IAAEU
Institut für Arbeitsrecht
und Arbeitsbeziehungen
in der Europäischen Union

IAAEU Discussion Paper Series in Economics
No. 10/2012

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Inga Hillesheim, Mario Mechtel

November 2012

Institute for Labour Law and Industrial Relations in the
European Union (IAAEU)
54286 Trier
www.iaaeu.de

How much do others matter? Explaining positional concerns for different goods and personal characteristics

Inga Hillesheim* Mario Mechtel†‡

November 7, 2012

Abstract

We test concerns for relative standing with respect to private consumption, income, leisure, savings, and personal characteristics, using data from a classroom survey. Our results show highest degrees of positionality for personal characteristics and income. In order to explain positionality, we employ survey participants' ratings of items with respect to (i) observability and (ii) non-psychological negative externalities on others. Based on these ratings, our results show that non-psychological externalities play an important role for an item's degree of positionality. In contrast to previous research, we find that there is no statistically significant effect of an item's observability on its degree of positionality.

Keywords: behavioral economics; relative consumption; other-regarding preferences; relative standing
JEL: C91, D63, D10

*Eberhard Karls University Tübingen, Melanchthonstr. 30, 72074 Tübingen, Germany, e-mail: inga.hillesheim@uni-tuebingen.de.

†**Corresponding author:** IAAEU Trier & University of Trier, Behringstr., 54286 Trier, Germany, e-mail: mechtel@uni-trier.de, phone: +49 651 201 4757, fax: +49 651 201 4742.

‡We thank Laszlo Goerke, Florian Hett, and Kerstin Pull for valuable suggestions and intensive discussions on the topic. Obviously, any errors are ours alone.

1 Introduction

In recent years, a number of scholars have investigated individual concerns for relative standing with respect to different goods and personal attributes using survey data (see Solnick and Hemenway, 1998, 2005; Johansson-Stenman et al., 2002; Alpizar et al., 2005; Solnick et al., 2007; Carlsson et al., 2007; Carlsson and Qin, 2010; Hillesheim and Mechtel, 2011, 2012). These papers examine whether participants are willing to sacrifice consumption in absolute terms in order to advance their consumption rank in comparison to others. Based on this research, the present paper aims to answer the question of whether different categories of items, namely *income*, *leisure*, *personal characteristics*, *private consumption*, and *savings* differ with respect to their degree of positionality[1]. Furthermore, we test possible explanations for these differences.

Our paper provides two contributions to the literature. Firstly, we cover a wide variety of different categories in one single study, including the category *savings*, which has to our knowledge not yet been investigated. Including all these different categories enables us to make comparisons between them. Recent papers have restricted their analysis to two or three different types of items. Comparisons are made, for example, between *personal characteristics* and *income* (Solnick and Hemenway, 1998), *private* and *public goods* (Solnick and Hemenway, 2005), *private consumption* and *leisure activity* (Alpizar et al., 2005), or *income*, *leisure*, and *private consumption* (Carlsson et al., 2007). By introducing two questions regarding private pension schemes and interest-paying investments, we fill the gap with respect to *savings*. From a theoretical point of view, there are at least two reasons to expect a positive degree of positionality for *savings*: If individuals make comparisons among themselves with regard to their wealth, it will be particularly relevant to save more than

[1] A good or personal characteristic is referred to as being positional, if the relation between individual consumption/endowment and the amount that others consume/are endowed with has an impact on individual utility.

others (see Veblen, 1997), implying a positive degree of positionality. In addition, today's *savings* increase the future budget for consumption. As *consumption* has already proven to be positional in previous studies, this could imply that *savings* are positional as well.

Secondly, and most importantly, we explicitly examine two explanations for individual choices regarding relative standing: items' association with non-psychological negative externalities on others[2] (Frank, 2008) and items' observability for others[3] (Frank, 1985). In contrast to other authors, who have already argued that observability (Alpizar et al., 2005; Carlsson et al., 2007) and non-psychological effects (Hillesheim and Mechtel, 2011) play a role regarding positionality, our classification of items' characteristics is based on the assessment of our survey participants. Besides not having to rely on our own evaluation of items' characteristics, this approach offers another important advantage: we can directly use a participant's rating to explain the participant's individual answers which allows for an analysis on the micro-level.

In order to clearly identify an item's degree of positionality correctly, we apply the modified survey methodology proposed by Hillesheim and Mechtel (2012), which requires that participants are divided into a treatment and a control group. Our results show strongly pronounced differences between different groups of items. Relative standing turns out to be highly relevant for *personal characteristics* and *income*, and at least partially for *savings*. However, it is less pronounced for *private consumption* and *leisure*. Regarding the explana-

[2]Non-psychological negative externalities occur if the possession of a good or the endowment with a personal characteristic causes disutility for others that goes beyond envy. Here, the endowments of other agents do not enter the utility function directly: individuals do not need to have a taste for being "better" than others for the sake of being better. Instead, relative standing affects individual utility in an indirect manner, for example in terms of competitive (dis)advantages which can, in a second step, be reflected in a lower relative consumption position in the future. For instance, having a worse education than the average person might, on the one hand, directly decrease individual utility if one compares in this dimension (psychological effect). On the other hand, it might be a relative disadvantage as it decreases one's probability of finding a good job and therefore having a secure and high income in absolute terms (non-psychological effect).

[3]An item's observability depends on whether it is easy for other persons to observe an individual's personal characteristics or that individual's consumption levels of a particular good.

tions for these differing degrees of positionality, our results indicate that non-psychological negative externalities are an important driving force behind positional concerns. This finding supports the results of Hillesheim and Mechtel (2011). Surprisingly, we find that an item's observability does not have a statistically significant impact on its degree of positionality. Whereas in previous research (Alpizar et al., 2005; Carlsson et al., 2007) items classified as easily observable turn out to have a higher degree of positionality, this is not the case in our survey, which relies on participants' perceptions of these attributes.

The paper is organized as follows: in Section 2, we describe the related literature with respect to survey methodologies and explanations for participants' choices. Detailed information about our survey structure and descriptive statistics are provided in Section 3. We present and discuss our results and explanatory approaches in Section 4. Our conclusion is provided in Section 5.

2 Related literature

Our work is based on the literature that analyzes positional concerns for different goods and personal characteristics as well as relative income concerns (see, e.g., Solnick and Hemenway, 1998, 2005; Johansson-Stenman et al., 2002; Alpizar et al., 2005; Solnick et al., 2007; Carlsson et al., 2007; Carlsson and Qin, 2010; Hillesheim and Mechtel, 2011, 2012). These papers test for positional concerns using two-states-of-the-world surveys. Participants are asked to choose between (a) a low individual endowment while others have an even lower endowment, or (b) a high individual endowment while others have an even higher endowment. Thus, they face a trade-off between a low individual endowment in absolute terms associated with a high individual rank and a high individual endowment in absolute terms associated with a low individual rank in society. Typically, the first scenario (a) is referred to as the *positional*

scenario, whereas the latter scenario (b) is considered the *non-positional scenario*. The share of positional answers is interpreted as the degree of positionality.

Using this technique, Zeckhauser (1991), Tversky and Griffin (1991), Solnick and Hemenway (2005), and Alpizar et al. (2005), among others, find that participants not only care about absolute levels of income, but also about their relative income. Solnick and Hemenway (1998) illustrate that concerns for relative standing are not limited to income only. They include different personal characteristics in their analysis, providing evidence for strong positional concerns regarding a person's attractiveness and intelligence. Solnick and Hemenway (2005), Carlsson et al. (2007), and Hillesheim and Mechtel (2011) show that positional concerns also play a role for the consumption of private goods. In respect to public goods, Solnick and Hemenway (2005) and Hillesheim and Mechtel (2011) come to different conclusions. Based on a survey conducted in the US, Solnick and Hemenway (2005) find that public goods are more positional than private goods, whereas Hillesheim and Mechtel (2011) find the opposite using a survey conducted in Germany. All these studies based on discrete choice experiments point to the importance of comparisons with others for individual consumption choices.

Importantly, other studies that focus on the influence of relative standing on individual happiness and life satisfaction show that there is a direct link between an individual's relative position in society and life-satisfaction/happiness. Subjective wellbeing turns out to depend on the relative income position (Hayo and Seifert, 2003) and the consumption position of goods such as clothes and housing relative to the average consumption in the community (Guillen-Royo, 2011). Furthermore, Winkelmann (2012) shows that there is a negative link between the density of luxury cars and satisfaction with own income in Swiss municipalities. In a recent contribution, Benjamin et al. (2012) find that predicted subjective wellbeing can indeed well explain individual decisions in hypothetic choice experiments regarding relative

and absolute income levels. Furthermore, they are interested in other factors that drive individual decisions, such as health, family happiness, and social status. Their econometric analysis shows that social status concerns have a direct influence on participants' choices that goes beyond the indirect effect of status concerns on subjective wellbeing. However, in contrast to Benjamin et al. (2012), in this paper we are more interested in how items' characteristics influence individual choices.

With regard to the survey technique, Hillesheim and Mechtel (2012) show that choosing the positional scenario may not necessarily be induced only by positional concerns, but also by non-monotonic preferences. Thus, they propose a modified survey methodology that allows disentangling participants' different motives for choosing the positional scenario by introducing a control group, whose members are only provided with information on their own endowment and do not receive any information on the reference group. With this means, it is possible to calculate the treatment effect, i.e., the difference between the share of positional answers in the treatment group and the share of absolutely-less answers in the control group, as the measure for an item's degree of positionality. Their results show that this is a necessary precondition to correctly interpret the survey participants' choices. We therefore apply their newly developed survey methodology in this paper.

As this paper focuses on explanations for differing degrees of positionality for different items, let us briefly describe the different explanatory approaches in the existing literature. Frank (1985) argues that interpersonal comparisons are more important for those items that are easily observable by others. In line with this reasoning, Alpizar et al. (2005) use an item's visibility as a predictor for its degree of positionality. Of the goods included in their study, they argue that cars and housing are easy to observe, whereas the level of observability is low for insurance and vacation. In accordance with their classification of visibility, they conclude that visible goods are more positional. In addition, Carlsson et al. (2007) postulate

that car value as a visible item is more positional than car safety, which they classify less visible. This conjecture is supported by the results of their research.

A further explanation is based on Frank's (2008) argumentation that concerns for relative standing can be induced by non-psychological negative externalities. On the one hand, emotions such as envy result in individual preferences for being better off or at least not worse off than others (see, e.g., Fehr and Schmidt, 1999). On the other hand, having less than others with respect to a particular item can just as well lead to more tangible costs. For example, having a lower educational level than others will decrease the probability of supplanting them when applying for certain jobs and thus can endanger a secure income. Based on this argumentation, Hillesheim and Mechtel (2011) examine whether items that are associated with non-psychological negative externalities show a higher degree of positionality. Furthermore, Hillesheim and Mechtel (2011) argue that there can be positive spillover effects from the consumption of certain public goods, which can decrease individual incentives to choose the positional scenario. Their results show that non-psychological negative externalities are a good predictor for a good's degree of positionality.

Common to all these papers is that they rely on *authors'* perceptions of the items' attributes. Although the authors' classifications into the categories mostly appear to be plausible, it is not clear whether survey participants would agree with them. In the present paper, we therefore use the classifications of the goods made by the survey participants themselves.

3 Design and sample

In order to address concerns that choosing the positional scenario may as well be motivated by non-monotonic preferences, participants of the present survey were randomly divided into

a control group and a treatment group. Only the members assigned to the treatment group were provided with questions following the structure described above, in which choices given were described in terms relative to "others". In contrast, participants of the control group did not obtain any information on "others" and therefore only had to choose between "more" or "less" of the item in consideration. The following example illustrates our methodology:

> Below, there are two states of the world. You are asked to pick which of the two you would prefer to live in. If you do not have a preference, choose "I have no preference".
>
> - Treatment group:
>
> (a) You own a car worth € 10 000; others own a car worth € 5 000.
>
> (b) You own a car worth € 20 000; others own a car worth € 30 000.
>
> (c) I have no preference.
>
> - Control group:
>
> (a) You own a car worth € 10 000.
>
> (b) You own a car worth € 20 000.
>
> (c) I have no preference.

For both the treatment and the control group, the second scenario (b) assures a higher level of endowment in absolute terms (*absolutely more*) whereas the first scenario (a) results in a lower level of endowment in absolute terms (*absolutely less*). In addition, for members of the treatment group answer (b) comprises the *non-positional* scenario while answer (a) corresponds to the *positional* scenario.[4]

[4]For the sake of brevity, we refer to scenario (a) as "absolutely-less (positional)" and scenario (b) as "absolutely-more (non-positional)" whenever we simultaneously talk about the treatment and control group in the remainder of this paper.

Our survey was conducted as a classroom survey in May 2011 with 190 participants, 131 of which were in the treatment group and 59 in the control group. All participants were second and third year students from the University of Tübingen with majors in international economics, international business, and economics and business administration. Table 1 illustrates the socio-economic characteristics of the treatment and the control group and shows that differences are small and not statistically significant.

	Treatment group	**Control group**	**p-value**
Observations	131	59	
Age (arithm. mean)	21.95	21.64	0.2268
Female (share)	0.56	0.66	0.2117
Grade in *Abitur* (arithm. mean)	1.57	1.63	0.3008
Response rate, second survey	57.3%	55.9%	0.8651

Table 1: Descriptive statistics: socio-economic variables. p-values of two-sample t-tests for Age and Grade in *Abitur* and two-sample test of proportion for Female and Response rate.

In total, the survey contained 16 questions. Two of the items included – restaurant visits and cinema visits – are associated with both private consumption and leisure, so that we obtain the additional category *private consumption and leisure*. While some of the categories included in the present survey were already extensively investigated prior to this study (for income, see, among others, Zeckhauser, 1991; Tversky and Griffin, 1991; Solnick and Hemenway, 1998; Johansson-Stenman et al., 2002; Carlsson and Qin, 2010), research on the other categories is rare (for leisure, see Solnick and Hemenway, 2005; Carlsson et al., 2007), or not existent at all (for savings). Moreover, as already stated above, there is to our knowledge no study analyzing items from more than two or three categories at once in order to compare their degrees of positionality.

All the questions and answers and the full instructions handed out to the treatment group are presented in the Appendix. To avoid the "order effect" (i.e., the tendency to choose the

first answer because it is presented first), each questionnaire contained eight questions with the absolutely-more (non-positional) scenario as the first answer and eight questions with the absolutely-less (positional) scenario as the first answer. Furthermore, there were two versions of the questionnaire, in which the answers of the second were arranged in reverse order of the first.

Two weeks after the classroom survey, we asked the participants to rate the items according to their observability and the existence of non-psychological negative externalities in a follow-up survey, which was conducted online. This two-step procedure provides several advantages. First, we did not frame the participants with respect to non-psychological negative externalities or observability effects. Therefore, we had to conduct the survey in which they evaluate the goods after the positionality survey. Second, we did not want the characteristics' assessment to be influenced by individual answers in the first survey, in order to avoid endogeneity problems in our econometric analysis. With a period of two weeks in between, it is unlikely that participants still had detailed memories of their individual answers to the 16 questions. Apart from this, waiting significantly longer than two weeks could have decreased the response rate.

In the online questionnaire, participants were requested to pick out of a list of all 16 items all those which they find to be easily observable.[5] Additionally, participants were also asked to identify of the 16 those items, which they associate with non-psychological negative externalities.[6] We choose the wording presented in footnote 6 such that it allows

[5]The exact wording of the question was: "Consumption levels of some goods or particular personal characteristics are easily observable for others. Please choose those items from the following list which are from your point of view easily observable for others.".

[6]The text we provided participants with reads as follows: "There are different channels through which consumption of particular goods or particular personal characteristics can influence the utility of another person negatively. On the one hand, individuals might compare their own consumption/characteristics with those of others and dislike falling behind the reference person (envy). On the other hand, consumption levels or personal characteristics of an individual A might decrease individual B's utility because they constitute a competitive disadvantage for individual B. From the following list of goods and personal characteristics please choose those items which are from your point of view connected with competitive disadvantages for

to decompose utility in a psychological and a non-psychological component, given that our participants are Economics and Business students who participated in basic micro courses in preceding semesters and are therefore familiar to these terminologies. However, this comes at the cost that the text is rather long. Furthermore, it might be argued that the instructions are relatively complex, especially with regard to non-psychological externalities. Therefore, the instructions were reviewed by student assistants at the Faculty of Economics at the University of Tübingen in a pretest. We asked them to explain in their own words what the instructions actually meant in order to ensure that they were intelligible to the participants in our follow-up survey. At the end of the follow-up survey, we offered the participants the possibility to provide us with their comments. None of the comments indicated that they had problems understanding the instructions or that the instructions had been too difficult.

In order to match the answers from this online survey with our first survey, participants were required to denote the individual three-digit code which was printed on their classroom questionnaire, before answering the actual online questionnaire. 108 of the 190 participants in the first survey also took part in the online survey. As can be seen from Table 1, the difference in the response rates for the treatment and the control group is small and not statistically significant. All results presented in Section 4.1 are based on the 190 participants that took part in the initial classroom survey. However, we also repeated our analysis using only the data from those participants who took part in both surveys. As Section 4 shows, our findings do not depend on the choice of the (sub)sample.

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others."

4 Survey results

We divide our empirical analysis into two parts. First, we focus on how the additional information about the existence of a reference group affects participants' choices. As the second step, we perform a number of regressions to investigate whether non-psychological negative externalities and observability influence individual choices.

4.1 Treatment effect

In order to examine whether participants' responses exhibit an overall treatment effect, we start off with a bivariate regression with the share of absolutely-less (positional) answers per participant as the dependent variable and a treatment group dummy – taking the value of one whenever the individual was a member of the treatment group and zero otherwise – as the explanatory variable. The first column in Table 2 illustrates that belonging to the treatment group increases a participant's share of positional answers by about 21 percentage points. This overall treatment effect is economically large and statistically significant at the 1%-level. Furthermore, it remains robust both in terms of statistical significance and numerical impact when adding socio-economic control variables. As can be seen from columns (2) to (5), none of the additional control variables *female*, *age*, and *grade in Abitur* has a significant effect on participants' choices.

Next, we will turn to the shares of positional (treatment group) and absolutely-less (control group) answers for each individual question, depicted in Table 3. Column (1) reveals great differences regarding the share of positional answers among the different questions in the treatment group. Turning to the category averages, we find that the share of positional answers in the treatment group is highest for *savings*, followed by *personal characteristics* and *income*. In contrast, the questions concerning *private consumption*, *leisure*, as well as

	(1)	(2)	(3)	(4)	(5)
Treatment group	0.2105***	0.2083***	0.2106***	0.2024***	0.1996***
	(9.02)	(8.98)	(9.06)	(8.61)	(8.61)
Female		-0.0232			-0.0324
		(-0.80)			(-1.11)
Age			-0.0049		-0.0061
			(-0.62)		(-0.75)
Grade in *Abitur*				-0.0338	-0.035
				(-0.92)	(-0.96)
Constant	0.1049***	0.1202***	0.2104	0.1618***	0.3171*
	(7.40)	(4.79)	(1.22)	(2.67)	(1.78)
Number of observations	190	190	189	187	186
R^2	0.22	0.22	0.22	0.21	0.22

Notes: value of t-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 2: OLS regression results. Dependent variable: share of positional (abs.-less) answers per participant. Heteroskedasticity-robust standard errors.

private consumption and leisure exhibit lower shares of positional answers.

Columns (1) and (2) of Table 3 illustrate that the share of absolutely-less answers in the control group is lower than the share of positional answers in the treatment group for every single question, except restaurant visits. The treatment effect, i.e., the difference between these two shares, is depicted in column (3). The greatest and most highly significant treatment effects exist for three of the *personal characteristics*, namely intelligence, the grade in *Abitur*, and attractiveness. The remaining two personal characteristics, body mass index and fitness, are characterized by intermediate treatment effects, which are also significant at the 1% level. According to column (3), well pronounced treatment effects significant at the 1% level are present as well for the two questions relating to *income*. Furthermore, the questions concerning *private consumption*, namely living space and car value, show smaller treatment effects significant at the 1% and 5% level.

Results for the other categories are ambiguous. Regarding the questions concerned with *savings*, we find a distinct and highly significant treatment effect of about 20 percentage points for investments, which exceeds the treatment effects determined for *private consump-*

	Percentage of responses		Treatment effect
	Treatment group positional (1)	**Control group** abs. less (2)	(1)-(2) (3)
Income			
Side job income	32.8	0	32.8***
Parents' income	40.5	6.8	33.7***
Average	*36.7*	*3.4*	*33.3*
Private consumption			
Car value	25.2	13.6	11.6**
Living space	21.4	6.8	14.6***
Average	*23.3*	*10.2*	*13.1*
Leisure			
Time for hobbies	13.7	0	13.7***
Evenings of leisure spent with friends	19.9	15.3	4.6
Vacation time	10.7	3.4	7.3**
Average	*14.8*	*6.2*	*8.5*
Private consumption and leisure			
Restaurant visits	26.0	27.1	-1.1
Cinema visits	13.0	1.7	11.3***
Average	*19.5*	*14.4*	*5.1*
Savings			
Contribution to private pension	63.4	59.3	4.1
Investments for future	30.5	10.2	20.3***
Average	*47.0*	*34.8*	*12.2*
Personal characteristics			
Grade in *Abitur*	52.7	6.8	45.9***
Personal intelligence	65.7	5.1	60.6***
Fitness and physical condition	17.6	3.4	14.2***
Body mass index	21.4	1.7	19.7***
Personal attractiveness	50.4	6.8	43.6***
Average	*41.6*	*4.8*	*36.8*
Average – all	**31.6**	**10.5**	**21.1**

Notes:*** treatment effect sign. at 1% level, ** sign. at 5% level, * sign. at 10% level. according to two-sample tests of proportion.

Table 3: Share of positional (absolutely-less) answers in the treatment (control) group and treatment effect per item.

tion. In contrast, the treatment effect for private pensions is small and insignificant. Several possible reasons for this difference are conceivable. First, although the yearly amount of savings was the same for both questions, the question regarding investments was phrased in terms of a yearly value, whereas the question regarding private pension was phrased in terms of monthly values. Second, the type of savings could have had an impact as well: while retirement is more than 40 years away for most of the participants in our survey, the temporal horizon for the second question is left unspecified. Furthermore, in contrast to private pension schemes, the purpose of the investments in the survey is not stated. They could, for instance, be interpreted as saving for retirement as well, but also as saving up to buy a new car the following year. All of these aspects could have an impact on the degree of positionality. However, these explanations are, of course, speculative. To shed more light on the positionality of savings, future research might therefore include savings in the analysis, varying one of these characteristics each time.

Results are also mixed for the categories *leisure* and *private consumption and leisure*. We find smaller treatment effects for time for hobbies and cinema visits, both significant at the 1% level, and for vacation time (significant at the 5% level), whereas the treatment effects for the remaining questions are statistically insignificant. Aggregating at the category level, treatment effects turn out to be most pronounced for *personal characteristics* and *income*.

As stated above, we also performed the analyses described in this section for the subsample of 108 participants who took part both in the classroom survey and in the follow-up survey. Our purpose was to test whether our results are different when relying only on those participants who took part in both surveys. The results for these "subsample robustness checks" are provided in the Appendix. Tables 10, 11, and 12 show that the results presented so far do not depend on the choice of the sample.

4.2 Explanatory approach

We now test two possible explanatory approaches for an item's degree of positionality. First, as described in Section 2, positional preferences can be caused by non-psychological negative externalities (Frank, 2008). In the presence of those non-psychological externalities, preferences for relative standing can occur even if emotions like envy do not exist. If an item imposes non-psychological negative externalities, relative standing enters the utility function in an indirect manner due to competitive (dis)advantages.[7] In line with this reasoning, Postlewaite (1998) distinguishes between whether relative standing is utility enhancing itself or whether it serves as a means of attaining a greater amount of consumption in absolute terms (e.g., an advantage in a contest). This leads us to

Hypothesis 1 *Items that are characterized by non-psychological negative externalities*[8] *are ceteris paribus more positional.*

Second, endowments have to be easily observable in order to compare them with those of others because otherwise, the comparison is impeded. Furthermore, some of the items included in our survey might be used as indicators for other attributes. Corneo and Grüner (2000) argue that conspicuous consumption may act as a signal of material well-being. In addition, Frank (1985) claims that consumption and income are used as a signal for individual ability. Mobius and Rosenblat (2006) find evidence that even physical appearance is drawn on as a signal for ability. Likewise, signaling is not possible (or, at least, not effective) if the signal is hardly observable. In line with previous work (Alpizar et al., 2005; Carlsson et al., 2007), we therefore suggest that being better than others is more important if the respective item is easily observable. The above reasoning leads us to

[7] For a formal definition, see Hillesheim and Mechtel (2011).

[8] For the sake of simplicity, we will refer to those "negative externalities" as "externalities" for the remainder of this paper.

Hypothesis 2 *Easily observable items are ceteris paribus more positional.*

	Non-psychological externalities (share)	**Observability** (share)
Income		
Side job income	42.6	11.1
Parents' income	64.8	18.5
Average	*53.7*	*14.8*
Private consumption		
Car value	25.0	57.4
Living space	24.1	50.0
Average	*24.5*	*53.7*
Leisure		
Time for hobbies	9.3	33.3
Evenings of leisure spent with friends	8.3	55.6
Vacation time	20.4	40.7
Average	*12.7*	*43.2*
Private consumption and Leisure		
Restaurant visits	6.5	25.9
Cinema visits	4.6	25.0
Average	*5.6*	*25.5*
Savings		
Contribution to private pension	12.0	2.8
Investments for future	21.3	0.9
Average	*16.7*	*1.9*
Personal characteristics		
Grade in *Abitur*	68.5	15.7
Personal intelligence	73.2	34.3
Fitness and physical condition	31.5	58.3
Body mass index	35.2	54.6
Personal attractiveness	68.5	77.8
Average	*55.4*	*48.1*

Table 4: Participants' assessment of items' characteristics: share of participants rating an item as "exerting non-psychological externalities" and "being easily observable by others".

Table 4 presents participants' assessments of items' characteristics, obtained from the follow-up survey. Column (1) shows the valuation with regard to the existence of non-psychological externalities, column (2) with regard to observability. *Personal characteristics*,

especially intelligence, personal attractiveness, and the grade in *Abitur*, as well as *income*, namely parents' income, are associated most often with non-psychological externalities. In contrast, both questions relating to *private consumption and leisure* and the majority part of the questions relating to *leisure* are the least associated with non-psychological externalities. With regard to observability, parts of the *personal characteristics*, namely the ones concerned with personal appearance, as well as the questions relating to *consumption* are perceived as the most observable, whereas *income*, and especially *savings*, are regarded as the least observable. There exist some other studies that also construct rankings of goods with regard to their observability. The rankings by Charles et al. (2009) and Heffetz (2012) resemble our participants' ranking for those goods represented in both our and their study (studies).

As stated above, the follow-up survey was conducted two weeks after the classroom survey. In order to rule out the smallest possibility of endogeneity (i.e., an influence of own positional answers in the classroom survey on the items' classifications in the follow-up survey), we replicated Table 4 based on the answers of only those people who were in the control group in the classroom survey. It turns out that the results are very similar to those presented in Table 4. Besides the fact that there is relatively little variation between the items' classifications made by members of the control and the treatment group, we do not find any systematic deviations between both groups. As a robustness check, we will refer to the modified classifications based only on control group participants in the remainder of the paper.

Before we start with our econometric analysis, Figure 1 provides a first idea about the effects of an item's characteristics on its degree of positionality. On the horizontal axis, we depict the share of participants who classify an item as being accompanied with non-psychological externalities. The vertical axis shows participants' assessments regarding items' observability. Each marker's size depends on the size of the item's treatment effect

taken from Table 3. Figure 1 indicates that there is no systematic relationship between observability and the size of the treatment effect. However, it can be seen from the graphic that the larger the share of participants who associate an item with non-psychological externalities the higher is treatment effect.

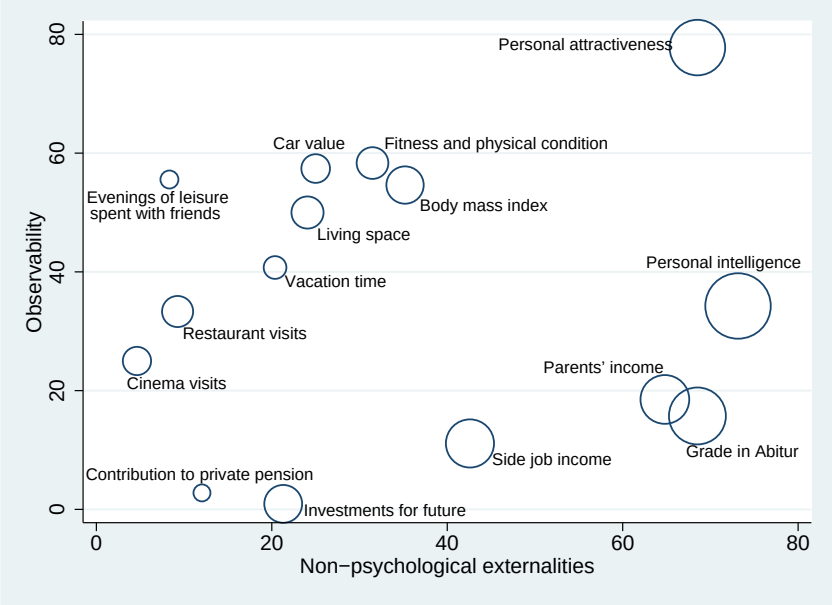

Figure 1: Participants' assessments of items' characteristics: observability (vertical axis) and non-psychological externalities (horizontal axis). Marker size represents the size of an item's treatment effect.

Due to the structure of our data, we perform an econometric approach consisting of three steps. In the previous section, each item's treatment effect was the variable of central interest. We therefore first perform regressions using data at the aggregated level and test whether observability and non-psychological externalities influence the treatment effect per item. This allows us to compare our results to those of previous papers that focused on aggregated outcome measures, such as Hillesheim and Mechtel (2011), Alpizar et al. (2005) and Carlsson et al. (2007). In contrast to these studies, the present paper does not rely on the authors' perceptions of items' characteristics. As the second step, we utilize the data at the

micro-level and explain each of the 190 participants' decisions with regard to all 16 items. Our logit model contains the survey participants' classifications of items' characteristics derived in the follow-up survey as explanatory variables. As not all participants took part in the follow-up survey, our estimations rely on the aggregated rating of items' characteristics rather than each participant's own rating. Our third step then utilizes the 108 follow-up survey participants' individual classifications of items' observability and non-psychological externalities. This obviously comes at the cost of losing all information from participants who did not take part in the follow-up survey. However, the third step's benefit is an econometric model that explains participants' individual choices using their individual perceptions of items' characteristics directly. Thus, the first step of our econometric analysis focusing on the explanation of the treatment effect is closely related to Section 4.1, whereas steps two and three focus on the micro-level. Considering the structure of our data, all three steps are necessary in order to thoroughly test the two explanatory approaches.

The first step of our explanatory approach thus contains a simple econometric model, using the follow-up survey participants' assessments as explanatory variables:

$$\text{treatment effect}_j = \alpha_0 + \alpha_1 \text{ non-psychological externalities}_j + \alpha_2 \text{ observability}_j + \epsilon_j, \quad (1)$$

where the dependent variable denotes each item j's treatment effect, $j = 1...16$, as reported in Table 3 and the explanatory variables, *non-psychological externalities*$_j$ and *observability*$_j$, are defined as follows. First, we use the shares of items' assessments, presented in Table 4, as explanatory variables. Second, equation (1) is estimated using dummy variables that take the value of one whenever the shares in Table 4 exceed 50 percent, i.e., when the majority of participants declared an item to be easily observable or to be associated with non-psychological externalities. Table 5 depicts the results of an OLS regression with

heteroskedasticity-robust standard errors. The results of both estimations coincide, pointing to a highly significant effect regarding non-psychological externalities: the treatment effect is 33.13 percentage points greater whenever the majority of participants declared an item to be associated with non-psychological externalities (column (2)). When using the share instead of the dummy, the coefficient in column (1) reveals that a one percentage point increase leads to a 0.68 percentage points greater treatment effect. Both columns reveal that observability does not have a statistically significant influence on the treatment effect.

To test for the robustness of our results and to rule out any problem with endogeneity (see discussion above), we again estimate equation (1) with items' classifications based only on ratings made by participants from the control group. Our inferences do not change when we employ these alternative measures for observability and non-psychological externalities. These regression results are available upon request. As a further robustness check, we re-estimate model (1) using only the observations of the 108 participants who also took part in the follow-up survey. The results, presented in columns (3) and (4) of Table 5, show that our findings are independent from the choice of the (sub)sample.[9] We follow the suggestion of one referee and additionally run an ANOVA of the size of the treatment effect per item on the observability and non-psychological externalities dummy variables. The results confirm our estimation results presented in Table 5. The ANOVA results are available upon request.

As a last test for the robustness of our results, we re-estimate equation (1) 32 times (16 times using the share-based control variables, 16 times using the dummy variables)[10]. Similar to Heffetz (2011), we drop one item at each time. In each of the 32 new estimations, the significance levels of the explanatory variables' coefficients turn out to be the same as in

[9]Furthermore, including only one of the two explanatory variables does not lead to different conclusions: we find a statistically significant positive effect of non-psychological externalities on the treatment effect, while the coefficient of the observability control variable remains statistically insignificant, regardless of whether we include the share or the dummy variable. Results of these regressions are available upon request.

[10]Regression results are available upon request.

Table 5. Most strikingly, even the point estimates turn out to be very similar. We therefore conclude that our results are not driven by one single item.

Regarding the two hypotheses, we can thus conclude that there is strong support for Hypothesis 1. However, we find no support for Hypothesis 2, as the coefficients of the observability control variables turn out to be statistically insignificant.

	Full sample		108-sample	
	(1)	(2)	(3)	(4)
Non-psych. externalities (share)	.6792***		.746***	
	(7.62)		(11.26)	
Observability (share)	-.0809		-.0978	
	(-1.52)		(-1.48)	
Non-psych. externalities (dummy)		33.1261***		35.4358***
		(5.51)		(6.91)
Observability (dummy)		-.3932		-.0905
		(-0.09)		(-0.02)
Constant	2.0039	12.9222***	1.0801	12.8593**
	(0.59)	(3.19)	(0.27)	(2.87)
Number of observations	16	16	16	16
R^2	0.88	0.73	0.91	0.71

Notes: value of t-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 5: OLS regression results. Dependent variable: treatment effect (per item). Heteroskedasticity-robust standard errors.

On the one hand, our results coincide with those of Hillesheim and Mechtel (2011), who show that non-psychological externalities are positively correlated with an item's degree of positionality. On the other hand, our findings contrast with Alpizar et al.'s (2005) and Carlsson et al.'s (2007) results, as it turns out that observability is not correlated with positionality.

We will now focus on the individual decisions of the participants as a second step and estimate the following model:

$$\text{positional answer}_{ij} = \alpha_0 + \alpha_1 \text{ non-psychological externalities}_j + \alpha_2 \text{ observability}_j + \sum_i \beta_i \gamma_i + \epsilon_{ij}, \tag{2}$$

where the dependent variable takes the value of one whenever participant i chooses the absolutely-less (positional) answer with respect to item j and γ_i denote participant dummies. *Non-psychological externalities*$_j$ and *observability*$_j$ are the same control variables as used in model (1), which means for the moment that we assume all participants make the same assessment of items' characteristics.[11]

	Treatment group (1)	Control group (2)	Treatment group (3)	Control group (4)
Non-psych. externalities (share)	.0048***	-.0024***		
	(14.75)	(-4.17)		
Observability (share)	-.0027***	-.0026***		
	(-6.39)	(-4.10)		
Non-psych. externalities (dummy)			.2746***	-.0736***
			(12.50)	(-3.40)
Observability (dummy)			-.0561***	-.0585***
			(-3.06)	(-2.64)
Number of observations	2032	784	2032	784
Pseudo-R^2 of initial regression	0.23	0.19	0.23	0.12
Participant dummies	yes	yes	yes	yes

Notes: value of z-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 6: Marginal effects of logit estimation results. Dependent variable: positional choice of participant i for item j. Heteroskedasticity-robust standard errors. z-values calculated using Delta-method. Database: full sample.

[11] When including those participants who only took part in the first survey in the analysis, there is no other possibility. As Tables 7, 8, and 13 show, the estimations using the full sample of participants are very similar to those using only the sample of the 108 participants that took part in both surveys. By estimating the micro data models for both samples of participants, we therefore provide a further indicator for the robustness of our results.

Based on the full sample of 190 participants, equation (2) is estimated separately for the treatment and the control group in order to calculate marginal effects for both groups. Since the dependent variable is binary, we use a logit estimator with heteroskedasticity-robust standard errors (see, for example, Cameron and Trivedi, 2005, pp. 465). Results are presented in Table 6: columns (1) and (2) display average marginal effects while the marginal effects in columns (3) and (4) are calculated for discrete changes of the dummy control variables using the finite-difference method (see Cameron and Trivedi, 2010, pp. 343).[12] Treatment group members turn out to be more likely to choose the positional scenario if an item imposes non-psychological externalities: the probability of choosing the positional scenario increases by 27.46 percentage points (column (3)). In contrast, for the control group, we find that there is a statistically significant negative effect of non-psychological externalities and observability on the probability of choosing the absolutely-less answer. The marginal effects indicate that the significant negative effect of observability on the probability of choosing the absolutely-less (positional) scenario can also be found in the treatment group. Thus, the existence of non-psychological externalities seems to affect choices in the treatment and control group in a different way. As opposed to this, the marginal effects of items' observability in the treatment group resemble those in the control group.

To test whether observability and non-psychological externalities affect the treatment group and the control group in a statistically different manner, we estimate the following

[12]Given our sample size, we have observations on $131 \cdot 16 = 2096$ individual choices in the treatment group and $59 \cdot 16 = 944$ individual choices in the control group. However, there are 10 participants in the control group who always chose the absolutely-more scenario. Additionally, three participants assigned to the treatment group chose the non-positional scenario for every item and one member of the treatment group always chose the positional scenario. Accordingly, the individual dummies of these participants can predict their answers perfectly and can therefore not be used in the estimations. For this reason, we remove these participants from our analysis and end up with 2032 observations (treatment group) and 784 observations (control group). To rule out that dropping these participants influences the results, we furthermore ran the regressions again without participant dummies (but with the participants that were dropped in the main specification). The coefficients and marginal effects remain very stable.

modified version of equation (2), using data from both treatment and control group members:

$$\begin{aligned}\text{positional answer}_{ij} = &\alpha_0 + \alpha_1 \text{ non-psychological externalities}_j + \alpha_2 \text{ observability}_j \\ &+ \alpha_3 \text{ treatment group}_i \\ &+ \alpha_4 \text{ non-psychological externalities}_j * \text{ treatment group}_i \\ &+ \alpha_5 \text{ observability}_j * \text{ treatment group}_i + \sum_i \beta_i \gamma_i + \epsilon_{ij},\end{aligned} \tag{3}$$

where *treatment group*$_i$ is a dummy variable that takes the value of one whenever participant i was assigned to the treatment group. The results of the logit estimations of equation (3) including both definitions of the observability and non-psychological externalities control variables are provided in Table 7. As can be seen in columns (1) and (2), non-psychological externalities affect the treatment group in a statistically significant different way than the control group (*non-psychological externalities*$_j$ $*$ *treatment group*$_i$). However, as already conjectured above, the coefficient of the *observability*$_j$ $*$ *treatment group*$_i$ interaction term remains insignificant.[13] In line with the findings from the estimation of equation (1) using aggregated data, we thus conclude that there is no statistically significant effect of an item's observability on its degree of positionality. In contrast, our results support Hypothesis 1.

As a third step we now use the subsample of these 108 participants and match their assessments of items' characteristics with the answers in the initial survey. These matched data allow us to explain participants' choices in the first survey using their individual evaluation of items' observability and non-psychological externalities from the second survey as

[13]For illustrative reasons, the marginal effects for the model with interaction terms are presented in Table 13, Appendix 5. We follow the procedure suggested by Ai and Norton (2003) using Stata's *margins* command (Cameron and Trivedi, 2010, pp. 355) to calculate marginal effects of model (3). The results reveal a statistically significant treatment effect.

	Full sample		108-sample
	(1)	(2)	(3)
Treatment group (dummy)	-.0849	1.2228	1.8166
	(-0.08)	(1.06)	(1.52)
Non-psych. externalities (share)	-.0267***		
	(-4.15)		
Observability (share)	-.0285***		
	(-4.04)		
Non-psych. externalities (share) * Treatm. group (dummy)	.057***		
	(8.27)		
Observability (share) * Treatment group (dummy)	.0115		
	(1.52)		
Non-psych. externalities (dummy)		-.883***	-1.1229***
		(-2.98)	(-3.07)
Observability (dummy)		-.6376**	-.7918**
		(-2.54)	(-2.16)
Non-psych. externalities (dummy) * Treatm. gr. (dummy)		2.4115***	2.2339***
		(7.48)	(5.61)
Observability (dummy) * Treatment group (dummy)		.2822	.3441
		(1.02)	(0.86)
Constant	-1.1739	-2.3323**	-2.1122**
	(-1.16)	(-2.27)	(-2.03)
Number of observations	2816	2816	1616
Pseudo-R^2	0.25	0.24	0.21
Participant dummies	yes	yes	yes

Notes: value of z-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 7: Coefficients of logit estimation results. Dependent variable: positional choice of participant i for item j. Heteroskedasticity-robust standard errors.

explanatory variables. The modified version of model (2) reads

$$\begin{aligned}\text{positional answer}_{jk} = \alpha_0 + \alpha_1 \text{ non-psychological externalities}_{jk} + \alpha_2 \text{ observability}_{jk} \\ + \sum_k \beta_k \gamma_k + \epsilon_{jk},\end{aligned} \tag{4}$$

with the dummy variables *observability*$_{jk}$ and *non-psychological externalities*$_{jk}$ taking the value of one whenever participant k, $k = 1, ..., 108$, rated item j as observable/accompanied by non-psychological externalities, and zero otherwise. In order to be able to calculate marginal effects for both the treatment and the control group, we estimate separate ver-

sions of this model for the treatment and the control group using a logit estimator with heteroskedasticity-robust standard errors. The marginal effects of discrete changes of the explanatory variables are presented in Table 8. The results regarding observability are in line with our previous findings using aggregate assessments for the items' characteristics. There are statistically significant negative marginal effects (with a similar numerical impact) of observability on the probability of choosing the absolutely-less (positional) scenario for both the control group and the treatment group. In contrast, participants' probability of choosing the positional scenario appears to be greater for items characterized by non-psychological externalities in the treatment group, while the probability of choosing the absolutely-less scenario is lower in the control group. Participants who rated an item as being connected with non-psychological externalities had a 20.4 percentage points greater probability of choosing the positional scenario. This numerical impact is slightly smaller than the results in Table 6 suggest, but the overall results of Tables 6 and 8 correspond perfectly to each other.

	Treatment group (1)	Control group (2)
Indiv. assessment regarding non-psych. externalities	.204***	-.0919***
	(7.25)	(-3.39)
Indiv. assessment regarding observability	-.0764***	-.0673**
	(-2.92)	(-2.32)
Number of observations	1168	448
Pseudo-R^2 of initial regression	0.18	0.13
Participant dummies	yes	yes

Notes: value of z-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 8: Marginal effects of logit estimation results. Dependent variable: positional choice of participant i for item j. Heteroskedasticity-robust standard errors. z-values calculated using Delta-method. Database: participants of follow-up survey.

Following the estimation strategy applied above, we also estimate a modified version of model (3) using the individual assessments of items' characteristics by the 108 participants

that participated in both surveys:

$$\begin{aligned}\text{positional answer}_{jk} = {} & \alpha_0 + \alpha_1 \text{ non-psychological externalities}_{jk} + \alpha_2 \text{ observability}_{jk} \\ & + \alpha_3 \text{ treatment group}_k \\ & + \alpha_4 \text{ non-psychological externalities}_{jk} * \text{ treatment group}_k \\ & + \alpha_5 \text{ observability}_{jk} * \text{ treatment group}_k + \sum_k \beta_k \gamma_k + \epsilon_{jk}.\end{aligned} \tag{5}$$

Column (3) in Table 7 presents the coefficients of this interaction model estimated using a logit estimator. Results show that the coefficient of the *non-psychological externalities*$_{jk} \cdot$ *treatment group*$_k$ interaction term is statistically significant. Furthermore, there is no statistically significant interaction effect between the observability dummy variable and the treatment group dummy variable. Hence, we once again find that there is no impact of an item's observability on its positionality even when using participants' individual assessments of items' characteristics to explain their individual choices. As a last robustness test, we re-estimate Tables 6, 7, and 8 several times, dropping one item at each time. It turns out that the results are not sensitive with regard to this variation.

The consistent results of our three econometric approaches presented in this section support Hypothesis 1: Items that impose non-psychological externalities are more positional. In contrast, we do not find empirical support for Hypothesis 2, which stated that items that are more observable are more positional. The latter finding contradicts with results of previous studies based on authors' own perceptions of items' characteristics.[14]

[14]Of the 16 items investigated in our survey, 11 were investigated in previous studies. Additionally, using a different wording, leisure was tested by Carlsson et al. (2007) in a very similar way (here: "time for hobbies"). Furthermore, Solnick and Hemenway (1998, 2005) and Solnick et al. (2007) asked questions regarding individual attractiveness and illness which resemble our questions concerning "fitness and physical condition" and the "body mass index". Even when dropping these three "new" items from the analysis, our inferences regarding non-psychological externalities and observability remain robust (estimations not shown). This also holds when additionally dropping the two new questions regarding savings.

5 Conclusion

We investigate concerns for relative standing with respect to different items using data from a classroom survey and find that *personal characteristics* and *income* are more positional than *private consumption* and *leisure* activities. This corresponds to the findings of previous research. Results for the questions concerned with *savings* are ambiguous: we find distinct positional concerns for investments, but not for contributions to private pensions. A possible explanation could be the differing degree of concreteness: contributions to private pensions are a well-defined type of *savings*, while investments are rather unspecific. Furthermore, although both questions on *savings* contained an identical yearly amount, one question was formulated in terms of monthly *savings*. As *savings* have not yet been investigated in studies on relative standing based on this survey methodology, our study provides first insights. However, potential explanations given here for the differing degrees of positionality with regard to *savings* are worth a more detailed investigation in future research.

To explain concerns for relative standing, we follow a novel approach and use participants' assessments of whether an item is observable and/or imposes non-psychological externalities. Our results clearly show that the existence of non-psychological externalities is the key driving force behind positionality: participants' concerns for relative standing are strongly pronounced for items characterized by non-psychological externalities. We do not find an effect of an item's observability on its degree of positionality. This result appears to be rather puzzling and sharply contrasts with the findings of previous research. However, until now, there has not been an estimation of the connection between observability and items' positionality in the shape of a survey. Future research might, therefore, shed more light on the empirical connection between observability and individuals' concern for relative standing in order to figure out an explanation for this surprising result.

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Appendix

Survey questions

In which world would you prefer to live in?

Below, there are two states of the world. You are asked to pick which of the two you would prefer to live in. The questions are independent from each other. If you do not have a preference, choose "I have no preference". "Others" describes the average of other persons in society. There are no "right" or "wrong" answers. Please note that the price level is identical in both states of the world and equal to the current price level.

1. *a*) You get paid €11 per hour for your side job; others get paid €14 per hour for their side job.

   b) You get paid €9 per hour for your side job; others get paid €6 per hour for their side job.

2. On a scale of German grades from 1.0 (best) to 6.0 (worst):

   a) Your grade average for your school leaving examinations (*Abitur*) is 1.4; the grade average of others is 1.2.

   b) Your grade average for your school leaving examinations (*Abitur*) is 1.7; the grade average of others is 2.0.

3. *a*) You contribute €50 per month to a private pension scheme; others contribute €75 per month to a private pension scheme.

   b) You contribute €35 per month to a private pension scheme; others contribute €20 per month to a private pension scheme.

4. *a*) The annual income of your parents is €280.000; the annual income of other students' parents is €560.000.

   b) The annual income of your parents is €140.000; the annual income of other students' parents is €70.000.

5. *a*) You own a car worth €20,000; others own a car worth €30,000.

   b) You own a car worth €10,000; others own a car worth €5,000.

6. *a*) You have 23 square meters of living space; others have 28 square meters of living space.

   b) You have 18 square meters of living space; others have 15 square meters of living space.

7. *a*) You have 4 weeks of vacation; others have 6 weeks.

   b) You have 2 weeks of vacation; others have 1 week.

8. *a*) You pursue your hobbies 7 hours a week; others pursue their hobbies 10 hours a week.

   b) You pursue your hobbies 5 hours a week; others pursue their hobbies 3 hours a week.

9. *a*) You achieved 100 out of 120 points on a heath and fitness check; others achieved 115 out of 120 points on the same heath and fitness check.

   b) You achieved 80 out of 120 points on a heath and fitness check; others achieved 60 out of 120 points on the same heath and fitness check.

10. *a*) You eat out at a nice restaurant 4 times per month; others eat out at a nice restaurant 8 times per month.

    b) You eat out at a nice restaurant twice per month; others eat out at a nice restaurant once per month.

11. *a*) You body mass index is 22; others' body mass index is 20.

    b) You body mass index is 25; others' body mass index is 27.

12. *a*) You go to the movies 3 times per month; others go to the movies 4 times per month.

    b) You go to the movies twice per month; others go to the movies once per month.

13. Assume that a person's attractiveness can be measured by the number of times this person is asked for his/her phone number at parties.

    a) You are asked for your phone number on average twice at parties; others are asked for their phone number on average 3 times at parties.

b) You are asked for your phone number on average once at parties; others are never asked for their phone numbers at parties.

14. *a*) You invest €600 per year for the future; others invest €900 per year for the future.

    b) You invest €420 per year for the future; others invest €240 per year for the future.

15. *a*) You intelligence quotient is 130; others' intelligence quotient is 140.

    b) You intelligence quotient is 120; others' intelligence quotient is 110.

16. *a*) You spend 3 evening per week with your friends pursuing common leisure activities; others spend 4 evenings per week with their friends pursuing common leisure activities.

    b) You spend 2 evenings per week with your friends pursuing common leisure activities; others spend 1 evening per week with their friends pursuing common leisure activities.

Robustness checks

Socio-economic variables

Treatment effect

Table 10 reproduces the regression from Table 2, limiting the data to the 108 participants who took part in both of our surveys and whose descriptive statistics can be found in Table 9. As can be seen, the share of absolutely-less (positional) answers in the treatment group is approximately 20 percentage points greater than in the control group. Thus, results

	Treatment group	**Control group**	**p-value**
Observations	75	33	
Age (arithm. mean)	21.99	21.67	0.3772
Female (share)	0.63	0.76	0.1837
Grade in *Abitur* (arithm. mean)	1.53	1.57	0.695

Table 9: Descriptive statistics for the subsample of 108: socio-economic variables. p-values of two-sample t-tests for Age and Grade in *Abitur* and two-sample test of proportion for Female.

are robust with respect to the overall treatment effect. Table 11 reproduces the content from Table 3, using the subsample. Due to the sample size, there are of course small differences between the full sample and the subsample of 108 participants. The difference in the treatment effect per item between Tables 3 and 11 ranges from 3.03 to -5.57 percentage points with an average difference of -0.63 percentage points. Comparing the items with respect to their treatment effect in the full sample and the subsample, we find a strikingly significant correlation of 0.9899, as pictured in Figure 2. Additionally, we also estimated the empirical models used to derive Table 2 and included a dummy variable that takes the value of one whenever the participant also took part in the follow-up survey. This dummy variable's coefficient remained insignificant in all specifications, as can be seen in Table 12. We therefore conclude that our results are robust with regard to the choice of the sample.

	(1)	(2)	(3)	(4)	(5)
Treatment group	.2169***	.2197***	.2175***	.2055***	.2072***
	(7.57)	(7.64)	(7.68)	(7.30)	(7.42)
Female		.0214			.0108
		(0.59)			(0.30)
Age			-.002		-.0011
			(-0.21)		(-0.11)
Grade in *Abitur*				-.075*	-.0731*
				(-1.82)	(-1.71)
Constant	.1023***	.0861***	.1446	.2228***	.2359
	(5.99)	(2.79)	(0.69)	(3.27)	(1.17)
Number of observations	108	108	108	106	106
R^2	0.25	0.25	0.25	0.26	0.26

Notes: value of t-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 10: OLS regression results for the subsample of 108. Dependent variable: share of positional (abs.-less) answers per participant. Heteroskedasticity-robust standard errors.

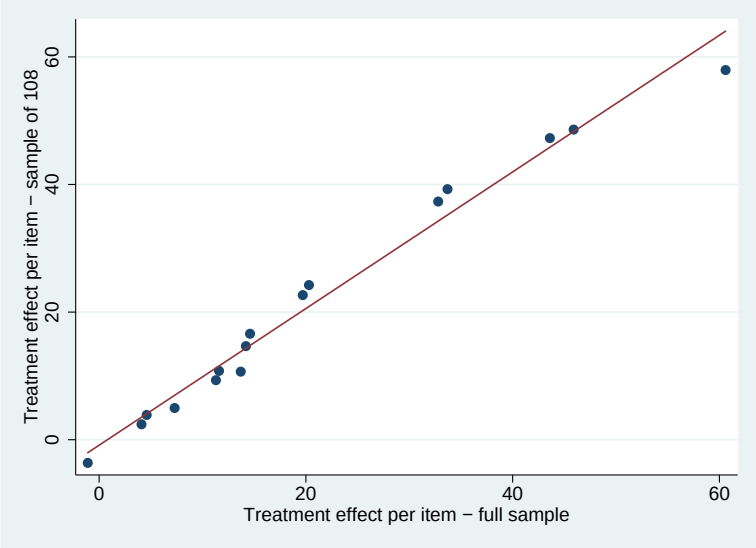

Figure 2: Treatment effect per item in the full sample (vertical axis) vs. treatment effect per item in the sample of 108 (horizontal axis) vs.

	Percentage of responses		Treatment effect
	Treatment group	**Control group**	(1)-(2)
	positional	abs. less	
	(1)	(2)	(3)
Income			
Side job income	37.3	0	37.3***
Parents' income	45.3	6.1	39.3***
Average	*41.3*	*3.0*	*38.3*
Private consumption			
Car value	32.0	21.2	10.8
Living space	22.7	6.1	16.6**
Average	*27.3*	*13.6*	*13.7*
Leisure			
Time for hobbies	10.7	0	10.7**
Evenings of leisure spent with friends	16.0	12.1	3.9
Vacation time	8.0	3.0	5.0
Average	*11.6*	*5.1*	*6.5*
Private consumption and leisure			
Restaurant visits	30.0	26.7	-3.6
Cinema visits	9.3	0	9.3**
Average	*18.0*	*15.2*	*2.9*
Savings			
Contribution to private pension	60.0	57.6	2.4
Investments for future	33.3	9.1	24.2***
Average	*46.7*	*33.3*	*13.3*
Personal characteristics			
Grade in *Abitur*	54.7	6.1	48.6***
Personal intelligence	64.0	6.1	57.9***
Fitness and physical condition	14.7	0	14.7**
Body mass index	22.7	0	22.7***
Personal attractiveness	53.3	6.1	47.3***
Average	*41.9*	*3.6*	*38.2*
Average – all	**31.9**	**10.2**	**21.7**

Notes:*** treatment effect sign. at 1% level, ** sign. at 5% level, * sign. at 10% level. according to two-sample tests of proportion.

Table 11: Share of positional (absolutely-less) answers in the treatment (control) group and treatment effect per item for the subsample of 108.

	(1)	(2)	(3)	(4)	(5)
Treatment group	.2104***	.208***	.2105***	.2024***	.1994***
	(8.98)	(8.94)	(9.02)	(8.57)	(8.55)
Female		-.0246			-.0336
		(-0.87)			(-1.18)
Age			-.0049		-.0062
			(-0.63)		(-0.78)
Grade in *Abitur*				-.0339	-.0337
				(-0.94)	(-0.94)
Follow-up survey dummy	.0043	.0084	.007	-.0006	.0076
	(0.15)	(0.31)	(0.25)	(-0.02)	(0.29)
Constant	.1025***	.1164***	.2075	.1623***	.3139*
	(4.69)	(3.84)	(1.18)	(2.72)	(1.74)
Number of observations	190	190	189	187	186
R^2	0.22	0.22	0.22	0.21	0.22

Notes: value of t-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 12: OLS regression results. Dependent variable: share of positional (abs.-less) answers per participant. Follow-up survey dummy included. Heteroskedasticity-robust standard errors.

Explanatory approach

	Full sample (1)	Full sample (2)	108-sample (3)
Non-psych. externalities (share)	.0027***		
	(9.49)		
Observability (share)	-.0026***		
	(-7.48)		
Treatment group (dummy)	.2523**	.249**	.3239***
	(2.38)	(2.12)	(3.09)
Non-psych. externalities (dummy)		.1777***	.1219***
		(10.48)	(5.62)
Observability (dummy)		-.0568***	-.0739***
		(-3.89)	(-3.60)

Notes: value of z-statistics in brackets. *** sign. at 1% level, ** sign. at 5% level, * sign. at 10% level.

Table 13: Marginal effects of logit estimation results of Table 7. Dependent variable: positional choice of participant i for item j. Heteroskedasticity-robust standard errors. z-values calculated using Delta-method.

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