MEASURING HYPOTHETICAL GRANDPARENTS' PREFERENCES FOR EQUALITY AND RELATIVE STANDINGS[1]

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Abstract

Individuals' aversion to risk and inequality, and their concern for relative standing, are measured through experimental choices between hypothetical societies. It is found that on average individuals are both fairly inequality-averse and have a strong concern for relative income. The results are used to illustrate welfare consequences based on a utilitarian SWF and a modified CRRA utility function. It is shown that the social marginal utility of income may then become negative, even at income levels that are far from extreme.

Key words: Well-being, Veil of ignorance, distributional considerations, welfare theory

JEL-classification: C91, D63

I. Introduction

The aim of this paper is twofold: (*i*) To measure the concavity of individual utility functions in terms of their Arrow-Pratt measure of relative risk aversion (or social inequality aversion), where utility is seen as a cardinal measure of individual well-being. (*ii*) To measure the extent to which individual well-being is a function of absolute and relative income. In public policy the degree of concavity of the utility function is central for the trade-off between efficiency and equity (see Atkinson and Stiglitz 1980, or Myles 1995). Relative income effects may also have important policy implications. For example, public goods, such as environmental quality, should typically be over-provided relative to the basic Samuelson (1954) rule in the case where relative private consumption matters for utility (Howarth 1996, Ng 1987, and Ng and Wang 1993). Relative income effects and status are also important for explaining much of actual behaviour, both in experiments (Fehr and Schmidt 1999) and in real life (Frank 1985a, Weiss and Fershtman 1998). We also show that a simultaneous analysis of equity and relative-income effects provides new insights, and that a utilitarian social welfare function (SWF) may actually be decreasing in income for a sufficiently high individual income.

1.1 Choosing Behind a Veil of Ignorance and the Social Welfare Function

In order to measure individuals' relative risk aversion we will utilize hypothetical choices behind a so-called 'veil of ignorance'. The idea of choosing behind a veil of ignorance has frequently been used in welfare theory and moral philosophy, and is also linked with the notion of the 'impartial spectator' as discussed by Adam Smith. Vickrey (1945) and Harsanyi (1955) argued that given a choice between different alternatives, people who are (hypothetically) behind a veil of ignorance, and hence ignorant of their future position and characteristics in society, would choose the alternative that maximizes expected utility. Hence, if all individuals were located behind

such a veil of ignorance, then, given a choice between different SWFs, each individual would again choose the one which maximizes its expected utility. As demonstrated by Harsanyi (1955), this happens to be the (unweighted) classical utilitarian SWF. The ethical significance of these results has been debated intensively. For example, Sen (1976, 1977, 1986) has objected to Harsanyi's theorems, claiming that they are not really about utilitarianism, since utility is not defined independently of individual choice.[2] Further, Rawls (1971), who first used the terminology 'veil of ignorance', rejected all kinds of utilitarianism and argued that each individual would instead adopt an extreme risk-averse strategy and select the alternative that provides the best of the worst possible outcomes (in terms of 'primary goods', including income). The arguments for this extreme risk-averse 'maxi-min' strategy are not very clear, however, and they have been criticized strongly by many economists including Arrow (1973), Harsanyi (1975b), and Ng (1990). From the experimental results in this paper we found that most individuals do not follow the strategy proposed by Rawls, but that some actually do.

This discussion, although certainly important, is nevertheless beyond the main scope of this paper. In the welfare analysis we take an additive utilitarian SWF as given, and the arguments for equality based on this paper must thus be centred around the concavity of the utility functions (in income) and, as will be shown, the relative income effects.

1.2 Relative Risk Aversion

As is well known, there is no general consensus in economics about the exact shape of individual utility functions. In conventional static ordinal consumer theory under certainty, nothing can be revealed about the concavity of the utility function, since the consumer choice is independent of

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[2]See also the rejoinders by Harsanyi (1975a, 1977) and the discussions by Broome (1991), Kaplow (1995), Ng (1981, 1999) and Weymark (1991) on this issue.

any monotonically increasing transformation of the utility function (e.g. Samuelson 1947). In the presence of uncertainty, where individuals maximize *expected* utility, or in the case of intertemporal choices, this is no longer true and we clearly need some kind of cardinal measure of utility. The literature on measuring relative risk aversion is rather extensive and although there is a considerable variation in the results, values in the interval 0.5 - 2 are often referred to. A common reference is Blanchard and Fischer (1989, p. 44) who claim that the results from studies based on consumption choices over time (where interest rates differ) vary greatly, but are often around or larger than unity. Stern (1977) summarized much of the extensive literature during the seventies and found larger values (around 4-5) from many studies based on savings behaviour. He also made estimations based on the actual tax system in UK under the assumption of "equal sacrifice" and found a relative risk aversion of about two. Similarly, Christiansen and Jansen (1978) estimated the implicit social preferences based on indirect taxation in Norway, and argued that the most reliable estimates of the relative risk aversion were around unity.

The idea behind this paper is to let individuals choose between alternative societies with different income distributions behind a veil of ignorance. The more concave the utility function, the larger is the relative risk aversion; thus the individual will be willing to trade-off more in terms of expected income in order to achieve a more equal income distribution. The only empirical studies we are aware of that utilizes the idea of choices behind a veil of ignorance for measuring inequality aversion are Johannesson and Gerdtham (1995, 1996), who discuss the inequality aspect of health care. It is difficult, however, to compare these results to those in other studies (including the present one) due to the unconventional functional form used. Others, such as Bukszar and Knetsch (1997), utilize choice behind a veil of ignorance to measure attitudes to different rules for the distribution of benefits within a group. These experiments are generally not discussed in relation to an actual income distribution; thus, they do not allow for estimating the

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concavity of the utility function.

1.3 The Importance of Relative Income or Status

There is a growing awareness in mainstream economics that individual utility may also partly depend on relative income, i.e. the individual's income compared to the incomes of other members of society, and not solely on absolute income; for classic contributions in economics, see Veblen (1899), Duesenberry (1949), Hirsch (1976), and Frank (1985a, b). Still, although early economists such as Adam Smith and John Stuart Mill discussed relative income effects, it has for a long time been unconventional to include these in economic modelling. In a recent book, Mason (1998) provides a thorough and informative historical overview of conspicuous consumption (made famous by Veblen) in economics, where he discusses in depth how it came to be that such issues were considered to be outside the domain of mainstream economics. This was not an obvious development and in the beginning of this century both Edgeworth and Pigou (among others) argued that status is important for explaining consumer behaviour, and should also be included in social welfare analysis.

There is a substantial psychological literature on the measurement of individual well-being, or happiness; see Oswald (1998) for a recent survey. The well-known conclusion by Easterlin (1974, 1995) and others from these studies is that stated happiness appears to increase with income in a given country (or area) for a specific time-period. However, happiness in a society does not appear to increase over time even though income does. Similarly, the level of happiness in the countries studied appears to be about the same, although income varies greatly. A utility framework consistent with these findings is that utility is a function of relative, rather than absolute

income.[3]

A possible weakness in these psychological studies is the link between *stated* happiness and *actual* happiness. Brekke (1997) and Osmani (1993) argue that people may respond to such questions relating to what they consider to be an average norm of happiness, and that this norm may also be dependent on income. If so, happiness may depend primarily on the absolute level of income even though this is not reflected by the survey responses. Although psychologists have tried to correct for such possibilities, there is clearly a need for more empirical research using other methods. Frank (1985a, pp. 32-33) argued, partly based on introspection, that it is most likely that utility depends positively on *both* relative and absolute income, a view which is supported by the results in this paper.

Economists are generally sceptical towards *statements* of well-being and prefer instead to rely on consumer *choices*. However, for obvious reasons, it is difficult to observe the utility derived from relative income by observing consumer behaviour, since individuals can only to a very limited extent choose the income of others in their surroundings. This is presumably the main reason why so little work has been done in this area, and why the unrealistic assumption of non-interdependency is still dominant. Our strategy is therefore to utilize *hypothetical* choices where the individuals' own income as well as mean income in society varies. The greater the importance of relative income, the more the individual will be willing to trade-off in terms of own income in order to achieve a better relative standing.

This remainder of this paper is organised as follows: Section 2 describes the models underlying the experiments on risk (or inequality) aversion and positionality. Section 3 presents the experimental set-ups, while section 4 presents the results of the experiments. Section 5

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[3] Kenny (1999) argue that there may actually also be a link from happiness to growth, since some elements of social capital, such as trust, are important both for happiness and for growth.

illustrates welfare consequences of preferences that are both risk-averse and positional, while section 6 draws conclusions.

2. The Model

2.1 The CRRA Utility Function

It is common in applied welfare economics to assume a special class of utility functions characterized by constant relative risk aversion (CRRA) as proposed by Atkinson (1970):

$$
u = \begin{cases} \dfrac{y^{1-\eta}}{1-\eta}, & \eta \neq 1 \\ \ln y, & \eta = 1 \end{cases}
\tag{1}
$$

where y is individual disposable income and $\eta = -yu''/u'$ is the relative risk aversion. Alternatively, assuming a classical utilitarian SWF where welfare $w = \sum u_i(y_i)$, η can be interpreted as the constant social inequality aversion, defined as $-y\dfrac{\partial^2 w}{\partial y^2} \Big/ \dfrac{\partial w}{\partial y}$. Utility is seen throughout the paper as an (imperfect) measure of individual well-being and the marginal utility of income is given by:

$$
\mu = \frac{\partial u}{\partial y} = y^{-\eta}
\tag{2}
$$

which is clearly decreasing in income for $\eta > 0$. $\eta = 0$ implies that utility is proportional to income, while $\eta \ 6 \ 4$ corresponds to extreme risk aversion of maxi-min type. In the case of uncertainty regarding income, the expected utility for an individual is given by:

$$
E(u) = \int_{y_{\min}}^{y_{\max}} u(y) f(y) \, dy
\tag{3}
$$

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where f is the probability density function for income. Throughout the paper we will assume that individuals maximise expected utility. In the experiments we use uniform density functions since these are relatively easy to interpret and understand by the respondents. In the special case of a CRRA utility function, together with a uniform density function, we have:[4]

$$E(u) = \int_{y_{min}}^{y_{max}} \frac{y^{1-\eta}}{1-\eta} \frac{1}{y_{max} - y_{min}} dy = \frac{1}{(1-\eta)(2-\eta)} \frac{y_{max}^{2-\eta} - y_{min}^{2-\eta}}{y_{max} - y_{min}} \tag{4}$$

Through hypothetical choices between alternative societies, with different uniform income distributions, we can obtain information about the respondent's degree of relative risk aversion. Consider the following example: Income varies uniformly between 10,000 and 50,000 SEK in society A, and between 19,400 and 38,800 SEK in society B. A risk neutral individual ($\eta = 0$) would maximize expected income thereby choosing society A. If the respondent is indifferent between the two societies, we have $E(u_A) = E(u_B)$ and hence:

$$\frac{y_{max,A}^{2-\eta} - y_{min,A}^{2-\eta}}{y_{max,A} - y_{min,A}} = \frac{y_{max,B}^{2-\eta} - y_{min,B}^{2-\eta}}{y_{max,B} - y_{min,B}} \tag{5}$$

There is no algebraic solution to this equation, but it is straightforward to solve for η using some standard numerical method. In this particular case indifference corresponds to $\eta = 0.5$. Consequently, if the respondent prefers society A over B, $\eta < 0.5$, and vice versa.

2.2 Modelling the Influence of Relative Income

Let us now assume that utility is a function of some *representative* income y_r, which in turn

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[4] For η equal to 1 and 2, respectively, we have: $E(u) = \frac{y_{max} \ln y_{max} - y_{min} \ln y_{min}}{y_{max} - y_{min}} - 1$ and

$E(u) = -\frac{\ln y_{max} - \ln y_{min}}{y_{max} - y_{min}}$.

depends on both absolute income and relative income in the following fashion:

$$y_r = y^{1-\gamma} \left(\frac{y}{\bar{y}} \right)^{\gamma} = \frac{y}{\bar{y}^{\gamma}} \qquad (6)$$

where $\bar{y}$ is the average (mean) income in society and $?$ is the degree of positionality. Thus, $\gamma = 0$ corresponds to the conventional assumption that utility does not depend on relative income, whereas at the other extreme, $\gamma = 1$, corresponds to the case where utility depends only on the positional effect from the individual's income relative to the average income in society, as proposed e.g. by Easterlin (1974, 1995).

The formulation in (6) is of course quite restrictive, and other types of positional effects could be considered. For example, Clark and Oswald (1998) discuss different theoretical implications of ratio comparison formulations, of which (6) is an example, as well as additive comparison formulations of positionality, where utility depends on the difference between individual income and mean income. Frank (1985b) analyses a third case where an individual's utility depends on her income *rank* in society (as well as of absolute income).[5] One related possibility is that the concern for relative standing depends on whether the individual is above or below some critical income level, such as the mean income, i.e. reflecting a kind of endowment effect. The formulation in (6) should therefore be seen as a first step chosen mainly for its relative simplicity in estimation, rather than as the most accurate description of reality. However, although beyond the main scope of this paper, we undertook two additional experiments reported in Section 4.2 in order to shed *some* light also on the functional form issue.

Assuming that each individual maximizes a utility function that is a function of representative income of the form given in (6), we can through hypothetical choices between alternative societies

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[5]In this case utility is unaffected by how *much* higher or lower the income is compared to others' income; what is important is the fraction of the population with a lower (or higher) income.

obtain information about their degree of positionality. Consider the following example: In society A, the average income is 30,000 SEK, while the individual's own income is 25,000 SEK. In society B, the average income is 20,000 SEK, and the individual's income is 23,000 SEK. If an individual is indifferent between the two societies, we have that $y_{rA} = y_{rB}$. Thus,

$y_A / \bar{y}_A{}^\gamma = y_B / \bar{y}_B{}^\gamma$ implying that $\gamma = \ln\left[\dfrac{23,000}{25,000}\right] \Big/ \ln\left[\dfrac{20,000}{30,000}\right] \approx 0.2$. Hence, if the respondent

is indifferent in the above example, we have that $\gamma = 0.2$ and, consequently, if A is preferred $\gamma <$ 0.2, and vice versa.

2.3 A Reinterpretation of the Relative Risk Aversion Parameter

If positional externalities exist, the interpretation of η as being a measure of relative risk aversion and inequality aversion simultaneously will change. In this case we have that utility is a function of y_r, instead of y; therefore, substituting y with y_r in (1) we get:[6]

$$u = \begin{cases} \dfrac{y_r{}^{1-\rho}}{1-\rho} = \dfrac{y^{1-\rho}}{\bar{y}^{(1-\rho)\gamma}(1-\rho)}, & \rho \neq 1 \\[4mm] \ln y_r = \ln \dfrac{y}{\bar{y}^\gamma}, & \rho = 1 \end{cases} \tag{7}$$

Relative risk aversion in terms of y, is still given by ρ, if $\bar{y}$ is seen as fixed. But the interpretation of ρ as social inequality aversion is now clearly incorrect (if social inequality aversion is defined

as $-y\dfrac{\partial^2 w}{\partial y^2}\Big/\dfrac{\partial w}{\partial y}$). Indeed, as we will show in Section 5, it is not even obvious that welfare

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[6] To avoid confusion we will use ρ , instead of η , to denote the relative risk aversion parameter when the degree of positionality, γ , is greater than zero.

is increasing in an individual's income.

Given the choice between alternative societies with different uniform income distributions, an individual maximizes:[7]

$$E(u) = \frac{1}{(1-\rho)(2-\rho)} \frac{y_{max}^{2-\rho} - y_{min}^{2-\rho}}{y_{max} - y_{min}} \frac{1}{\overline{y}^{-(1-\rho)\gamma}} \tag{8}$$

implying that the individual is indifferent between societies A and B if:

$$\frac{y_{max,A}^{2-\rho} - y_{min,A}^{2-\rho}}{y_{max,A} - y_{min,A}} \frac{1}{\overline{y}_A^{-(1-\rho)\gamma}} = \frac{y_{max,B}^{2-\rho} - y_{min,B}^{2-\rho}}{y_{max,B} - y_{max,B}} \frac{1}{\overline{y}_B^{-(1-\rho)\gamma}} \tag{9}$$

It can be shown that relative risk aversion is generally decreasing in γ. Hence, indifference between the two societies A and B implies a lower relative risk aversion compared to the case where $\gamma = 0$.

3. The Experiments

A total of 374 students from The University of Karlstad and Göteborg University took part in the main experiments. Participation was voluntary and there was no show-up fee paid. The degree of participation was approximately 90% although this varied between the groups. The experiment consisted of three sections, (i) the risk aversion experiment, (ii) the positional experiment, and (iii) questions regarding the respondent's socioeconomic status. The students were given verbal information before each section, in addition to the printed information. The total time for conducting the experiment, including our instructions, varied between 25 and 40 minutes, mainly

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[7] For ρ equal to 1 and 2, respectively, we have: $E(u) = \frac{y_{max} \ln y_{max} - y_{min} \ln y_{min}}{y_{max} - y_{min}} - \ln \overline{y}^\gamma - 1$ and

$E(u) = -\frac{\ln y_{max} - \ln y_{min}}{y_{max} - y_{min}} \overline{y}^\gamma$.

due to the difference in class sizes.

In the experiments the respondents made repeated choices between two societies, characterized by different income distributions (the risk aversion experiment), and absolute and relative incomes (the positional experiment). The respondents were given information about the approximate level of consumption possible given different incomes, and were told that all goods and prices were constant over the alternative societies.[8] In both societies there was essentially no welfare state and all individual welfare was provided through private insurance systems. The respondents were also informed that there were no dynamic effects, such as higher growth, of any specific income distribution. To minimize problems with learning and order effects, the respondents were encouraged to go back and change their responses.

3.1 Hypothetical Grandchildren and Preference Elicitation

There are many reasons why one may question whether the individual is able to disregard her personal circumstances and environment in the experiment. Furthermore, it is possible that utility may also be a function of income changes over time (i.e. positional in the time-dimension, see e.g. Frank and Hutchens, 1993). Therefore we instructed the respondents to consider the well-being *of their imagined grandchild*. Their task was then to choose the alternative that would be in the best interest of their grandchild. They were frequently reminded that they should not choose the society that they considered to be the best society on the whole, but the society in which their grandchild would be the most content.

Our hypothesis is that the respondents will either use their own preferences while choosing on their grandchild's behalf, since they have no (or very limited) information regarding their

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[8] From the focus groups we learned that this was especially difficult for the respondents to understand; therefore it was carefully and repeatedly explained to them.

grandchild's preferences, or, alternatively, that the respondents believe that their grandchild's preferences would be similar to their own preferences. This need not always be perfectly correct, however. If, for example, the respondent believes that her own preferences are somewhat extreme, then when forming expectations of her grandchild's preferences she may adjust her responses towards the mean. Still, in the subsequent econometric analysis, the parameters associated with characteristics of the respondents have the expected signs and are of a reasonable magnitude which supports our hypothesis to some degree.[9]

There may also be more general problems associated with preference elicitation from hypothetical surveys or experiments. For example, it may be argued that these do not fully reveal the true preferences, and that the responses to a certain degree also reflect a "purchase of moral satisfaction" (cf. Kahneman and Knetsch, 1992). If so, the answers may be biased in (what the respondent thinks is) an 'ethical' direction. If making the ethical choice implies selecting the more equitable outcome, and not receiving utility from being richer than other people, respectively, then this would imply a bias upwards for risk aversion and downwards for positionality.

3.2 Risk (Inequality) Aversion Experiment

In this experiment the respondents made choices between two societies, A and B, described only by their income distribution. The respondents were told that they do not know the position of their grandchild, and that they should place equal probability on all outcomes for their grandchild. Both societies have a uniform income distribution,[10] and for society A, monthly income always varies

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[9]Our interpretation is also supported by expressed responses from pre-tests and focus groups.

[10] In order to make the set-up more realistic, respondents were told that in both societies there are a small number of individuals with very low incomes (the homeless, destitute etc.) and a small number of individuals with extremely high incomes (top-executives, stars etc.). Since these two groups are equally large in both societies the respondents were told to disregard them in their choices.

uniformly between 10,000 and 50,000 SEK; hence average income is 30,000 SEK/month. Given the utility function in (1) we create another society, society *B*, with a different uniform income distribution. The distribution in this society corresponds to a certain level of risk aversion when the respondent is indifferent between society *A* and *B*. There are eight different *B* societies, and thus the respondents made eight pair-wise choices. The societies in the experiments are presented in Table 1, which is also the order in which the societies were presented in the experiment.[11]

[Table 1 about here]

The respondents' choice of societies reflects their relative risk aversion. If, for example, an individual chooses society *B* in the first pair-wise alternative, her relative risk aversion is at least zero. If she then also chooses *B* in the second alternative, but *A* in the third alternative, we know that her risk aversion is greater than 0.5 and less than 1. The table also reports the relative risk premium when the respondent is indifferent between the societies, i.e. the difference between the mean incomes of the two societies. This measure can be seen as the amount of money the respondent is willing to trade-off for increased equality (and hence reduced risk) in society *B*.[12] The respondents were given the information about the societies' incomes and their distributions both as numbers in pair-wise choices (as in Table 1) and in a diagram describing the income distributions for the two societies (they did not receive any information about implicit relative risk aversion); see appendix.

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[11] There is a possibility of ordering effects here, i.e. their answers may depend on the order in which the choices are made. This was tested in one of the pilot studies, with 54 respondents. For the relative risk-aversion experiment the reversed order implied no significant difference. For the positional experiment there was a significant difference; reversed order was associated with a higher degree of positionality. However, the number of inconsistent responses was also significantly higher, and the task appeared slightly more difficult to understand. Therefore, we chose only to include the order presented here.

[12] The notion of *relative* risk premium is used since the comparison is not between a risk-free and a risky alternative, but between two risky alternatives.

3.3 Positional Experiment

In this experiment the respondents were again required to make repeated choices between two societies, *A* and *B*, described by the average income and their grandchild's income. Thus, the respondents now know the position of their grandchild. Here, all *A* and *B* societies have the same degree of income inequality. The society *A* alternative is fixed with average income at 30,000 SEK/month and the grandchild's income at 25,000 SEK/month. Society *A* is compared with seven different *B* societies with varying individual and average incomes; thus, the respondents made seven pair-wise selections where the objective was to choose the society that is best for their grandchild.

Given a utility function which is a function of relative income of the form given in (6), the individual and average incomes in society *B* correspond to a certain degree of positionality when the respondent is indifferent between the two societies. The societies in the experiments are presented in Table 2, in the same order as in the experiment.

[Table 2 about here]

The information was presented to the respondents as numbers in pair-wise choices, where the degree of positionality is reflected in their choice of societies in a similar way as in the risk aversion experiment. Table 2 also reports the relative positional premium when the respondent is indifferent between the societies, i.e. the difference between the grandchild's incomes in the two societies. This can be seen as the amount of money that the individual is willing to trade-off in order to obtain the improved relative standing in society *B*.

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4. Results

4.1 Descriptive Results of the Experiments

There were 367 consistent responses for the risk/inequality-aversion experiment,[13] the results of which are presented in Table 3.

[Table 3 about here]

The median relative risk aversion, given that there are no positional effects, is in the interval between two and three. The respondents are fairly evenly distributed among the categories, although 43% of the respondents have a risk aversion between one and five. Furthermore, a considerable number of respondents (17%) were found to have zero or negative risk aversion. 19% exhibit rather extreme risk aversion ($\eta > 8$), compatible with the Rawlsian maxi-min strategy, which is unquestionably a non-negligible fraction, but still a minority.

Given the discussion in Section 2.3 concerning the relative risk aversion measure, the results of the experiment can be reinterpreted. We can calculate the relative risk aversion for a given degree of positionality (γ) by solving for ρ in equation (9). We then assume that all individuals have the same degree of positionality equal to 0.35, corresponding to the median value in the second experiment. As can be seen in table 3, ρ is lower than η and the difference between them increases for larger values of η. To see why, consider the choice between the society *A* and a specific *B*-society in the case with positionality. Since utility depends negatively on mean income (eq. 7), and mean income is lower in *B*, a lower relative risk aversion is needed to prefer *B*,

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[13] Seven of the respondents (or about 2%) are inconsistent in the sense that they switched from choosing society *A* and then in a later choice alternative chose society *B*, e.g. implying a risk aversion parameter that is smaller than, say, 0.2, and larger than, say, 0.6. There could be several reasons for these responses including learning- or fatigue effects, or that the respondent has some other functional form of the utility function.

compared to the non-positional case. A natural comparison can be made to the recent literature on the equity-premium puzzle, where the results indicate that the seemingly unreasonably high degrees of risk aversion may be reduced substantially when allowing for relative-income effects and habit formation (Abel 1999; Campbell and Cochrane 1999), or (myopic) loss aversion (Benartzi and Thaler, 1995).

Amiel et al. (1999) estimated social inequality aversion using a 'leaky-bucket experiment' (Atkinson, 1980) on students. In this experiment the respondents were instructed to state the amount of 'lost money' that they were willing to accept for transfers from a rich person to a poorer one. The median relative risk aversion was estimated to be between 0.1 and 0.22, which completely contrasts our results. However, the specific circumstances are very different from this study, making a relevant comparison of the results difficult. For example, even an individual who is generally positive toward large income re-distributions through taxes and transfers, despite large associated inefficiency costs, may oppose simply taking 1000 dollars from a rich person in the street and giving it to a poor one.

For the positional experiment there are 358 consistent responses,[14] and the results are presented in Table 4.

[Table 4 about here]

The median degree of positionality is between 0.2 and 0.5, and almost 30% of the respondents are within this category. Still, a substantial fraction of the respondents are either not positional at all ($\gamma \leq 0$), or completely positional ($\gamma \geq 1$).

The importance of relative standing was verified in a similar hypothetical survey by Solnick and Hemenway (1998), where the influence of relative standing for different goods such as own

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[14] There were 18 inconsistent responses in this experiment. Thus, this experiment seems somewhat more difficult than the previous one, although 4.8% invalid responses is still fairly low.

income, education and intelligence was tested. Their (single) question on income was similar to ours, and where indifference between their alternatives implies a degree of positionality of 0.33. They found that on average 48% of the respondents preferred the society with a higher relative but lower absolute income, which is perfectly consistent with our findings.

4.2 On the Structure of Positional Concern

As mentioned earlier, the functional form adopted for positional concern is far from obvious, and we performed some crude tests in order to gain some insight into this issue. First, we feared that the respondents might adapt a heuristic choice-rule based on a reference point, and always choose society *A* when the grandchild's income is lower than mean income (choices 5-7 in Table 2). Therefore we let 1/3 of the respondents choose between a modified set of societies *A* and *B*, where the grandchild's income in society *B* is always larger than the mean income in *B*, and where indifference reflects the same degree of positionality as in Table 2. However, we found no significant difference between the two versions of the questionnaire.

Second, we performed another experiment based on 3 different sets of questions with 103 respondents, of which 90 were consistent.[15] In each set the average income in the societies are the same as before, i.e. 30,000 SEK/month in *A* and 20,000 SEK/month in *B*. The difference is the grandchild's income. In the first set (Low income), the grandchild's income is much lower than the average income. The second set (Medium income) is the same as before, while in the third set (High income) the grandchild's income is much higher than the average income. The implicit positionality (γ) associated with indifference between *A* and *B* is the same for each respective

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[15] We are indebted to an anonymous referee for proposing this test. The remaining 13 respondents were inconsistent in at least one of the sets and therefore excluded from the analysis.

choice in all sets, given the assumed functional form. For example, to test whether γ is larger or smaller than 0.5 in the low-income set, the grandchild's income is set to 15,000 SEK/month in A and 12,240 SEK/month in B; in the high income set the grandchild's income is instead 60,000 SEK/month in A and 48,960 SEK/month in B. If the functional form adopted is a good approximation of the true one for most respondents, we would not expect the responses between different sets to vary systematically. If, on the other hand, an additive-comparison formulation of positionality such as $y_r = (1 - \delta)y + \delta(y - \overline{y}) = y - \delta\overline{y}$ is more accurate, we would expect people to be less positional (in terms of γ) in the set with higher income, and vice versa. The results of the experiment are presented in Table 5, together with the implied degree of positionality for both the ratio- and additive-comparison utility function.[16]

[Table 5 about here]

We see that the median degree of positionality (γ) is the same for all three sets for the ratio-comparison utility function. The mean is highest for the Medium income set and lowest for High income, but the differences are relatively small. For the additive-comparison function, both median and mean δ increase strongly with income. These results indicate that the ratio-comparison function performs better than the additive-comparison function. Still, only 19% of the respondents chose alternatives consistent with the same degree of positionality, in terms of γ, in all three sets.[17] The results should therefore not be seen to imply that the chosen functional form

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[16]For non-extreme responses we use the mid-value in each interval when calculating the mean. For the extreme responses, we chose the degree of positionality implied by indifference in the extreme cases.

[17]16% were equally positional only in the Low and Medium income sets, 18% only in the Low and High income sets, and 9% only in the Medium and High income sets. The remaining 38% chose alternatives which imply different values of γ in all three sets.

is always the most appropriate one. Just as there is a large heterogeneity with respect to the degree of positionality, it seems reasonable that also the functional form may differ between individuals. This is clearly an important area for future research.

4.3 Econometric Analysis

We now turn to the question concerning which factors determine the degree of relative risk aversion and positionality. As the dependent variable in the regression for the risk aversion experiment we use the relative risk premium when the respondent is indifferent between the two societies (see Table 3).[18]

[Table 6 about here]

Left-wing voters[19] are seen to be significantly more risk-averse than others, while business students tend to be the least risk-averse among different student groups. We see that a large fraction believed that their future grandchild would have a slightly higher income than average, which may not be surprising given that the respondents are university students. As we might expect, this affects their behaviour in the experiment; respondents who believe that their grandchild will earn more than the mean income are less risk-averse. Thus, even if the

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[18] The premium is calculated as the difference between the mean income in society A and the average of the mean income levels in the B-societies where the respondent switches from B to A. For the extreme cases $\eta < 0$ and $\eta \, 6 \, 4$ we set the relative risk premiums to -500 and 15,500, respectively. Since there is a considerable share of extreme responses we have tested for both higher and lower corresponding relative risk premiums. However, the results turned out to be quite robust, and there was no change in terms of significant parameters.

[19] A left-wing party implies the Social Democrats, the Left Party itself and the Green Party. A lower fraction than expected said that they would vote for a left-wing political party, "if an election was held today", which may partly be explained by the fact that business students were over-represented in the sample.

respondents were told that they do not know the position of their grandchild, they have some difficulties with liberating themselves from their own expectations. Because of the complexity of the experiment we have also tested whether there are any enumerator effects, i.e. if the results of the experiments differ between instructors; however, the corresponding dummy variable used was insignificant in all estimations.

The coefficients in the regressions can also be converted into partial effects in terms of the relative risk aversion.[20] We calculate the corresponding partial effects for both η and ρ at sample means. Thus, at the sample mean, left party voters have a relative risk aversion (ρ) which is 1.08 units higher, while business students have a relative risk aversion which is 0.59 units lower than others.

As the dependent variable for the positional experiment we use the relative positional premium when the respondent is indifferent between the societies (see Table 4).[21]

[Table 7 about here]

We see that left-wing voters are also found to be significantly more positional than others, while technology and law students are less positional than others. Again, using equation (7), the coefficients can be converted into partial effects in terms of the degree of positionality. For example, at sample means, the degree of positionality is 0.075 units higher for left-wing voters and 0.15 units lower for law students.

The idea that the study of economics may be important for values and behaviours has been

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[20] This is done by solving equations (5) and (9) for the partial effects on η and ρ respectively. Again, there is no algebraic solution, so this is solved numerically.

[21] This is calculated as for the relative risk premium. For the extreme cases $\gamma < 0$ and $\gamma > 1$ we set the relative positional premium to -500 and 8,850, respectively. Again we tested for other values for the extreme cases, but with no changes with respect to significant variables.

discussed by many including Frank et al. (1993, 1996), who argued that studying economics seems to decrease the probability of cooperation in social dilemmas. Here we see no effect from studying economics on relative risk aversion, despite the common emphasis in economics on efficiency rather than equity. However, there is a significant negative effect on positionality, indicating a likely influence of the dominating micro-economic assumption that utility and well-being do not depend on relative consumption. Thus, it is possible that students of economics have been taught that relative income *should* not matter, and therefore that it would be irrational to include such aspects. An alternative explanation is selection-bias, in that less positional individuals may be over-represented among economics students.

Although the number of siblings does not affect the degree of relative risk aversion, there seems to be an effect with respect to positionality. This is a possible indication that preferences for relative status are acquired in childhood and that the presence of siblings leads to a higher awareness of relative status. Whether people live in urban or rural areas or whether they frequently attend religious services do not appear to significantly affect either risk aversion or positionality.

5. Welfare Implications

In this section we will show that interesting welfare implications follow when individuals are *both* risk-averse and positional. Let us first consider the general case where $u = u(y, y / \bar{y})$ and also a utilitarian SWF. Without positional considerations (or other externalities), an income increase for any individual will always increase welfare (assuming non-satiation of utility). However, this is not necessarily true in the general case, since an income increase for one individual implies reduced relative consumption for all others. Consider a marginal income increase for an individual

k and the corresponding change in social welfare:

$$\lambda \equiv \frac{\partial w}{\partial y_k} = \frac{\partial u\left(y_k, y_k / \overline{y}\right)}{\partial y_k} + \frac{\partial u\left(y_k, y_k / \overline{y}\right)}{\partial \left(y_k / \overline{y}\right)} \frac{\partial \left(y_k / \overline{y}\right)}{\partial y_k} + \sum_{i_{-k}} \frac{\partial u\left(y_i, y_i / \overline{y}\right)}{\partial \left(y_i / \overline{y}\right)} \frac{\partial \left(y_i / \overline{y}\right)}{\partial \overline{y}} \frac{\partial \left(\overline{y}\right)}{\partial y_k}$$

$$= \alpha_k + \frac{1}{\overline{y}}\left(\beta_k - \frac{1}{n}\sum_i \beta_i \frac{y_i}{\overline{y}}\right) = \alpha_k + \frac{\overline{\beta}}{\overline{y}}\left(\frac{\beta_k}{\overline{\beta}} - 1 - \mathrm{cov}\left(\frac{y}{\overline{y}}, \frac{\beta}{\overline{\beta}}\right)\right)$$

(10)

where λ is the social marginal utility of income, α_k is the marginal utility of absolute income (holding relative income fixed), and β_k is the marginal utility of relative income (holding absolute income fixed). Hence, a sufficient condition for a positive marginal welfare change is that $\beta_k \geq \overline{\beta}$ and that the normalized covariance between y and β is less than or equal to zero. If the individual marginal utility of relative income decreases in income (for any given mean income), the latter condition is fulfilled.

If we assume a functional form of the utility function according to (7) then the marginal utility of relative income is decreasing in income.[22] However, social welfare may still decrease in income for large incomes (i.e. for small α_k and β_k, since both these are decreasing in income). The welfare change of an increase in income in this case is:

$$\lambda \equiv \frac{\partial w}{\partial y_k} = \frac{y_k^{-\rho}}{\overline{y}^{(1-\rho)\gamma}} - y_k^{1-\rho} \frac{\gamma}{\overline{y}^{(1-\rho)\gamma+1}} \frac{1}{n} - \sum_{i_{-k}} y_i^{1-\rho} \frac{\gamma}{\overline{y}^{(1-\rho)\gamma+1}} \frac{1}{n}$$

$$= \frac{1}{\overline{y}^{(1-\rho)\gamma}}\left(y_k^{-\rho} - \frac{\gamma}{\overline{y}} \sum_i \frac{y_i^{1-\rho}}{n}\right)$$

(11)

For $\gamma = 0$ (the non-positional case) this expression is always positive and it is straightforward

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[22]Since $\beta_k = y_k^{-\rho} \dfrac{\gamma}{\overline{y}^{\gamma-\rho\gamma-1}}$ we have $\left.\dfrac{\partial \beta_k}{\partial y_k}\right|_{\overline{y}} = -\gamma\rho \dfrac{y_k^{-\rho-1}}{\overline{y}^{\gamma-\rho\gamma-1}} < 0$ for $\gamma, \rho \geq 0$.

to see that the same holds for $\rho = 0$.[23] Thus, in order for social welfare to decrease in individual income, the signs of the positionality-parameter as well as that of the relative risk aversion parameter must be positive.

Assuming that the estimated parameters apply even outside the experimental conditions, we can easily illustrate the welfare implications of an income change for individuals with different income levels by imposing a more realistic income distribution into (11). Since the log-normal distribution function (Aitchison and Brown, 1957) appears to be the most frequently used function for describing actual income distributions on a national level, we impose this function into (11) to obtain:

$$\lambda \equiv \frac{\partial w}{\partial y_k} = \frac{1}{\overline{y}^{(1-\rho)\gamma}} \left(y_k^{-\rho} - \frac{\gamma}{\overline{y}} \int_0^\infty \frac{y^{-\rho}}{k_1 \sqrt{2\pi}} e^{-(\ln y - k_2)^2/(2k_1^2)} \mathrm{d}y \right) \qquad (12)$$

where k_1 and k_2 are constants. We can then calculate the social marginal rate of substitution (*SMRS*) for 2 individuals i, j with different incomes:

$$SMRS_{i,j} \equiv \frac{\lambda_i}{\lambda_j} = \left(\frac{y_j}{y_i} \right)^\rho \frac{1 - \frac{\gamma}{\overline{y}\, k_1 \sqrt{2\pi}} \int_0^\infty \left(\frac{y_i}{y} \right)^\rho e^{-(\ln y - k_2)^2/(2k_1^2)} \mathrm{d}y}{1 - \frac{\gamma}{\overline{y}\, k_1 \sqrt{2\pi}} \int_0^\infty \left(\frac{y_j}{y} \right)^\rho e^{-(\ln y - k_2)^2/(2k_1^2)} \mathrm{d}y} \qquad (13)$$

where the first factor equals *SMRS* in the absence of positionality. Using a specific log-normal income distribution,[24] and for a degree of positionality corresponding to the median value $\gamma =$

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[23] From (11) we have that when ρ goes to zero: $\frac{\partial w}{\partial y_k} = \frac{1}{\overline{y}^\gamma}(1 - \gamma) > 0$ for $\gamma < 1$.

[24] In the graphs we have chosen parameter values as follows: $k_1 = 0.73$ and $k_2 = 10$, corresponding to a mean income in the society of 28,700 SEK/month. The implied Gini-coefficient is equal to 0.395, or the same as the before-tax income Gini-coefficient for UK in 1996. Note that *SMRS* is invariant to any monotonic transformation of the SWF, implying that the SWF can be seen as ordinal.

0.35, Figure 1 plots the *SMRS* between the income levels for two individuals, where income is 10,000 SEK/month for the reference individual, as a function of income for different levels of relative risk aversion ρ .

[Figure 1 about here]

For example, we see that *SMRS* is roughly equal to 0.1 at $\rho = 1$ when income y is equal to 50,000, implying that taking 10 SEK from the richer person and giving 1 SEK to the poorer would keep social welfare constant, *ceteris paribus*. We also see that the critical income at which marginal social utility becomes negative is roughly 45,000 SEK for the median relative risk aversion of 1.72. Of course there are large differences depending on the degree of relative risk aversion, but it is interesting to see that for a broad range of risk aversion the social marginal utility of income becomes negative at income levels which are not at all extreme. For the conservative estimate where the relative risk aversion is equal to 1, the critical income is 80,000 SEK, which is less than three times the mean income. With a relative risk aversion equal to 3, the critical income is 24,000, i.e. lower than the mean income. Figure 2 depicts *SMRS* for different degrees of positionality, with a given relative risk aversion ρ = 1.72.

[Figure 2 about here]

We see that *SMRS* decreases rapidly in income in all cases. If individuals are completely non-positional, social marginal utility is always positive. In the somewhat extreme case when the degree of positionality is 0.9, the critical income for which *SMRS* becomes negative is roughly 26,000 SEK, which is again below the mean income level in the society.

6. Conclusions

We have found that the individuals in our sample are rather risk (or inequality) averse, although

the results are not extreme in comparison to earlier studies. Further, we found that most of the individuals in our sample were willing to trade-off a non-negligible amount of money for increasing their grandchild's relative standing in the society.

It is possible, however, that individual utility is a function not only of absolute and relative consumption, but also of inequality *per se*. This would imply a utility function of the type $u(y, y/\overline{y}, \xi)$, where ξ is a measure of income inequality, e.g. the coefficient of variation or the Gini-coefficient. If so, the estimated relative risk aversion may be overstated, and may in part reflect the individuals' willingness to pay for living in a more equal society. Reasons for this might be that a more equal society is considered safer to live in, or that the presence of poor people causes discomfort. On the other hand, some individuals may not be able to disregard the link between a more equal income distribution and government intervention through, for example, re-distributive taxes. Individuals who are not in favour of such policies might then have understated their relative risk aversion in the experiment.

We also illustrated how a simultaneous treatment of relative risk aversion and concern for position in society can affect the welfare implications of an increase in incomes, given a utilitarian SWF. Even with quite conservative parameters of relative risk aversion and positionality, the marginal social utility of income becomes negative above certain non-extreme income levels. At these income levels it may then seem rational to increase taxes even if no one else would benefit in terms of increased consumption. Hence, taking money from the very rich and throwing them into the sea would be welfare improving, if no indirect effects would occur. Still, one may question the functional form chosen, the ethics underlying a utilitarian SWF, or simply argue that the respondents' 'true' preferences are not revealed in this experimental setting. Alternatively it could be claimed that increased taxes on the rich would be so distorting that it may even lead to lower consumption for other groups. Further, there are of course public-choice reasons that make

extreme tax-increases for the rich difficult to implement.

To our knowledge this is the first attempt to measure relative risk aversion behind a veil of ignorance, and also the first simultaneous treatment of risk aversion and concern for relative standing. There are several interesting areas for future research. Firstly, measuring individuals' aversion to inequality per se, thus separating this effect from risk aversion. Secondly, to extend the treatment of positionality, for example by allowing it to depend on the consumption of goods other than income, or by including moments of the income distribution other than average income. Finally, to undertake similar studies in other countries, where the preferences for equality and status may differ.

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Table 1

Societies in the relative risk aversion experiment

	Minimum income	Mean Income	Maximum income	Relative risk premium if indifference between *A* and *B*	Relative risk aversion if indifference between *A* and *B*
Society A	10000	30000	50000		
Society B_1	20000	30000	40000	0	$\eta = 0$
Society B_2	19400	29100	38800	900	$\eta = 0.5$
Society B_3	18800	28200	37600	1800	$\eta = 1$
Society B_4	17200	25800	34400	4200	$\eta = 2$
Society B_5	15800	23700	31600	6300	$\eta = 3$
Society B_6	13600	20400	27200	9600	$\eta = 5$
Society B_7	12200	18300	24400	11700	$\eta = 8$
Society B_8	10000	15000	20000	15000	$\eta \; 6 \, 4$

Table 2

Societies in the relative-income experiment

	Average income	Grandchild's income	Relative positional premium if indifference between A and B	Degree of positionality if indifference between A and B
Society A	30000	25000		
Society B$_1$	20000	25000	0	$\gamma = 0$
Society B$_2$	20000	24000	1000	$\gamma = 0.1$
Society B$_3$	20000	23000	2000	$\gamma = 0.2$
Society B$_4$	20000	20400	4600	$\gamma = 0.5$
Society B$_5$	20000	18400	6600	$\gamma = 0.75$
Society B$_6$	20000	17400	7600	$\gamma = 0.9$
Society B$_7$	20000	16650	8350	$\gamma = 1$

Table 3

Results of the relative risk aversion experiment

Parameter values, risk aversion	No.	Freq.	Cum. freq.	Relative risk premium
$\eta < 0$ $\rho < 0$	62	0.17	0.17	-500
$0 < \eta < 0.5$ $0 < \rho < 0.32$	21	0.06	0.23	450
$0.5 < \eta < 1$ $0.32 < \rho < 0.63$	18	0.05	0.28	1350
$1 < \eta < 2$ $0.63 < \rho < 1.39$	42	0.11	0.39	3000
$2 < \eta < 3$ $1.39 < \rho < 2.05$	58	0.16	0.55	5250
$3 < \eta < 5$ $2.05 < \rho < 3.19$	60	0.16	0.71	7950
$5 < \eta < 8$ $3.19 < \rho < 4.11$	36	0.10	0.81	10650
$8 < \eta < 4$ $4.11 < \rho < 6.54$	25	0.07	0.88	13350
$\eta \, 6 \, 4 \,^*$ $\rho > 6.54$	45	0.12	1.00	15500

* Strictly speaking, with no positionality these responses are incompatible with the chosen functional form.

Table 4
Results of the relative-income experiment

Parameter values, positionality	No.	Freq.	Cum. freq.	Relative positional premium
$\gamma < 0$	64	0.18	0.18	-500
$0 < \gamma < 0.1$	42	0.12	0.30	50
$0.1 < \gamma < 0.2$	30	0.08	0.38	1500
$0.2 < \gamma < 0.5$	101	0.28	0.66	3300
$0.5 < \gamma < 0.75$	52	0.15	0.81	5600
$0.75 < \gamma < 0.9$	14	0.04	0.85	7100
$0.9 < \gamma < 1$	20	0.06	0.91	7975
$\gamma > 1$	33	0.09	1.00	8850

Table 5

Results of experiment on the structure of positional concern

Low income		Medium income		High income	
Parameter values, positionality	Freq. (Cum. freq.)	Parameter values, positionality	Freq. (Cum. freq.)	Parameter values, positionality	Freq. (Cum. freq.)
$\gamma < 0$ $\delta < 0$	0.04 (0.04)	$\gamma < 0$ $\delta < 0$	0.10 (0.10)	$\gamma < 0$ $\delta < 0$	0.28 (0.28)
$0 < \gamma < 0.1$ $0 < \delta < 0.06$	0.21 (0.26)	$0 < \gamma < 0.1$ $0 < \delta < 0.1$	0.10 (0.20)	$0 < \gamma < 0.1$ $0 < \delta < 0.24$	0.18 (0.46)
$0.1 < \gamma < 0.2$ $0.06 < \delta < 0.12$	0.21 (0.47)	$0.1 < \gamma < 0.2$ $0.1 < \delta < 0.2$	0.09 (0.29)	$0.1 < \gamma < 0.2$ $0.24 < \delta < 0.48$	0.02 (0.48)
$0.2 < \gamma < 0.5$ $0.12 < \delta < 0.28$	0.21 (0.68)	$0.2 < \gamma < 0.5$ $0.2 < \delta < 0.46$	0.36 (0.64)	$0.2 < \gamma < 0.5$ $0.48 < \delta < 1.10$	0.30 (0.78)
$0.5 < \gamma < 0.75$ $0.28 < \delta < 0.4$	0.14 (0.82)	$0.5 < \gamma < 0.75$ $0.46 < \delta < 0.66$	0.14 (0.79)	$0.5 < \gamma < 0.75$ $1.10 < \delta < 1.58$	0.07 (0.84)
$0.75 < \gamma < 0.9$ $0.4 < \delta < 0.46$	0.03 (0.86)	$0.75 < \gamma < 0.9$ $0.66 < \delta < 0.76$	0.07 (0.86)	$0.75 < \gamma < 0.9$ $1.58 < \delta < 1.82$	0.03 (0.87)
$0.9 < \gamma < 1$ $0.46 < \delta < 0.5$	0.10 (0.96)	$0.9 < \gamma < 1$ $0.76 < \delta < 0.83$	0.11 (0.97)	$0.9 < \gamma < 1$ $1.82 < \delta < 2$	0.07 (0.94)
$\gamma > 1$ $\delta > 0.5$	0.04 (1.00)	$\gamma > 1$ $\delta > 0.83$	0.03 (1.00)	$\gamma > 1$ $\delta > 2$	0.06 (1.00)
Median γ	[0.2- 0.5]	Median γ	[0.2- 0.5]	Median γ	[0.2- 0.5]
Mean γ	0.37	Mean γ	0.43	Mean γ	0.31
Median δ	[0.06-0.12]	Median δ	[0.2-0.46]	Median δ	[0.48-1.10]
Mean δ	0.2	Mean δ	0.38	Mean δ	0.65

Table 6
OLS estimates of relative risk premium

Variable	Coefficient	P-value	Mean	Partial effect on η, $\gamma = 0$	Partial effect on ρ, $\gamma = 0.35$
Intercept	7127.96	0.00			
Female	490.12	0.39	0.47	0.27	0.16
No. of siblings	-319.03	0.17	1.53	-0.18	-0.11
Left	3119.77	0.00	0.26	1.99	1.08
Education: - Technology	-528.69	0.57	0.17	-0.29	-0.17
- Nurse	806.38	0.44	0.12	0.47	0.27
- Business	-1803.82	0.03	0.39	-0.99	-0.59
- Law	-124.13	0.90	0.16	-0.07	-0.04
At least one semester in economics	-63.97	0.94	0.12	-0.036	-0.02
Frequent church visitor	1747.76	0.14	0.05	0.97	0.58
Grandchild will earn more than the mean	-1593.05	0.00	0.55	-0.9	-0.53
Area: Big city	933.88	0.22	0.17	0.54	0.31
R-squared	0.15				
Breusch-Pagan	$13.33 \sim \chi^2_{chr.(0.05;12)} = 21.026^*$				

* Using the Breush-Pagan test we can thus not reject the hypothesis of homoskedasticity.

Table 7

OLS estimates of relative positional premium

Variable	Coefficient	P-value	Mean	Partial effect on γ
Intercept	3142.68	0.00		
Female	471.92	0.17	0.47	0.053
No. of siblings	259.76	0.06	1.53	0.029
Left	663.17	0.07	0.26	0.075
Education: - Technology	-1346.69	0.02	0.17	-0.149
- Nurse	168.21	0.79	0.12	0.019
- Business	-21.69	0.96	0.40	-0.002
- Law	-1042.27	0.06	0.16	-0.115
At least one semester in economics	-1263.34	0.01	0.13	-0.139
Frequent church visitor	-893.62	0.21	0.05	-0.101
Area: Big city	299.57	0.51	0.17	0.034
R-squared	0.08			
Breusch-Pagan	$13.36 \sim \chi^2_{chr.(0.05;10)} = 18.307$ *			

* Using the Breush-Pagan test we can again not reject the hypothesis of homoskedasticity.

Figure text:

Fig. 1. *Social marginal rate of substitution for different parameters of relative risk aversion for a constant degree of positionality (=0.35).*

Fig. 2. *Social marginal rate of substitution for different degrees of positionality for a constant relative risk aversion (=1.72).*