average-incomes of particular provinces for every group (black/white/coloured). This regression shows the effect more on black-social-group than the white-social-group - a difference that author argues points out alternate ways of signaling for white-social-group relative to black-social-group.

8.2 United States - Consumer Expenditure Survey[5]

Charles et al. ([5]) consider a black-dummy and hispanic-dummy in regression of visible consumption against demographic, time, permanent income and household characterisitcs. The hispanic dummy is inferred by the "horref1" variable in CEX data - which is recorded side-by-side with the race variable. This means that households/individuals can associate with either white or black while recording their ethnicity. Only about 1489 out of 22980 households surveyed in years 2004, 2009 and 2014, for example, associate with neither white nor black. If that criterion is relaxed (i.e. if anyone reporting the horref1 variable is considered hispanic for the study) the number of hispanics in the survey almost doubles.

[22] First: `ivreg(lnvis~black_dummy+coloured_dummy+ lninc+ lnpinc + age+ n_members + area_type| . - lnpinc + cbinc + lsecd + secd + degree)` Second: `ivreg(lnvis~black_dummy+coloured_dummy+ lnpinc +lsecd + age + n_members + area_type | . - lnpinc + cbinc+lninc +incpsv)` - where n_members is the number of members in the household and area_type is urban/rural factor

	Controls	Black	Hispanic
I	No Controls ($R^2 = 1e-3$)	-0.133	-0.009
II	Income Controls ($R^2 = 0.059$)	0.035	0.13
III	Log Expenditure ($R^2 = 0.217$)	0.126	0.131
IV	2SLS Regression ($R^2 = 0.161$)	0.258	0.202
VI	2SLS Regression with Time ($R^2 = 0.158$)	0.271	0.215
VII	2SLS Regression with Demographics ($R^2 = 0.157$)	0.269	0.187

Table 5: Results from regressing ln(visible_consumption) against respective set of control variables

Starting with no controls(I)[23] (with black-dummy and hispanic-dummy), the coefficients for coloured and black are negative (i.e. black and hispanic social groups spend less on visible consumption than the white population). These coefficients flip signs after adding income controls(II)[24] .

The authors report problems with the quality of income data in the survey and point out the log-expenditure is a better candidate for the study. Using total expenditure as a control, the coefficients for black and hispanic groups rise significantly(III)[25]. The endogeneity of total expenditure requires instrumentation - these are positive-income-dummy, cube-of-income-level, dummies for under-secondary-education, secondary-eduation and degree-education. The 2SLS regression is performed with education as instrument variables[26] and then with education-dummies as control variables (while still using instruments)[27]. The instrumentation thus performed (Specification IV in Table 5) results in lower coefficients for the black and hispanic dummies. When demographic params are added(VI), the coefficients lower - however more for the hispanic_dummy than for the black_dummy.

[23] `lm(lnvis~black_dummy+hispanic_dummy)`

[24] `lm(lnvis~black_dummy+coloured_dummy+ lninc+incpsv+cbinc)` - where lninc is log(income), incpsv is dummy for positive income and cbinc is income-cubinc.

[25] `lm(lnvis~black_dummy+coloured_dummy+ lnpinc)` - where lnpinc is log of total expenditure (the proxy for permanent income)

[26] `ivreg(lnvis~black_dummy+coloured_dummy+ lninc+ lnpinc | . - lnpinc + cbinc + lsecd + secd + degree)` - where lsecd,secd and degree are education dummies and cbinc is income-level-cubic.

[27] `ivreg(lnvis~black_dummy+coloured_dummy+ lnpinc +lsecd | . - lnpinc + cbinc+lninc +incpsv)`

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 6: Visible commodities in LSMS data

Part III

Analysis of LSMS 2010 Data for Tanzania

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 6 - these are meant to include the categories identified by Khamis et al as far as possible[26].

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 7.

Obtaining visible consumption elasticities (using equation 1) from recall method while computing

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 7: Descriptive statistics for LSMS Tanzania 2010

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[28].

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[29]. Given the sparsity of available income data, however, instruments for age and occupation codes were chosen for the current study.

10 A review of relevant techniques for analysis of consumption data

Techniques for Panel data analysis can be used on a population that is observed for a sufficiently long time to provide effects of changing incomes, price variations on the consumer preferences. 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). A few commonly adopted techniques are discussed below.

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

[29]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.

10.1 Engel Curves

Houthakker attributes the suitability 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 [sic] [9], his research was influential in popularising the use of income and expenditure elasticities in cross-sectional analyses [33]. The simplest Engel curves are set up with the Woking-Leser model:

$$w_i = \beta \cdot log\ x_i + \alpha \tag{2}$$

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.

10.2 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 $\Phi_n(\cdot)$:

$$w_i = a_i(p) + b_i(p) ln\ x + d_i(p) \sum_{m=1}^{M} \gamma_m(p) (ln\ x)^m \tag{3}$$

$$w_i = a_i(p) + b_i(p) \sum_{\sigma_m \epsilon S_-} \mu_m(p) x^{\sigma_m} + d_i(p) \sum_{\sigma_m \epsilon S_+}^{M} \theta_m(p) x^{\sigma_m} \tag{4}$$

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). The restrictions$\sum a_i(p) = 1$ and $\sum b_i(p) = 0$ apply. Gorman model is said to combine "demographic scaling" and "demographic translating"[32]. 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:

$$c^h(u^h, p, a^h) = m(a^h, u^h) \cdot c(u^h, p) \tag{5}$$

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

$$w_i^h = \frac{ln\ c(u^h, p)}{\partial\ ln\ p_i} \tag{6}$$

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 [30].

10.3 Testing Spatial Variation

An analysis of expensive vs non-expensive food items was done by Prais and Houthakker (1955)[33]. A similar model has been employed for LSMS data in the current study. To address spatial variations, Deaton uses the following model for a cluster-based analysis:

$$ln\ q_{Gic} = \alpha_G^0 + \beta_G^0 ln\ x_{ic} + \gamma_G^0 \cdot z_{ic} + \sum_{H=1}^{5} \theta_{GH} ln\ p_{Hc} + (f_{Gc} + u_{Gic}^0) \tag{7}$$

$$ln\ v_{Gic} = \alpha_G^1 + \beta_G^1\ ln\ x_{ic} + \gamma_G^1 \cdot z_{ic} + \sum_{H=1}^{5} \psi_{GH} ln\ p_{Hc} + u_{Gic}^1 \tag{8}$$

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 $u^1$are used to derive cluster effects e.g. inter-cluster variances and covariances for the separable goods.

The form currently used in the study is:

$$ln\ q_i^h = \alpha_i + \beta\ ln\ x^h + \gamma_i\ ln\ n^h + u_i \tag{9}$$

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)[9]. 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.

10.4 Model for Price Differences

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) [33]. It is found that inferred prices do vary quite a bit amongst different commodities. 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 [33](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), different elasticities are derived for different price bands of an item.

The 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 :

$$\frac{x}{q_i}\frac{\partial q_i}{\partial x} = \frac{x}{k_i}\frac{\partial k_i}{\partial x} + \frac{x}{p_i}\frac{\partial p_i}{\partial x} \tag{10}$$

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 ([6],[10]). 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.

11 Detecting and measuring positional consumption

11.1 Measures for Scarcity [22]

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 [26] 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[41]).

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 consumptioyhe factors that affect status competitions are indeed beyond scarcity.

With that admission, we determine the degrees to which an item may be desirable based on its scarcity. The term scarcity can be confusing because it often involves what is physically unavailable and what is felt as unavailable (despite closer alternatives being available).

The method with percentile thresholds briefly described in the section 11.3 is used to measure the degrees of scarcity on grounds of availability (electricity, food, education etc.) and affordability. If the item is affordable and not available, it should be considered as scarce. Severe scarcities would create minimal status competitions while under medium scarcity, status competition may thrive. For items that are not scarce(3) at all (i.e. affordable by all and available to all) would not permit status competitions to develop. This expanded upon in the next section.

11.2 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.

11.3 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

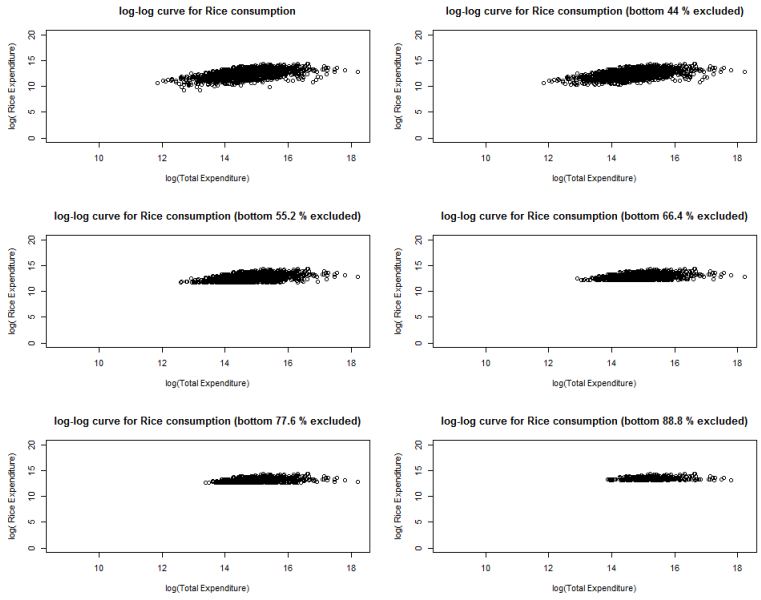

Figure 1: LSMS Tazanania 2010: Percentiles of nonzero consumption of rice

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 ([3, 21]).

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).

12 Ranking the Appeal of items

12.1 Consumer Appeal and Utility

In an $n-$commodity world, the elasticities of demand can explain the relative preference of items. If a utility function for every individual is given by $u = f(q_1, q_2...q_n; p_1, p_2...p_n)$ for n commodities in the consumer universe where quantities consumed are denoted by q_i and prices as p_i, then every consumer is said maximize her utility by choosing quantities $q_1, q_2...q_n$. With the assumption that every consumer is rational and adjusts the quantities $q_1, q_2, q_3...q_n$ to optimize the utility function, we fit the utility function given fixed $q_{1i}, q_{2i}...$ values for every consumer i. The parameters of the

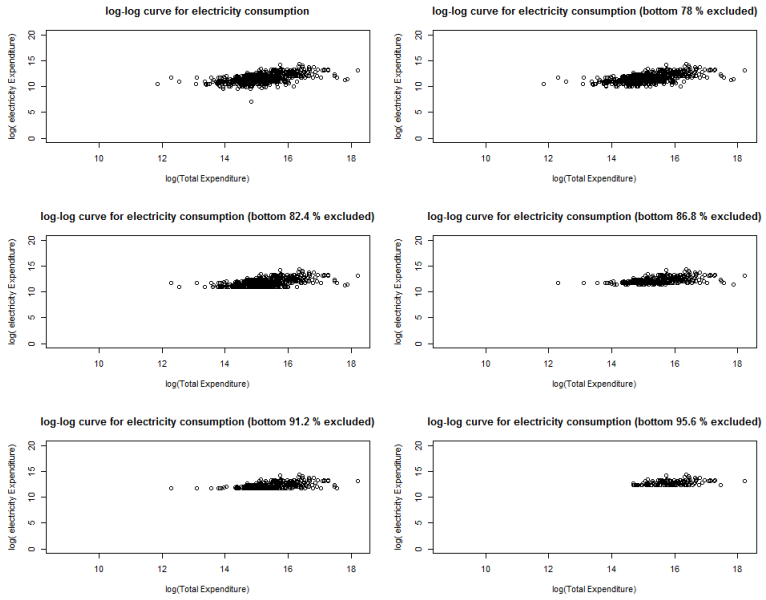

Figure 2: LSMS Tazanania 2010: Percentiles of nonzero consumption of electricity

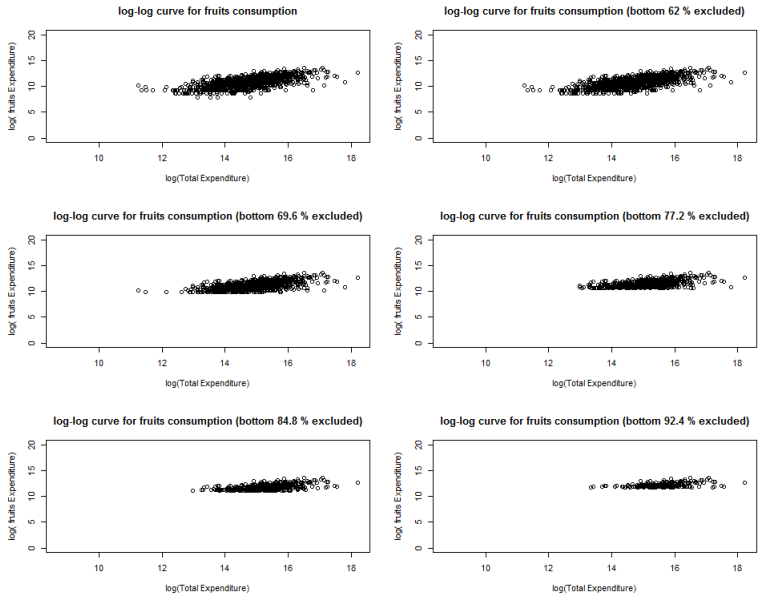

Figure 3: LSMS Tazanania 2010: Percentiles of nonzero consumption of fruits

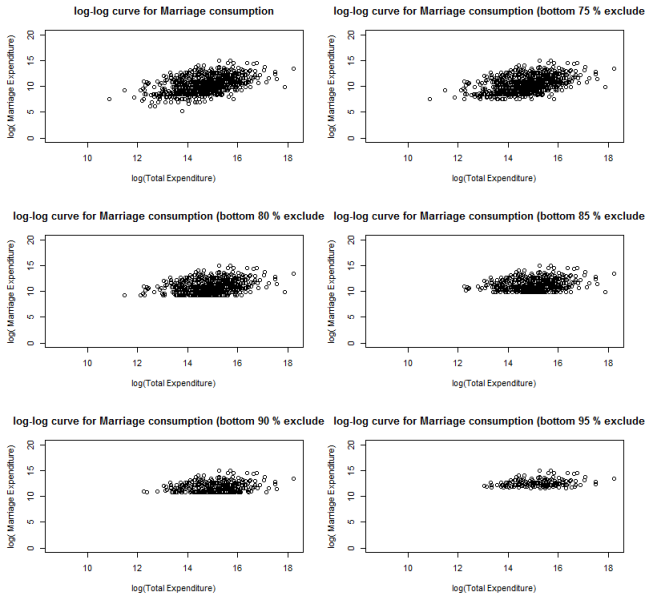

Figure 4: LSMS Tazanania 2010: Percentiles of non-zero expenditure on marriage

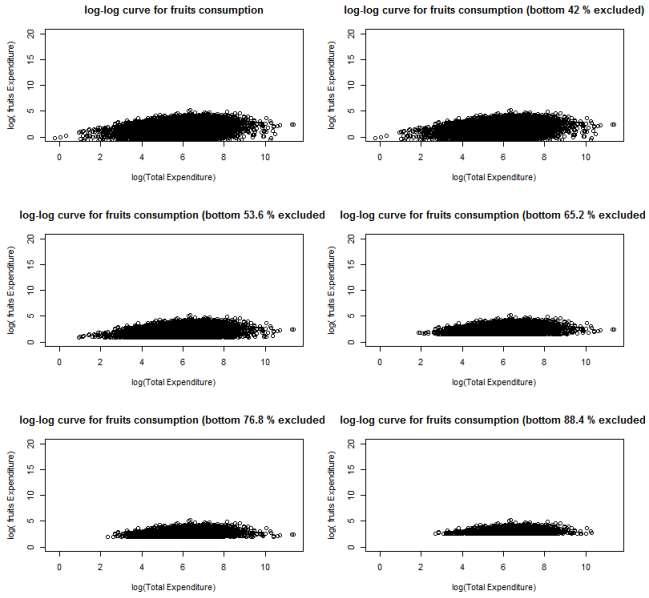

Figure 5: US CEX (2004,2010,2014): Percentiles of non-zero consumption of fruits

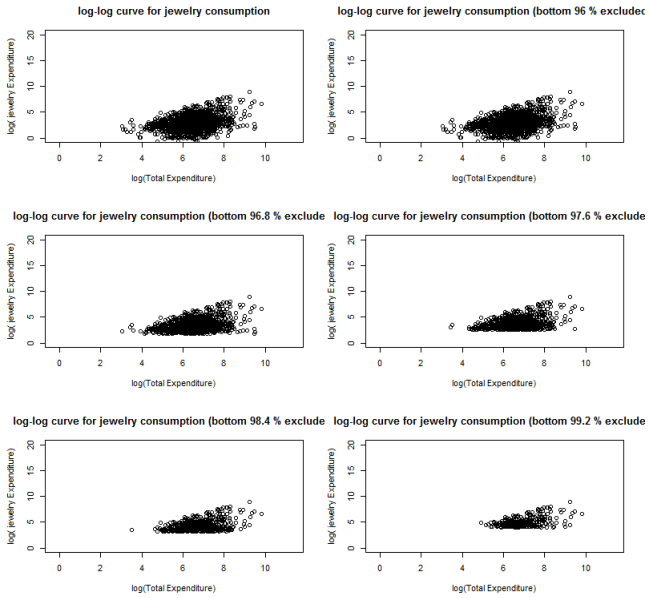

Figure 6: US CEX (2004,2010,2014): Percentiles of non-zero consumption of jewelry

function f that optimize the set of data are thus inferred from the consumption data. A model that considers the visual and positional appeal of every item, would require the utility function to include the parameters related to positional and visual appeal of the item. The interpretation of Slutsky equation which is derived $dq = \frac{\partial q}{\partial p}dp + \frac{\partial q}{\partial x}dx$ (where $\Sigma_n q = x$) would also need to change in consideration of the parameters related to positional consumption. Some of these parameters are considered in the section 12.2. To separate the price and budget concerns in the conventional utility function from these suggested parameters related to positional consumption, we delineate all the price and budget concerns under affordability.

To demonstrate how price and budget concerns are addressed in a discussion of utility curves, we can consider a two-good world comprising of food and education. If we choose a Cobb-Douglas function $u(x, y) = Ax^{\alpha}y^{1-\alpha}$(where x, y are food and education quantities respectively)[30], then we can calibrate $\alpha = \alpha_0$ for a vector of observations X and Y. In the Cobb-Douglas utility, α measures whether consumption is complementary (high α) or necessary (low α). The shape of the curve (marginal propensity to consume) can tell us which product is preferred more over the other. The total expenditure elasticities of demand similarly provide an estimate of the preference between education and food[31]. It is easy to see from Figure 7 for the LSMS data from Tanzania, that most consumers

[30] A utility curve can be visualized as $y = e^{\frac{(lnu - lnA) - \alpha lnx}{1-\alpha}}$ or `a=.8;plot(x,exp(-(a/(1-a))*log(x)),xlim=c(0,100),ylim=c(0,1))`

[31] Strictly speaking we cannot use total expense elasticity since we should consider the cost of education in the area to calculate education unit consumed and calculate food units consumed based on the food price in the survey. A multiple

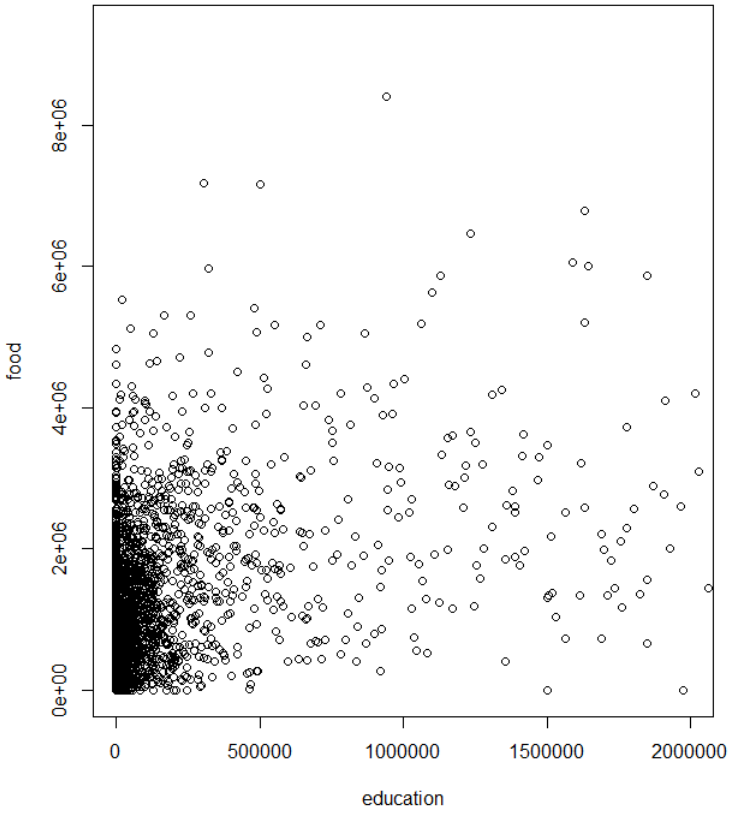

Figure 7: Education vs Food expense in LSMS data

would rather spend on food than on education. For multiple items, we would rely on the elasticities of demand to understand the relative preferences of the consumer. A model for positional consumption needs to be be developed to enhance the utility function so that elasticities of demand with respect to parameters pertinent to positional consumption can be interpreted similarly.

The non-parametric methods specified by Afriat and Varian take a different path by not assuming the nature of the utility function (Cobb-Douglas, CES etc.)[2, 40]. These may be more relevant for the fitting of utility function. Afriat's utilities consider prices and quantities that sum up to the total expenditure. Even though we don't have the price-data available from the survey, an approach similar to Afriat equations has the advantage that it provides a utility function that is consistent with data

regression approach - which can easily include region, education or other factors affecting consumer preferences - is often preferred over an analysis based on utility curves.

(unlike a parametric method). This is planned to be explored later in the study.

12.2 Availability, Affordability, Popularity and the Bandwagon effect

The challenge to a theory for conspicuous consumption is the difference between what people can buy (with the available options for a given price and budget in the market locally) and what they wish to buy instead (options that could change the current consumption when they become available). While the income elasticity for every item in the consumption category indicates how the consumption changes with response to increase in income or prices, the degree to which consumption on existing items would change by introduction of a new item or category (e.g. a new technology) is not explained by elasticities of demand of existing categories.

In analysis of a typical consumption survey, the substitution effect of the item explains whether consumers like an item more than the other while whether consumers buy more of the same item as they become richer and the price goes lower is captured by the income effect. While the analysis is typically based on the utility derived from products in the consumer basket, the research on conspicuous consumption has pointed out to relevance of visibility and scarcity of items in the utility function. To explore some such factors into the model for utility, the current study introduces four parameters to measure the consumer appeal of the item. The conventional price and budget concerns are encompassed by **affordability** of the item (which is simply a statement of price of the item).

Since the elasticities of products interpreted from the consumption data cannot measure how consumption might be transformed if new items were introduced, we introduce a parameter to measure the availability of the item. This is based on the observation that consumption on the same item varies between regions that have another item available vs places where the item is completely unavailable. In developing countries, the issue of availability is particularly relevant since rural areas are faced with unavailability of services and goods that are available (although limited) in the urban areas[32]. In the data from Tanzania, not only are region dummies significant in consumption of items in the survey (particularly with respect to such as electricity which is completely unavailable in large parts of the country), but the availability of electricity seems to transform the income elasticities of demand for other expenditures as well (e.g. marriage). A model that we wish to develop for appeal of an item attempts to include this difference in availability between regions. This is why **availability** is introduced as a concern different from affordability.

Given the unavailability of items like electricity in the developing world, the number of non-users of the item (those with zero quantity of consumption) can be quite high. To measure the appeal of an item, therefore we also consider how popular the item is among the consumers. The **popularity** of item is derived from the percentiles of consumers. Higher popularity of the item (i.e. higher number

[32]The unavailability can spiral into severe demand pressures through pressures on urban migration.

of purchasers of the item in the population of consumers) can drive the appeal of the item down or up. Items like jewelry and luxury cars are those that cannot become extremely popular by definition. If such items were to become popular, then the richer consumers would rush to something else that indicates their higher status. Such items are known as snob items. Items which people rush to purchase - on the other hand - are called bandwagon items.

It is worth emphasizing that in a market where product differentiation exists, items can change from snob type to bandwagon type (or vice versa) over time. It is therefore important to have a dynamic model for bandwagon characteristics of an item. Items like new electronics are snob items when they're not affordable - but as they become more affordable with time they become bandwagon items. As consumers rush to them, they get replaced by a new snob item in the market. The effect of popularity of an item on to its demand can thus be in either direction i.e. low popularity canr be associated with high demand (for a snob item) or high popularity can be associated with high demand (for a bandwagon item). In other words, for snob items, limited supply would mean a higher appeal but the high supply would mean less appeal. A time-series of expenditures can help us understand the trend in rushing towards certain items. The degree to which consumers rush to an item is termed as the **bandwagon effect** in the study. The snob or bandwagon effects must be seen in combination with affordability and availability. If the item is available and not affordable - then the price and budget constraints dominate the bandwagon characteristics of the item. The snob or bandwagon nature of the item can reflect in demand only when it is affordable (thus potentially popular) as well as available - if the item is not affordable or not available then its appeal cannot be measured in the consumption surveys. This is in accordance with the discussion in Section 12.3 i.e. all direct physical scarcities are perceived scarcities.

In summary, the appeal of a certain commodity is provided by its availability, affordability, popularity and bandwagon effect. Availability encompasses all issues that put an item in the market. Regional and supply-side issues thus affect availability. In absence of the data on supply of the items, we assign availability as a binary variable which is set to true in a region when the item appears in the consumption data for the region. Affordability, on the other hand, sums up price-related concerns on the demand-side. An item is affordable solely based on the price of the average consumption unit. Further, the popularity of an item is measured as percentile of users of item i.e. the percentile which consumes the quantity. Popularity of an item may increase or decrease the consumption of an item based on whether the item is a snob or bandwagon type. An individual is likely to lose interest in a particular jewelry product if it the latter is available and affordable to everybody. The effect of popularity on the appeal of the item is thus measured by another parameter called the bandwagon effect. Snob items are considered those with negative bandwagon effect in the study. In the Hirschian terminology[22], a physical scarcity is only realized by the availability of an item while social scarcities are realised through the rest of the three parameters.

The table 8 summarizes the essential claims from the the model using the four parameters and is

discussed in more detail in Section.

12.2.1 Measuring Availability

In the absence of supply data, availability is simply a binary variable - indicating whether an item is either available or not in the local consumer.

12.2.2 Measuring Affordability

For every individual an item is more affordable if its cost is within the threshold percentage of the (permanent) income. If consumers spend a high portion of their income on rice than on vegetables, then for the purposes of this study, rice is less affordable than fruits. One reason for choosing this simple method (instead of a regression of demand against household characteristics such as size and age of the consumers) is the unavailability of quantities of consumption in the diary recall section - where only total costs of the item have been collected (rather than prices or quantities). Semantically, affordability is a statement of price in the market should be calculated from the average price of the item.

For example, to answer whether AC is more affordable than electricity, we decide only based on average cost of AC in the population of N consumers for item i amongst total number of items K ($\frac{1}{N}\Sigma_{n=1}^{N}(\frac{q_i}{\Sigma^K q_k})$). If average expenditure on AC amongst those who buy AC (i.e. the cost of AC) is higher than than the respective mean for electricity, then AC would be considered less affordable than electricity. That electricity is a service and consumed immediately (as opposed to AC which is an asset) is currently ignored in the model. The dependency amongst items is also ignored in the model. For example, one cannot have A.C. without having electricity - so even if A.C. is cheaper (more affordable) than electricity, a rational consumer wouldn't run to AC without having purchased electricity.

We also note that prices can be significantly different between regions. As discussed there are categories for which difference prices may exists within the same region. The way to incorporate this in the model would be to split the item category into multiple price band categories and treat each of the bands as different items - thus assigning them respective affordability values.

12.2.3 Measuring Reference Popularity

Appeal of items within the social-psychological communication is based on perceived differences between life standards and is thus relative to a reference area. At local levels this could be due to disparate neighborhoods while at national levels, reference areas could be metropolitan cities. The

choice of reference area cannot be arbitrary - reference area is decided only between regions that are socially and economically inter-connected and thus where sufficient flow of information and people is possible. For the current analysis, Dar-es-salaam (region =7) is chosen as the reference area. The measure of popularity of an item is thus the reference area - i.e. the percentile of consumers using the product in the reference area. For example, only about 25% of the surveyed population uses electricity. Thus the popularity metric is set to .25 for electricity.

12.2.4 Measuring the Bandwagon effect

Bandwagon effect is the measure of increase in appeal if the popularity in reference area were to increase (through increase in local availability). If we denote the popularity of an item in the reference area by ρ_{ref}, then the measure of the bandwagon effect is $\frac{\partial A}{\partial \rho_{ref}}$ i.e. the change in appeal of the item in the reference area with respect to the change in the popularity of the item. Since appeal is represented by the demand of the item in the consumption survey, we can set $\frac{\partial \gamma}{\partial \rho_{ref}} = \frac{\partial A}{\partial \rho_{ref}}$ where $\gamma = \frac{q}{x}$, q is the quantity purchased, x is the total expenditure, A is the appeal and ρ_{ref} is the item's popularity in the reference area. If items have become more popular over time and if consumers are on average spending a higher portion of their income on the item, then the bandwagon effect of the item would be considered strong.

Notice that the bandwagon effect is only calculated in the reference area. In the local area, the bandwagon effect must be calculated even if the item were not available i.e. the bandwagon effect b is calculated even when the item is the item is not locally available. In other words, we compute b for when the item is to become available. b is interpreted as the tendency to flock i.e. changes in quantity demanded as the popularity of the item grows.

A better measure of the bandwagon effect would be providing by observing the effect of popularity on demand over time (a term series). As a first-cut analysis, we may approximate the change in quantity demanded in two randomly selected sub-samples with respect to the change in observed popularity (percentile of non-zero consumption). If slightly different quantiles of the society are spending more or less on the item then it may allow us to compute the $\Delta\gamma/\Delta\rho$. More specifically, for two samples M and N, we look for $(\gamma_M - \gamma_N)/(\rho_M - \rho_N)$. The quantity $\gamma_M - \gamma_N$ represents the combined effect of differences in income, education level etc. between the two samples. A regression on the in-sampled data - `lm(expenditure/total_expenditure ~ consu + highest_educ + age + occupation_rank+housingstatus` - can thus provide a rough estimate of $\frac{\partial \gamma}{\partial \rho}$(notice that region - which cannot be ranked easily - is excluded from this equation - since we only consider the reference region)[33].

[33]To consider differences in categorical (dummy) variables - we use a transformation of every categorical variable into an ordered variable (education becomes education level, region becomes an order of uranbization etc.). The transformations are considered only as long as the sorting criteria is significant (using regions sorted based on popdensity for example would treat two regions with same popdensity as equivalent - this may or may not be desirable).

Notice also that services and products don't follow a different treatment in the above analysis. The average analysis considers the average cost spent on the item - regardless of the quantity consumed.

12.3 The notion of Scarcity

Scarcity can be a confusing term since it encompasses both a so-called physical scarcity (unavailability) and the perceived scarcity (what we feel as scarce). We'll assume that all physical scarcities are indeed felt as scarce. In other words, $F \subset S$. Unfortunately, the perceptions of quality of life are entities that cannot be measured easily but still may qualify as felt scarcities. This makes the claims on scarcity as a driver of demand particularly difficult. Wherever used, the term scarcity implies the notion of perceived scarcity- factors affecting which are the goal of this study (i.e. effects beyond unavailability).

Further, the nature of item matters for perceived scarcity since the direction of the effect of popularity on perceived scarcity can reverse depending on the "appeal" of the item (visual or status-related). If everybody has a certain item, then consumers may not consider it so important to acquire the item (since everyone else already has it) whereas for other types of item, consumers may rush to the item solely because there is a trend amongst everybody else to acquire. These are the snob and bandwagon types of item considered in the literature [7][34].

If F is the set of items that one feels are scarce and S is the set that is physically or socially difficult to achieve (unavailable and/or unaffordable) then we can safely say that $F \subset S$ i.e. there can be items that are scarce (not available and/or not not affordable) but their scarcity is not felt. On the other hand, all items that are felt as scarce must be scarce - either physically or socially (otherwise consumers would purchase it). Thus tems that are not scarce (i.e. both affordable and available) cannot be felt as scarce. Conditions for physical scarcity - when included with snob and bandwagon effects must capture all conditions for scarcity.

The goal of sorting the commodities by their appeal (or perceived scarcity) is to see how closely list of top appeals matches with the list of visible items. Within the items that are scarce, the visible commodities (i.e. those that are talked about often in society) might have higher income elasticities and exhibit variations across social clusters. The analysis attempts to view an overall alignment of visible ranking with that of scarcity ranking.

12.4 Combining the parameters into a ranking of Items

If the four parameters where strictly binary (i.e. if an item was available or not, affordable or not, popular or not and was bandwagon or snob), then order of appeals would be as shown in the table 8 - with appeals ranked from low to high for every tuple of the 4 four parameters (16 in total). An available,

[34]Researchers have used an extended social-means model to measure these in experiments[18].

local availability	affordability	bandwagon effect	popularity	appeal rank (low to high)
1	1	0	1	1
1	0	0	1	2
0	1	0	1	3
0	0	0	1	4
0	0	1	0	5
1	0	1	0	6
0	1	1	0	7
1	1	1	0	8
0	0	1	1	9
0	0	0	0	9
0	1	1	1	10
0	1	0	0	10
1	0	1	1	11
1	0	0	0	11
1	1	1	1	12
1	1	0	0	12

Table 8: The list of binary parameters sorted by appeal

affordable and popular bandwagon would have a higher appeal than an unavailable, unaffordable and and unpopular bandwagon item and so on. Notice that popular bandwagon and unpopular snob type items are given the same rank if availability and affordability is the same for them. Another key feature of the ranking is that availability and affordability make a snob item less interesting while they both increase the appeal of the bandwagon item. If we were to map the appeal from these four parameters in a linear function it may look something like that following:

$$\pi = k_\alpha \alpha + k_\aleph \aleph + k_b b + k_\rho \rho + k_{b\rho} b\rho + \nu$$

where$\alpha \epsilon \{0, 1\}$, $0 \leq \aleph \leq 1$,$0 \leq b \leq 1$ and $0 \leq \rho \leq 1$

$\alpha = availability$

$\aleph = affordability$

$b = bandwagon\ propensity$

$\rho = popularity$

$\pi = appeal$

An easier formulation of the function would be of the form $-(1-b)\rho(\alpha + mb\aleph) + b(1-\rho)(\alpha + mb\aleph) + b\rho(\alpha + mb\aleph + \kappa) + (1-b)(1-\rho)(\alpha + mb\aleph + \kappa) = K_1 + \kappa K_2$.

In the decomposition $K_1 + \kappa K_2$, K_1 represents the appeal for misaligned items (unpopular bandwagon and popular snob) while K_2 represents the aligned items (popular bandwagon and unpopular

category	affordability	availability	popularity	bandwagon effect	appeal
vehicle service	0.0002	1	0.032	1	1.590
skincream	0.0306	1	0.885	0.012	1.886
meat	0.0013	1	0.796	0.1	2.391
toothbrush	0.0223	1	0.69	0.004	2.582
cosmetics	0.0242	1	0.654	0.012	2.672
rice	0	1	0.583	0.08	2.822
marriage	0.0125	1	0.542	0.04	2.889
fruits	0.0077	1	0.399	0.04	3.095
barsoap	0.0131	1	0.349	0	3.171
donations	0.0131	1	0.349	0	3.171
electricity	0.0028	1	0.258	0.04	3.259
carpetsrugs	0.0231	1	0.234	0.008	3.305
alcohol	0.0379	1	0.075	0.12	3.398
personal items repair	0.0238	1	0.049	0.08	3.440
funeral	0.0254	1	0.089	0.02	3.442
tobacco	1	1	0.18	0.08	4.105

Table 9: Items with the four parameters and predicted appeal

snob). Appeal of a bandwagon item is only affected by a constant factor $\kappa b\rho$ in addition to the purchase concern $\alpha + mb\aleph$. If an item is a snob item then popularity switches the sign of appeal from negative ($\rho = 1$) to positive ($\rho = 0$).

A simpler form of the above equation can be written as follows:

$$B = \frac{(1-b)(1-\rho)}{(1+\delta-\alpha)(1+2\delta-\aleph)} + \frac{(1-b)\rho}{(1-2\delta+\alpha)(1-\delta+\aleph)} + \frac{b(1-\rho)}{(1+2\delta-\alpha)(1+\delta-\aleph)}$$

$$\sigma = (1-b)\rho + 2b(1-\rho) + \kappa(b\rho + 2(1-b)(1-\rho))$$

$$A = \sigma B$$

where δ, κ are constants to control the scale. The sorting of items identified of potential positional value is shown in Table 9.

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13 Analysis of LSMS 2010 Data

13.1 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)

(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

13.2 Possible sources of Error

We extrapolate weekly diary to annual expense in Step 1. With large size of families (40% of housesholds have sze 5 or higher), it may be common to stock items for consumption. Items such as soap, skin creams are likely to be purchased in bulk in large families. Further, the frequency of purchases gets lower as the quantity of bulk purchases increase. We can probably estimate the number of rooms as a proxy of storage space - but store and consume is itself a consumption pattern. This may happen more when the closest market is distant from the household. The data for distance from market (or the cost from(public transport) is quite sparse (a lot of NAs). The NAs could be because the market as described in the survey is never visited (or it doesn't exist in the immediate region). We would assume that the habit of stocking is uniform throughout the country - which might be sweeping assumption - but since we do take region into account - we should be able to account regional differences or household factors (such as household size) in this habit.

To perform this analysis, we have the expenditure on the item q, the total expenditure x and the distance from the market d. We have assumed that anybody recalling the purchase in the last month would be repeating that purchase every month. This ignores that those who are stockpiling might not need to purchase the item again for another few months. This can overestimate the purchases for stockpilers - whose habit is unobservable in the model $ln(q) \sim ln(x) + d + region.$ q is endogenous in the model stockpiling behavior may influence q, x. We don't know if distance is a parameter of significance - if it is then we can look for proxies. A reasonable assumption is that the percentage of stockpilers to the regional population is constant i.e. there are no reasons why this percentage would change within a region within a period of a few years. Assuming this we can assume that stockpilers in any two regions A, B with populations p_A and p_B respectively would have $\eta p_A$and ηp_B stockpilers respectively (where η is the fixed frequency of stockpilers). These stockpilers would buy less frequently but there is no reasons to believe that they would consume more than the non-stockpilers (another assumption). Thus if stockpilers and non-stockpilers live within a region (and are not captured by region dummies) then we should observe fixed difference in all regions (since η is fixed). We perform this analysis at the region level (the data on district level is limited - at times only 7 consumers in the

district). Some regions do seem to have clusters - but these clusters could arise out of many household factors. We need to study the combined effect of the imaginary stockpiler dummy to test whether such a difference exists. Given the low effect of the travelcosts on ratio $log(\frac{q}{x})$ (as shown in Table 10) and the lack of different means in the region, we can be assured that stockpiling is not significant. It is more likely that larger families buy more of such quantities.

Another source of error is the overrepresentation of the urban areas in the survey. The weights provided in the survey would be included in the subsequent analyses.

13.3 Claims Tested

13.3.1 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 classesTHez 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 **??**.

13.3.2 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.

13.3.3 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) .

13.3.4 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

Table 10: Skin Cream Consumption

	(1)
consu	0.494***
	(0.000)
popdensity	-0.0343*
	(0.011)
travelcost	-0.000270
	(0.291)
1.region	0
	(.)
2.region	-10.56*
	(0.029)
3.region	-7.382
	(0.076)
4.region	-7.445
	(0.100)
5.region	-2.778
	(0.612)
6.region	-3.269
	(0.602)
7.region	97.56**
	(0.009)
8.region	-5.601
	(0.274)
9.region	-6.144
	(0.163)
10.region	-10.00*
	(0.049)
11.region	-8.248
	(0.134)
12.region	-3.888
	(0.477)
13.region	-1.114
	(0.839)
14.region	-1.302
	(0.810)
15.region	-2.881
	(0.625)
16.region	-0.508
	(0.927)
17.region	-0.996
	(0.822)
18.region	-4.266
	(0.351)
19.region	4.314
	(0.191)
20.region	-14.04**
	(0.004)
51.region	-5.924
	(0.297)
52.region	10.02
	(0.057)
53.region	3.437
	(0.302)
54.region	-1.093
	(0.702)
55.region	0
	(.)
0.accessiblemarket	0
	(.)
1.accessiblemarket	1.172
	(0.367)
_cons	-4.661
	(0.368)
N	1746
R^2	0.063

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tanzania does not have electricity - See Table **??**).

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.

13.3.5 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.

13.3.6 Services as Visible Consumption

One of the interesting observations in the Vindex survey (Heffetz[21]) 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.

13.4 Analysis and Discussion

Food is a significant portion of total spending overall [35]. More importantly, those in non-agrarian professions spend about as much of their total expenditure on food as those in agrarian occupations [36]. The other half of the expenditure is spent on housing, education and energy requirements as well as various household products[37].

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 signals high-status 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

[35] 50% of those surveyed spend 60% or higher of their total expenditure on food - subject to estimation errors.

[36] 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.

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

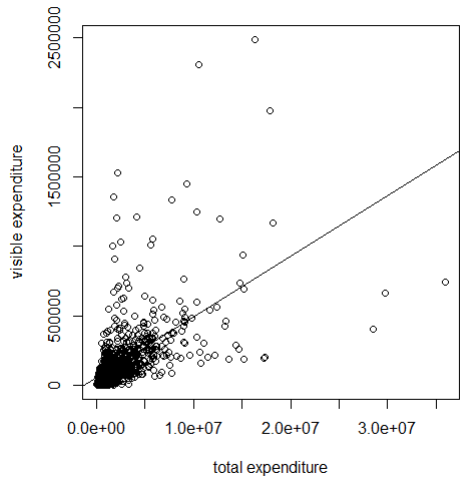

Figure 8: Visible Expenditure vs Total Expenditure for LSMS 2010

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 11 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 , $ln(highest\_education)$, $cubic(highest\_education)$ [38].

Table 11,12 and 13 summarize the results obtained by running regressions on several commodity-categories. A column in the Table 11 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

[38] 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.

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.

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 11: Results from regression over selected variables

Table 12: 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 13: 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 IV

A Behavioural Model for Status Utility

14 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[23]. 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).

14.1 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.

15 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 [22] 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.

Part V

A Behavioural Experiment for Status Competitions

15.1 Status and Consumption as games

Behavioural games have been used in the developing countries to gauge motivations of the participating consumers [39]. While the visibility surveys ([26, 21]) 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 15.2 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.

15.2 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

[39] 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.

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 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 15.2.2)
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[40]
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

15.2.1 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)

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

5. Savings for future Asset purchase
6. Entertainment/Dining Out/Travel/Travel Abroad
7. Health
8. Education (School/University)

15.2.2 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).

15.3 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 15.2.2, 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 15.2.2).

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 [26, 21]). 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.

15.4 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.

15.5 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.

16 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 [14] 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[22]). 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[33]) - 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 VI

Effect of Price on food vs non-food items

17 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 ([11]). 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"[11]).

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).

18 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 14).

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. See Table 15.

Table 14: 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 15: Instrumented regression with population density and expensive-food

	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)

*p<0.1; **p<0.05; ***p<0.01

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