Status consumption under extreme inequalities

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Abstract

While status consumption is assumed to be ubiquitous, the possibility that extreme wealth inequalities in an economy could discourage status comparisons across reference groups has been explored less often. Focusing on the context of a developing economy with extreme wealth differences, we consider status consumption as non-durable consumption in excess of consumer needs in her reference group and explore the opposing effects of peer influences and extreme wealth differences. Using the subjective well-being data from Tanzania, we discuss how a segregation of status concerns may characterise status consumption in a developing economy.

1 Question

In an environment of wealth disparities, do consumers rule out status comparisons beyond their asset-groups (i.e. have completely different status consumption) or do they substitute being in a poorer reference group (less assets) with high status competition (consumption)? We assess this empirically for a developing economy by testing if the consumers in richer references face less competition for relative quality in non-durable consumption (and vice versa). Lower status consumption (viewed as local relative non-durable consumption) in higher asset groups indicates a substitution implied between being asset-rich and facing stiff competitions through status consumption. Alternatively, the richer groups exhibiting more intense competitions through high non-durable consumption would imply segregated status consumption - as poorer consumers with lower assets cannot be in a competition with richer consumers with more assets who also have a higher status consumption.

Further, is it possible to argue that in the specific context of urbanisation-related changes in the developing economies, status consumption is largely an appeal for urbanisation in the poorest sections of the developing economy? This may have particular implications for the notion of status consumption in developing economies.

2 Model

While the intertemporal substitution framework has been widely used in consumer economics, its applications in status consumption have been limited. The unavailability of brand variety and the often insufficient prices of supposed status goods in consumer

surveys tend to restrict the empirical approaches using intertemporal substitution - but the peculiar characteristic of a status item wherein it both indicates a rich consumer's exclusive status and creates bandwagons for the poorer consumer - also seems to pose a challenge. The returns from status items to the consumer cannot be substituted with savings when the demand for status items can always grow for all consumers as they acquire more assets. The utility of an intertemporal approach might therefore be little unless one is able to track the varying social contexts of the consumers as they acquire more assets. In the proposed chapter, we use a particular dataset on ownership of long-term assets along side with the consumption diary to infer the context of status consumption in a developing economy. Using the model we develop by assuming that status is modified by consumption through only durable goods and a local relative advantage in non-durable consumption, we examine how the demand for non-durable consumption in excess of one's needs varies across disparate regions in an economy.

The notion of a status reference group is key to our understanding of the consumer's context in status-related consumption as it helps us pin down a certain level of status consumption as the consumer's social need. It allows us to answer if the not-so-rich spend disproportionately higher on status items in an economy or if the high spending on status goods is limited to the rich. Unlike the mechanisms of invidious comparison (IC) and pecuniary emulation (PE) identified by Veblen - concerns that are essentially normative - reference groups provide a descriptive context for status competitions where a consumer identifies her status. As the consumer's social need for status is hardly as universal as it is for essential food or clothing, reference groups serve a critical role in this view of status.

In the proposed model, reference groups are interpreted as the level of asset-ownership in the consumer's immediate environment. A consumer who resides in an area where the population has more durable assets transferable over generations is considered a "higher" (richer) reference group. The utility function which the representative consumer optimises consists of the non-durable consumption above needs determined by household characteristics and the richness of her reference group (defined with long-term assets ownership in the consumer's locality). Thus given a per-head consumption budget x_t, the representative household can either spend on non-durable consumption above needs determined by household characteristics (henceforth referred to as "excess") by increasing a multiplier factor ν_t or choose a reference position r_t in the economy-wide asset-hierarchy. The needs of the consumer are assumed to be predetermined and tied with the number of family units. After excluding the needs of the consumer determined by household characteristics and the cost associated with owning assets (fees, maintenance and repair costs relevant for the consumer's owned assets), the choice for the consumer is therefore between excess and the richness through her reference.

It is worth highlighting that the above approach does not assume a substitution between quantity and quality. Instead, the representative consumer pursues quality (or a higher-than-necessary quantity) once her basic needs are met. The consumption c_t would depend both on the needs of the respective families and the local costs of consumption in the area so that we have

$$c_t = \pi(r_t) \times \psi_t \times \nu_t \tag{1}$$

Here, ψ_t represents the needs units of the consumer (e.g. number of family members), ν_t is a multiplicative factor chosen by the consumer, r_t the richness of the consumer's reference (surroundings) in the economy-wide hierarchy of assets and $\pi(r_t)$ the local costs of consumption imposed by the consumer's surroundings r_t. To reiterate, the representative consumer does not "choose" her needs in the model and the only choice she makes is between higher non-durable consumption above needs (excess) set with ν_t and her local surroundings r_t. Higher excess in a lower reference r_t is essentially substituted with lower excess by the representative consumer in a higher (richer) reference.

The model necessarily assumes a continuum of asset-bands r_t as well as that of consumption ν_t above needs costs $\psi_t \cdot \pi(r_t)$. In other words, the representative consumer exercises the choice to move to a village or live in an urban area or move between rich and poor areas within a locality likewise. While at a descriptive level, such a choice is typically constrained by a household's income or social class which limit the consumer's mobility, the supposed behaviour of the representative consumer in our model under a granted budget c_t is only to empirically test the significance of this supposed "movability" through a measure of substitution between ν_t and r_t. The following additive log-utility represents this substitution

$$u(\nu_t, r_t) = \alpha log(\nu_t - \bar{\nu}) + (1 - \alpha) log(r_t - \bar{r}) \tag{2}$$

Here, $\alpha \in (0, 1)$ and $\bar{r}, \bar{\nu}$ are constants. From Equation 1, we have

$$\nu_t \pi(r_t) \psi_t = c_t \Rightarrow log(\nu_t) + log(\pi(r_t)) + log(\psi_t) = log(c_t)$$

Given the per-head consumption in the household $\frac{c_t}{\psi_t} \equiv x_t$, the budget can be rewritten as follows

$$log(\nu_t) + log(\pi(r_t)) = log(x_t) \tag{3}$$

The consumption-level average associated with the consumer's surroundings represented with the function $\pi(r_t)$ depends only on the reference r_t. Empirically, we observe $\pi(r_t)$ directly as the aggregate consumption associated with the reference r_t. A richer area i.e. a richer asset-band (a higher r_t) would for example correspond to a certain value $\pi(r_t)$ above which the excess ν_t is chosen by the consumer. The first order conditions for Equations 2 and 3 imply

$$L = u(\nu_t, r_t) - \lambda(log(x) - log(\nu_t) - log(\pi(r_t)))$$

i.e.

$$\begin{aligned} L = \alpha log(\nu_t - \bar{\nu}) + (1 - \alpha) log(r_t - \bar{r}) \\ -\lambda(log(x_t) - log(\pi(r_t)) - log(\nu_t)) \end{aligned}$$

$$\frac{\partial L}{\partial \nu_t} = 0 \Rightarrow \frac{\alpha}{1 - \frac{\bar{\nu}}{\nu_t}} = -\lambda$$
$$\frac{\partial L}{\partial r_t} = 0 \Rightarrow \frac{1-\alpha}{r_t - \bar{r}} = -\frac{\lambda \pi'(r_t)}{\pi(r_t)} \Rightarrow \frac{\pi(r_t)}{\pi'(r_t)} \frac{1-\alpha}{r_t - \bar{r}} = -\lambda$$

Using $\pi(r_t)\nu_t = x_t$ (or $\frac{1}{\nu_t} = \frac{\pi(r_t)}{x_t}$) we have

$$\frac{\pi(r_t)}{\pi'(r_t)} \frac{1-\alpha}{r_t - \bar{r}} = \frac{\alpha}{1 - \frac{\bar{\nu}}{\nu_t}} \Rightarrow \frac{\pi(r_t)}{\pi'(r_t)} \frac{1-\alpha}{r_t - \bar{r}} = \frac{\alpha}{1 - \frac{\pi(r_t)\bar{\nu}}{x_t}}$$
$$\frac{1-\alpha}{\pi'(r_t)(r_t - \bar{r})} = \frac{\alpha}{\pi(r_t)(1 - \frac{\pi(r_t)\bar{\nu}}{x})}$$
$$\Rightarrow \frac{\alpha}{(1-\alpha)}(r_t - \bar{r})\pi'(r_t) = \pi(r_t) - \frac{\pi(r_t)^2 \bar{\nu}}{x}$$

The above motivates our comparison of the average consumption ν_t with r_t (see Appendix for the constraints on $\pi(r_t)$ imposed by the solution of the above first-order conditions). We discuss the results from regressions implied by the above model in Section 4. The results from a non-parametric view of the consumption data are also presented in Section 4.

3 Empirical Analysis

3.1 LSMS Data for Tanzania

Our analysis uses the consumption microdata from LSMS waves for Tanzania from the years 2010, 2012 and 2014 to infer r_t and ν_t described in the above model (see Section 2). The sections 3.1.1 and 3.1.2 detail the classification and aggregation methods used to prepare this data.

3.1.1 Excess

The consumption items in the LSMS survey are classified under four broad categories - food, energy, transport and household. Given the ample evidence for pressures on food-quality in sub-Saharan countries (see for example Schneider et al[1]), we argue that an attainment of higher food quality would be visible enough in the society and consider it as part of excess. Further, since only about 10% of Tanzanians avail electricity, the improvement of food quality through having a refrigerator is a luxury that cannot be considered as basic needs of the consumer. In other words, when the needs for food quality are not met for the majority of a population, social interactions are likely to separate consumers who can afford better food quality from those who can't.

The expenditures on energy and transport are treated as costs of maintaining a certain level of assets. The idea behind such a treatment of energy- and transport-related costs is that while comparing statuses of two consumers of which only one owns a motorcycle, we do not need to compare how much petrol they've purchased when we've already taken into account the difference in their transportation-related asset(s). As energy and transport related assets are already considered as part of r_t for the consumer, we exclude costs associated with energy and transport from the notion of excess non-durable consumption. Therefore, it's only the household category where the non-food expenditure is not associated with the assets owned by the consumer. The items over which the expenditure is aggregated to arrive at total excess ν_t in the year t are listed in Table 5. These include only food and household categories.

3.1.2 Durable goods and reference level consumption

The notion of asset-richness of the neighborhood that we have defined in Section 2 depends on the stock of durable goods owned by every consumer. The durable goods recorded in the LSMS survey - which we use for this notion - range from short-term durable items such as mobile phones to the expensive and long-term assets such as land or houses. Of these, we are interested only in the long-term assets that can be transferred over generations - accumulations that encompass the notion of asset-richness. The assets transferred over a generation are readily verified by inspecting households in the data that are split when a young member of the unsplit family starts a new household.

The details of the records of asset-ownership in the LSMS data include the number n_t of durable goods owned by the household, the reported cost C_t at which the durable good was purchased and the reported price P_t which the household expects by selling the durable good in the current market at the time of survey. We use the reported price P_t of the durable goods to infer the asset-values in the area surrounding the consumer - partly because P_t is not susceptible to errors associated with recall of the purchase value (which often varies for the same item over years in the panel data for a household). Further, P_t encapsulates the perceived depreciation of the durable good over time - a feature that makes it more appropriate for a comparison against non-durable consumption at a given time t. The total cost of the assets of a household is thus obtained simply as a product of the number of assets n_t reported by the consumer with price P_t.

At the time of writing this chapter, the precise geographic-location of every household (or the ward she belongs) to is not available to us in the LSMS data. As a result, we have relied only on the geocoding of districts where the consumes resides in order to define the consumer's vicinity[1]. Other than a 4-km Euclidean radius around the consumer's district, we also consider a population-adjusted neighborhood metric around the consumer household by incorporating the population mass in the consumer's district from the 2012 Population and Housing Census (PHC) data for Tanzania. Since the districts with the highest population densities are in the Dar-es-salaam and Geita regions, we repeat our analyses with the rural distances standardised to the level of Dar-es-salaam districts -

[1] A more appropriate analysis could use the immediate neighborhood of the consumer's wards - but not having the geographic location of the ward (or the MTAA field in the survey) limits the granularity of our analysis to the district's level.

effectively aggregating data from districts to the same level as that of the district in Dar-es-salaam region[2]. The results discussed in the Section 4 are not however significantly different from those using a Euclidean distance approach . This is both because of the coarse granularity of our reference boundaries (district level) and the district boundaries already being wider in the rural regions (with only a few exceptions such as Sumbawanga and Nkasi in Rukwa which we consider within the same reference on grounds of proximity in Euclidean distance).

In summary, we infer consumer's asset-richness r_t as the average market value of assets owned by the consumers within the boundary of reference around the consumer (including the district which the consumer belongs to) and $\pi(r_t)$ as the average excess consumption i.e. the expenditure on items that classified as excess or food in Table 5 for the consumers within the reference boundary. All consumers within the reference necessarily have the same r_t and $\pi(r_t)$ while their $\nu_t = \frac{x_t}{\pi(r_t)}$ as well as the individual asset-worth A_t varies. A constraint that this aggregation imposes is that the number of observed households within the reference boundary should be high enough to average out the idiosyncratic effects and issues related to seasonality of data-capture (e.g. less electricity needed in winter etc.). At the time of writing this chapter, we've made sure no districts with less than 10 observations per year are included in our analyses.

3.2 Empirical Method

The primary goal of our analysis is to test whether the consumers in richer references use less relative quality (and vice versa) or not. To this end, we look at the variation in ν_t - the per-head expenditure in excess of neighbourhood's average per-head consumption $\pi(r_t)$ - across r_t based on the model in Section 2. To recall, the costs of lifestyle in a particular region that we measure with $\pi(r_t)$ does not include the cost of owning and maintaining assets from c_t since r_t already includes the contribution of assets to one's status.

Since a consumer does not choose the maintenance of assets separately from choosing to purchase the asset, the idea that a representative consumer "scales-up" her per-head non-nondurable consumption with ν_t (excess) by availing a higher quality or quantity than necessary makes sense only if we exclude the costs imposed on the consumer due to having bought certain assets (through maintenance, repair, fees etc.) from the per-head consumption x_t. The total expenditure $\pi(r_t)$ which the consumer scales up encompasses the social need of being in the vicinity r_t and excludes the cost of maintaining assets. Similarly, the advantage that the consumer gets from being in an asset-rich neighborhood is meant to be measured with r_t rather than ν_t - with a possible substitution between the

[2]This population-adjusted distance - over which the cluster of $\pi(r_t)$ and r_t are aggregated - is simply $\frac{\delta_{AB}}{N_A+N_B}$ for the consumer in district A where δ_{AB} is the Euclidean distance between coordinates for A, B and $N_A + N_B$ is population that is meant to reside within the distance δ_{AB} i.e. the distance weighted by the total population in districts A, B which are meant to be in the consumer's vicinity depending on a given threshold. The bubble around the consumer that determines her locality comprises of districts that are at a distance less than the given threshold. It is evident that the population-adjusted distance is shorter for denser areas but larger for sparser populations (which represent an effectively smaller reference for consumers' in the bubble despite being spread over a larger geographical area). In other words, denser areas imply a narrower reference group over which r_t and $\pi(r_t)$ are calculated. For example, the population-distances would be higher in Arusha (region 1 in the survey) but far less in Dar-es-salaam (region 7 in the survey).

two. Thus as the consumer scales up her required expenditure $\pi(r_t) \cdot \psi_t$ by ν_t for higher utility (see Equation 1), ν_t would not include the contribution from asset purchases or asset costs but merely the indication of how much below or above the consumer wants to be from average $\pi(r)$ imposed by her locality r_t. Given two consumers in a locality who have needs ψ_1, ψ_2 and consumption c_1, c_2 respectively for example, we have $x_1 \equiv \frac{c_1}{\psi_1}$,$x_2 \equiv \frac{c_2}{\psi_2}$ for the two consumers and $\pi(r) = \frac{x_1+x_2}{2}$ so that $\nu_1 = \frac{x_1}{\pi(r)}$, $\nu_2 = \frac{x_2}{\pi(r)}$. As $\nu_1\pi(r) + \nu_2\pi(r) = x_1 + x_2$, we view ν_1, ν_2 as the excess measures for the two consumers.

While one may never tell from the consumption diaries alone whether a consumer's high expenditure on non-durable consumption is due to the local social need (bandwagon behaviour) or competitive (snob) behaviour, the LSMS survey does allow us to gauge the extent to which excess consumption increases consumer contentment with the data on consumers' subjective well-being. This is assessed with the consumer perceptions data - which consists of consumer responses tracking their financial, health, housing and overall satisfaction levels for every year - by comparing the satisfaction levels with the asset distribution and regional differences in Tanzania. The results from this comparison as a non-parametric smoothening of the consumer perception measures with respect to ν_t (which depends on $\pi(r_t)$) and r_t are presented in Section 4.1.

It is worth clarifying that our analysis of the subjective-well-being data does not argue that the consumers optimise their subjective perception through consumption. While there is some descriptive sense in the argument that there is nothing else the consumers would rather optimise - our model for consumption does not identify variables that influence her happiness and thus while the consumers may believe that being rich makes them happier, it cannot be ruled out that the consumers may choose to stay miserable in order to achieve happiness in their future or of their progeny. We revisit concern later in Section 4.1, but it suffices to say for now that our analysis is limited to explaining how consumer perceptions may be shaped by consumption rather than how they influence consumer choice.

The argument that a consumer makes consumption choices by optimising their perceptions is much stronger than the converse that the consumers improve their perception by choosing consumption. Our intertemporal substitution approach is better positioned to treat happiness as a social need constrained with budget constraints and endowments rather than as a motivation for consumption. We therefore view consumer perceptions only as a measure of what the consumer feels after having exercised her choice rather than what motivates her choice.

4 Results and Discussion

4.1 Non-parametric view

The most pervasive observation from the LSMS data for Tanzania is the disparity in income/occupations between the east-coast and the rest of the country. The occupations associated with higher income are far fewer in the hinterland than in the east coast of Tanzania (see Figure 1). To explore the effect of this disparity on status consumption in more detail we examine the variation in excess ν_t with respect to occupation/education levels and distribution of long-term assets in the economy. In this analysis, the occupation

levels are measured using "ranks" derived from the income-data in the survey by mapping the occupation levels to values (ranks) ranging from 0 to 3 (see Table 1). Education levels are similarly mapped to education ranks (see Table 2). These mappings are also used to vary the reference boundaries to include only those with the same occupation/education rank as oneself (see Section 4.2). We believe that the relative poverty in the rural areas of Tanzania and high population density in the central and eastern Tanzania (see Figure 2) provides a particular context to status differences in the economy and that the disparity in services as well as amenities across the country has strong implications for any consumption deemed status-related.

Since status concerns are necessarily localised, one would expect that the non-durable consumption for consumers in the asset poor south and west are much lower. But the extreme poverty in the southern regions means that the food prices are not so much lower despite lower incomes in the region (see Figure 3 for a comparison of food-prices[3]). Thus while the poor consumer in the south may not need a lot to differentiate herself from others in her reference group, the extreme poverty would fail to make her indifferent between being poor in the densely populated regions in the east and being slightly more asset-rich in poor south. A consumer cannot compete with another for status while having both a low relative stock of durable goods A_t and less non-durable consumption ν_t. As we now detail with a comparison of ν_t and r_t , the regional differences seem to dominate the local hierarchies for south vs the east - due to both food prices being comparable with the eastern region and the amenities available to the urban residents that are unimaginable in the remote south. In other words, the excess non-durable consumption in the south can never provide a utility comparable to that in the eastern coast. We also observe that despite lower incomes in the central north, the median net-asset worth of the individuals in regions such as Singida and Manyara (region around -5S,36E) could match up with that of the consumers in the east coast of Tanzania (-6S,40E) (see the differences in occupation ranks [4] in Figure 1). With the average asset-values and food prices relatively more aligned in the central and eastern regions, the occupational/asset differences and non-durable consumption are more comparable between the two regions.

To inspect the differences non-durable consumption across regions in Tanzania in more detail, we provide local regression (loess) estimates which smoothen the plotted values in the household's surroundings (i.e. the S and E coordinates of the resident's district). The excess non-durable consumption ν_t in the unit log local asset i.e. $\frac{\nu_t}{r_t}$ is plotted in Figure 7 and the assets-worth of the individual household $log(A_t)$ for year 2012 are shown in Figure 6. The loess plots and the distribution of assets suggest a proportionately high non-durable consumption in the central region. A consumer could be indifferent to living in a poor neighborhood in the Dar-es-Salaam and being slightly richer in the Singida.

To verify that the variations in the non-durable consumption are not solely due to

[3]The food basket comprises of the cheapest item in carbohydrates, fat, protein and fruits-vegetables sub-categories. The minimum recommended quantities for the household are multiplied with the available market prices in the survey. For most regions (districts), the basket consists of recommended per-head diet of cassava, cooking-oil, eggs and bananas.

[4]In the context of sub-Saharan Africa, empirical studies often use the data on occupation or education to proxy the income differences (see Alesina et al.). This is largely due to insufficient coverage of the income surveys and significant informal sectors in the economies.

higher food prices, we compare the food and non-food expenditures in Figure 5 as well. These plots do not suggest that food expenditures are the primary driver for variation in non-durable consumption between east-coast and central regions. The differences in consumption (durable and non-durable) indicate overall poverty in the south (-10S,36E) as well as far north regions (-3S,32E) and the relatively higher ν_t/r_t in the less densely populated central Tanzania (see the population distribution for Tanzania in Figure 2). The variation of non-durable consumption in Figure 7 is thus characterised by higher expenditure relative to asset-richness (measure by $\frac{\nu_t}{r_t}$) in the south/far-north (due in part to low levels of asset ownership r_t) and slightly higher ν_t in the central north regions (-8S,36E) as well as the eastern coast (-4S,40E).

Whether the excess ν_t is associated with higher satisfaction or not is verified using the data on subjective well-being in the survey. More specifically, if for the same level of assets, the consumers with higher excess register higher satisfaction than those with less excess, we can infer that a higher excess ν_t makes the consumer happier. Since the converse does not hold i.e. happier consumers need not have higher excess, the subjective perception data is only used to test whether the excess ν_t makes consumers happier or not and eventually how perceptions vary with excess and assets. Since status is a social need, a consumer could in fact be miserable as she raises expenses on relative non-durable consumption to satisfy status requirements. More importantly, as we don't value consumer perceptions in a market and consider only what is revealed from consumer expenditures, we are prevented from viewing consumer perceptions under economic constraints and using revealed preference methods to attribute consumer contentment to a particular type of consumption (e.g. excess). We can nevertheless use the subjective well-being data to test whether consumers of different expenditures (e.g. the excess ν_t) gain different perceptions across the economy and this we using the data for housing, financial and overall well-being. The consumer's perception of status is encompassed by her perception of well-being in the present circumstances and are also localised the way the well-being perceptions are. The test whether consumers are more content with higher excess (for the same assets) is thus feasible without the claim that consumers make consumption choices to optimise subjective well-being.

In the loess results in Figure 8, a rudimentary view might suggest that a positive (negative) outlook of the future is related to having higher assets. This seems particular true for eastern regions which have much higher perceptions as well as high value of assets (see area around -8S, 40E in Figure 8). However, it is noticeable that the poorer regions do not have the poorest perceptions - as the regions in the centre stand out in their negative perceptions (see area around -4S,34E). These regions in the centre (around -4S,34E) have both low non-durable consumption per head per unit-asset ν_t/r_t and relatively low assets. The perceptions in the asset poor southern regions is relatively higher (see -10S,40E) - confirming that the perceptions of quality of life are localised. Neither asset poverty nor high food prices seem to influence the subjective perceptions of the quality of life for the consumer in southern areas.

The relatively low non-durable consumption in areas with low perception suggests a role of ν_t in consumer perception. Similarly, the high subjective perception of life in the eastern regions (despite perceptions for housing and relative richness being much worse e.g. around - 2S,40E) demonstrates that ν_t also has a role to play in the denser urban areas. The latter

seems due to the influence yielded by the urban amenities - including better variety in food (which in turn seems to be assisted with the availability of electricity and refrigeration). In summary, poverty may not influence subjective well-being so much in Tanzania - but without ruling out the possibility that the poor may not in the same status competition as the rich.

The plots shown in Figures 5, 7 and 8 retain their shape as we vary the distances metrics (e.g. the population adjusted distance discussed in Section 3.1) and the criteria for reference boundaries (e.g. by using a reference group limited to consumers of own education or occupation level). To examine the net effect of local hierarchies and wider regional differences, we explore the variation in ν_t with r_t across the economy in Section 4.2.

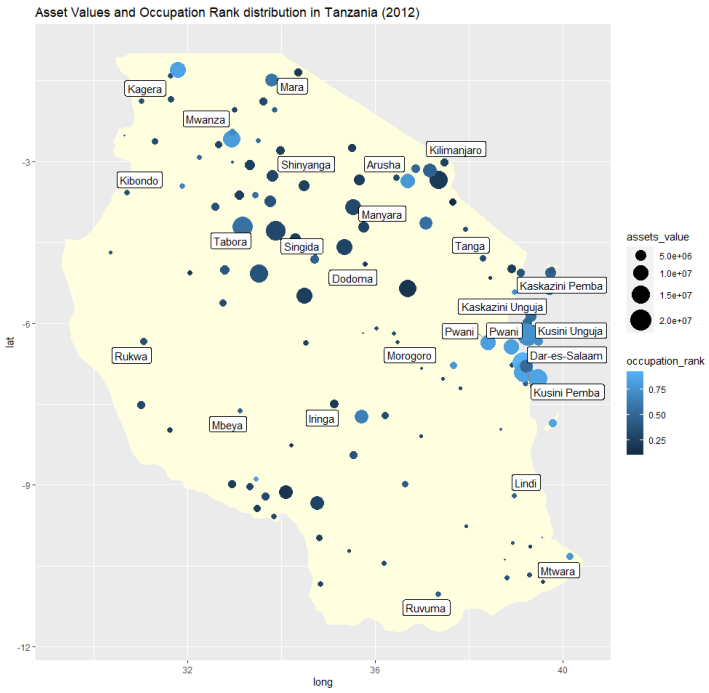

Figure 1: Differences in occupations and consumer-owned assets (2012 - Tanzania)

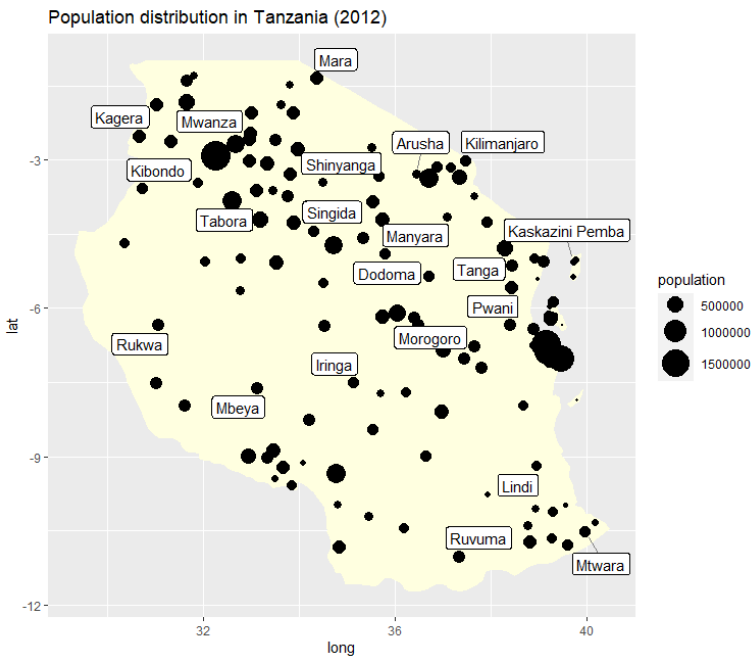

Figure 2: Population distribution in Tanzania (2012)

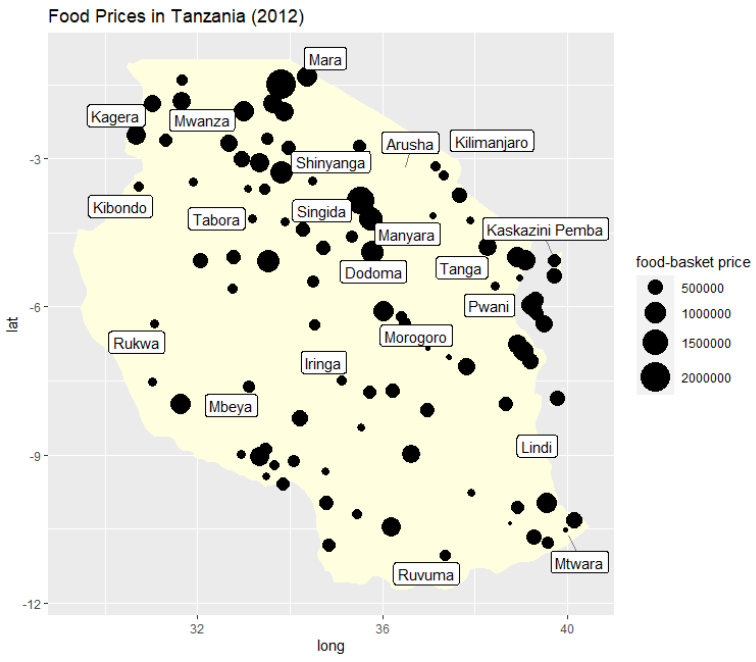

Figure 3: Food Prices in Tanzania (2012)

occupation code	*occupation*	*occupation rank*
14	Student	0
13	Job Seeker	0
12	Paid Family Work	0
16	Unemployed	0
11	Unpaid Family Work	0
1	Livestock/Agriculture	0
17	Unemployed (too young)	1
2	Fishing	1
3	Mining	1
4	Tourism	1
7	Private Sector	2
9	Non-Agricultural (w Employer)	2
10	Non-Agricultural (w/o Employer)	2
8	Non-Government/Religious Org	3
5	Government	3
6	Parastatal	3

Table 1: Types of occupations as ranks

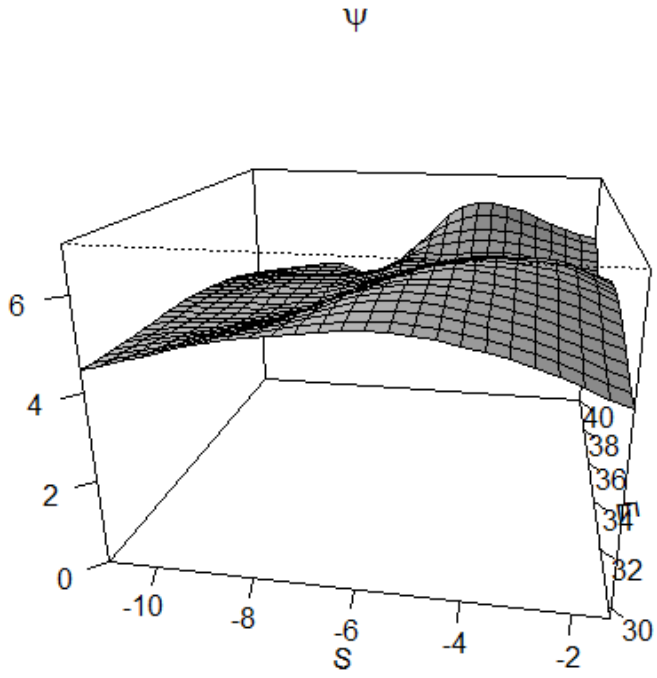

Figure 4: Household sizes in Tanzania (2012)

education level	*education code*	*education rank*
PP	1	1
ADULT	2	1
D1	11	1
D2	12	1
D3	13	1
D4	14	1
D5	15	1
D6	16	1
D7	17	1
D8	18	1
OSC	19	2
MS COURSE	20	2
F1	21	2
F2	22	2
F3	23	2
F4	24	2
O COURSE	25	3
F5	31	3
F6	32	3
A COURSE	33	4
DIPLOMA	34	4
U1	41	4
U2	42	4
U3	43	4
U4	44	4
U5&	45	4

Table 2: Education Level as education ranks

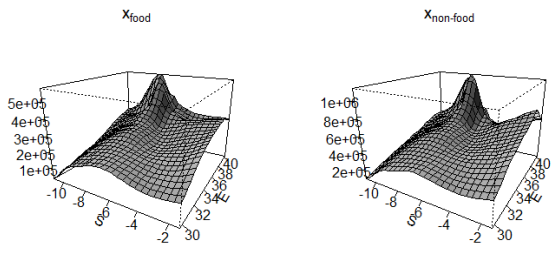

Figure 5: Food and Non-Food Expenditures

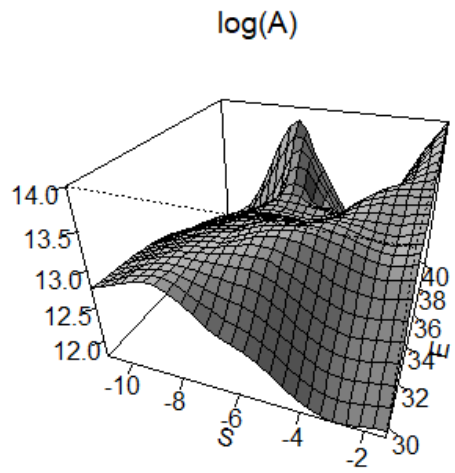

Figure 6: The loess plot for the assets owned $log(A)$ in 2012

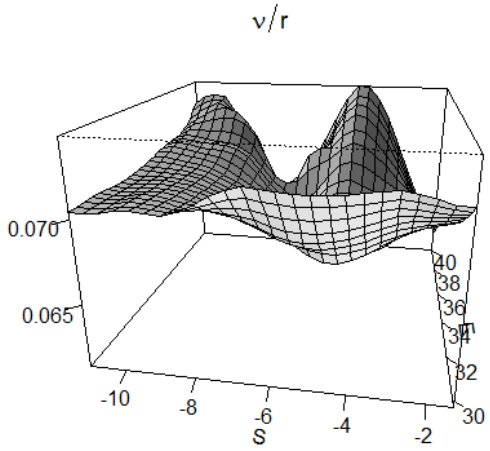

Figure 7: Loess results for $\frac{\nu_t}{r_t}$ with smoothing parameter = 0.3 for year 2012

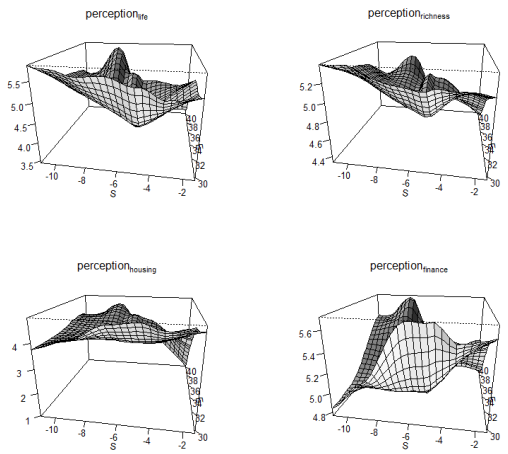

Figure 8: Subjective well-being in Tanzania (2012)

4.2 Parametric Analysis

Recall that the model in Section 2 defines r_t as the average asset value averages in the locality and ν_t as a measure of deviation from the average per-head non-durable consumption $\pi(r_t)$ in the consumer's locality. In the results shown in Tables 3 and 4, r_t is represented by `r` and the quantity $log(A_t) - r_t$ is represented as `Ar` (A_t being the total value of assets accumulated by the households). Further, the factor variables `max_occupation_rank` and `max_education_rank` are the maximum occupation and education ranks in the household respectively (see Table 1 and Table 2).

Over the entirety of Tanzania, we find that ν_t increases with A_t i.e. the consumers with more assets have overall higher food and non-food expenditures even after excluding the asset-driven costs. This isn't atypical since lifestyle changes usually require higher non-durable consumption as consumers accumulate more assets. However, given the disparities in the economy we have noted in Section 4.1, we refine this observation with net effects of disparities in assets, occupation and amenities on consumption with a parametric approach.

Here, we do find some evidence of substitution between r_t and ν_t. While it is evident from the variation in the average of observed x_t i.e. $\pi(r_t)$ with the asset average r_t in the consumer's vicinity (see Figure 9) that ν_t should rise with A_t, the extreme regional disparities also imply that $\pi(r_t)$ varies significantly across regions (see Figure 10). The net effect of the regional disparities and local disparities in incomes is so that the excess ν_t at local levels is more sensitive to differences in occupation levels whereas regional disparities overweigh at higher (coarser) levels in the economy. We verify this observation by inspecting different quantiles of excess ν_t and by varying the notion of asset-localities to consider consumers close to one's own occupational/educational level.

In the results from quantile regression of excess ν_t as the dependent variable shown in Table 4, we find that the education ranks 2 and 3 are associated with lower excess quantiles (see `q30` and `q60` results). More specifically, ν_t for education rank 2 is in lowest quantiles (`q30`) and that for education rank 3 is in medium quantiles (`q60`). The highly educated have less excess ν_t in high quantiles (`q90`) but high excess in low quantiles.

Unlike education levels, the occupational differences have a more significant influence on ν_t - which is consistently high for those with high-earning occupations and low for those in the poorer occupations. This holds for all quantiles - i.e. regardless of whether one is in a disadvantaged or a rich region and whether one has a relative local asset advantage or hasn't, the effects of occupation on lifestyle remain significant. This tell us that the relative advantage from having a higher income occupation is not limited to the Dar-es-salaam (which is where excess is the highest). The economic significance of $log(A_t)$ (i.e. `Ar`) is higher than that of r_t (i.e. `r`) in both `q30` and `q60`, implies that the local richness drives up the lifestyle costs ν_t for most consumers - despite the average consumption $\pi(r_t)$ rising on the whole with average assets r_t. In other words, the income differences dominate at the local level for excess ν_t but regional disparities are more important than occupational differences at the coarser level. Further, the significant negative coefficients for r_t (`r`) at high quantiles (`q90`) also suggests that highest spenders of ν_t are limited to a few regions (e.g. Dar-es-Salaam and Zanzibar in Figure 7). This is also verified with the loess plot in Figure 5. Loosely speaking, one could therefore say that the consumption is bandwagon-like at local levels but has snob-like characteristics at coarser levels. The variation of ν_t against r_t and $log(A_t)$ is inspect with a linear estimation in Table 3. Similar to the observations from the quantile regression, the relative significance of r_t (`r`) over the personal wealth $log(A_t)$ (`Ar`) dominates when taken over the entirety of Tanzania.

Examining ν_t by choosing narrower reference groups based on the occupation levels or education levels - i.e. by calculating average expenditures $\pi(r_t)$ by taking expenditure only from consumers who have the same level of occupation or education as oneself, we find little evidence of occupation levels influencing excess ν_t at coarser levels. More particularly, one expects a sharper rise in the expenditure $\pi(r_t)$ rises with r_t when r_t is narrowed to one's own occupation and education level (since better occupations and higher education level should decrease ν_t and increase $\pi(r_t)$ - the average consumption of those with same occupation/education). But taken as a whole, the narrower references do not seem to have more economic significance than the regional differences. Therefore, while occupation and education do influence relative ν_t within consumer localities, the effect of occupation-level on ν_t is not strong over the entirety of the economy.

Notice that while the above analysis of urban and rural disparities may appear to ignore any differences between the consumer's agricultural and industrial assets, the measure r_t does consider the effect of urban and rural differences due to urban and rural disparities in wealth. Thus, if a consumer gains more status by owning a luxury car in the city than owning a tractor (which cost the same) in a village, our approach does not differentiate between the vehicle being a tractor or a luxury car but it does consider the asset in a rich area (city) and the poor area (village). The measures of A_t and r_t depending only on their reported prices alone (see Table 6) therefore suffice for the above analysis.

4.3 Conclusions

Using asset ownership to define the consumer's context, we have considered status consumption in an intertemporal framework while accounting for the income and lifestyle disparities that characterise a developing economy. Instead of focusing on visible consumption, we look at status consumption as non-necessary non-durable consumption

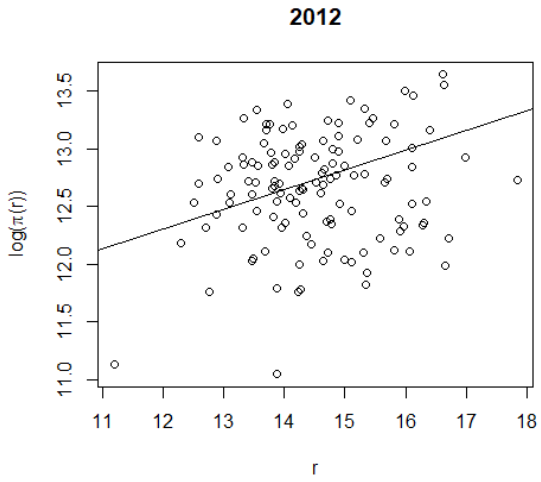

Figure 9: Plot of mean consumption in neighboring-districts against asset ownership (2012)

apart from the stock of durable goods which serve as consumer's endowments. The non-parametric plots and quantile regressions for Tanzania present some evidence of substitution between having higher assets and availing relative local advantages in the non-durable consumption at regional levels - but the substitution between A_t and ν_t is weak overall - esp for medium occupations. While the econometric results point to the consumers in asset-richer areas having less inequalities in non-durable consumption among themselves than in rural areas, the role of increased urban non-durable consumption in consumer contentment suggests a race towards urban lifestyles and consumption related to it. This is based on the observation that consumers with medium incomes exhibit competitions of some intensity whereas there is segregation of demand in non-durable consumption at both higher and lowest income levels (poorer consumers cannot be in a status competition with richer consumers). We expect other developing countries to share such trends - so that the consumers in remote areas may have less concerns/avenues for status-related consumption while the urban amenities - which increase non-durable consumption - significantly influence consumer contentment.

Localising the consumer's context and arguing that status can be modified through consumption only through durable assets and relative non-durable differences shows us how consumers in a developing economy withstand extreme differences in amenities and yet participate in non-durable consumption to address local needs constituting status. This means that the demand for non-durable urban goods could separate if the differences between urban and rural areas rise - whereas a leveling of the differences would make the substitution between having more assets and higher status consumption possible. Viewing other developing economies with varying levels of urbanisation could help us better understand how of urban-rural differences and income or wealth inequalities in a developing economy could influence consumption excesses.

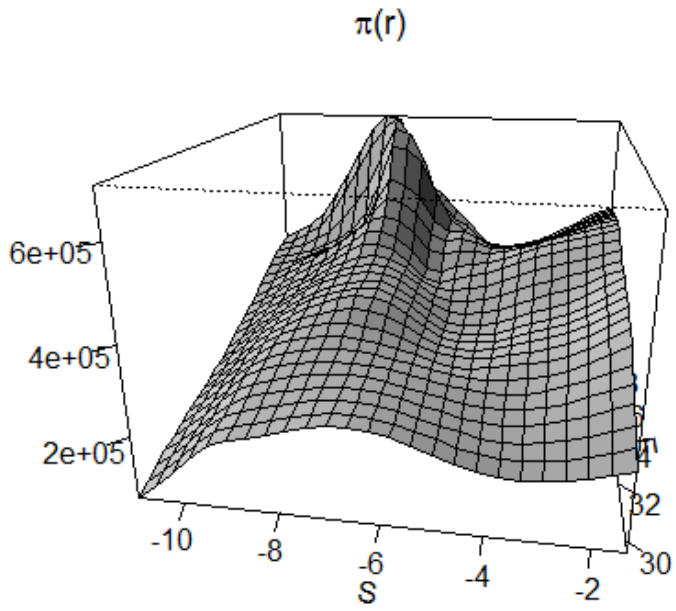

Figure 10: Loess results for $\pi(r)$ with smoothing parameter = 0.3 for year 2012

Table 3: Linear estimation for excess ν as dependent variable

	(1)	(2)	(3)
	2010	2012	2014
r	-0.0322*	-0.00602	-0.0356**
	(0.023)	(0.647)	(0.002)
Ar	0.0160*	0.0399***	0.0433***
	(0.032)	(0.000)	(0.000)
1.max_occupation_rank	-0.180***	-0.280***	-0.321***
	(0.000)	(0.000)	(0.000)
2.max_occupation_rank	0.181***	0.112**	0.0609
	(0.000)	(0.004)	(0.090)
3.max_occupation_rank	0.742***	0.578***	0.341***
	(0.000)	(0.000)	(0.000)
1.max_education_rank	-0.149***	-0.220***	-0.199***
	(0.000)	(0.000)	(0.000)
2.max_education_rank	-0.104*	-0.157***	-0.143***
	(0.026)	(0.000)	(0.000)
3.max_education_rank	0.0662	-0.211*	0.0651
	(0.503)	(0.015)	(0.363)
4.max_education_rank	-0.0183	-0.101	0.0651
	(0.886)	(0.394)	(0.485)
_cons	1.538***	1.296***	1.733***
	(0.000)	(0.000)	(0.000)
N	3208	4067	3613

p-values in parentheses

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

Table 4: Quantile Regression of ν_t as dependent variable

	(1)	(2)	(3)
	2010	2012	2014
q30			
r	-0.0189*	-0.00696	0.0142
	(0.049)	(0.381)	(0.099)
Ar	0.0107*	0.0246***	0.0328***
	(0.027)	(0.000)	(0.000)
1.max_occupation_rank	-0.0984***	-0.105***	-0.120***
	(0.000)	(0.000)	(0.000)
2.max_occupation_rank	0.0985**	0.137***	0.0884**
	(0.004)	(0.000)	(0.001)
3.max_occupation_rank	0.327***	0.290***	0.176**
	(0.000)	(0.000)	(0.002)
1.max_education_rank	0.0122	-0.0176	-0.0426
	(0.561)	(0.365)	(0.057)
2.max_education_rank	0.121***	0.0638**	0.0383
	(0.000)	(0.010)	(0.154)
3.max_education_rank	0.209*	0.168**	0.240***
	(0.013)	(0.001)	(0.000)
4.max_education_rank	0.361**	0.168	0.336***
	(0.003)	(0.053)	(0.000)
_cons	0.780***	0.629***	0.415***
	(0.000)	(0.000)	(0.001)
q60			
r	-0.0313**	-0.00552	-0.0238
	(0.008)	(0.655)	(0.060)
Ar	0.0147*	0.0295***	0.0437***
	(0.043)	(0.000)	(0.000)
1.max_occupation_rank	-0.164***	-0.235***	-0.290***
	(0.000)	(0.000)	(0.000)
2.max_occupation_rank	0.153***	0.106*	0.0838*
	(0.000)	(0.020)	(0.032)
3.max_occupation_rank	0.440***	0.385***	0.223*
	(0.000)	(0.000)	(0.016)
1.max_education_rank	-0.0536	-0.125***	-0.140***
	(0.081)	(0.000)	(0.000)
2.max_education_rank	0.0444	-0.0363	-0.0682
	(0.371)	(0.368)	(0.060)
3.max_education_rank	0.344*	-0.0127	0.202**
	(0.021)	(0.884)	(0.009)
4.max_education_rank	0.371*	0.173	0.234
	(0.022)	(0.180)	(0.052)
_cons	1.430***	1.139***	1.485***
	(0.000)	(0.000)	(0.000)
q90			
r	-0.0970*	-0.0381	-0.108***
	(0.012)	(0.318)	(0.000)
Ar	0.0137	0.0647**	0.0659***
	(0.357)	(0.005)	(0.000)
1.max_occupation_rank	-0.419***	-0.438***	-0.645***
	(0.000)	(0.000)	(0.000)
2.max_occupation_rank	0.199	0.188	-0.0177
	(0.087)	(0.114)	(0.864)
3.max_occupation_rank	1.354***	1.060***	0.293
	(0.001)	(0.000)	(0.122)
1.max_education_rank	-0.387***	-0.559***	-0.478***
	(0.000)	(0.000)	(0.000)
2.max_education_rank	-0.357**	-0.490***	-0.465***
	(0.003)	(0.000)	(0.000)
3.max_education_rank	0.273	-0.631*	-0.0698
	(0.498)	(0.010)	(0.696)
4.max_education_rank	-0.385	-0.384	-0.390
	(0.178)	(0.209)	(0.222)
_cons	3.664***	2.955***	3.977***
	(0.000)	(0.000)	(0.000)
N	3208	4067	3613

p-values in parentheses

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

Table 5: Classification of Expenditure items

type	category	name
needs	carbs	rice_husked
needs	carbs	rice_paddy
needs	carbs	maize_green
needs	carbs	maize_grain
needs	carbs	maize_flour
needs	carbs	millet_grain
needs	carbs	millet_flour
needs	carbs	wheat
needs	carbs	bread
needs	carbs	bunscakes
needs	carbs	pasta
needs	carbs	othercereal
needs	carbs	cassava_fresh
needs	carbs	cassava_flour
needs	carbs	sweet_potato
needs	carbs	potatoes
needs	fat	peanuts
needs	fat	coconut
needs	fat	cashew_almonds
needs	fat	nut_products
needs	fat	cooking_oil
needs	fat	butter_margarine
needs	protein	pulses
needs	protein	milk_products
needs	protein	fresh_milk
needs	protein	canned_milk
needs	protein	goat
needs	protein	beef
needs	protein	pork
needs	protein	chicken
needs	protein	wild_birds
needs	protein	wild_meat
needs	protein	fish_seafood
needs	protein	dried_canned_fish
needs	protein	packaged_fish
needs	protein	eggs
needs	fruitsveg	onion
needs	fruitsveg	greens
needs	fruitsveg	dried_canned_veg
needs	fruitsveg	yam
needs	fruitsveg	banana_green

needs	fruitsveg	othervegstarch
needs	fruitsveg	banana_ripe
needs	fruitsveg	citrus
needs	fruitsveg	mangoes
needs	fruitsveg	sugarcane
excess	general	cigarettes
excess	general	bar_soap
excess	general	clothes_soap
excess	general	toothpaste
excess	general	toilet_paper
excess	general	skin_cream
excess	general	other_personal
excess	general	misc_cleaning
excess	general	donation
excess	general	services
excess	general	bride_price
excess	general	marriage
excess	general	funeral
excess	general	sugar
excess	general	sweet
excess	general	honey
excess	general	salt
excess	general	spices
excess	general	tea
excess	general	coffee
excess	general	miscdrinkpowder
excess	general	canned_drink
excess	general	readymade_tea_coffee
excess	general	beer
excess	general	brews
excess	general	winespirits
excess	general	mensclothes
excess	general	womensclothes
excess	general	childrensclothes
excess	general	mensshoes
excess	general	womensshoes
excess	general	childrensshoes

Table 6: List of owned assets (sorted by median reported market-price)

name	median-price
livestock	21428.57
bed	30000.00
sofa	33333.33
videoplayer	40000.00
bike	50000.00
cart	50000.00
donkey	50000.00
plough	90000.00
sewingmachine	90000.00
harrow	100000.00
stove_electricgas	100000.00
tv	100000.00
waterpump	100000.00
boat	104166.67
musicsystem	200000.00
refrigerator	200000.00
computer	350000.00
animalcart	400000.00
house	666666.67
handmill	1000000.00
motorbike	1200000.00
powertiller	1400000.00
trailer	3000000.00
car	6000000.00
tractor	20000000.00

APPENDIX

For simplicity of notation, we replace $r_t \rightarrow r$, $x_t \rightarrow x$ and $\nu_t \rightarrow r$ in the following expressions. The utility function is therefore

$$L = u(\nu, r) - \lambda(log(x) - log(\pi(r)) - log(\nu))$$
$$L = \alpha log(\nu - \bar{\nu}) + (1-\alpha)log(r - \bar{r}) - \lambda(log(x) - log(\pi(r)) - log(\nu))$$

With the first order conditions,
$\frac{\partial L}{\partial \nu} = 0 \Rightarrow \frac{\alpha}{1-\bar{\nu}/\nu} = -\lambda$ and $\frac{\partial L}{\partial r} = 0 \Rightarrow \frac{1-\alpha}{r-\bar{r}}\frac{\pi(r)}{\pi'(r)} = -\lambda$. Since $x = \nu\pi \Rightarrow \frac{1}{\nu} = \frac{\pi(r)}{x}$, we have the Bernoulli Equation $\frac{\alpha}{(1-\alpha)}(r-\bar{r})\pi'(r) = \pi(r) - \frac{\pi(r)^2\bar{\nu}}{x}$. Rewriting it with the definition $g(r) \equiv \frac{1}{\pi(r)}$

$$\pi'(r) = \frac{1-\alpha}{\alpha(r-\bar{r})}\pi(r) + (-\frac{(1-\alpha)\bar{\nu}}{x\alpha(r-\bar{r})})\pi(r)^2 \tag{4}$$

We now have $g'(r) = \frac{-\pi'(r)}{\pi(r)^2}$ allowing us to simplify the Equation 4 as $-\frac{\pi'(r)}{\pi(r)^2} = -\frac{1-\alpha}{\alpha(r-\bar{r})}\frac{1}{\pi(r)} + \frac{(1-\alpha)\bar{\nu}}{x\alpha(r-\bar{r})}$ so that the following is a linear differential equation

$$g'(r) = -\frac{1-\alpha}{\alpha(r-\bar{r})}g(r) + \frac{(1-\alpha)\bar{\nu}}{x\alpha(r-\bar{r})}$$

Letting $a(r) \equiv -\frac{1-\alpha}{\alpha(r-\bar{r})}$ and $b(r) = \frac{(1-\alpha)\bar{\nu}}{x\alpha(r-\bar{r})}$ and using the solution for $g'(r) = a(r)g(r) + b(r)$ with the initial value $g(r_0) = g_0$we have

$$g(r) = g_0 e^{A(r)} + e^{A(r)}\int_{r_0}^{r} e^{-A(s)}b(s)ds \tag{5}$$

Here, $A(r) = \int_{r_0}^{r} a(s)ds$ i.e. $A(r) = (\frac{1-\alpha}{\alpha})log(\frac{r_0-\bar{r}}{r-\bar{r}})$ and

$$e^{A(r)} = (r_0 - \bar{r})^{\frac{1-\alpha}{\alpha}}(r-\bar{r})^{-\frac{1-\alpha}{\alpha}}$$

$$\int_{r_0}^{r} e^{-A(s)}b(s)ds = \int_{r_0}^{r}\{(\frac{s-\bar{r}}{r_0-\bar{r}})^{\frac{1-\alpha}{\alpha}}\frac{(1-\alpha)\bar{\nu}}{x\alpha(s-\bar{r})}\}ds = \frac{(1-\alpha)\bar{\nu}}{x\alpha(r_0-\bar{r})^{\frac{1-\alpha}{\alpha}}}\int_{r_0}^{r}(s-\bar{r})^{\frac{1}{\alpha}-2}ds$$

With $\alpha \neq \frac{1}{2}$, we have the following solution (for $\alpha = \frac{1}{2}$ the integrand is a constant)

$$\int_{r_0}^{r} e^{-A(s)}b(s)ds = \frac{(1-\alpha)\bar{\nu}}{x\alpha(r_0-\bar{r})^{\frac{1-\alpha}{\alpha}}} \times \frac{1}{\frac{1}{\alpha}-1}\{(s-\bar{r})^{\frac{1}{\alpha}-1}|_{r_0}^{r}\}$$
$$= \frac{\bar{\nu}}{x(r_0-\bar{r})^{\frac{1-\alpha}{\alpha}}}\{(r-\bar{r})^{\frac{1-\alpha}{\alpha}} - (r_0-\bar{r})^{\frac{1-\alpha}{\alpha}}\}$$

Therefore,

$$\int_{r_0}^{r} e^{-A(s)} b(s) ds = \frac{\bar{\nu}}{x}((\frac{r-\bar{r}}{r_0-\bar{r}})^{\frac{1-\alpha}{\alpha}} - 1)$$

and

$$g(r) = \frac{1}{\pi(r_0)}(\frac{r_0-\bar{r}}{r-\bar{r}})^{\frac{1-\alpha}{\alpha}} + (\frac{r_0-\bar{r}}{r-\bar{r}})^{\frac{1-\alpha}{\alpha}} \times \frac{\bar{\nu}}{x}((\frac{r-\bar{r}}{r_0-\bar{r}})^{\frac{1-\alpha}{\alpha}} - 1)$$

or

$$g(r) = \frac{1}{\pi(r)} = (\frac{1}{\pi(r_0)} - \frac{\bar{\nu}}{x})(\frac{r_0-\bar{r}}{r-\bar{r}})^{\frac{1-\alpha}{\alpha}} + \frac{\bar{\nu}}{x}$$

Since $g(r) \equiv \frac{1}{\pi(r)}$, we can now write

$$\pi(r) = \frac{x(r-\bar{r})^{\frac{1-\alpha}{\alpha}}}{(\frac{x}{\pi(r_0)} - \bar{\nu})(r_0-\bar{r})^{\frac{1-\alpha}{\alpha}} + (r-\bar{r})^{\frac{1-\alpha}{\alpha}}\bar{\nu}}$$

For the optimal r^*, therefore $\nu^* = \frac{x}{\pi(r^*)} = xg(r)$ or

$$\nu^* = (\frac{x}{\pi(r_0)} - \bar{\nu})(\frac{r_0-\bar{r}}{r-\bar{r}})^{\frac{1-\alpha}{\alpha}} + \bar{\nu}$$

ν^* is thus a function of with both x and r in the model. The regressions pertinent to the above relation thus attempt to estimate $\frac{\partial \nu^*}{\partial x}$ in the analyses.

References

[1] K. R. Schneider, P. Webb, L. Christiaensen, and W. A. Masters, "Assessing Diet Quality Where Families Share Their Meals: Evidence from Malawi," *The Journal of Nutrition*, 09 2021, nxab287. [Online]. Available: https://doi.org/10.1093/jn/nxab287