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The Price Sensitivity of Health Plan Choice: Evidence from Retirees in the German Social Health Insurance

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Abstract

We investigate two determinants of the price sensitivity of health plan demand: the size of the choice set and the salience of premium differences. Using variation in both features in the German Social Health Insurance (SHI) and information on health plan switches of retirees in the German Socio Economic Panel, augmented with information on individuals' choice sets we find that retirees react less to potential savings from switching when they have more plans to choose from and when differences between premiums are less salient. Simplifying choices could save consumers money and improve the functioning of the health insurance market.

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1. Introduction

Consumer choice of health insurance has become a core principle in many health insurance markets in the United States and European countries, such as Germany, the Netherlands and Switzerland (Thomson et al., 2009). In the U.S., choice is a central element in the health insurance exchanges established under the Affordable Care Act and in the context of employer-sponsored insurance. Choice is intended to encourage competition between health plans in order to lower premiums and increase welfare (e.g., Dafny et al., 2013). The market's ability to generate and distribute these benefits, however, depends on a price sensitive demand, which in turn is a function of consumers' willingness and competence to choose. There is growing evidence that consumers have difficulties in making good health insurance choices (Abaluck and Gruber, 2011; Heiss et al., 2013; e.g., Kling et al., 2012; Sinaiko and Hirth, 2011). However, there is only limited evidence on the impact of specific features of the choice architecture on choice quality.

In this paper, we examine the impacts of two features of the choice environment on the price sensitivity of choices: the size of the choice set and the salience of premium differences. The size of the choice set may affect health plan choice as more choices increase market complexity and make it more difficult for consumers to find the best plan (Frank and Lamiraud, 2009). An increase in the salience of premium differences across plans may focus consumers' attention on potential savings from switching and thus increase their price sensitivity. Both, the size of the choice set and salience of premium differences are potentially actionable tools for policy-makers to influence the quality of consumer choice and market dynamics.

We study the impact of both features on the price sensitivity in the German Social Health Insurance (SHI), a competitive health insurance market in which individuals choose among a large number of health plans. The SHI provides an ideal setting for studying plan choices. Because of a high degree of standardization, consumers mostly choose on price and there is limited risk of confounding due to unobserved plan attributes that tend to complicate other studies on health plan choices (Sinaiko and Hirth, 2011).

We evaluate the importance of the complexity of choice by leveraging market dynamics from 2005 to 2011 in the SHI, which repeatedly changed the size of the choice sets of plans across administrative health insurance regions. To identify the effect of the salience of premium differences we use variation introduced by a 2009 reform that changed how premiums are framed and paid. Before 2009, premiums were displayed as plan-specific contribution rates on income and deducted from the paycheck or pension. As explained in greater detail below, individual savings were not directly observable. Since 2009, the plan-specific contribution rate

has been replaced with a uniform rate and the option for plans to set supplemental fees or rebates. These supplemental fees or rebates directly reflect the premium differences across plans that consumers have to bear and pay directly to their plan. Therefore, the 2009 reform increased the prominence of premium differences.

Data come from the German Socio Economic Panel (SOEP), a long-running panel with detailed information on individual characteristics and health plan choices. We augment these data with information on health plan premiums and information on the regions in which the plans operate. Our analysis focuses on retirees, a group for which we can observe the full choice sets in the data and that, in the U.S. literature, has been shown to have significant difficulties in making good health plan choices (Abaluck and Gruber, 2011; Heiss et al., 2013; Ketcham et al., 2012). We calculate the potential savings that each retiree could reap from switching to a different health plan at different points in time. We then analyze how sensitive retirees are to their potential savings, and whether the sensitivity varies with the size of the choice set and with the salience of premium differences using a linear probability model of switching. We use administrative region-specific hospital payment rates to instrument for the size of the choice set; and separate the effects of the two distinct aspects of the 2009 reform (the changes in payment modalities and in framing) by comparing groups of retirees who were only affected by part of the reform in a difference-in-difference analysis.

Our findings indicate that retirees are more sensitive to prices when the salience of price differences increases, and less price sensitive when the choice is more complex, i.e., when the number of available options increases. We further find that, on average, switchers pay relatively lower premiums in their new plan compared to their old plan and that these savings are larger if there are fewer options in their choice set. These results imply that simplifying choices might increase the sensitivity of retirees to savings potentials, even in the already relatively simple setting of the German SHI.

The paper proceeds as follows: Section 2 summarizes the related literature on health plan choice. Section 3 describes key features of the SHI and the reforms that generated the empirical variation for our study. Sections 4 and 5 present the data and estimation methods, respectively. We discuss results on price sensitivity of switching in section 6 and on savings from switching in section 7. In section 8, we present several robustness checks. The last section discusses the results and concludes.

2. Related literature

Prior research has identified economic and psychological factors that influence the price sensitivity of health plan choice. Economic factors include search costs due to imperfect information and transactions costs in switching plans, e.g. as consumers have to investigate alternatives and fill out paperwork (Handel, 2013; Maestas et al., 2009). Low price sensitivity persists even in insurance markets that are largely homogenous and where individuals can easily switch plans, such as the Dutch, Swiss and German health insurance systems (Frank and Lamiraud, 2009; Schut et al., 2003) or the U.S. Medigap program for the elderly (Maestas et al., 2009; Starc, 2011), suggesting that even small search or transactions costs may be important. The behavioral literature focuses on psychological factors such as cognitive biases or heuristics that influence decisions, including choice overload or status quo bias (Loewenstein, 1999; Tversky and Shafir, 1992). These factors can inhibit switching and result in low price sensitivity (Frank and Lamiraud, 2009). The findings suggest that changes to the environment in which individuals make plan choices can reduce economic or cognitive costs and thus affect their price sensitivity (Kling et al., 2012).

A growing empirical literature on health plan choices highlights the importance of these factors to price sensitivity and switching. The U.S. literature on the non-elderly tends to study plan choice in single and large employer groups (Handel, 2013; Strombom et al., 2002) or in laboratory settings (Schram and Sonnemans, 2011), with only few studies on large, individual insurance markets (such as Ericson and Starc, 2012; Kling et al., 2012). Studying employees at a large firm, Handel (2013) finds evidence that switching costs are large and heterogeneous, while Strombom et al. (2002) find evidence of status quo bias among incumbent employees and large variations in price sensitivity, including that older, less healthy individuals are relatively less price sensitive. Schram and Sonnemans (2011) use an experiment to examine plan choices and find that positive switching costs reduce switching rates but improve the quality of switches. In an observational study of the Massachusetts Connector, an individual insurance markets for non-elderly consumers, Ericson and Starc (2012) find evidence that is consistent with either a simple "choose the cheapest plan" heuristic or heterogeneity in consumer preferences. In studying enrollment and initial plan choice in the U.S. Medicare prescription drug program (Medicare Part D), Heiss et al. (2010) find that elderly consumers respond to incentives to enroll in the program, but may have difficulty discriminating among available plans. Furthermore, Heiss et al. (2013) find that individuals on average choose Part D plans with about 300 USD higher expected costs compared to the least-cost plan specified by the Medicare Plan Finder tool, suggesting that consumers might not be optimizing effectively.

Kling et al. (2012) also consider Medicare Part D and find that many elderly Medicare recipients do not use information that contrasts benefits of different plans even if it is readily available. In an experiment, they find that providing personalized cost information has large and statistically significant effects on switching rates which, in turn, are associated with sizeable savings for consumers. Similarly, research in public finance suggests that even small changes in the salience of prices or taxes can significantly influence consumers' price sensitivity (Chetty et al., 2009; Finkelstein, 2009).

Despite this emerging literature, there is limited evidence on the impact of specific features of the choice environment on the price sensitivity that could be used by policy-makers to facilitate improved choice and modify market dynamics. Frank and Lamiraud (2009) study switching in Switzerland's health plan market which, like the German SHI market, has relatively homogenous plans but persistent price dispersion. They find that switching rates decline in the number choices. However, Frank and Lamiraud rely on average savings from switching instead of constructing individual specific potential savings from switching. Schmitz and Ziebarth (2013) evaluate the importance of the framing of premiums in the German SHI for health plan switching among the non-elderly. Using variation in framing of premiums introduced by the same reform that we focus on, they find that the probability to switch health plans increased six fold for individuals subject to premium increases after framing was changed. However, Schmitz and Ziebarth do not construct individuals' choice sets and thus cannot take changes in the menu length into account. Furthermore, they mainly focus on price changes of the current plan, whereas the relevant measure is the change in a plan's price relative to that of its competitors.

Our study extends the literature on the effect of the choice environment on the price sensitivity of health plan choice in several ways. First, we study the price sensitivity of retirees in a large, individual market and thereby complement earlier work on the Medicare prescription drug program and the market for Medigap supplemental insurance. Second, we study changes in the choice environment that provide insights into the mechanisms underlying consumer price sensitivity and, unlike some experimental studies, offer evidence of real-life and actionable policies to mediate this sensitivity. Third, the institutional context of the German SHI provides a suitable setting to study price sensitivity. Relative to settings like the U.S. employer-based and Medicare systems, SHI plans are highly standardized. This reduces the risk that unobserved plan attributes affect choices. The standardization also reduces the uncertainty and cognitive load for consumers, as they do not have to compare multi-attribute plans that they tend to misunderstand (Barcellos et al., 2014). Moreover, the strict regulation of the SHI market reduces the risk of confounding due to concurrent attempts by firms to risk-select or influence consumers (Bauhoff, 2012; Starc, 2011).

3. Background on the German Social Health Insurance (SHI)

The SHI is a competitive health insurance market in which individuals choose between a large number of health plans under guaranteed-issue and community-rating. The benefits package, provider networks and reimbursements are almost entirely standardized. Other than premiums, SHI plans may distinguish themselves only in minor ways.[4] As a consequence, premium variation remains a primary element of plan choices. Switching costs in the SHI are small: individuals merely cancel their old health plan by sending a brief letter and fill out a short application form for the new plan which mainly collects address information (Bauhoff, 2012). Since 2002 individuals can switch to a new plan once they have been with their current plan for at least 18 months or when their current plan raises its premium.[5]

The *size of the choice set* varied considerably in the SHI across health plan regions and over time. Figure 1 shows changes in regional choice sets since 2005. The changes in the number of available plans followed a reform in 1996 that introduced free health plan choice in the SHI. Prior to 1996, most members were assigned to a plan based on their employer, industry or trade group. The 1996 reform initially dramatically expanded the choice set and led to a prolonged period of mergers that captured economies of scale (McGuire and Bauhoff, 2007). As plans can operate nationally or only in certain regions, health plan mergers also introduced variation in the number of available health plans across geographic regions. Importantly, since individuals cannot easily alter their own choice set, the time and regional variation in the choice set is plausibly exogenous from the individual perspective. As detailed below, we address possible concerns about endogeneity of the changes in the choice set by employing administrative region-specific payment rates as an instrumental variable (Chernew et al., 2008).

The *salience of price differences* in the SHI was changed by a reform in 2009 that changed how premiums are framed and paid. Before 2009, premiums were posted as plan-

[4] For example, plans may offer coverage for non-essential services not included in the standard benefits, such as spa treatments, or through the quality of their customer service. However, consumers have limited interactions with their plans, which work directly with providers, so that plan service quality is relatively less important in the SHI. In addition, there is no evidence of systematic variation in measured service quality (Schmitz and Ziebarth, 2013). Since 2007, the SHI also allows health insurers to offer alternative plans (so-called *Wahltarife*) that deviate from the regulated benefit package and have different cancellation policies. In our data, we do not observe in all waves whether individuals have selected such an alternative plan. To check whether our results are influenced by individuals who have chosen alternative plans and might not be able to switch, we exclude all those individuals who ever report having chosen an alternative plan in a sensitivity analysis presented in section 8.

[5] Individuals who newly retire and were already members of the SHI before retirement do not have to make an active choice of plan when entering retirement. By default, they stay in their old plan or face the same switching procedures as active employees or older retirees, i.e., they have to cancel their old plan and apply to the new plan.

specific contribution rates on income and – for most individuals – deducted from labor or pension incomes. The 2009 reform replaced the plan-specific contribution rate with a uniform rate and gave plans the option to set supplemental fees or rebates.[6] Individuals pay/receive fees or rebates directly to/from their health plans. The change in framing and the change in payment likely increased the visibility of relevant price differences across plans for consumers.

Salience effect of the change in framing. The consumer-relevant price difference before 2009 depended on the difference in contribution rates across plans as well as on rules on splitting the premiums between individuals and their employer or pension plan. While the premiums based on pension income are split between retirees and the pension fund (see section 4 and Appendix for details), retirees bear the full premium based on other types of income, e.g., income from private pensions, self-employment or capital payments (Basel et al., 2011). To calculate the difference in premiums before 2009, consumers thus had to consider the differences in contribution rates across plans, the splitting rules, and the amounts of their different types of income. Since 2009, the only differences in premiums across plans are captured by the supplemental fees or rebates and consumers pay the full difference. That is, the change in framing made the relevant difference in premiums salient for all consumers.

Salience effect of the change in payment modality. For most individuals premiums were deducted from income prior to 2009. Only individuals with income from self-employment and retirees who are voluntary members of the SHI with income from capital payments or rents had to pay the premium based on these types of income directly to the health plan already before 2009.[7] Since 2009, all individuals who pay supplemental fees or get rebates have to directly interact with their health plan. Paying the supplemental fees directly to the health plan exposed those individuals who did not pay part of their premium directly to their health plan before 2009 to a new and more explicit payment mode. This plausibly increased their awareness of premium differences compared to the pre-2009 situation when premiums were deducted from pensions.

Table 1 and Figure 2 illustrate how the 2009 reform changed the framing of premium differences and the variation in contribution rates across plans. As Figure 2 shows there were no supplemental fees or rebates in January 2009. As early as February 2009, however, plans started issuing rebates. The first supplemental fees were introduced in September 2009, but more plans followed in 2010. Table 1 illustrates, for a selected sample of plans, the

[6] Until 2011 these fees or rebates could be cast in absolute value or as percent on income. Since 2011, however, they have to be specified in absolute value.

[7] Voluntary members are individuals with income above a threshold that shifts yearly as they can opt out of the SHI and choose substitute private health insurance instead.

development in contribution rates, supplemental fees and rebates, and demonstrates how the 2009 reform has simplified the choice environment.

4. Data

The German Socio Economic Panel (SOEP), a long-running panel dataset representative of the German population (Wagner et al., 2008), allows us to construct retirees' full choice sets and their potential savings from switching. We augment the SOEP with external data on plans' contribution rates and operating region that is only fully available since 2005, limiting our analysis to the years 2005 to 2011.

Table 2 displays means and standard deviations of the variables that we use in our analysis. The data are an unbalanced panel of individuals who receive pension income or report to be retired, are at least 65 years old, and are members of the SHI. The main outcome of interest is whether individuals switch their health plan between two adjacent years. We construct this measure based on the health plan names that individuals report in adjacent interviews.[8] The variable *switch* is coded as 1 in year *t* if an individual reports different health plans in the SOEP interviews *t* and *t+1*. Differences in health plan names in two adjacent interviews that result from a change in the health plan's name or from a merger, are not coded as a switch.

In the SHI, health plan switches can occur any time during the year. The exact timing of switching, however, is not observed in our data. Health plan switches between the interviews in 2008 and 2009 could thus have occurred before or after January 1, 2009. Since the 2009 reform became effective on that date, we exclude the 2008 data (i.e., information on switching between interviews in 2008 and 2009) from our analysis; this also alleviates concerns of anticipatory effects. Table 2 contains data for the years 2005-2007 and 2009-2010. Information from the SOEP interview in 2011 is used to construct the 2010 switching indicator.

The first row of Table 2 reports the fraction of retirees who switch to a new health plan. Switching rates are generally very low among retirees in the SHI. On average, only 2.7% of retirees in our sample switch to a new health plan between two interviews.[9] While column (1) and (2) show means and standard deviations for the entire sample of retirees, columns (3) and (4) restrict the sample to those individuals who are allowed to switch. As discussed above, SHI

[8] We were not able to match all reported health plans to actual health plans because the self-reported health plan information was not always exact. In a robustness analysis we exclude all observations for which the true health plan was uncertain.

[9] Switching rates for the overall SHI between 1997 and 2004 were between 4 and 6 percent (Andersen and Grabka, 2006).

members are only allowed to switch to a different plan if they have either been with the same health plan for at least 18 months, or if their current health plan increases its contribution rate or introduces or increases a supplemental fee. As we do not observe the exact timing of switching, we cannot precisely condition on the 18 months window. Instead we exclude all observations from our analysis for which we see a switch in one of the two prior years *(t-1 or t-2)* unless the individual's plan increases its contribution rate or introduces or increases a supplemental fee between the interviews in *t* and *t+1*. As only very few individuals switch every year, excluding those that are not allowed to switch reduces the sample by less than 1% of observations. In columns (5) – (8) we split the sample based on pre-2009 payment modalities. Individuals in columns (5) and (6) had to pay part of their premium directly to their health plan already prior to 2009 and are therefore only affected by the change in framing of premium differences since 2009. Individuals in columns (7) and (8) did not pay directly to their health plan prior to 2009.[10] For these individuals the 2009 reform thus changed both framing and payment modalities. We allow for different effects of the 2009 reform across these two groups to separately identify the effect of framing and payment modalities on switching.

Our measure of health plan switching captures switches between two adjacent interviews. As interview months vary across individuals and years in the SOEP, the question spans different number of months for different individuals. Table 2 indicates that the average number of months at risk, i.e., the average number of months during which individuals could have switched, is roughly 12. We use this information as a control variable since the likelihood that individuals switch plans might increase with the time between interviews.

In addition to whether individuals switch, crucial variables for our analysis are the number of plans that individuals can choose from and the potential savings that they could realize by switching. Both variables derive from individuals' choice sets, which we construct based on information on individuals' region of residence in the SOEP and information on which plans are available in the specific regions stemming from the German consumer reports (*Stiftung Warentest)*. Details on the construction of the choice set can be found in the Data Appendix 1. Table 2 shows that on average across years and regions individuals can choose from about 100 plans.[11] However, as Figure 1 shows, there is substantial variation across space and time. Furthermore, many of these plans are rather small and may be unknown to

[10] Among retirees who are mandatory SHI members those without income from self-employment or capital payments (such as life insurance) did not have to pay premiums directly to their health plan before 2009. Voluntary members did not have to pay directly before 2009 only if they had no income in addition to their (public or private) pension.

[11] The number of plans can vary over the course of the year as plan exists and entries may occur every month. We use the maximum number in individuals' choice sets between two adjacent interviews in our analysis.

consumers (Frank and Lamiraud, 2009), an issue that we revisit in a sensitivity analysis below. We merge these data with information on the number of enrollees in each health plan from *dfg Krankenkassenatlas* to calculate regional market shares. On average across regions and time only about 14 plans have market shares that are larger than 1%.

For each individual in the SOEP, we calculate potential savings from switching to the cheapest plan in their choice set. Even though before 2009 both individuals and their pension plans or employers could have saved premiums if an individual switched to a lower cost plan, our measure of potential savings only focuses on the individual's part of the savings. For the years 2005 through 2008 we first calculate the difference in percentage points between the contribution rate of a consumer's current health plan and the cheapest plan in his or her choice set. We then transform these values into Euros by multiplying the part of the contribution rate that is borne by retirees with the relevant income (see the Data Appendix 2 for details) Since 2009, premium differences are no longer hidden in the contribution rates but cast as supplemental fees or rebates. These are paid entirely and directly by the consumers. For this period we calculate consumers' potential savings as the sum of the supplemental fee of an individual's current plan and the maximum rebate in his or her choice set (for individuals in plans with supplemental fees) or the difference between the maximum rebate and the individual's plan's rebate (for individuals in plans with rebates). Figure 3 displays the development of the distribution of potential savings over time and shows that the 2009 reform has decreased the spread in potential savings.

The potential savings measure based on individuals' current plans' premiums ignores possible equilibrium effects and might be sensitive to outlier plans. Following Frank and Lamiraud (2009) we use the standard deviation of premiums – weighted by number of enrollees in each plan – in an individual's choice set as another measure of potential savings in a robustness analysis. This measure captures the expected savings from switching to a random plan for individuals whose current plan has above mean premiums.

Table 2 further displays means and standard deviations for a set of socio-demographic and economic variables, such as age, sex, educational attainment, household composition, income, health, and additional private health insurance, as well as regional characteristics, capturing regional health care supply, economic conditions, and costs of hospital treatments for health plans. All regional variables are lagged by one period. They are used as controls and instruments in the following analyses. The SOEP also contains information on cognitive ability for a subset of individuals, which may be related to switching propensity and the quality of choice (Buchmueller, 2006, 2000; McWilliams et al., 2011). Cognition is measured in a word-

fluency and a symbol correspondence test. We generate a measure of low cognition that captures if an individual gets fewer than the median number of correct responses in each of the two tests. Overall, 28% of the 3,405 individuals for whom this measure is available have low cognition. As this is only available for a few individuals, we cannot use it as a control in our main analyses. However, in a sensitivity analysis, we use it to investigate whether there are heterogeneous effects of the size of the choice set and of the salience of premium differences on the price sensitivity across groups with high or low cognition.

5. Methods

We examine how retirees' price sensitivity is affected by the size of the choice set and the salience of premium differences. The former changed gradually over time and across plan regions since the SHI was opened to competition in 1996. As further explained below, we use lagged administratively set region-specific hospital payment rates to instrument for the size of the choice set. These payment rates make regions more or less attractive to plans, thereby inducing plan entry and exit. The salience of premium differences changed abruptly through the 2009 reform. We use the variation over time and between groups introduced by this reform in a difference-in-differences design as explained further below.

We estimate the effects of both features in a joint model. Our approach follows earlier work (e.g., Frank and Lamiraud, 2009) and evaluates the probability that individual *i* in region *r* switches plans in year *t* in a linear probability model:

$$\Pr(switch_{irt} = 1|\boldsymbol{X}) = \alpha PS_{irt} + \beta CE_{irt} + \gamma(PS_{irt} * CE_{irt}) + \delta X_{it} + \vartheta r_{rt-1} + \theta_t + c_i \qquad (1)$$

The parameters of interest are included in the coefficient vector γ on the interaction between individual *i*'s potential savings PS_{irt} from switching to the cheapest health plan in the choice set and measures of the two features of the choice environment captured by the vector CE_{irt}.

In our main specification the vector CE_{irt} contains three variables: the number of health plans that individual i in region r and year t can choose from, and separate indicators for the two years after the 2009 reform (2009 and 2010). The coefficient on the interaction of the number of plans and potential savings captures whether individuals react differently to potential savings when the size of their choice set varies, everything else equal. The coefficients on the interaction between the post-reform indicators and potential savings measure whether

individuals react differently to the same amount of savings after the uniform contribution rate and supplemental fees and rebates were introduced in 2009. As there were only few plans that introduced supplemental fees or rebates in 2009 and to allow for adaptation effects, we allow the reform effects to vary between 2009 and 2010.

We further control for individual's observable time-varying characteristics (X_{it}, such as age, household size, and health) and observable time-varying regional characteristics (r_{rt-1}, such as regional GDP and measures of regional health care supply) that are displayed in Table 2. We also include time effects that affect individuals in all regions equally (θ_t) and, in the most comprehensive model, we include individual fixed effects to account for individuals' specific time-invariant propensity to switch (c_i). The standard errors are clustered by region to allow inference robust to region-specific unobserved shocks, as well as by individual to allow for correlation in individual shocks over time. As there are only 17 health insurance regions, we adjust for the low number of clusters by using a t-distribution with 15 degrees of freedom for inference on our coefficients (Cameron et al., 2008; Cohen and Dupas, 2010).

We include regional fixed effects as well as time-varying regional variables, such as economic activity and health care supply, in equation (1) to account for potential regional factors that might be correlated with the size of the choice set. In addition, we instrument for the size of the choice set using lagged values of administratively-set regional payment rates per hospital case interacted with the prior year's number of hospital cases in the region.[12] While plan revenues do not directly depend on members' residence, the payment rates and number of cases determine the plans' relative costs across regions and therefore affect the plans' decisions to enter or exit regions. This resembles an approach previously used to study the effects of managed care plans in the U.S. Medicare Advantage program on utilization and cost (Baicker et al., 2013; Chernew et al., 2008). Since managed care penetration is potentially endogenous, these studies use longitudinal variation in administratively-set, county-level payment rates as instrumental variable for market penetration.

The introduction of the uniform contribution rate with the possibility of supplemental fees and rebates in 2009 affected all SHI members, thus there is no natural control group that is entirely isolated from the reform. However the coefficient on the interaction of *PS*CE* in equation (1) estimates the difference in switching between individuals along the continuum of potential savings *PS*. Our approach thus resembles a differencing approach that relies on the

[12] The SHI transfers funds between plans to compensate for the variation in health care costs due to different risk pools. The risk adjustment formula is applied prospectively and accounts demographic and morbidity factors. Although the formula accounted for differences between East and West Germany before 2007, it did not alleviate all regional differences (see Bauhoff, 2012).

pre- and post-2009 differences among individuals with the same amount of potential savings. The identifying assumption is that, without the reform or another change in the choice environment, individuals with the same potential savings would have had the same probability to switch before and after the reform. In column (1) of Appendix Table 1 we show a placebo test for the pre-reform years 2005-2007. We find no statistically significant differences in the sensitivity to potential savings across these years, suggesting that it is plausible to assume that, in the absence of the reform in 2009, individuals would have reacted similarly to potential savings also after 2009.

We further separate the concurrent change in the framing and payment modalities by identifying the effect of the latter in an explicit difference-in-difference design. We make use of the fact that those retirees who had income beyond their public pension (e.g., income from self-employment or capital payments) had to pay part of their contributions directly to the health plans already before the 2009 reform. For these individuals, the reform only changed the framing of prices but not the payment modality. We exclude this group from the main analysis, which therefore estimates the overall effect of the changes in framing and payment modalities. We then add this group to the analysis sample to estimate the effect of the payment modalities by comparing the change in the price response between the two groups of retirees. To implement this test we estimate equation (1) with the full vector *CE* as described above, and include an indicator identifying the two groups of retirees and an interaction of this indicator with the post reform *year* indicators. This provides an estimate of the "payment modality" effect. The identifying assumption is that, in the absence of the change in payment modalities for some retirees, both groups of retirees would have reacted similarly to the change in framing and that the responsiveness to potential savings would have changed in the same way over time for both groups of retirees. As discussed below we find similar trends in switching rates and in the sensitivity to potential savings among both groups of retirees prior to the reform in 2009.

6. Results

Table 3 presents the main results, coefficient estimates and standard errors for the parameters α, β, and γ in equation (1) estimated using linear probability models. The estimates are multiplied by 100 for exposition and thus reflect percentage point changes in the probability to switch to a different health plan.

Column (1) in Table 3 shows the results with all controls and column (2) adds individual specific fixed-effects to the model. The results presented in column (3) use lagged values of administrative region-specific payment rates interacted with the number of hospital cases in the

region as an instrument for the size of the choice set. The interactions of these values and potential savings are used as an instrument for the interaction term of the number of health plans and potential savings. Column (4) extends the baseline model and includes the interaction of the size of the choice set and the post-reform year indicators and the interaction of this variable with individuals' potential savings to analyze how the two features of the choice architecture interact. Column (5) uses the same instruments as column (3) and adds additional interactions of the instrument for the additional variables that involve the number of health plans. For both IV models, the Angrist and Pischke (2009) F-statistics are included at the bottom of the table and suggest that the instruments are not weak.

Across all specifications, retirees are more likely to switch health plans if they can save more from switching though this coefficient is only marginally significantly different from zero in some specifications. In the fixed effects specification in column (2), for example, the p-value is 0.102. The magnitude of the fixed effects estimates in column (2) suggest that prior to 2009 one additional Euro/month in potential savings increased the probability that an individual switches by about 0.28 percentage points at the reference number of plans, which is set to 58 (the minimum in the data). Given that the average switching rate is at 2.7%, this is not a small effect in relation to the frequency of switching. The coefficient on the interaction between potential savings and the size of the choice set indicates that this effect is significantly and substantively smaller when more plans are available. For example, the fixed effects model in column (2) predicts that, at the average number of 100 plans in the sample, the probability to switch to a different plan increases only by 0.05 percentage points (0.2810-(100-58)*0.0056) for an additional 1 Euro in potential savings. This result is in line with findings by Frank and Lamiraud (2009) and supports the hypothesis that retirees are less price sensitive when the choice is more complex.

Our results show a significantly positive association between the number of available plans and the probability to switch when holding potential savings constant. By contrast, Frank and Lamiraud find a positive association between the size of the choice set and the probability to switch only at fewer than 30 plans, and negative associations for choice sets between 56-70 plans. Our smallest choice set includes 58 plans, i.e., all our choice sets are in the range where Frank and Lamiraud find a negative relationship between the number of plans and the probability to switch. In section 8, we explore possible nonlinearities in the relationship between the number of plans and the probability to switch plans.

Most specifications show a large increase in the sensitivity to potential savings in 2010. One additional Euro of monthly savings from switching increases the probability to switch in

2010 by an additional 0.54 percentage points in the fixed effects model in column (2). Increasing the salience of premium differences thus seems to increase the price sensitivity of demand for health plans in 2010. For 2009, however, the coefficient on the interaction is not significant in most specifications. A potential reason could be that consumers were first waiting to see how the market would develop in the new environment before making new health plan choices. The increased sensitivity to potential savings in 2010 is qualitatively in line with Schmitz and Ziebarth's (2013) finding that the reform increased switching for employees who saw their premium increase. Our estimates focus on retirees and, unlike Schmitz and Ziebarth's, are net of any concurrent effect of changes in menu length on switching around the time of the 2009 reform.

The results in columns (4) and (5) for the models with interaction effects between the two features further demonstrate that a larger choice set mutes retirees' reaction to potential savings before and after 2009. The results also demonstrate that the 2009 salience reform changed the impact of the size of the choice set on the price sensitivity. Before 2009, an additional plan in the choice set decreases the probability to react to a 1-Euro increase in potential savings by 0.005 percentage points. By contrast, in 2010 the impact is 0.09 percentage points (0.005+0.0891). The stronger impact of the number of plans after the choice environment has been simplified is surprising. The post-2009 impact is stronger even when taking into account the higher propensity to switch after 2009. Put in terms of the response to 1 Euro of potential savings and for a choice set of 75 plans – roughly the average number of available plans in 2010 – the probability to switch is 0.16 percentage points before 2009 but 0.66 percentage points in 2010. Relative to these numbers the increase by one plan leads to a 3% decrease in the probability to switch before 2009 and a 13% decrease in 2010.

Table 4 investigates heterogeneity in these results among different groups of retirees. The first column shows results for a model in which the choice set variables are interacted with an indicator for whether individuals have already paid part of their premium directly to their health plan prior to the 2009 reform because they received income outside their public pension. For these individuals the reform thus only changed the framing, not the payment modalities. Appendix Table 1 columns (2) and (3) show that the trends in switching rates and the sensitivity to potential savings prior to the 2009 reform were similar for the two groups, lending credibility to the identifying assumption of our difference-in-differences design. Column (1) of Table 4 shows that the estimated coefficients on the interaction between potential savings and the post reform year-indicators are positive but not significantly different from zero for the group of individuals who already paid directly to their health plan prior to the

reform. This suggests that the payment modalities effect was not very important and that the increase in price sensitivity after the 2009 reform mainly works through the change in framing.

Table 4 also investigates heterogeneities with respect to health, education, income and cognition. Few of the interaction terms of potential savings, the changes in the choice environment and the group indicator are significant, suggesting that these groups are not relatively less sensitive to potential savings when more health plans are available than their reference groups, and also have not benefitted more from the increase in salience due to the 2009 reform. The only significant finding is that individuals with lower than median education appear less sensitive to potential savings than those with more education. In contrast to studies on the U.S. Medicare Advantage program (McWilliams et al., 2011), and possibly due to low statistical power, we do not find a differential effect by cognition.

Overall our results suggest that large number of choices can decrease the price sensitivity of health plan choice among retirees, even in a setting like the German SHI, in which differences between health plans are limited and switching between plans is easy. Furthermore, framing of premiums seems to be an important determinant of the price sensitivity of health plan choice among retirees.

7. Are potential savings realized?

So far we have focused on whether individuals switch health plans, conditional on the amount of money they can save from switching. We have not taken into account the specific destination plan. In this section, we assess whether retirees in the SHI who switch health plans actually pay less than those who stay in their old plan. We further analyze how much switchers save from switching in absolute value and how this compares to their potential savings.

To analyze whether those who switch do better than those who stay we compare the development of premiums over time for switchers and stayers. Column (1) of Table 5 shows coefficients of an OLS regression of the premium change over time (premium of baseline plan in *t* minus premium of next year's plan in *t+1,* where the plans may be identical) on the number of available plans, post-reform year indicators (2009, 2010), and the interaction of these variables with an indicator for whether individuals switch health plans. The dependent variable is positive if an individual paid a higher premium in *t* than in *t+1, i.e.,* a positive value measures how much he/she saved in *t+1* compared to the plan in *t*. Importantly, these differences do not reflect changes in income over time. Although premiums generally depend on income, we calculate both premiums based on the income in t. Premium differences thus only reflect differences in contribution rates and/or supplemental fees or rebates, not changes in income

over time. For comparison the mean and median premiums before 2009 are shown in the bottom rows of the table.

The results suggest that, on average, switchers do better than stayers. While retirees who stay in their old plan on average have to pay 1.8 Euros/month more in year *t+1* than in year *t*, individuals who switch pay about 3.4 (-1.8+5.2) Euros/month less in *t+1*. The coefficient on the interaction term between switching and the size of the choice set is negative, suggesting that switchers save less compared to stayers when more plans are available. Both switchers and stayers see their premiums decrease in 2009 and 2010. Switchers' advantage over stayers narrows in 2009.

Columns (2) and (3) of Table 5 focus on switchers' *realized savings*. These are measured as the difference between the old plan's premium and the new plan's premium at the same point in time, i.e., these realized savings capture the difference between the premium that an individual would have had to pay had she stayed in her old plan and her actual premium in the new plan. In contrast to the first measure, this measure is always 0 for stayers and takes into account changes in the old plan's premium over time. As in the first exercise, premiums for both plans are calculated based on the income reported in *t* and thus premium differences only reflect changes in contribution rates and/or rebates and supplemental fees, but not changes in income. The realized savings measure may be positive or negative for switchers. A positive value indicates that the switcher would have paid more in her old plan than she pays in the new plan and thus that she saved from switching (ex post). A negative value indicates that the switcher loses money from switching (ex post). This can happen either because individuals switch to a plan that is already more expensive at the time they switch or as the old and/or new plan change premiums after an individual has switched. For example, if the individual's old plan decreases its premium to a level lower than the new plan's premium after the individual has switched, the individual will realize ex post losses from switching. As we do not observe the exact timing of switches in our data, we cannot distinguish whether individuals made an ex ante choice to switch to a more expensive plan or whether they were surprised by changes in the plans ex post. We calculate switchers' ex post savings for each month between two adjacent interviews and use the average monthly realized savings as dependent variable in the regression presented in column (2) of Table 5.

Column (2) of Table 5 shows coefficients of an OLS regression of this measure on the choice environment variables. In column (3) the dependent variable in the OLS regression is the ratio of realized over potential savings, which measures the percent of potential savings that are realized. Column (2) indicates that on average switchers pay 6.3 Euros less per month in their

new plan than they would have paid in their old plan, and column (3) suggests that this reflects 34% of potential savings. Switchers save less when more plans are available but they also save less and realize a lower fraction of their potential savings after the 2009 reform. This suggests that a larger choice set not only reduces switching rates but also worsens the average quality of the choices among switchers. After the 2009 reform, however, more individuals switch but the quality of switches as measured by realized savings is lower on average.

Overall, the analyses suggest that switchers do better than stayers and that the average switcher saves from switching. Averages, however, might hide important heterogeneity. Figure 4 displays the cumulative distribution functions of realized savings among four different groups of switchers: Those who switched before 2009 facing choice sets with up to 85 plans; those who switched before 2009 with choice sets of more than 85 plans; those who switched in 2009 or 2010 with choice sets with up to 85 plans; and those who switched in 2009 or 2010 with more than 85 plans. With more than 85 plans almost 50% of switchers before 2009 selected a plan in which they ended up paying more than they would have paid in their old plan, while the other half of switchers saved money from switching. In the group of switchers with fewer than 85 plans prior to 2009, only about 25% of individuals switched to plans in which they ended up paying more, while 75% of individuals saved from switching. With fewer plans, a larger fraction of switchers thus saved from switching prior to 2009. While Table 5 suggests that in 2009 and 2010 switchers realized lower savings on average (relative to the period before 2009), the cumulative distribution functions show that a lower share of them switched to more expensive plans. However, a relatively large fraction (30% for those who choose between up to 85 plans and 55% of those who choose between more than 85 plans) switched to a plan that is as expensive as their old plan, while the rest (around 40% of those with up to 85 plans and 25% of those with more than 85 plans) save from switching.

Overall, the results suggest that fewer plans allow a larger share of switchers to realize savings and that the change in framing in 2009 might have prevented a larger share of individuals from switching to more expensive plans.

8. Sensitivity Analyses

Table 6 reports on the sensitivity of our main results. All results presented in this table are based on linear probability models of health plan switching with individual fixed effects, as in column (2) of Table 3.

The results presented in the first column of Table 6 explore the possibility of a non-linearity in the relationship between the size of the choice set and the probability to switch

plans. We include categories for the number of plans instead of the actual number of plans to capture the size of the choice set. This provides a basic test of the inverted-U hypothesis that has been associated with decision overload (Frank and Lamiraud, 2009), i.e., whether switching probabilities initially increase and then, upon reaching a maximum, decrease in the number of choices. Like in the main analysis, the results indicate that individuals react less to their potential savings with more plans. However, the probability to switch still increases with the number of available plans holding potential savings constant. As the choice sets in Germany are larger than in other settings, our results are not directly comparable to related estimates. For instance, Frank and Lamiraud (2009) estimate an inverted-U relation (initial increase and subsequent decrease) in the switching probability for choice sets that include 30 to 70 plans in Switzerland, while McWilliams et al. (2011) find that the probability of enrollment in U.S. Medicare Advantage plans peaks for choice sets of 15-30 plans. Taken together, this evidence suggests the existence of multiple local maxima.

In column (2) of Table 6 we exclude retirees for whom we were not able to identify their current or next health plan with certainty. Excluding these 100 cases does not change our results.

In column (3) we present results that exclude all individuals who ever report having selected an alternative plan. Since 2007, insurers in the SHI may offer alternative plans that differ slightly from the standardized plans, e.g. the plans can have deductibles and pay rebates in case enrollees do not use any health care services in a given year. Individuals who choose an alternative plan are often only allowed to switch to a different plan once they have been with the alternative plan for at least 3 years. Switching rates among individuals in alternative plans might thus be lower and individuals in these plans are not able to react to their potential savings. Unfortunately, we only observe whether individuals have selected an alternative plan in 2008, 2009 and 2010, and thus cannot take selection into alternative plans into account for all years. Excluding all observations of individuals who report being in an alternative plan in any of the years 2008, 2009 or 2010, however, does not change our results.

In our main analysis, we treat individuals from the same household as independent observations, as long as these individuals report being paying health insurance members. Individuals who report being insured via another member of their family are excluded as they do not make a health insurance choice themselves – they are covered by the primary member's plan. However, health insurance choices within a household may not really be independent of each other. This may result in correlation of error terms within households, which can be

addressed by clustering the standard errors at the household rather than the individual level.[13] A bigger concern could be that some households effectively make only one (joint) health insurance choice, whereas we count multiple choices for the household and thus essentially increase our sample size. In our sample, about 40% of respondents share a household. Including each household only once with a randomly chosen member thus reduces our sample size by 20%. This is a very conservative restriction because we exclude individuals in multiple-member households who may be making independent decisions. Column (4) of Table 6 displays results based on the smaller sample using household instead of individual savings from switching as potential savings measure. The results are very similar to our main results indicating that the latter are not driven by mistaking household for individual choices.

In column (5) we restrict the number of plans to larger plans, as consumers may not consider smaller fringe players in their decisions (Frank and Lamiraud, 2009). Instead of the total number of plans we only use plans with at least 1% market share in the regional market. The results in column (5) suggest that a higher number of larger health plans reduces the probability to switch and the price sensitivity of health plan choice though the coefficients are not statistically significantly different from zero. These results are in line with Frank and Lamiraud's findings that switching rates are largely driven by the number of fringe firms in the market. The complexity of choice thus does not merely depend on the number of larger plans.

In column (6) of Table 6 we follow Frank and Lamiraud (2009) and use the (weighted) standard deviation of average premiums as a measure for potential savings. This measure has the advantage that it is less sensitive to small outlier plans and is less affected by equilibrium effects. However, it is also less well able to capture each individual's situation and instead reflects what an average person in a plan with above average costs could expect to save when switching to a random plan. It is thus not surprising that none of the coefficients on the interaction terms that include the potential savings measure are significantly different from zero at conventional significance levels.

In the final column of Table 6 we exclude individuals whose spouse is still working as these individuals might be able to choose their spouse's employer-based health plan if the spouse works for an employer that offers such a plan. Since we cannot observe whether a spouses' employer offers an employer-based plan, we cannot construct the complete choice sets for individuals who have a working spouse. The results presented in column (7) of Table 6 are very similar to our main results.

[13] Clustering at the household level does not change the results (available upon request).

9. Discussion

Our study examines policy changes in the choice environment of the German SHI to identify determinants of the price sensitivity of health plan choice. We focus on two features of the choice environment, the size of the choice set and the salience of price differences, and evaluate how exogenous variation in these two features affects retirees' price sensitivity of plan choice in a large individual-level panel. We also examine possible heterogeneities in these effects across individuals with respect to observable characteristics, such as physical health status, income, education, and cognitive ability. Understanding the impact of the choice environment and its heterogeneities might help to target interventions to support individuals' health plan choices and increase their ability to capture the benefits of competitive insurance markets.

Our results indicate that the choice environment can impact how much individuals react to the amount of money that they can save from switching. In particular, they react more to the savings if they have fewer plans to choose from. They also react more to potential savings if those savings are more salient, a finding in line with related research on the salience of taxation (Chetty et al., 2009; Finkelstein, 2009). Our results also indicate that the increase in salience mainly acts via a change in the framing of premium differences. In particular, if the difference to a cheaper plan is cast as a supplemental fee, it seems to be easier for retirees to understand that they are paying more than necessary. This finding underlines the potential importance of "comparison frictions" (Kling et al., 2012) and suggests that modifying the framing of premiums may be a feasible policy to reduce these frictions and increase consumers' price sensitivity. We also found that complexity seems to be driven by firms of all sizes, which suggests that consolidation of fringe players could facilitate comparisons and switching. This finding also indicates a potential role for policies that address the industrial organization of the SHI market.

We also find that on average individuals realize savings when switching plans, and that 50% of switchers save from switching. Furthermore, switchers perform better (capture a higher share of the feasible savings) when the plan menu is smaller. The 2009 reform increased the number of switchers but was not associated with higher average savings among switchers. However, it decreased the share of switchers who select a plan that is more expensive than their original plan but has the same (standardized) benefits. This suggests that, at least from a basic consumer perspective, there was initially "too much choice" in the SHI and that the policy changes increased both the switching rates and the quality of choices.

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Tables

Table 1: Reform 2009 - Examples

	Plan-specific Rate				Uniform Rate					
Health Plan	**2005**	**2006**	**2007**	**2008**	**2009**		**2010**		**2011**	
	(%)	(%)	(%)	(%)	rate(%)	fee(+)/reb(−)	rate(%)	fee(+)/reb(−)	rate(%)	fee(+)/reb(−)
Gemeinsame BKK Köln	15.3	15.3	16.2	16.6	15.5	-	14.9	+ €8	15.5	+ €8
BKK für Heilberufe	14.8	14.8	15.7	16.2		-		+ 1%		+ €10
hkk	13.5	13.5	14.1	14.1		− €5		− €5		− €5
Techniker Krankenkasse	13.7	13.7	14.4	14.7		-		-		-

Notes: Contribution rates (as % on income) for February of the respective year. Since 2009 there is a uniform contribution rate for all plans, but plans can levy supplemental fees or issue rebates. Until 2011 the latter could be framed either as % on income or in absolute values. Since 2011, the law requires absolute values. There were no supplemental fees or rebates in January 2009. The first plans (hkk and IKK Südwest) introduced rebates in February 2009. The first supplemental fee was introduced in September 2009 by Gemeinsame BKK Köln.

Table 2: Descriptive Statistics – Retirees

	Entire Sample		Allowed to switch		Paid directly		Did not pay directly	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	mean	sd	mean	sd	mean	sd	mean	sd
Individual level variables								
Switches plan	0.027	0.16	0.027	0.16	0.020	0.14	0.029	0.17
Months at risk	12.0	1.37	12.0	1.37	12.0	1.57	12.0	1.34
Allowed to switch	0.99	0.098	1	0	1	0	1	0
# Plans	97.9	17.0	97.9	17.0	101.3	17.3	97.3	16.9
# Plans with market share $> 1\%$	13.8	1.41	13.8	1.41	13.9	1.45	13.8	1.40
Potential savings Euro/month	11.0	9.77	11.0	9.75	17.0	16.7	9.92	7.45
Increase rate/fee	0.30	0.46	0.30	0.46	0.33	0.47	0.30	0.46
Plan merges	0.13	0.33	0.13	0.33	0.13	0.33	0.13	0.33
Age (years)	73.2	6.18	73.2	6.18	72.7	5.60	73.3	6.27
Female	0.53	0.50	0.53	0.50	0.31	0.46	0.57	0.49
Education (years)	11.2	2.30	11.2	2.29	12.7	2.86	11.0	2.08
German national	0.89	0.31	0.89	0.31	0.92	0.26	0.89	0.32
Eastern German	0.33	0.47	0.33	0.47	0.16	0.36	0.36	0.48
# Kids in household	0.0080	0.11	0.0078	0.11	0.0063	0.10	0.0081	0.11
Household size	1.79	0.62	1.79	0.62	1.88	0.53	1.77	0.63
Married	0.65	0.48	0.65	0.48	0.75	0.43	0.63	0.48
Bad or very bad health	0.33	0.47	0.33	0.47	0.24	0.43	0.35	0.48
Household income (in 1000 Euros)	25.8	17.0	25.8	17.0	36.2	24.6	24.0	14.5
Supplemental private insurance	0.15	0.36	0.15	0.36	0.31	0.46	0.12	0.32
Voluntary SHI	0.041	0.20	0.041	0.20	0.25	0.43	0.0038	0.061
Retires this year	0.0058	0.076	0.0056	0.075	0.018	0.13	0.0033	0.058
Working spouse	0.026	0.16	0.026	0.16	0.027	0.16	0.026	0.16
Low cognition (N=3405)							0.28	0.45
Regional variables - lagged								
Doctors/capita	1.91	0.61	1.91	0.61	1.96	0.61	1.90	0.61
Hospitals/capita	0.024	0.0043	0.024	0.0043	0.025	0.0042	0.024	0.0043
Hospital beds/capita	6.32	0.58	6.32	0.58	6.26	0.56	6.34	0.58
GNP/capita	33964.5	17239.7	33963.4	17237.4	36998.1	16554.3	33429.1	17300.6
Instruments - lagged								
Administrative payment rate	2739.0	110.6	2739.0	110.4	2740.8	113.0	2738.6	110.0
# Hospital cases (in 1000)	1432.4	769.8	1432.4	770.1	1659.2	774.1	1392.5	762.5
N	13904		13768		2061		11707	

Notes: Retirees (aged 65+) in SOEP years 2005-2007, 2009-2010, unbalanced sample. Information from interviews in 2011 is used to calculate potential savings between interviews 2010 and 2011 and to construct information on switching between these two interviews.

Table 3: Linear Probability Model for Health Plan Switching Among Retirees

	(1) Controls	(2) FE	(3) IV	(4) Full Int.	(5) Full Int. IV
Potential Savings (PS)	0.1850^{+}	0.2810^{+}	0.4479*	0.2661^{+}	0.2314
	(0.116)	(0.161)	(0.222)	(0.163)	(0.168)
PS × 2009	0.3050**	-0.2112	-0.2615	0.3424	0.1828
	(0.138)	(0.168)	(0.187)	(0.473)	(0.532)
PS × 2010	0.8369**	0.5389*	0.4216	2.0040*	1.9018*
	(0.290)	(0.295)	(0.309)	(0.961)	(0.939)
# Plans	0.1992**	0.2354**	0.3904***	0.1224*	0.3762
	(0.083)	(0.085)	(0.121)	(0.064)	(0.261)
PS × # Plans	-0.0027	-0.0056*	-0.0090*	-0.0053*	-0.0047
	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
# Plans × 2009				0.0921	0.2307
				(0.097)	(0.196)
# Plans × 2010				0.4122	0.5913
				(0.298)	(0.438)
PS × # Plans × 2009				-0.0174	-0.0128
				(0.013)	(0.015)
PS × # Plans × 2010				-0.0891*	-0.0826^{+}
				(0.050)	(0.048)
Ind. F.E.	No	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes	Yes
Add controls	Yes	Yes	Yes	Yes	Yes
Angrist & Pischke F					
# Plans			61.73		5.16
PS × # Plans			152.86		209.64
# Plans × 2009					12.91
# Plans × 2010					12.89
PS × # Plans × 2009					38.34
PS × # Plans × 2010					51.02
N	11707	11707	11707	11707	11707
adj. R^2	0.013	-0.344	-0.345	-0.339	-0.341

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ + $p < 0.15$

Notes: Retirees (aged 65+) in SOEP years 2005-2007, 2009 and 2010 who are allowed to switch plans and did not pay part of their health plan premium directly to their health plan already prior to 2009. Coefficients are multiplied by 100. Standard errors in parentheses allow for serial correlation over time as well as clustering within regions. p-values are calculated using a t-distribution with number of region-2 as degrees of freedom to correct for small number of clusters. Additional controls as shown in table 2. IV estimations are just identified using lagged regional administrative payment rate interacted with number of hospital cases, and their interaction with all variables that are interacted with number of plans in the respective model. Angrist and Pischke F statistics for weak identification. The variable # plans is rescaled as the original value minus 58 (the minimum number of plans in the data).

Table 4: Heterogeneities

	(1)	(2)	(3)	(4)	(5)
Group=	Direct payers	Poor health	Low educ	Low income	Low cogn.
Potential Savings (PS)	0.2750^{+}	0.3915	0.3990**	0.4220	0.4989^{+}
	(0.168)	(0.262)	(0.142)	(0.296)	(0.312)
PS × 2009	-0.2317	-0.3881^{+}	-0.1042	-0.5044^{+}	-0.1704
	(0.173)	(0.246)	(0.198)	(0.308)	(0.293)
PS × 2010	0.5277^{+}	0.6351*	0.6217*	0.3464	0.7463
	(0.307)	(0.330)	(0.332)	(0.349)	(0.576)
# Plans	0.2138**	0.2622**	0.2710***	0.2663	0.2217
	(0.084)	(0.110)	(0.082)	(0.199)	(0.180)
PS × # Plans	-0.0055^{+}	-0.0079^{+}	-0.0071**	-0.0081	-0.0093^{+}
	(0.003)	(0.005)	(0.003)	(0.006)	(0.006)
Group × 2009	-5.2828	-2.6886	-0.0864	-3.9764	6.3840
	(5.400)	(3.557)	(3.039)	(3.914)	(7.178)
Group × 2010	-7.0940	0.0194	-3.3287	-1.3791	13.6444
	(5.480)	(5.111)	(6.115)	(6.763)	(13.363)
Group × PS	-0.2100	-0.2048	-0.6175**	-0.2693	0.1279
	(0.144)	(0.314)	(0.276)	(0.295)	(0.988)
Group × PS × 2009	0.6768	0.3617	-0.6437^{+}	0.5185^{+}	0.1032
	(0.600)	(0.348)	(0.421)	(0.336)	(0.671)
Group × PS × 2010	0.2899	-0.2073	-0.5531	0.3817	-0.2873
	(0.511)	(0.426)	(0.822)	(0.392)	(1.281)
Group × # Plans	-0.1646	-0.0422	-0.1844^{+}	-0.0413	0.4075
	(0.136)	(0.147)	(0.110)	(0.214)	(0.340)
Group × PS × # Plans	0.0044^{+}	0.0044	0.0072	0.0043	-0.0040
	(0.003)	(0.006)	(0.005)	(0.006)	(0.018)
Ind F.E.	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes	Yes
Add controls	Yes	Yes	Yes	Yes	Yes
Switching rate pre 2009					
Group	0.018	0.026	0.031	0.025	0.016
Reference	0.025	0.025	0.023	0.026	0.019
N	13723	11707	11707	11707	3405
adj. R^2	-0.344	-0.344	-0.341	-0.344	-0.318

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ + $p < 0.15$

Notes: Retirees (aged 65+) in SOEP years 2005-2007, 2009 and 2010 who are allowed to switch plans and (except for column 1) did not pay part of their health plan premium directly to their plan prior to 2009. Coefficients are multiplied by 100. Standard errors in parentheses allow for serial correlation over time as well as clustering within regions. p-values are calculated using a t-distribution with number of region-2 as degrees of freedom to correct for small number of clusters. Additional controls as shown in table 2. The variable # plans is rescaled as the original value minus 58 (the minimum number of plans in the data).

Table 5: Savings from Switching

	(1) Switchers and Stayers Premium t - Premium t+1	(2) Switchers Realized Savings	(3) Switchers Realized/Potential Savings
# Plans	0.001	-0.110***	-0.009***
	(0.010)	(0.028)	(0.003)
2009	0.327	-2.170***	-0.031
	(0.303)	(0.795)	(0.092)
2010	1.677***	-2.078	-0.218*
	(0.427)	(1.411)	(0.128)
Switched	5.212***		
	(1.346)		
Switched × 2009	-1.675*		
	(1.004)		
Switched × 2010	-1.340		
	(1.144)		
Switched × # Plans	-0.100***		
	(0.028)		
Constant	-1.824***	6.282***	0.339**
	(0.598)	(1.506)	(0.181)
Monthly premium prior to 2009			
Average	86.60	92.57	
Median	78.23	86.19	
N	11704	333	330

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ + $p < 0.15$

Notes: Clustered standard errors on individual and regional level in parentheses. p-values adjusted for small number of clusters. The sample in column (1) is reduced by 3 compared to the general sample because for 3 individuals the plan in year t+1 is not known. Number of switchers is lower in last column because there are 3 observations among the switchers with potential savings of 0.

Table 6: Sensitivity Analyses

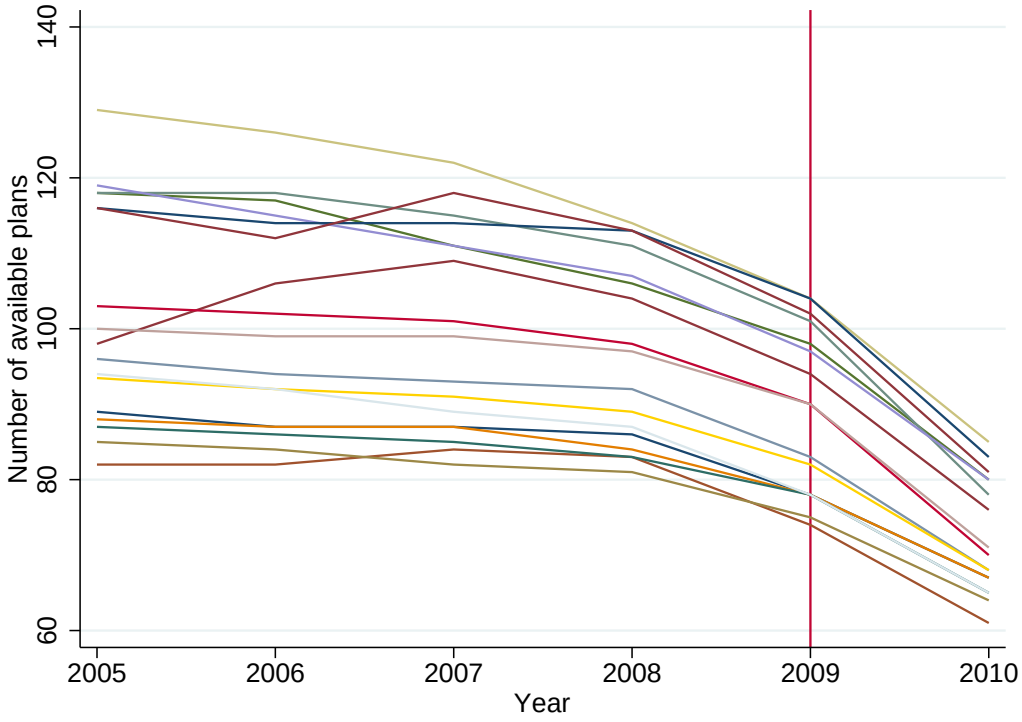
	(1) Plan categories	(2) No uncertain	(3) No alternative plan	(4) Only one HH member	(5) Only large plans	(6) SD of premiums	(7) No work. spouse
Potential Savings (PS)	-0.0085	0.2500^{+}	0.2972^{+}	0.2487^{+}	-0.0209	3.7534	0.2889^{+}
	(0.060)	(0.149)	(0.175)	(0.151)	(0.338)	(2.716)	(0.167)
PS × 2009	-0.1949	-0.1762	-0.1921	-0.0652	0.2432*	-0.0053	-0.2410
	(0.147)	(0.174)	(0.177)	(0.112)	(0.136)	(2.800)	(0.180)
PS × 2010	0.4405	0.6072*	0.5424^{+}	0.2075^{+}	0.7347*	19.8542	0.5496^{+}
	(0.403)	(0.291)	(0.314)	(0.130)	(0.415)	(15.570)	(0.328)
# Plans		0.2190**	0.2448**	0.2233**	-0.4274	0.2756	0.2247**
		(0.079)	(0.094)	(0.094)	(0.332)	(0.184)	(0.084)
$<$ 85 plans	-3.1880**						
	(1.252)						
$>$100 plans	2.0863**						
	(0.972)						
PS × # Plans		-0.0053*	-0.0059*	-0.0050^{+}	-0.0003	-0.0553	-0.0056*
		(0.003)	(0.003)	(0.003)	(0.024)	(0.051)	(0.003)
PS × $<$ 85 plans	0.3025***						
	(0.088)						
PS × $>$100 plans	-0.0035						
Ind F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Add controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11707	11607	10807	9261	11707	11707	11381
adj. R^2	-0.344	-0.344	-0.343	-0.352	-0.347	-0.351	-0.345

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ $^{+}$ $p < 0.15$

Notes: Based on specification (2) in table 3, coefficients are multiplied by 100, clustered standard errors on individual and regional level in parentheses. p-values adjusted for small number of clusters.

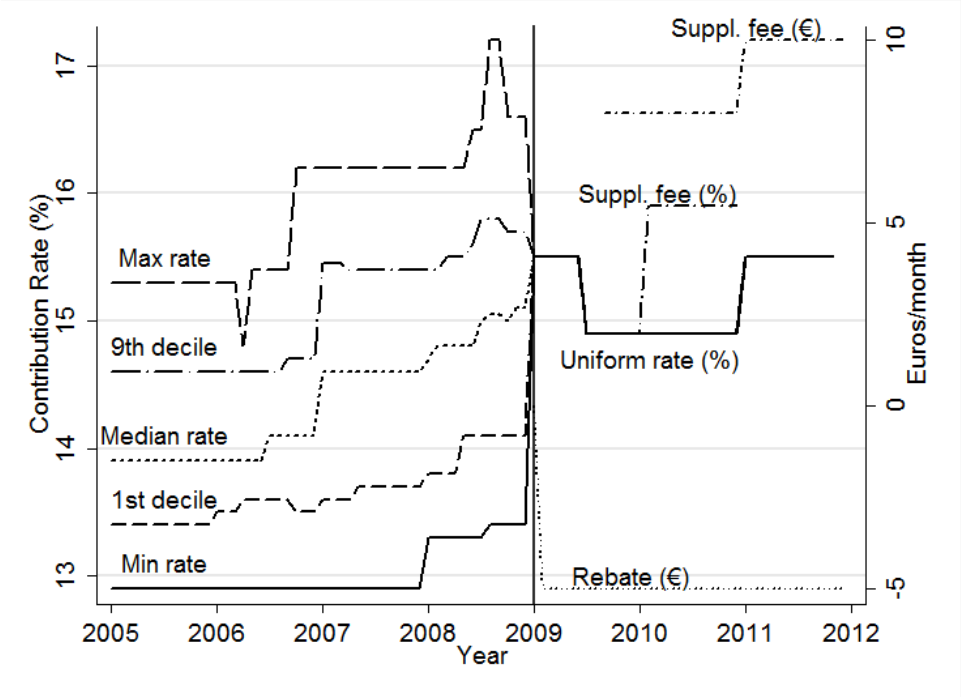
Figures

Figure 1: Size of Choice Set across Regions and Years



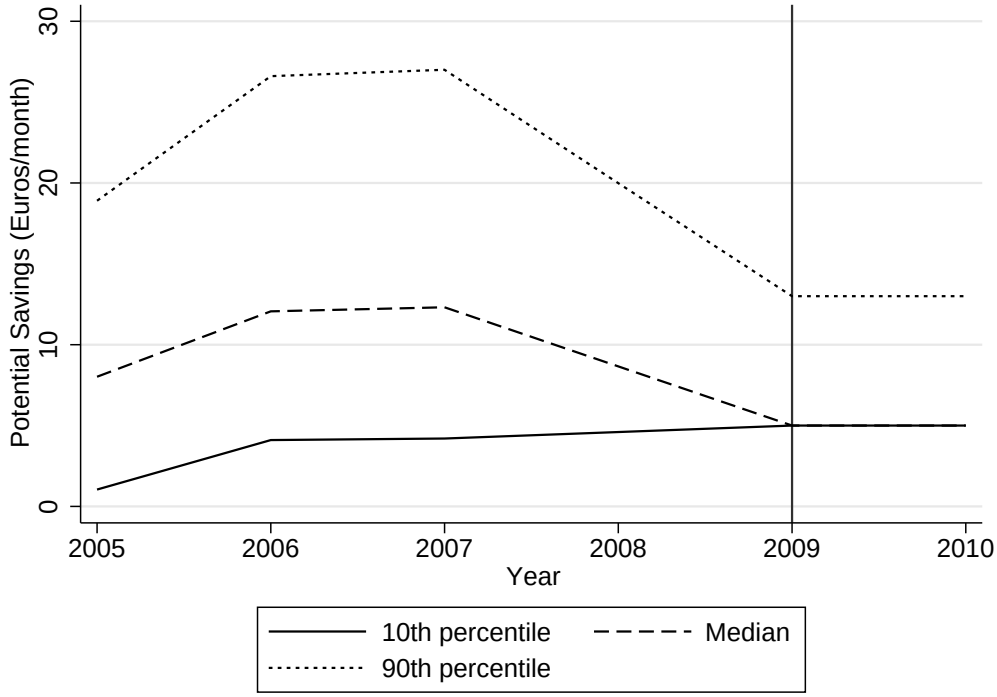
Note: Number of available health plans for the 17 health insurance regions in Germany. Number of plans can vary within year. Figure shows maximum number of plans within region for given year. Source: German Consumer Report (Stiftung Warentest)

Figure 2: Contribution Rates, Supplemental fees and Rebates



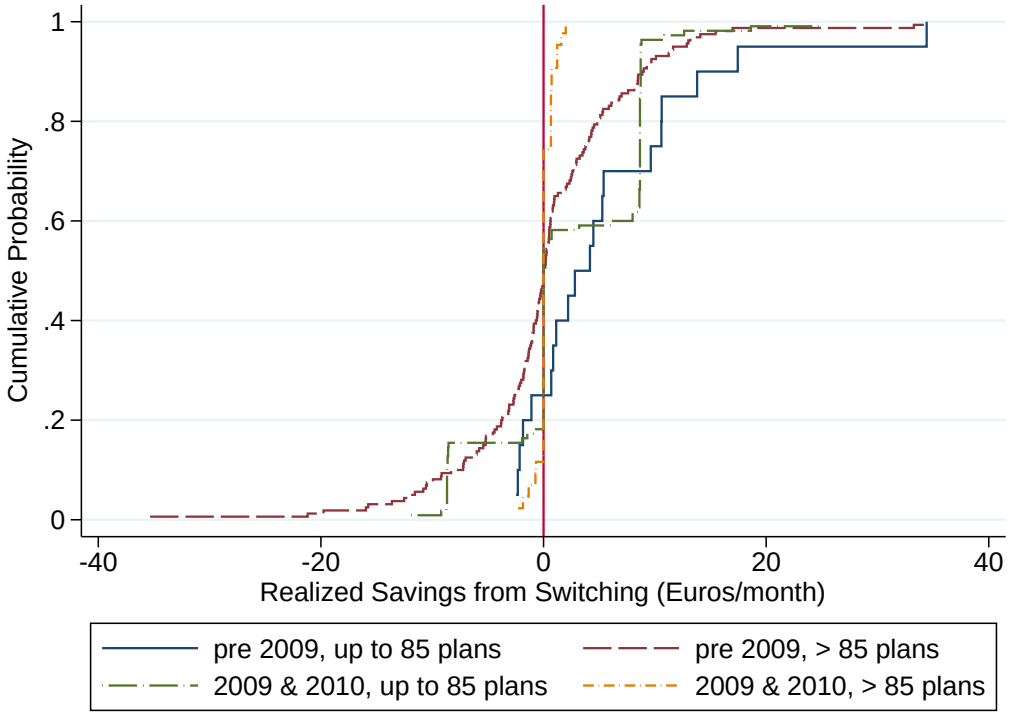
Note: Based on plans that are common to the choice sets in all regions. Source: German Consumer Report (Stiftung Warentest)

Figure 3: Potential Savings over Time



Note: Figure displays quantiles of the consumers' part of savings from switching from her current plan to the cheapest plan in her choice set.

Figure 4: Realized Savings from Switching



Appendix

Table 1: Pre-trends Analyses

	(1) Pr(switch=1)	(2) Pr(switch=1)	(3) Pr(switch=1)
2006	-0.0116^{+}	0.0003	-0.0116^{+}
	(0.008)	(0.005)	(0.008)
2007	-0.0026	0.0008	-0.0026
	(0.007)	(0.005)	(0.007)
Potential savings (PS)	-0.0001		-0.0001
	(0.000)		(0.000)
PS × 2006	0.0010^{+}		0.0010^{+}
	(0.001)		(0.001)
PS × 2007	0.0003		0.0003
	(0.001)		(0.001)
Direct payer		-0.0087	-0.0120^{+}
		(0.007)	(0.008)
Direct payer × 2006		0.0042	0.0220^{+}
		(0.010)	(0.014)
Direct payer × 2007		-0.0010	0.0162
		(0.010)	(0.014)
Direct payer × PS			0.0003
			(0.000)
Direct payer × PS × 2006			-0.0012*
			(0.001)
Direct payer × PS × 2007			-0.0009^{+}
			(0.001)
Constant	0.0258***	0.0248***	0.0258***
	(0.005)	(0.003)	(0.005)
N	7266	8514	8514

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ $^{+}$ $p < 0.15$

Notes: Retirees (aged 65+) in SOEP in years 2005, 2006 and 2007. Coefficients after OLS estimation. Robust standard errors in parentheses. Direct payer indicates whether retiree paid part of premium directly to health plan prior to 2009.

Data Appendix

1. Construction of the choice set

Since 1996, individuals can choose among all plans that operate in their region of residence and their region of employment. Furthermore, certain employers offer employer-based ("closed") plans that only individuals who work for these employers and their spouses can choose. In order to construct the full choice set (of employees) one would thus have to observe their region of residence, their region of employment, and their own and their spouse's current employer. In this paper, we focus on retirees who are older than 65 and who are not employed. In this population, we do not need to observe the region of employment to construct individuals' full choice sets. Employer-based plans are also less of a worry for retirees. These plans are only part of a retiree's choice set in three cases: (a) if their last plan before retirement was a closed plan and they have remained in this plan since, i.e. the plan is their current plan; or (b) if their spouse is a member of an employer-based plan; or (c) if their spouse works at an employer that offers an employer-based plan. In our data, we can observe (a) and (b) but not (c). For our main analysis, we construct the choice set as the set of all plans that operate in each individual's region of residence plus their own and their spouses current plan (if the latter are employer-based plans). Our approach might not capture the full choice set for retirees who have younger spouses that are still working and are working at an employer that offers a closed plan, as in scenario (c). We explore excluding individuals with spouses who are still working as a robustness analysis.

2. Construction of potential savings measure

The premiums that retirees pay for health insurance in the SHI depend on a health plan's contribution rate and on the retirees' income. The relevant income definition includes pensions (social security as well as company and private pensions) and other types of income (such as income from self-employment). For retirees who decide to stay in the SHI as voluntary members, the contribution rate applies to all types of income, e.g. including dividends and rents. These retirees could also choose to get insurance in the private system but decided to stay in the SHI.

Prior to 2009 Reform:

To construct potential savings prior to 2009, we calculate the difference in the contribution rate of an individual's health plan to the cheapest available plan in his choice set for each month during the relevant period at risk. Using this measure we calculate the *maximum monthly potential savings in Euros* that individuals could have gotten from switching by multiplying each respondent's maximum difference in contribution rates with the relevant monthly income that an individual had during the first of the two adjacent years. By using the maximum monthly savings we likely overstate the actual savings that individuals could have gotten in the average month. This may occur because contribution rates fluctuate across the year and we do not observe at what point in the year individuals switch health plans. If they switch in a month in which they could only get less than the maximum savings, we essentially underestimate their sensitivity to savings.

In the multiplication of the difference in contribution rates and income we further take into account that (a) for some types of income retirees bear only half of the contribution rate while the pension fund bears the other half, and that (b) only income below statutory thresholds counts towards premiums. Specifically:

a) For some types of incomes retirees only bear half of the contribution rate while the other half is paid by the pension fund or an employer (social security). For other types of income (income from self-employment, private pensions) the retiree bears the full contribution rate. For social security we thus only use half the difference between contribution rates to construct potential savings.[1]

b) Only income up to a statutory threshold – the so-called *Beitragsbemessungsgrenze* – is used to calculate premiums. We take this into account when calculating the potential savings and cap the maximum potential savings amount at the differences in

[1] Since July 2005, individuals have to pay an additional 0.9% of their income for premiums. As this additional premium is equal for all plans it is differenced out in the savings measure.

contribution rates between an individual's own plan and the cheapest plan in the choice set multiplied by the threshold.

Post-2009 Reform:

Since the 2009 reform, all health plans have the same uniform contribution rate. Differences in premiums arise from plan-specific supplemental fees and rebates. Health plans that require additional resources must implement fees whereas those needing fewer resources can issue rebates. To construct our measure of potential savings we calculate the relevant income measures as before the reform, and how much an individual would save by switching from his current plan to the cheapest plan in the choice set in each month during the period at risk. As prior to the reform, we choose the maximum monthly savings in this period and use it as measure of potential savings.