The Conspicuous Consumption of the Poor: Forgoing Calories for Aspirational Goods*

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Abstract

This paper explores why the poor indulge in conspicuous consumption at the expense of caloric intake. It considers relative deprivation, or the expenditure gap between rich and poor, as the driving mechanism. Relative deprivation is embedded in the required quantities of a demand system. We structurally estimate the demand system over 12 food and non-food categories of expenditure using Indian survey data covering about 160,000 Below Poverty Line households. We find that (1) aspirational goods, whose demand increase with relative deprivation, are less nutritious or non-food, (2) on average, relative deprivation induces poor households to forgo 13% of daily caloric intake – about 65 grams of rice per person – in favor of aspirational purchases. The number of Below Poverty Line households under malnutrition would be 7 percentage points lower in the absence of relative deprivation. (*JEL* D01, D12, I14, I30, O10, Z10)

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1 Introduction

The very poor spend a considerable amount on conspicuous goods such as branded clothing or cold drinks, even when they are malnourished.[1] This behavior is a source of concern for poverty alleviation in developing countries, and may have contributed to the persistence of malnutrition in India.[2] If the link between conspicuous consumption and poverty has been discussed in the literature, the mechanism behind it and its impact on nutrition have not been empirically determined.

In this paper, we argue that inequality leads the poor to consider conspicuous goods as essential, at the expense of adequate nutrition. The concept of conspicuous consumption dates back to Veblen (1899), who noted that the poor need to "live up to the accepted canons of decency" driven by "the usages of the highest social and pecuniary class."[3] This implies that relative deprivation, i.e. the income gap between the poor and the rest of society, may raise their minimum required spending on conspicuous goods. In other words, the conspicuous consumption of the poor reflects a need for social inclusion.

We make three empirical contributions to the discussion on conspicuous consumption and poverty. First, we propose a strategy to empirically identify items of conspicuous consumption, which we call "aspirational". We define them as goods whose demand increases with relative deprivation. We also show that their income elasticity decreases with relative deprivation (they become more "necessary"). Second, our framework allows to determine if social inclusion comes at a nutritional cost, that is, if an increase in relative deprivation drives the poor to forgo calories for aspirational goods. Third, we adapt it to different socio-cultural contexts and inquire who the reference group is for the aspirational consumption of the poor.

We propose a demand system to address empirical issues raised by the introduction of the aspirational motive in consumption decisions, i.e., how this motive affects consumer demand and

[1] Van Kempen (2003) and Banerjee and Duflo (2007) bring evidence of such conspicuous behavior for the poor in developing countries.

[2] Deaton and Drèze (2009) document that despite a spectacular economic growth, the last decades witnessed a decrease in calorie intake along with no increase in real food expenditure in India.

[3] Smith (1776) mentioned this type of social expenditure, noting that "the Greeks and Romans lived very comfortably though they had no linen, [but] in the present time, a creditable day-laborer would be ashamed to appear in public without a linen shirt." The literature on capabilities and poverty measures considers such expenditure as a necessity (Sen, 1983; Atkinson and Bourguignon, 2001; Ravallion and Chen, 2011).

how to account for economic constraints (prices, income). We use a demand system based on a Stone-Geary representation of utility in which the consumer needs to reach a minimum required quantity for each good. We embed the aspirational motive as one of the determinants of these minimum required quantities. In short, the individual faces a higher need for conspicuous goods when she feels more relatively deprived. Relative deprivation is measured as the sum of all income gaps with people richer than the individual living in the same area, an index first proposed by Yitzhaki (1979).[4]

We estimate the demand system using the expenditure of Below Poverty Line (BPL) households on 12 food and non-food categories in five thick rounds of the Indian National Sample Surveys (NSS) (1983 to 2004–2005). We focus on BPL households for two reasons. First, they constitute a large portion of the population in India (45% in 1983; 27% in 2004–2005) for whom an adequate level of nutrition is not reachable.[5] Any fraction of the budget spent on non-nutritional goods would therefore further reduce spending on nutrition. Second, they are the most relatively deprived due to their position at the bottom of the income distribution. Given their extreme poverty, they cannot credibly signal wealth to others and have little incentive to do so. Hence, the conspicuous consumption motive is unlikely to be driven by status competition (downward distinction), another approach found in the literature. These reasons are both verified in the empirical analysis.

Our empirical strategy exploits variations in income distribution across Indian regions to compare the consumption choices of similar households facing different levels of relative deprivation. Relative deprivation may be correlated with the local availability of goods, or may affect consumption through other regional characteristics. We account for these issues by using local prices and including socio-demographic and economic characteristics. We also discuss the endogeneity of relative deprivation, total expenditure and prices, and show that our findings hold when we instrument for these variables.

The paper establishes three sets of results. First, aspirational goods are indeed non-food or less

[4]Our approach relates to other empirical works on expenditure cascades using aggregate measures of inequality (Duesenberry, 1949; Frank et al., 2014; Bertrand and Morse, 2016), as the mean relative deprivation index of a population is equal to the Gini coefficient.

[5]This paper uses the Indian official absolute poverty line defined as the expenditure per capita above which the household can reach an adequate level of nutrition. It is very close to the $1 a day threshold at 2005 prices (Ravallion, 2010), and defined for each round, State and sector (urban/rural).

caloric-intensive items (clothing, dairy products, meat, fuel and lighting, packaged products and drinks), while demand for cheap nutritious goods such as cereals, pulses and vegetables falls with relative deprivation. Our framework accounts for the socio-cultural context, in this case Hindu religious norms: for instance, dairy products are found to be aspirational. Interestingly, we do not find that intoxicants such as alcohol or tobacco (common temptations for the poor) are aspirational. Relative deprivation appears to be distinct from temptation or lack of self-control.

The caloric cost of aspirational consumption is the second and central finding. Using the estimated parameters of our demand system, we find that a one standard deviation increase in relative deprivation corresponds to a daily loss of about 60 calories per capita. This caloric loss is substantial given their state of malnutrition,[6] and represents 13% of their mean daily per capita consumption, or about 65 grams of raw grain (rice or wheat) per person. We estimate that the fraction of malnourished BPL households would be about seven percentage points lower in the absence of concern for social inclusion.

In a third set of results, we investigate the channels through which these consumption aspirations arise. We discuss the spatial visibility of the reference group for the aspirational motive. We find that the reference group is neither very local (the village), nor distant (the State); the region seems the appropriate geographical level of comparison. Our results also confirm the "trickle-down" theory, i.e. an individual measures herself against richer ones but not those that are very distant in the income distribution. The need for social inclusion is arguably stronger for the absolutely poor. The estimation run separately on each quartile of BPL households and non-poor households indeed shows that the incurred caloric loss decreases with income once the household is above mere survival (first quartile). We also find that social norms affect which goods are necessary for social inclusion: dairy products are more aspirational for Hindus, while meat is more aspirational for Muslims.

To test the consistency of our results, we perform several robustness checks. First, we show that the minimum caloric requirement estimated by our demand system is consistent with medical

[6]The threshold for malnutrition which is officially used in India is 2100 daily per capita calories in urban areas, and 2400 in rural areas. More than 90% of BPL households are below these thresholds in our data. Their mean daily per capita consumption is about 1700 calories.

evaluations of metabolic survival. Also, virtually all BPL households in our sample can afford the total required expenditure. To account for interdependent wants across commodities, a generalization of our demand system introduces cross-price terms. Finally, the fact that relative deprivation at village level does not drive the caloric loss shows that our results are not purely driven by supply differences due to local inequality.

The approach of our paper is closest to the literature on the detrimental effect of inequality on the savings behavior of lower income classes in developed countries (Duesenberry, 1949; Frank et al., 2014; Bertrand and Morse, 2016). Inequality has also been shown to affect other outcomes such as work hours (Bowles and Park, 2005), mortality (Deaton, 2001), and happiness (Clark and D'Ambrosio, 2015). Relative income has been used to explain differences in conspicuous consumption across social groups (Charles et al., 2009; Khamis et al., 2012). We provide evidence that inequality also changes the consumption decisions of the very poor with an adverse effect on caloric intake.

Conspicuous consumption has attracted much attention in the theoretical literature on its distinctive nature. It has been modeled as a signal of otherwise unobservable income, leading individuals to spend more than those below them to distinguish themselves (Frank, 1985; Robson, 1992; Ireland, 1994; Hopkins and Kornienko, 2004; Heffetz, 2011; Moav and Neeman, 2012). In this view, the very poor have little to no incentive to consume conspicuously as they have little to signal. Our paper takes a complementary approach by modeling the incentive of the poor to engage in conspicuous consumption through upward comparison. The deprivation motive finds additional support from the work of Bursztyn et al. (2017) showing that low self-esteem drives the demand for conspicuous goods (platinum credit cards in their experiment) among middle-class consumers. The empirical literature on conspicuous behavior in developing countries is largely focused on occasional big spendings such as festivals or gift giving (Bloch et al., 2004; Brown et al., 2011). Our paper shows that it also affects day-to-day consumption decisions which are much easier targets of marketing campaigns.[7]

[7]The concept of Bottom Of the Pyramid (BOP) marketing consists of selling cheaper items to a large consumer base of poor people. Prahalad and Hammond (2002) underline that "it is incorrect to assume that the poor are too concerned with fulfilling their basic needs to 'waste' money on nonessential goods. In fact, the poor often do buy 'luxury' items." This strategy has been adopted in the Indian context by Coca Cola and Unilever among others (Karnani, 2009).

The consumption decisions of the poor are not purely determined by their physiological needs. They choose to spend on expensive calories (Deaton and Subramanian, 1996; Atkin, 2016) or non-essential goods (Banerjee and Duflo, 2007) even when they would benefit from better nutrition by reallocating their budget. Our results offer additional evidence that through consumption people aspire to other goals than nutrition. They provide a rationale for the conspicuous behavior of the poor, thereby underlining the importance of accounting for social motives when designing poverty alleviation policies or defining poverty lines.

The article is organized as follows: Section 2 presents the relative deprivation index and derives testable implications from our model of aspirational consumption. Section 3 provides descriptive statistics on Below Poverty Line households, expenditure and price data. It also illustrates the link between relative deprivation and consumption of the poor in our data. Section 4 identifies aspirational goods through the structural estimation of the model, and computes the caloric loss driven by relative deprivation. We also test the robustness of our results. Section 5 discusses the channels and tests for different groups of reference. Section 6 concludes.

2 A Model of Aspirational Consumption

2.1 Relative Deprivation Index

The idea of a minimum social requirement of consumption goes back to Smith (1776) and Veblen (1899) who identified the need, even of the poorest, to be socially included and considered that it translated into spending on socially valued goods. We call these goods "aspirational", because their required level of consumption is usually assumed to be determined by high-income people.[8] The intuition is that the minimum social requirement increases for everyone when people at the top of the income distribution become richer.

The relative income hypothesis of Duesenberry (1949) draws on this intuition to explain that

[8]The mechanism through which high-income people determine the desired level of aspirational consumption could be direct, for example if they are highly visible on information channels. Aspirational consumption could also trickles down from one class to another. In that case, it is referred to as "expenditure cascade" (Frank et al., 2014) or "trickle-down consumption" (Bertrand and Morse, 2016).

poor households tend to consume more and save less when the society in which they live is wealthier. Recent empirical applications measure the effect of inequality on the decline in savings and increase in consumption of poorer households in the United States (Frank et al., 2014; Bertrand and Morse, 2016). Inequality, however, is an aggregate measure of this phenomenon: for each individual, social requirements are determined by upward comparison with people who are richer.

Relative deprivation captures the upward comparison motive at the individual level. Yitzhaki (1979) provides an individual measure of relative deprivation based on the insight of Runciman (1966), and defines relative deprivation as the sum of the income gap between the individual and any individual above. We measure relative deprivation $\rho_h(m)$ of a individual h with income m_h as the sum of all the gaps between her income and the income m_y of the set of better-off individuals $y \in B_h(m)$ divided by the population n and the mean income $\bar{m}$ in the area:[9]

$$\rho_h(m) = \sum_{y \in B_h(m)} \frac{1}{n} \frac{(m_y - m_h)}{\bar{m}} \quad \text{where } m_y > m_h \tag{1}$$

The individual index of relative deprivation $\rho_h(m)$ is in fact directly linked to inequality: aggregate deprivation corresponds exactly to the Gini coefficient (Yitzhaki, 1979; Hey and Lambert, 1980).[10] The index of relative deprivation is considered a direct measure of the compensatory need to be socially included. The sense of relative deprivation also depends on the group of reference for the individual (Runciman, 1966). This index allows us to vary the reference group $B_h(m)$ – for instance the geography or income group – for which it is computed, and explore how it drives their consumption choices.

2.2 Demand System with Relative Deprivation

The intuition that relative deprivation increases the requirement for aspirational goods can be embedded in a demand system through the cost of living. There are two main advantages to develop

[9] This normalization by mean income and population allows the individual relative deprivation index to be bounded between 0 and 1 (Chakravarty, 1997; Clark and D'Ambrosio, 2015).

[10] Interestingly, Frank et al. (2014) chose the Gini coefficient as their preferred measure of inequality to capture expenditure cascades. Empirical works exploring the link between happiness and relative deprivation also use the Gini coefficient (Clark and D'Ambrosio, 2015).

and structurally estimate a demand system: first, it allows us to make theoretical assumptions about consumer behavior and directly test them in the data. Second, it provides us a functional form to flexibly compare households facing the same real income and local prices, but different levels of relative deprivation.

We use the Linear Expenditure System (LES), which relies on a Stone-Geary utility function. This demand system is characterized by a minimum required quantity for each good, which is an intuitive way to capture and estimate social requirements. For this reason, the Stone-Geary utility function has been widely used in models in which the individual decision depends on what others do (Pollak, 1970, 1976; Bowles and Park, 2005; Heffetz, 2004; Lewbel et al., 2016).[11]

In this framework, each individual maximizes her utility $U(Q)$ from consuming a vector Q of quantities, in which she values a minimum required quantity of each good i, denoted γ_i. The consumer maximizes her utility subject to the budget constraint (Pollak and Wales, 1969):

$$\begin{aligned} U(Q) = \quad & \textstyle\sum_i \beta_i \ln(q_i - \gamma_i), \\ \text{with} \quad & \textstyle\sum_i \beta_i = 1, \quad q_i - \gamma_i > 0, \\ \text{s.t.} \quad & \textstyle\sum_i p_i q_i = m. \end{aligned} \tag{2}$$

The parameter γ_i is the minimum quantity of reference for each good i. Above the total required level of expenditure or cost of living $\sum_i p_i \gamma_i$, the individual allocates income m according to taste parameters β_i. The supernumerary income of each individual is defined as their income minus cost of living: $m - \sum_i p_i \gamma_i$. Two restrictions are imposed on the parameters of the LES: first, the additivity restriction $\sum_i \beta_i = 1$. Second, the system is not defined if the individual does not consume the required amount of each good, i.e. if $q_i - \gamma_i \leq 0$. In other words, if the individual cannot afford the cost of living, she does not survive.

We introduce relative deprivation in the demand system by decomposing the parameter of required quantity γ_i into two components. We denote these two components "basic" and "socially"

[11] Heffetz (2004) uses this utility function to underline the signaling component of consumption (downward distinction), another conspicuous motive distinct from relative deprivation. The model, however, does not use the minimum requirement parameters in the empirical analysis, focusing on status signaling which affects the curvature of the Engel curves rather than their intercept.

required quantities.[12] We consider the following model:

$$\gamma_i = \tau_i + \nu_i \rho, \qquad \text{with} \quad \sum_i p_i \nu_i \rho \geq 0, \tag{3}$$

where τ_i is the basic required quantity and $\nu_i \rho$ is the socially required quantity.

The basic required quantity τ_i can be interpreted as a reference level for each good, driven by physiological subsistence, cultural norms, or other reference levels aside from social inclusion. The individual needs to afford the required quantity of all goods, for example to compose a meal or a complete outfit.

The socially required quantity $\nu_i \rho$ captures the extent to which the individual is influenced by relative deprivation ρ in the consumption of good i. ρ is the individual measure of relative deprivation in equation (1).[13] Relative deprivation translates into the commodity space by affecting the required quantity of each good i differently.[14] The parameter ν_i captures this differential effect across goods. The assumption that the sum of socially required expenditure is positive, $\sum_i p_i \nu_i \rho \geq 0$, illustrates that relative deprivation increases the total required level of expenditure.[15]

By allowing ν_i to be flexible across goods, we introduce a first empirically testable prediction to differentiate between goods which are socially valued, that is, considered important for inclusion in each society, and socially inferior goods which are substituted away when relative deprivation increases.

Implication 1. The sign and magnitude of ν_i provides information on the social valuation of good i.

Relative deprivation affects minimum requirements in both directions: it increases the required quantity γ_i for socially valued goods ($\nu_i > 0$), but is neutral or may decrease required quantities for socially inferior goods ($\nu_i \leq 0$).

[12] Pollak (1970, 1976) proceeds with a similar linear decomposition to introduce habit formation or demographic components in the LES.

[13] The model is derived for a representative individual with a representative level of relative deprivation ρ, hence the absence of subscript h in individual variables.

[14] This assumption is a major departure from models of external habit (interdependent preferences). These models commonly assume the same strength of comparison across goods, i.e. $\gamma_i = \tau_i + \nu \rho_i$ in our framework.

[15] The restriction is expressed in expenditure as quantities are in different units (cannot be summed up).

The corresponding Marshallian demand function is (in expenditure):

$$x_i = q_i p_i = (\tau_i + \nu_i \rho) p_i + \beta_i (m - \sum_j (\tau_j + \nu_j \rho) p_j). \tag{4}$$

The demand functions allow us to determine the goods for which demand increases with relative deprivation, which leads us to the following definition:

Definition. Aspirational goods are the goods whose demand increases with relative deprivation.

A good is aspirational if and only if $\nu_i p_i > \frac{\beta_i}{1-\beta_i} \sum_{j \neq i} \nu_j p_j$.[16] It reflects two factors at play in determining aspirational goods: the more socially valued good i is ($\nu_i p_i$), the higher the demand x_i for it at any level of income, while the more socially valued other goods are ($\sum_{j \neq i} \nu_j p_j$), the lower is the demand for good i. Aspirational goods are not only goods whose required quantity increases with relative deprivation (Implication 1), but relatively more so than other goods.

To understand how relative deprivation affects income elasticity, we derive the income elasticity ξ_i for each good i:

$$\xi_i = \frac{1}{1 + (\tau_i + \nu_i \rho) \frac{1}{\beta_i} \frac{p_i}{m} - \sum_j (\tau_j + \nu_j \rho) \frac{p_j}{m}}, \tag{5}$$

which leads us to a second testable implication:

Implication 2. If a good is aspirational, its income elasticity decreases with relative deprivation, i.e. it becomes relatively more necessary.[17]

Implication 2 clarifies why aspirational goods become more necessary when relative deprivation increases. The demand for aspirational goods would not be so high in the absence of relative deprivation, but individuals spend more on such goods as they face higher relative deprivation, i.e. a higher social cost of inclusion.

[16] Differentiating equation (4) with respect to the level of relative deprivation ρ, we obtain: $\frac{\partial x_i}{\partial \rho} = (1 - \beta_i) \nu_i p_i - \beta_i \sum_{j \neq i} \nu_j p_j$. Hence, the demand x_i for good i increases if and only if $\nu_i p_i > \frac{\beta_i}{1-\beta_i} \sum_{j \neq i} \nu_j p_j$.

[17] Differentiating equation (5) with respect to relative deprivation ρ, we obtain: $\frac{\partial \xi_i}{\partial \rho} = \frac{-\frac{1-\beta_i}{\beta_i} \nu_i \frac{p_i}{m} + \sum_{j \neq i} \nu_j \frac{p_j}{m}}{\left[1 + (\tau_i + \nu_i \rho) \frac{1}{\beta_i} \frac{p_i}{m} - \sum_j (\tau_j + \nu_j \rho) \frac{p_j}{m}\right]^2}$. This expression is negative if and only if $\nu_i p_i > \frac{\beta_i}{1-\beta_i} \sum_{j \neq i} \nu_j p_j$, i.e. if good i is aspirational.

In Appendix A we develop a two-goods case of the LES which illustrates the two testable implications of our model of aspirational consumption (Appendix A.1). We also develop a generalization of the LES, the Linear Preference System (LPS), which introduces cross-price effects on demand (Appendix A.2). We pursue our empirical analysis with the LES which provides an intuitive and straightforward implementation of our model of aspirational consumption. The LPS is nonetheless tested as a robustness check.

3 Data and Statistics

3.1 Databases

We use five rounds of the Indian National Sample Surveys (NSS) on Consumption and Expenditure (38th, 43rd, 50th, 55th and 61st rounds), which correspond to two decades where drastic changes to the economy were experienced (1983 to 2005). These cross-sectional surveys of the Indian population offer detailed consumer expenditure at the household level, as well as economic, demographic and social characteristics for households and individuals. They are representative at the level of the region,[18] which is formed of several districts and smaller than a state (India has 88 regions, 29 states and 7 union territories). The NSS surveys also provide household survey weights which we use in all computations and estimations. The survey unit in the NSS rounds is the household, but we use expenditure data and relative deprivation at the per capita level in our analysis to account for heterogeneity in household size.

3.2 Below Poverty Line Households

We focus on Below Poverty Line (BPL) households for several reasons. First, this population is highly budget-constrained and suffers from malnutrition, so the trade-off between aspirational goods and other goods is arguably very costly.[19] Second, BPL households have little-to-no incen-

[18] Regions have been constructed in the NSS so as to gather territories sharing similar agro-climatic and population characteristics within each State.

[19] While buying a house or a car is rarely a feasible alternative for the poor, a reallocation of income towards day-do-day "luxuries" may help maintaining a certain degree of inclusion at the cost of other investments.

tive to signal their income by conspicuous consumption compared to households in higher income categories (Heffetz, 2011), so the incentive to spend on such goods is more likely to be driven by relative deprivation. These two hypotheses are validated by our empirical results.

Table 1: Descriptive Statistics across Survey Rounds, Below Poverty Line Households

	1983	1987–1988	1993–1994	1999–2000	2004–2005
Number of BPL Households in NSS Rounds	43573.0	37595.0	30632.0	21784.0	25778.0
Fraction BPL in Total Population (%)	45.6	39.3	35.8	25.9	27.5
Fraction under Malnutrition (%)	89.5	89.5	92.8	94.7	96.8
Mean Monthly Per Capita Expenditure (Rs 2005)	285.3	300.4	307.8	319.9	320.1
Household Size (no)	6.9	6.8	6.5	7.0	6.8
Hindu (%)	83.3	82.2	81.7	80.9	80.5
Muslim (%)	13.0	14.1	14.4	15.7	16.4
Urban (%)	20.6	22.4	22.7	23.3	23.8
Agriculture Labor Share (%)	60.8	58.5	57.2	57.4	52.9
Household Head Literate (%)	39.1	39.3	40.4	40.7	44.5

To obtain our sample of BPL households, we use the official absolute poverty line provided by the Government of India (Planning Commission, 2014) using NSS survey rounds. The poverty line corresponds to the monetary amount needed to achieve adequate nutrition.[20] It is specific to each sector (rural/urban) within a state in a round. Given their per capita calorie consumption in our data, almost all BPL households are indeed qualified as malnourished (90% in 1983 to 97% in 2004–2005). The absolute definition of poverty therefore allows us to compare the consumption choices of relatively similar households across states, sectors and rounds in terms of standard of living.

Table 1 provides summary statistics for the BPL population in the five NSS rounds. The fraction of BPL households in the population fell from 45% in 1983 to 27% in 2004–2005. BPL households are on average similar across waves in terms of social and economic characteristics. Their mean total expenditure increased very little over time.[21] In recent rounds they appear to be more urban, less likely to work in the agricultural sector and more literate, but also more malnourished. The increase in malnutrition in India during the period has been reported to affect all income ranges (Deaton and Drèze, 2009).

[20] With this monetary amount, the household should be able to buy a sufficient amount of calories, proteins and fats. It is based on nutrition norms defined by the Indian Council of Medical Research.

[21] In comparison, the mean monthly per capita expenditure of the entire population went from Rs 525 to 685 over the same period. Banerjee and Piketty (2005) note a substantial increase in inequalities in the 1990s in India.

3.3 Expenditure Categories and Prices

The NSS survey rounds record monthly household expenditure on items in all consumption categories. They also provide information on the quantities consumed for food items, drinks, intoxicants, fuel, clothing and footwear. In order to obtain comparable data, we harmonize the classification of items across rounds. We also harmonize the quantity unit of food items by converting them into calories using the caloric equivalents provided by the NSS survey rounds.

Prices are crucial to our analysis as the income distribution may affect local prices and availability of items due to demand from high-income households. We therefore restrict our analysis to the items for which quantity is reported so that we may compute unit values (expenditure divided by quantity) and obtain a measure of prices.[22] Estimating demand on the items with recorded quantity is legitimate for two other reasons. First, our aim is to estimate how relative deprivation affects daily consumption decisions, hence we primarily focus on items frequently consumed, which correspond to those for which the quantity is recorded. They also account for the large majority of the expenditure of BPL households, comprising between 83% and 89% of their monthly budget (see Table 2). Second, durable goods and services are usually excluded from such demand systems because they are based on the allocation of total expenditure among goods in a single period. We therefore assume separability from durable goods and services, for which the quantity is not reported.

We aggregate items in 12 categories following the NSS classification. Table 2 shows the average share spent by BPL households on the 12 categories and other expenditure (items without recorded quantity) in each NSS round.[23] The composition of the basket of goods consumed by poor households does not drastically change over time. The budget share of categories such as meat, dairy, packaged food, drinks, fuel and other goods and services increases over time. The budget share of cereals sharply declines, even though Table 1 shows a very limited increase in per capita total expenditure over the period. The large majority of BPL households spends a positive

[22] Quantities are not always recorded in consumer expenditure surveys used to study conspicuous consumption (for example, Charles et al., 2009 and Bertrand and Morse, 2016). In this regard, the NSS provides an ideal setting to study consumption choices while accounting for prices.

[23] The NSS survey rounds include home consumption, which is priced at the local market level.

Table 2: Budget Shares across Survey Rounds, Below Poverty Line Households

	1983	1987–1988	1993–1994	1999–2000	2004–2005
Cereals (%)	41.8	35.5	32.8	32.3	25.6
Pulses (%)	3.6	4.3	4.3	4.4	3.8
Vegetables, Fruits (%)	6.1	6.9	7.9	8.2	8.8
Sugar, Oil (%)	6.7	7.8	7.8	6.5	7.8
Spices (%)	2.7	3.1	2.9	3.1	2.3
Meat (%)	2.5	2.8	2.9	2.9	2.8
Dairy (%)	3.6	4.4	5.2	4.3	4.7
Packaged (%)	1.2	1.5	1.7	1.4	2.0
Drinks (%)	1.6	1.8	2.0	1.9	1.8
Intoxicants (%)	2.8	3.2	3.2	2.8	2.6
Clothing, Footwear (%)	7.9	7.9	8.8	8.0	9.1
Fuel, Lighting (%)	8.6	9.3	8.7	8.5	11.6
Total Twelve Categories	**89.1**	**88.7**	**88.2**	**84.3**	**82.9**
Other (%)	10.9	11.3	11.8	15.7	17.1

"Packaged" products are extra items, usually processed, such as salted refreshments, sweets, biscuits, dry fruits. "Intoxicants" are alcohol, tobacco and pan products. "Other" expenditure is composed of durable goods and services (no recorded quantity).

amount in the 12 categories. Table B.1 in Appendix B reports the fraction of BPL households with positive expenditure by category.

To obtain price indexes by category, we first compute unit values by item. Following Deaton and Tarozzi (2000), we systematically draw the quantity and unit value densities for each item by round, and delete the few items which are not registered in all rounds or which have multimodal distributions. These items are products rarely consumed by the poor and represent a very small or null fraction of expenditure within each category. We harmonize the few quantity units which are different across rounds whenever feasible. Table B.3 in Appendix B summarizes the changes (quantity unit or deletion) for the relevant items. We obtain a total of 177 harmonized items with recorded quantity. The kernel distributions of mean household quantities and unit values by category across NSS rounds show that monthly recorded quantities are consistently similar across rounds, and unit values increase over time (Figures B.1 and B.2 in appendix B).

Once we obtain unit values for each item by household, we compute the median unit value by

village or urban unit.[24] Unlike household unit values, local median unit values reflect local costs, are robust to outliers, not affected by measurement error bias and not endogenous to the quality choice of the household (Atkin, 2013). We refer to these measures as prices.

The price indexes for the 12 aggregate categories are constructed based on the median village prices by item. The price index $P_{i,vt}$ of a given category i in village or urban block v in NSS round t containing n_i items is defined as:[25]

$$P_{i,vt} = \sum_{j=1}^{n_i} w^i_{j,rt} p_{j,vt} \ , \quad \text{s.t.} \quad \sum_{j=1}^{n_i} w^i_{j,rt} = 1,$$

where the price index for category i is the average of the median prices $p_{j,vt}$ of each item $j = \{1,...,n_i\}$ in village v, weighted by their mean budget share $w^i_{j,rt}$ in category i in region r.

The weight on budget shares is at regional level in order to have a representative share of the preferences of consumers in a region. It captures the local availability of a product, as an item which is little or not consumed in a region does not appear in the category price index. As it encompasses the consumption of all households in a region, it also captures the real price of a category including items locally available but not consumed by BPL households.[26] Taking into account the whole population allows us to capture the true cost of each category in a particular place, providing a real measure of the supply side exogenous to demand among the poor.

3.4 Relative Deprivation and Consumption: Stylized Facts

We compute the relative deprivation index of each household within the region in which it resides. We use the measure of relative deprivation described in equation (1), that is the sum of the gaps between the total monthly per capita expenditure of each household and all richer households residing in the same NSS region, normalized to be bounded between 0 and 1. The total monthly per capita expenditure, a proxy for individual income, is recorded in the surveys and accounts for

[24] In cases where the item is not consumed at this level, we step one level higher by geography*sector*quarter until we obtain a median value for the item.

[25] It is similar to a Stone price index, but with prices in level (not log) to fit the LES demand system.

[26] If we restrict the regional weights to represent the preference of BPL households rather than all households in a region, expensive and less frequently consumed items would not be taken into account in the price index, although they are locally available.

all types of expenditure.[27] Within the sample of BPL households, the median relative deprivation index is 0.45 with a standard deviation of 0.13.

The central assumption of our model of aspirational consumption is that relative deprivation increases the minimum level that households are required to spend on aspirational goods. In the Linear Expenditure System (LES), it is equivalent to an upward shift of the Engel curve of aspirational goods (see Figure A.1.1 in Appendix A.1). The LES also assumes quasi-homothetic preferences, implying linear Engel curves. To confirm that both assumptions fit our data, we draw non-parametric Engel curves for the twelve consumption categories using our sample of BPL households. We divide the sample into low (below median) and high (above median) levels of relative deprivation. This allows us to compare the Engel curves of BPL households with the same total expenditure but facing different levels of relative deprivation. Figure 1 shows these Engel curves for our 12 categories.[28]

The Engel curves illustrate than highly deprived households spend much less on cereals, pulses and vegetables at any given level of total per capita expenditure, while spending more on clothing, dairy products and fuel among others.[29] Interestingly, this difference is fairly constant across the total expenditure distribution. Relative deprivation shifts the Engel curves rather than affects their slopes, consistent with the assumption in our model of aspirational consumption.[30] The Engel curves also appear fairly linear for BPL households, confirming that the assumption of quasi-homotheticity of the LES demand system is a good approximation of our data.[31]

These Engel curves provide a first empirical evidence on how relative deprivation affects de-

[27] Income is often a noisy and imprecise measure of means of living in developing countries, especially for BPL households which primarily work in the informal sector or home production.

[28] In order to obtain Purchasing Power Parity (PPP) expenditure across rounds, we multiply all expenditures by a factor of conversion based on the poverty line of the 61th round (1999-2000) within each State-sector. We use local polynomial smoothing to draw the Engel curves. The total per capita expenditure below the fifth percentile and above the ninety-fifth percentile have been truncated.

[29] The large effect on cereals is confirmed by the structural estimation, while aspirational consumption is distributed among different categories each accounting for a small budget share.

[30] In a few cases (e.g. spices), the two curves join at the end of the total per capita expenditure distribution. Given the assumptions of our demand system, this pattern is likely to underestimate the estimated effect of relative deprivation on the demand for aspirational goods. In Section 5, we indeed show that households at the top quartile of the BPL expenditure distribution are less affected by relative deprivation.

[31] We observe a slight curvature which appears, for instance, concave for cereals, showing that it is a necessity for BPL households. Our estimation captures this curvature in the basic required level due to the quasi-homotheticity assumption, which may slightly underestimate the required quantity of cereals compared to the other goods.

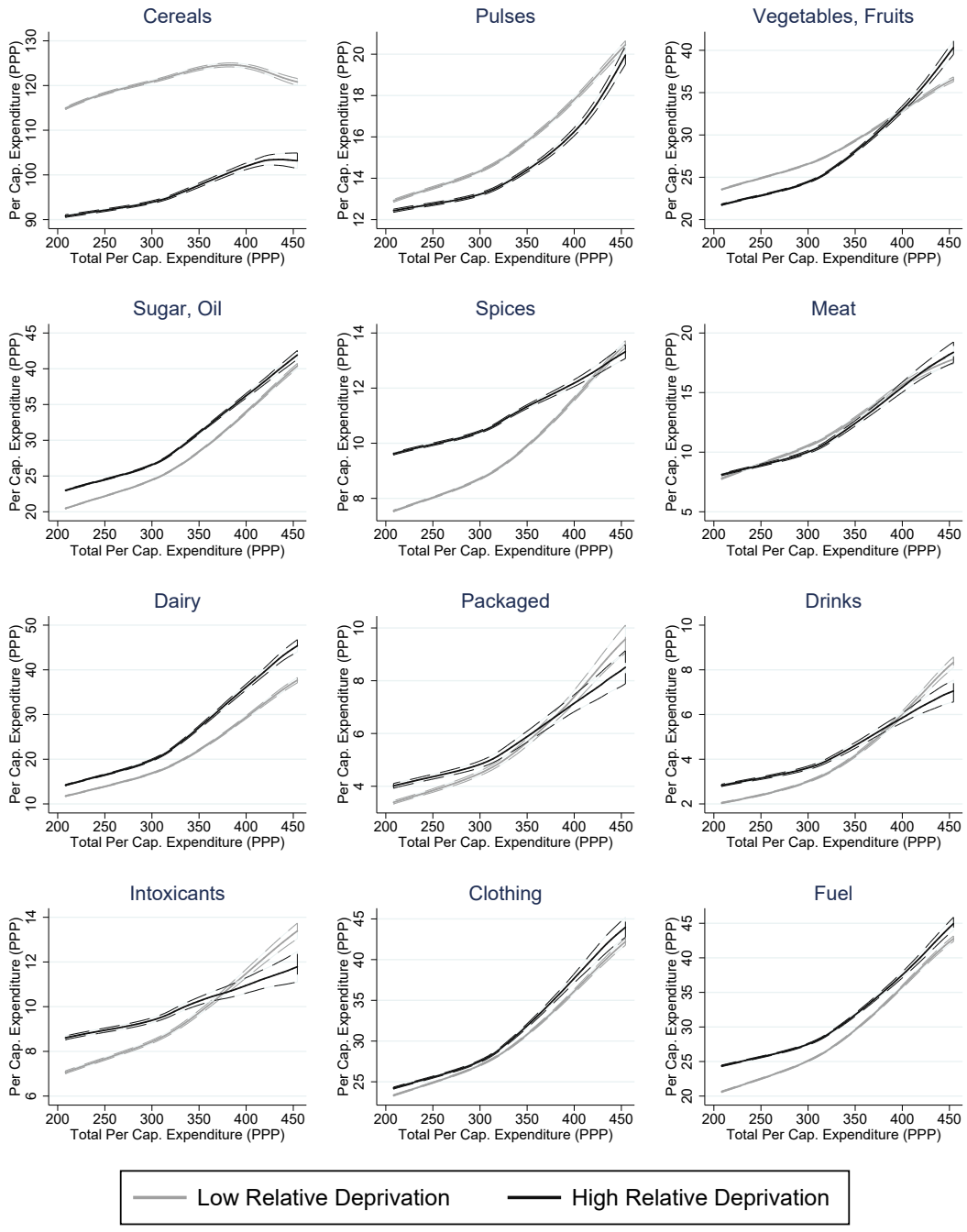

Figure 1: Non-Parametric Engel Curves with Variation in Relative Deprivation, BPL Households

mand among the poor when they are expected to reach a higher social standard. They however use unconditional expenditure shares, and may be driven by other factors correlated with inequality

levels such as local prices. We therefore need the complete demand system specified in Section 2 to identify the effect of relative deprivation and measure its consequences on calorie consumption of BPL households.

Under the relative deprivation hypothesis, richer households define the social standard of consumption. If poorer individuals are upward-looking, we expect that the same goods used by the wealthy to signal status are aspirational for the poor. Heffetz (2011) shows that the goods used to signal status are luxury goods (goods whose income elasticity is higher than 1). This leads us to predict that aspirational goods for the poor tend to be luxury goods for the entire population.[32] A simple test of this prediction is to draw the Engel curves in shares for the entire population: if the budget share spent on a category increases with total expenditure, the good is a luxury, and inversely for a necessity. Figure B.3 in Appendix B shows the unconditional Engel curves in share for each category using the entire sample of households. As predicted, there is a correlation between the effect of relative deprivation on the demand of the poor for a good and its status as a luxury or a necessity for the entire population.

4 Demand System Estimation

4.1 Baseline Specification

We structurally estimate the Linear Expenditure System (LES) obtained in our model of aspirational consumption (equation (4)) on monthly per capita expenditure in our 12 categories of goods. The estimation is performed on BPL households in five NSS survey rounds. We use the iterative Feasible Generalized Nonlinear Least Squares (FGNLS) estimator which allows for the non-linearity of the LES[33] and takes into account the simultaneity of the budget allocation decision among the 12 categories.[34] Expenditures by category add up to total expenditure (additivity con-

[32] In the LES, whether a good is a luxury ($\xi_i > 1$) or a necessity ($\xi_i < 1$) depends on the size of its basic requirement. In particular, the income elasticity of a good i increases as its basic required level τ_i is small relative to the other goods ($\tau_i p_i < \frac{\beta_i}{1-\beta_i} \sum_{j \neq i} \tau_j p_j$).

[33] The LES is linear in expenditure but non-linear in parameters.

[34] The iterative FGNLS estimator is a standard method for demand estimations (Deaton, 1986; Herrendorf et al., 2013). It provides a seemingly unrelated regression framework, taking into account that error terms are correlated

straint), so the error covariance matrix is singular unless we drop one of the demand equations. We drop the demand equation for fuel in all estimations, but the estimation procedure is not sensitive to the choice of the dropped category.

Our demand system is based on the intuition that, conditional on prices and income, relative deprivation affects household consumption through the need to be socially included, which translates into the commodity space in terms of socially required quantities. There are, however, other variables potentially correlated with relative deprivation and consumption choices: household size, the sector in which the household works, and the state of development of the region.[35] These variables may accentuate the correlation between relative deprivation and the decrease in caloric requirement if they are not accounted for.[36] Our empirical specification introduces controls for these factors in a linear fashion within the minimum requirements, following Pollak (1970, 1976).

From the expenditure functions in equation (4), we estimate the following demand system of $n-1$ equations for household h in NSS round t:

$$\begin{cases} x_{1,ht} & = (\tau_1 + \nu_1\rho_{hrt} + \delta_{1,t} + \Pi_1 Z_{ht})P_{1,vt} + \beta_1 m_{ht} \\ & \quad -\beta_1\left[\sum_j(\tau_j + \nu_j\rho_{hrt} + \delta_{j,t} + \Pi_j Z_{ht})P_{j,vt}\right] + \varepsilon_{1,ht} \\ x_{2,ht} & = (\tau_2 + \nu_2\rho_{hrt} + \delta_{2,t} + \Pi_2 Z_{ht})P_{2,vt} + \beta_2 m_{ht} \\ & \quad -\beta_2\left[\sum_j(\tau_j + \nu_j\rho_{hrt} + \delta_{j,t} + \Pi_j Z_{ht})P_{j,vt}\right] + \varepsilon_{2,ht} \\ \ldots & \\ x_{n-1,ht} & = (\tau_{n-1} + \nu_{n-1}\rho_{hrt} + \delta_{n-1,t} + \Pi_{n-1} Z_{ht})P_{n-1,vt} + \beta_{n-1} m_{ht} \\ & \quad -\beta_{n-1}\left[\sum_j(\tau_j + \nu_j\rho_{hrt} + \delta_{j,t} + \Pi_j Z_{ht})P_{j,vt}\right] + \varepsilon_{n-1,ht} \end{cases} \tag{6}$$

The demand system (6) is our baseline specification. $x_{i,ht}$ is the per capita expenditure on cat-

in a demand system. Under the assumption that the error terms are not correlated with the exogenous variables, the iterative FGNLS estimator is equivalent to maximum likelihood estimation.

[35] If poorer households tend to be larger, they may have a lower caloric requirement (economies of scale or presence of more children) while also being more relatively deprived. Likewise, people working in the agricultural sector are likely to need more calories to perform their daily work (Deaton and Drèze, 2009). Lastly, the state of development of a region may decrease the nutritional requirements, for example by providing different occupations or a better health and sanitation environment (Deaton and Drèze, 2009; Duh and Spears, 2017).

[36] Other factors may influence minimum requirements, but as long as they are not correlated with relative deprivation, they are captured by the basic minimum requirement τ_i. If they lead to a positive correlation, our estimation will provide a lower bound for the true social cost of relative deprivation.

egory i of household h in round t (in village v in region r), $P_{i,vt}$ is the price index of category i in village or urban block v[37] and m_{ht} is the per capita expenditure of the household on the 12 categories, also referred to as income in our analysis. The total minimum requirement is composed of the basic required quantity τ_i and the socially required quantity $\nu_i \rho_{ht}$ driven by relative deprivation ρ_{hrt} felt by household h in region r. Our parameter of interest, the effect of relative deprivation on the required quantity, is ν_i. We cluster the standard errors by region-round, as BPL households within a region-round share the same expenditure gap with households above the poverty line. $\varepsilon_{i,ht}$ is the error term.

Our baseline specification also includes round intercepts $\delta_{i,t}$ (round 2004-2005 is our omitted category) to accommodate round-specific effects, and a vector of controls Z_{ht} to account for the factors potentially correlated with a lower nutritional requirements and a higher relative deprivation level: the log of the household size, a dummy for working in the agricultural sector, the share of the urban population in the region, the density of the regional population, and the regional shares of population working in industry and service (agriculture is our omitted category). In the estimation, we mean-center relative deprivation and all the controls by subtracting the variables' average from the data so that they are centered at zero. It leaves their estimated effect unchanged but preserves the interpretation of τ_i as the basic required quantity of the representative household in our sample. Potential concerns raised by the endogeneity of relative deprivation, prices and total expenditure are addressed in Section 4.3.

4.2 Estimation Results

The estimated parameters of the baseline specification (6) are reported in Table C.1 of Appendix C. Reassuringly, all β_i, representing the budget share allocated to each good[38] i after the minimum requirements are met, are bounded between 0 and 1. Also, almost all basic requirement estimates τ_i are positive. The negative parameters τ_i correspond to categories with a larger number of zero expenditures (see Table B.1 in Appendix B) and allow the system to be defined at zero. Among the

[37] The price index is at village level to account for the endogeneity of household unit values to consumption choices (see Section 3.3).

[38] We use the term category or good interchangeably to refer to the twelve categories.

controls, the effect of the log of household size is noteworthy as it goes in the opposite direction than the one which concerns us: having a larger household increases the requirement for caloric intensive products (cereals, pulses).

In this section, we focus on the estimation results in light of Implications 1 and 2 of our model of aspirational consumption.

Implication 1

The first implication of our model of aspirational consumption is that an increase in relative deprivation affects differently the minimum required quantity of each good. In particular, it increases the minimum requirement of socially valued goods and may decrease the minimum requirement of other goods. This implication is captured by the sign and magnitude of the parameter ν_i. Using the estimated parameters, we can compute the impact of a one standard deviation increase in relative deprivation on the required quantity for each category. Categories do not have the same unit, so we normalize the change in required quantity by the quantity consumed by an average BPL household (i.e. the change is expressed as a share of mean category quantity).[39]

Figure 2 shows how a one standard deviation increase in relative deprivation affects minimum requirements in the 12 categories. It decreases or does not affect the required quantities on cheaply available sources of calories such as cereals (6% of mean cereal quantity)[40] or vegetables and pulses. On the contrary, it increases minimum requirements on expensive sources of calories such as meat and dairy (around 10% of mean category quantity), spices, packaged products, and non-caloric goods such as clothing or fuel and lighting (around 5% of mean category quantity).

The baseline specification includes round fixed effects as well as sociodemographic and environmental controls. We estimate the demand system without these controls to better understand how they affect our estimates. We plot the equivalent change in required quantities excluding controls as grey dots in Figure 2. Strikingly, they are very close to the baseline specification and are not

[39] We multiply each ν_i by one standard deviation of relative deprivation, then divide by the mean per capita quantity in category i in our sample.

[40] The estimated decrease in cereal consumption appears smaller in magnitude than the increase in other categories due to the normalization by mean consumed quantity, as the consumed quantity is on average much larger than for other categories. In monetary terms, the additional spending on socially valued goods is partially or totally compensated by the decrease in spending on socially inferior goods.

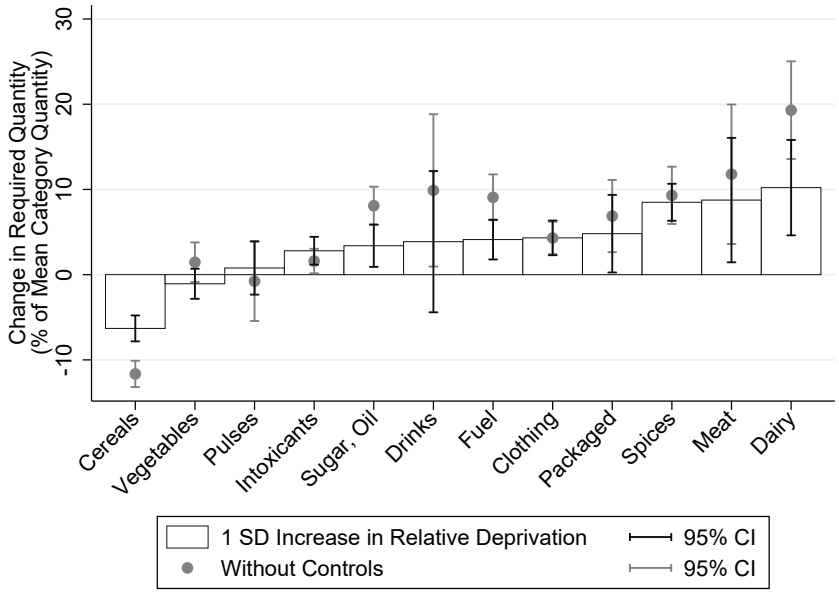

Figure 2: Effect of Relative Deprivation on Required Quantities (% of Mean Category Quantity), BPL households

Notes: the bars show the effect of one standard deviation increase in relative deprivation on required quantities for each category i using the estimation of the baseline specification. Each bar reports the change in required quantity $\nu_i \rho_{SD}$ divided by $\bar{q}_i$, with ρ_{SD} a one standard deviation of relative deprivation and $\bar{q}_i$ the mean consumed quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level. The dots show the corresponding estimates of the demand system excluding round intercepts, sociodemographic and environmental controls.

statistically different, except for cereals. Although these variables may be important determinants of minimum requirements, they do not seem to drive the effect of relative deprivation.

Products whose minimum requirement increases with relative deprivation are socially valued: clothing is a typical visible good, packaged products, dairy and meat are very expensive sources of calories consumed in social events or festivals; fuel and lighting capture what the household spends in energy for home devices. Dairy products are revealed as the most socially valued for the poor. This is an interesting outcome of our estimation in the Indian context, as consumption is highly linked to Hinduism and reverence for cows. Dairies are used in Hindu rituals and are a cornerstone of the vegetarian ideal. In particular, they are deeply linked to the food practices of superior castes (Brahmin), so their status as aspirational could be a sign of "sanskritization".[41] Spices and oil

[41] Concept introduced by Srinivas (1956) to describe how lower and poorer castes mimic the practices of the higher

are valued to a lesser extent, but can be related to what Aparna Pallavi, an Indian food researcher, wrote in Livemint (2016): "Contemporary urban Dalit[42] food is mostly spicy, heavy on oil – both of which were hallmarks of rich people's food. The high use of salt, oil and chilli, therefore, is a reaction to the Dalit sense of deprivation."

Because certain food categories are socially valued, relative deprivation could actually be conducive to a diversification of the diet of the poor. It clearly appears, however, that even in terms of fat and protein content, it would be optimal to spend an additional rupee on cereals or pulses. Table B.2 in Appendix B gives the caloric, fat and protein contents of one rupee (Rs 2005) for the food and drink categories. It shows that one rupee spent on cereals has more than fifteen time the caloric content of one rupee of meat, and more than twice the protein content. Similarly, one rupee of pulses, a precious source of vegetable proteins, provides more than twice the protein contain of one rupee of meat. BPL households in our data are already malnourished and extremely poor, and it is suboptimal for their nutritional state to spend on such expensive food categories.

Another result worth underlining is the very small effect of relative deprivation on intoxicants (alcohol, tobacco and pan). The consumption of intoxicants has often been underlined as a self-control issue (temptation goods), and a threat to long-term investment for the poor, potentially leading to a poverty trap (Banerjee and Mullainathan, 2010; Bernheim et al., 2015). Our results show that the aspirational motive differs from temptation and does not lead to a higher consumption of intoxicants.

Implication 2

The second and central implication of our model of aspirational consumption is based on the definition of aspirational goods as goods whose demand increases with relative deprivation. Recall that if a good is aspirational it becomes more necessary as relative deprivation increases (Section 2.2). Relative deprivation leads poor households to consume aspirational goods in positive and larger quantities than they would otherwise. To test Implication 2, we compute the income elasticity of each category as specified by equation (5) using a level of relative deprivation ρ one

castes

[42]Dalits are the ex-Untouchable and are over-represented in the poorest sections of the Indian society.

standard deviation lower (low relative deprivation) or higher (high relative deprivation) than the sample mean.

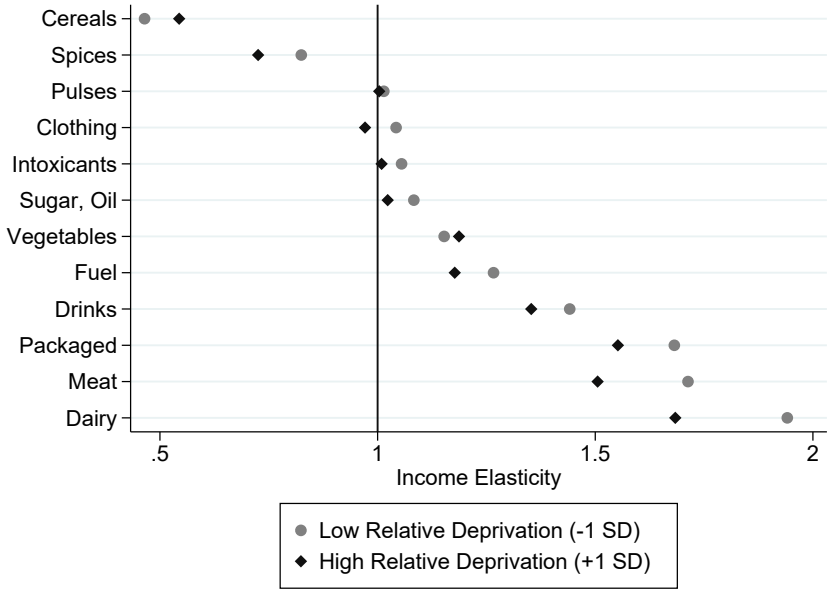

Figure 3: Estimated Income Elasticities for Low and High Deprivation Levels, BPL Households

Notes: The graph reports income elasticities ξ_i for each category i using the estimated parameters of the baseline specification. We compute the income elasticity by varying relative deprivation ρ from relatively low (1 standard deviation lower than average) to relatively high (1 standard deviation higher than average) The categories are ordered from lowest to highest income elasticity when relative deprivation is low.

Figure 3 reports the income elasticities for each category in a low versus high relative deprivation condition. Two patterns stand out. First, not surprisingly, the aspirational goods correspond to the goods with a high socially required level in proportion of the category expenditure (see Figure 2). In particular, the income elasticity of dairy, meat, packaged products, drinks, fuel and lighting and clothing decreases sharply with relative deprivation. Second, the more luxurious the category (the higher its income elasticity), the more it is aspirational (the more the income elasticity decreases with relative deprivation).

The second result confirms our empirical prediction which pursues the work of Heffetz (2011) on conspicuous goods (see Section 3.4 and Figure B.3 in Appendix B). The same goods which are luxuries for the entire population, hence signaling status for the rich, are aspirational for the poor. They tend to become more necessary for relatively deprived households. Clothing even reverses its

status, from being a luxury at low relative deprivation levels to a necessity when relative deprivation is high.

These results underline the trade-off between physiological and social needs: the goods which are not usually consumed by the poorest households, and not necessary to their physiological needs, are consumed in greater quantities when households are more relatively deprived.

4.3 Robustness Checks

Our approach relies on the intuition that our estimated τ_i coefficients can be interpreted as minimum required quantities. We discuss this intepretation in Appendix D.1. First, we show that cereals are by far the most important basic expenditure of BPL households, followed by other intuitively necessary categories. Second, virtually all households in our sample can afford the basic required expenditure predicted by the estimation. Third, we compute the predicted basic caloric requirement, which is about 780 calories per capita per day, a number close to the lower bound for metabolic survival given in the medical literature (Ball et al., 1970; Willms et al., 1978). These results, while reassuring on their interpretation of basic minimum requirements, also show that the LES may be used in other contexts to capture basic needs in a straightforward way. Our focus on social requirements is one of the many potential applications of the LES, which could also capture minimum requirements for different populations or at different periods. This interesting property of the LES has been little explored before.

Another source of concern is the assumption of independent wants across commodities, which is a specificity of the Linear Expenditure System (LES). In order to relax this assumption and introduce cross-price effects in our demand system, we estimate the Linear Preference System (LPS) developed in Appendix A.2. The results of the estimation, discussed in Appendix D.2, show that our findings are robust to the inclusion of cross-price terms. We keep the LES baseline specification in the rest of the article for its theoretical and empirical tractability.

Two sources of endogeneity of relative deprivation, discussed in Appendix D.3, could also affect our findings. First, a specific case of measurement errors on total expenditure may lead to an upward bias on our results. This case arises under two conditions: higher total expenditure

should be systematically underestimated, and relative deprivation should be positively correlated with household income. This second hypothesis is not intuitive, and we show that it is refuted by the data. Measurement errors are therefore more likely to attenuate our results. Second, some individuals may have a specific taste for aspirational goods, so as to consume relatively more of them in the past. In this case, they would be presently more malnourished, and consequently poorer due to a lower working capacity (Dasgupta, 1997). The taste for aspirational goods would lead the individual to be more relatively deprived (lower income) in the present. We introduce an instrument for relative deprivation not correlated with taste and total expenditure: the mean relative deprivation level in the region leaving out the household. The estimation of our demand system with instrumented relative deprivation in fact magnifies our results on social requirements. The inherent taste for aspirational goods does not seem to drive our findings.[43]

Lastly, a general concern of demand estimation is the endogeneity of prices and total expenditure to consumption choices. In Appendix D.4 we discuss how this concern may affect our results, and the relevance of instrumental variables. We estimate the LES baseline specification with our set of instruments: total expenditure on all goods and services for expenditure on the 12 categories, and Hausman instruments for prices, namely prices in a nearby village (Hausman, 1996; Atkin, 2013). Our results on social requirements are magnified by the instrumented estimation, confirming that the endogeneity of prices and total expenditure may attenuate the effect of relative deprivation.

4.4 Caloric Cost of Relative Deprivation

More than 90% of the households living under the poverty line in our data are under malnutrition,[44] and this fraction does not reduce over time (see Table 1).[45] Our findings suggest that relative deprivation is one of the factors driving demand of the poor away from caloric goods. To have

[43] Another related concern is that households having a taste for aspirational goods move to regions where they are more available, but where inequality is also higher. This explanation is unlikely in our context, first because migration is very low in India (Munshi and Rosenzweig, 2009), second because the results of Section 5 show geographical and income class variations which we cannot reconcile with a potential taste-based migration.

[44] The malnutrition threshold used by the Indian Government is 2100 (urban) or 2400 (rural) daily per capita calories.

[45] This caloric consumption puzzle has been underlined by Deaton and Drèze (2009) using the same data over the entire Indian population.

an order of magnitude of this effect, we quantify the average loss in consumed calories driven by relative deprivation. From equation (4) we compute the difference in quantity (not expenditure) demanded with and without relative deprivation.[46] For each good i, it is given by:

$$\Delta_{i,ht} \quad = \nu_i \rho_{hrt} - \frac{\beta_i}{P_{i,vt}} \sum_j \nu_j \rho_{hrt} P_{j,vt}.$$

Our estimation of the baseline specification provides the parameters ν_i for all categories. We compute $\Delta_{i,ht}$ for each category i consumed by household h in round t (in village v in region r) using these parameters and the data on which we performed the estimation. The total caloric loss κ_{ht} faced by the household is the sum of the differences $\Delta_{i,ht}$ in daily calories:[47]

$$\kappa_{\text{ht}} = \sum_i \Delta_{i,ht}. \tag{7}$$

Figure 4 shows the calories forgone by below poverty line households when the level of relative deprivation increases.[48] The effect of relative deprivation on the nutritional state of BPL households is substantial: a two standard deviation increase in relative deprivation (between the two dashed vertical lines) corresponds to a daily loss of about 120 calories per capita. Relative deprivation does weigh heavily on the nutritional status of the poor in India.

As a counterfactual, we estimate the fraction of households which would not be under malnutrition in the absence of relative deprivation. We add the estimated caloric loss to the per capita calorie consumption of each BPL household of our sample. Using these counterfactual caloric consumptions, we find that malnutrition would be reduced by 7 percentage points on average in the absence of relative deprivation (Table 3). BPL households would also consume about 220 additional calories per capita.

The estimated caloric loss is an important indicator of the impact of relative deprivation beyond

[46] The difference can be interpreted as the gap between similar individuals (or two Engel curves) with and without relative deprivation, as depicted in Figure A.1.1 in Appendix A.1.

[47] Only food and drinks categories appear in the sum, as $\Delta_{i,ht} = 0$ for non-caloric categories. The estimation predicts monthly per capita kilo-calories. We multiply the estimated caloric quantities by 1000/30 to obtain daily calories.

[48] The effect of relative deprivation on calorie consumption is not a cost by construction. If aspirational goods were intensive in calories, our measure would provide a caloric benefit to relative deprivation.

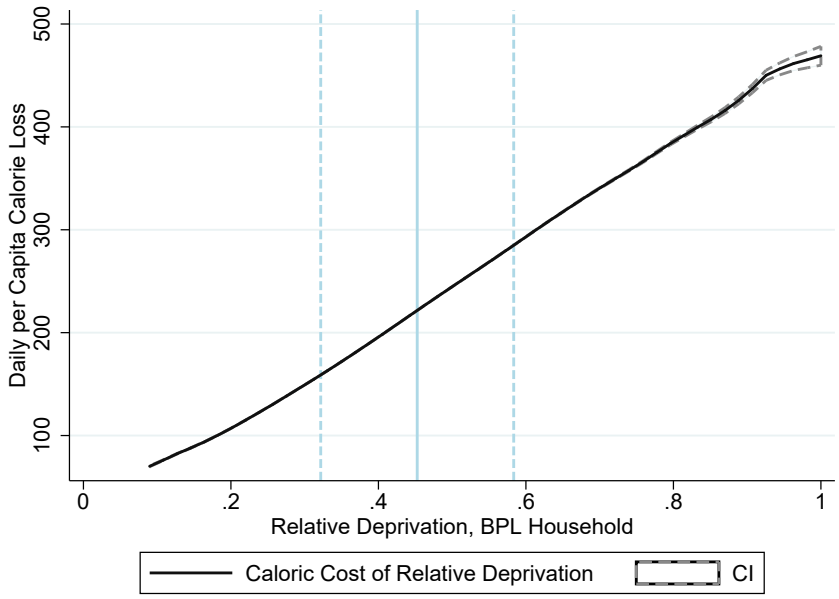

Figure 4: Calories Forgone in Function of Relative Deprivation, BPL households

Notes: Local polynomial plot of the caloric loss κ_{ht} in function of the level of relative deprivation. The full vertical line in light blue is the mean relative deprivation in our sample of BPL households, and the dashed vertical lines are one standard deviation below and above the mean.

Table 3: Counterfactual Nutritional Status Without Relative Deprivation, BPL Households

	1983	1987–1988	1993–1994	1999–2000	2004–2005	Total
% under Malnutrition, Actual	0.89	0.90	0.93	0.95	0.97	0.92
% under Malnutrition, Counterfactual	0.82	0.80	0.86	0.89	0.91	0.85
Daily Per Capita Calories, Actual	1732	1760	1715	1672	1625	1700
Daily Per Capita Calories, Counterfactual	1934	1985	1931	1887	1880	1924

Malnutrition is measured as daily per capita calorie consumption below 2100 (urban) or 2400 (rural).

budget reallocation. It is more difficult for households to reach adequate nutrition when they are more relatively deprived, and hence less privileged to begin with.

5 Testing the Channels

5.1 How Local is the Reference Level of Comparison?

When considering relative deprivation, we may wonder what is the appropriate geographical level for the reference group. On the one hand, Bowles and Park (2005) suggest that the influence of

the reference group is independent of its size: a small group at the top may influence by cascade the aspirational consumption of all sections of income. In this case, the geographical area should be sufficiently wide to accurately capture the group of reference. On the other hand, Frank (2005) points out that local interactions matter the most for status comparison.[49]

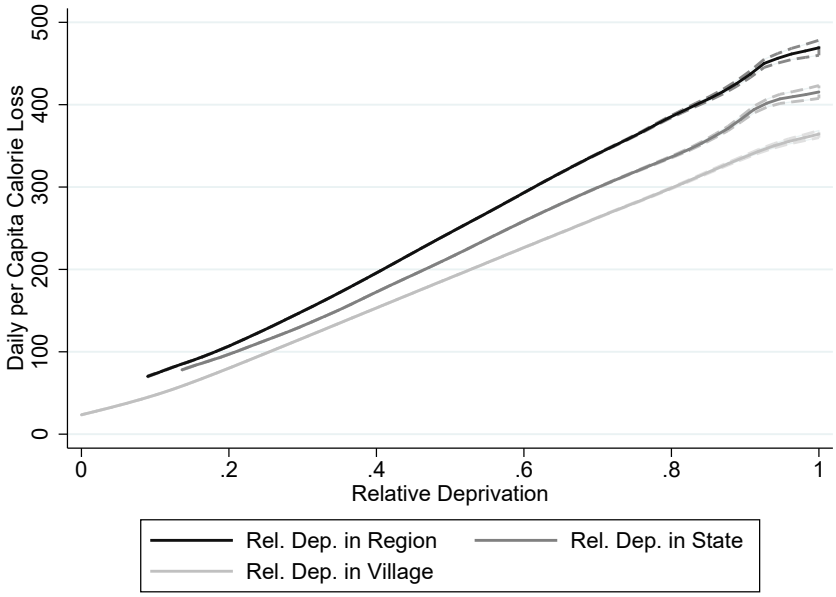

Figure 5: Calories Forgone in Function of Relative Deprivation at Village, Region and State level, BPL households

Notes: Local polynomial plots of the caloric loss using estimates of the baseline, village-level and state-level specifications.

This points towards a non-linear impact of distance on upward comparisons: too wide, wealthier households may not be visible; too narrow, it may capture clusters of households at similar income levels which do not look up to each other.[50] Our relative deprivation measure is so far computed using the regional expenditure distribution, but our data allow us to explore local (village/urban block) or state-level measures of relative deprivation. We estimate the baseline speci-

[49]Distance also affects the visibility of consumption: relative deprivation may have a stronger effect on the demand for aspirational goods when these are the only luxury items that people observe from the rich. On the contrary, long-term investment choices such as savings or human capital may only be visible when made by neighbors and close peers (Genicot and Ray, 2017).

[50]Lewbel et al. (2016) bring evidence that individuals with a low social or economic status do not look up to people with similar characteristics for their consumption choices. Our results suggest that they rather look up to richer individuals.

fication (equation (6)) using these additional measures of relative deprivation.[51] The caloric loss due to relative deprivation at the three geographical levels is plotted in Figure 5.

Strikingly, the estimated caloric loss incurred due to relative deprivation is smaller at both local and state levels, especially as relative deprivation increases. This downward shift of the caloric loss curve is even more accentuated using the local measure of relative deprivation. At high relative deprivation levels, local relative deprivation leads to a decrease in the caloric loss of about 100 calories compared to the baseline regional relative deprivation. These results suggest that the NSS region is the appropriate geographical level of reference for setting the social standard of aspirational goods.

5.2 Local Inequality and Availability of Aspirational Goods

The availability of aspirational goods is yet another channel through which the demand of the poor may be correlated with relative deprivation. Could it be that the presence of wealthier households make these goods more available, and in turn more tempting for poor households? In this case, the relative deprivation index computed at local level also captures the effect these wealthy households have on the availability of each category. If it drives our estimates, we should expect village level relative deprivation to increase (not decrease) the consumption of aspirational goods compared to region relative deprivation. As shown in the above section, we find the contrary: village-level relative deprivation decreases the caloric loss incurred. The inclusion of local price indexes – one of the main advantages of our demand system – also controls for product availability (see Section 3.3). Once we control for local prices, local economic incentives do not seem to drive our results.

5.3 Relative Deprivation or Competition for Status?

In our model of aspirational consumption, people do not compete for status in function of their income, but attempt to keep up with the standard of decency determined by higher income house-

[51] For consistency, we replace the region-level controls and cluster the standard errors at the appropriate geographical level (village/urban block or state) in these estimations.

holds. In other words, rich and poor households who face the same level of relative deprivation are similarly impacted by it. Another strand of the literature models conspicuous consumption as a distinctive motive, aimed at signaling income which is otherwise unobservable. The signaling motive interacts with income and is negatively correlated with relative deprivation: to signal my rank, I need to conspicuously consume marginally more than the person ranked below me in the income distribution.

To test for a potential interaction with total expenditure, we estimate the baseline specification on the four quartiles of BPL households separately.[52] We also estimate it on Above Poverty Line (APL) households whose total expenditure is below 1.5 times the poverty line, ensuring that they may still be affected by the deprivation motive. Figure 6 shows the caloric loss of relative deprivation for each BPL quartile and our sample of APL households. At low relative deprivation levels, the caloric loss is remarkably similar for the three poorest quartiles. At higher levels of relative deprivation, an interesting non-linear relationship emerges: the caloric loss is slightly lower for the poorest quartile, composed of households barely above the physiological minimum and hence usually not consuming aspirational goods. It is highest for the second quartile, BPL households still extremely poor but slightly above survival. Finally it drops for the third quartile, and is much lower for BPL households closer to the poverty line (fourth quartile). APL households forgo a much lower caloric loss than any quartile of BPL households, confirming the intuition that the aspirational motive primarily affects the very poor.

These results show that, overall, relative deprivation drives the caloric loss rather than the absolute purchasing power of the household. Second, aside from households just above survival, it decreases with total expenditure, contrary to what the signaling motive would suggest. Households close to the poverty line seem to suffer the least from relative deprivation, while BPL households just a little above mere survival (second quartile) incur the highest caloric loss. The first quartile of households still suffers a higher caloric loss than the fourth quartile. Finally, APL households seem even less sensitive to the relative deprivation motive. At least regarding poor households, the relative deprivation hypothesis (i.e. the cost of social inclusion) better explains conspicuous consumption than the signaling hypothesis (the cost of social distinction).

[52] Quartiles are computed using purchasing power parity total expenditures.

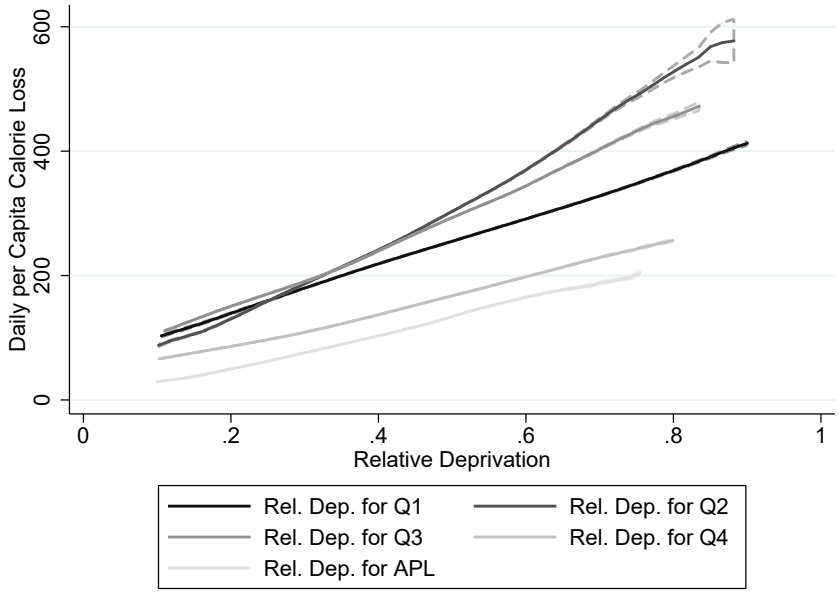

Figure 6: Calories Forgone in Function of Relative Deprivation, Total Expenditure Quartiles

Notes: Local polynomial plots of the caloric loss using estimates of the baseline specification run separately for each quartile of BPL household by PPP monthly per capita total expenditure and Above Poverty Line (APL) households.

5.4 How Wealthy is the Reference Group?

Who defines the social standard of consumption of the poor? Aspirational consumption may be driven by classes closer to the household's means of living. If the very poor do not directly observe the behavior of the very rich, the latter may have a small influence on the consumption of the former. To test for the income class of reference, we compute for each BPL households two relative deprivation measures: relative deprivation with the BPL population only, and relative deprivation with the population above the poverty line.[53]

Figure 7 shows the caloric loss obtained using these two measures compared to the baseline measure. We plot the caloric loss predicted by each estimation against the level of baseline relative deprivation computed on the entire population. Several interesting patterns emerge. First, at low levels of baseline relative deprivation, households are not deprived among BPL households but with the households above poverty line. Hence, the caloric loss is driven by the relative deprivation

[53]Both of these measures are computed as if the rest of the expenditure distribution does not exist.

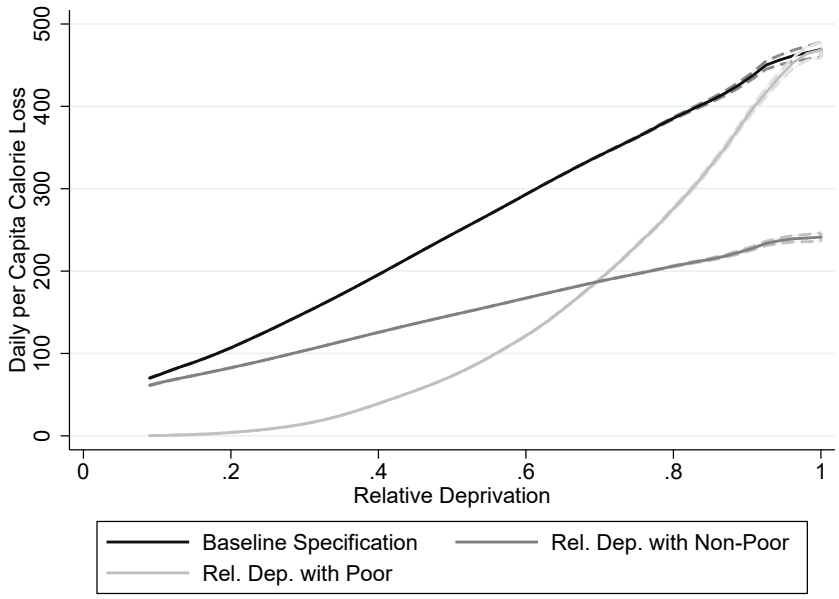

Figure 7: Calories Forgone in Function of Relative Deprivation of BPL Households with Poor and Non-Poor Households

Notes: Local polynomial plots of the caloric loss using estimates of the baseline specification run separately on household relative deprivation compared to the BPL population, and compared to households above poverty line. The horizontal axis is the baseline relative deprivation level.

with non-poor households. As the baseline relative deprivation increases, relative deprivation with other poor households accounts for an increasing share of the caloric loss. For the most deprived households, the relative deprivation with other poor households accounts for the major part of the caloric lost.

These results strongly suggest a trickle-down pattern: households feel relatively deprived compared to other households above them in the income distribution, but not too far above. The most relatively deprived are affected by the non-poor population through expenditure cascade, although the major effect is driven by households just above them. This pattern is also consistent with the definition of relative deprivation by Runciman (1966), who suggests that you feel relatively deprived of something if you see it as potentially reachable.

5.5 Social Groups and Aspirational Consumption

The flexibility of our specification allows to test if different social groups in India have different aspirational goods. India has strong social and religious divisions, and each social group may have its own definition of what is aspirational. The empirical results in Section 4 imply that dairy products are aspirational in India. This result is consistent with reverence for the cow and the place dairy products (milk, ghee) have in religious rituals and festivals in Hinduism, especially for upper castes. It comes along with a taboo on meat consumption, particularly beef (cow). Muslims, on the contrary, have no taboo on meat consumption aside from pork, and do not show a particular reverence to dairy products. We may therefore expect Muslim aspirational goods to differ from their Hindu counterparts.

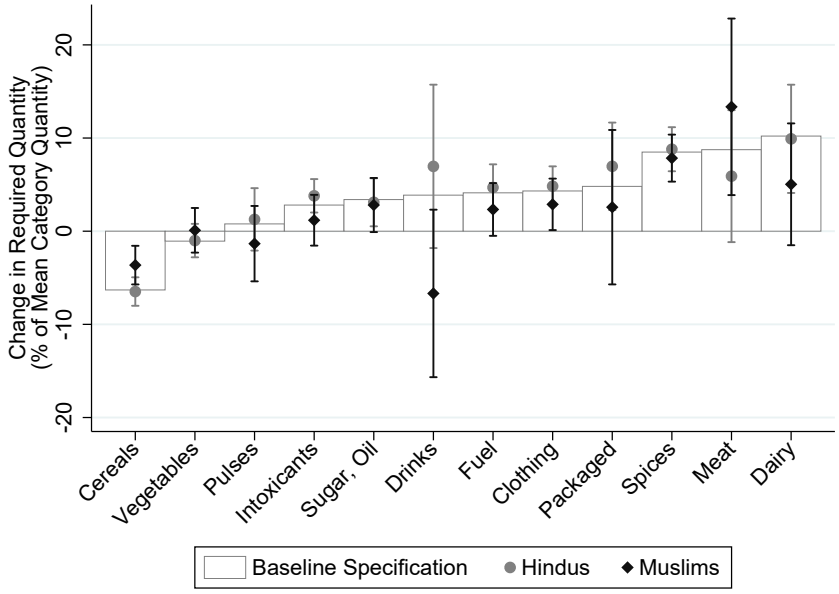

Figure 8: Relative Deprivation for Hindus and Muslims, % of Mean Category Quantity, BPL Households

Notes: the graph plots the effect of one standard deviation increase in relative deprivation on required quantities for each category i for the entire BPL population (baseline), the Muslim population and the Hindu population. The estimates report the change in required quantity $\nu_i \rho_{SD}$ divided by $\bar{q}_i$, with ρ_{SD} a one standard deviation of relative deprivation and $\bar{q}_i$ the mean consumed quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level.

We run the baseline specification separately on Muslim and Hindu sub-samples of BPL house-

holds. Figure 8 shows the effect of a one standard deviation increase in relative deprivation as percentage of mean category quantity, compared with the baseline specification. The Hindu subsample is almost at the same point estimate than the baseline specification, as it comprises almost 80% of the BPL households. It is however slightly different for drinks, packaged products and meat, three products for which Muslims seem to differ in their preferences. The only good which appears more socially valued for Muslims than for Hindus is meat, a sign of wealth for Muslims as it is in many countries but taboo for religious Hindus. Conversely, dairy products appear less socially valued for Muslims than for Hindus. Intoxicants, which contain alcohol (a strong taboo for Muslims), also appear less socially valued for Muslims. The overall effect of relative deprivation on the consumption requirement of Muslims seems weaker, although the coefficients are not statistically significant due to the large 95% confidence intervals.

These results underline the importance to have a flexible definition of aspirational goods: they strongly depend on the socio-cultural context, and may have different implications for different groups. In the Indian context, we measure a heavy caloric cost of relative deprivation for BPL households, even if consumption aspirations differ slightly across social groups.

6 Conclusion

This article provides evidence that relative deprivation drives the conspicuous consumption of the poor. Our central hypothesis is that poor households in areas where inequality prevails bear an additional cost of social inclusion, as the consumption standard of conspicuous goods is higher. We introduce relative deprivation in a fully specified demand system which provides guidance to determine aspirational goods, which become more necessary to the poor when relative deprivation increases, and to compute the caloric cost of relative deprivation.

The structural estimation of the demand system on BPL households in India confirms our hypothesis: relative deprivation increases the required consumption level of expensive calories (e.g. dairy or packaged products) and non-caloric goods (e.g. clothing or fuel). These goods, identified as aspirational, become more necessary when relative deprivation increases. Our estimation suggests that relative deprivation causes poor households to forgo on average 13% of their daily per

capita calorie consumption, or about 65 grams of rice. Computing counterfactual calorie consumptions, we find that malnutrition would be reduced by 7 percentage points on average in the absence of relative deprivation. These findings are robust to alternative specifications of the demand system, and to instrumenting for relative deprivation, prices and total expenditures.

To uncover the precise channels driving our results we examined the contribution of various reference groups in terms of geographical level (region, state, village) or social class (poor only versus non poor) to the caloric loss. Our results suggest that social comparisons are stronger at the regional level. They also confirm the trickle-down (or expenditure cascade) hypothesis: the poor are upward-looking, but primarily towards other households not too far above in the income distribution. In other words, the standard of living must appear sufficiently reachable, or visible, to increase demand among the poor for aspirational goods. Our identification also captures meaningful categories of aspirational goods considering prevailing status norms in India. Notably, we find dairy products to be more aspirational for Hindus, and meat for Muslims.

Our findings provide a rationale for the conspicuous behavior of the poor. They show that a poor household living in an unequal region is more likely to remain malnourished than a similar household in a more equal region. We believe that they help achieve a better understanding of the multiple dimensions of deprivation, and have major consequences for the design and targeting of programs fighting endemic malnutrition. A common argument against poverty-alleviation policies in the form of direct or indirect transfers is that the poor choose to spend a substantial amount of the additional budget on goods we may think as non-necessary, rather than spending it all on food or education. Understanding how the distribution of income in society can determine the definition of basic needs may help redirect the argument towards inequality rather than the presumed irrationality of the poor.

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Appendix

A Theoretical Appendix

A.1 Illustration: A Two-Goods Case of the LES

To illustrate the properties of the linear expenditure system with relative deprivation, we take a simple two-goods case where the individual spends her income on cereals f and a conspicuous good, for instance clothing, c. We derive the following LES demand system in expenditure (equation (4)):

$$\begin{cases} x_f = p_f q_f = (1-\beta)(\tau_f + \nu_f \rho) p_f + \beta m - \beta(\tau_c + \nu_c \rho) p_c \\ \\ x_c = p_c q_c = \beta(\tau_c + \nu_c \rho) p_c + (1-\beta) m - (1-\beta)(\tau_f + \nu_f \rho) p_f \end{cases} \tag{8}$$

with $\beta_f = \beta$ and $\beta_c = 1 - \beta$.

We assume that relative deprivation increases the required quantity of good c, i.e. $\nu_c > 0$ and $\nu_f \leq 0$ (Implication 1). In this simple 2-goods case, this assumption is sufficient for good c to be aspirational. Indeed, if $\nu_c > 0$ and $\nu_f \leq 0$, then the demand for cereals f decreases with relative deprivation, and the demand for clothing c increases with relative deprivation. This can be seen more clearly by differentiating the demand equations with respect to relative deprivation:

$$\frac{\partial x_f}{\partial \rho} = (1-\beta)\nu_f p_f - \beta \nu_c p_c < 0, \qquad \frac{\partial x_c}{\partial \rho} = \beta \nu_c p_c - (1-\beta)\nu_f p_f > 0. \tag{9}$$

As relative deprivation ρ increases, the individual spends a higher fraction of her income on the aspirational good. If this good is non caloric, as in our case with clothing, then she diminishes by the same amount her caloric consumption.

We derive the income elasticities to obtain Implication 2, which is that an aspirational good

becomes more necessary as relative deprivation increases:

$$\begin{cases} \xi_f = \frac{1}{1+(\tau_f+\nu_f\rho)\frac{1-\beta}{\beta}\frac{p_f}{m}-(\tau_c+\nu_c\rho)\frac{p_c}{m}} \\ \\ \xi_c = \frac{1}{1+(\tau_c+\nu_c\rho)\frac{\beta}{1-\beta}\frac{p_c}{m}-(\tau_f+\nu_f\rho)\frac{p_f}{m}} \end{cases} \tag{10}$$

We show in Implication 2 that the condition for that the income elasticity ξ_c of clothing to decrease with relative deprivation ρ is that clothing is an aspirational good, i.e. $\nu_c p_c > \frac{1-\beta}{\beta}\nu_f p_f$. This condition is realized under the assumption that $\nu_c > 0$ and $\nu_f \leq 0$. As relative deprivation increases, the conspicuous good becomes more necessary, i.e. its income elasticity decreases. Similarly, the income elasticity of the non-conspicuous good is a positive function of relative deprivation (thus becoming less necessary with relative deprivation).

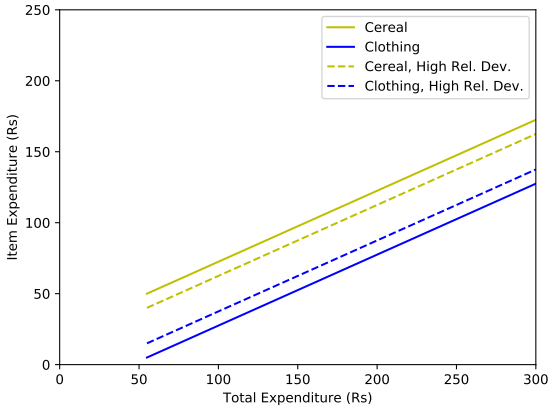

Figure A.1.1: Engel Curves with Variation in Relative Deprivation

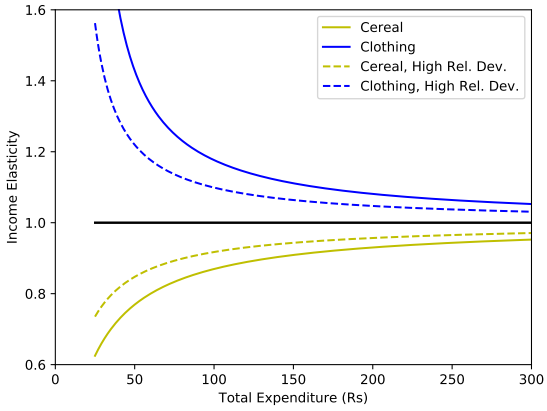

Figure A.1.2: Income Elasticities with Variation in Relative Deprivation

Figure A.1.1 shows the Engel curves in a case without relative deprivation (dotted lines) and with a high relative deprivation level (full lines) when the aspirational good is c.[54] The Engel curves shift in the opposite direction when relative deprivation increases, illustrating that an individual increases her consumption of clothing and decreases her consumption of food at any level of income. Also, the minimum expenditure required for an individual to survive increases with the

[54] In all graphs, prices are normalized to 1. We do not exploit price effects in this illustrative section.

income gap, except if the aspirational good is substituted to the non-conspicuous good by the same amount ($\nu_f p_f = -\nu_c p_c$), as illustrated on the graph.

We also observe that even though food is more necessary than clothing, the income elasticities converge as relative deprivation increases. Figure A.1.2 illustrates the difference in income elasticities between individuals confronted to a low versus high level of relative deprivation. At the extreme, relative deprivation could be so high as to inverse the trends of the income elasticities, making the aspirational good more necessary than the non-conspicuous one.

A.2 Generalization: the Linear Preference System

The Linear Expenditure System (LES) can be nested in a family of demand systems with linear and quasihomothetic preferences (Blundell and Ray, 1984),[55] generated by the following expenditure function $C(p,u)$ with given utility level u and price vector p:

$$C(p,u) = a(p) + b(p)u, \tag{11}$$

with $a(p)$ and $b(p)$ concave, linear, homogeneous functions of prices. The two price aggregators correspond respectively to the cost of living and the relative price of income elastic goods.

The expenditure function which corresponds to the LES utility function in equation (2) is:

$$C(p,u) = \sum_k \gamma_k p_k + u\Pi_k p_k^{\beta_k}. \tag{12}$$

This expenditure function assumes separable behavior, or independent want: there is no substitution across goods. The generalization of this demand system is referred to as Linear Preference System (LPS) by Blundell and Ray (1984). It preserves the linearity of the Engel curves (quasihomothetic preferences), but allows to relax the separability assumption by providing a flexible

[55] These features imply that the consumer's minimum expenditure function takes the Golar polar form, hence allowing demand aggregation of the population as a representative consumer. This family of demand systems defines the consumer problem by taking the dual and equivalent approach of minimizing expenditure under a specific utility level at given prices.

functional form in the price space. It corresponds to the following expenditure function:

$$C_{\text{LPS}}(p,u) = \sum_k \sum_j \gamma^*_{kj} p_k^{1/2} p_j^{1/2} + u\Pi_k p_k^{\beta_k}, \tag{13}$$

with the price aggregators:

$$\begin{aligned} a(p) &= \textstyle\sum_k \sum_j \gamma^*_{kj} p_k^{1/2} p_j^{1/2}, \\ b(p) &= \textstyle\Pi_k p_k^{\beta_k}. \end{aligned} \tag{14}$$

The expenditure function reduces to the baseline case, equation (12), with the additional assumption of $\gamma^*_{kj} = 0$ for all $k \neq j$. In both cases, the utility level u has a lower bound at 0, at which the expenditure function is $C(p,u) = a(p)$. The intuition of this property is that the price aggregator $a(p)$ represents the cost of living. This family of demand systems keeps the ease of interpretation of the cost of living as the sum of required expenditure: $\sum_k \gamma_k p_k$ in the Linear Expenditure System (LES) and $\sum_k \left[\sum_j \gamma^*_{kj} (\frac{p_j}{p_k})^{1/2}\right] p_k$ in the LPS.[56]

Using Shephard's Lemma, the price derivatives of the expenditure function in equation (13) generate the following Hicksian demand function for each good i:

$$\frac{\partial C_{\text{LPS}}(p,u)}{\partial p_i} = q_{i,\text{LPS}}(p,u) = \sum_j \gamma_{ij} (\frac{p_j}{p_i})^{\frac{1}{2}} + \frac{\beta_i}{p_i} u\Pi_k p_k^{\beta_k}, \tag{15}$$

where $\gamma_{ij} = (\gamma^*_{ij} + \gamma^*_{ji})/2$, and the following restrictions hold:

$$\begin{aligned} &\textstyle\sum_i \beta_i = 1 \qquad (\text{additivity}), \\ &\gamma_{ij} = \gamma_{ji} \qquad (\text{symmetry}). \end{aligned} \tag{16}$$

Under the standard assumption that the household spends her entire income by minimizing her expenditure, i.e. $C_{\text{LPS}}(p,u) = m$, we rewrite equation (11) as the indirect utility function $u(p,m)$

[56] It is not the case of the Almost Ideal Demand System (Deaton and Muellbauer, 1980) (AIDS). The LES generalization allows us to have a direct estimation and intuitive interpretation of minimum required levels in terms of quantities. The advantage of the AIDS is to add flexibility in the income space, as it does not assume linear Engel curves. We show in the stylized facts, however, that the assumption of linear Engel curves fits well the demand of poor households in our data.

using the LPS price aggregators:

$$u(p,m) = \frac{m - \sum_k \sum_j \gamma^*_{kj} p_k^{1/2} p_j^{1/2}}{\Pi_k p_k^{\beta_k}}. \tag{17}$$

Replacing u in the Hicksian demand functions (15) by its expression in equation (17), we obtain the Marshallian demand function for each good i which we express as expenditure:

$$x_{i,\text{LPS}} = p_i . q_{i,\text{LPS}}(p,m) = \sum_j \gamma_{ij} (p_i p_j)^{\frac{1}{2}} + \beta_i (m - \sum_k \sum_j \gamma_{kj} (p_k p_j)^{\frac{1}{2}}). \tag{18}$$

Replacing γ_{ii} by its decomposition into a basic and social component (equation (3)), we obtain the LPS specification of our demand system with relative deprivation:

$$x_{i,\text{LPS}} = (\tau_{ii} + \nu_{ii}\rho) p_i + \sum_{j \neq i} \gamma_{ij} (p_i p_j)^{\frac{1}{2}} + \beta_i (m - \sum_k (\tau_{kk} + \nu_{kk}\rho) p_k - \sum_k \sum_{j \neq k} \gamma_{kj} (p_k p_j)^{\frac{1}{2}}). \tag{19}$$

Equation (19) relaxes the assumption of independent want across goods by introducing cross-price effects on the demand for each good ($\gamma_{ij} \neq 0$). The empirical predictions of the effect of relative deprivation on demand, in particular Implications 1 and 2, can be similarly derived from the LPS.

B Additional Descriptive Statistics

Table B.1: Share of Below Poverty Line Households with Positive Consumption, all Survey Rounds

	1983	1987–1988	1993–1994	1999–2000	2004–2005
Cereals (%)	97.8	99.6	99.2	99.7	99.6
Pulses (%)	89.4	94.4	96.4	96.3	97.7
Vegetables, Fruits (%)	97.3	99.3	99.4	99.8	99.7
Sugar, Oil (%)	96.7	99.0	99.3	99.6	99.5
Spices (%)	97.2	99.3	99.1	99.5	99.5
Meat (%)	51.3	54.6	56.0	58.7	58.4
Dairy (%)	53.2	57.7	61.5	57.1	64.7
Packaged (%)	41.1	53.2	67.6	62.4	86.2
Drinks (%)	67.3	73.0	78.5	80.2	87.8
Intoxicants (%)	82.4	83.7	80.4	76.2	75.8
Clothing, Footwear (%)	96.0	96.6	97.9	99.5	99.8
Fuel, Lighting (%)	97.6	99.7	99.3	99.8	99.8
Other (%)	98.4	99.9	99.8	100.0	100.0

"Packaged" products are extra items, usually processed, such as salted refreshments, sweets, biscuits, dry fruits. "Intoxicants" are alcohol, tobacco and pan products. "Other" expenditure is composed of durable goods and services (no recorded quantity).

Table B.2: Calorie, Protein and Fat content of one 2005 Rupee for Food and Drink

	Calories (cal per 2005 Rs)	Fats (gms per 2005 Rs)	Proteins (gms per 2005 Rs)
Cereals	380.72	2.57	11.58
Sugar, Oil	162.53	14.89	0.01
Pulses	140.23	0.96	9.46
Packaged	57.12	2.00	1.27
Vegetables, Fruits	57.19	0.60	1.56
Dairy	54.34	3.98	1.99
Spices	40.94	0.80	1.41
Meat	22.18	0.67	3.74
Drinks	13.65	0.04	0.31

Table B.3: Items Dropped for all Rounds or Normalized for some Rounds

Normalized Quantity	Item Dropped
Other Milk Products	Cereal Substitutes
Lemon	Ice-cream
Other Vegetables	Oilseeds
Papaya	Ice
Guava	Tea Leaves
Other Fresh Fruits	Coffee Beans
Cold Beverages (bottled/canned)	Other Beverages
Biscuits	Other Processed Food
Salted Refreshments	Pan Leaf
Prepared Sweets	Hookah Tobacco
Lime	Other Tobacco Products
Katha	Ganja
Other Ingredients for Pan	Other Intoxicants
Bidi	Dung Cake
Cigarettes	Gobar Gas
Leaf Tobacco	Other Fuel
Snuff	Second-hand Clothing
Cheroot	Other Clothing
Zarda, Kiman, Surti	
Electricity	
Matches	
L.P.G.	
Candle	
Lungi	
Headwear	
Kitting wool	
Footwear	

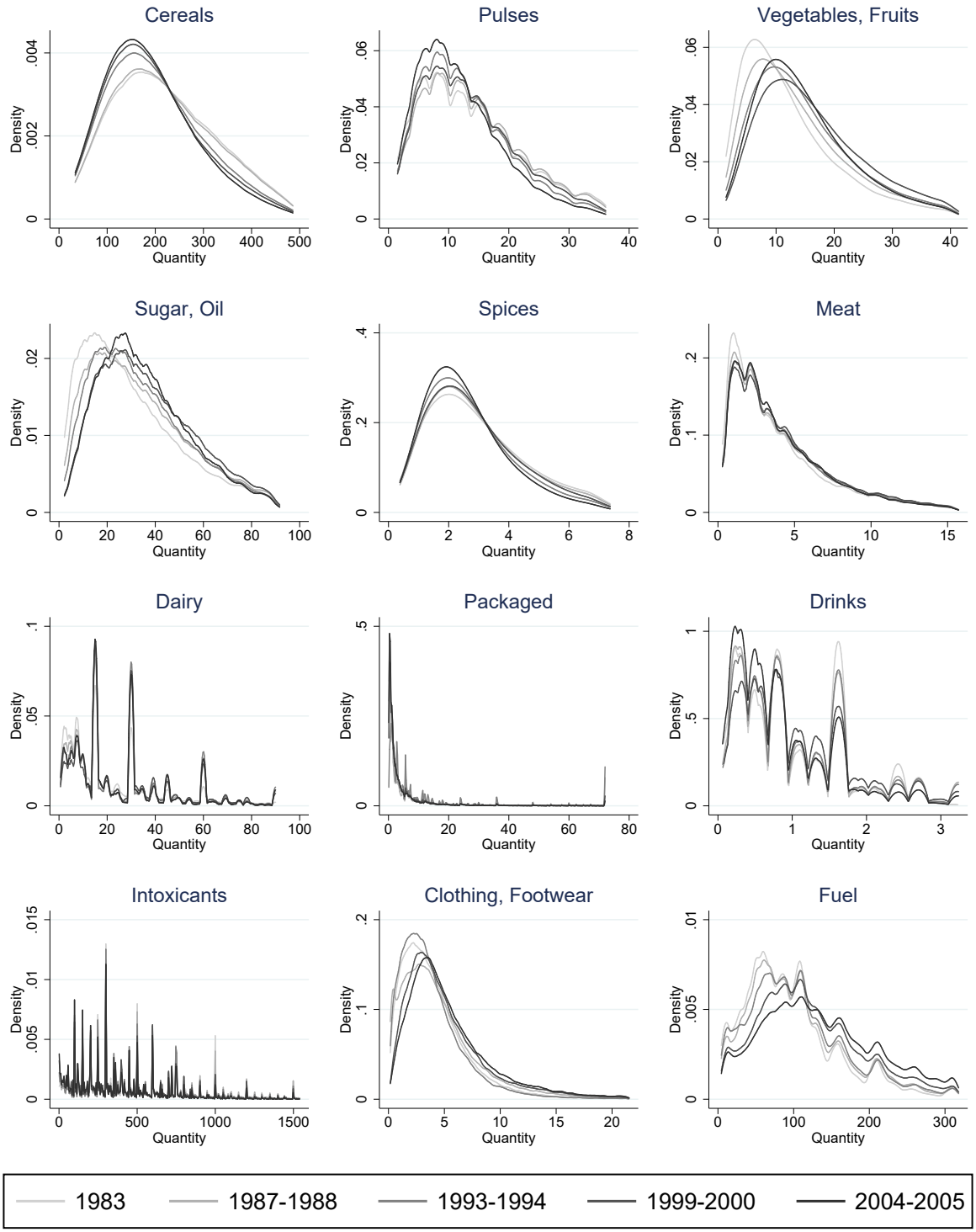

Figure B.1: Kernel Distributions of Household Quantities, all rounds

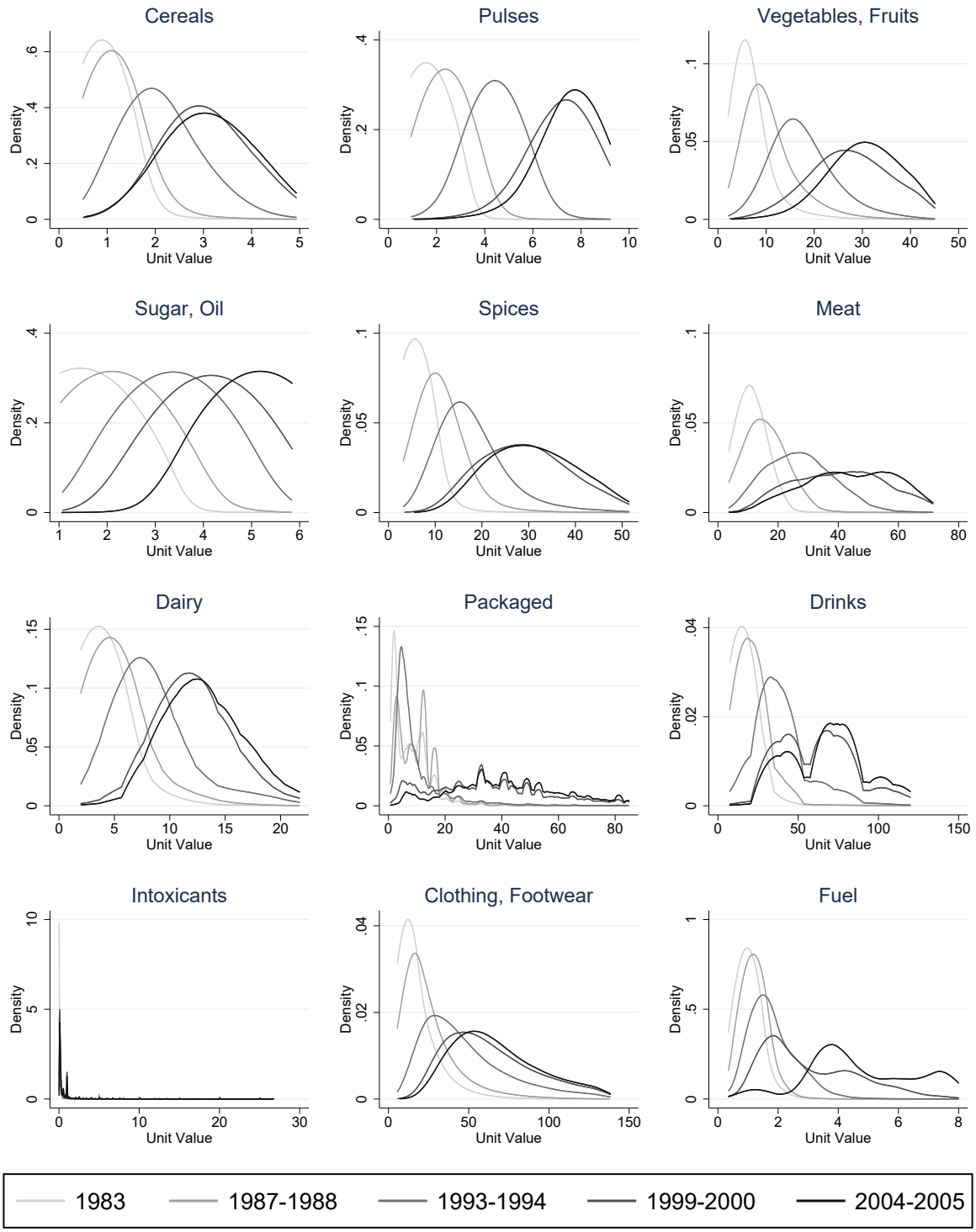

Figure B.2: Kernel Distributions of Household Unit Values, all rounds

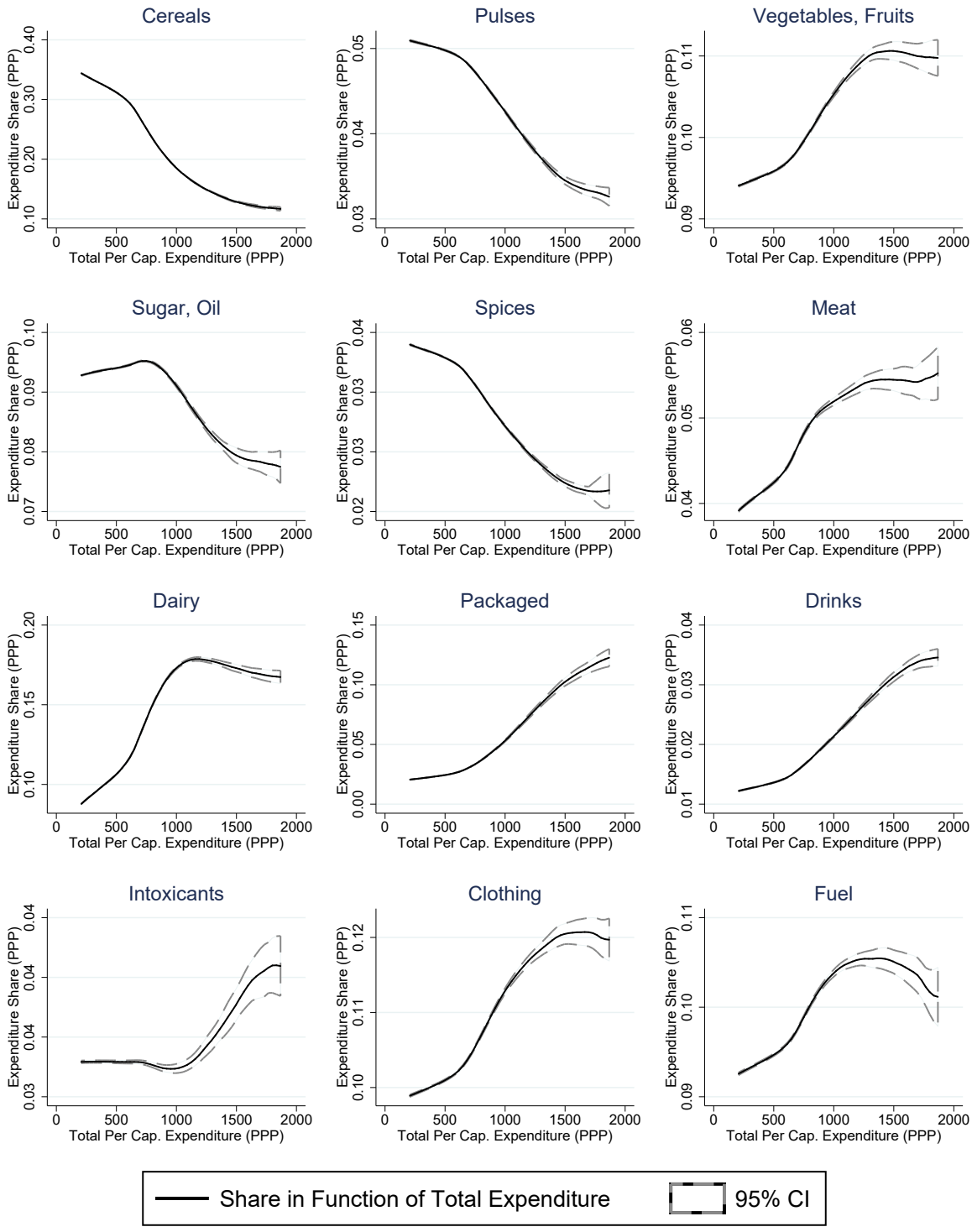

Figure B.3: Non-Parametric Engel Curves in Shares, All Households

Table C.1: Estimated Parameters of the Baseline Specification, BPL Households

	Cereals	Clothing	Dairy	Drinks	Fuel	Intoxicants	Meat	Packaged	Pulses	Spices	Sugar, Oil	Vegetables
β_i	0.150	0.116	0.154	0.018	0.129	0.037	0.074	0.032	0.051	0.030	0.105	0.103
	0.010	0.004	0.010	0.002	.	0.001	0.006	0.002	0.003	0.001	0.004	0.004
Basic Requirement τ_i	19.315	0.031	-1.424	-0.020	0.633	-0.036	-0.170	-0.046	0.212	-0.000	0.455	0.173
	1.285	0.018	0.202	0.005	0.331	0.031	0.028	0.011	0.122	0.012	0.284	0.060
Relative Deprivation ν_i	-16.778	0.143	0.988	0.014	2.084	0.217	0.122	0.041	0.093	0.181	1.114	-0.118
	2.481	0.038	0.325	0.018	0.709	0.076	0.064	0.023	0.253	0.029	0.495	0.090
Round 1983	9.333	0.005	0.288	0.013	-1.502	0.265	0.086	-0.029	-0.061	0.105	-0.472	-0.179
	1.248	0.026	0.145	0.006	0.337	0.088	0.023	0.008	0.114	0.017	0.257	0.057
Round 1987–1988	7.393	-0.027	0.287	0.007	-1.848	0.170	0.050	-0.007	0.156	0.095	-0.144	-0.148
	1.192	0.022	0.132	0.006	0.319	0.052	0.023	0.009	0.109	0.015	0.232	0.051
Round 1993–1994	5.190	0.003	0.312	0.008	-2.628	0.128	0.032	0.001	0.093	0.083	-0.101	-0.064
	1.238	0.022	0.163	0.007	0.416	0.048	0.021	0.008	0.113	0.014	0.257	0.056
Round 1999–2000	4.739	-0.005	0.304	0.008	-1.072	0.089	0.076	-0.002	0.270	0.115	-0.335	0.063
	1.138	0.021	0.146	0.007	0.317	0.036	0.021	0.009	0.113	0.015	0.237	0.055
Log Household Size	2.226	0.033	0.827	-0.012	-1.107	0.021	0.041	-0.024	0.124	-0.053	0.320	-0.102
	0.324	0.010	0.065	0.004	0.127	0.015	0.008	0.009	0.037	0.005	0.087	0.021
Household in Agriculture	4.142	-0.010	-0.228	-0.024	-0.965	0.008	-0.026	-0.023	-0.001	-0.005	-0.228	-0.008
	0.332	0.008	0.058	0.003	0.107	0.018	0.005	0.005	0.031	0.004	0.074	0.015
% Pop. Urban in Region	-0.218	0.002	0.017	0.000	0.050	-0.001	-0.007	0.000	0.041	0.002	0.059	-0.004
	0.057	0.001	0.007	0.000	0.020	0.002	0.001	0.000	0.005	0.001	0.011	0.002
% Pop. Industry in Region	-0.015	-0.004	-0.010	0.000	-0.011	-0.002	-0.001	-0.001	-0.037	0.001	-0.047	-0.005
	0.089	0.001	0.009	0.000	0.023	0.002	0.001	0.001	0.007	0.001	0.014	0.004
% Pop. Service in Region	0.044	-0.004	-0.007	-0.000	-0.050	-0.001	0.012	0.000	-0.038	-0.004	-0.043	0.012
	0.079	0.001	0.009	0.001	0.031	0.003	0.002	0.001	0.007	0.001	0.013	0.003
% Pop. Density in Region	0.799	0.009	0.075	-0.001	-0.034	0.001	-0.009	0.005	0.126	0.012	0.143	0.051
	0.236	0.004	0.034	0.001	0.075	0.011	0.005	0.002	0.039	0.003	0.048	0.015

Standard errors clustered at round-region level below the parameters. The parameters are given by the estimation of the baseline specification, equation (6). We estimate $n-1$ equations which result in $n-1$ parameters β_i. The remaining parameter β_n is computed using the additivity restriction $\sum_i \beta_i = 1$. The estimation method is not sensitive to the category for which the demand equation is dropped.

D Additional Tests

D.1 Basic Minimum Requirements

In the LES demand system, τ_i represents the basic required quantity of each category. We test if this interpretation is meaningful in light of our empirical results, i.e. if it lines up with what we expect as survival expenditure. This would consolidate our findings on social requirements, and also shows an interesting aspect of the LES which has not been underlined previously.

Table C.1 of Appendix C provides the estimates for the monthly basic requirement level τ_i of each category i. We first transform the τ_i in terms of 2004-2005 Indian rupees by multiplying them with the mean price of the 2004-2005 round. The results are plotted in Figure D.1.1 and show that cereals are by far the most important basic required expenditure for BPL households, as we expect for survival expenditure. This category is followed by a small but positive level of required expenditure on other cheap sources of calories such as vegetables, pulses or sugar and oil, and basic non-food categories such as fuel and clothing.

The same categories for which we have a higher proportion of zero consumption (see Table B.1 in Appendix B) tend to have non-significant or negative basic required expenditure, such as dairy, meat, packaged products or drinks.[57] The correlation between zero consumption and negative basic requirement means that these goods are not necessary for strict survival, and are not consumed until the individual meets her basic requirement in other goods, plus an additional level of income.

To get a sense of how much basic required expenditures weigh on the budget of the poor, we draw the total of all basic required expenditures as a percentage of total expenditure. Reassuringly, the vast majority of our sample is well above the required level of expenditure, with a peak at around 30% of monthly per capita budget (Figure D.1.2). Although it comprises a significant share of the budget of the poor, the total basic required expenditure can be afforded by virtually all households in our sample.

As a further test on our measures of basic required expenditure, we compute the basic caloric in-

[57] We did not constrain the sign of the basic requirement to be positive. It is equivalent to allow the utility function to be defined at zero levels of expenditure for some categories.

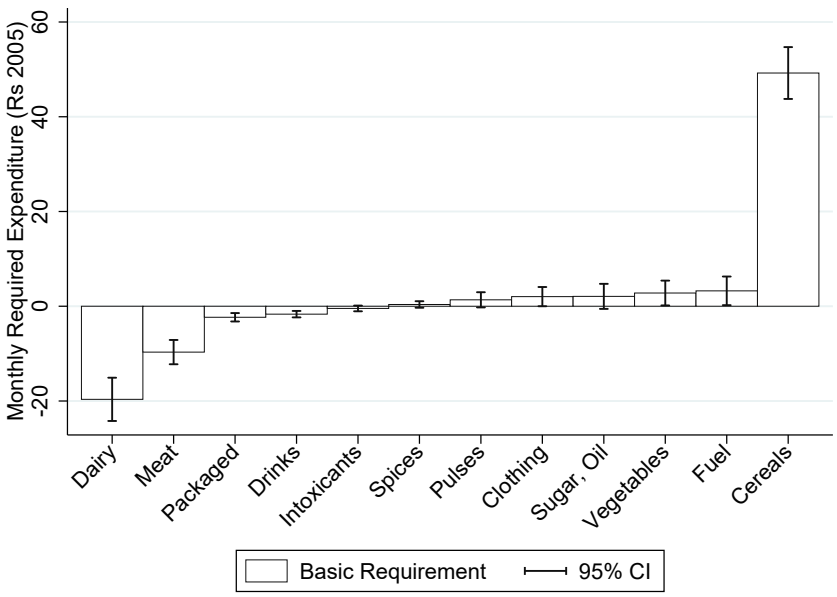

Figure D.1.1: Basic Required Levels of Expenditure

Notes: the dots shows the basic required level of expenditure in Rs 2005 for each category i using the estimation of the baseline specification. Each dot reports $\tau_i \bar{p}_i$, with $\bar{p}_i$ the mean 2005 price of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level.

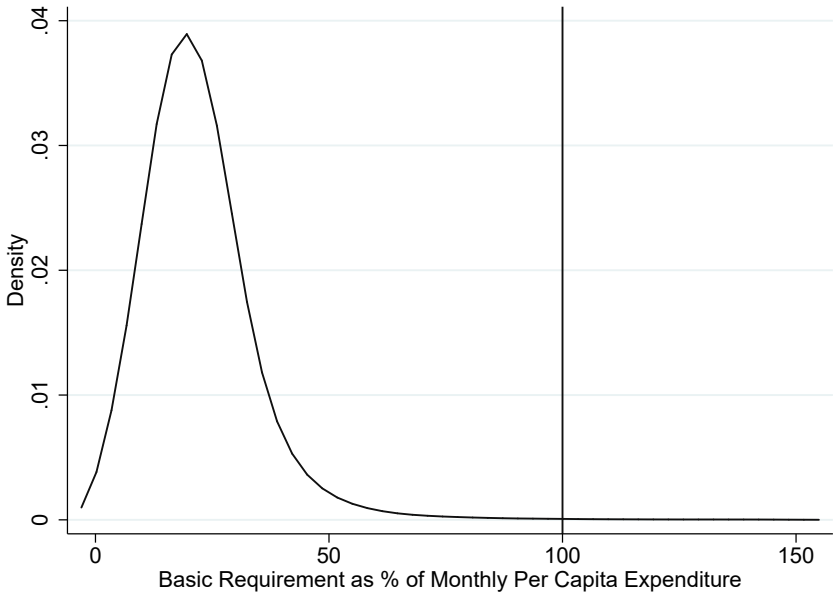

Figure D.1.2: Total Basic Required Expenditure as Share of Total Budget, BPL Households

take predicted by our estimation.[58] We obtain a required level of calorie consumption of about 780 calories per capita per day, which is usually considered as a lower bound for metabolic survival.[59] This additional finding goes in the direction of interpreting these measures as basic "required" expenditure.

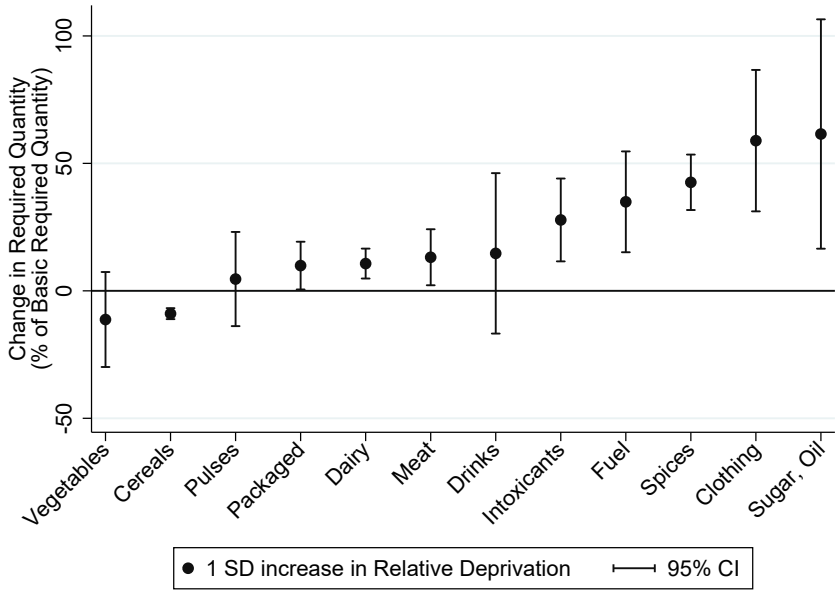

Figure D.1.3: Effect of Relative Deprivation on Required Quantities (% of Basic Required Quantity), BPL Households

Notes: the bars show the effect of one standard deviation increase in relative deprivation on required quantities for each category i using the estimation of the baseline specification. Each bar reports the change in required quantity $\nu_i \rho_{SD}$ divided by τ_i, with ρ_{SD} a one standard deviation of relative deprivation and τ_i the basic required quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level.

We show in Figure D.1.3 how relative deprivation affects requirement levels in percentage of the basic required quantity per category. A one standard deviation increase in relative deprivation decreases the required quantity of cereals, but not drastically, due to their importance for survival (around 10%). On the contrary, an additional one standard deviation of relative deprivation more

[58] We sum the τ_i for all food and drinks categories, and transform the amount, expressed in monthly kilo-calories, into daily calories (1000/30).

[59] The official health information website MedlinePlus of the U.S. National Institute of Health defines a Very Low-calorie Diet (VLCD) as a diet of 800 calories per day. This type of diet is only recommended to obese individuals, under the supervision of a health care provider, and on a short time duration. Several clinical "starvation" experiments involved diets at 800 calories a day (Ball et al., 1970; Willms et al., 1978).

than doubles the required quantity of clothing.[60]

D.2 Estimation of the Linear Preference System

The LES assumes independent wants across commodities. This assumption can be relaxed, as shown by the generalization of the LES developed in Appendix A.2, the Linear Preference System (LPS). We estimate the LPS demand system with expenditure on each good i being defined by equation (19) in Appendix A.2. We otherwise use the same database, methodology and controls as the baseline specification.

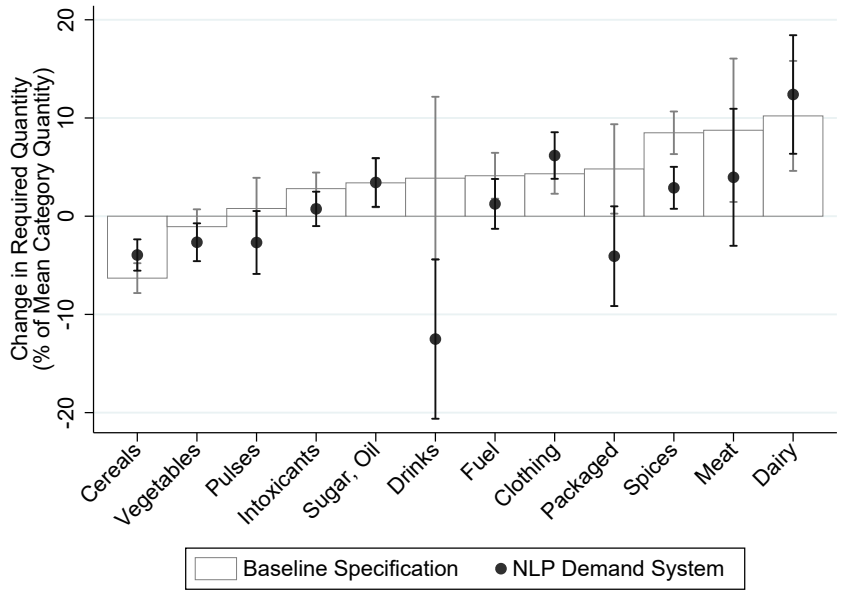

Figure D.2.1: Effect of Relative Deprivation on Required Quantities using the Linear Preference System (% of Mean Category Quantity), BPL Households

Notes: the bars show the effect of one standard deviation increase in relative deprivation on required quantities for each category i using the estimation of the baseline specification. Each bar reports the change in required quantity $\nu_i \rho_{SD}$ divided by $\bar{q}_i$, with ρ_{SD} a one standard deviation of relative deprivation and $\bar{q}_i$ the mean consumed quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level. The dots show the corresponding estimates obtained by estimating the LPS demand system.

Figure D.2.1 plots the change in socially required quantities estimated by the LPS demand

[60]The effect of relative deprivation on required levels of consumption depends on the size of the category in the budget of the poor, hence the higher increase for goods such as sugar and oil or intoxicants. The effect on demand is shown through the income elasticities.

system compared to the baseline specification. First, it is remarkable that for all categories, the estimates are not significantly different. It also provides additional evidence that vegetables and pulses are considered socially inferior, like cereals, as their required level of consumption decreases with relative deprivation. The two goods which stand out are clothing and dairy products, as their required level increases even more with relative deprivation than with the baseline specification. One of them, clothing, is considered a highly visible good, while the other is conspicuous in the Indian cultural and religious context.

The addition of cross-price terms does not significantly change our results probably because consumption items are already aggregated in broad categories. The broader the categories, the less substitutable they are, and hence the better the performance of the LES (Pollak and Wales, 1969). Furthermore, cross-price effects should primarily affect consumption through the basic required level τ_{ii}, and not through the effect of relative deprivation.

D.3 Discussion on the Endogeneity of Relative Deprivation

In this appendix section, we discuss two potential sources of endogeneity of relative deprivation: measurement errors and reverse causation.

Measurement Errors The first concern is that relative deprivation may capture some income effect if total expenditure is mis-measured. Let's take the intuitive case in which relative deprivation and total expenditure are negatively correlated: in that case, measurement errors on total expenditure should lead to an attenuation bias on the effect of relative deprivation. Indeed, if higher relative deprivation captures lower total expenditure, it should lead to an increased demand for caloric products. This effect goes in the opposite direction of our findings, so our estimates would in fact be a lower bound for the true effect of relative deprivation on caloric consumption.

There could however be an opposite, although less intuitive, relationship: households which are more relatively deprived could actually be comparatively wealthier. This would be the case if greater regional inequality is positively correlated with higher development and hence relatively wealthier poor households. We need two other conditions for this case to lead to an upward bias

of the effect of relative deprivation: first, measurement errors on total expenditure are such that higher total expenditure is systematically underestimated. Second, relative deprivation accounts for some of the income effect, in this case, higher relative deprivation means that the household is in fact richer. These two conditions mean that we may observe two households with similar levels of expenditure in our data although one household is actually wealthier and more relatively deprived. Relative deprivation would then be correlated with the demand for aspirational (luxury) goods, leading to an upward bias of our estimates.

Table D.3.1: Correlation between Relative Deprivation and Total Expenditure, BPL Households

	(1)	(2)	(3)	(4)
	Rel. Dep.	Rel. Dep.	Rel. Dep.	Rel. Dep.
Log Monthly Per Capita Expenditure	-0.0534***	-0.313***	-0.369***	-0.361***
	(0.00699)	(0.00751)	(0.00584)	(0.00611)
Observations	160040	160040	160040	160040
Adjusted R^2	0.075	0.522	0.724	0.836
FE Round	No	Yes	Yes	Yes
Log Prices	No	No	Yes	Yes
Controls	No	No	No	Yes

* p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors clustered at round-region in parentheses. Specifications in columns (2), (3) and (4) have NSS round fixed effects. Column (3) adds the log prices for the twelve categories to capture the local cost of living. Column (4) adds the controls of the baseline specification: log of household size, agricultural labor, urban density in region, share working in industry and service in region, and population density.

This second case implies that relative deprivation is overall positively correlated with total expenditure for BPL households. We check that this is not the case in our data by regressing household relative deprivation on the log of monthly per capita expenditure using an Ordinary Least Squares estimation. Table D.3.1 gives the results of the regression, first without controls, then adding round fixed effects, and finally adding log prices and the controls of the baseline specification. What stands out is a persistent negative correlation between relative deprivation and total expenditure, which gets stronger as we control for the cost of living and the economic environment in the region. Relatively deprived households are on average poorer, which makes the fact that they forgo calories for aspirational goods even more surprising. In the case of measurement errors on total expenditure, our estimates of the effect of relative deprivation would be attenuated.

Reverse Causation Another potential concern about the endogeneity of relative deprivation is reverse causation. This would be the case if an individual has a specific taste for aspirational goods, hence having spent more on them in the past. Aspirational goods are less nutritious, so she would likely be more malnourished in the present, and hence relatively poorer due to a lower working capacity (Dasgupta, 1997).

To test this hypothesis, we use an instrument for household relative deprivation which is neither correlated with the household's personal taste nor with her total expenditure. We compute the average level of relative deprivation felt by BPL households in their region, leaving out the household for which this level is measured.[61] It is correlated to the household level of relative deprivation as all BPL households face the same distribution of total expenditure at the regional level, but the household is not contributing to this measure.

The first stage of our instrumentation is an OLS estimation of household relative deprivation on our instrument for relative deprivation and the other variables of the baseline specification (prices, total expenditure and controls). We introduce the predicted value as our instrument in the non-linear least square estimation of the demand system in equation (6). We adjust the standard errors by bootstrapping them in round–region clusters.

Figure D.3.1 plots the results of the estimation compared to the baseline specification. Instrumenting relative deprivation by mean regional relative deprivation (leaving out own household relative deprivation) in fact magnifies its effect on requirement levels: it significantly decreases the social required level for cereals and increases it for aspirational goods, especially dairy products and clothing as for the LPS estimation. Hence, the effect of relative deprivation on consumption does not seem to come from an inherent taste for aspirational goods.

D.4 Estimation with Instrumentation of Prices and Total Expenditure

The endogeneity of total expenditure and prices to consumption choices is a general concern in demand system estimation. In this appendix section, we discuss how this concern could affect our findings and estimate the LES with instrumental variables for total expenditure and prices.

[61] Recall that the regional level of relative deprivation is equal to the regional Gini coefficient (Yitzhaki, 1979).

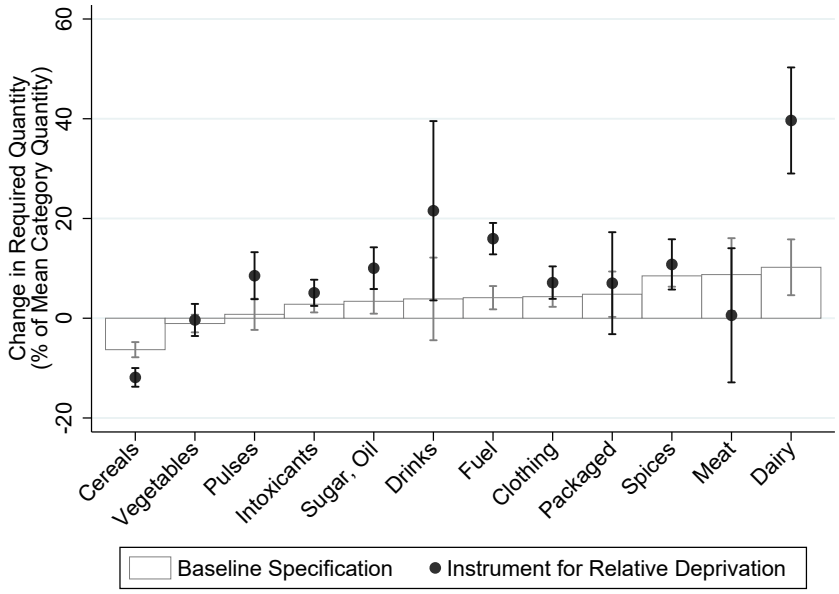

Figure D.3.1: Effect of Instrumented Relative Deprivation on Required Quantities (% of Basic Required Quantity), BPL Households

Notes: the bars show the effect of one standard deviation increase in relative deprivation on required quantities for each category i using the estimation of the baseline specification. Each bar reports the change in required quantity $\nu_i \rho_{SD}$ divided by $\bar{q}_i$, with ρ_{SD} a one standard deviation of relative deprivation and $\bar{q}_i$ the mean consumed quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level. The dots show the corresponding estimates obtained by instrumenting household relative deprivation with regional-level relative deprivation leaving out the household.

Total expenditure may be affected by simultaneity bias, as the household decides as the same time how much to spend on each category and on the total budget allocated to the twelve categories. This bias could be correlated with relative deprivation if, for example, relative deprivation drives the allocation to these twelve categories versus other sources of spending.[62]

A natural instrument for total expenditure used in demand system estimation is income, but this is not reported by the NSS rounds. As an alternative, we instrument monthly per capita expenditure on the twelve categories by the monthly total per capita expenditure on all goods and services. This measure is arguably a good measure of means of living for BPL households: savings, which are not reported, constitute a very small or null fraction of their income. It is the measure we use to compute the relative deprivation index.

[62] Another standard concern is measurement errors, discussed in Appendix D.3

As for the endogeneity of household unit values, we first take it into account by using village-level price indexes (see Section 3.3). The poor have a very low purchasing power, so their demand is unlikely to drive local prices. However, their demand may be correlated to the demand of other sections of society. If everyone has a locally higher taste for certain categories, and competition is not perfect, the supply side may adjust by increasing prices accordingly. This supply-side effect would typically underestimate the strength of the local demand. If this local taste is uncorrelated with relative deprivation, it only attenuates the basic required level τ_i. If, however, local taste is driven by local expenditure distribution, and hence relative deprivation, the supply-side response would attenuate our results.

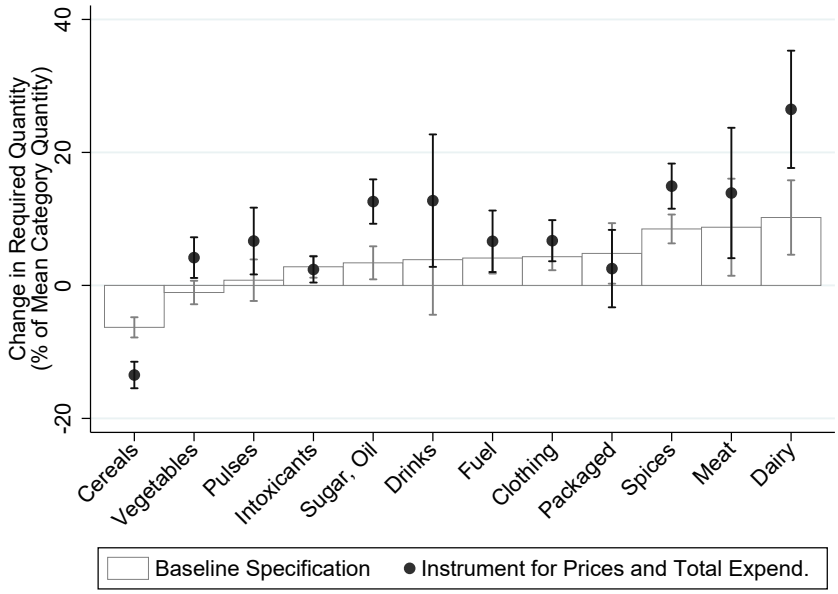

Figure D.4.1: Effect of Relative Deprivation on Required Quantities (% of Basic Required Quantity), Instrumented Prices and Total Expenditure, BPL Households

Notes: the bars show the effect of one standard deviation increase in relative deprivation on required quantities for each category i using the estimation of the baseline specification. Each bar reports the change in required quantity $\nu_i \rho_{SD}$ divided by $\bar{q}_i$, with ρ_{SD} a one standard deviation of relative deprivation and $\bar{q}_i$ the mean consumed quantity of category i. The 95% confidence interval is drawn using standard errors clustered at region-round level. The dots show the corresponding estimates obtained by using our instruments for prices and total expenditure.

We follow Hausman (1996) and Atkin (2013) by instrumenting the local price indexes by the price indexes of a nearby village. These are valid instruments if temporary supply shocks are spatially correlated, so that the price of a nearby village reflects the true production and supply

cost. Permanent supply differences across villages, driven by local taste, should however not be spatially correlated. This latter hypothesis is likely to be true in the case which concerns us, first because expenditure distribution varies across villages, and additionally because our measure or relative deprivation is computed using the regional, not local, expenditure distribution. Hausman instruments should therefore be valid instruments for prices in the specific context of our estimation and our parameters of interest.

Figure D.4.1 plots the results of the estimation with instrumented total expenditure and prices compared to the baseline specification. The endogeneity of total expenditure and prices seems to attenuates the effect of relative deprivation on consumption. The instrumented specification shows that a one standard deviation increase in relative deprivation leads to an additional significant decrease in the required level of cereals, main driver of the caloric loss. Most estimates are, however, not significantly different from the baseline specification. These results mitigate the concerns about the endogeneity of total expenditure and prices.