Keeping up with the Vaishyas? Caste and relative standing in India

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People care about relative, and not only absolute, income. This paper investigates the
importance of relative income within and between castes in the Indian caste system,
using a choice experimental approach. The results indicate that slightly more than half
of the marginal utility of income comes from some kind of relative income effects,
on average. This is comparable to the results from previous studies in other countries.
Belonging to a low caste and having a low family income are associated with higher
concern for relative income. Moreover, an increase in the mean income of the caste to
which the individual belongs, everything else held constant, reduces utility for the
individual. Thus, the negative welfare effect of having a reduced relative income com-
pared to the own caste average income dominates the positive welfare effect due to
increased relative income of the own caste compared to the income of other castes.

JEL classifications: C91, D63, H21.

I. Introduction

People care about relative income. Despite the non-appearance in conventional
economics textbooks, this was considered an obvious fact for many of the founding
fathers of modern economics, including Adam Smith, John Stuart Mill, Karl Marx,
Alfred Marshall, Thorstein Veblen, Arthur Pigou, and John Maynard Keynes. There
is now again in economics a growing interest in status and relative income and
consumption; see e.g. Solnick and Hemenway (1998, 2005); Frank (1999, 2005);
Johansson-Stenman *et al.* (2002); Oxoby (2003, 2004); Falk and Knell (2004);
Hopkins and Kornienko (2004); Luttmer (2005); Carlsson *et al.* (2007), and
Aronsson and Johansson-Stenman (2008). A subfield in this new literature,

to which this paper belongs, is concerned with measuring the degree to which relative income matters. There are two main measurement methods: the first and most-used method relies on asking people about their subjective happiness or satisfaction (e.g. Easterlin, 1995; Clark and Oswald, 1996; van Praag and Frijters, 1999; Blanchflower and Oswald, 2004; Ferrer-i-Carbonell, 2005; Luttmer, 2005; Clark et al., 2008). The results from many of these studies are summarized in the excellent review of the happiness literature by Frey and Stutzer (2002, p.85): 'It is not the absolute income that matters most, but rather one's position relative to other people'. The alternative measurement-method is based on questionnaire-experimental methods where people make hypothetical choices between alternative societies or outcomes. This paper uses this latter method, drawing on Johansson-Stenman et al. (2002), Alpizar et al. (2005), Carlsson et al. (2007), and Solnick and Hemenway (1998, 2005).[1] The results in these studies indicate that relative income, on average, seems to be about as important as absolute income, at the margin.

However, the underlying models for these results tend to be unrealistically simple, typically assuming that people care solely about their own income relative to the average income in society, in addition to their own income. In reality, we compare ourselves with other people, and groups of people, to a varying extent. According to mainstream social psychology we tend to compare ourselves to a larger extent with people that in some sense are closer to us.[2] Moreover, just as we care about having a positive individual identity or self-image (cf. Akerlof and Kranton, 2000; Benabou and Tirole, 2002), much evidence in psychology suggests that we also care about having a positive group identity, or social identity (Tajfel and Turner, 1986). Tajfel (1981, p.255) defines social identity as 'the individual's knowledge that they belong to certain social groups together with some emotional and value significance to them of their group membership'. Thus, we want to be successful within the groups that we belong to, and we also want to belong to successful groups. The relative importance of these effects is in general difficult to analyse empirically since, for example, group membership is endogenous.

The caste system in India is a good point of departure for analysing this issue, to the extent that caste constitutes an important reference point with respect to income comparisons, since caste membership is hereditary and cannot be changed.[3]

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[1] Both of these methods remain controversial and, as all methods, they have their inherent strengths and weaknesses. In the general economics literature, there is no sign of an emerging consensus or even convergence regarding the importance of relative income. This is remarkable, given that whether aggregate well-being increases with aggregate income, or whether relative income is most important, is one of the most fundamental questions in economics. In light of this, we consider the two methods complementary.

[2] However, as noted by Clark et al. (2008), there is very limited empirical support for this in the literature.

[3] However, the extent to which individuals compare themselves in one dimension compared to another may still be endogenous, as convincingly argued by Oxoby (2003, 2004). In this paper we do not aim to quantify such processes, although it is an important task for future research.

Consequently, the comparison income with respect to caste is fixed and cannot be changed. To see the importance of this, consider an example where comparison income is not exogenous. Most cities consist of some residential areas with high social status and high average income, whereas others have lower social status and lower average income. First, since people can move, it is possible that those living in the area with higher social status do so partly because they have higher willingness to pay for this kind of social status (even adjusted for income effects). Second, the possibility of moving may also directly affect their choices between various alternatives with respect to income distribution. Consider a choice between (i) an alternative with a small income increase for those living in area X, combined with a larger income increase for people living in the neighboring areas, and (ii) a status quo alternative where income is held constant for all (i.e., both for those living in area X and for those living in the neighboring areas). Even if the net utility effect of the first alternative is negative for individuals living in X, they may still choose this alternative since the income increase may imply that they can now afford to move to one of the neighboring areas.

Moreover, despite political attempts to change it, caste membership is still very important in Indian society. There is ample evidence that caste is an important part of identity, and plays an important role in Indian society still. Perhaps the best example of this is the study by Hoff and Pandey (2006). They strikingly demonstrated that the lower self-confidence associated with belonging to a caste with lower status may directly affect individual performance in a profound way. They let young boys compete by solving mazes. When the subjects were anonymous, no significant difference between castes was found. However, when names and caste membership were publicly announced, the number of mazes solved by low caste subjects dropped by 20%. It is also interesting to find out whether earlier results concerning the extent to which relative income matters can be generalized to poorer, less individualistic countries such as India. In addition, India is the third largest economy in the world and constitutes about 17% of world population, which makes it empirically relevant in its own right.

The investigation of the importance of relative income both within and across castes in India is the main empirical task of this paper. We use a questionnaire-based choice experimental method, in which Indian students made repeated pairwise choices between imagined societies on behalf of a likewise imagined grandchild. The design of the experiment uses the same basic set-ups as those in Johansson-Stenman et al. (2002) and Alpizar et al. (2005), with some important modifications and extensions, in particular making between-group and within-group comparisons possible. We do not a priori assume that relative income with respect to caste matters. This is something that we test by means of our choice-experimental method, and it is indeed found that it does matter.

Our first main result is that on average between half and two-thirds of the respondents' marginal utility of income comes from relative income effects. This is comparable to the results from earlier studies based on similar methods in other, Western, countries. We also investigate whether an increase in the average income

of the subgroup to which an individual belongs increases or decreases the individual's utility (holding the individual's own income fixed). The answer is not straightforward, since there are two effects that presumably work in the opposite direction: (i) people derive utility from having a high relative income compare to others in the caste (or group more generally) to which they belongs; (ii) people derive utility through improved social identity from belonging to a caste with higher average income and status. Our second main result is that the former effect dominates the latter; i.e., people's utility tends to decrease with increased average income of the caste to which they belong.

Using hypothetical choices in a questionnaire setting is of course not without problems, which we discuss below. However, following Kahneman and Tversky (1979, p.265), we argue that choices between large hypothetical incomes can reveal useful information when participants have no particular reason to disguise their true preferences.[4]

The next section presents the basic model where different kinds of relative income are arguments in the utility function, while Section 3 describes the survey-based experiment. Section 4 presents descriptive results, followed by econometric analysis in Section 5. Section 6 discusses possible biases and the extent to which we should believe the empirical results. Section 7 summarizes and draws conclusions.

2. Modeling positionality in a caste society

The caste system in India is over 3000 years old, and every Hindu still belongs to a caste. A caste is a group membership that has a specific rank in society. Traditionally there were four castes: Brahmins (priests), Kshatriyas (warriors and kings), Vaishyas (traders and businesspersons), and Shudras (agricultural workers and manual laborers). In ancient times, caste membership was thus profession based. However, as there were few alternative opportunities to learn a profession except from one's parents or relatives, the caste system became hereditary. In the middle ages, the caste system degenerated into many sub-castes. The present system is hereditary, hierarchical, and extremely complex. That a system that is disadvantageous to a large share of the population can nevertheless prevail has been ascribed to social customs and social sanctions (Akerlof, 1976, 1980), and to preference falsification (Kuran, 1995).

However, after the independence of India in 1947 the new constitution banned the practice of untouchability and made it a punishable offence. The constitution

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[4] Laboratory experiments with actual money would be an alternative to our setup. For example, the asymmetric inequality aversion found by Fehr and Schmidt (1999) can be interpreted as reflecting concern for relative payoff. Nevertheless, it is difficult to generalize findings from two- (or a few) person experiments with relatively small pay-offs to a social setting such as the one we are interested in, particularly when it comes to quantifying the degree to which relative income matters for well-being. In an experiment, individuals may prefer a payoff increase for their co-player *ceteris paribus*, even though their well-being depends strongly on their relative income in society.

also encouraged movement away from the caste system and any discrimination based on caste. At the same time, special treatment (especially with regard to educational and employment opportunities) was accorded to the so-called Scheduled Castes (SC), mainly consisting of the Untouchables. Later similar affirmative action was initiated for the Scheduled Tribes (ST), the indigenous people of India, as well as for Other Backward Classes (OBC). All of these groups are often considered as socially and politically repressed, and they remain quite closed in social relations, marriage, and rituals.[5]

Despite the secular constitution, caste is still very present and important in Indian society (Bayly, 1999); in terms of disparity/inequality (Deshpande, 2000); for how people respond to opportunities (Hoff and Pandey, 2004); and regarding fertility (Borooah, 2004); trade limitations (Anderson, 2007); fuel collection in the countryside (Köhlin and Parks, 2001); and most likely also for the continuing use of old customs such as dowry payments (Anderson, 2003).

Thus it appears reasonable that both the position of the caste in society and the position of an individual within a specific caste may be important issues for the individual. Hence, we model utility for an individual i as depending (presumable positively) on i's (absolute) income y_i; on i's relative income compared to the average income level in society, r_{is}; on i's relative income compared to the average income level in the caste to which i belongs, r_{ic}; and finally on the average income level in the caste relative to the average income level in society, r_{cs}. Thus we can write

$$U_i = u_i(y_i, r_{ic}, r_{is}, r_{cs}) \equiv u_i(y_i, y_i/y_{caste}, y_i/y_{society}, y_{caste}/y_{society}) \qquad (1)$$

where y_{caste} and $y_{society}$ are the average income levels in the caste/group to which the individual belongs and in society, respectively; and where it appears probable that $\partial u_i/\partial y_i > 0, \ \partial u_i/\partial r_{is} > 0, \ \partial u_i/\partial r_{ic} > 0, \ \partial u_i/\partial r_{cs} > 0$.

We will analyse two aspects of this model in this paper: First, we will attempt to quantify the degree to which relative income matters on the margin, compared to absolute income. This is done by estimating the degree of positionality (Johansson-Stenman *et al.*, 2002); i.e., the extent to which the utility increase of one additional dollar is due to the corresponding increase in relative income. In previous studies this parameter has been quantified based on a model where only one aspect of relative income matters, namely personal income relative to the average income in society. Here we extend this concept to instead reflect the relative degree to which an additional dollar gives utility through increased relative income of any kind,

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[5] Present affirmative action laws (reservation laws as they are called in India) allow non-Hindus to also belong to SC and OBC categories provided they can prove that they converted to some other religion after 1947. Likewise, membership of SC, OBC, and ST categories cannot be gained or lost through marriage. Sowell (2004) provides a critical examination of affirmative action around the world, including in India.

not just related to the mean income of society. We can then formally define the degree of positionality for individual i as:

$$\gamma_i = \frac{\frac{\partial u_i}{\partial r_{ic}}\frac{\partial r_{ic}}{\partial y_i} + \frac{\partial u_i}{\partial r_{is}}\frac{\partial r_{is}}{\partial y_i}}{\frac{\partial u_i}{\partial y_i} + \frac{\partial u_i}{\partial r_{ic}}\frac{\partial r_{ic}}{\partial y_i} + \frac{\partial u_i}{\partial r_{is}}\frac{\partial r_{is}}{\partial y_i}} \tag{2}$$

If $\gamma = 0$, then relative income does not matter at all at the margin, as in conventional economic theory. At the other extreme, if $\gamma = 1$, the utility effect of an income increase arises solely because relative income (compared to other people of the same caste, and to other people in society) has increased, not at all because of the increase in absolute income.[6]

It is not possible to estimate γ from conventional revealed behavior analysis, since individuals can in general not choose their surroundings in terms of average income (either in society or of their caste). This is the main advantage of using a choice-experimental method, since it also enables us to vary these characteristics.

The second question we will analyse is whether an increase in the average income of the caste to which an individual belongs is good or bad for the individual; i.e., whether individual utility increases or decreases with caste average income. Based on the utility function (1) we have:

$$\frac{dU_i}{dy_{caste}} = \frac{\partial u_i}{\partial r_{ic}}\frac{\partial r_{ic}}{\partial y_{caste}} + \frac{\partial u_i}{\partial r_{cs}}\frac{\partial r_{cs}}{\partial y_{caste}} = -y_i\frac{\partial u_i}{\partial r_{ic}}\frac{1}{y_{caste}^2} + \frac{\partial u_i}{\partial r_{cs}}\frac{1}{y_{society}} \tag{3}$$

The first term reflects the fact that the individual's relative income compared to caste average income has decreased, which has a negative impact on utility. The second term reflects the fact that the caste's relative income compared to average income in society has increased, which has a positive impact on utility. A priori, it is impossible to say which term will dominate. We therefore test in the choice experiment where people choose between different imagined societies on behalf of their imagined offspring.

In the empirical analysis we will work with two explicit utility functions, one linear and the other log-linear. The linear utility function is:

$$u_i = \alpha_{i1}y_i + \alpha_{i2}y_{i,caste} + \alpha_{i3}y_{society} \tag{4}$$

By combining (2) and (4), it is easy to verify that i's degree of positionality is given by $\gamma_i = -(\alpha_{i2} + \alpha_{i3})/\alpha_{i1}$. Furthermore, the sign of α_{i2} directly gives the sign

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[6] It is theoretically possible that the degree of positionality in special cases is either negative or larger than one. The first case would occur if a person, to a sufficient degree, got decreased utility from an improved relative position in either society or their own caste; i.e., either $\partial u_i/\partial r_{ic} < 0$ or $\partial u_i/\partial r_{is} < 0$. In this model, this is equivalent to a situation where people's utilities, to a sufficient degree, increase if either the average income in society, or the average caste income, increases. The second case would occur, for example, if a proportional income increase for all in a society implied that utility decreased. This might be justified by some kind of 'small-is-beautiful-perception,' or a perception that a simple life makes us all happier, for example through some kind of Rousseau-inspired back-to-nature ideal.

of the expression in equation (3), i.e., whether an increase in the average income of the individual's caste is good or bad for the individual.

The log-linear utility function is:[7]

$$\ln u_i = \beta_{i1} \ln y_i + \beta_{i2} \ln y_{i,\,caste} + \beta_{i3} \ln y_{society} \qquad (5)$$

where again i's degree of positionality is given by $\gamma_i = -(\beta_{i2} + \beta_{i3})/\beta_{i1}$, and where the sign of β_{i2} determines whether an increase in the mean income of the individual's caste is good or bad for the individual. Our two parameterized utility functions are of course highly simplified. However, given the complexity of the task and the associated cognitive burden for the individuals, and the quite limited data, we refrain from elaborating on richer and more complicated functional forms.

3. The survey and the choice experiment

Students from Jadavpur University, Calcutta University, Kalyani University, and Viswa Bharati University participated in the experiment. The first two universities are located in city of Kolkata (Calcutta), and the other two in rural areas in West Bengal. The reason we chose these universities was to have an appropriate mix with respect to caste, religious affiliation, and family income. Participation was voluntary. The time for conducting each session varied between 20 and 30 minutes, and the students were given information both verbally and in printed form. From previous experiments and several pre-tests, we had learned that it is difficult but important to present the information in a clear and understandable way. The experiment consisted of three parts: (i) a general introduction, (ii) the relative income experiment, and (iii) questions regarding the respondent's socio-economic status.

In each choice situation, the respondents make a choice between two societies, A and B, described by their own income, the caste average income, and the average income in society.[8] In the construction of the scenarios, we followed Johansson-Stenman et al. (2002) and Alpizar et al. (2005) by instructing the respondents, when making their choices, to consider the well-being of an imagined relative living two generations from now. This framing was used in order to help the respondents liberate themselves from their current circumstances. Nevertheless it seems more natural to choose what is best for an imagined relative than for a complete stranger. Following earlier studies, the respondents were frequently reminded that they

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[7] Both utility functions are purely ordinal, implying that any monotonic transformations of (4) and (5) are equally valid utility functions, and that no cardinal information is thus identifiable. This implies, for example, that the relative importance of the components in the general utility function (1) cannot be identified with these empirical models.

[8] Non-Hindu respondents were asked to imagine the caste question in terms of their religious group, i.e., Muslim or Christian.

should not choose what they considered the overall best society, but the society that would be best for their grandchild.[9] The students were told that the societies were identical in all respects, except the issue being analysed. It was also stressed that prices of goods were the same in all societies. Appendix 1 gives the exact wording of the general introduction. In order to reduce the respondent's cognitive burden we did not present the questions randomly, as is often done in choice experiments (e.g., Louviere *et al.* 2000), but rather in a specific sequence, a more logical order. In the first set consisting of three questions, we always let average caste income equal the average income in society. The instructions to the first part of the questionnaire were as follows:

Part 1

Please start at the top and go down. Please do not skip or omit any information in the text

Consider that in the future you have a grandchild. Imagine that you have the power to place him or her in any society of your choice. In the following questions you will be faced with two alternative societies, A and B. You will be given

(i) The income of your grandchild in that society
(ii) The average income in that society
(iii) The average income of your grandchild's caste in that society. If you are not a Hindu and therefore do not belong to a Caste, please think of this as your community in terms of your religious membership.

Societies A and B are identical in terms of culture, religion and language pattern and your grandchild could fit into any one that you choose.

People in Societies A and B face the same prices for essential and other commodities (you can imagine them to be today's prices in Kolkata). The quality of government services such as health care, education or public transport are the same in A and B. You may assume that the Government Policy regarding reservation in education and employment will remain the same.

You have no knowledge of your grandchild's education, skills, abilities or interests, but they remain the same irrespective of whether he or she lives in Society A or B.

In each question below, you are required to make a choice between Society A or B. It is important that you focus your answer on what is in the best interest of your grandchild. Do not consider what is best for others or which society is the better on the whole. There is no 'correct' response to these questions and we ask you to reflect on the choices carefully. If you change your mind along the way, you may of course change your earlier responses.

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[9] This does not imply that we believe that people's altruistic preferences are less important than other determinants of their utility, but our aim was not to measure such preferences. Without the information asked for, we would not know to what extent people chose with respect to what is best for their grandchild, and to what extent with respect to what is best for society as a whole. Hence, it would be impossible to identify the projected utility effects for the grandchild.

Example: This is not a real question in the study. It is an example to make you familiar with the type of questions that you will face.
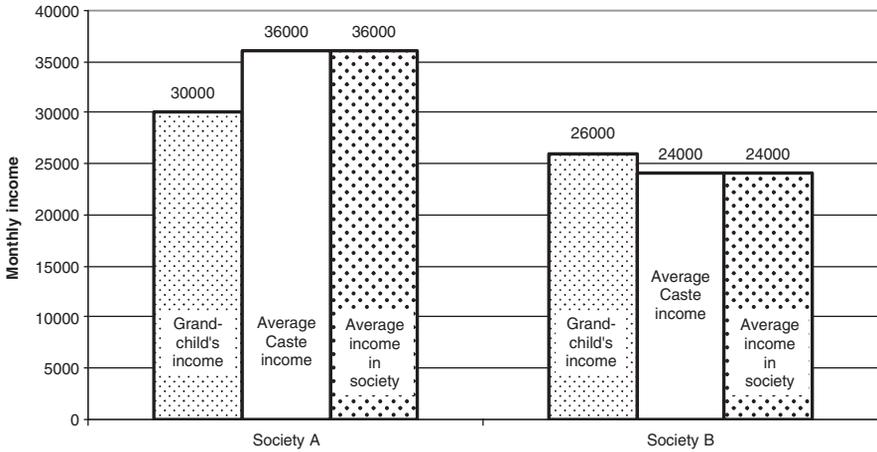
In society B, your grandchild earns less income than in Society A, but this income is higher than the caste and society average in society B, while in society A your grandchild's income is lower than the caste and society average income.

Again, please make your choices solely based upon what you think is in the best interests of your grandchild, where you think he or she will be most happy and content. Please do not choose a society that you think is good for others or one that you think is a better society as a whole.

The subjects were then making three pairwise choices of this kind, with income levels as given in Tables 2 and 3. In the next set of three questions, we instead let the grandchild's income always equal the society's mean income. These questions were preceded by the following instructions and example:
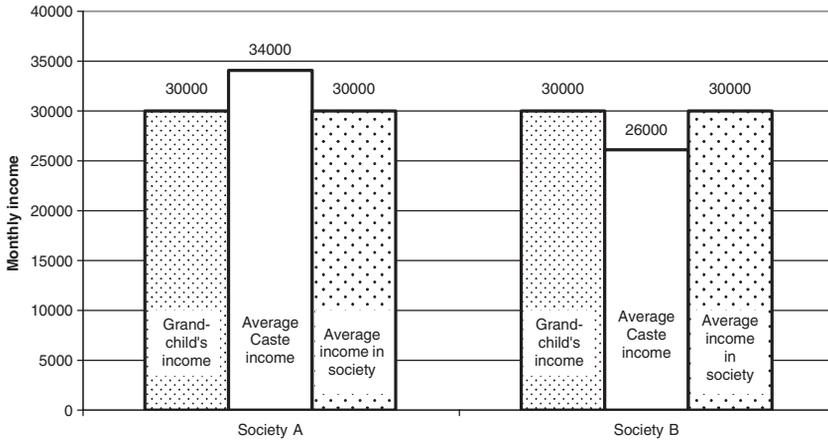
Part 2

Again, you will be faced with the same choices between Society A and Society B. Again, please make your choices solely based upon what you think is in the best interests of your grandchild, where you think he or she will be most happy and content.

In this set of questions your grandchild's income is always the same as the average income in the society. However, your grandchild's caste average income can be higher or lower than the average income in society. Furthermore, the caste average income can be higher or lower than your grandchild's income.

Remember: People in all societies described below face the same prices for all commodities (you can imagine them to be today's prices in Kolkata).

Example: In society A, the caste average income is higher than both the grandchild's income and the average income in society. In society B, the caste average income is lower than your grandchild's income and the average income in society.

After responding to three questions of this kind, respondents received the last set of three questions, where we instead let the grandchild's income always equal the caste's mean income. The instructions and example were similar to the above ones, and given as follows:

Part 3

Again, you will be faced with the same choices between Society A and Society B. Again, please make your choices solely based upon what you think is in the best interests of your grandchild, where you think he or she will be most happy and content.

In this set of questions your grandchild's income is always the same as the caste average income. However, the average income in the society can be higher or lower than the caste average income. Furthermore, the average income in society can be higher or lower than your grandchild's income.

Remember: People in all societies described below face the same prices for all commodities (you can imagine them to be today's prices in Kolkata).

Example: In society A, the average income in society is higher than both the grandchild's income and the average caste income. In society B, the average income in society is lower than your grandchild's income and the average caste income.
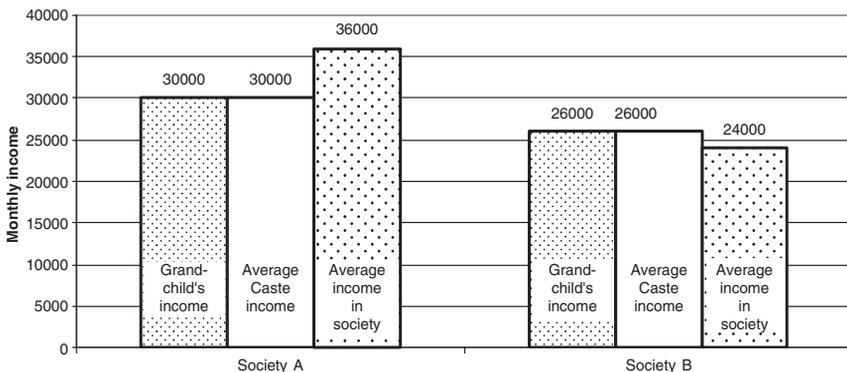
Thus, each respondent was asked to make nine pairwise choices in total, where the grandchild's own income, the caste average income, and the average income in society varied independently. There were two versions of the experiment (split-sample design), with the only difference being the level of the grandchild's income, since we wanted to test whether relative concerns vary with income level. In version 1 (Normal, see Table 2), the grandchild's income is of the same order of magnitude as the mean income in society. In version 2 (High, see Table 3), the grandchild's income is considerably higher than the mean income in society. Within each of the three sets of questions, Society A remains the same, while income varies in Society B.

4. Descriptive results

In total 498 students participated in the experiments. Of these, 429 are available for analysis, since we dropped inconsistent responses and respondents who stated that they do not belong to a caste.[10] Table 1 presents the descriptive statistics of the respondents.

Since this is a sample consisting of university students, most respondents are young and many come from wealthy families. In the analysis, we group the castes and tribes subject to affirmative action as one group called 'low caste', which thus includes the untouchables. Low caste respondents are slightly under represented in our sample, but without affirmative action in higher education it is very likely that the share of low caste respondents would have been even lower. Table 2 presents the societies and the response frequencies of the normal scale experiment.

From the first set of questions we see that many respondents are willing to pay a non-negligible premium for having an income above rather than below the average income levels in society and in their own caste. From the next set of questions, and from question 4 in particular, it is clear that the majority consider an increase of the caste average income to be bad *ceteris paribus*. It seems that the negative utility effect from their reduced relative income within their caste, on average, dominates the positive utility effect from the higher average income of their caste relative to society as a whole. This can be compared to Stutzer (2004) and Luttmer (2005) who found that people's self-reported happiness on average depends negatively on the mean income in the area in which they live.[11] The societies and the response frequencies of the high scale experiment are presented in Table 3, with pattern similar to that for the normal scale.

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[10] We considered a response inconsistent if in any of the three question sets the respondent first chooses society B and then switches to society A, since such behaviour is inconsistent with our theoretical model. In the normal scale experiment, 8.8% of the respondents were inconsistent in this sense, and in the high scale experiment 9.9%. These respondents were dropped from the analysis.

[11] The comparison is not straightforward, since the degree of endogeneity of the reference group is much higher for neighbors, and since residential area may contribute less to an individual's identity and social status than does caste membership. Nevertheless, the results are compatible.

Table 1 Descriptive statistics and variable descriptions

Variable	Description	Mean	Std.
Female	= 1 if respondent is female	0.498	0.500
Income	Household income, 10000 rupees	1.713	1.033
High scale version	= 1 if high income questionnaire version	0.193	0.394
Caste			
General	= 1 if general caste	0.833	0.373
Low caste	= 1 if scheduled caste, scheduled tribe or other backward castes (OBC)	0.167	0.373
Religion			
Hindu	= 1 if Hindu	0.920	0.271
Muslim	= 1 if Muslim	0.044	0.206
Other, not religious	= 1 if other religion (mainly Christian) or stated not religious	0.035	0.184

Table 2 Societies and response frequencies in the normal scale experiment

Question		Own income	Caste average income	Average income in society	Share of responses choosing each society
Question set 1					
Question 1	Society A	30000	36000	36000	0.29
	Society B	27000	24000	24000	0.71
Question 2	Society A	30000	36000	36000	0.49
	Society B	24500	24000	24000	0.51
Question 3	Society A	30000	36000	36000	0.75
	Society B	22000	24000	24000	0.25
Question set 2					
Question 4	Society A	30000	36000	30000	0.22
	Society B	30000	24000	30000	0.78
Question 5	Society A	30000	36000	30000	0.56
	Society B	27000	24000	27000	0.44
Question 6	Society A	30000	24000	30000	0.95
	Society B	27000	36000	27000	0.05
Question set 3					
Question 7	Society A	30000	30000	36000	0.27
	Society B	27000	27000	24000	0.73
Question 8	Society A	30000	30000	36000	0.44
	Society B	24500	24500	24000	0.56
Question 9	Society A	30000	30000	36000	0.67
	Society B	22000	22000	24000	0.33

Table 3 Societies and response frequencies high scale experiment

Question		Own income	Caste average Income	Average income in society	Share of responses choosing each society
Question set 1					
Question 1	Society A	60000	36000	36000	0.49
	Society B	54000	24000	24000	0.51
Question 2	Society A	60000	36000	36000	0.67
	Society B	49000	24000	24000	0.33
Question 3	Society A	60000	36000	36000	0.90
	Society B	44000	24000	24000	0.10
Question set 2					
Question 4	Society A	60000	36000	30000	0.16
	Society B	60000	24000	30000	0.84
Question 5	Society A	60000	36000	30000	0.39
	Society B	54000	24000	27000	0.61
Question 6	Society A	60000	24000	30000	0.98
	Society B	54000	36000	27000	0.02
Question set 3					
Question 7	Society A	60000	60000	36000	0.52
	Society B	54000	54000	24000	0.48
Question 8	Society A	60000	60000	36000	0.69
	Society B	49000	49000	24000	0.31
Question 9	Society A	60000	60000	36000	0.92
	Society B	44000	44000	24000	0.08

5. Econometric analysis

We cannot directly observe the respondents' degree of positionality, not even based on their questionnaire-experimental choices. However, it is possible to estimate the parameters of an assumed utility function and thus derive the sample-average for the degree of positionality. In order to do this we apply a random utility model (McFadden, 1974), where we introduce an additive non-observable error term into the utility function, assumed linear. We then have the utility of individual i as

$$v_i = \alpha_{i1} y_i + \alpha_{i2} y_{i, caste} + \alpha_{i3} y_{society} + \varepsilon_i \tag{6}$$

where is the error term, reflecting choice errors and preference heterogeneity. Applying this to the experiment, the probability that an individual chooses society B is

$$P[B] = P\left[\alpha_{i1} y_i^A + \alpha_{i2} y_{i, caste}^A + \alpha_{i3} y_{society}^A + \varepsilon_i^A < \alpha_{i1} y_i^B + \alpha_{i2} y_{i, caste}^B + \alpha_{i3} y_{society}^B + \varepsilon_i^B\right] \tag{7}$$

$$= P\left[\alpha_{i1}(y_i^A - y_i^B) + \alpha_{i2}(y_{i, caste}^A - y_{i, caste}^B) + \alpha_{i3}(y_{society}^A - y_{society}^B) < \eta_i\right]$$

where $\eta_i = \varepsilon_i^B - \varepsilon_i^A$. If we assume that the error terms are standard normally distributed, the parameters of the expression can be estimated with a binary probit model, but individual heterogeneity is only captured by the error term. To account for observed heterogeneity, we include a number of socio-economic characteristics

interacted with the grandchild's caste average income and the average income in society. These interaction-terms capture differences across groups in preferences for caste and society average income. The probability that an individual chooses society B can then be expressed as

$$P[B] = P\left[\begin{array}{c} \alpha_{i1}(y_i^A - y_i^B) + \alpha_{i2}(y_{i,\,caste}^A - y_{i,\,caste}^B) + \alpha_{i3}(y_{society}^A - y_{society}^B) + \\ \beta x_i(y_{i,\,caste}^A - y_{i,\,caste}^B) + \delta x_i(y_{society}^A - y_{society}^B) < \eta_i \end{array} \right] \quad (8)$$

where x_i is a vector of socio-economic characteristics of individual I, and β and δ are the corresponding parameter vectors.

The estimated degree of positionality for individual i is given by

$$\gamma_i = -\frac{\alpha_{2i} + \alpha_{3i} + \beta x_i + \delta x_i}{\alpha_{1i}} \quad (9)$$

which clearly reduces to $\gamma_i = -(\alpha_{2i} + \alpha_{3i})/\alpha_{1i}$ in a model without socio-economic characteristics. Similar expressions are straightforward to derive for the log-linear utility function. To account for unobserved heterogeneity in a more flexible way, we estimate the models with random parameters; Train (2003) gives a detailed description of random parameter models. We assume that the two parameters, for the grandchild's caste average income and the society average income, are normally distributed. Thus we estimate a mean and a standard deviation for the randomly distributed parameters. Since we observe the respondents over several choice situations, they can be seen as a panel. Therefore we assume that the random parameters are constant across the choice situations for each member of the panel, i.e., for each respondent.

Table 4 report the results of the estimations for the linear and the log-linear utility functions, respectively. The models are estimated with simulated maximum likelihood using Halton draws with 200 replications.[12] For each model we calculate the sample mean degree of positionality, and for the socio-economic characteristics we also calculate the net marginal effects on the mean degrees of positionality.[13]

Most of the parameters of the interaction-terms are significant and the standard deviations of the random parameters are highly significant, even when we include the socio-economic characteristics. This suggests that we are successful in capturing both observed and unobserved heterogeneity. The estimated mean degree of positionality does not differ much across the models, varying between 0.50 and 0.52.[14] This implies that if income increases marginally, more than half of the associated utility increase comes from the increase in relative income. Crude comparisons

[12] Train (2003) provides details on simulated maximum likelihood and Halton draws.

[13] Since each socio-economic characteristic is interacted with both society and caste income, the degree of positionality depends on both interaction terms. This in turn means that the marginal effect on the degree of positionality also depends on both interaction terms.

[14] The results of basic binary probit models, available upon request, are also very similar. Furthermore, the inclusion of the socio-economic characteristics does not affect the estimate of the mean degree of positionality in any substantial way.

Table 4 Estimated random utility models, linear utility function, *p*-values in parentheses

Attributes	Linear utility function		Log-linear utility function	
	Coefficient	Coefficient std.	Coefficient	Coefficient std.
Own income	5.07 (0.000)		15.36 (0.000)	
Society income	−2.09 (0.000)	1.62 (0.000)	−7.05 (0.000)	4.89 (0.000)
Caste income	−0.96 (0.000)	0.83 (0.000)	−2.89 (0.000)	2.45 (0.000)

Interaction terms	Coefficient	Net marginal effect positionality on	Coefficient	Net marginal effect on positionality
High scale version × Society income	−0.31 (0.001)		4.28 (0.000)	
High scale version × Caste income	−0.45 (0.000)		−1.29 (0.000)	
High scale version		0.15 (0.000)		−0.19 (0.000)
Own income × Society income	0.11 (0.000)		0.70 (0.000)	
Own income × Caste income	0.06 (0.114)		0.16 (0.204)	
Own income		−0.05 (0.000)		−0.06 (0.000)
Female × Society income	−0.06 (0.492)		−0.20 (0.480)	
Female × Caste income	0.19 (0.000)		0.53 (0.039)	
Female		−0.02 (0.069)		−0.02 (0.114)
Low caste × Society income	−0.37 (0.002)		−1.09 (0.004)	
Low caste × Caste income	0.24 (0.017)		0.62 (0.062)	
Low caste		0.02 (0.170)		0.03 (0.081)
Muslim × Society income	0.01 (0.978)		0.25 (0.678)	
Muslim × Caste income	0.44 (0.010)		1.15 (0.005)	
Muslim		−0.09 (0.008)		−0.11 (0.001)
Other religion × Society income	0.14 (0.571)		0.75 (0.347)	
Other religion × Caste income	0.21 (0.318)		0.46 (0.531)	
Other religion		−0.07 (0.055)		−0.08 (0.032)
Pseudo R^2	0.26	0.27		
Mean degree of positionality (s.e.)	0.52 (0.007)	0.50 (0.006)		

with samples from other countries suggest students in India care about relative income to about the same degree as students in Sweden (Johansson-Stenman *et al.*, 2002), Costa Rica (Alpizar *et al.*, 2005) and the US (Solnick and Hemenway, 1998, 2005), and as a representative sample of adults in Sweden (Carlsson *et al.*, 2007).

The negative sign of the parameter for mean caste income is consistent with the descriptive results discussed. Thus, an increase in one's own caste's mean income has a negative net effect on utility. One explanation, of course, is that one cannot leave one's caste, so the natural reference group is the caste. Another explanation

is that many marriages are still within the same caste. This means that the grand-child's position within the caste is important, especially if the grandchild is a woman.

From the estimated interaction parameters we can see: (i) differences in the degree of marginal positionality, and (ii) differences in concern for the average income of one's own caste and of society. For example, the coefficient for the interaction variable between female and caste average income is positive and significant in both models. This indicates that, all else equal, females have a smaller negative utility effect than men from an increased average income for their own caste. This is also true for all the caste and religious variables, implying that Hindus—who are members of a general caste (which constitutes the base case)—to a larger extent dislike increases in their own caste income, whereas Muslims are the least negative towards income increases for their own group. A possible reason why Muslims and low caste people are less negative to increases in their group/caste income is the low status of these groups, if one assumes diminishing returns in between-caste (or group) status.

We can also calculate the total effect on the estimated degree of positionality, reported in the column Net marginal effects.[15] The degree of marginal positionality decreases with family income. Being a Muslim or belonging to any other religion implies a lower degree of positionality. Females have a slightly (but statistically significant) lower degree of positionality than males, which is consistent with Frank's (1999, pp.134–5) evolutionary arguments, but which contradicts the empirical findings in Alpizar *et al.* (2005) and Johansson-Stenman *et al.* (2002). All net marginal effects associated with the interaction variables have the same sign for both functional forms, except for the dummy variable indicating the high scale experiment.[16]

To see the differences among various castes and religious groups more clearly, we calculate the mean degree of positionality for five groups, presented in Table 5. There are only small difference between the results from the linear and the log-linear utility functions; in particular, the ranking of the various groups is the same. The group with the highest degree of positionality is low caste Hindus, followed by general caste Hindus and low caste other religion. The difference between low caste Hindus and the other groups is statistically significant. Muslims have the lowest degree of positionality.

An only-recently explored feature of the random parameter model is the possibility of estimating individual-level parameters from the estimated parameter distribution, based on Bayes Theorem (Train, 2003). Since we can estimate where in the parameter distribution each individual is, we can also estimate a degree

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[15] For all discrete variables, the parameters reflect the difference in degree of positionality when the variable is equal to one and when it is equal to zero.

[16] It is not surprising that this parameter is more sensitive to the functional form, and we can hence not provide any conclusion regarding the impact of scale.

Table 5 Estimated marginal degree of positionality for various groups, standard errors in parentheses

	Linear utility function	Log-linear utility function
General caste Hindu	0.522 (0.007)	0.503 (0.007)
General caste other religion	0.452 (0.037)	0.424 (0.037)
General caste Muslim	0.435 (0.032)	0.392 (0.031)
Low caste Hindu	0.547 (0.016)	0.534 (0.016)
Low caste other religion	0.477 (0.036)	0.455 (0.036)

of positionality for them, and hence also the distribution of preferences with respect to specific variables, such as average own-caste income. Thus, that the estimated parameter for mean caste income is negative does not imply that all individuals are negatively affected by an increase. Indeed, the individual-level estimates (not shown here) are positive for 21% with the linear utility function, and for 13% with the log-linear utility function.

6. Can we trust the results?

The results in this paper rely on data from hypothetical choices made by students, which, as mentioned earlier, is not without problems (Bertrand and Mullainathan, 2001). For example, students have less experience with earning own money, and most of them do not have a lot of money even if they do not come from poor families. It could also be that the students' views of the various castes and religious groups differ from those of the general population. In the present case, we are interested in people's perceptions of the importance of relative income of various kinds. However, just as we as researchers do not know the 'right answers', one may wonder whether students do. Indeed, the perceptions of experts vary widely, across the whole spectrum, from the conventional textbook economics position that only absolute income matters, to the other extreme that only relative income matters (Easterlin, 1995). Moreover, results from earlier studies, such as Johansson-Stenman et al. (2002) and Alpizar et al. (2005), seem to indicate an overrepresentation of extreme responses, with either a very small (or even negative) degree of positionality, or very large. The results here, based on individual-level parameters estimated from the estimated parameter distribution, show a similar pattern at both tails of the distribution.[17] It may be that at least some of these extreme responses derive from students choosing to apply cognitively easier strategies when responding to the questions (Payne et al., 1993). For example, in the first set of questions it is possible that some students initially decided that absolute income is more important than relative income, and then answered consistently, without trying

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[17] Detailed results are available upon request.

to make tradeoffs in each case. Similarly, some may have concluded that relative income matters, and then answered correspondingly.

But it is less clear whether, and how, such strategies affect our estimated mean degree of positionality, or the observation that within-caste relative income is more important than between-caste relative income. Indeed, an important reason for the efficiency of markets is that people's average judgment is much more accurate than is a single individual's. This is not to say that there are no systematic biases, however. A possible source of positive bias with respect to the overall degree of positionality is if respondents underappreciated the fact that all prices were held constant, even though they were explicitly and clearly told so. Similarly, a possible source of negative bias is if respondents felt that they should not care much about relative income and consumption, perhaps considering such concern to be an unfavorable charactrer trait (cf. Johansson-Stenman and Martinsson, 2006).

Finally, in this study we have attempted to quantify people's preferences with respect to outcomes in terms of income levels. However, in reality it seems likely that people also derive utility from the processes that yield the outcomes (cf. Frey and Stutzer, 2005). Such effects are not covered, or at least not covered explicitly, by the present method.

7. Conclusions

This paper has investigated the importance of relative income both within and between castes in India, using a survey-based choice-experimental method where Indian students made repeated choices between imagined societies. We have two main results: 1) On average, slightly more than half of people's marginal utility of income comes from relative income effects. This is comparable to the results from earlier studies in Western countries. Thus, we find no support for the idea that large concerns for relative income primarily reflect a Western and/or rich-country phenomenon. 2) An increase in the mean income of the caste to which the individual belongs, everything else held constant, reduces utility. Thus, the negative welfare effect of reduced relative income compared to one's own caste dominates the positive welfare effect of increased income of the caste relative to other castes. As far as we know, this is the first paper that has tried to quantify such within- and between-group effects in any society.[18] We also found that a low family income is associated with stronger overall relative concerns, as measured by the degree of positionality.

It goes without saying that one should be cautious in making policy recommendations based on these quantitative estimates. Still, it may be useful to reflect on potential policy implications. First, the results confirm the important role of caste, despite political attempts to change it. Second, the high degree to which relative

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[18] However, see Falk and Knell (2004) regarding how people to some extent may choose their reference group.

income matters suggests that the optimal provision of public goods may largely exceed the level implied by the conventional Samuelsonian rule, in terms of the aggregate marginal willingness to pay for the good (Ng, 1986; Aronsson and Johansson-Stenman, 2008). Intuitively, relative-income concerns imply that private income constitutes a negative externality on others, since their relative income decreases, while there is no such mechanism underlying public good consumption.[19] This may be particularly important in a developing-country perspective, where it is reasonable to believe that public goods are underprovided, even without considering such relative-income effects.[20] Third, the high degree of relative-income concerns also implies that optimal tax-rates are generally higher, compared to the standard case when such effects are not taken into account (Boskin and Sheshinki, 1978; Ireland, 2001; Aronsson and Johansson-Stenman, 2008).

Finally, as argued by Carlsson *et al.* (2007), all known methods for measuring relative-income concerns (including the one used here) have drawbacks. But whether we primarily derive utility from absolute income—as in the standard economic model—or whether various kinds of relative income matter—and if so, how much—are core economic questions. Therefore we strongly encourage future work on measuring utility from relative income, both in India and in other countries, based on a variety of methods and samples.

Acknowledgements

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[19] However, this conclusion is dependent on how people's marginal willingness to pay for the publicly provided good is quantified (Aronsson and Johansson-Stenman, 2008).

[20] Much empirical evidence suggests that this is particularly the case in areas with a high degree of ethnic diversity (Easterly and Levine, 1997, and Alesina *et al.*, 1999).

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Appendix 1. General introduction to the experiment

Measuring Preferences for Status in India

Dear Friend,

Thank you very much for participating in our survey. Please allow us to explain the purpose of this research.

Most people care about their own income. This is natural since the more they earn, the more they can buy and own. But in addition to this, their income compared to others' income may also be important to them. For example, people may feel more confident, or get status and prestige in the society, if they earn more than most other people. The present survey is being conducted to find out how important this relative aspect of income is

Caste is also an important factor in society. It may, or may not be important to you, but it is important to some people in society. For example, it matters to some people whether they earn an income that is high within the caste to which they belong. Also, it matters to some people how well their own caste is doing in terms of income, i.e. whether their own caste on average earns a high income in society.

In the next half hour, you are asked to make several pair wise choices between different hypothetical societies. There are no right or wrong answers. It is important that you are honest in the choices you make. Please do not choose an alternative because you feel that it is somehow expected of you, or it is the choice all your friends will make. Your opinion and beliefs should be the only basis of your choice. The information gathered here will remain strictly confidential and will be used for research purposes only.

Thank you.