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Prevalence and Relationship with  
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# Positional Income Concerns: Prevalence and Relationship with Personality and Economic Preferences\*

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## Abstract

This paper presents detailed evidence about who compares to whom in terms of relative income. We rely on representative survey data on the importance of income comparisons vis-à-vis seven reference groups, allowing us to exploit within-subject heterogeneity. We explore the prevalence and determinants of positional income concerns, investigating the role of personality and economic preferences. Our results establish robust relationships between positional income concerns and the personality traits agreeableness, conscientiousness, and neuroticism, some of which depend on the reference group. Furthermore, risk and fairness preferences are significantly correlated with positional income concerns.

*Keywords: relative income, status, personality, Big Five, survey, SOEP, economic preferences, risk, fairness*

*JEL: D03, D12, D63*

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# 1 Introduction

## 1.1 Motivation and main results

People compare their income to that of others. The existence of positional income concerns and their importance for both subjective well-being and actual behavior have been established in numerous contributions (see, e.g., Clark et al. 2008, Cohn et al. 2014, Dohmen et al. 2011, Kuhn et al. 2011, Luttmer 2005, Stutzer 2004). For example, studies have shown that people are willing to forfeit substantial amounts of absolute income in order to be ahead in terms of relative income and to make labor market participation contingent on relative income (see, e.g., Johansson-Stenman et al. 2002, Neumark and Postlewaite 1998). However, detailed evidence on *who* actually compares and to *whom* is still very scarce. This is despite the fact that understanding positional income concerns better is important due to their critical influence on many kinds of behavior. The lack of comprehensive evidence up to now can primarily be attributed to important limitations of the available data.<sup>1</sup>

This paper presents detailed evidence about who compares to whom in terms of relative income, using exceptional *direct* information for seven potential reference groups from a survey representative of Germany (German Socio-Economic Panel [SOEP]).<sup>2</sup> We explore (1) which individual characteristics are related to strong positional income concerns (i.e., *who* compares to others), and (2) which reference groups are relevant (i.e., *to whom* do individuals with specific characteristics compare). With regard to individual characteristics, we investigate the role of both personality traits and economic preferences. When investigating the relationship between positional income concerns and personality traits, we rely on the Big Five personality inventory encompassing openness, conscientiousness, extraversion, agreeableness, and neuroticism. With regard to economic preferences, we focus on measures of risk and fairness preferences. Our data set allows us to exploit the within-subject variation of positional income concerns and frees us from having to focus on a hypothetical reference group (which is standard practice in the empirical literature; see, e.g., Ferrer-i-Carbonell 2005).

Our findings about the prevalence of positional income concerns in the general population indicate substantial heterogeneity regarding the different reference groups. Importantly, this is true in both the within-subject and the between-subject dimensions. To our knowledge,

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<sup>1</sup>In addition to having representative data, it is necessary to have within-subject variation on the reference group dimension in order to cleanly identify to whom individuals compare most strongly. Previous studies either focus on income comparisons *on average* (e.g., Alpizar et al. 2005, Yamada and Sato 2013) or ask about comparisons to *other people* and then inquire about the single most relevant reference group (Clark and Senik 2010).

<sup>2</sup>These reference groups are: colleagues at the workplace, people in the same occupation, neighbors, friends, partner, people of the same age, and parents when they were at the same age.

we are the first to describe the prevalence of positional income concerns in the general population in such a detailed way.

Our results about the determinants of positional income concerns establish robust relationships to both personality traits and economic preferences. With regard to *personality*, we show that more agreeable individuals attach less importance to income comparisons, for example. The fact that our data allows us to distinguish seven reference groups proves particularly valuable. We present evidence that the relationship between conscientiousness and positional income concerns depends on the domain of the reference group. More conscientious people tend to compare more intensively in the work domain and less intensively in the private domain.<sup>3</sup> Overall, positional income concerns are significantly correlated with three out of the five personality traits considered, namely, agreeableness, conscientiousness, and neuroticism. When we relate positional income concerns to *economic preferences*, we find a negative correlation between risk tolerance and positional income concerns in the work domain, whereas it is insignificant in the private domain. Moreover, subjects with strong positional income concerns show less fairness (significant independent of the comparison domain). Our results regarding the relationship of positional income concerns and economic preferences are robust to the inclusion of personality traits, indicating that economic preferences and psychological personality measures are complementary with regard to positional income concerns.

Previous research has impressively established the implications of employees reacting to the social context at the workplace (see, e.g., Bandiera et al. 2005, 2010). Our findings are, therefore, of immediate practical importance in the corporate context, for example. When firms know about the personality of their employees (collected in the assessment center at the entry level, for instance),<sup>4</sup> then the reported correlations help to predict the implications of different compensation schemes for the firm’s employees’ well-being and their behavior. Card et al. (2012) show that when the incomes of all employees at the University of California became easily comparable due to the launch of a dedicated website, this had detrimental consequences on some employees’ loyalty and effort.<sup>5</sup> Relatedly, Auriol et al. (2012) consider how employees’ status orientation shapes the relative attractiveness of two types of promotion hierarchies. When firms have a rough idea about their employees’ positional income concerns, this can be useful in scaling the responses to interventions mandating more transparency

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<sup>3</sup>The work domain encompasses the reference groups *colleagues at the workplace* and *people in the same occupation*, whereas the following five reference groups are ascribed to the private domain: *neighbors*, *friends*, *partner*, *people of the same age*, and *parents when they were at the same age*.

<sup>4</sup>Recently, the BBC News Magazine reported that 89 of the Forbes 100 are, indeed, using personality tests in their hiring procedures ([www.bbc.co.uk/news/magazine-18723950](http://www.bbc.co.uk/news/magazine-18723950)).

<sup>5</sup>For an experimental study about earnings transparency and relative income on work effort, refer to Cohn et al. (2014).

about pay and changes in promotion hierarchies, to name just two examples.

Firms may also want to rely on the association of personality, economic preferences, and positional income concerns for recruiting purposes. Offering a very competitive, transparent, and unequal compensation scheme may attract individuals who attach importance to favorable income comparisons in the work domain. This would be welcomed by firms that attach great importance to conscientiousness, for example.<sup>6</sup> At the same time, firms must be aware of the fact that such compensation schemes attract individuals who are less risk-taking and who score lower on fairness.<sup>7</sup>

In summary, our paper is of academic interest (because it contributes to a better understanding of positional income concerns), has policy implications (as it allows us judgments about whose behavior is most strongly affected by positional concerns), and is of practical importance (since the reported relationships can be used in the corporate context).

## 1.2 Contributions to the literature

The present paper makes five contributions to the literature. First, it adds to the literature about positional income concerns. Most of the literature attempts to learn about the role of income comparisons only *indirectly* (making use of hypothetical scenarios as in, for example, Alpizar et al. 2005, Yamada and Sato 2013) and focuses on the importance of income comparisons *on average* (neglecting both the heterogeneity in the population and the potential relevance of different reference groups). In contrast, our dataset contains *direct* evidence about the *individual* positional income concerns regarding different reference groups, allowing us to exploit both the within-subject and the between-subject heterogeneity in the data. Second, since our research addresses how positional income concerns vary with personality and risk and fairness preferences, our paper not only complements the evolving literature seeking to explore the relationship between economic preferences and personality traits (e.g., Almlund et al. 2011, Becker et al. 2012, Borghans et al. 2008, Dohmen et al. 2008, van Rooij and Teppa 2014), but also presents robust associations to be used in public or corporate policy. People with strong positional income concerns behave differently from people without such considerations, making a better understanding of which personalities most likely revert to potentially inefficient behavior as a result of strong positional income concerns important for public policy. Such interdependencies may also be employed by corporations in their hiring and compensation decisions, for example. Third, our paper reports

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<sup>6</sup>Ones et al. (2007) present findings about the relationships between job performance and personality traits, indeed attributing particular importance to conscientiousness.

<sup>7</sup>Related to our argument about screening using compensation schemes, for example, Brekke and Nyborg (2008) establish that firms may use corporate social responsibility as an instrument to screen employees.

findings about the relationship of positional income concerns with both risk and fairness preferences based on a representative survey of the general population. Fourth, this paper enriches theoretical explorations of the implications of a positional income term in the utility function of individuals. In this literature, it has usually been assumed that the importance of relative standing can be captured by an undifferentiated weight (see, e.g., Corneo 2002, Glazer and Konrad 1996, Goerke 2013, Konrad and Lommerud 1993). Our paper focuses on this weight and how it varies across the general population. Finally and importantly, the present study contributes to our understanding of the relevance of various kinds of reference groups for different people. The vast majority of empirical papers simply imposes the reference group (see, e.g., Ferrer-i-Carbonell 2005, Layard et al. 2010, Luttmer 2005), whereas we rely on self-reported importance across different reference groups.

Our paper is most closely related to Clark and Senik (2010) who use data from the European Social Survey. However, the question about positional income concerns they utilize is not reference-group specific. Instead, the survey first asks about comparisons to “other people” and then inquires about the most relevant reference group (from the choice set: work colleagues, family members, friends, others).<sup>8</sup> In contrast, the data we utilize specifies the importance with regard to seven different reference groups, enabling us to exploit the within-subject dimension by using the variation of individuals’ comparison intensities towards different groups. The study closest to our endeavor in this regard is Dahlin et al. (2014), who report survey results for different reference groups being particularly interested in whether geographically proximate peers are important. Senik (2009) relies on data from the Life-in-Transition survey for Eastern Bloc countries which deal with comparisons to different benchmarks (e.g., past living standards, parents, and former schoolmates). The repercussions of positional income concerns for subjective well-being, which are at the heart of Senik (2009) and most other papers on relative income (see the survey by Clark et al. 2008), are not of interest to us in the present paper. Instead, our research focuses on the association of positional income concerns, personality, and economic preferences, a nexus not yet explored in the previous literature (including Clark and Senik 2010, Clark et al. 2013, Dahlin et al. 2014, and Senik 2009).

The remainder of the paper is structured as follows. The next section describes the data. Section 3 presents our findings about the prevalence of positional income concerns in the general population. Section 4 investigates the determinants of positional income concerns, exploring personality traits and economic preferences. Section 5 concludes.

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<sup>8</sup>The data used by Clark et al. (2013) stems from an internet survey and accords with the data description for Clark and Senik (2010).

## 2 Data

Our analysis uses the 2008–2010 pretest modules of the German Socio-Economic Panel (SOEP).<sup>9</sup> By design, the three SOEP pretest modules are self-contained representative random samples of the population in Germany with a sample size of about 1,000 each. The survey instruments used to collect information about the importance of income comparisons were introduced in the 2008 pretest module and no longer included in the 2011 edition. We restrict our pooled working sample to employed respondents aged 17 to 65 years in the respective years, which represent about 40% of the entire sample.<sup>10</sup>

Our dataset provides yet unparalleled direct information on the importance of income comparisons with respect to a set of nine reference groups. The question in the 2010 pretest reads:<sup>11</sup>

*When you think about your gross labor income compared to that of other individuals: How important is it to you how your gross income compares to that of (a) your neighbors, (b) your friends, (c) your colleagues at the workplace, (d) other people in your occupation, (e) people of your own age, (f) your parents when they were your age, (g) your partner, (h) other women, or (i) other men.*

The importance of income comparisons is to be indicated on a seven-point scale, ranging from 1: *completely unimportant* to 7: *extremely important*. In our paper, we restrict our analysis to the first seven potential reference groups, because the question relating to men and women was changed over the period considered, making comparisons more hazardous.

The data on positional income concerns is central to our research. Goerke and Pannenberg (2013, 2014) validate the positional income concerns data by establishing that intuitive relationships emerge with happiness and labor supply (namely, households with positional income concerns work more overtime). To increase our confidence in the data even further, we did a series of tests to check whether individual comparison intensities are related to life outcomes in a way predicted by the literature on status. First, based on our three SOEP pretest waves, we find that individuals who report stronger positional income concerns are less likely to work part-time (as in, e.g., Alvarez-Cuadrado 2007). Moreover, using the difference between annual revenues and expenditures for each household (data included in pretest

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<sup>9</sup>For more information about the SOEP in general, refer to Wagner et al. (2007).

<sup>10</sup>This restriction is due to the fact that the questions about relative income comparisons were addressed only at employed respondents in the pretest 2010. Our results below indicate that this restriction is reasonable because comparisons in the work domain prove to be important.

<sup>11</sup>The exact wording of the income comparison question was slightly refined over the years. First, in 2008 the questions referred to own income instead of own gross income. Second, in 2009, the two gender-specific reference groups were referred to as “women (men) in general” instead of “other women (men).” However, the basic structure of the relevant questions and their position in the questionnaire were unaffected

2009), we establish that households with higher income comparison intensities in the private domain have smaller surpluses and the probability of being indebted is higher (as in, e.g., Moav and Neeman 2012, Tooth 2008).<sup>12</sup>

We study the relationship between positional income concerns and personality.<sup>13</sup> To measure the latter, we use the Big Five personality traits.<sup>14</sup> The Big Five approach uses respondents’ self-assessments in terms of agreement with how specific adjectives describe their personality (e.g., Costa and McCrae 1992) on a scale from 1 (*not at all true*) to 7 (*completely true*). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions. A higher value of the derived variable represents a stronger intensity of that trait (e.g., being more conscientious). Table 1 presents a definition of the five traits following Becker et al. (2012).

Table 1: Definition of Big Five Personality Traits (Becker et al. 2012).

<b>Openness</b>	Individual differences in the tendency to be open to new aesthetic, cultural, and intellectual experiences
<b>Conscientiousness</b>	The tendency to be organized, responsible, and hardworking; located at one end of a dimension of individual differences (conscientiousness versus lack of direction)
<b>Extraversion</b>	An orientation of one’s interests and energies toward the outerworld of people and things rather than the inner world of subjective experience; includes the qualities of being outgoing, gregarious, sociable, and openly expressive
<b>Agreeableness</b>	The tendency to act in a cooperative, unselfish manner; located at one end of a dimension of individual differences (agreeableness versus disagreeableness)
<b>Neuroticism</b>	A chronic level of emotional instability and proneness to psychological distress

In addition, we explore the relationship between positional income concerns and risk preferences and fairness. The risk preference question reads *How do you see yourself: Are*

<sup>12</sup>We do not find significant relationships of these two outcome measures and income comparison intensities in the work domain (although the parameter estimates have the expected signs). However, as these variables are only included in the 2009 pretest, the sample size is very small ( $N$  lies between 213 and 395). The estimation results are available upon request.

<sup>13</sup>The literature in psychology has recently started to investigate a broader concept of *social comparison orientation* and individual heterogeneity in this regard. Buunk and Gibbons (2007, p. 14) report that people high in social comparison orientation “are characterized by a combination of (a) a high accessibility and awareness of the self, (b) an interest in what others feel and think, and (c) some degree of negative affectivity and self-uncertainty”. Buunk and Gibbons developed the Iowa-Netherlands Comparison Orientation Measure (INCOM) in order to test the tendency to involve in social comparisons. A shortened version of INCOM was introduced in the SOEP pretest 2010, which is part of our pooled data set. However, Schneider and Schupp (2014) found significant correlations between the comparison orientation dimensions and the direct income comparison intensity measures we use in our empirical analysis in only 3 out of 18 cases.

<sup>14</sup>Gerlitz and Schupp (2005) describe the implementation of the Big Five inventory into the SOEP and the reliability of measurements. Cobb-Clark and Schurer (2012) provide evidence that these measured traits are stable over time and that intra-individual changes are not economically meaningful. Therefore, they conclude that the Big Five measures may be considered stable input into economic decisions. Specht et al. (2011) test the stability of personality traits in terms of mean-level and rank-order consistency using the SOEP.

*you generally a person who is fully prepared to take risks, or do you try to avoid risks?* and uses a scale from 0 (*unwilling*) to 10 (*fully prepared to take risks*). Dohmen et al. (2011) validate this survey item by showing that responses to this question in the SOEP are strongly correlated to actual behavior in experiments. With regard to fairness, we use the response (measured on a scale ranging from 1: *does not apply to me at all* to 7: *applies to me perfectly*) to the statement: *It has happened in the past that I kept the money when I received too much in change* as (an admittedly imperfect) proxy.<sup>15</sup> In the literature, for instance, behavior in dictator games is considered informative regarding the subject’s fairness preferences (e.g., Schulz et al. 2014). The context referred to in the change question we use has important parallels to this and related circumstances. Both economic preferences variables are standardized to have mean 0 and standard deviation 1 (see Table 2). The risk question is included in the pretests 2009 and 2010, whereas the pretests 2008 and 2010 contain the fairness question.

Table 2: Descriptive Statistics. Pooled over all SOEP Pretest Waves (i.e., 2008–2010).

Variable	Obs	Mean	Std. Dev.	Min	Max
Male	1211	0.47	0.50	0	1
Age	1211	42.41	11.84	17	65
Foreign	1211	0.05	0.21	0	1
Openness	1196	-0.01	1	-3.42	1.95
Conscientiousness	1208	-0.01	1	-4.06	1.28
Extraversion	1207	0	1	-3.15	1.63
Agreeableness	1207	0	1	-3.27	1.71
Neuroticism	1206	0	1	-2.29	2.96
Fairness preferences	783	0	1	-0.83	2.01
Risk preferences	755	0	1	-2.01	2.01

With regard to our empirical approach, we consider only a few other covariates besides personality traits and economic preferences. Principally, we seek to exclude outcome variables driven by positional concerns, personality, or economic preferences (as in, e.g., Dohmen et al. 2008). With regard to demographic information, we include gender, age, and being a foreigner. Our sample encompasses almost equal shares of male (47%) and female (53%) participants. The average respondent is 42.41 years old and the share of foreign participants is approximately 5%. Table 2 presents descriptive statistics for all covariates of our pooled sample.

### 3 Prevalence of Positional Income Concerns

First, we briefly describe individuals’ average comparison intensities over the seven reference groups, because this may be easily compared to the results by Clark and Senik (2010) who

<sup>15</sup>This item is part of a battery of items introduced into the SOEP to get at social desirability responding building on Paulhus (1984).

relied on responses to “How important is it for you to compare your income with other people’s income?”.<sup>16</sup> We find that comparisons are completely unimportant for about 22% of the participants, while more than one third reveal average comparison intensities higher than 3. In fact, our results are very similar to those presented by Clark and Senik (2010).

Analyzing our direct information for seven reference groups, we find substantial heterogeneity in positional income concerns (see Figure 1 for histograms). Whereas more than 60% of our subjects report that income comparisons with “neighbors” are completely unimportant, this is true for only 30% when the reference group is “people in the same occupation”.<sup>17</sup> Averaging income comparison intensities separately for the work (private) domain leads to 32.6% (54.1%) of respondents reporting that income comparisons are unimportant.

The distributions in Figure 1 differ in meaningful ways. For example, whereas the distribution for the importance of comparing one’s own income with that of “neighbors” is clearly left-skewed, this does not apply to the distribution for the importance of comparing one’s own income with that of “people in the same occupation”. A substantial number of respondents chose the highest category for comparisons with either “coworkers” (5.9%) or “people in the same occupation” (9.5%). These shares increase to 16.5% (“coworkers”) and 24.1% (“people in the same occupation”) when we consider subjects who find it very important to compare their own income (i.e., those reporting a 6 or 7). For income comparisons in the private domain, the share of respondents who find it very important to compare ranges between 1.4% (“neighbors”) and 9.1% (“partner”).<sup>18</sup>

**Result 1** *Positional income concerns are very heterogeneous within subjects (i.e., contingent on the specific reference group) and between subjects.*

Figure 2 shows how the prevalence of positional income concerns changes with the age of the subject. The importance of comparing one’s own income with that of “people in the same occupation” clearly decreases with age. However, the absolute level of the importance of relative income remains relatively high for this reference group despite the decline. On average, relative income in the work domain remains most important throughout work life. In contrast, there is hardly any effect of age on comparisons with “neighbors” and “parents when they were at your age.” Positional income concerns vis-à-vis “friends” first experience

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<sup>16</sup>As Clark and Senik use an undirected question, our approach is not exactly the same. It might be that survey respondents implicitly thought about a reference group particularly relevant to them when answering the more general question.

<sup>17</sup>Dahlin et al. (2014) similarly report that the classical emphasis on neighbors and proximate potential peers is regularly misplaced when it comes to which individuals are part of the reference group.

<sup>18</sup>Our results about the relative importance of different reference groups can help to explain the findings by Boodoo et al. (2014), for example. They find that the association of positional income and happiness is much stronger for non-retired individuals than retired. This is very much in line with the relevance of reference groups in the work domain shown here.

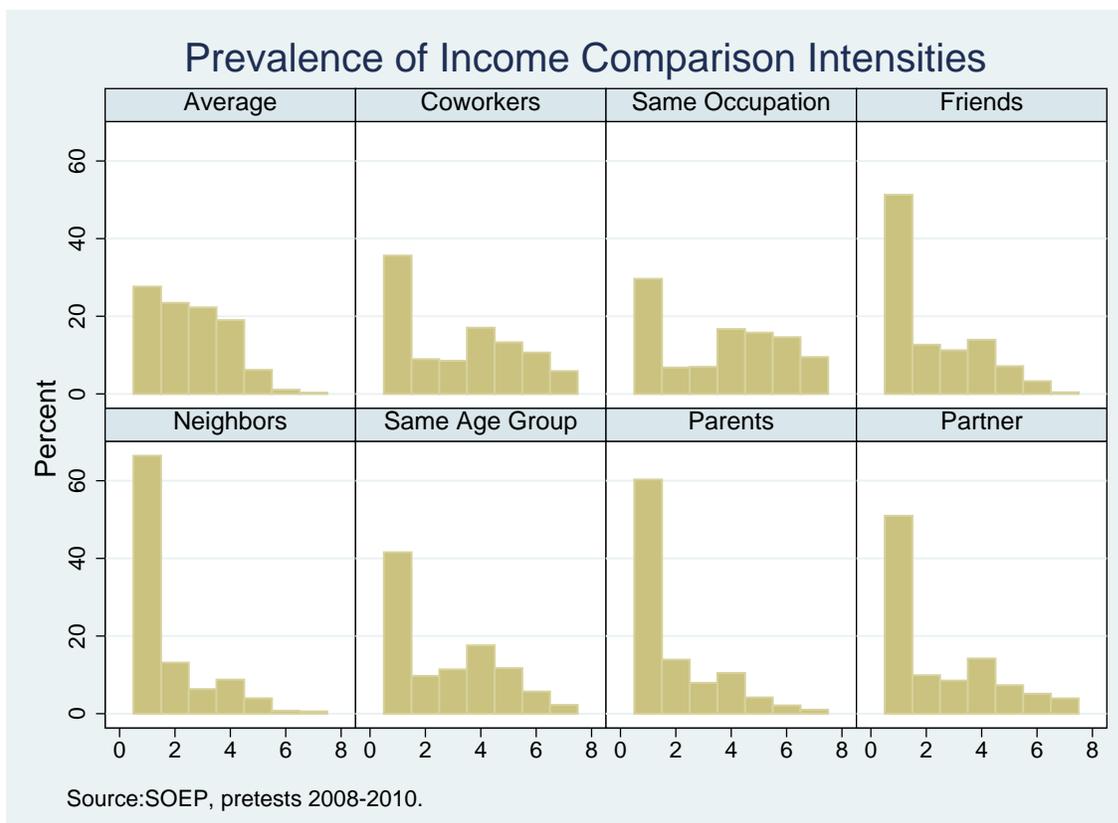


Figure 1: The Prevalence of Positional Income Concerns Regarding Seven Reference Groups.

a rapid decline, only to gain in importance toward the end of the work life. Similar, but less pronounced changes occur for the other reference groups. Overall, positional income concerns significantly decrease with age for all reference groups except “neighbors” and “parents”.<sup>19</sup> Although Figure 2 presents weak evidence for a slight increase at a higher age for “coworkers”, “friends”, and “individuals from the same age group”, the increase of comparison intensities at a later point in life does not compensate for the strong decrease in earlier years.

**Result 2** *Positional income concerns decrease with age.*

<sup>19</sup>To test for the significance of the age effect on comparison intensities, we regressed individual comparison intensity with respect to a particular reference group on a set of dummy variables capturing the deciles of the age distribution. In the literature, Dahlin et al. (2014) similarly find that income comparisons are less important for older individuals, whereas it is not significant in Clark and Senik (2010).

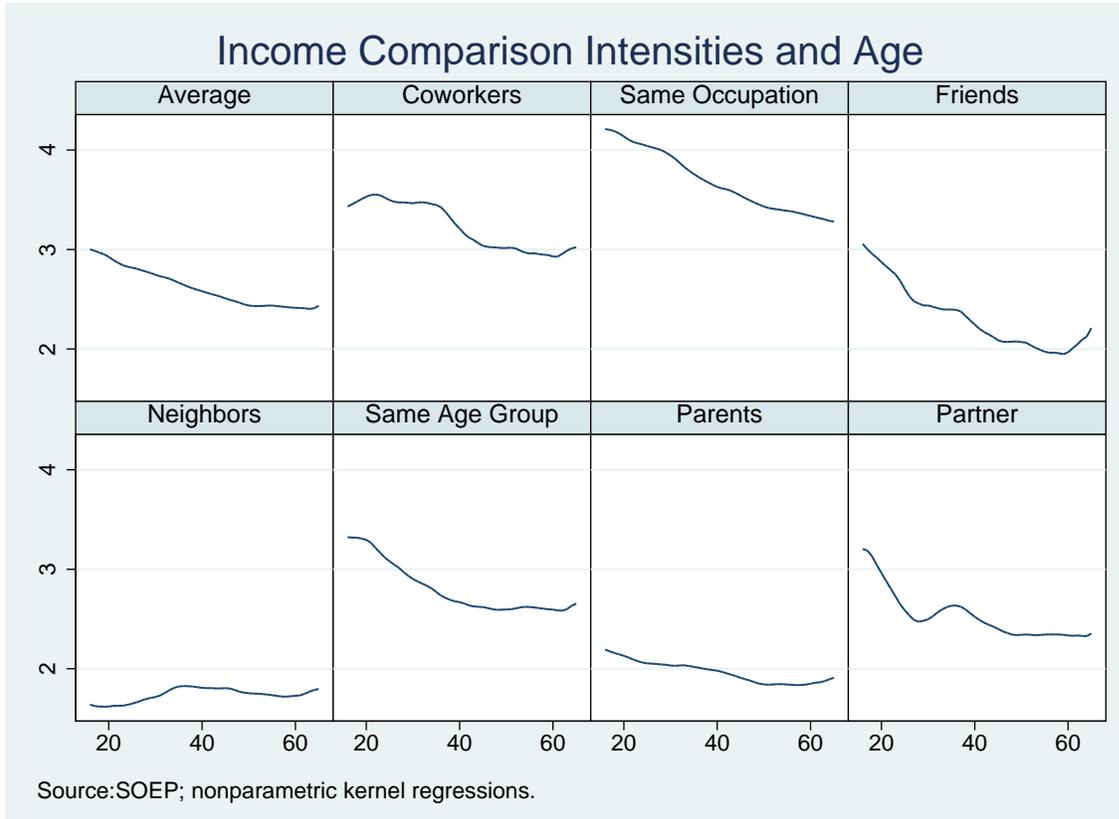


Figure 2: Kernel Regressions for Positional Income Concerns and Age.

## 4 Determinants of Positional Income Concerns

The previous section exposed substantial heterogeneity with regard to positional income concerns in our representative sample. On the one hand, some individuals do not care about relative income at all; on the other hand, there are large differences in comparison intensities for different reference groups. “Coworkers” and “people in the same occupation” prove to be important reference groups, which we take as a first answer to our *to whom*-part of our research question. In this section, we investigate potential determinants of positional income concerns relative to seven different reference groups to shed more light on the question: *who* are the individuals with strong positional income concerns? We will proceed in three steps. First, we use all of the respondents’ statements for the seven reference groups and focus on correlations of personality traits with either the level of income comparison intensity or the likelihood of ascribing importance to income comparisons. Next, we consider that we have seven income comparison intensities from each respondent and focus on the within-subject dimension. Finally, we add economic preferences as covariates in our quest to identify determinants of positional income concerns.

## 4.1 Determinants of Positional Income Concerns for Each of the Seven Reference Groups

In this section, we investigate cross-sectional variation of positional income concerns for seven reference groups. The dependent variable in the ordinary least squares (OLS) specifications presented in this section is each participant’s comparison intensity. In addition, we consider a probit model in an attempt to explain which personalities have positional income concerns regarding the respective reference group. The dependent variable takes the value of 1 when the comparison intensity is 5 or higher.

To get a rough understanding of *who* compares to others, we start with ordinary least squares estimations using individuals’ average positional income concerns as the dependent variable and probit estimations in which the dependent variable is equal to 1 when an individual’s average comparison intensity is larger than 5. For the level of average positional income concerns (i.e., when focusing on the between estimator), we find that less conscientious, more neurotic, and less agreeable individuals have stronger positional income concerns (column 1 of Table 3). The probit estimations show no significant coefficients at the aggregate level (column 2 of Table 3). As a next step, we take advantage of our detailed data and explore the relationships for the seven different reference groups.

In view of the high number of reference groups available to us, we start with a factor analysis in order to test whether there are underlying common factors. We find that the reference groups from the work domain load onto a different factor than those from the private domain (see Figure A.1 in our appendix). Accordingly, we will later consider two categories of reference groups (that is, work domain and private domain) and sort our presentation along these lines in the present section.

Table 3 presents results for the two reference groups belonging to the work domain. Columns (3) and (5) show coefficients of ordinary least squares specifications, and columns (4) and (6) present average marginal effects from probit specifications. More agreeable subjects attach less importance to comparing income with that of reference groups from the work domain (irrespective of the empirical approach). More conscientious subjects are more likely to have strong positional concerns in the work domain. The other personality traits exhibit no significant correlation with either the level of positional income concerns or the likelihood of having strong concerns. Moreover, the respondents’ demographic information is not related to positional income concerns.

Table 4 presents our results for reference groups from the private domain. Results from ordinary least squares specifications are presented in Panel (a) and average marginal effects from probit specifications are given in Panel (b). The emergent picture contrasts with the one obtained for the work domain in several regards. More neurotic subjects attach more

Table 3: Average Comparison Intensities and Comparison Intensities for Different Reference Groups in the Work Domain.

	(1) Average	(2) Average	(3) Coworkers	(4) Coworkers	(5) Same Occupation	(6) Same Occupation
	OLS	Probit	OLS	Probit	OLS	Probit
Male	0.0195 (0.0781)	0.0248** (0.0124)	-0.1651 (0.1222)	-0.0374 (0.0277)	-0.0514 (0.1274)	-0.0029 (0.0297)
Age	-0.0384* (0.022)	-0.0018 (0.0031)	-0.0279 (0.0327)	-0.0016 (0.0075)	-0.0541 (0.0352)	-0.0152* (0.008)
Age <sup>2</sup>	0.0003 (0.0003)	0.00001 (0.00004)	0.0001 (0.0004)	-0.00003 (0.0001)	0.0003 (0.0004)	0.0001 (0.0001)
Foreign	-0.1261 (0.1719)	-0.0348 (0.0332)	-0.3539 (0.2725)	-0.0513 (0.0644)	-0.2327 (0.2914)	-0.0302 (0.0677)
Openness	-0.0207 (0.0435)	0.0027 (0.007)	-0.101 (0.0678)	-0.0172 (0.0148)	-0.0427 (0.0707)	-0.0049 (0.0159)
Conscientiousness	-0.0854** (0.0404)	0.0057 (0.0057)	0.0503 (0.0639)	0.0367** (0.0147)	0.0358 (0.0664)	0.0277* (0.0156)
Extraversion	0.001 (0.0397)	-0.0011 (0.0059)	-0.0196 (0.0679)	-0.0069 (0.0152)	-0.0103 (0.0705)	-0.0019 (0.0161)
Agreeableness	-0.1435*** (0.0397)	-0.0063 (0.0056)	-0.2806*** (0.0652)	-0.0537*** (0.0141)	-0.1827*** (0.0682)	-0.0366** (0.0154)
Neuroticism	0.1167*** (0.0401)	0.0002 (0.0061)	0.018 (0.0642)	-0.0033 (0.014)	0.0741 (0.0674)	0.0043 (0.0149)
Constant	3.7416*** (0.4459)		4.4886*** (0.6619)		5.5107*** (0.7104)	
Wave dummies	yes	yes	yes	yes	yes	yes
N	1174	1189	1153	1153	1171	1171
(Pseudo-)R <sup>2</sup>	0.0623	0.0401	0.0504	0.0289	0.0415	0.0219

*Notes:* We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates are from ordinary least squares (columns 1, 3, and 5) and average marginal effects from probit (columns 2, 4, and 6) specifications. The dependent variable captures a subject's average income comparison intensity with regard to all 7 reference groups (columns 1 and 2), a subject's income comparison intensity with regard to his or her coworkers (columns 3 and 4) and other persons with the same occupation (columns 5 and 6). For the OLS specifications, income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). In the probit specifications, the dependent variable takes the value of 1 whenever a particular subject's income comparison intensity is larger than or equal to 5. *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* represent the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions where a higher value indicates a more pronounced markedness of the respective personality trait. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.  
\*\* significant at the 5% level.  
\*\*\* significant at the 1% level.

importance to comparing income to reference groups from the private domain (irrespective of the empirical approach). Except for the reference group “people in the same age-group”, conscientiousness is correlated with the level of the importance of relative income. Importantly, this relationship is negative, in contrast to the sign of the correlation established for the work domain. In line with the results from the work domain, more agreeable subjects find comparing income to reference groups from the private domain less important. Moreover, for the reference groups “friends” and “people in the same age-group”, we find that older people ascribe less importance to relative income (in line with our discussion in Section 3). According to the results from our probit specifications, males are more likely to attach importance to income relative to “friends” and “neighbors”. The results of the previous literature regarding gender and status effects have been ambiguous.<sup>20</sup>

We summarize our results about *who* compares to others and *to whom* in:

**Result 3** *More agreeable subjects have weaker positional income concerns. More conscientious subjects have stronger (weaker) positional income concerns in the work (private) domain. Neurotic subjects have stronger positional income concerns in the private domain.*

## 4.2 Determinants of Positional Income Concerns when Accounting for Individual Heterogeneity

Our data includes seven positional income concerns ratings for each respondent, allowing us to exploit the variation on the within-subject dimension. In this section, we present two different approaches. First, we consider the deviation of the comparison intensity for a reference group from an individual’s mean comparison intensity as the dependent variable in ordinary least squares specifications. This disentangles the effects of individual heterogeneity regarding the stated level of positional income concerns and the variation of comparison intensity across reference groups.<sup>21</sup> Second, we pursue the idea that the income comparison intensities from (1) the work domain and (2) the private domain result from different data generating processes. To this end, we separately estimate linear random effects panel models for both types of reference groups and, therefore, allow for unobserved individual heterogeneity, which does not vary with personality.

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<sup>20</sup>Alpizar et al. (2005) survey Costa Rican students and their results point towards women caring more about relative income and consumption than men. A similar finding is obtained by Corazzini et al. (2012) and Friehe and Mechtel (2014). However, Pingle and Mitchell (2002) argue that gender did not influence the probability that a participant will show a positional income concern based on their survey results. Similarly, Dohmen et al. (2011) report that the importance of relative standing is comparable for both sexes.

<sup>21</sup>For example, some subjects may refrain from indicating high comparison intensities and express the differences across reference groups by using only numbers less than five. Focusing on the within-subject dimension, we can address this potential issue.

Table 4: Comparison Intensities for Different Reference Groups in the Private Domain.

<i>Panel (a)</i>					
	(1)	(2)	(3)	(4)	(5)
	Friends	Age Group	Partner	Parents	Neighbors
	OLS	OLS	OLS	OLS	OLS
Male	0.1279 (0.0925)	0.0604 (0.1083)	0.0136 (0.118)	0.0726 (0.0912)	0.0408 (0.0782)
Age	-0.0631** (0.0268)	-0.0754** (0.0302)	-0.0384 (0.034)	-0.0157 (0.0248)	0.0331 (0.0213)
Age <sup>2</sup>	0.0005* (0.0003)	0.0007** (0.0004)	0.0003 (0.0004)	0.0001 (0.0003)	-0.0004 (0.0003)
Foreign	-0.0172 (0.1889)	0.0895 (0.238)	-0.2254 (0.2595)	0.0488 (0.198)	-0.1348 (0.1388)
Openness	-0.0419 (0.0503)	-0.0143 (0.0617)	0.0261 (0.0639)	0.0133 (0.0512)	-0.0418 (0.0418)
Conscientiousness	-0.1806*** (0.048)	-0.0599 (0.0568)	-0.1625*** (0.0616)	-0.1108** (0.0463)	-0.1286*** (0.0411)
Extraversion	0.0162 (0.0483)	0.0224 (0.06)	0.0664 (0.06)	-0.0044 (0.0456)	-0.0204 (0.0413)
Agreeableness	-0.1276*** (0.0475)	-0.148** (0.0579)	-0.0363 (0.059)	-0.1188** (0.0467)	-0.1048*** (0.038)
Neuroticism	0.1404*** (0.0481)	0.1834*** (0.0576)	0.2061*** (0.0605)	0.1051** (0.0436)	0.0895*** (0.0397)
Constant	3.928*** (0.5487)	4.6401*** (0.6156)	3.6179*** (0.6981)	2.3357*** (0.5087)	1.0569** (0.4262)
Wave dummies	yes	yes	yes	yes	yes
R <sup>2</sup>	0.0767	0.0444	0.0347	0.0334	0.0389

<i>Panel (b)</i>					
	(1)	(2)	(3)	(4)	(5)
	Friends	Age Group	Partner	Parents	Neighbors
	Probit	Probit	Probit	Probit	Probit
Male	0.0388** (0.0184)	0.0252 (0.0239)	0.0271 (0.0232)	0.0197 (0.0162)	0.0367*** (0.0136)
Age	-0.0135*** (0.0048)	-0.0166*** (0.0063)	-0.0117* (0.0062)	-0.0001 (0.0041)	-0.0018 (0.0036)
Age <sup>2</sup>	0.0001** (0.0001)	0.0002** (0.0001)	0.0001 (0.0001)	-0.00001 (0.0001)	0.00002 (0.00004)
Foreign	-0.01 (0.0419)	-0.0485 (0.0568)	-0.0897 (0.0607)	-0.0228 (0.038)	-0.0427 (0.0437)
Openness	-0.0055 (0.0096)	0.0063 (0.0129)	-0.0021 (0.0124)	0.0042 (0.0091)	-0.0097 (0.007)
Conscientiousness	-0.0084 (0.0092)	0.0086 (0.0123)	-0.0166 (0.0121)	0.0055 (0.0083)	0.0007 (0.0067)
Extraversion	-0.0051 (0.0096)	0.0061 (0.0128)	0.0138 (0.0124)	0.0049 (0.0082)	-0.0019 (0.0074)
Agreeableness	-0.0013 (0.0096)	-0.0181 (0.0122)	0.015 (0.0118)	-0.0145** (0.0073)	-0.0082 (0.0063)
Neuroticism	0.0192** (0.0098)	0.0292** (0.0122)	0.0324*** (0.0116)	-0.002 (0.0076)	0.0078 (0.0068)
Wave dummies	yes	yes	yes	yes	yes
Pseudo-R <sup>2</sup>	0.0436	0.031	0.0318	0.026	0.0507
N	1171	1173	1076	1153	1166

*Notes:* We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates are from ordinary least squares (panel a) and average marginal effects from probit (panel b) specifications. The dependent variable captures a subject's income comparison intensity with regard to his or her friends (column 1), persons from the same age group (column 2), partner (column 3), parents when they were in the subject's actual age (column 4), and neighbors (column 5). For the OLS specifications, income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). In the probit specifications, the dependent variable takes the value of 1 whenever a particular subject's income comparison intensity is larger than or equal to 5. *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* represent the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions, where a higher value indicates a more pronounced markedness of the respective personality trait. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.  
 \*\* significant at the 5% level.  
 \*\*\* significant at the 1% level.

Table 5 shows coefficient estimates from ordinary least squares specifications using the difference between the comparison intensity for a reference group and the individual's mean comparison intensity as dependent variable. We find substantial variation across the different reference groups. Column (1) shows that females have a higher inclination to compare intensively with "coworkers". While a higher conscientiousness increases the deviation of the importance attached to comparing own income with that of "coworkers" from the individual mean, both a higher agreeableness and a higher neuroticism decrease the deviation. Note that neuroticism did not correlate with positional income concerns in the work domain in the previous section. The results for comparisons to "friends" are detailed in Column (3). We find that a higher conscientiousness represents a negative association in this domain, whereas neuroticism is not significant. In this domain, males find it more important to compare with "friends" (as similarly established in the probit specifications in Table 4).<sup>22</sup>

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<sup>22</sup>We obtain similar results when we estimate a probit specification, where the dependent variable is equal to one (zero) when the answer with the highest importance of income comparisons comes from a reference group from the work (private) domain, that is, a significant and positive coefficient for conscientiousness and a negative coefficient for neuroticism. Results are available upon request.

Table 5: Deviation of Comparison Intensities for Different Reference Groups from Individual Mean.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	Coworkers	Same Occupation	Friends	Age Group	Partner	Parents	Neighbors							
Male	-0.1744** (0.0781)	-0.0702 (0.0841)	0.1182** (0.0559)	0.0428 (0.066)	0.0102 (0.088)	0.0588 (0.0694)	0.0236 (0.0607)							
Age	0.011 (0.0209)	-0.015 (0.022)	-0.0273** (0.0162)	-0.0376** (0.0173)	-0.0166 (0.0241)	0.0151 (0.0181)	0.0714***							
Age <sup>2</sup>	-0.0002 (0.0003)	0.00003 (0.0003)	0.0003 (0.0002)	0.0004** (0.0002)	0.0002 (0.0003)	-0.0001 (0.0002)	-0.0007***							
Foreign	-0.2325 (0.1463)	-0.1047 (0.1785)	0.105 (0.1003)	0.2172 (0.1531)	-0.0993 (0.1986)	0.1216 (0.1264)	-0.0204 (0.1264)							
Openness	-0.0654 (0.044)	-0.0219 (0.0469)	-0.0087 (0.0315)	0.0061 (0.0374)	0.0453 (0.0491)	0.0485 (0.0325)	-0.0035 (0.0325)							
Conscientiousness	0.1247*** (0.0421)	0.1199*** (0.0444)	-0.1016*** (0.0297)	0.026 (0.0335)	-0.0906* (0.0479)	-0.0382 (0.0365)	-0.0441 (0.0327)							
Extraversion	-0.0273 (0.046)	-0.0113 (0.0475)	0.0125 (0.0319)	0.0199 (0.0388)	0.0521 (0.0493)	-0.0122 (0.0383)	-0.0255 (0.0331)							
Agreeableness	-0.1395*** (0.0419)	-0.0403 (0.0452)	0.0134 (0.0302)	-0.0037 (0.0352)	0.1166** (0.048)	0.0244 (0.0366)	0.0331 (0.0325)							
Neuroticism	-0.1084** (0.0434)	-0.0417 (0.0441)	0.0169 (0.029)	0.0661* (0.0356)	0.1027** (0.0458)	-0.0078 (0.0366)	-0.0258 (0.0302)							
Constant	0.7491* (0.4276)	1.7583*** (0.4378)	0.2462 (0.3339)	0.9099** (0.3587)	0.1984 (0.4808)	-1.247*** (0.4023)	-2.6673*** (0.3768)							
Wave dummies	yes	yes	yes	yes	yes	yes	yes							
N	1153	1171	1171	1173	1076	1153	1166							
R <sup>2</sup>	0.0363	0.023	0.029	0.0113	0.0156	0.0223	0.0602							

Notes: We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates stem from ordinary least squares specifications. The dependent variable captures the deviation of a subject's income comparison intensity with regard to a particular reference group from this subject's average income comparison intensity. Income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). Therefore, our dependent variable's theoretical range lies between -5.143 and 5.143. *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* represent the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the dimension-specific questions, where a higher value indicates a more pronounced markedness of the respective personality trait. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.  
\*\* significant at the 5% level.  
\*\*\* significant at the 1% level.

Our second approach to deal with (unobserved) individual heterogeneity with respect to positional income concerns is the specification of linear random effects panel models for comparisons (1) in the work domain and (2) in the private domain. The results of this exercise are reported in Table 6. We obtain a negative association of comparison intensity with agreeableness. With regard to comparisons in the private domain, we additionally find that people with higher conscientiousness ratings are less inclined to indicate that relative income is important, whereas more neurotic people are more inclined.

The results we obtain when taking individual heterogeneity into account are consistent with the findings reported in Result 3. Stable relationships exist between positional income concerns and the Big Five personality traits conscientiousness, agreeableness, and neuroticism.

Table 6: Linear Random Effects Panel Model to Account for Individual-Specific Effects.

	(1) Work Domain	(2) Private Domain
	RE GLS	RE GLS
Male	-0.1038 (0.1158)	0.0659 (0.0748)
Age	-0.0392 (0.0314)	-0.0342 (0.021)
Age <sup>2</sup>	0.0002 (0.0004)	0.0003 (0.0003)
Foreign	-0.2966 (0.2664)	-0.0557 (0.1512)
Openness	-0.0675 (0.0643)	-0.0053 (0.0411)
Conscientiousness	0.0412 (0.0602)	-0.1323*** (0.0386)
Extraversion	-0.0143 (0.0645)	0.0108 (0.0374)
Agreeableness	-0.2337*** (0.0615)	-0.1081*** (0.0369)
Neuroticism	0.0431 (0.0598)	0.1458*** (0.0379)
Constant	4.9798*** (0.6356)	3.1583*** (0.4233)
Wave dummies	yes	yes
No of obs	2324	5739
No of groups	1173	1174
R <sup>2</sup> (overall)	0.0436	0.0342

*Notes:* We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates are from random effects generalized least squares specifications to account for individual specific effects. The dependent variable captures a subject's income comparison intensity in the work domain (coworkers and persons with the same occupation) in column (1) and in the private domain (friends, persons from the same age group, partner, parents when they were the subject's actual age, and neighbors) in column (2). Income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* capture the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions, where a higher value indicates a more pronounced markedness of the respective personality trait. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.

\*\* significant at the 5% level.

\*\*\* significant at the 1% level.

### 4.3 Positional Income Concerns and Economic Preferences

We have established the relationship between positional income concerns and personality. Now, we explore the role of economic preferences and their interaction with personality when

it comes to the strength of positional income concerns.

We address risk preferences first. The results in Table 7 strongly indicate that positional income concerns in the work domain are negatively related to risk tolerance (irrespective of whether or not we include personality traits). Moreover, the size of the estimated parameter of risk tolerance remains stable and standard selection criteria (like Akaike's information criterion) are in favor of the full model. Hence, when considering positional income concerns in the work domain, risk preferences and personality traits seem to be complements. However, Columns (3) and (4) highlight that such a relationship does not exist for people who strongly compare income in the private domain, while the parameter estimates for the personality trait measures are similar to the results presented above. Accordingly, Akaike's information criterion points to the inclusion of personality only when it comes to positional income concerns in the social domain. These findings are of interest in particular with respect to studies such as Konrad and Lommerud (1993) and Robson (1992), exploring risk taking under social referencing, as they suggest that the curvature of the utility function and the weight applied to status utility may be interrelated. In a previous empirical study using other representative data from Germany, Friehe and Mechtel (2013) show that more status-oriented subjects take more risks (i.e., they are more likely to engage in gambling activities and spend more on gambling conditional on participation).<sup>23</sup>

The relationship between positional income concerns and fairness is addressed in Table 8. In contrast to what we found for risk preferences, this relationship is not contingent on the domain of income comparison. We find that people who score low on the fairness scale score high on the income comparison intensity scale. Moreover, the relationship between positional income concerns and fairness remains when we add the personality traits as covariates, and Akaike's information criterion is in favor of the full model. This result, once again, indicates that economic preferences and psychological personality measures are complements with respect to positional income concerns. Our findings with regard to the relationship of positional income concerns and personality traits are fully aligned with the results presented in previous sections. The correlation that we establish between the strength of positional concerns and fairness is relevant for the behavioral literature studying the economics of fairness (see, e.g., Fehr and Schmidt 2006) and can be related to previous findings in the literature. Volk et al. (2012) and Kagel and McGee (2014) establish a positive correlation between cooperation and agreeableness. This fits well with our result that people with strong positional concerns are both less agreeable and more unfair. Proto and Rustichini (2014) establish a positive correlation between cooperation and conscientiousness. Again,

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<sup>23</sup>In addition, there are experimental studies with a somewhat different objective, focusing on the influence of changes in the social reference point on risk-taking (e.g., Linde and Sonnemans 2012, Schwerter 2013).

Table 7: Positional Income Concerns and Risk Preferences.

	(1)	(2)	(3)	(4)
	Work Domain	Work Domain	Private Domain	Private Domain
	RE GLS	RE GLS	RE GLS	RE GLS
Male	-0.0894 (0.1386)	-0.1319 (0.1475)	0.0112 (0.0913)	0.0487 (0.0972)
Age	0.0011 (0.0389)	-0.0062 (0.0393)	-0.0133 (0.0260)	-0.0097 (0.0267)
Age <sup>2</sup>	-0.0003 (0.0005)	-0.0002 (0.0005)	0.0000 (0.0003)	0.0000 (0.0003)
Foreign	-0.2214 (0.3280)	-0.1528 (0.3270)	-0.0426 (0.1931)	-0.0120 (0.1900)
Openness		-0.0049 (0.0799)		0.0016 (0.0525)
Conscientiousness		0.0201 (0.0749)		-0.1036** (0.0470)
Extraversion		0.0629 (0.0843)		0.0537 (0.0468)
Agreeableness		-0.1829** (0.0781)		-0.1006** (0.0471)
Neuroticism		0.0266 (0.0748)		0.1576*** (0.0471)
Risk tolerance	-0.1446** (0.0711)	-0.1492* (0.0782)	-0.0239 (0.0464)	-0.0146 (0.0487)
Constant	3.5986*** (0.7912)	3.813*** (0.8019)	2.604*** (0.5279)	2.5159*** (0.5513)
Wave dummies	yes	yes	yes	yes
No of obs	1481	1447	3649	3570
No of groups	746	729	747	730
R2 (overall)	0.0280	0.0385	0.0062	0.0265

*Notes:* We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates are from linear random effects specifications. The dependent variable captures a subject's income comparison intensity with regard to the work domain (coworkers and persons with the same occupation) in column (1) and the private domain (friends, persons from the same age group, partner, parents when they were the subject's actual age, and neighbors) in column (2). Income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* represent the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions, where a higher value indicates a more pronounced markedness of the respective personality trait. The *Risk tolerance* measure relies on the question: *How do you see yourself: Are you generally a person who is fully prepared to take risks, or do you try to avoid risks?* and the ratings are on a scale from 0 (*unwilling*) to 10 (*fully prepared to take risks*). The risk tolerance variable is standardized to have mean 0 and standard deviation 1. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.

\*\* significant at the 5% level.

\*\*\* significant at the 1% level.

our results dovetail by indicating that people with strong positional concerns in the private domain are both less conscientious and more unfair.

Table 8: Positional Income Concerns and Fairness Preferences.

	(1)	(2)	(3)	(4)
	Work Domain	Work Domain	Private Domain	Private Domain
	RE GLS	RE GLS	RE GLS	RE GLS
Male	0.0312 (0.1392)	-0.0426 (0.1411)	0.0954 (0.0894)	0.1171 (0.0912)
Age	-0.0585 (0.0383)	-0.0756** (0.0379)	-0.0358 (0.0266)	-0.0383 (0.0269)
Age <sup>2</sup>	0.0005 (0.0005)	0.0007 (0.0004)	0.0003 (0.0003)	0.0004 (0.0003)
Foreign	-0.5122 (0.3194)	-0.5181 (0.3209)	-0.0895 (0.1985)	-0.1185 (0.1899)
Openness		-0.0456 (0.0798)		0.0020 (0.0543)
Conscientiousness		0.1068 (0.0745)		-0.1025** (0.0497)
Extraversion		-0.0598 (0.0779)		0.0134 (0.0488)
Agreeableness		-0.2567*** (0.0738)		-0.1125** (0.0459)
Neuroticism		0.0467 (0.0759)		0.1807*** (0.0485)
Unfairness	0.2512*** (0.0698)	0.2203*** (0.0718)	0.1604*** (0.0461)	0.1082** (0.0479)
Constant	5.064*** (0.7650)	5.512*** (0.7569)	3.122*** (0.5242)	3.1594*** (0.5344)
Wave dummies	yes	yes	yes	yes
No of obs	1535	1447	3792	3750
No of groups	775	729	775	766
R2 (overall)	0.0295	0.0385	0.0175	0.0406

*Notes:* We use data from the SOEP pretests 2008, 2009, and 2010. Parameter estimates are from linear random effects specifications. The dependent variable captures a subject's income comparison intensity with regard to the work domain (coworkers and persons with the same occupation) in column (1) and the private domain (friends, persons from the same age group, partner, parents when they were the subject's actual age, and neighbors) in column (2). Income comparison intensities are measured on a Likert scale from 1 (lowest) to 7 (highest). *Male* and *Foreign* are dummy variables, while *Age* captures a subject's age measured in years. The variables *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* represent the Big Five personality traits. They are based on 15 survey questions (see Gerlitz and Schupp 2005 for more details). Each of them is measured on a Likert scale from 1 (lowest) to 7 (highest). The five variables are generated by standardizing the sum of the scores of the dimension-specific questions, where a higher value indicates a more pronounced markedness of the respective personality trait. The *Unfairness* measure makes use of the response measured on a seven-point scale (ranging from 1 *does not apply to me at all* to 7 *applies to me perfectly*) to the statement: *It has happened in the past that I keep the money when I receive too much in change*. The unfairness variable is standardized to have mean 0 and standard deviation 1. Heteroskedasticity-robust Huber-White standard errors are in brackets.

\* significant at the 10% level.

\*\* significant at the 5% level.

\*\*\* significant at the 1% level.

We summarize our results about the relationship between positional income concerns and economic preferences in:

**Result 4** *Risk-averse subjects have stronger positional income concerns in the work domain. Fair subjects have weaker positional income concerns.*

## 5 Conclusion

There is convincing empirical evidence that individuals compare their income to that of others and that such comparisons are driving behavior. Our paper investigates both the

prevalence and the determinants of strong positional income concerns based on a representative survey from Germany, exploring the question of *who* actually compares *to whom*. We find that positional income concerns very much depend on the reference group. Whereas most people attach some importance to relating their income to that of “other people in the same occupation”, this is not at all the case for the reference group “neighbors”. Furthermore, we show that three personality traits of the Big Five personality inventory (namely, agreeableness, conscientiousness, and neuroticism) are important correlates of strong positional concerns and that the direction of the association depends on the reference group. For example, conscientious people compare their income more strongly in the work domain and less in the private one. In addition, we establish that people who ascribe importance to income comparisons are also different in their economic preferences, that is, their risk and fairness preferences. These latter findings suggest that theories may benefit from taking these interrelations into account.

In summary, our paper provides first evidence regarding the relationship of personality traits, economic preferences, and positional income concerns based on a survey that is representative for Germany. Strong positional concerns influence behavior in economically important ways, making the associations established here relevant for employers and policy makers alike. Moreover, strong positional concerns are likely to impose substantial welfare losses on society (e.g., Alvarez-Cuadrado 2007, Frank 2008). As a result, further research on the driving forces of positional income concerns and their impact on life outcomes is desirable.

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## **A Appendix**

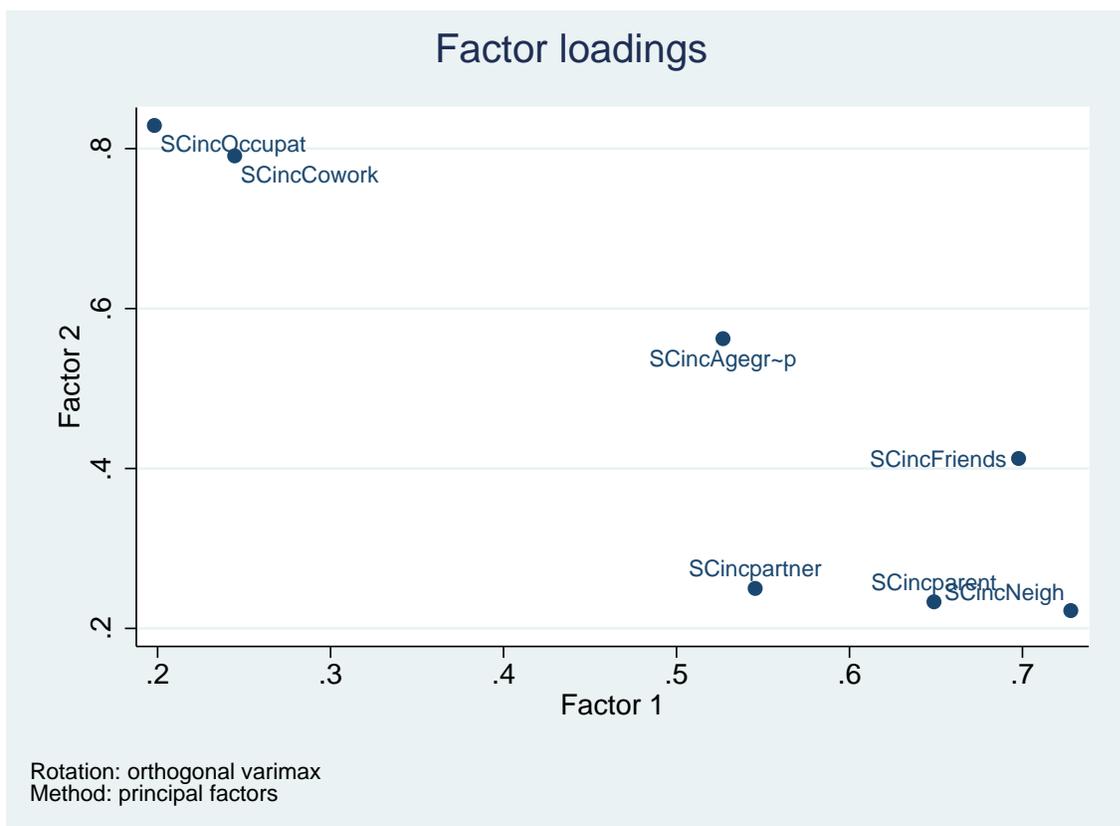


Figure A.1: Factor Analysis of Positional Income Concerns for Different Reference Groups.

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