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Stated preferences and actual choices in german health insurance

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Anna Werbeck

Stated Preferences and Actual Choices in German Health Insurance

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Anna Werbeck*

Stated Preferences and Actual Choices in German Health Insurance

Abstract

Hypothetical bias is the discrepancy between stated preferences and actual choices. As such, it is one of the key issues regarding the use of hypothetical survey methods and therefore highly relevant for economists in understanding human behavior and refining policy interventions. Hypothetical survey methods are often used to inform our view on decision making in health and financial settings. However, there is limited understanding of the extent and underlying factors of hypothetical bias within the context of health insurance. This study contributes to this understanding and explores the extent of hypothetical bias and its correlation with personality traits and behavioral patterns in a health insurance setting. Using large-scale survey data in tandem with detailed information on health plans, I show that the majority of enrollees overestimate their willingness to switch health plans when facing a price increase: 64% show hypothetical bias. Especially conscientious, impulsive or negative reciprocal individuals are prone to hypothetical bias. In contrast, internal locus of control correlates with consistent preferences. These findings can help refine mitigation strategies and assess the reliability of stated preferences.

JEL-Codes: D91, G40, I13

Keywords: Behavioral; hypothetical bias; finance; health insurance

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1 Introduction

Standard economic theory assumes individuals to be rational agents with well-defined preferences and consistent behavior. They respond predictably to changes in prices through substitution when confronted with homogeneous goods in a competitive market. However, empirical observations often uncover a contrast between these theoretical assumptions of consistency and actual human behavior.

One notable example of this contrast is a phenomenon called hypothetical bias, often observed in stated preference studies. Hypothetical bias arises when survey participants state unrealistic preferences in hypothetical scenarios that do not align with their actual behavior (Hensher et al., 2015). Despite their inherent shortcomings, economists often rely on stated preferences to inform policy makers. Stated preferences are easy to gather in a survey during the design phase of an intervention when the actual choice remains unknown and allow inquiries into aspects that cannot be explored through retrospective surveys¹.

Thus, for reliable policy advice, economists need not only a nuanced understanding of hypothetical biases and its prevalence in different context but also of potential underlying factors to refine mitigation strategies and improve the reliability of stated preference methods. This paper contributes to the understanding of hypothetical bias and underlying factors by addressing the questions “What is the extent of hypothetical bias in a health insurance context with a financial trade-off?” and “What are common personality traits or behavioral patterns of people showing hypothetical bias?”.

Following a 2009 health insurance reform, health insurance funds introduced standardized contribution rates with the option to charge (or refund) premiums. Though insurance in one health insurance fund is mandatory in Germany, the funds offer a standard health plan defined by the law such that enrollees can choose between quasi homogenous benefit packages. They can easily switch health insurance funds (hereafter health plans) and face low transaction costs and transparent price framing, i.e., it is a competitive market with little friction.

Between 2009 and 2012, a representative survey asked participants about their intended and actual switching behavior after the change in pricing rules. Using information from this representative survey and the health plans, I show that the majority of enrollees overestimate their willingness to switch health plans when facing a price increase: 64% of stated switchers² show hypothetical bias. Stated stickers are instead more consistent in their preferences, with only 10% showing hypothetical bias. A low level of hypothetical bias is also present when analyzing averages on an aggregate level.

In terms of underlying factors and common personality traits and behavioral patterns, I find that for stated switchers, those who are more conscientious, impulsive or negative reciprocal (respond to unfriendly behavior in kind) have a higher probability to show hypothetical bias.

¹E.g. in times of pandemic when people are asked whether they would stick to wearing a mask in public transport when governmental rules are phased out

²I define stated switchers as enrollees who stated to switch plans in response to a price increase, stated stickers are enrollees who stated to stick to their current plan even when facing a price increase.

Conversely, for stated stickers, solely those who are more positive reciprocal demonstrate an increased likelihood. Further, my findings suggest that hypothetical bias is uncommon in individuals with a high internal locus of control. This promises a high predictive power of stated preferences for individuals with a high internal locus of control.

Research in different fields of economics have assessed the extent of hypothetical bias and show heterogeneity depending on elicitation method and context (Adamowicz et al., 1994; Kesternich et al., 2013; Lusk & Schroeder, 2004; Mark & Swait, 2004; Murphy et al., 2005; Whitehead et al., 2008; Wong et al., 2020). See Haghani et al. (2021) for an excellent overview.

In health economics, Quaife et al. (2018) provide a good overview. Here, most studies find negligible extents of hypothetical bias (e.g. Kesternich et al., 2013; Mark & Swait, 2004; Telser & Zweifel, 2007). Haghani et al. (2021) argue that the reason for this low extent of hypothetical bias might be the importance of health-related questions and that participants put more effort in predicting their behavior than when they are confronted with less relevant questions. However, the extent of hypothetical bias also depends on the health context, which ranges from vaccination decisions (Lambooij et al., 2015) over sleep-apnea treatment (Krucien et al., 2015) to decisions on HIV testing (Strauss et al., 2018).

While taking place in the health context, individuals in my setting do not face a treatment decision but rather a financial trade-off. Therefore, I do not only contribute to the literature on hypothetical bias when facing health-related decisions but also when facing financial decisions (e.g. Brownstone & Small, 2005; Luchini & Watson, 2014; Wuepper et al., 2019)³. The only other study analyzing hypothetical bias in a health insurance context, including financial implications, is a study by Kesternich et al. (2013). In contrast to my study, however, the authors focus on the US with no universal health coverage. They specifically consider individuals eligible for Medicare Part D who had no insurance for drug prescriptions before and face a large choice set of different health plans. Results show basically no hypothetical bias.

In my setting, individuals are compulsorily insured and switch between quasi homogenous health plans suggesting small consequences of their choices. As such, I specifically contribute to a question raised by Haghani et al. (2021) whether hypothetical choices with a financial trade-off and with less drastic consequences are more prone to hypothetical biases. My findings of a pronounced hypothetical bias for stated switchers suggest that this is the case.

Common explanations or sources of hypothetical bias range from protest responses (Meyerhoff & Liebe, 2008) to social desirability bias (Lusk & Norwood, 2009) when focusing on the stated preferences or inattention and unknown transaction costs when focusing on the actual choices (Heiss et al., 2021). Some studies have tried to address different sources and mitigate hypothetical bias by implementing a “cheap talk” explanation (Cummings & Taylor, 1999; List, 2001) or using questions of certainty or consequentiality (Carson & Groves, 2007; Penn & Hu, 2018). Yet, the effects of these mitigation strategies are mixed and seem to work better in some contexts (e.g. Bosworth & Taylor, 2012) and for some people (e.g. Wuepper et al., 2019). Wuepper et al. (2019) show in their study that relying not only on “cheap talk” but further using information

³See table E for an overview on studies evaluating hypothetical bias in choice experiments in health and financial contexts.

on individuals' concerns about appearance and self-control helps reduce hypothetical bias much more. This underlines the importance of understanding the correlation between hypothetical bias and individual characteristics such as personality traits or behavioral patterns to refine mitigation strategies and ultimately enhance the reliability of stated preference surveys.

To my knowledge, the paper by Grebitus et al. (2013) is the only other study that analyzes the phenomenon of hypothetical bias based on personality traits. They explore the role of Big Six personality traits in (real and hypothetical) choice and auction laboratory experiments and observe that personality traits play a more pronounced role in explaining hypothetical bias in choice contexts than in auctions. Different to my study, they explore the correlation of hypothetical bias and personality traits in a laboratory experiment with a non-binary choice, focusing only on Big Six personality traits and on comparing correlations between different elicitation methods. I provide evidence based on a simple, binary real-world choice setting and – in addition to the Big Five personality traits – consider further, more precise personality traits (impulsivity, locus of control) and behavioral patterns (reciprocity, risk preference).

My findings contribute to a better understanding of hypothetical bias in a competitive market with little friction when facing financial trade-offs – specifically in the health insurance context – and suggest that especially conscientious, impulsive as well as negative reciprocal individuals are prone to showing hypothetical bias and individuals with an internal locus of control are not. These findings can be used to refine mitigation strategies and enhance reliability of stated preference surveys.

2 The German Health Insurance Market and Reform

Germany has a two-tier health insurance system with a co-existing multi-payer public and an individual private market. Nearly ninety percent of the population are covered by the public system. Depending on the nature of the employment and the level of salary most employees are compulsory insured under the public system. Only civil-cervants, self-employed and employees with an annual gross income above € 69,300 can opt out of the public system and choose a private company for full insurance. Public health plans are constrained to contract every German citizen who is legally bound or asks for insurance voluntarily, there is no risk-rating. Also, non-working dependents are included in a family contract free of charge.

The public health insurance system is a competitive health insurance market. Since 1996 individuals have been free to choose their health plan independent of their employer. The health plans operate with very similar benefits packages, provider networks and reimbursements. Thus, health plans offer very homogenous products and mainly compete on the basis of prices. Also, switching costs between plans are negligible. Individuals can switch funds by making a phone call to the new health plan and sending mainly postal information (Bauhoff, 2012) or simply by doing it online. Since 2002 individuals can switch to a new health plan once they have been with their current plan for minimum 18 months or when the current plan changes the premium. Still, before 2009, only about 5 % of insured individuals switched health plans per year (Schmitz & Ziebarth, 2017).

Before 2009, health plans charged plan specific contribution rates which were entirely deducted from income. In 2009, health plans were enforced to introduce a standardized contribution rate for all plans with the option to charge (or refund) premiums. Premiums were either charged in euro values of 8 or later 10 Euro or as 1% of the taxable income up to a cap of 37.50 Euro. Contribution rates were still paid by payroll deductions, premiums were billed separately and mostly paid by deposit. As an example, before the reform, health plan A charged a contribution rate of 14.7% per month, health plan B 16.6%. After the reform, both charged 15.5%, but health plan B additionally charged a premium of 8€ per month. These pricing rules were in place from 2009 to 2015. Between 2009 and 2011, in total 17 health plans charged add-on premiums. The 202 health plans active in 2009 decreased to 156 in 2011. Table B1 in the Appendix shows the contribution rates and add-on premiums of those 17 health plans that introduced a premium between pre-reform year 2008 and 2011. Further, it reports the market share of those plans.

The studies by Schmitz and Ziebarth (2017) and Wuppermann et al. (2014) evaluate the effectiveness of the reforms intention to foster competition and indicate that the change in price framing indeed led more enrollees to switch health plans.

3 Preferences and Hypothetical Bias

3.1 Data

The empirical analysis relies on rich individual-level panel data from the German Socio-Economic Panel Study (SOEP). The SOEP is a large and long-running household panel that started in 1984. About 30,000 people in nearly 15,000 households are surveyed every year. The SOEP questionnaire includes questions on individuals' health plans, their willingness to switch plans in response to a potential price change and their actual switching behavior as well as socioeconomic and psychological traits (Goebel et al., 2019). I use SOEP waves 2008 through 2012 (SOEP, 2023) and augment the SOEP data with additional information on whether a health plan charged an add-on premium between 2009 and 2011.

I restrict my sample on individuals taking part in the public health insurance system who answered both, the question on stated preference and actual choice. I further restrict it to health plan enrollees, i.e. those who are paying members of the health plan. This excludes family members insured under family insurance, who do not have to pay for themselves. This has the advantage that I observe only one decisionmaker for each contract, which is especially relevant for the observation of the revealed preferences. Further, I focus on enrollees of health plans that introduce an additional premium. I do so as they are the ones transparently exposed to the situation described in the stated preference question “*The health plans will all have the same contribution rate from 2009 but can demand additional premiums or pay out refunds. For example, if your health plan were to charge an additional premium of 8 euros or another health plan were to grant a refund of 8 euros per month: would that be a reason for you to change your health plan?*”

Enrollees of these plans face a higher price than the rest of the population and are informed

about this two month before premium introduction. As such, I assume the switching (or sticking) behavior in the year after premium introduction as their actual reaction to the price increase. Consequently, I interpret the (concurrent) divergence of stated preference and actual choice as (no) hypothetical bias. Further, underlining the relevance of this group, the paper by Schmitz and Ziebarth (2017) shows that health plans introducing a premium are the ones losing most enrollees. Including only those facing a premium introduction, the sample contains 1,719 individuals. When excluding individuals without sufficient education, 1,713 individuals remain in the sample.

For my main analysis, I focus solely on individuals who stated a preference to “yes, absolutely” or “certainly not”⁴ switch their health plan in response to a price change. I do so because participants here indicate clear preferences for switching or sticking. This makes me confident to evaluate an individual’s hypothetical bias precisely⁵. This restricts the sample further, such that my final sample for the main analysis contains 749 individuals, with 127 indicating a preference for switching and 622 a preference for sticking.

3.2 Results

The *stated preference* question describes the change in price framing and asks participants to state their willingness to switch health plans in response to a potential price increase, as stated above. Answers are stated on a 4-point Likert scale ranging from “Yes, absolutely” to “Certainly not”⁶ I focus on the 749 individuals that choose option 1 “Yes, absolutely” (127 individuals) and option 4 “Certainly not” (622 individuals) to have the most precise estimation of hypothetical bias.

I take the information on the *actual choice* from the individual’s answer to the question whether he or she switched health plans since the beginning of the year the premium was introduced: “Did you change your health plan since January, 1st 2009 (to 2011)?”⁷. Of the 749 individuals that stated to “yes, absolutely” or “certainly not” switch health plans, 110 actually switched, 639 stuck to their current plan.

Studying hypothetical bias is then straightforward. I simply compare the stated preferences indicated in the first question to the actual choices from the second question.

I do this task on sample as well as on an individual level. On sample level, I compare average stated preferences and actual choices for all individuals in my main sample. Table 1 shows the cross table of the stated preferences and actual choices of the 749 individuals. On average, hypothetical bias is quite small. 127 out of 749 (17%) stated that they certainly want to switch health plans in response to a price increase, while in fact 110 do (15%). This suggests a good predictive power of the choice survey. On an individual level, the main diagonal shows the

⁴In regression tables, I will abbreviate “yes, absolutely” with “yes” and “certainly not” with “no”.

⁵Indeed, robustness checks in Tables 8 and 9 the Appendix D show that individuals with clear preferences are very different from individuals who answer “Yes, maybe” or “Rather not”.

⁶In Appendix A shows the response behavior of the participants for the four options. 7.4% stated to absolutely want to change, 36.4% stated certainly not.

⁷3 in Appendix A shows the revealed preferences of all participants insured in a health plan that introduced a premium. Of all 1,719 individuals facing premium introductions, 16.6% actually switched health plans.

number of individuals, 604 (558 + 46), who reveal their stated preference. This suggests a predictive power of 81% and in turn an extent of hypothetical bias of 19%⁸.

Table 1: Preferences and Hypothetical Bias

	Actual Choices		Total
	Yes	No	
Stated Preference			
Yes, absolutely	46 (6.1%)	81 (10.8%)	127 (17.0%)
Certainly not	64 (8.5%)	558 (74.5%)	622 (83.0%)
Total	110 (14.7%)	639 (85.3%)	749 (100%)

Notes: Data from SOEP waves 2008 to 2012 for individuals insured in a health plan that charged add-on premiums between 2009 and 2011 and who stated to certainly switch (“Yes, absolutely”) or stick (“Certainly not”) in response to the reform. The table reports number of observations.

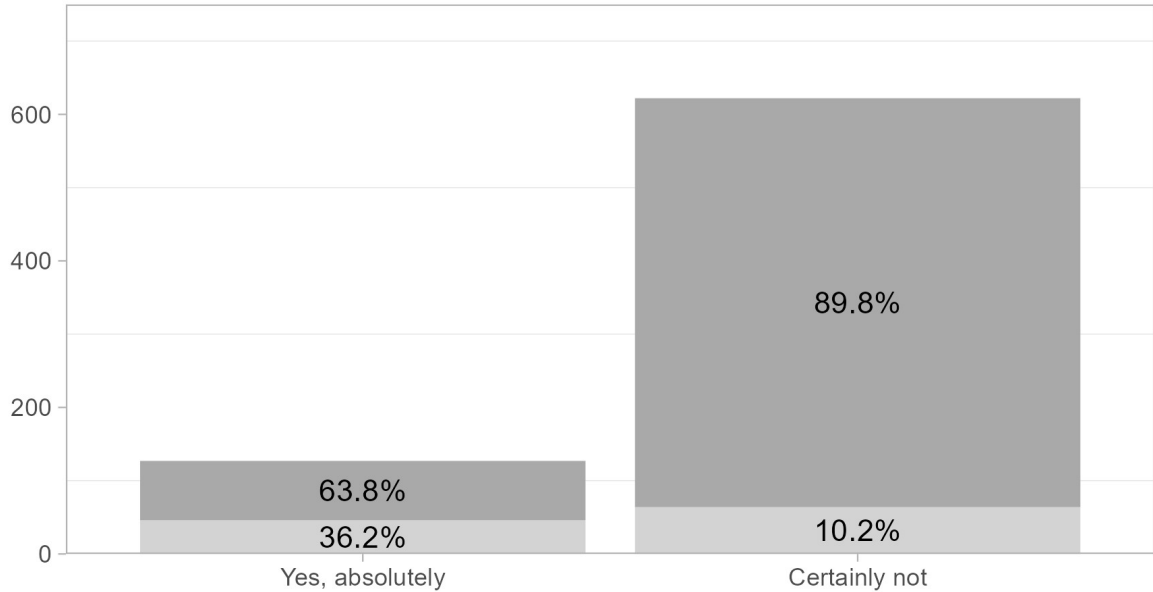
Yet, these results are driven by those who stated that they will stick to their current health plan, 558 (90%) – consistently – did so in real-life. 64 (10%) instead switched the plan. This translates to an extent of hypothetical bias for the stated stickers of 10% or a high specificity, i.e. true negative rate, of 90%. The term specificity stems from clinical diagnostics and indicates the reliability of opting-out behavior. One might argue that especially those 10% who stated to stick to their plan and then switched plans might have other reasons to switch than the price change as they indicated to not react to the premium and stay inactive. While this might be true for some people, I show, in a robustness check, that of those who stated to stick to their plan and *did not* face a premium introduction only 3.6% actually switched plans, much less than the 10% in the group of enrollees who faced a price increase (see Figure 5). This makes me confident that the price change did play a role in the decision making of stated stickers who actually switched plans and their inconsistency can be interpreted as hypothetical bias.

In the group of stated switchers, 46 (36%) of the 127 individuals who stated to switch their health plan did so in the end, 81 (64%) stuck to their current plan instead. This translates to an extent of hypothetical bias of 64% or a sensitivity, i.e. true positive rate, of 36%. Sensitivity, in contrast to specificity, indicates the reliability of opting-in behavior. Figure 1 illustrates the extent of hypothetical bias for the stated switchers (left bar – upper part “changed = no”) and the stated stickers (right bar – lower part “changed = yes”) ⁹.

⁸See Table 6 for results on the full sample of 1,713 individuals, where I group individuals who stated to certainly switch (“Yes, absolutely”) or maybe switch (“Yes, maybe”) and those who stated to certainly (“Certainly not”) or probably stick (“Maybe not”) in response to a price increase.

⁹See Figure 4 for results on the full sample of 1,713 individuals

Figure 1: Stated Preferences and Actual Choices for Switching Health Plans Post Price Increase



4 Hypothetical Bias, Personality, and Behavior

4.1 Data

4.1.1 Hypothetical Bias

In the regression analysis, I estimate the correlation of hypothetical bias with personality traits and behavioral patterns. To do so, I construct my main variable of interest *hypothetical bias* by coding as 1 if an individual’s stated preference differs from the actual choice. For example, if a respondent states that she *wants to* switch health plan (“yes, absolutely”) but then *does not report* a switch after premium introduction or, on the contrary, if another respondent states that he *does not want to* switch health plan (“Certainly not”) but *reports* a switch after premium introduction, I code it as 1.

4.1.2 Personality Traits

For personality traits, a widely accepted and empirically sound measure are the Big Five personality traits (Gill & Hodgkinson, 2007). The model identifies five broad traits that capture the major dimensions of personality variation: *Agreeableness*, *Conscientiousness*, *Extraversion*, *Neuroticism* and *Openness to Experience*. Agreeable individuals are empathic, friendly, and cooperative in their relationships. Conscientious individuals are organized, disciplined, and careful in their actions. Extraversion refers to the extent to which a person is outgoing and enjoys socializing. Individuals high in neuroticism may experience higher levels of anxiety, moodiness, and have little resilience to stress. Openness to experience reflects a person’s creativity, curios-

ity, and willingness to explore novel experiences. These traits are considered relatively stable over time and are thought to influence various aspects of behavior, potentially – partly – including hypothetical bias (Greibitus et al., 2013). Openness to Experience is measured using four questions or items, the other four traits are based on three items respectively.

Further, I include personality traits that might be less stable over time but still helpful in discovering underlying factors of hypothetical bias: *Locus of control* and *impulsivity*. *Locus of control*, as conceptualized by Rotter (1966), delineates individuals’ beliefs regarding their control over life events. It distinguishes between internal locus of control, emphasizing personal agency, and external locus of control, attributing outcomes to external factors. Agency, closely tied to locus of control (Caliendo et al., 2023), emerges as the primary personality trait influencing differences in stated and revealed preferences in choice experiments in the paper by Greibitus et al. (2013). As agency is not surveyed in the SOEP, it is interesting to look at the correlation of locus of control and hypothetical bias in the setting of this study. The original scale of *Locus of control* (Nolte et al., 1997) consists of ten items. The SOEP uses a scale with good reliability consisting of seven of the ten items (Specht et al., 2013). The items are measured on a Likert-scale of 1 to 7.

Impulsivity possesses distinct characteristics related to hyperbolic discounting, where immediate rewards are favored over delayed ones (Wang et al., 2016). Impulsivity influences behavior by prompting actions without thorough consideration of consequences, emphasizing its relevance in decision-making scenarios, both hypothetical and real, and as such potentially its relevance for hypothetical bias. *Impulsivity* is measured by a single item Likert-scale of 0 to 10.

4.1.3 Behavioral Patterns

As behavioral patterns, I consider individuals’ *risk preferences* and their tendencies for *negative and positive reciprocity*. *Risk preferences* influence decision-making not only in actual or incentivized choices but also in hypothetical scenarios (Penn et al., 2023), suggesting the relevance of risk aversion as a potential factor correlating with hypothetical bias. Risk preference is measured on a single 10-item Likert-scale.

Reciprocity is defined as the tendency to respond to others’ actions in kind (Fehr & Schmidt, 2006; Perugini et al., 2003), encompasses both positive and negative forms, which are measured on separate scales and may not correlate; individuals may exhibit positive reciprocity by returning favors while abstaining from revenge (Perugini et al., 2003). However, both positive and negative reciprocity may correlate with hypothetical bias in my setting, as individuals with tendencies for negative reciprocity may react to changes in their health plan premiums with switching, while those who are more positive reciprocal may prefer to maintain their current plan due to past benefits received. The original scale of *Reciprocity* by Perugini et al. (2003) consists of 27 items. The SOEP uses a shortened version on the two scales of negative and positive reciprocity, each consisting of three items on a Likert-scale of 1 to 7.

The exact questions surveyed in the SOEP can be found in Appendix Table 4.F.1 and 4.F.2.

4.1.4 Socioeconomic Factors

As socioeconomic factors, I include age, biological sex, education¹⁰, income as well as an individual's past health plan switching behavior. The latter defines whether an enrollee switched its health plan before 2009. I control for these factors as they might also impact hypothetical and/or actual decision making and as such possibly the occurrence of hypothetical bias.

4.1.5 Descriptive Statistics

Table 2 displays descriptive statistics of the 749 enrollees of a health plan that introduced additional premiums between 2009 and 2011 who answered “Yes, absolutely” (127 enrollees) or “Certainly not” (622 enrollees) in the stated preference question in 2009. The table shows means and standard deviations (SD) of stated preferences and actual choices, the hypothetical bias variable, the personality traits and behavioral patterns as well as the socioeconomic controls used in the analysis. The first three rows underline the answering behavior and the extent of hypothetical bias, discussed in depth in the previous chapter. The following rows report the calculated means of the personality traits and behavioral patterns¹¹. At last, the table shows means and standard deviations for the considered socioeconomic characteristics and past switching behavior, i.e. whether an individual has switched its health plan before 2009. Overall, the table reports means and standard deviations for stated switchers and stickers separately.

¹⁰I use education measured by the isced 1997 classification. It defines seven levels of education, starting from pre-primary education to second stage of tertiary education (UNESCO, 1997).

¹¹To calculate the means of the aggregated personality traits/behavioral patterns, I calculate the mean of each item, sum the means of all items that belong to one trait/pattern and divide them by the number of items. For impulsivity and risk preference it is simply the mean of the single item.

Table 2: Descriptive Statistics

	Stated Preference = “Yes”		Stated Preference = “No”	
Stated Preference (Want change)	1.00	(0.00)	0.00	(0.00)
Actual Choice (Changed)	0.36	(0.48)	0.10	(0.30)
Hypothetical Bias	0.64	(0.48)	0.10	(0.30)
Agreeableness	4.54	(0.74)	4.59	(0.69)
Conscientiousness	5.94	(0.90)	5.96	(0.90)
Extraversion	4.86	(1.05)	4.93	(1.12)
Neuroticism	3.95	(1.30)	3.81	(1.24)
Openness	4.69	(1.09)	4.73	(1.11)
Negative reciprocity	3.22	(1.54)	2.90	(1.48)
Positive reciprocity	5.96	(0.98)	5.87	(0.94)
Risk lovingness	3.61	(2.20)	3.59	(2.16)
Impulsivity	5.14	(2.23)	5.21	(2.34)
Locus of control	3.22	(0.85)	3.18	(0.96)
Age	48.62	(15.26)	56.91	(15.71)
Male	0.422		0.416	
Education general (class 2)	0.05	(0.23)	0.08	(0.27)
Education upper secondary (class 3)	0.58	(0.50)	0.60	(0.49)
Education A level (class 4)	0.08	(0.27)	0.05	(0.22)
Education higher vocational (class 5)	0.10	(0.30)	0.06	(0.24)
Education higher (class 6)	0.18	(0.39)	0.20	(0.40)
Log income	3.40	(0.19)	3.36	(0.26)
Changed health plan before	0.41	(0.49)	0.21	(0.41)
Observations	127		622	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011 and who stated to “Yes, absolutely” or “Certainly not” switch in responds to a price increase. This table shows means and standard deviations (SD) for stated switchers (columns 1 and 2) and stated stickers (columns 3 and 4) separately.

4.2 Results

Table 3 and 4 report average marginal effects of logistic regressions for the 127 stated switchers and the 622 stated stickers separately (see Appendix C for details on the estimation). Column (1) of Table `refhypBias:tab:reg-results1` reports average marginal effects for the 127 individuals stating to switch their plan pre-price increase. The results suggest that of those, the more conscientiousness have a higher probability to show hypothetical bias, i.e. to state to switch but then reveal sticking to their current plan. For every standard deviation increase of conscientiousness (0.90), the probability to show hypothetical bias increases by 13%. More agreeable individuals seem to be more consistent instead. These results do not show for individuals who stated to stick to their current plan pre-price increase, displayed in column (2). The Big Five traits do not seem to correlate with hypothetical bias here. Of the socioeconomic controls, the age coefficient is significant but rather small in magnitude for both the intended switchers and stickers. However, this rather shows a tendency to stick to the current plan, the older one gets. This finding and interpretation is robust across different specification (see Table 4 below were I estimate the same regression but with the other personality traits and behavioral patterns and

Tables 10 to 17 in Appendix D, were I estimate the two regressions with the same explanatory variables but use the stated preference or actual choice as dependent variables for the SOEP and the full sample of enrollees facing a price increase).

Table 3: Regression Results of Big Five Personality Traits

	Dependent Variable = Hypothetical Bias			
	Stated Preference = “Yes”		Stated Preference = “No”	
Agreeableness	-0.108*	(0.063)	-0.022	(0.019)
Conscientiousness	0.141***	(0.044)	0.019	(0.015)
Extraversion	-0.018	(0.044)	0.020	(0.014)
Neuroticism	0.017	(0.031)	-0.004	(0.010)
Openness	-0.034	(0.040)	-0.002	(0.012)
Age	0.006**	(0.003)	-0.001	(0.001)
Male	0.022	(0.086)	-0.013	(0.025)
Switched before	-0.099	(0.082)	0.036	(0.028)
Education upper secondary (class 3)	0.156	(0.162)	0.015	(0.046)
Education A level (class 4)	0.441*	(0.217)	-0.068	(0.080)
Education higher vocational (class 5)	0.384*	(0.211)	-0.011	(0.071)
Education higher (class 6)	0.137	(0.181)	0.019	(0.015)
Ln Income	0.377	(0.219)	-0.028	(0.050)
Observations	127		622	
Log-Likelihood	-70.809		-197.493	

Notes: Data from SOEP waves 2009 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011 and who stated to “Yes, absolutely” or “Certainly not” switch in responds to a price increase, standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4 zooms in on more precise personality traits and considers further behavioral patterns. For the stated switchers in column (1), impulsivity and locus of control seem to be important personality traits correlating with hypothetical bias – in differing directions. Impulsive individuals tend to have a higher probability to show hypothetical bias. They state to switch but finally stick to their current plan. This seems to be driven by differences in their actual behavior. In robustness checks, I show that more impulsive individuals who face a premium introduction are less likely to switch plans than less impulsive people, while they do not differ in their stated preferences (see Tables 13 and 17 in Appendix D). On the other hand, individuals with a higher level of internal locus of control seem to have a higher probability to be consistent in their preferences than individuals with a higher level of external locus of control. In terms of behavioral patterns, more negative reciprocal individuals have a higher probability to show hypothetical bias. This seems to be driven by differences in their stated preferences. In robustness checks, I observe for both the SOEP sample and the full sample of individuals facing a premium introduction, that negative reciprocal individuals show a higher probability to state a preference for switching (see Table 17 in Appendix D).

Interestingly, stated stickers (column (2)) with a higher internal locus of control also have a higher probability to reveal their stated preference and stick to the current plan – just like the stated switchers. This suggests a high predictive power of stated preferences for actual choices of individuals with a higher internal locus of control. In a robustness check, I estimate the

specific personality traits, the behavioral patterns and the Big Five traits together (see Table 7 in Appendix D). Although statistical significance vanishes, the tendency remains unchallenged. In terms of behavioral patterns, only positive reciprocity seems to matter for stated stickers indicating a higher probability to finally switch plans and show hypothetical bias.

Just as in the previous estimation of the Big Five traits, age is again significant, indicating a tendency to stick to the current plan the older one gets.

Table 4: Regression Results of Personality Traits and Behavioral Patterns

	Dependent Variable = Hypothetical Bias			
	Stated Preference = "Yes"		Stated Preference = "No"	
Negative Reciprocity	0.080***	(0.028)	0.003	(0.008)
Positive Reciprocity	0.066	(0.044)	0.040***	(0.015)
Risk Loving	-0.027	(0.021)	-0.006	(0.006)
Impulsivity	0.046***	(0.018)	0.001	(0.006)
Locus of Control	-0.115**	(0.050)	-0.025*	(0.014)
Age	0.008***	(0.003)	-0.002**	(0.001)
Male	0.040	(0.080)	-0.011	(0.025)
Switched before	-0.058	(0.081)	0.032	(0.029)
Education upper secondary (class 3)	0.184	(0.178)	0.028	(0.047)
Education A level (class 4)	0.383*	(0.229)	-0.040	(0.080)
Education higher vocational (class 5)	0.399*	(0.222)	-0.003	(0.071)
Education higher (class 6)	0.193	(0.195)	0.021	(0.053)
Ln Income	0.262	(0.221)	-0.049	(0.051)
Observations	127		622	
Log-Likelihood	-68.040		-195.229	

Notes: Data from SOEP waves 2009 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011 and who stated to "Yes, absolutely" or "Certainly not" switch in responds to a price increase, standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5 Discussion and Conclusion

This paper explores hypothetical bias and its correlation with personality traits and behavioral patterns in a competitive health insurance market where individuals face a financial trade-off. I use data from a representative choice survey in context of a price framing reform in the German health insurance market because setting and data are particularly suited. Public health insurance is offered by nearly 100 health plans with quasi homogenous benefit packages that mainly compete on prices. Enrollees are free to choose between plans, while facing low transaction costs. The 2009 reform changed price framing from plan specific contribution rates to a uniform rate across plans. Plans had the chance to top this rate with an add-on premium.

When the reform was introduced, a large-scale representative survey asked participants about their stated preferences and actual choices for switching health plans in response to the reform. The same survey also frequently collects information on personality traits and behavioral patterns. This enables me to not only study hypothetical bias in a very clear natural setting but also to explore underlying factors in terms of personality traits and behavioral patterns.

I find that the majority of enrollees overestimate their willingness to switch health plans when facing a price increase: 64% of stated switchers show hypothetical bias. This translates to a low sensitivity or true positive rate of 36%. Stated stickers are instead more consistent in their preferences, only 10% show hypothetical bias. As such, specificity or true negative rate is high (90%). The phenomenon of hypothetical bias is virtually non-existent when analysing averages across groups on an aggregate level. These findings add to the literature on hypothetical bias in choice experiments in health and financial settings. While the low sensitivity is in line with the suggestions of (Haghani, Bliemer, Rose, Oppewal, & Lancsar, 2021) that when facing a financial trade-off and less drastic consequences, people tend to show more hypothetical bias (see Table 18 in Appendix E), the high specificity suggests the opposite. It is more in line with the findings of low extents of Hypothetical bias in health settings (see Table 19 in Appendix E).

Further, my results suggest that some personality traits and behavioral patterns are indeed part of the underlying factors of hypothetical bias. In the group of stated switchers, especially those being more conscientious seem to be prone to hypothetical bias, when considering the broad traits of the Big Five model. Of the more specific traits and patterns, it is the more negative reciprocal and more impulsive who show hypothetical bias. For the stated stickers only positive reciprocity shows a significant correlation with hypothetical bias.

Of both, stated switchers and stickers, it is the ones with a higher internal locus of control that show consistent preferences. Here, stated switchers indeed switch plans after the introduction of the premium, stated stickers stick to their current plans. Individuals with a higher internal locus of control feel responsible for their actions and believe that their own decisions shape their lives. My results suggest that this sense of responsibility of individuals with a high internal locus of control and their understanding that they oversee their lives also translates into assessing the impact of their actions in advance and, ultimately, revealing their stated preferences. As such, I add to the thin literature on the correlation of hypothetical bias with individual traits such as personality traits or behavioral patterns. Grebitus et al. (2013), Wuepper et al. (2019) and this study consistently identify significant correlations, implying the opportunity to enhance mitigation strategies for hypothetical bias based on individual traits, while also seeing the need for further research.

Finally, although facing limitations of a small sample size – especially in the most reliable group of stated switchers – and not having certainty that the final reason for switching was the premium introduction, I contribute to a better understanding of hypothetical bias and how it comes to be. My findings support the idea that there are personality traits and behavioral patterns that shape an individuals stated and revealed preferences and as such the occurrence of hypothetical bias. These findings can help assess the reliability of stated preferences and ultimately refine policy interventions.

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Appendix

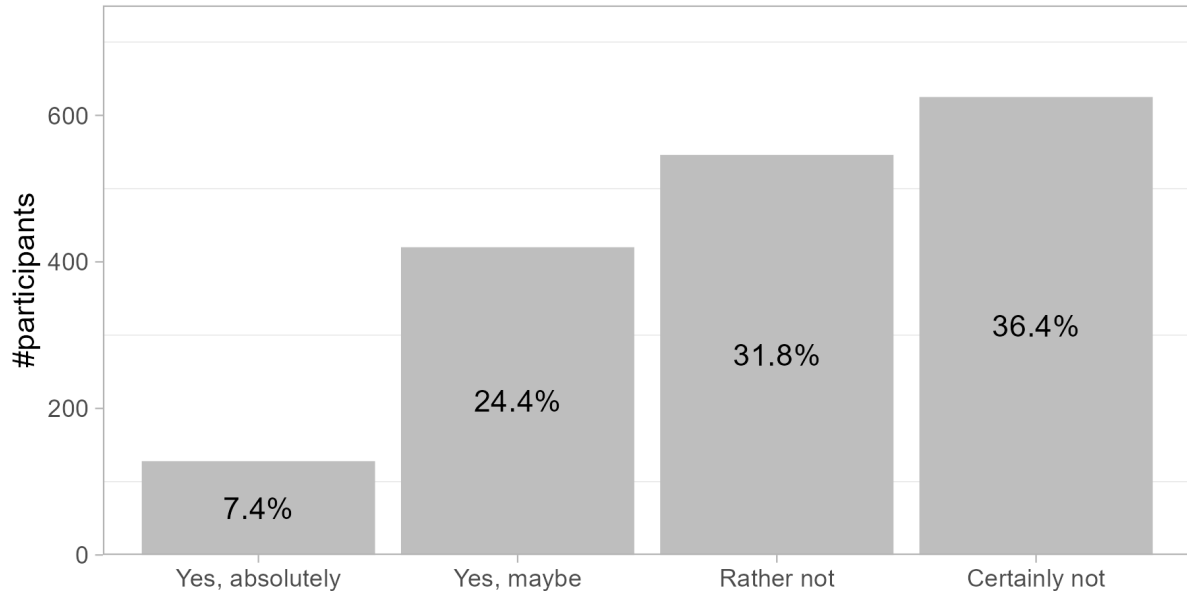
A Stated Preference and Actual Choice Questions and Answers

A.1 Stated Preference Question

The health plans will all have the same contribution rate from 2009 but can demand additional fees or pay out refunds. For example, if your health plan were to charge an additional fee of 8 euros or another health plan were to grant a refund of 8 euros per month: would that be a reason for you to change your health plan?

- Yes, absolutely
- Yes, maybe
- I rather do not like this
- Certainly not

Figure 2: Stated Preferences for Switching Health Plans Post Price Increase (Four Options)



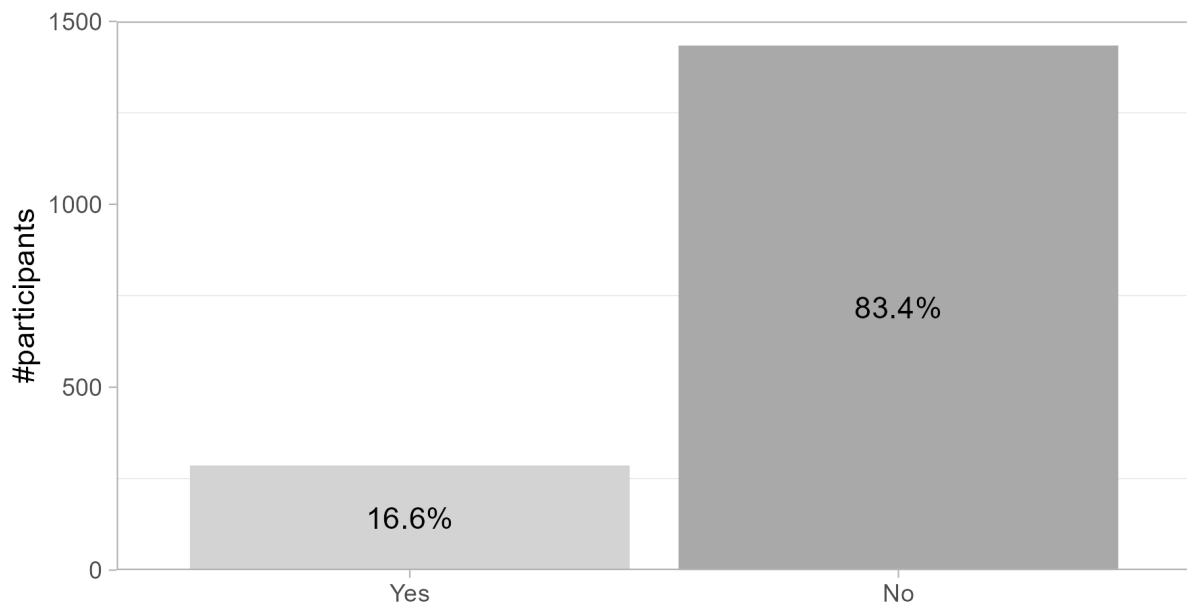
Notes: This Figure shows the stated preferences question whether or not participants believe that a price increase will cause them to switch health plans. The horizontal axes states the four options, the vertical axes states the number of participants. In the bars, the share of participants stating that answer is reported.

A.2 Actual Choice Question

Did you change your health plan since January, 1st 2009 (to 2011)?

- Yes
- No

Figure 3: Actual Choices for Switching Health Plans Post Price Increase



Notes: This Figure shows the actual choices question whether or not participants switched health plans after the implementation of the add-on premium. The horizontal axes states the two options, the vertical axes states the number of participants. In the bars, the share of participants stating that answer is reported.

B Health Plans' Contribution Rates and Premiums

Table 5: Health Plans' Contribution Rates and Premiums

Health Plan	Contribution Rate 2008 (pre-reform)	Contribution Rate 2009 (post-reform)	Additional Premium (post-reform)	Contribution Rate 2010 (post-reform)	Additional Premium (post-reform)	Contribution Rate 2010 (post-reform)	Additional Premium (post-reform)	Market Share (2011)
JointBKKCologne	16.6%	15.5%	8-37.50	14.9%	8-37.50	14.9%	8-37.50	0.06%
CityBKK	17.4%	15.5%		14.9%	15.00	14.9%	15.00	0.29%
BKKoftheHealingProfessions	16.2%	15.5%		14.9%	10.00	14.9%	10.00	0.16%
BKKWestphalian-Lippe	15.7%	15.5%		14.9%	12.00	14.9%	12.00	0.05%
BKKPhoenix	16.3%	15.5%		14.9%	8.00	14.9%	8.00	0.01%
DAK	15.4%	15.5%		14.9%	8.00	14.9%	8.00	8.59%
NovitasBKK	15.4%	15.5%		14.9%	8.00	14.9%	8.00	0.62%
GermanBKK	15.1%	15.5%		14.9%	8.00	14.9%	8.00	1.24%
BKKHealth	14.9%	15.5%		14.9%	8.00	14.9%	8.00	1.41%
KKH-Allianz	14.8%	15.5%		14.9%	8.00	14.9%	8.00	2.64%
EssoBKK	14.5%	15.5%		14.9%	8.00	14.9%	8.00	0.03%
BKKPublik	15.5%	15.5%		14.9%	8.00	14.9%	8.00	0.01%
BKKAxelSpringer	15.1%	15.5%		14.9%	8.00	14.9%	8.00	0.02%
BKKMerck	14.3%	15.5%		14.9%	8.00	14.9%	8.00	0.04%
e.onBKK	14.5%	15.5%		14.9%	8.00	14.9%	8.00	0.01%
BKKadvita	15.1%	15.5%		14.9%	6.50	14.9%	6.50	0.06%
BKKHoesch	15.8%	15.5%		14.9%		14.9%	15.00	0.09%

Notes: Contribution rates as % on income. Since 2009 there is a uniform contribution rate for all health plans. Additionally, there can be grants or premiums. In this study and in this table, I focus on the 17 health plans that charged add-on premiums between 2009 and 2011. The first add-on premium was introduced in September 2009 by Gemeinsame BKK Köln.

C Methodology

To analyze personality and behavioral factors that might explain differences in the stated and revealed preferences, i.e. the occurrence of hypothetical bias, I estimate the following logistic regression by maximum likelihood:

$$P(\text{HB}_i = 1 | X_i' C_i') = \Lambda(\beta_0 + \beta_1 * X_i' + \beta_2 * C_i') \quad (1)$$

$\Lambda(\bullet)$ is the logistic cumulative density function. HB_i is the binary variable constructed with the stated and revealed preferences that indicates whether an individual shows hypothetical bias or not. The vector X_i' contains different personality traits and behavioral tendencies described in Table 1 depending on the specification. In the first specification, it contains the Big Five personality traits, in the second specification, it contains locus of control and impulsivity as personality traits and reciprocity and risk preference as behavioral tendencies. C_i' contains socioeconomic controls and past switching behavior also described in

1. Socioeconomic controls include age, biological sex, education¹² and income, past switching behavior reflects whether an individual has switched health plans before the introduction of the reform.

I do this exercise for individuals who stated to switch their health plan pre-reform (“Yes, absolutely”) and for individuals who stated to stick to their current plan (“Certainly not”) in separate regression. Average marginal effects of the regression results are reported in Table 3 for the Big Five personality traits and in Table 4 for the more specific traits and tendencies.

¹²Education is measured by the isced 1997 classification (UNESCO, 1997). It defines seven levels of education, starting from pre-primary education to second stage of tertiary education.

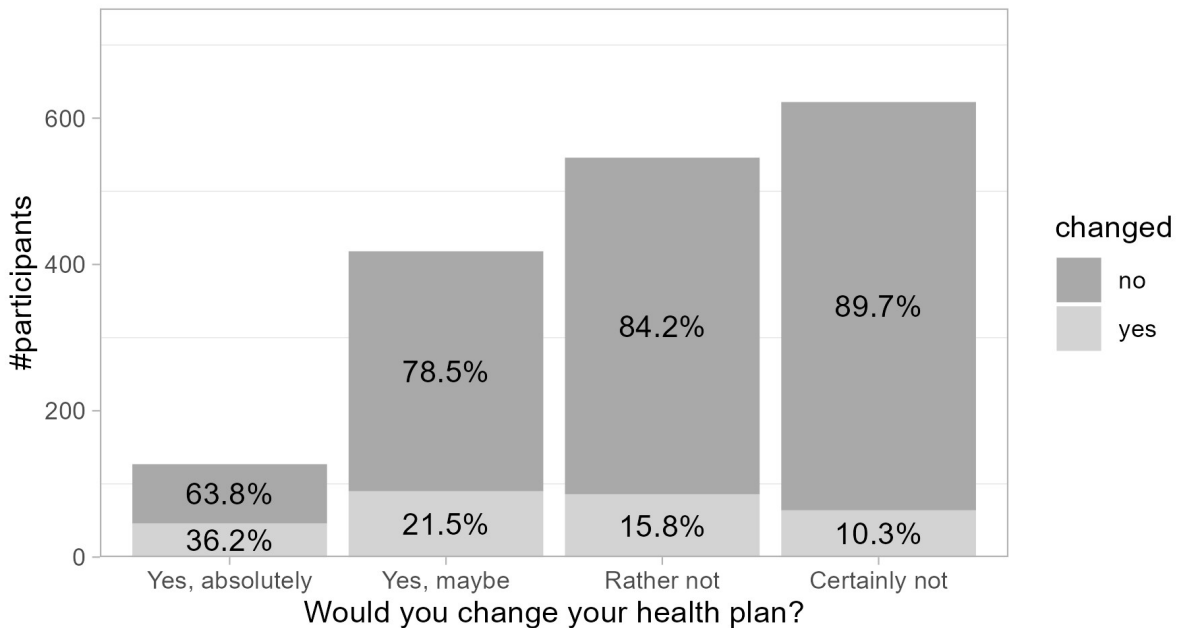
D Robustness Figures and Tables

Table 6: Preferences and Hypothetical Bias - Full Sample

	Actual Choices		Total
	Yes	No	
Stated Preference			
Yes, absolutely	136 (7.9%)	409 (23.9%)	545 (31.8%)
Certainly not	150 (8.8%)	1,018 (59.4%)	1,168 (68.2%)
Total	286 (16.7%)	1,427 (83.3%)	1,713

Notes: Data from SOEP waves 2009 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011. For the variable *stated preference* “Yes” includes individuals who stated to certainly switch (“Yes, absolutely”) or maybe switch (“Yes, maybe”), “No” includes those who stated to certainly (“Certainly not”) or probably stick (“Maybe not”) in response to a price increase. The table reports number of observations, the share is shown in parentheses.

Figure 4: Stated Preferences and Actual Choices for Switching Health Plans Post Price Increase (Four Options)



Notes: This Figure shows the stated preferences for the pre-reform question whether or not participants believe that the reform will cause them to switch health plans as well as their revealed preference in terms of their answer to the question whether they switched health plans after the introduction or not. The horizontal axes states the four options, the vertical axes states the number of participants. In the bars, the dark shaded area presents the share of individuals that did not switch health plans, the light shaded area the share of individuals that switched.

Figure 5: Stated Preferences and Actual Choices for Switching Health Plans Post Reform Introduction (Enrollees of Health Plans without Price Increase)

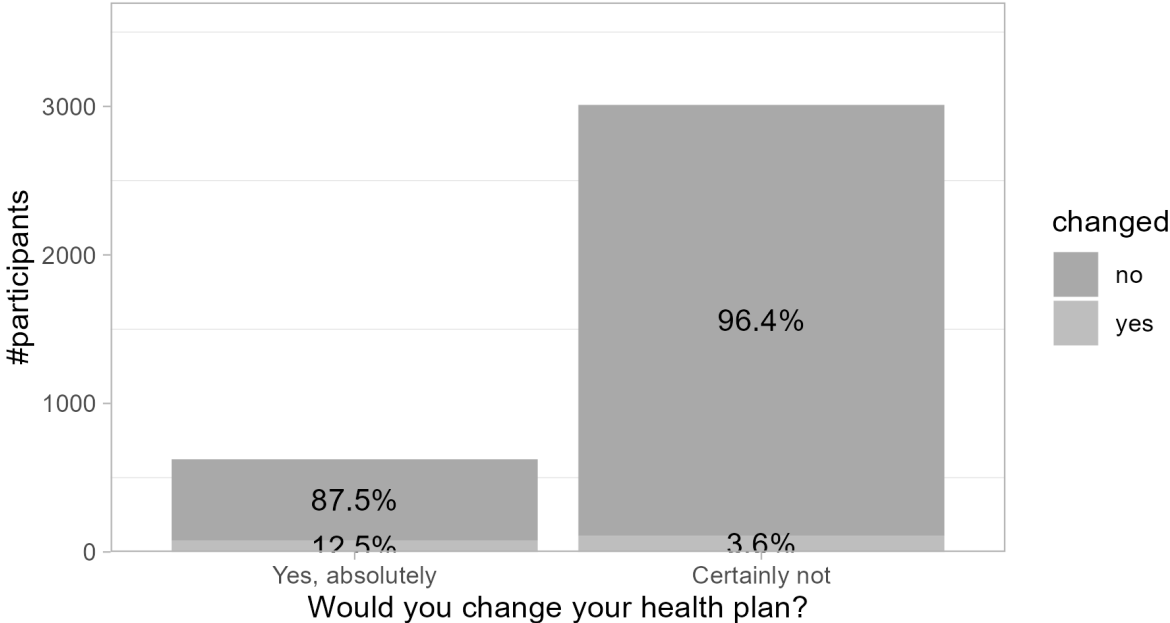


Table 7: Regression Results of Big Five and Specific Personality Traits and Behavioral Patterns

	Dependent Variable = Hypothetical Bias			
	(1)		(2)	
	Stated Preference = "Yes"		Stated Preference = "No"	
Agreeableness	-0.089	(0.067)	-0.027	(0.020)
Conscientiousness	0.114**	(0.045)	0.011	(0.015)
Extraversion	-0.008	(0.044)	0.015	(0.014)
Neuroticism	0.005	(0.036)	-0.001	(0.009)
Openness	-0.058	(0.043)	-0.002	(0.012)
Negative Reciprocity	0.084***	(0.030)	0.001	(0.009)
Positive Reciprocity	0.072	(0.048)	0.037**	(0.015)
Risk Loving	-0.014	(0.022)	-0.007	(0.006)
Impulsivity	0.038*	(0.020)	0.002	(0.006)
Locus of Control	-0.089	(0.056)	-0.020	(0.014)
Age	0.008***	(0.003)	-0.002**	(0.001)
Male	0.016	(0.083)	-0.007	(0.026)
Switched before	-0.076	(0.079)	0.036	(0.029)
Education upper secondary (class 3)	0.121	(0.181)	0.024	(0.046)
Education A level (class 4)	0.422*	(0.234)	-0.048	(0.080)
Education higher vocational (class 5)	0.335	(0.218)	-0.001	(0.079)
Education higher (class 6)	0.164	(0.201)	0.023	(0.054)
Log Income	0.302	(0.218)	-0.047	(0.051)
Observations	127		622	
Log-Likelihood	-63.628		-192.619	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011 and who stated to certainly switch or stick in responds to a price increase, Education by isced 1997, General education is baseline. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Regression Results of Hypothetical Bias and Big Five Personality Traits (Comparison Stated Preference “Yes”, “Yes/Yes,maybe”, “Rather not/No” and “No”)

	Dependent Variable = Hypothetical Bias							
	Stated Preference = “Yes’		Stated Preference = “Yes/Yes,maybe”		Stated Preference = “Rather Not/No”		Stated Preference = “No”	
Agreeableness	-0.108*	(0.063)	-0.037	(0.030)	0.007	(0.016)	-0.022	(0.019)
Conscientiousness	0.141***	(0.044)	0.026	(0.021)	-0.000	(0.011)	0.019	(0.015)
Extraversion	-0.018	(0.044)	0.013	(0.020)	0.011	(0.011)	0.020	(0.014)
Neuroticism	0.017	(0.031)	0.015	(0.016)	0.005	(0.008)	-0.004	(0.010)
Openness	-0.034	(0.040)	-0.021	(0.019)	-0.001	(0.010)	-0.002	(0.012)
Age	0.006**	(0.003)	0.004***	(0.001)	-0.002***	(0.001)	-0.001*	(0.001)
Male	0.022	(0.086)	0.032	(0.038)	-0.013	(0.020)	-0.013	(0.025)
Switched before	-0.099	(0.082)	-0.063*	(0.038)	0.007***	(0.021)	0.037	(0.028)
Education upper secondary (class 3)	0.156	(0.162)	-0.053	(0.080)	0.012	(0.040)	0.016	(0.046)
Education A level (class 4)	0.441*	(0.217)	0.061	(0.100)	-0.045	(0.058)	-0.068	(0.080)
Education higher vocational (class 5)	0.384*	(0.211)	0.007	(0.103)	-0.003	(0.054)	-0.011	(0.071)
Education higher (class 6)	0.137	(0.181)	0.024	(0.088)	0.052	(0.045)	0.019	(0.054)
Log Income	0.374*	(0.217)	0.115	(0.084)	-0.013	(0.042)	-0.028	(0.050)
Observations	127		545		1,168		622	
Log-Likelihood	-70.809		-293.776		-430.398		-197.493	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011. Column 1 reports coefficients and standard deviations for individuals who stated to certainly switch (“Yes, absolutely”), column 2 groups individuals who stated (“Yes, absolutely”) and (“Yes, maybe”). Column 3 groups individuals who stated (“Certainly not”) or (“Maybe not”), while column 4 reports coefficients and standard deviations for individuals who stated (“Certainly not”). in responds to a price increase, Education by isced 1997, General education is baseline. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Regression Results of Hypothetical Bias and Personality Traits and Behavioral Patterns (Comparison Stated Preference "Yes", "Yes/Maybe", "Rather not/No" and No")

	Dependent Variable = Hypothetical Bias							
	Stated Preference = "Yes"		Stated Preference = "Yes/Yes,maybe"		Stated Preference = "Rather Not/No"		Stated Preference = "No"	
Negative Reciprocity	0.079***	(0.028)	0.024*	(0.014)	0.000	(0.007)	0.003	(0.008)
Positive Reciprocity	0.066	(0.043)	0.034*	(0.019)	0.010	(0.011)	0.040***	(0.015)
Risk Loving	-0.027	(0.021)	-0.004	(0.010)	-0.000	(0.005)	-0.006	(0.006)
Impulsivity	0.046***	(0.018)	0.022**	(0.009)	-0.003	(0.005)	0.001	(0.006)
Locus of Control	-0.115**	(0.050)	0.021	(0.021)	-0.007	(0.011)	-0.025*	(0.014)
Age	0.008***	(0.003)	0.004***	(0.003)	-0.002***	(0.001)	-0.002**	(0.001)
Male	0.040	(0.080)	0.027	(0.038)	-0.020	(0.020)	-0.011	(0.025)
Switched before	-0.058	(0.081)	-0.048	(0.038)	0.077	(0.022)	0.032	(0.028)
Education upper secondary (class 3)	0.184	(0.177)	-0.035	(0.079)	0.016	(0.040)	0.028	(0.047)
Education A level (class 4)	0.383*	(0.229)	0.069	(0.099)	-0.041	(0.058)	-0.040	(0.080)
Education higher vocational (class 5)	0.399*	(0.222)	0.028	(0.103)	-0.000	(0.054)	-0.003	(0.071)
Education higher (class 6)	0.193	(0.195)	0.040	(0.088)	0.051	(0.045)	0.021	(0.053)
Log Income	0.262	(0.221)	0.111	(0.085)	-0.020	(0.042)	-0.049	(0.051)
Observations	127		545		1,168		622	
Log-Likelihood	-68.040		-289.733		-430.179		-195.229	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011. Column 1 reports coefficients and standard deviations for individuals who stated to certainly switch ("Yes, absolutely"), column 2 groups individuals who stated ("Yes, absolutely") and ("Yes, maybe"). Column 3 groups individuals who stated ("Certainly not") or ("Maybe not"), while column 4 reports coefficients and standard deviations for individuals who stated ("Certainly not"). in responds to a price increase, Education by isced 1997, General education is baseline. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: SOEP Descriptives (Wants to Change)

	Stated Preference = "Yes"		Stated Preference = "Yes, maybe"		Stated Preference = "Rather not"		Stated Preference = "No"	
Stated Preference (Want Change)	1.00	(0.00)	2.00	(0.00)	3.00	(0.00)	4.00	(0.00)
Switched Post Reform (Changed)	0.17	(0.38)	0.10	(0.31)	0.07	(0.25)	0.05	(0.22)
Agreeableness	4.51	(0.75)	4.57	(0.66)	4.55	(0.69)	4.58	(0.72)
Conscientiousness	5.90	(0.92)	5.79	(0.91)	5.83	(0.90)	5.97	(0.91)
Extraversion	4.81	(1.16)	4.71	(1.13)	4.7	(1.12)	4.79	(1.12)
Neuroticism	3.87	(1.23)	3.89	(1.15)	3.85	(1.18)	3.79	(1.26)
Openness	4.67	(1.14)	4.62	(1.02)	4.54	(1.03)	4.57	(1.15)
Negative Reciprocity	3.33	(1.56)	3.19	(1.36)	3.03	(1.33)	3.00	(1.51)
Positive Reciprocity	5.94	(0.89)	5.82	(0.84)	5.81	(0.88)	5.85	(0.95)
Risk lovingness	3.84	(2.36)	4.01	(2.07)	3.71	(2.09)	3.42	(2.23)
Impulsivity	5.11	(2.29)	5.05	(2.09)	4.99	(2.08)	5.08	(2.33)
Locus of Control	3.35	(0.96)	3.34	(0.91)	3.31	(0.90)	3.26	(0.98)
Age	47.87	(14.81)	46.32	(15.03)	51.61	(15.98)	57.77	(16.43)
Male (%)	53.3		49.2		49.6		48.9	
Education general (class 2)	0.07	(0.26)	0.07	(0.25)	0.09	(0.29)	0.14	(0.34)
Education upper secondary (class 3)	0.56	(0.50)	0.55	(0.50)	0.54	(0.50)	0.56	(0.50)
Education A level (class 4)	0.08	(0.27)	0.08	(0.26)	0.06	(0.25)	0.05	(0.22)
Education higher vocational (class 5)	0.09	(0.29)	0.08	(0.28)	0.09	(0.28)	0.08	(0.27)
Education higher (class 6)	0.19	(0.39)	0.22	(0.42)	0.22	(0.41)	0.17	(0.37)
Log income	3.36	(0.21)	3.36	(0.23)	3.37	(0.23)	3.33	(0.24)
Changed health plan before	0.46	(0.50)	0.39	(0.49)	0.27	(0.44)	0.20	(0.40)
Observations	751		2,472		3,124		3,632	

Note: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan. Education by isced 1997. Standard deviations in parenthesis.

Table 11: Full Sample Descriptives (Wants to Change)

	Stated Preference = "Yes"		Stated Preference = "Yes, maybe"		Stated Preference = "Rather not"		Stated Preference = "No"	
Stated Preference (Want Change)	1.00	(0.00)	2.00	(0.00)	3.00	(0.00)	4.00	(0.00)
Actual Choice (Changed)	0.39	(0.49)	0.24	(0.43)	0.17	(0.37)	0.12	(0.33)
Agreeableness	4.53	(0.74)	4.58	(0.68)	4.62	(0.65)	4.59	(0.69)
Conscientiousness	5.94	(0.90)	5.89	(0.90)	5.91	(0.87)	5.96	(0.90)
Extraversion	4.85	(1.06)	4.72	(1.13)	4.75	(1.10)	4.92	(1.12)
Neuroticism	3.96	(1.29)	3.87	(1.17)	3.90	(1.22)	3.80	(1.24)
Openness	4.69	(1.09)	4.76	(1.04)	4.64	(1.01)	4.73	(1.11)
Negative Reciprocity	3.22	(1.55)	3.07	(1.38)	2.86	(1.24)	2.89	(1.48)
Positive Reciprocity	5.96	(0.89)	5.88	(0.87)	5.81	(0.84)	5.87	(0.94)
Risk lovingness	3.61	(2.21)	3.82	(2.06)	3.62	(2.07)	3.58	(2.17)
Impulsivity	5.13	(2.24)	5	(2.12)	5.15	(2.02)	5.20	(2.33)
locus of Control	3.21	(0.85)	3.33	(0.97)	3.26	(0.92)	3.18	(0.97)
Age	48.69	(15.30)	47.38	(14.70)	52.18	(15.89)	57.03	(15.62)
Male (%)	41.7		42.6		40.5		41.5	
Education general (class 2)	0.06	(0.23)	0.06	(0.23)	0.05	(0.22)	0.08	(0.27)
Education upper secondary (class 3)	0.58	(0.50)	0.56	(0.50)	0.59	(0.49)	0.61	(0.49)
Education A level (class 4)	0.08	(0.27)	0.09	(0.28)	0.07	(0.26)	0.05	(0.22)
Education higher vocational (class 5)	0.10	(0.30)	0.08	(0.27)	0.09	(0.28)	0.06	(0.25)
Education higher (class 6)	0.18	(0.39)	0.22	(0.41)	0.20	(0.40)	0.20	(0.40)
Log income	3.40	(0.19)	3.37	(0.22)	3.38	(0.23)	3.36	(0.26)
Changed healt plan before	0.41	(0.49)	0.33	(0.47)	0.24	(0.43)	0.21	(0.41)
Observations	127		418		546		622	

Note: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011. Education by isced 1997. Standard deviations in parenthesis.

Table 12: Regression Results Stated Preference "Yes, absolutely" and Big Five Personality Traits (SOEP and Full Sample)

	Dependent Variable: Wants to Change = "Yes"			
	(1)		(2)	
	SOEP		Full Sample	
Agreeableness	-0.008*	(0.004)	-0.009	(0.010)
Conscientiousness	0.004	(0.003)	0.004	(0.007)
Extraversion	0.000	(0.003)	-0.000	(0.007)
Neuroticism	0.004	(0.002)	0.006	(0.005)
Openness	0.004*	(0.003)	-0.001	(0.006)
Age	-0.001***	(0.000)	-0.001	(0.000)
Male	0.015***	(0.005)	0.002	(0.013)
Switched before	0.048***	(0.006)	0.043***	(0.014)
Education upper secondary (class 3)	0.016	(0.010)	0.012	(0.028)
Education A level (class 4)	0.020	(0.014)	0.013	(0.035)
Education higher vocational (class 5)	0.020	(0.013)	0.036	(0.034)
Education higher (class 6)	0.010	(0.012)	0.007	(0.031)
Log Income	-0.008	(0.012)	0.042	(0.029)
Observations	9,979		1,713	
Log-Likelihood	-2,587.126		-441.059	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan (SOEP) and those enrolled in health plans that charged add-on premiums between 2009 and 2011 (Full Sample). Education by isced 1997, General education is baseline. Standard errors are in parentheses.

Table 13: Regression Results Stated Preference "Yes, absolutely" and Personality Traits and Behavioral Patterns (SOEP and Full Sample)

	Dependent Variable: Wants to Change = "Yes"			
	(1)		(2)	
	SOEP		Full Sample	
Negative Reciprocity	0.006***	(0.002)	0.009*	(0.004)
Positive Reciprocity	0.010***	(0.003)	0.011	(0.008)
Risk Loving	-0.001	(0.001)	-0.002	(0.003)
Impulsivity	0.000	(0.001)	-0.001	(0.003)
Locus of Control	0.004	(0.003)	-0.005	(0.007)
Age	-0.001***	(0.000)	-0.001	(0.000)
Male	0.009	(0.005)	-0.003	(0.013)
Switched before	0.048***	(0.006)	0.042***	(0.014)
Education upper secondary (class 3)	0.018*	(0.010)	0.013	(0.028)
Education A level (class 4)	0.025*	(0.013)	0.013	(0.035)
Education higher vocational (class 5)	0.025*	(0.013)	0.041	(0.034)
Education higher (class 6)	0.017	(0.012)	0.009	(0.031)
Log Income	-0.006	(0.012)	0.034	(0.029)
Observations	9,979		1,713	
Log-Likelihood	-2,572.185		-438.684	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan (SOEP) and those enrolled in health plans that charged add-on premiums between 2009 and 2011 (Full Sample). Education by isced 1997, General education is baseline. Standard errors are in parentheses.

Table 14: SOEP Descriptives Actual Choices

	Changed = "No"		Changed = "Yes"	
Stated Preference (Want Change)	3.00	(0.94)	2.58	(1.02)
Switched Post Reform (Changed)	0.00	(0.00)	1.00	(0.00)
Agreeableness	4.56	(0.70)	4.57	(0.69)
Conscientiousness	5.88	(0.91)	5.86	(0.92)
Extraversion	4.74	(1.12)	4.83	(1.15)
Neuroticism	3.84	(1.20)	3.84	(1.25)
Openness	4.57	(1.08)	4.68	(1.05)
Negative Reciprocity	3.08	(1.43)	3.04	(1.39)
Positive Reciprocity	5.84	(0.90)	5.85	(0.88)
Risk lovingness	3.67	(2.17)	3.86	(2.20)
Impulsivity	5.04	(2.19)	5.11	(2.22)
Locus of Control	3.31	(0.94)	3.19	(0.91)
Age	52.85	(16.46)	45.36	(15.29)
Male (%)	4579	(49.8)	360	(46.1)
Education general (class 2)	0.10	(0.30)	0.08	(0.27)
Education upper secondary (class 3)	0.55	(0.50)	0.60	(0.49)
Education A level (class 4)	0.06	(0.24)	0.07	(0.26)
Education higher vocational (class 5)	0.08	(0.28)	0.07	(0.25)
Education higher (class 6)	0.20	(0.40)	0.19	(0.39)
Log income	3.35	(0.23)	3.38	(0.23)
Changed health plan before	0.27	(0.44)	0.49	(0.50)
Observations	9,198		781	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan that charged add-on premiums between 2009 and 2011. Education by isced 1997. Standard deviations in parenthesis.

Table 15: Full Sample Descriptives Actual Choices

	Changed = "No"		Changed = "Yes"	
Stated Preference (Want Change)	3.05	(0.92)	2.59	(1.01)
Actual Choice (Changed)	0.00	(0.00)	1.00	(0.00)
Agreeableness	4.59	(0.69)	4.62	(0.65)
Conscientiousness	5.93	(0.89)	5.89	(0.90)
Extraversion	4.81	(1.11)	4.83	(1.13)
Neuroticism	3.86	(1.22)	3.85	(1.24)
Openness	4.70	(1.06)	4.75	(1.06)
Negative Reciprocity	2.96	(1.41)	2.90	(1.32)
Positive Reciprocity	5.86	(0.88)	5.84	(0.91)
Risk lovingness	3.64	(2.13)	3.72	(2.03)
Impulsivity	5.17	(2.19)	4.94	(2.08)
Locus of Control	3.25	(0.95)	3.19	(0.91)
Age	53.58	(15.83)	47.21	(15.41)
Male (%)	41.8		39.5	
Education geneal (class 2)	0.06	(0.24)	0.06	(0.24)
Education upper secondary (class 3)	0.59	(0.49)	0.61	(0.49)
Education A level (class 4)	0.07	(0.26)	0.06	(0.24)
Education higher vocational (class 5)	0.08	(0.27)	0.07	(0.25)
Education higher (class 6)	0.20	(0.40)	0.20	(0.40)
Log income	3.37	(0.24)	3.36	(0.22)
Changed health plan before	0.23	(0.42)	0.40	(0.49)
Observations	1,427		286	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan. Education by isced 1997. Standard deviations in parenthesis.

Table 16: Regression Results Actual Choice "Yes" and Big Five Personality Traits (SOEP and Full Sample)

	Dependent Variable: Changed = "Yes"			
	(1)		(2)	
	SOEP		Full Sample	
Agreeableness	0.005**	(0.004)	0.015	(0.015)
Conscientiousness	-0.001	(0.003)	-0.009	(0.010)
Extraversion	0.002	(0.003)	-0.002	(0.009)
Neuroticism	0.001	(0.002)	-0.002	(0.007)
Openness	0.004	(0.003)	0.009	(0.009)
Age	-0.002***	(0.000)	-0.003***	(0.001)
Male	-0.010*	(0.005)	-0.018	(0.018)
Switched before	0.051***	(0.006)	0.076***	(0.019)
Education upper secondary (class 3)	0.019*	(0.010)	0.031	(0.038)
Education A level (class 4)	-0.002	(0.014)	-0.036	(0.051)
Education higher vocational (class 5)	0.002	(0.014)	0.004	(0.050)
Education higher (class 6)	0.004	(0.011)	0.037	(0.042)
Log Income	0.017	(0.012)	-0.046	(0.039)
Observations	9,979		1,713	
Log-Likelihood	-2,610.148		-741.291	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan (SOEP) and those enrolled in health plans that charged add-on premiums between 2009 and 2011 (Full Sample). Education by isced 1997, General education is baseline. Standard errors are in parentheses.

Table 17: Regression Results Actual Choice "Yes" and Personality Traits and Behavioral Patterns (SOEP and Full Sample)

	Dependent Variable: Changed = "Yes"			
	(1)		(2)	
	SOEP		Full Sample	
Negative Reciprocity	-0.003	(0.002)	-0.007	(0.010)
Positive Reciprocity	0.001	(0.003)	0.000	(0.010)
Risk Loving	-0.001	(0.001)	0.000	(0.005)
Impulsivity	-0.001	(0.001)	-0.009**	(0.004)
Locus of Control	-0.007**	(0.003)	-0.013	(0.010)
Age	-0.002***	(0.000)	-0.003***	(0.001)
Male	-0.010*	(0.005)	-0.017	(0.018)
Switched before	0.051***	(0.006)	0.076***	(0.019)
Education upper secondary (class 3)	0.019*	(0.010)	0.030	(0.038)
Education A level (class 4)	-0.002	(0.014)	-0.038	(0.050)
Education higher vocational (class 5)	0.002	(0.014)	0.004	(0.050)
Education higher (class 6)	0.004	(0.012)	0.036	(0.042)
Log Income	0.014	(0.012)	-0.045	(0.040)
Observations	9,979		1,713	
Log-Likelihood	-2,607.053		-738.466	

Notes: Data from SOEP waves 2008 to 2012 for enrollees insured in a health plan (SOEP) and those enrolled in health plans that charged add-on premiums between 2009 and 2011 (Full Sample). Education by isced 1997, General education is baseline. Standard errors are in parentheses.

E Literature Overview

Table 18: Literature Examples on Hypothetical Bias from Choice Experiments including Financial Decisions

Authors	Choice Context	Sample	Within/Between Sample	Method	Hypothetical Bias
Brownstone & Small (2005)	Road Pricing	Road Users	Between	Mixed Logit	Yes
Ghosh (2001)	Road Pricing	Commuters	Between	Multinomial/Heteroskedastic Logit	Yes
Luchini & Watson (2014)	Laboratory Good	Students	Between	Multinomial Logit	Yes
Lusk & Schroeder (2004)	Food quality	Random sample of consumers	Between	Random Parameter Logit, Heteroskedastic Extreme Value, Multinomial Probit	Yes
Nielsen (2004)	Road Pricing	Commuters	Within	Multinomial/Error Component Logit	Yes
Ready et al. (2010)	Wildfire rehabilitation	Students	Between	Multinomial Logit	Yes
Svenningsen & Jacobsen (2018)	Climate policy	Random sample of population	Both	Random Parameter Logit	Yes
Wuepper (2019)	Sustainable coffee	Online costumers	Between	Multinomial/Random Parameter Generalised/Latent-class Logit	Yes

Table 19: Literature Examples on Hypothetical Bias from Choice Experiments on Health Decisions

Authors	Choice Context	Sample	Within/Between Sample	Method	Hypothetical Bias
Huls & de Bekker-Grob (2022)	Colorectal cancer screening test	Residents eligible for screening test	Within	(Heteroskedastic) Multinomial Logit	No
Kesternich et al. (2013)	Health Insurance	Representative Sample of elderly people	Within	Multinomial/Scaled Logit	No
Krucien et al. (2015)	Sleep apnea treatment	Patients with sleep apnea	Within	Multinomial Logit	Yes
Lambooij et al (2015)	Vaccination decision of parents	Parents of newborns	Within	Mixed Logit	Yes
Linley & Hughes (2013)	Adoption of new medicine	Committee members	Within	Random Effects Logit	No
Mark & Swait (2004)	Physicians alcoholism medication prescription	Physicians	Within	Multinomial/Scaled Logit	No
Mohammadi et al (2018)	Latent Tuberculosis Infection treatment	Patients	Within	Mixed Logit	No
Ryan & Watson (2009)	Chlamidia Screening	Clinic visitors	Within	Multinomial Logit	Yes
Salampeyy et al (2015)	Diabetes intervention	Patients with diabetes	Within	Mixed Logit	No
Strauss et al (2018)	HIV testing	Truck drivers	Within	Conditional Logit	No
Telser & Zweifel (2007)	Hip protector	Elderly people	Within	Probit	No

F Questions on Personality Traits and Behavioral Patterns

Table 20: Overview on Big Five Personality Traits

Scale Name	# Items	Items	German Items	Range
		I see myself as someone who . . .	Ich bin jemand, der	1 (does not apply at all) to 7 (applies perfectly)
Openness	4	. . . is original, comes up with new ideas	originell ist, neue Ideen einbringt	1 to 7
		. . . values artistic, aesthetic experiences	künstlerische, ästhetische Erfahrungen schätzt	1 to 7
		. . . has an active imagination	eine lebhaftige Phantasie, Vorstellungen hat	1 to 7
		. . . is eager for knowledge	wissbegierig ist	1 to 7
Conscientiousness	3	. . . does a thorough job	gründlich arbeitet	1 to 7
		. . . tends to be lazy (R)	eher faul ist	1 to 7
		. . . does things effectively and efficiently	Aufgaben wirksam und effizient erledigt	1 to 7
Extraversion	3	. . . is communicative, talkative	kommunikativ, gesprächig ist	1 to 7
		. . . is outgoing, sociable	aus sich herausgehen kann, gesellig ist	1 to 7
		. . . is reserved (R)	zurückhaltend ist	1 to 7
Agreeableness	3	. . . is sometimes somewhat rude to others (R)	manchmal etwas grob zu anderen ist	1 to 7
		. . . has a forgiving nature	verzeihen kann	1 to 7
		. . . is considerate and kind to others	rücksichtsvoll und freundlich mit anderen umgeht	1 to 7
Neuroticism	3	. . . worries a lot	sich oft Sorgen macht	1 to 7
		. . . gets nervous easily	leicht nervös wird	1 to 7
		. . . is relaxed, handles stress well (R)	entspannt ist, mit Stress gut umgehen kann	1 to 7

Source: SOEP wave 2009

Table 21: Overview on Personality Traits and Behavioral Patterns

Scale Name	# Items	Items	German Items	Range
		To what degree do the following statements apply to you personally	In welchem Maße stimmen Sie persönlich den einzelnen Aussagen zu	1 (does not apply at all) to 7 (applies perfectly)
Locus of Control	7	... How my life goes depends on me	Wie mein Leben verläuft, hängt von mir selbst ab	1 to 7
		... Compared to other people, I have not achieved what I deserve	Im Vergleich mit anderen habe ich nicht das erreicht, was ich verdient habe	1 to 7
		... What a person achieves in life is above all a question of fate or luck	Was man im Leben erreicht, ist in erster Linie eine Frage von Schicksal oder Glück	1 to 7
		... I frequently have the experience that other people have a controlling influence over my life	Ich mache häufig die Erfahrung, dass andere über mein Leben bestimmen	1 to 7
		... If I run up against difficulties in life, I often doubt my own abilities	Wenn ich im Leben auf Schwierigkeiten stoße, zweifle ich oft an meinen Fähigkeiten	1 to 7
		... The opportunities that I have in life are determined by the social conditions	Welche Möglichkeiten ich im Leben habe, wird von den sozialen Umständen bestimmt	1 to 7
		... I have little control over the things that happen in my life	Ich habe wenig Kontrolle über die Dinge, die in meinem Leben passieren	1 to 7
Impulsivity	1	Do you generally think things over for a long time before acting – in other words, are you not impulsive at all? Or do you generally act without thinking things over a long time – in other words, are you very impulsive?	Sind Sie im Allgemeinen ein Mensch, der lange überlegt und nachdenkt, bevor er handelt, also gar nicht impulsiv ist? Oder sind Sie ein Mensch, der ohne lange zu überlegen handelt, also sehr impulsiv ist?	1 (not at all) to 10 (very)
Reciprocity		To what degree do the following statements apply to you personally	In welchem Maße treffen die folgenden Aussagen auf Sie persönlich zu	1 (does not apply at all) to 7 (applies perfectly)
Positive Reciprocity	3	... If someone does me a favor, I am prepared to return it	Wenn mir jemand einen Gefallen tut, bin ich bereit, dies zu erwidern	1 to 7

Table 21: Overview on Personality Traits and Behavioral Patterns

Scale Name	# Items	Items	German Items	Range
Negative Reciprocity	3	... I go out of my way to help somebody who has been kind to me in the past	Ich strenge mich besonders an, um jemandem zu helfen, der mir früher schon mal geholfen hat	1 to 7
		... I am ready to assume personal costs to help somebody who helped me in the past	Ich bin bereit, Kosten auf mich zu nehmen, um jemanden zu helfen, der mir früher geholfen hat	1 to 7
		... If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost	Wenn mir schweres Unrecht zuteilwird, werde ich mich um jeden Preis bei der nächsten Gelegenheit dafür rächen	1 to 7
		... If somebody puts me in a difficult position, I will do the same to him/her	Wenn mich jemand in eine schwierige Lage bringt, werde ich das Gleiche mit ihm zu machen	1 to 7
		... If somebody offends me, I will offend him/her back	Wenn mich jemand beleidigt, werde ich mich ihm gegenüber beleidigend verhalten	1 to 7
Risk Preference	1	Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?	Sind Sie im Allgemeinen ein risikobereiter Mensch oder versuchen Sie, Risiken zu vermeiden?	1 (risk averse) to 10 (risk loving)

Source: SOEP wave 2009