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Abstract

The coexistence of social health insurance and private health insurance in Germany is subject to intense public debate. As only few have the opportunity to choose between the two systems, they are often regarded as privileged by the health insurance system. Applying a hazard model in discrete time, this paper examines the role of incentives set by the regulatory framework as well as the influence of individual personality characteristics on the decision to opt out of the statutory system. To address potential endogeneity of one of the key explanatory variables an instrumental variable approach is also applied. The estimation results yield robust evidence on the choice of health insurance type that is consistent with rational decision making, with both incentives set by regulation and personality traits as relevant determinants.

Keywords: Statutory and private health insurance; incentives; personality traits

JEL classification: C13, C23, I13.

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1 Introduction

In recent years, the German health insurance system has been the subject of intense public as well as scientific debates (e.g. Federal Ministry of Labour and Social Affairs, 2003; Wörz and Busse, 2005; Jacobs et al., 2006). A crucial issue in these debates concerns a decisive feature of the German system: the coexistence of social health insurance (SHI) and private health insurance (PHI). While for the majority of the German population, roughly 90 percent, insurance under the SHI is mandatory, certain groups of the population may opt out and purchase substitutive PHI (these groups may also stay in the SHI as voluntary members). This exemption from the SHI applies to civil servants, self-employed people, and high-earning employees. Of the latter, however, less than one quarter actually choose private insurance coverage (Thomson et al., 2002).

Who selects PHI and who prefers to stay under the SHI is usually discussed primarily in terms of concerns about efficiency and fairness. Potential adverse selection at the expense of the SHI may lead to undesirable outcomes in the German health insurance market (Greß, 2007). Moreover, holders of private health insurance might receive different and possibly better medical treatment than publicly insured individuals, as physician compensation is higher for private patients (Jürges, 2009; Walendzik et al., 2008). Lüngen et al. (2008), for instance, observe shorter waiting times for privately insured persons and Gruber and Kiesel (2010) find a higher rate of specialist utilizations among privately insured men. Hullegie and Klein (2010) even observe a positive overall effect of being privately insured on self-reported health.

Based on the regulatory framework and different features of both systems, which are covered in more detail in section 2, the existing literature clearly suggests who should prefer which type of insurance (e.g. Thomson and Mossialos, 2006; Wasem et al., 2004; Schneider, 2003). The empirical literature on the actual choice between

the SHI and PHI, however, yields ambiguous results. The present paper provides further empirical evidence on how incentives set by the regulatory framework affect the inclination to switch from the SHI to PHI. Moreover, the literature provides some indication that other, previously unconsidered factors, such as attitude towards risk, may also have an effect on the choice of insurance type (Thomson and Mossialos, 2006). We include several personality traits in the empirical model to analyze their potential effects and to test whether they lead to different behavior than suggested by pure financial incentives.

Using individual level data from the German Socio-Economic Panel of 1997-2010, switching from the SHI to PHI is modeled in the fashion of a discrete time hazard model. Additionally, we adopt an instrumental variable approach that accounts for potential endogeneity of one of our key variables. The estimation results suggest that switching behavior can be explained to a great extent by the incentives set by the regulatory framework. Yet, we also observe a considerable impact of personality traits on the inclination to opt out of the SHI. Overall, the results yield robust evidence that individuals act on a rational basis.

The rest of this paper is organized as follows. Section 2 discusses institutional features of the German health insurance system that are relevant for the investigation of switching behavior from the SHI to PHI. Section 3 describes the data set used in the empirical part, and section 4 outlines the econometric models used for the estimation. Section 5 provides the estimation results, and section 6 concludes.

2 Institutional Background and Related Incentives

In Germany, insurance under the SHI is mandatory for the majority of the population (roughly 90 percent), while certain groups are permitted to opt out in favor of substitutive PHI. Insurance under the SHI is compulsory for all employees who earn less than the relevant income threshold (*Versicherungspflichtgrenze*: 50,850 EUR

in 2012).[1] Employees with annual income above this ceiling can either remain in the SHI as a voluntarily member or purchase substitutive PHI instead. Apart from high-income individuals, civil servants and self-employed people are also allowed to choose between the two systems regardless of their earnings. Once an individual has chosen private insurance coverage, switching back to the SHI is restricted to cases where an individual becomes subject to compulsory insurance again. This applies to employees if annual earnings fall below the income threshold for at least one year or if they become unemployed. Civil servants and self-employed people are eligible to switch back to the SHI only if they take up a blue- or white-collar occupation and, at the same time, earn less than the relevant income threshold. In order to prevent opportunistic behavior, individuals aged 55 and older are generally not allowed to switch back to the SHI.[2] Hence, opting out of the social system is often a lifetime decision (Schneider, 2003; Wasem et al., 2004). Therefore, this analysis only considers switchers from SHI to PHI, as switching back to the SHI is typically attributable to exogenous events rather than to individual choice.

The choice between SHI and PHI is closely related to several institutional differences between the two systems. Perhaps the most essential difference concerns premium calculations. In the SHI premiums are based solely on income. That is, independent of individual risk factors, employees pay a certain percentage (15.5% in 2012) of their annual gross earnings up to the current social security contribution ceiling (*Beitragsbemessungsgrenze*: 45.900 EUR in 2012). Thus, the maximum contribution in 2012 amounts to 7,115 EUR and is split roughly equally between employee and employer. Basically, the statutory system is a pay-as-you-go system based on solidarity as the underlying principle: Contributions are redistributed from the younger to the elderly, from the healthy to the sick, and from high-income

[1] The income threshold is adjusted on a yearly basis. From 2000 to 2012, the income threshold was raised by roughly 2% on average each year. Employees are eligible for PHI in t if their annual income, including all extra payments, exceeded the threshold in $t-1$.

[2] Otherwise, young healthy individuals could benefit from lower, risk-adjusted PHI premiums and then switch back to the SHI at an older age when PHI premiums become more unattractive.

to low-income individuals (Wasem et al., 2004). In contrast, premiums in the PHI are capital-funded and determined solely by risk factors such as age, gender, and health risks. Hence, premiums may be high for bad health risks, older individuals, and women (due to their higher life expectancy). Moreover, private health insurers are legally obliged to build up old age provisions to prevent premiums from increasing too strongly with age. Contributions are therefore higher than the fair premium at the beginning of the insurance contract, but lower than the fair premium at an older age. Though private insurers are not allowed to readjust an individual's premium due to changes in his risk-profile, there are other factors that cause PHI premiums to rise, for instance medical progress and increasing life expectancy (Grabka, 2006). The SHI may be especially attractive for families, since a member's non-working spouse and children under 25 are co-insured at no additional cost. Free co-insurance of dependents does not apply to PHI, where a separate premium is charged for each insurant. Civil servants have a strong financial inventive to opt out of the SHI, as they are entitled by law to a 50% subsidy (*Beihilfe*) for private health insurance from their public employer (Jacobs and Schulze, 2006). Self-employed people bear the full cost of insurance coverage themselves, regardless of the type.

While in the SHI the scope of coverage and the premium amounts are almost completely predetermined by legislation, the PHI offers more flexibility in contract design. Insurants may choose different levels of deductibles and coverage by in- or excluding certain services. This flexibility gives rise to contracts with fairly low premiums. Schuldzinski (2006) points out that these may be especially attractive to self-employed people with low and unstable income.

Against the background of these regulatory conditions, the existing literature clearly suggests who will prefer which type of insurance (e.g. Thomson and Mossialos, 2006; Wasem et al., 2004; Schneider, 2003). Thomson et al. (2002), for example, conclude that half of those who choose PHI are young, healthy, and high-earning

employees, while the other half are civil servants and self-employed people. Yet, the empirical literature on the choice between SHI and PHI yields ambiguous results. Most studies provide descriptive analyses on differences in socioeconomic status, health, and health behavior between those who are insured under the SHI and those who are covered by PHI (Kriwy and Mielck, 2006; Greß, 2007; Finkenstädt and Kessler, 2012). Cross-sectional descriptive analyses allow only partial explanations for the choice of insurance type, in particular since the decision is driven by an individual's socioeconomic characteristics at the time of the decision, not by characteristics held at the time of the survey. Switching behavior based on individual-level data has rarely ever been analyzed; Grunow and Nuscheler (2013) are a notable exception. They provide empirical evidence for risk selection in favor of private insurers, as individuals in poorer health are more likely to switch back to the SHI. Thus, the financial burden of bad health risks is passed on to the solidary community, while private insurers benefit by retaining the accrued old age provisions. Risk selection would also take place if individuals of better health were more inclined to switch from the SHI to the PHI. Though statistically insignificant, the estimated coefficient suggests that there is some effect of this sort. Considering the other incentives mentioned above, the results of Grunow and Nuscheler (2013) partially conflict with expectations derived from the literature. For instance, they observe no significant effect of either family composition or occupation on the probability of switching in their model, an instrumental variable estimator with individual fixed effects. This might be attributable to insufficient within-group variation in some of the explanatory variables, for instance occupation, marital status, or number of children.

The literature also provides some indication that other, previously unconsidered factors could have an effect on the decision to opt out of the SHI. Thomson and Mossialos (2006) emphasize the role of attitude towards risk. They find that switching to PHI is associated with risk in terms of uncertainty about future earnings, as

PHI contributions are not calculated based on income and because of uncertainty about future health care needs and family size. This uncertainty might prevent risk-averse individuals from switching to PHI, given that opting out of the SHI is nearly irreversible.

Furthermore, it is also conceivable that altruistic behavior in itself provides a motivation to stay in the SHI. Individuals with an altruistic attitude might prefer the SHI if they were aware of their contribution to the system of redistribution. This paper therefore also analyzes whether personality matters for the decision to switch to PHI, and whether controlling for personal traits affects the impact of the financial incentives set by the regulatory framework.

3 Data

This analysis is based on data from the German Socio-Economic Panel (GSOEP).[3] GSOEP is a German representative longitudinal survey that provides extensive information on both the household and the individual level. Aside from a wide range of socioeconomic characteristics, GSOEP covers topics such as health and health insurance, but also contains information on personal attitudes, opinions, and values. GSOEP began in 1984, and – following various refreshments and enhancements – currently comprises more than 20,000 individuals per year (Wagner et al., 2007).

The estimation sample is restricted to all person-year observations for which an individual has the opportunity to opt out of the SHI. Basically, this applies to civil servants, self-employed people, and employees with income exceeding the relevant threshold in the previous year, who are insured under the SHI. We also include employees who reported to be voluntarily insured under the SHI but provide in-

[3] In order to extract data we use the add-on package PanelWhiz v4.0 (Sep 2010) for Stata. PanelWhiz was written by Dr. John P. Haisken-DeNew (john@panelwhiz.eu). Any data or computational errors in this paper are our own. Haisken-DeNew and Hahn (2010) describe PanelWhiz in more detail.

sufficient information checking whether their income actually exceeds the relevant threshold.[4] We only consider individuals aged 20 to 60, as this is the group for which choosing between PHI and SHI is a relevant question. Younger individuals are usually covered by family insurance, while switching becomes quite unattractive for older people due to disproportionately high premiums caused by risk adjustment and a lack of old age provisions. The estimation sample covers the period from 1997 to 2010 and consists of 20,431 person-year observations, 6,109 individuals and 797 switchers.[5] Table 1 provides descriptive statistics of the variables used in our analysis.

The dependent variable is a binary indicator based on the reported type of insurance. It equals one in the period before an individual first reported to be privately insured.[6] In all previous observations the dependent variable is zero. Some individuals switch several times between both systems. This is mostly explained by misreporting of insurance status, as switching to PHI is almost irreversible and only allowed if strict conditions are met. In order to mitigate this kind of error, we let an individual enter the sample only until she has switched to PHI for the first time and ignore later observations of this individual.

To investigate determinants that influence the inclination to switch, we include a rich set of explanatory variables which can be categorized in four groups. The first group provides the basis for analyzing switching behavior and comprises socioeconomic characteristics, as they are strongly related to incentives set by the regulatory framework. Aside from gender, age at inception date is an important determinant of premium amounts under the PHI, as older individuals represent higher health risks and have less time to build up the obligatory old age provisions.[7] Age enters

[4]GSOEP participants are asked whether they are voluntarily or compulsorily insured under the SHI; an indicator to mark individuals who enter the sample because of stating to be voluntarily insured enters the right-hand-side of all estimated regression models.

[5]Due to a change in questioning, GSOEP contains no information on insurance status in 1996.

[6]This ensures that all explanatory variables were determined before an individual switched from SHI to PHI.

[7]Women are charged higher premiums than men under the PHI as they represent a higher insur-

Table 1: Descriptives

	Observations	Mean	Std.	Min.	Max.
dependent variable: switch to PHI	20,431	0.04	0.19	0	1
self-assessed health					
very good	20,431	0.11	0.31	0	1
good	20,431	0.49	0.50	0	1
poor	20,431	0.09	0.28	0	1
bad	20,431	0.01	0.10	0	1
socioeconomic controls					
age20-29	20,431	0.08	0.27	0	1
age30-39	20,431	0.29	0.45	0	1
age50-60	20,431	0.27	0.44	0	1
female	20,431	0.31	0.46	0	1
non-working spouse	20,431	0.12	0.33	0	1
# children under 16	20,431	0.82	1.02	0	6
income (thousand EUR)	20,431	45.38	32.22	0	1,200
years of education	20,431	13.54	2.88	7	18
civil servant	20,431	0.03	0.18	0	1
self-employed	20,431	0.26	0.44	0	1
white-collar job	20,431	0.57	0.50	0	1
residence west	20,431	0.80	0.40	0	1
german	20,431	0.95	0.21	0	1
personal traits					
neuroticism	14,945	48.32	9.56	24.48	78.58
openness	14,945	51.19	9.13	15.99	89.31
extraversion	14,945	49.40	10.20	14.68	75.62
agreeableness	14,945	47.72	10.22	6.53	73.28
conscientiousness	14,945	50.82	9.17	6.37	71.60
risk-loving	19,115	0.38	0.49	0	1
time at risk					
time at risk=2	20,431	0.15	0.36	0	1
time at risk=3	20,431	0.11	0.32	0	1
time at risk=4	20,431	0.09	0.29	0	1
time at risk=5	20,431	0.07	0.26	0	1
time at risk=6	20,431	0.06	0.24	0	1
time at risk=7	20,431	0.05	0.23	0	1
time at risk=8	20,431	0.04	0.20	0	1
time at risk=9	20,431	0.03	0.18	0	1
time at risk$\geq$ 10	20,431	0.16	0.36	0	1
calendar time					
year 1998	20,431	0.06	0.23	0	1
year 1999	20,431	0.06	0.24	0	1
year 2000	20,431	0.09	0.28	0	1
year 2001	20,431	0.09	0.29	0	1
year 2002	20,431	0.10	0.31	0	1
year 2003	20,431	0.10	0.30	0	1
year 2004	20,431	0.08	0.28	0	1
year 2005	20,431	0.08	0.27	0	1
year 2006	20,431	0.08	0.27	0	1
year 2007	20,431	0.07	0.25	0	1
year 2008	20,431	0.07	0.25	0	1
year 2009	20,431	0.06	0.24	0	1
further controls					
awareness	20,431	0.46	0.50	0	1
extended	20,431	0.25	0.44	0	1
left-censored	20,431	0.35	0.48	0	1
instruments					
# hospitalizations	20,336	0.14	1.12	0	60
disability	20,336	0.05	0.22	0	1

the model in terms of four categories for individuals aged 20-29 years, 30-39 years, 40-49 years, and 50-60 years. We account for the effect of free co-insurance of dependents under the SHI by including the number of children aged 16 and younger as well as a dummy variable for a non-working spouse. Since occupation, in particular being a civil servant, may also affect the insurance choice, indicator variables for civil servants, self-employed individuals, white-collar, and blue-collar workers also enter the empirical model. We account for income by including current annual gross earnings in thousands of EUR. Years of education, a dummy for German citizenship, and an indicator variable for West German residence complete the number of socioeconomic controls.

The second group of explanatory variables is related to health. Health, in particular health risks, might be a key determinant in analyzing switching from the SHI to PHI, as they directly affect premium amounts under the PHI. As an overall measure of health status, we use self-assessed health (SAH), which is reported on a scale of one (*very good*) to five (*bad*). Though SAH is a subjective measure, it has been shown to be a good predictor of both morbidity and mortality (Idler and Benyamini, 1997). Nevertheless, we also use two more objective health-related variables from the GSOEP: the number of hospitalizations during the last year and whether an individual is legally classified as handicapped. These variables do not directly enter the basic model as explanatory variables, but are used to instrument the potentially endogenous variable SAH.

The third group comprises individual characteristics, which can be assumed to be time-invariant. As pointed out by Thomson and Mossialos (2006), switching to PHI is associated with uncertainty, which may prevent risk-averse individuals from taking this step. Moreover, considering that solidarity is the underlying principle of the SHI, one might also hypothesize that highly altruistic individuals are less likely

ance risk due to their higher life expectancy. In 2004, the European Court of Justice forced private insurers to offer gender-neutral premiums as of 2013. However, this ruling does not affect our sample, which covers the period 1997-2010.

to opt out of the SHI. In order to account for heterogeneity in personality, we use the *Big Five Inventory* (BFI-S), which was included in the GSOEP in 2005 and 2009 (Gerlitz and Schupp, 2005). The BFI-S is a 15-item questionnaire based on the *NEO Personality Inventory Revised* (McGrae and John, 1992a)) which is used to assess five core dimensions of personality: extraversion, agreeableness, neuroticism, openness, and conscientiousness. Extraverts tend to seek excitement and have a higher tolerance of risk. Agreeable people are characterized by altruistic and cooperative behavior. Neuroticism captures differences in emotional stability such as how people handle negative emotions or unfamiliar situations. Openness reflects the appreciation for arts, cultural events, and curious ideas. Conscientiousness captures the tendency towards efficient and self-disciplined behavior.[8] We primarily use the information from the 2009 survey, as respondents might at this point be more familiar with these questions than in 2005 when the BFI-S was introduced. The information from 2005 is used for robustness checks. Following Dehne and Schupp (2007), we perform an explorative factor analysis on the 15-item questionnaire to construct measures for each of the five dimensions.[9] We also use an alternative, probably more direct measure of risk-lovingness based on self-reported attitude towards risk. Self-reported willingness to take risks ranges from 0 (*risk averse*) to 10 (*fully prepared to take risks*). The raw information is collapsed into a binary variable indicating risk-lovingness, which is one if the average of self-reported willingness to take risks is greater than or equal to six.[10]

The fourth group of variables contains further controls. The probability of switching may depend on the duration of being at risk to switch. One might hypothesize

[8]For more information on the Five Factor Model see McGrae and Costa (1987) and McGrae and John (1992b).

[9]First, the 15 items are z-transformed so that each variable has a zero mean and unit variance. Based on these standardized items, we conduct an explorative factor analysis. The resulting matrix of factor loadings is utilized to obtain the factor scores, which are linear combinations of the standardized items and the corresponding factor loadings. The calculated factor scores were standardized to have a mean of 50 and a standard deviation of 10. In contrast to Dehne and Schupp (2007), we use unweighted data.

[10]Self-reported willingness to take risks is not included in each wave of GSOEP.

that individuals who are willing to opt out of the SHI will do so as soon as they get the opportunity. To account for how long an individual has already had the chance of leaving the SHI - his *time at risk* - a set of binary indicators is included. For those individuals who were already at risk when they entered GSOEP, the decision whether or not to stay in the SHI could have been made already. Hence, another binary indicator is included to control for this kind of left-censoring. Furthermore, it is conceivable that individuals may not opt out of the SHI simply because they are not aware of the possibility of leaving the public system. We cannot observe directly whether an individual is aware of her opportunity to opt out. However, we construct a binary variable for awareness which is based on reported insurance status, i.e. voluntary or compulsory member under the SHI. An individual is assumed to be aware of her options if she states she is a voluntary member and simultaneously reports being either a civil servant, or self-employed, or having annual earnings above the relevant threshold. Finally, the sample period covers two policy changes that further restrict the opportunities to choose PHI for employees: In 2003, the relevant income threshold was increased substantially by 13%, and since 2007 income has had to exceed the relevant thresholds in the three preceding years, rather than only in the previous year. To capture effects of these exogenous shocks a set of yearly dummies also enters the econometric model.

4 Empirical Strategy

The empirical analysis considers switchers from the SHI to PHI. Switching back to the SHI is typically attributable to exogenous events rather than to individual choice, which is why the model can be interpreted as a hazard model in discrete time with PHI as the absorbing state. Each individual either *survives*, i.e. stays under the SHI, *fails*, i.e. switches to PHI , or leaves the sample because she is no longer allowed to choose between the systems, i.e. becomes a compulsory member under

the SHI. The unobservable inclination to switch from statutory to private health insurance $switch_{it}^{*}$ is specified by the following equation:

$$switch_{it}^{*} = SAH_{it}^{*}\gamma + X_{it}\beta + \varepsilon_{it} \tag{1}$$

Individuals and periods are indicated by the subscripts i and t, respectively. SAH_{it} contains the set of dummy variables for self-reported health status. X_{it} comprises socioeconomic characteristics, personality traits, and supplementary controls. Finally ε_{it} denotes a random error term, which is assumed to be normally distributed, allowing for the estimation of coefficients γ and β by a simple probit regression. Hence, rather than the unobserved variabel $switch_{it}^{*}$, its binary counterpart $switch_{it}$ serves as dependent variable of the regression model. As switching to the PHI is regarded as irreversible, the dependent variable is either zero in all periods (non-switcher) or exhibits a sequence of zeros that is completed by a single one (switcher). To account for correlations between observations of the same individual, we use clustered standard errors that are robust to arbitrary intra-cluster correlation. As discussed in section 3, the five personality measures are generated by using an explorative factor analysis and, for this reason, are generated regressors in the sense of Murphy and Topel (1985). Standard errors hence need to be adjusted. This is done by a bootstrap procedure that encompasses both the generation of the variables through factor analysis and probit estimation.

Though SAH is frequently used as proxy for overall health status, there are also indications in the literature that SAH may be correlated with other factors such as income and personal preferences (Doiron et al., 2008). By using a wide range of socioeconomic controls as well as personal traits, we already eliminate much of the potential effects of confounding variables that operate through SAH. Nevertheless, SAH may still suffer from endogeneity due to correlations with unobservables. For instance, Doiron et al. (2008) argue that individuals with the same objective health

status may report different SAHs, as perceived health may depend on different comparison groups. These peer groups could also affect the choice of insurance type, which in turn would result in an endogeneity problem and in inconsistent estimates. To tackle potential endogeneity of SAH, we adopt an instrumental variable approach and augment equation (1) by the following equation:

$$SAH_{it}^{*} = Z_{it}^{*}\alpha + X_{it}\delta + \vartheta_{it} \tag{2}$$

Note that SAH_{it}^{*} is now considered a underlying continuous health measure, that is just reported in terms of the familiar 5-point categorical measure that directly enters equation (1). X_{it} is the vector of covariates that also enters equation 1 and ϑ_{it} denotes a random error term. Z_{it} is a vector of instruments containing objective measures of health: the number of hospitalizations in the previous year and a dummy variable for being legally classified as handicapped. The intuition behind using hospitalizations and disability as instruments is that individuals may rate their health according to their recent health care utilization. With respect to exogeneity, we argue that hospitalization usually requires an objective medical assessment, and thus is hard to influence by a person herself. The same holds for disability status, which is typically not influenced by individuals but rather through exogenous shocks. To estimate both equations simultaneously, we assume a bivariate normal distribution with correlation ρ for the error terms ε_{it} and ϑ_{it} and estimate a bivariate ordered probit model (Sajaia, 2008).[11] Endogeneity of SAH can be tested by conducting a Wald Test on the estimated error correlation. Any significant estimates of ρ distinct from zero would point towards endogeneity of SAH. Again, we use clustered standard errors and apply bootstrap resampling methods.

[11] We use the add-on package bioprobit for Stata (Sajaia, 2008). For a detailed description of bioprobit see Sajaia (undated). Any data or computational errors are of course our own.

5 Results

This section provides the estimation results for the models presented above. In Table 2 we begin with a detailed overview of the results drawn from a simple probit estimation of equation 1. The left column refers to the basic specification (specification 1) which does not account for personal traits, the middle part correspond to the five factor specification (specification 2), and the right part shows the estimation results for the alternative risk specification (specification 3). Table 3 presents the estimation results for the bivariate ordered probit model that takes potential endogeneity of SAH into account.

5.1 Health

With respect to the crucial difference in premium calculations between SHI (income-related premiums) and PHI (risk-adjusted premiums) we would expect individuals in better health to have a higher probability of switching to the private system than individuals in worse health. The estimated coefficients of SAH are jointly significant in all specifications, indicating that health status, which is directly related to premiums under the PHI, does affect the inclination to switch from SHI to PHI. Moreover, all point estimates exhibit the expected sign (base category: *satisfactory*). While individuals in very good and good health are more inclined to switch than individuals in satisfactory health, the opposite holds for individuals in poor or bad health. However, the coefficient estimates of the last two categories are jointly insignificant. Apart from higher switching costs due to higher premium amounts, switching costs may also be higher for bad risks because of physical and mental impairments (Roos and Schut, 2012) and related time limitations due to restoring health (Nuscheler and Knaus, 2005).

For non-linear models, the raw estimated coefficients do not tell much about the size of the effects under scrutiny. As a first indication of magnitudes, multiplying

the estimated coefficients by $\phi(0) \approx 0.399$ provides an upper bound of the corresponding marginal effects. To get a perspective on the size of the estimates, we consider a simple simulation. Based on the estimation results of specification 2 (including personal traits), switching probabilities are predicted for two counterfactual scenarios. In the first scenario we manually shift individuals' self-reported health to the next higher level. For instance, individuals who reported being in satisfactory health are now assumed to be in good health. The opposite applies to the second scenario, where individuals' self-reported health was shifted to the next lower level.[12] The original values of SAH and the corresponding switching probabilities serve as reference. In this reference scenario, the average predicted probability of switching amounts to 3.60 percent. This rather low figure is explained by the small share of switchers in the sample. Scenario 1 (improved health status) yields an average predicted probability of 4.04 percent. This is an increase of 0.45 percentage points or 12 percent. In scenario 2 (worsened health status), the average predicted probability of switching is 2.95 percent. Compared to the reference, this is a decrease of 0.65 percentage points, which translates to 18 percent. While the absolute changes in the average switching probabilities seem rather low, the relative changes reveal an effect of substantial magnitude.

5.2 Socioeconomic Characteristics

In line with previous studies (Grunow and Nuscheler, 2013; Federal Ministry of Labour and Social Affairs, 2003), we observe a significant effect of age on the propensity to switch. Age coefficients are jointly significant (p-value < 0.01) in all specifications. Moreover the point estimates display the expected pattern. That is, individuals younger than 40 have the highest inclination to switch to PHI while older

[12] Health status was not changed for individuals who reported being in very good health (scenario 1) or bad health (scenario 2). Calculations are based on specification 2, which includes personal traits.

Table 2: Probit Models

	Specification 1		Specification 2		Specification 3	
	Coef.	S.E.	Coef.	S.E.[a]	Coef.	S.E.
sah (*jointly sig.*)	yes (***)		yes (**)		yes (***)	
very good	0.194***	0.061	0.178**	0.073	0.222***	0.064
good	0.136***	0.044	0.132**	0.052	0.151***	0.046
poor	−0.092	0.081	−0.078	0.100	−0.041	0.083
bad	−0.409*	0.233	−0.221	0.210	−0.287	0.231
socioeconomic characteristics						
age20-29	0.118*	0.066	0.000	0.088	0.109	0.070
age30-39	0.126***	0.046	0.101	0.062	0.134***	0.048
age50-60	−0.148***	0.054	−0.173**	0.068	−0.156***	0.057
female	−0.183***	0.043	−0.174***	0.054	−0.156***	0.045
non-working spouse	−0.180***	0.069	−0.181**	0.085	−0.185***	0.070
# children under 16	−0.103***	0.020	−0.114***	0.023	−0.091***	0.021
income	0.002***	0.001	0.002***	0.001	0.002***	0.001
years of education	0.013*	0.007	0.010	0.009	0.011	0.007
civil servant	1.734***	0.109	1.637***	0.137	1.745***	0.114
self-employed	0.927***	0.095	0.823***	0.114	0.902***	0.100
white-collar job	0.439***	0.089	0.360***	0.113	0.418***	0.092
residence west	−0.021	0.047	−0.026	0.063	−0.018	0.049
german	−0.108	0.079	−0.083	0.126	−0.102	0.088
personal traits (*jointly sig.*)			yes (*)			
neuroticism			−0.005*	0.003		
openness			0.000	0.002		
extraversion			0.009***	0.003		
agreeableness			−0.001	0.002		
conscientiousness			0.001	0.003		
risk-loving					0.108***	0.039
further controls						
time effects (*jointly sig.*)	yes (***)		yes (***)		yes (***)	
time at risk (*jointly sig.*)	yes (***)		yes (***)		yes (***)	
awareness	0.246***	0.046	0.262***	0.056	0.262***	0.049
extended	0.038	0.062	0.060	0.074	0.060	0.065
left-censored	−0.167***	0.044	−0.130**	0.059	−0.169***	0.046
constant	−2.279***	0.156	−2.259***	0.379	−2.291***	0.170
# observations	20,431		14,945		19,115	
# individuals	6,109		3,967		5,390	
# switchers	797		538		727	

Notes: *** significance at 1%; ** significance at 5%; * significance at 10%.
Standard errors are clustered at the individual level; [a] bootstrapped standard errors, 250 replications.

individuals aged 50 and over are least likely to opt out of the SHI. Again, this is likely attributable to risk-adjusted premiums which are unattractive for new insurants above a certain age. The latter results may partly stem from the obligation to build up old age provisions under the PHI. The shorter the time span available for building up these provisions is, the higher – ceteris paribus – is the premium level in the private system.

The SHI offers free co-insurance of children aged 25 and younger and of non-working spouses, which makes it attractive for families. In line with this, both

the estimated coefficient of the number of children under 16 and the indicator variable for a non-working spouse exhibit negative signs and are statistically significant. Our result that free co-insurance of family members is an important reason for staying with the SHI is in accordance with evidence from aggregated data. The Federal Ministry of Health reports that on average a voluntary member has 0.70 co-insured dependents, while a mandatory member has only 0.46. In 2011, roughly 75% of these co-insured dependents were aged 25 and younger, suggesting that co-insurance of children is more important than co-insurance of spouses, which does not apply when both spouses are employed.[13]

Overall, we observe a strong effect of occupation on the choice of insurance type. The positive and highly significant coefficient estimate of civil servants is in line with expectations. While on principle civil servants can choose between both systems, they lose entitlements to an additional allowance if insured under the SHI. This creates an exceptionally strong financial incentive to buy private insurance.[14] The results also suggest that self-employed people have a higher inclination to switch to PHI than white- and blue-collar workers (base category). One reason for this observation might be the degree of flexibility under the PHI. The possibility to influence PHI premiums when earnings are low and unstable may be especially attractive for self-employed people, who are usually subject to the maximum premium amount under the SHI (Schuldzinski, 2006).[15]

For the considered period (1997-2010), gender was a key determinant in calculating risk-adjusted premiums. Higher health-related expenditures for women, for instance due to higher life expectancy, led to higher risk-adjusted premiums as

[13] Own calculations based on Federal Ministry of Health (2011).

[14] In order to ensure that the results are not driven by the strong financial incentives facing civil servants, we also estimate the model excluding civil servants, which does not change the results.

[15] In general, under the SHI self-employed – analogous to paid employees – are eligible for adjustment of premiums to reduced income. However, unlike paid employees whose contributions are automatically adjusted to changes in wage earnings, they have formally to apply for premium reductions, for instance, by means of a tax assessment notice. Moreover, irrespective of actual income, voluntary members are subject to a substantial minimum premium.

compared to men. The estimated coefficient of *female* is highly significant in all specifications and indicates a lower tendency to switch for women. In March 2011, the European Court of Justice ruled that insurers must offer gender-free premiums as of December 2012. This could also have had an impact on the switching probability for women, as those who anticipated this amendment may have postponed their switch until after the law came into effect.

Apart from civil servants and self-employed individuals who are able to switch irrespective of their annual earnings, employees are eligible for PHI only if their annual wage income exceeds the relevant threshold. However, premiums in the SHI are capped just above this threshold and do not rise for individuals who earn substantially above the threshold. That is, all voluntarily insured employees pay the same (maximum) premium amount. Hence, one would expect income to have no significant effect on the inclination to switch to PHI. Nevertheless, we observe a significant coefficient estimate for income, suggesting a positive effect on the decision to switch. One explanation for this could be that quality of health care is a normal good, thus has a positive income effect (Besley et al., 1999; Costa and Garcia, 2003). Assuming the expectation that PHI offers better medical care, which is frequently claimed in public debates and to some extent confirmed by research (Lüngen et al., 2008; Gruber and Kiesel, 2010; Hullegie and Klein, 2010), the inclination to switch would rise when income increases. Furthermore, PHI offers the opportunity to insure additional "luxury" medical treatments, which are not part of the benefit package under the SHI.

Finally, we observe no significant effect on the inclination to switch of education, nationality, or residence.

5.3 Personality Traits

Accounting for personal traits (specification 2 and specification 3) does not change the previous results in qualitative terms. The five estimated coefficients are jointly significant (p-value: 0.0504), yet this is driven by the single coefficient of extraversion. In line with the conclusion drawn by Thomson and Mossialos (2006), the coefficient estimate of extraversion exhibits a positive sign. Extraverts are characterized, among others facets, by a positive attitude towards risk. Risk-averse individuals, who also score low on extraversion, may prefer the SHI for at least two reasons. First, income-related premiums under the SHI provide an indirect way to insure against income-risks. Second, free-coinsurance of dependents may also be an attractive feature for those without dependents but with uncertainty about their future family composition. Considering specification 3, which includes the alternative measure for risk-loving, the conclusion does not change with respect to the effect of attitude towards risk. Again, the coefficient estimate is positive and significant. The results concerning personal traits other than risk attitude are less conclusive. Therefore, we approximate the effect size only for attitude towards risk.[16]

To obtain a first idea of the effect size we estimate the average marginal effect of extraversion using specification 2. A one unit increase in extraversion, which translates into one tenth of a standard deviation, increases the probability of switching by 0.06 percentage points on average. In relation to the average probability of switching (3.60 percent), this is a rise of 2.1 percent. Using specification 3, which includes the binary indicator for risk-loving, we estimate average switching probabilities in two counterfactual scenarios. The first assumes all individuals to be risk-averse, while all individuals are assumed to be risk-loving in the second scenario. The difference in the average inclination to switch between both scenarios amounts to 0.79

[16]This overall conclusion also holds if we use the information from the BFI-S of 2005 instead of 2009.

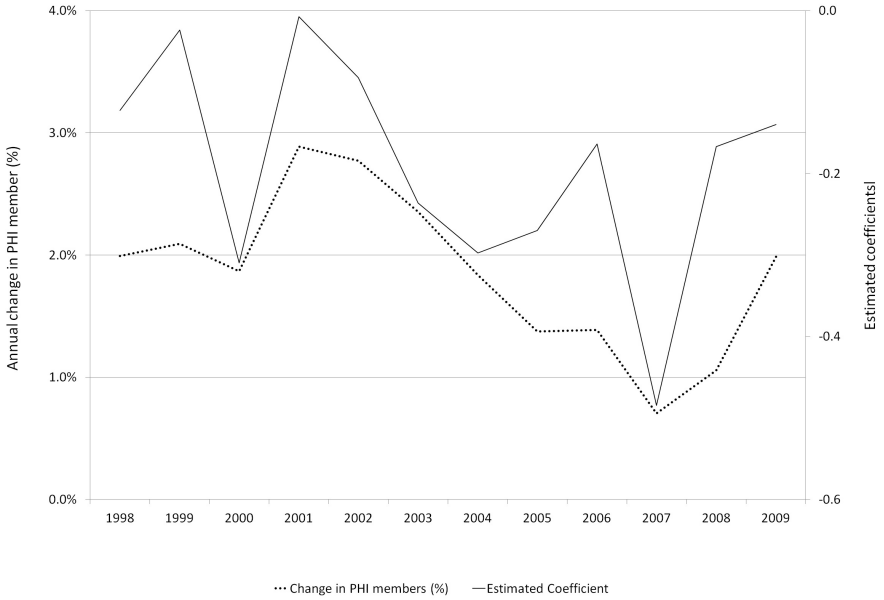

Figure 1: Fixed Time Effects: Estimated Coefficients

percentage points, equivalent to an increase of 22 percent. Taken together, these calculations reveal an effect of considerable magnitude of attitude towards risks on the probability to opt out of the SHI.

5.4 Further Controls

Figure 5.3 shows a comparison of the estimated coefficients of calendar time (solid line), which are jointly significant (p-value < 0.001), to the annual percentage change in PHI members (dashed line). The latter is calculated from aggregated data based on annual reports by the private insurance business (Association of German private healthcare insurers, 2009, 2012) and is expected to react to major changes in legislation. The sample period covers two substantial changes in legislation that further restrict opportunities for employees to switch to PHI. In 2003 the income threshold was raised substantially by 13%. And after 2007, income had to exceed the relevant threshold in three successive years, while it had to exceed the thresh-

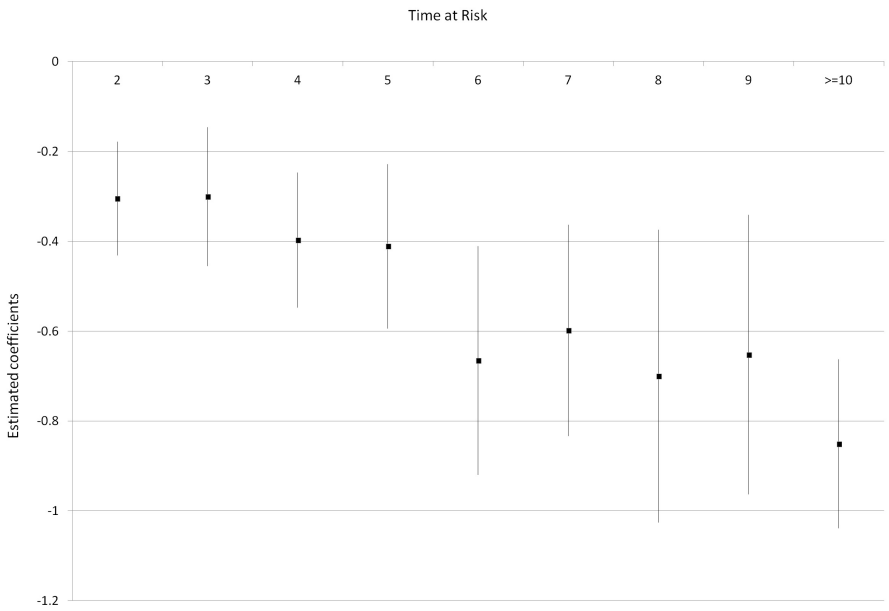

Figure 2: Time at Risk: Estimated Coefficients

old only in the previous year prior to 2007.[17] The peaks in 2001/2002 and 2006 can be explained by earlier switches of individuals who would have been affected by these reforms. The increase from 2007 to 2009 might be attributable to the introduction of a general obligation to obtain insurance coverage, which came into effect by 2009.[18] The similar pattern of both graphs suggests that the set of yearly dummies captures variation in the probability of switching due to exogenous shocks. Hence, we are confident that the results are not influenced by changes in the regulatory framework.

Figure 5.4 presents the estimated coefficients of *time at risk*. As discussed in section 3, individuals who are willing to leave the SHI are likely to switch as soon as the opportunity arises. This is in line with Schneider (2003), who points out that the time of underwriting affects premium amounts, since early switching provides more time to build up the obligatory old age provisions. Hence, the sooner an in-

[17] As of January 2011, the "three-years-rule" was replaced by the former regulation, i.e. income now has to exceed the relevant threshold only in the previous year.

[18] Deutsche Rückversicherung AG (2010), a large private re-insurance concern in Germany, reports in their annual report of 2009 a "*pleasing rise of 3.8% in premium income in private health insurance*" due to the legal regulations.

dividual switches, the lower his premium amount. The estimated coefficients of *time at risk* are jointly significant (p-value < 0.0001) and show the expected negative trend, indicating that individuals tend to switch as soon as they have the opportunity. Moreover, we observe a negative and significant estimate for *left-censored*, suggesting a lower probability to switch. This is reasonable as these individuals have been longer at risk than indicated by the relevant indicators, as they were already at risk when they entered the sample.

To investigate the effect of awareness, i.e. whether or not an individual is aware of her opportunity to leave the SHI, we include an indicator variable. The estimated coefficient of awareness is positive and highly significant. However, this should not be interpreted as causal, as individuals who would not consider leaving the SHI are not likely to invest any effort in researching switching options. Finally, the estimated coefficient for individuals who entered the sample only through reported insurance status is insignificant.[19]

5.5 Potential Endogeneity of Self-Assessed Health

To ensure that the above-mentioned results are not driven by potential endogeneity of self-assessed health, Table 3 reports the estimation results using the bivariate ordered probit model, where we consider two sets of explanatory controls. The first two columns refer to the five factor specification (specification 2), whereas the last two columns display the results of the alternative risk specification (specification 3).[20] With respect to the instrumental equation, a test on instruments relevance turns out highly significant in both specifications. Hence, we are not concerned about weak instruments. Considering the switching equation, the results, and in particular the estimated coefficient of SAH, are very close to what we find in the

[19] We also perform a sensitivity analysis which excludes these observations. This does not affect the results in qualitative terms.

[20] Similar results of the basic specification are not reported.

Table 3: Bivariate Ordered Probit Models

	Specification 2				Specification 3			
	Health Eq.		Switch Eq.		Health Eq.		Switch Eq.	
	Coef.	S.E.[a]	Coef.	S.E.[a]	Coef.	S.E.	Coef.	S.E.
sah			−0.412***	0.141			−0.355***	0.123
socioeconomic characteristics								
age20-29	−0.431***	0.047	−0.159	0.112	−0.418***	0.046	−0.015	0.090
age30-39	−0.260***	0.035	−0.002	0.078	−0.238***	0.030	0.061	0.059
age50-60	0.231***	0.037	−0.065	0.083	0.191***	0.033	−0.080	0.065
female	0.008	0.037	−0.171***	0.052	0.044	0.033	−0.144***	0.046
non-working spouse	0.018	0.040	−0.162**	0.081	−0.002	0.036	−0.176**	0.068
# children under 16	0.014	0.017	−0.104***	0.024	0.002	0.015	−0.089***	0.021
income	−0.002***	0.001	0.002**	0.001	−0.002***	0.000	0.001***	0.001
years of education	−0.023***	0.006	0.001	0.009	−0.028***	0.006	0.003	0.008
civil servant	−0.346***	0.097	1.421***	0.204	−0.324***	0.091	1.591***	0.163
self-employed	−0.183***	0.060	0.703***	0.133	−0.157***	0.048	0.817***	0.112
white-collar job	−0.122**	0.048	0.293***	0.113	−0.133***	0.039	0.362***	0.096
residence west	−0.085*	0.044	−0.050	0.058	−0.130***	0.036	−0.052	0.051
german	0.199**	0.087	0.012	0.126	0.116*	0.062	−0.061	0.089
personal traits (*jointly sig.*)			yes (**)					
neuroticism	0.022***	0.003	0.003	0.005				
openness	−0.002	0.002	0.000	0.002				
extraversion	−0.004	0.003	0.007***	0.003				
agreeableness	−0.007***	0.002	−0.004*	0.002				
conscientiousness	−0.005***	0.002	−0.001	0.003				
risk-loving					−0.106***	0.030	0.074*	0.043
further controls								
time effects (*jointly sig.*)			yes (**)				yes(***)	
time at risk (*jointly sig.*)			yes (***)				yes(***)	
awareness	0.048	0.035	0.264***	0.055	0.077**	0.030	0.271***	0.049
extended	0.009	0.039	0.066	0.071	0.051	0.034	0.075	0.063
left-censored	−0.042	0.038	−0.139**	0.055	−0.059*	0.033	−0.177***	0.046
instruments (*jointly sig.*)	yes(***)				yes(***)			
# hospitalizations	0.072***	0.019			0.066***	0.013		
disability	0.728***	0.067			0.785***	0.067		
correlation / p-value	0.346 / 0.021				0.278 / 0.029			
# observations	14,885				19,027			
# observations	3,963				5,378			
# observations	535				772			

Notes: *** significance at 1%; ** significance at 5%; * significance at 10%.
Standard errors are clustered at the individual level; [a] bootstrapped standard errors, 250 replications.

simple probit model. However, this does not hold fully for the estimated coefficients of age, which are no longer significant. The loss of significance in some estimated coefficients, most notably age, may be attributable to fewer restrictions and in consequence larger standard errors in the bivariate ordered probit model. The estimated correlations between the equations' error terms are positive and significant in both specifications (p-values: 0.021 / 0.029), indicating endogeneity of SAH. The positive sign of the estimated coefficient suggests that unobservable factors lead to lower reported health and a higher inclination to switch. This counterintuitive re-

sult might be explained by an expected quality gap in favor of the PHI, which might attract especially individuals who are more concerned about their health. Overall, the qualitative conclusions drawn from the simple probit regression still hold.

6 Conclusion

Based on data from the GSOEP this paper analyzes incentives to switch from public to private health insurance in Germany. In order to account for the various regulatory conditions and related incentives, a comprehensive set of explanatory variables is used. We include health status, age, and gender to capture the effect of risk-adjusted premiums under the PHI; family characteristics to control for free co-insurance of dependents under the SHI; and we account for specific incentives due to occupation through a set of dummies. To investigate the previously unconsidered role of personality, five personal traits, including measures for risk-aversion and for altruism, enter the model. Moreover, since individuals who are willing to leave the SHI tend to switch as soon as they have the opportunity, we control for the duration for which an individual has been able to opt out.

Applying a hazard model in discrete time and accounting for potential endogeneity of self-assessed health through an instrumental variable approach, the estimation results yield robust evidence that individuals typically opt out of the SHI and chose substitutive PHI for economic reasons. For instance, the SHI is preferred by individuals who benefit from free co-insurance of dependents or by those who are discouraged by risk-adjusted premiums under the PHI, i.e. bad health risks. Moreover, the present analysis provides convincing empirical evidence for the notion that attitude towards risk also affects the choice of insurance type. Risk-loving individuals have a significantly higher probability of buying private health insurance than those who are risk-averse, with simulations revealing an effect of considerable size. With respect to the remaining personality traits considered in this analysis

the results are less conclusive. In particular, we observe no significant effect of the measure of altruism on the decision to opt out of the SHI. This implies that staying under the SHI cannot be regarded as a statement of solidarity, but rather as a result of rational, benefit-maximizing behavior.

This paper also complements and confirms the key finding of Grunow and Nuscheler (2013) that risk-segmentation in favor of the PHI is present in the German health insurance system. Our analysis also finds that young, healthy, and high-earning individuals are more likely to leave the public system. This generates several problems for the health insurance system in Germany. First, since contributions of potential switchers typically correspond to the maximum premium amount under the social health insurance scheme, generating positive marginal returns for the SHI, advantageous selection into the PHI may further increase financial pressure on the former, which is already severely affected by demographic change. Second, to prevent individuals from opting out, statutory sickness funds may adapt their offers to the needs of relatively few potential switchers. However, these needs may not be in line with those of the majority of compulsory members. This is likely to result in an inefficient allocation of resources in the German health system.

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