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Sociodemographic, Economic, and Psychological Drivers of the Demand for Life Insurance: Evidence from the German Retirement Income Act

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Carolin Hecht · Katja Hanewald

Abstract We exploit the natural experiment of the 2005 income tax reform in Germany to study the effects of tax incentives on consumer behavior in life insurance markets. Our empirical analysis of sociodemographic, economic, and psychological household characteristics elicited in the German SAVE study shows that two very different consumer groups buy (endowment) life insurance before and after the tax reform. We find that education plays a central role in reactions to the modified tax environment. Our stylized characterization of “arbitrageur” and “straggler” buyers will assist both life insurance firms and regulatory authorities design effective policies.

Keywords life insurance demand, tax incentives, financial literacy

JEL classifications D12, D14, D91, G22, K34

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INTRODUCTION

Two related trends can be observed in international life insurance and pension markets: first, less generous social welfare systems force individuals to take more responsibility for their financial security and, second, governments try to influence this process by changing the tax incentives for household consumption and savings decisions. One prominent example of this situation is U.S. 401(k) retirement saving plans, which benefit from deferred income taxes on contributions and earnings. However, budget constraints regularly require fiscal authorities to reduce or eliminate tax advantages—with severe consequences for consumer behavior. The U.S. Deficit Reduction Act of 1984, for example, eliminated most tax advantages of endowment life insurance contracts. Since then, these policies, which combine savings accumulation with death benefit coverage, are only very rarely sold in the United States (Dorfman, 2002, pp. 280–281). A similar situation can be seen in Germany: generous tax exemptions for premium payments and survival benefits made endowment insurance *the* most popular form of life insurance for decades.¹ With enactment of the Retirement Income Act on January 1, 2005, however, endowment insurance policies lost their substantial tax advantage over alternative investments. The effects are clearly seen in the number of new endowment insurance policies written in Germany: after a sharp increase of 66.4% in 2004 attributable to a “sales effect,” the new endowment insurance business decreased drastically by 63.7% in 2005 and has continued to decrease ever since (see Figure 1).

In this study, we exploit the “natural experiment” of the 2005 tax reform in Germany to analyze characteristics of endowment insurance buyers and draw general conclusions about the effects of tax incentives on life insurance demand. Our analysis is based on the German

¹ The most common form of German life insurance policies [*Kapitallebensversicherung*] is sometimes translated as “whole life insurance”; the actual equivalent is “endowment insurance.” These policies pay out all accrued savings at the end of the policy term or the lump sum insured in case of premature death of the insured. Furthermore, they typically participate in the insurer’s profits that exceed the guaranteed minimum interest rate.

SAVE study, a rich panel data set offering detailed information on households' financial, sociodemographic, and psychological characteristics. We focus on the actual purchasing decision (instead of analyzing intentions to buy insurance), and use the panel structure of the SAVE survey to identify endowment insurance purchases. Thanks to the comprehensive information on individuals' life insurance consumption, we can separate endowment insurance from term life insurance demand and thus provide a clean-cut econometric analysis.

Our study makes two important contributions to the literature. First, it examines the demand for endowment insurance on the microeconomic level of the household, incorporating a large set of economic, sociodemographic, and psychological indicators. Our analysis includes the household's direct assessment of key features of endowment insurance policies. Second, the natural experiment of the 2005 tax reform is used to classify households that (do not) vary their decision to buy life insurance in response to the tax reform according to their self-reported characteristics. Our resulting characterization of “arbitrageurs”—those who bought insurance before the reform—and “stragglers”—those who purchased afterward—provides valuable information for insurance firms and regulatory authorities: insurers need to know their customers' (price-) sensitivity to changes in product characteristics and tax treatment, and the design of effective regulation requires reliable information on the reaction of market participants.

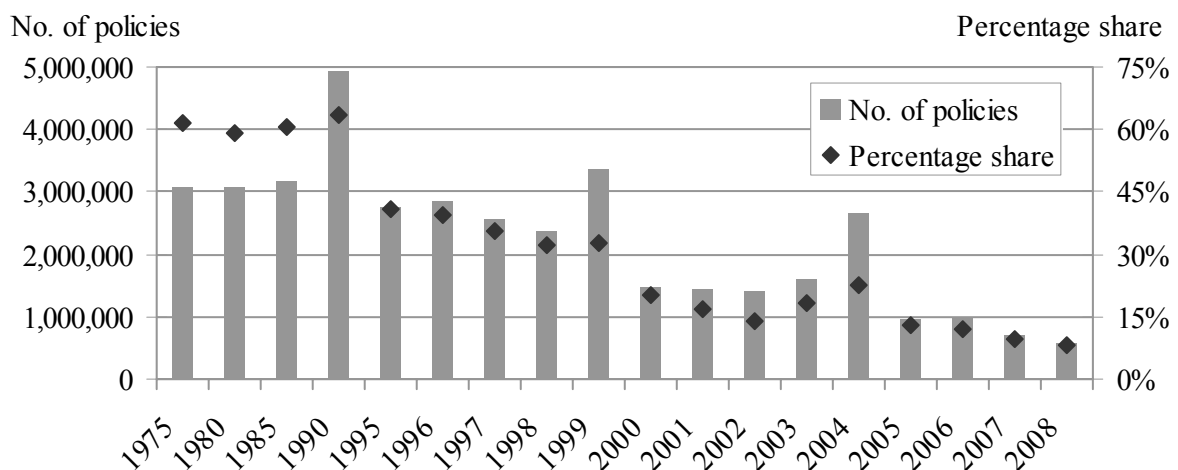
The rest of this article is organized as follows. In the next section, we review the role of endowment insurance policies in Germany. A brief overview of relevant literature on life insurance demand follows. We then derive a model of endowment insurance demand and derive testable hypotheses that form the basis for the empirical analysis. We next describe our data and methodology. Empirical results are subsequently presented. Our conclusions are set out in the final section.

ENDOWMENT INSURANCE IN GERMANY

Endowment insurance has been a bestseller in the German life insurance market for decades. Between 1975 and 1990, endowment policies accounted for about 60% of all newly written individual life insurance contracts (see Figure 1). A historic peak was reached after German Reunification in 1990 when 16 million new citizens entered the insurance market. In the mid 1990s, however, sales started to gradually decline due to the rising popularity of pension and annuity products. This downward trend was interrupted two times. In 1999, an increase of about 42% is observed due to the anticipated 2000 tax reform that halved the tax exemption limit for capital income. The second, and much higher, increase in the number of new endowment policies was induced by the German Retirement Income Act of 2005 (12% in 2003 and another 66% in 2004), which is the focus of our study.

Figure 1

New business in endowment insurance in Germany, number of policies and percentage share of newly written individual life insurance contracts, 1975–2008



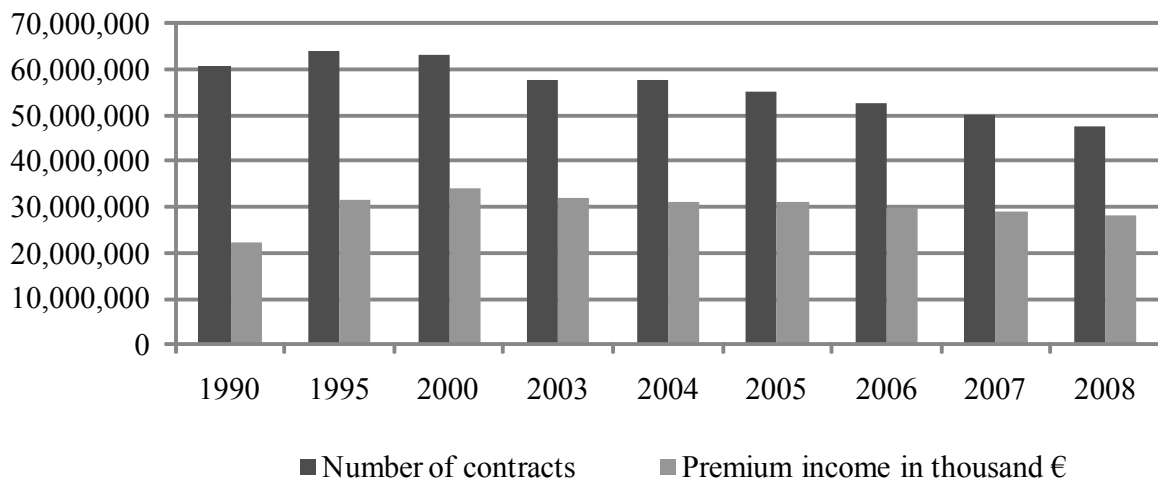
Note: Own calculation on the basis of data from GDV (2009a).

The consequences for endowment insurance business in force are illustrated in Figure 2. After having reached a peak of almost 64 million contracts in 1995, this line of business decreased to 48 million contracts in 2008. Premium income, however, has remained relatively stable,

with 31 billion EUR in 1995 and 28 billion EUR in 2008. So, endowment insurance still plays an important role in the German life insurance market.

Figure 2

Business in force in endowment insurance in Germany, 1990–2008



Source: Own calculation on the basis of data from GDV (2009b).

Endowment insurance policies in Germany have enjoyed a long tradition of special tax treatment (see, e.g., Mauch, 1994). These privileges date back to the 1891 Prussian income tax law, which provided for setting off premium payments against tax liability and for a full tax exemption for accrued gains. Since then, the law has undergone only slight modifications, mainly having to do with the maximum tax-deductible premium amount and conditions for the policy returns to be eligible for tax exemption, such as minimum duration or use of funds (Waldow, 2002). The two key features of the 1891 law, however, remained essentially unchanged for decades. Thus, for endowment insurance contracts closed as late as 2004, premium payments were partially tax deductible as “special expenses” up to a threshold that varied by marital status and type of employment.² Insurance benefits were fully tax exempt if at maturity the policyholder was older than 60, the contract has been in force for 12 years,

² Compared to the tax exemption for insurance benefits, premium deductibility is a subordinate tax advantage since the “special expenses” threshold is typically exhausted by households’ obligatory contributions to the social security system.

premiums had been paid for at least five consecutive years, and the death protection component accounted for at least 60% of insurance benefits (§10 Para. 1 No. 3b, EStG 2005).

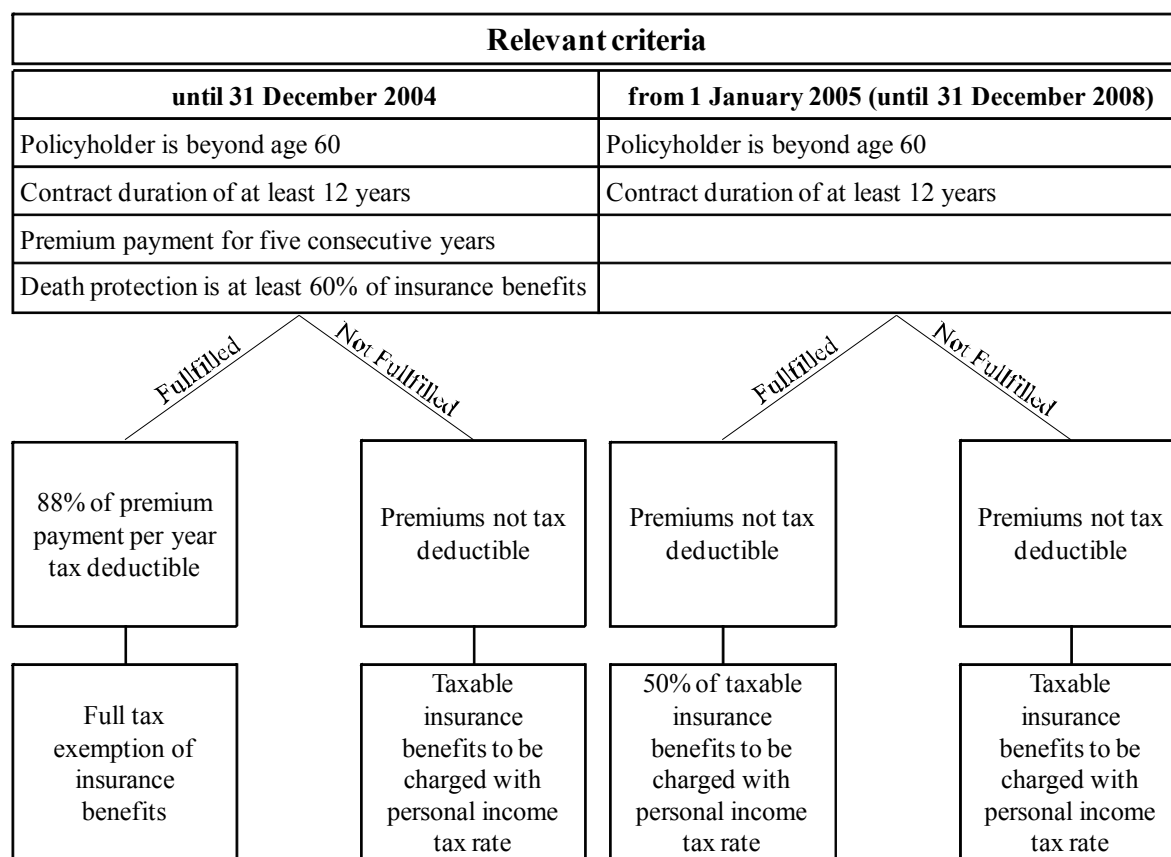
On January 1, 2005, however, the Retirement Income Act (*Alterseinkünftegesetz*) substantially changed the fiscal treatment of endowment insurance policies in Germany. The act constituted a response to the decision of the German Federal Constitutional Court in March 2002 holding that the differential taxation of civil servants' pensions and payments from the German public pension system is incompatible with the principle of equality set forth in the Basic Constitutional Law (German Federal Ministry of Finance, 2005a). The act introduced the transition to a downstream taxation (i.e., tax exemption of premium payments for old-age provision and taxation of retirement income) with the goal of promoting annuity products (German Federal Ministry of Finance, 2005a). To make endowment insurance (with lump-sum payment at maturity) more equal to other capital investment products, its special treatment in the tax system was abolished. The abolishment of tax privileges was justified by the fact that lump-sum benefits do not provide life-long retirement income (German Federal Ministry of Finance, 2005a).

The modified income tax act makes lump-sum insurance benefits of endowment plans subject to the personal income tax rate of the policyholder. If, however, insurance benefits are paid after age 60 and the contract has been in force for 12 years, only half the taxable insurance earnings (i.e., the difference of maturity payment and paid premiums) are included in the policyholder's personal income tax. If these conditions are not met, insurance earnings are taxed fully. Premium payments are no longer tax deductible (German Federal Ministry of

Finance, 2005b). Figure 3 summarizes the changes in the tax treatment of endowment insurance policies before January 1, 2005 and afterward.³

Figure 3

Tax treatment of endowment insurance policies with lump-sum payments at maturity before and after the German Retirement Income Act



³ Since January 1, 2009, returns from maturity, termination, or sale of endowment insurance policies are, in general, subject to the final withholding tax rate of 25%. If the half earnings tax procedure is applicable, endowment insurance policies are taxed with the personal income tax if matured or terminated.

LITERATURE REVIEW

We use the 2005 income tax reform in Germany to empirically analyze the effects of tax incentives on individual life insurance demand. Results of our study contribute to a number of different streams of the insurance literature, which are briefly reviewed here. We follow a general-to-specific approach in this literature review, beginning with the literature on life insurance demand followed by the literature on endowment insurance covering specific aspects, such as financial literacy or East/West German differences.

The seminal studies by Yaari (1965), Hakansson (1969, 1970), and Merton (1969, 1971) provide the theoretical foundation for most empirical studies on life insurance demand. Zietz (2003) gives an extensive overview of empirical findings on the determinants of individual life insurance demand. She summarizes key demographic and economic factors, and points out other related aspects, such as risk aversion, bequest motives, and inflation. Recent studies add several new aspects to these findings. Chang (2005) finds social networks to be essential for household saving and investment information. Such networks are used most often by those with least wealth; wealthier households are more likely to turn to paid financial professionals and the media. Using cross-section data for 30 OECD countries, Li et al. (2007) find sociodemographic factors and product market characteristics to be significant influences on life insurance demand. Carson and Fier (2009) find increased risk awareness due to the occurrence of catastrophic events to be a driver of life insurance demand, and Carson et al. (2009) provide evidence that life events play a major role in life insurance purchase decisions.

Results concerning the sign of single factors, however, differ substantially. For example, Anderson and Nevin (1975) and Hau (2000) observe a positive relationship between household wealth and life insurance demand; they argue that higher financial assets require higher coverage via life insurance to ensure an upscale standard of living. In contrast, Fortune

(1973) and Lewis (1989) report a negative effect of financial wealth on life insurance demand and explain this finding by the increased opportunity of using “internal hedging” as financial assets increase. These contrasting findings are possibly due to different time periods, data sources, or empirical methods used in the respective analyses. The type of life insurance products analyzed differs as well: some studies consider term life insurance and life insurance policies with savings components separately (Neumann, 1969; Anderson and Nevin, 1975; Ferber and Lee, 1980; Hau, 2000), whereas others do not distinguish between the two (see, e.g., Browne and Kim, 1993; Showers and Shotick, 1994; Gandolfi and Miners, 1996).

Endowment life insurance is an attractive investment vehicle as it pays out regardless of whether the insured lives or dies within a certain time period. There are some empirical studies on endowment insurance demand; many of them focus on the German market: Wähling et al. (1993) analyze consumer motives and find bequest and old-age provision motives to be most dominant for endowment insurance demand. Brunsbach and Lang (1998) calculate that an average household could achieve a 54% higher after-tax return with endowment insurance saving than with any other form of asset formation. Surprisingly, however, the authors observe no demand-increasing effect of this tax privilege. Müller (1998) identifies security aspects, asset formation, bequest, old-age provision, and capital investment as the five leading motives for endowment insurance demand. Further, he finds product specifics, such as the extreme planning horizon of endowment insurance policies (on average 31 years; GDV, 2006), the relatively high level of premium payments, and the altruistic nature of dependents’ protection, to be significant in consumer purchasing decisions. Walliser and Winter (1998) study data from the German Consumer Expenditure Survey (EVS), finding that both bequest motives and tax incentives are driving forces of endowment insurance demand. They show that the influence of external factors on life insurance demand changes

significantly if a savings component is added, which illustrates the importance of controlling for the specifics of endowment insurance.

The focus of our study is the effect of the substantial 2005 German retirement income tax reform on endowment insurance demand. A very recent study by Sauter, Walliser, and Winter (2010) on the effects of the 2000 tax reform that halved the tax exemption limit for capital income in Germany provides an interesting comparison with our work. Using data from the German Socioeconomic Panel Study, they find that the demand for life insurance increased strongly among households affected by the 2000 tax reform. Summarizing a large number of other empirical studies, however, Sauter, Walliser, and Winter (2010) point out that the evidence on the importance of tax incentives for individual saving decisions is mixed. For example, Jappelli and Pistaferri (2003) find that abolishment of tax advantages in Italy has no effect on the decision to purchase life insurance or on the amount invested. They argue that lack of knowledge about the tax incentives might explain this rather surprising finding.

Indeed, an optimal consumer reaction requires information on the tax reform, ability to understand the implications of it, and the capacity to adapt investment decisions accordingly. Therefore, an extensive body of literature addresses the issue of education, in particular financial literacy, in the context of retirement planning (see Bucher-Koenen, 2009, for a recent overview). Financial illiteracy appears to be widespread among the U.S. population and leads to significant gaps in old age income (see, e.g., Hogarth and Hilgert, 2002; Moore, 2003; Lusardi and Mitchell, 2006). For Germany, the evidence is mixed: some studies (see, e.g., Leinert and Wagner, 2004; Bundesverband Deutscher Banken, 2008) observe low levels of financial literacy, but Bucher-Koenen (2009) reports good financial knowledge measured on the basis of three financial literacy questions proposed by Lusardi and Mitchell (2006).

Bucher-Koenen (2009) finds that East and West Germans are equally financially literate when controlling for differences in income, wealth and education. Other studies document still considerable East-West differences in key aspects related to individual financial decision-making. For example, Tigges et al. (2000) show that individuals in East Germany have a higher financial risk aversion than West Germans, and Alesina and Fuchs-Schündeln (2007) observe that East Germans are more in favor of state intervention in social policies. Apart from differences in preferences substantial economic differences between the (former socialist) East and West Germany remain. For example, Uhlig (2008) shows that low wages, high unemployment and increasing reliance on social security persist across wide regions of East Germany. We find it therefore necessary to control for differences between East and West Germans in our analysis of endowment insurance demand.

A FRAMEWORK FOR ANALYZING ENDOWMENT INSURANCE DEMAND

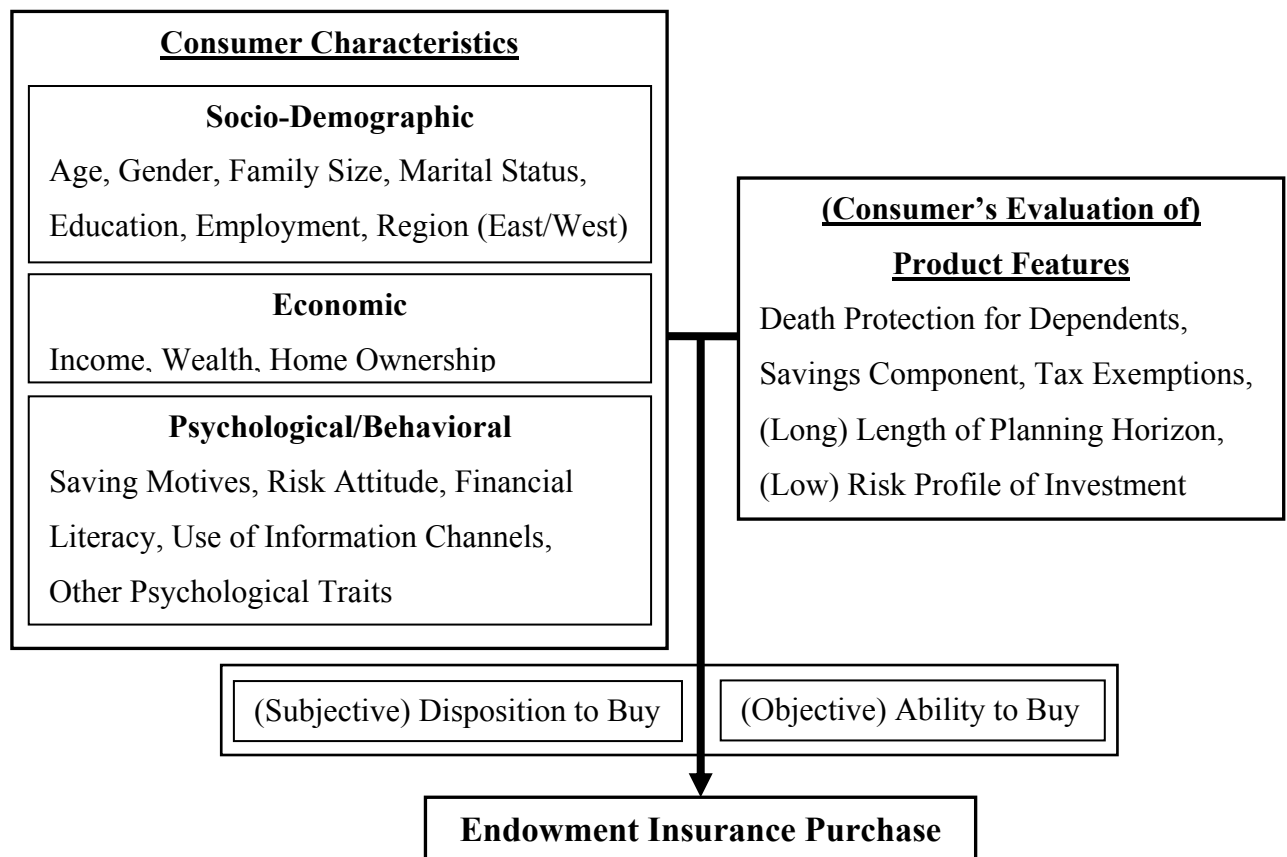
Building on the above-cited literature, we conceptualize endowment insurance demand as the result of the process pictured in Figure 4. Sociodemographic, economic, and psychological consumer characteristics, together with consumer evaluation of typical product features of endowment insurance, are determinants of a subjective disposition to buy endowment life insurance, which could be considered as a sort of initial demand for endowment insurance. However, only if the insurance-inclined household has sufficient financial resources (i.e., also has the objective ability to actually buy endowment insurance) will there be an actual insurance purchase. Thus, it is the interplay of subjective and objective conditions that results in the purchase decision (or not)—the outcome most of interest to life insurance companies. Based on this framework, we use the variation introduced by the natural experiment of the 2005 German tax reform to examine the characteristics of households that respond to tax reforms by varying their decision to buy life insurance. We focus on the following research questions:

- Do buyers of endowment insurance before the German Retirement Income Act (Consumer Group I) differ significantly from buyers of endowment insurance after the tax reform (Consumer Group II)?
- Are financial literacy and education important factors in distinguishing between Consumer Group I and Consumer Group II?

We investigate these questions using empirical data and use the results of this analysis to characterize endowment insurance buyers before and after the tax reform according to their sociodemographic, economic, and psychological traits.

Figure 4

Factors driving the demand for endowment insurance



DATA AND METHODS

Our study is based on the SAVE panel, which is a rich micro-level survey conducted by the Mannheim Research Institute for the Economics of Aging (MEA) on the financial situation of households in Germany. The survey focuses on savings and old-age provision and collects detailed quantitative information on households' financial structure and relevant socio-psychological aspects. The study began in 2001 as a biennial panel, but has been conducted yearly since 2005. In 2004, parts of the household survey "TPI Access Panel" administered by the company TNS Infratest TPI were included. Since then, SAVE consists of two panels: the "Random Sample" started in 2003 and the "Access Panel." Börsch-Supan et al. (2008) find that the two samples exhibit very similar characteristics.

Households in SAVE also report whether they own endowment insurance. The corresponding question explicitly rules out term life insurance policies (i.e., policies that only pay out in case of premature death and do not include a savings component), which is most important for a clear-cut analysis of the saving motives of endowment insurance buyers. However, possible answers can include children's endowment insurance and funeral expense insurance, both of which represent negligible market shares compared to classic endowment insurance. Yet, to avoid any confusion, we restrict our sample to those households where the household head is 65 years old or younger. 65 is the current statutory retirement age for men and women in Germany; it provides a rather high upper age bound for the financial advantageousness of endowment insurance.

We use SAVE's panel structure to identify new endowment insurance purchases by analyzing a change in ownership status from one year to the next, and focus on households who bought endowment insurance in the years before (Consumer Group I) and after (Consumer Group II) enactment of the German Retirement Income Act on January 1, 2005. Corresponding data

covering the year 2003 consist of households surveyed in the 2004 “Access Panel.” To capture the “Random Sample” as well, we also include in Consumer Group I those households that bought endowment insurance in 2003. Consumer Group II is made up of 2005 households only, the first year after the tax reform, because in mid 2006, the tax treatment of endowment insurance was again widely discussed in connection with the Final Withholding Tax (*Abgeltungsteuer*), which was enacted on January 1, 2009.

The SAVE survey allows us to study all key drivers of endowment insurance demand identified in the literature review, and Table 1 provides an overview of sociodemographic, economic and psychological household characteristics included as explanatory variables. To compare buyers of endowment insurance before and after the tax reform, we employ two complementary methods for quantitative group comparisons. In a first step, we analyze compositional differences between the two consumer groups (*differences in composition*). Bivariate statistics are used to compare the two groups in detail, and *t* tests are used to identify significant differences. This method gives a first indication of how pre- and post-tax-reform consumers differ as to single features. In a second step, multivariate regression analysis is used to analyze and compare the effect of explanatory variables on endowment insurance demand (*differences in effects*).⁴

⁴ Weights used for descriptive statistics and regressions in this paper are based on the income and age distribution of the German Microcensus. All results use the fully imputed SAVE data set, which is based on an iterative multiple imputation procedure (Schunk, 2008).

EMPIRICAL ANALYSIS

Bivariate Analysis: Differences in Composition

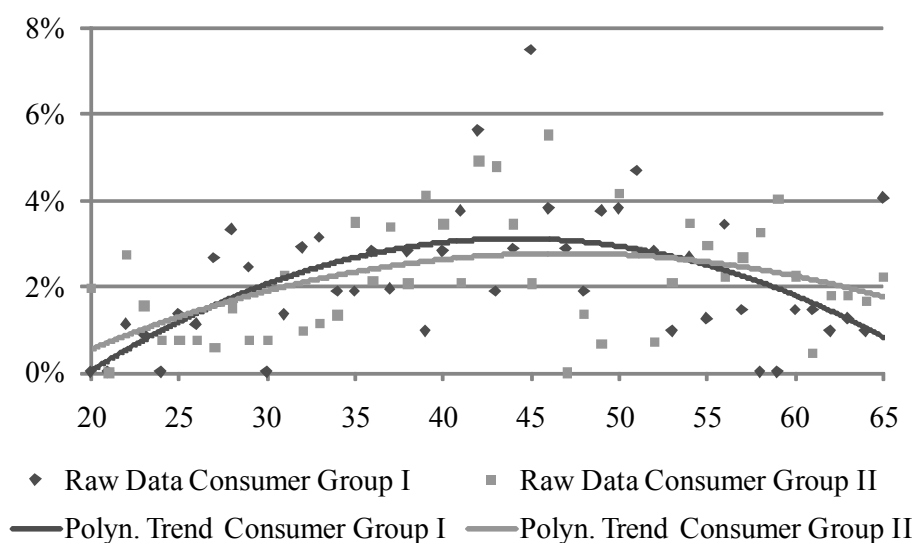
Our sample consists of 1,651 households in the years 2003 and 2004 and 2,622 households in 2005, and we observe 104 purchases of endowment insurance in 2003/2004 before the tax reform (Consumer Group I), and 143 purchases for 2005 (Consumer Group II). These numbers represent a decrease in purchases from 6.3% to 5.5%, a good reflection of the decrease in new endowment insurance business from 2004 to 2005 experienced by the German market as a whole (Figure 1). To test the significance of compositional differences, we calculate the cross-sectional means of all variables for Consumer Group I and Consumer Group II and conduct a standard t test for the hypothesis that the difference in means equals zero. This hypothesis is rejected for 20 of 63 variables, that is, significant differences in composition are observed for 32% of the variables (see Table 3).⁵ We now compare selected characteristics of the two consumer groups in more detail and comment on their significance.

Age: For both groups, endowment insurance purchases by age (see Figure 5) follow the hump-shaped pattern often observed for life insurance demand (see, e.g., Sommer, 2005). The difference in mean age (44.59 years vs. 45.21 years) is not significant, but the age distribution of Consumer Group I is more compressed than the age pattern of Consumer Group II, which is nicely illustrated by the estimated polynomial trend lines in Figure 6. The trend line for Consumer Group I is more arched, and its peak lies more to the left than that of Consumer Group II. That is, Consumer Group I contains a higher share of individuals aged 30 to 50, whereas Consumer Group II contains both more very young respondents (below age 25) and more individuals aged 55 and older.

⁵ For this calculation, we use the Stata command “ttest.” This command does not allow for weights. Mean values calculated for weighted and unweighted data differ only marginally.

Figure 5

Consumer Groups I and II by age

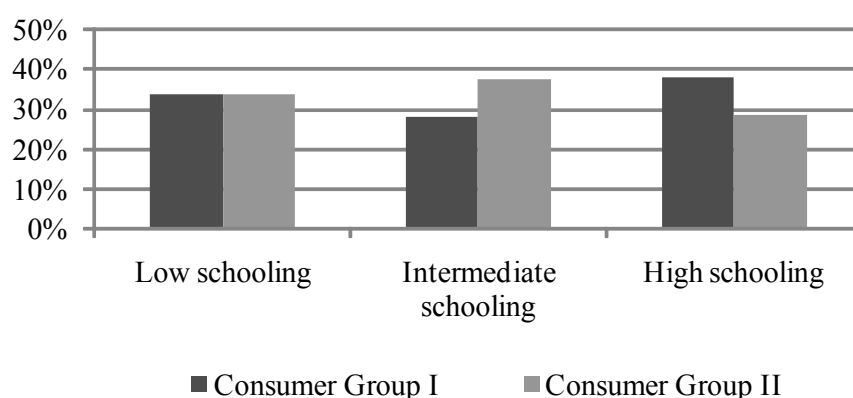


Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data). 2nd degree polynomial trend lines added.

Education: We expect demand for endowment insurance to be closely related to education level. Knowledge about financial matters is crucial to understanding complex product features and evaluating the consequences of the 2005 tax reform on the financial attractiveness of endowment insurance. Figure 6 shows the levels of school-leaving certificates for the two groups. In Consumer Group I, most household heads have a university entrance diploma (38%), followed by a low school degree (34%), and an intermediate degree (28%). After the tax reform, this composition is turned on its head: households with a university entrance diploma now form the minority (28%; the difference is significant at the 10% level) and those with an intermediate degree have the highest share (37%). The share of respondents with a low school degree remains stable (35%).

Figure 6

Consumer Groups I and II by level of school-leaving certificate

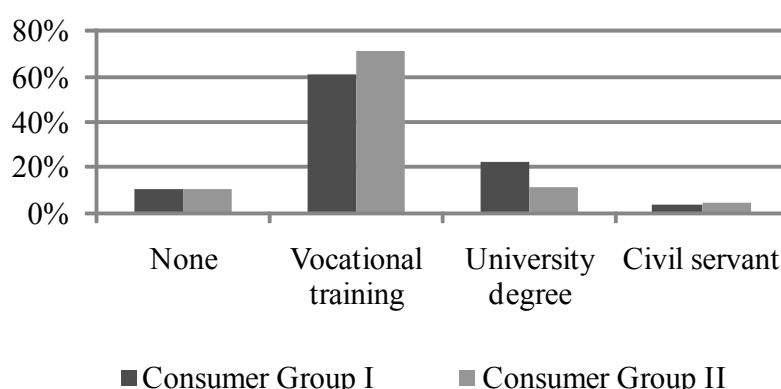


Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Occupational Training: Another indicator of education is occupational training, which is illustrated in Figure 7. Both groups have similar (small) shares of household heads with no occupational education or working as civil servants, but Consumer Group II has a significantly lower share of university graduates—only 11% compared to 22% in Consumer Group I. Instead, Consumer Group II contains more households with vocational training.

Figure 7

Consumer Groups I and II by occupational training

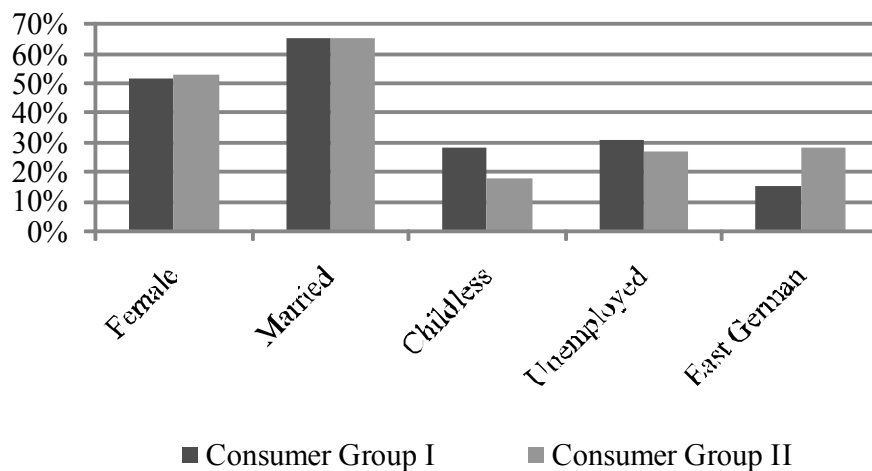


Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Figure 8 shows five additional socio-demographic characteristics. Consumer Group I has a higher share of households without children and a significantly lower share of East Germans (14%, Consumer Group II: 26%). The groups are similar with respect to gender, marital status, and employment status.

Figure 8

Consumer Groups I and II by different sociodemographic characteristics



Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

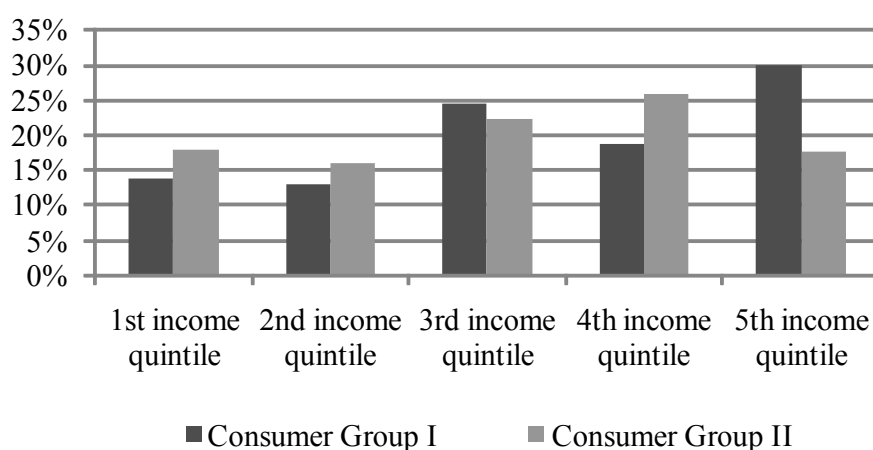
Income: Figure 9 shows the two consumer groups sorted by income quintiles. The clear majority of respondents who bought endowment insurance before the tax reform (Consumer Group I) belongs to the highest (5th) income quintile. This income level and the 4th income quintile are significantly less well represented in Consumer Group II; in this group, we see much higher shares of households in the first and second income quintiles. Accordingly, net incomes of Consumer Group I (€2,863) and Consumer Group II (€2,413) differ significantly.

Wealth: The types of asset classes held by respondents indicate to some extent household risk attitude. Figure 10 shows the shares of respondents holding different types of asset classes; respondents can check as many options as apply. Consumer Group I holds significantly more wealth (€52,558) than Consumer Group II (€40,683) and can therefore hold more assets in

every asset class. Significant differences are observed for “Savings account” and for the more risky asset types—equity and real estate funds, bonds, and innovative financial products.

Figure 9

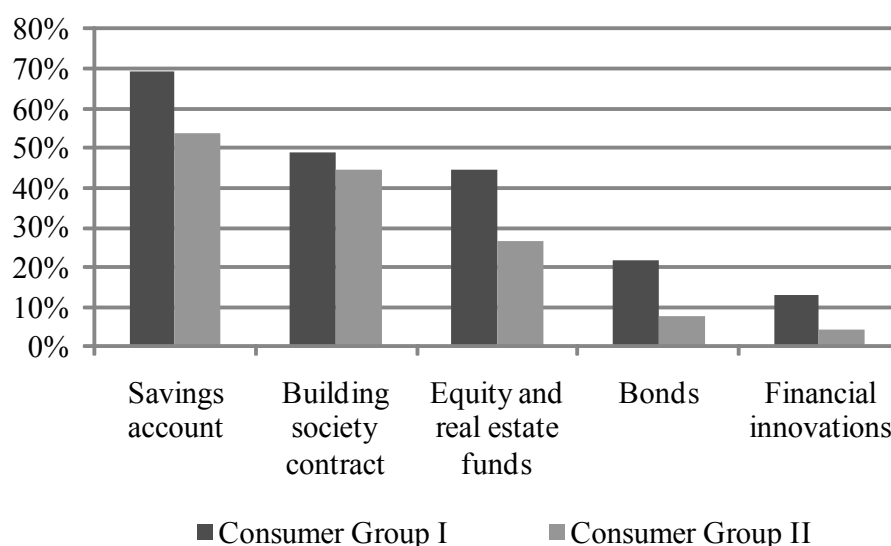
Consumer Groups I and II by income quintiles



Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Figure 10

Consumer Groups I and II by share of respondents holding different types of assets

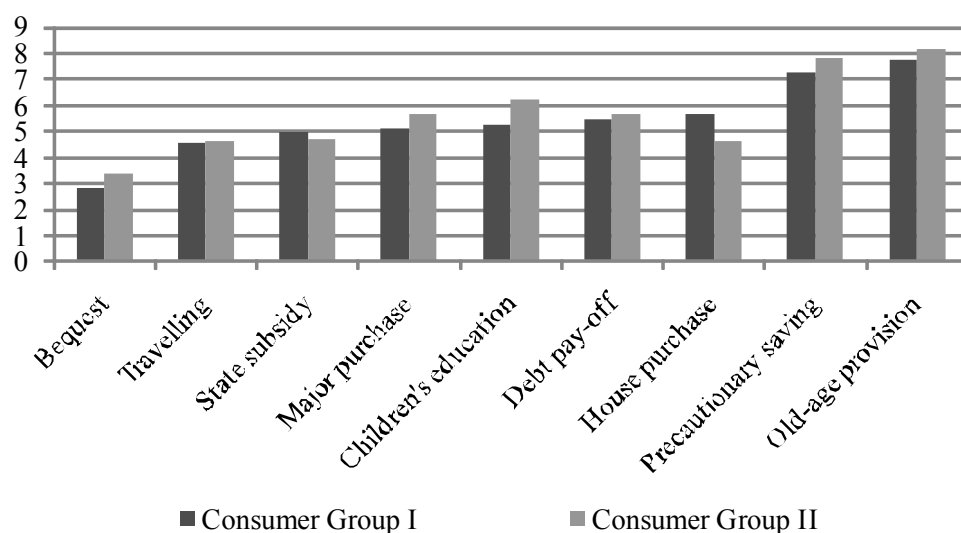


Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Saving Motives: In the SAVE survey, respondents indicate the subjective importance of various saving motives on a scale from 0 (not important at all) to 10 (very important). Figure 11 illustrates the results. Old-age provision and precautionary saving are the most important saving motives for both groups. Comparing the two groups, we see that precautionary saving (and children's education) is significantly more important in Consumer Group II. A significant negative difference is observed for the saving motive real estate purchase.

Figure 11

Consumer Groups I and II by importance of saving motives



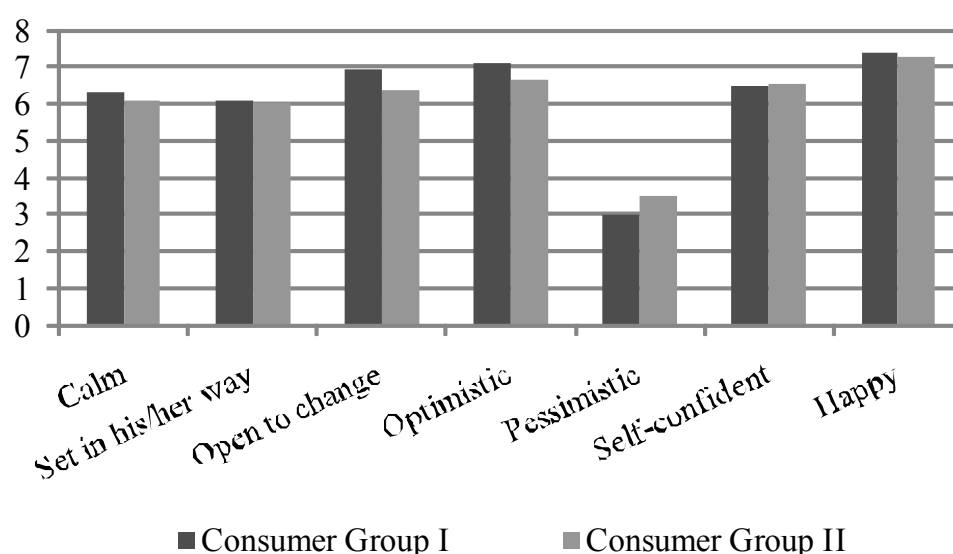
Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Risk Attitude: Buyers of endowment insurance before the German Retirement Income Act are much less risk-averse than buyers of endowment insurance after the tax reform: Consumer Group I has a significantly higher risk-seeking coefficient than Consumer Group II (no graph). Other indicators of risk aversion support this finding: more individuals in Consumer Group II consider themselves as “planner types” or “decent decision makers.”

Other Character Traits: Figure 12 shows how respondents assess themselves on seven character traits. Consumer Group I has a slightly higher share of respondents who declare themselves as being optimistic and open to change (difference is significant at the 10% level); consequently, fewer households in this groups see themselves as pessimistic. The two groups are similar with respect to the other character traits.

Figure 12

Consumer Groups I and II by character traits (0 = not applicable at all, 10 = fully applicable)



Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

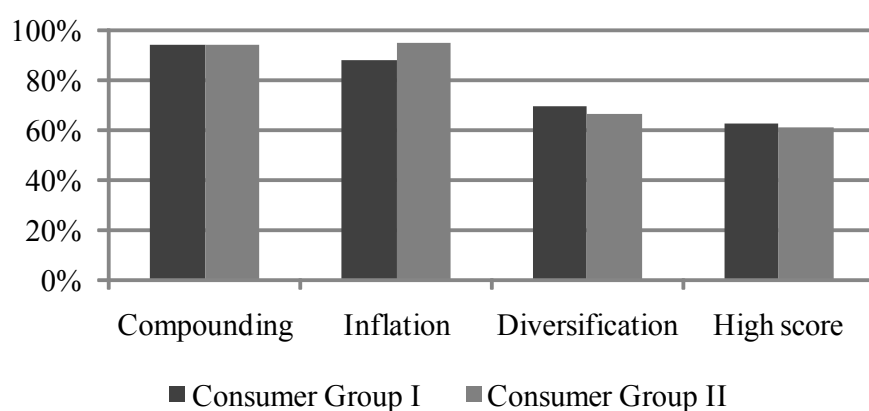
Financial Literacy: Ideally, endowment insurance purchasers should have some basic understanding of financial concepts such as compounding, inflation, and diversification. The SAVE questionnaire includes three questions on these topics suggested by Lusardi and Mitchell (2006); see Table 2 in the Appendix for the question wording. Figure 13 gives the proportions of endowment insurance buyers who correctly answered one of these questions, and the share of respondents who answered all three correctly.⁶ Both consumer groups are

⁶ SAVE includes questions on financial literacy from SAVE 2007 on, but the panel structure can be used to allot answers given to the financial literacy questions in SAVE 2007 to respondents in SAVE 2005 and 2006. Since not all first-time endowment insurance buyers stay in the sample until SAVE 2007, data on financial literacy cover a sample that is 600 observations (22%) smaller than the original sample.

fairly financially literate. They receive very similar results in the question on compounding. Endowment insurance purchasers in Consumer Group II (after the tax reform) are significantly better at calculating real interest rates and do slightly worse on the question regarding diversification. Both groups have similar shares of respondents who answered all three questions correctly.

Figure 13

Share of households that correctly answered questions on three financial literacy concepts

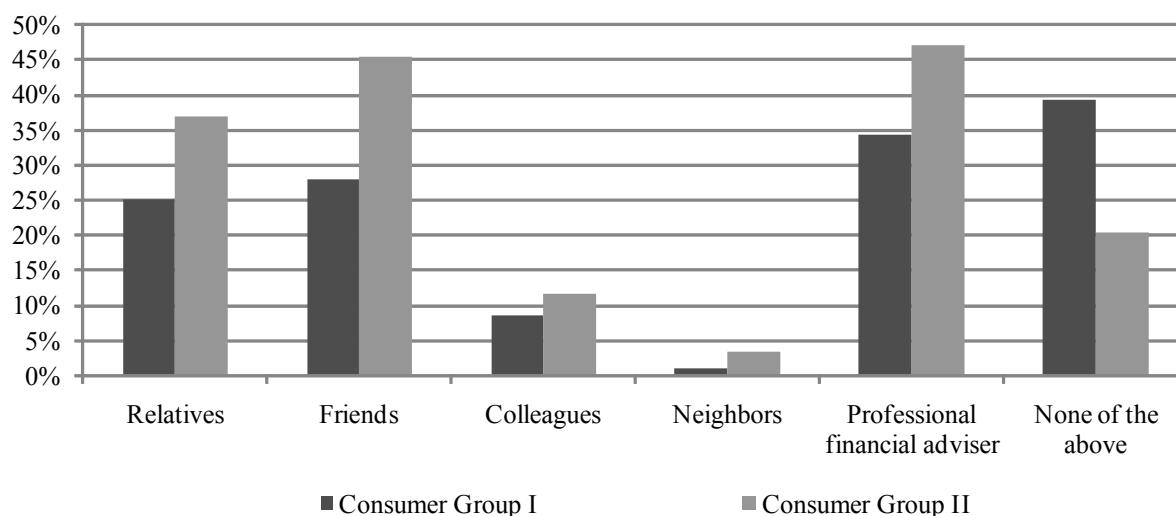


Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Information Channel: To assess respondents' information sources for financial decision making, Figure 14 identifies those with whom respondents discuss financial issues. Clear differences are observed: Consumer Group II discusses financial issues much more often with a financial advisor (significant), relatives (significant), friends, or colleagues. In contrast, Consumer Group I predominantly chooses none of the options (significant), which indicates that members of this group rely more on other information sources and their own judgment.

Figure 14

Consumer Groups I and II by counterpart of financial conversations



Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data).

Multivariate Regression Analysis: Differences in Effects

The previous section revealed significant differences in composition between Consumer Group I that bought endowment insurance before enactment of the German Retirement Income Act on January 1, 2005 and Consumer Group II that bought such insurance in the year after the reform. In this section, multivariate regression analysis is employed to compare the effects of external variables on endowment insurance purchase decisions when interdependencies between variables are controlled for. We now consider a subset of the variables analyzed in the previous section; that is, we select those variables with the most relevant information content. For example, we only consider “married” and ignore “married, living separately”, “single”, “divorced”, and “widowed”. The dependent variable—endowment insurance purchase in a given year—is binary; therefore a probit model is used to explain the purchase decision. This analysis includes SAVE respondents who do not own endowment insurance and first-time endowment insurance buyers. We cannot include respondents who already own endowment insurance since SAVE does not allow for the identification of additional endowment insurance purchases in the years before 2005.

Separate Probit Regression Models for Consumer Group I and Consumer Group II

The straightforward approach to comparing the effects of external factors on endowment insurance demand is to run two separate cross-sectional regressions for the period before and the period after the tax reform. So, based on the previous sections, we estimate the following model separately for Consumer Group I and Consumer Group II:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + \varepsilon_i \quad \text{for } i = 1, 2, \dots, N \quad (1)$$

where y_i is the binary (0/1) decision of household i to buy endowment insurance, x_{ki} is an independent variable, k is the number of independent variables, and ε_i is an iid disturbance term. The set of independent variables includes typical sociodemographic and economic variables established in the life insurance literature as well as additional factors such as psychological traits and household evaluation of typical product features of endowment insurance (see Figure 4).

Estimation results are shown in Table 4. According to McFadden's Pseudo R^2 (McFadden, 1973), the model fit is better for Consumer Group I. Four variables exert significant effects on endowment insurance purchases before and after the tax reform: households owning a building society contract or equity and real estate funds buy endowment insurance more often, the motive of "old-age provision" has a positive effect, and having a goal to "pay off debt" reduces demand.

Some variables have a significant effect only in Consumer Group I, that is, on consumers who bought endowment insurance before the tax reform:

- Age and Age²: We observe the expected hump shape pattern (see bivariate analysis).
- East Germans buy significantly less endowment insurance.
- Contact with a tax advisor fosters endowment insurance demand.

- Households that own bonds or innovative financial instruments more likely buy endowment insurance.

Other variables are significant only for households that bought endowment insurance after the tax reform:

- Married couples are more likely to buy endowment plans.
- The presence of children increases endowment insurance demand.
- University graduates are less likely to buy endowment insurance.
- Advice from financial professionals increases endowment insurance demand.
- Financially literate households are more likely to purchase endowment plans (correct answers given to questions on compounding and inflation).
- Households seeking to cover dependents are more likely to buy endowment insurance (a “bequest” motive). Households that try to take advantage of state subsidies in order to increase their savings buy less endowment insurance after the tax reform.

Pooled Probit Regression Model for Consumer Group I and Consumer Group II

Results of these separate regressions help assess the significance of effects of external factors before and after the tax reform. A direct comparison of probit coefficients across regressions, however, is difficult. To test for the significance of differences in effects, a pooled probit regression model is conducted that includes interaction terms for all independent variables. The use of interaction terms makes it possible to discover whether the effects differ significantly between the two groups:

$$y_i = \beta_0 + \gamma_1 \delta + (\beta_1 + \gamma_1 \delta) x_{1i} + (\beta_2 + \gamma_2 \delta) x_{2i} + \dots + (\beta_k + \gamma_k \delta) x_{ki} + \varepsilon_i \text{ for } i = 1, 2, \dots, N \quad (2)$$

where y_i is again the binary decision of household i to buy endowment insurance, x_{ki} is an independent variable, k is the number of independent variables, and ε_i is an iid disturbance term. δ is a dummy variable indicating group membership; it is equal to 0 for respondents

who bought endowment insurance before the tax reform (Consumer Group I) and equal to 1 for Consumer Group II. Thus, the β coefficients in Equation (2) indicate the “main effect” of the independent variables on the endowment insurance purchase decision of respondents in Consumer Group I. Significant “main effects” are observed for East Germans, advice from tax counsel, asset holdings, risk attitude, and saving motivation (see Table 5 in the Appendix); in all cases, the estimated coefficients match the direction of effects observed in the separate probit regressions.

In the pooled regression model, differences between the two consumer groups are indicated by significant interaction terms. However, the interpretation of interaction terms in probit models is not as straightforward as in OLS regressions. In particular, the sign and strength of interaction effects can vary across respondents—in contrast to the OLS regression where there is one single interaction coefficient for all observations. We use the procedure suggested by Norton et al. (2004) to compute the magnitude, sign, and statistical significance of interaction effects in our probit model. Table 6 summarizes these results for the interaction effects found to be significant and their respective standard errors of the pooled regression analysis: being a university graduate, “East German,” and owning innovative financial instruments. We find that the strength of effects varies widely across respondents. The mean interaction effect for East Germans is again positive, but smaller than in the case of the separate regressions. The same holds for the direction and size of the mean effects of a university degree and ownership of innovative financial instruments.

A STYLIZED CHARACTERIZATION OF THE TWO CONSUMER GROUPS

Results of the t tests and the probit regressions show that consumers who bought endowment insurance before the tax reform and those who purchased it afterward are dissimilar with respect to a variety of characteristics that go beyond differences that could be attributed to chance. Results of our empirical analysis suggest the following stylized characterization of the two consumer groups:

Consumer Group I: Bivariate results suggest that Consumer Group I is slightly younger and has a higher share of highly educated households—both in terms of school-leaving certificate and tertiary education. A large share of this group is in the highest income quintile. Consumer Group I relies less on outsiders' advice when it comes to financial issues and seems a little more risk-seeking than Consumer Group II. In terms of financial market activity, Consumer Group I contains a higher proportion of respondents who buy equity, bonds, and financial innovations. The separate regression analysis confirms the results of the bivariate findings. In the pooled regression case, significant differences with respect to having a university degree, being East German, and owning innovative financial instruments persist. These results hint at an active, well-informed, above-average earning, and opportunity-seeking consumer group that reacted to the announced tax reform by quickly transforming information into action (“arbitrageurs”). The fact that East Germans are under-represented in this group indicates that 15 years after reunification differences between East and West Germans still persist—differences that are not explained by income, wealth, education, or other key control variables.

Consumer Group II: In contrast, according to the bivariate analysis, Consumer Group II is constituted by a larger share of older households with low to medium education. This consumer group relies more on relatives, friends, colleagues, and professionals for financial

advice than does Consumer Group I. Bequest motives and old-age provision are more important in this group, and a higher share of households actually has children. Results of the multivariate regression analysis support the results of the bivariate analysis: Consumer Group II is more interested in the typical product features of endowment insurance and is less sensitive to adverse tax changes (“stragglers”).

DISCUSSION

Results of our empirical analysis suggest that two different groups of consumers were active in the German insurance market: opportunity-seeking “arbitrageurs” before the 2005 income tax reform and “stragglers” afterwards. However, the latter group (i.e., consumers interested in the typical product features and less sensitive to adverse tax changes) most likely also bought endowment insurance in the two years before the tax reform. So we actually observe in Consumer Group I a mixture of these buyers and of arbitrageurs that enter the market before the tax reform. From that we can expect much more pronounced characteristics for these arbitrageurs whose characteristics superpose those of the stragglers and lead to the significant differences observed between Consumer Group I and Consumer Group II.

Further differences could be expected if the SAVE data set would allow us to include households that bought a second or third endowment life insurance policy into the analysis. We would expect to find more high-income households (because they could afford another endowment insurance policy), better educated/financial literate households, and more West Germans (because they had more time to buy endowment insurance). In summary: we would expect to find even more households falling into the “arbitrageur” category.

CONCLUSION

The German Retirement Income Act of 2005 severely compromised the financial attractiveness of endowment insurance—a policy that has been a bestseller in the German life insurance market for decades. Based on rich micro data, we compare the sociodemographic, economic and psychological characteristics of the endowment insurance buyers in the years before and after the tax reform. We observe significant differences—both in composition and effects—between the two consumer groups. *t* tests for a wide range of consumer characteristics indicate that disparities are associated with levels of education, risk attitude, and sources of financial information. Results of different multivariate probit regressions support these findings: characteristics of Consumer Group I hint at active, well-informed, above-average earning, and opportunity-seeking households that might have accelerated the decision to buy endowment insurance in face of the forthcoming tax reform. Consumer Group II is found to incorporate a large share of households that seek typical product features, such as coverage of dependents or investment in a low risk asset.

Our study adds to the mixed literature on the impact of tax incentives on life insurance demand. We can confirm key findings of a recent study by Sauter, Walliser, and Winter (2010); focusing on the 2000 German income tax reform, these authors find tax incentives to have a strong influence on consumer's life insurance demand. Our findings, additionally, suggest education to be an important determinant of consumers' reaction to such policy changes: those with higher education and higher income appear to have reacted to the changing tax environment by accelerating the decision to purchase this product. Those who were less informed might have missed this opportunity.

Our findings thus have important implications for regulatory authorities that seek to influence household consumption and saving decisions with tax incentives. When designing and

implementing tax reforms, information is key to fostering appropriate consumer reaction. Results of this study imply the need for more effective and broader-based communication with respect to tax modifications in order to avoid discrimination against certain sections of the population. Regulatory authorities need to ensure that such information is accessible to and understandable by all segments of the population. Buyers of financial products, in turn, need to ensure that they are in possession of information necessary to make an appropriate decision; in a society where individuals are becoming increasingly responsible for their own financial security informed consumer choice is of paramount importance.

APPENDIX: TABLES

Table 1
Definition of Variables

Variable	Definition
Sociodemographic consumer characteristics	
Age	Age of head of household respondent
Gender	DV
Household size	Number of household members
Number of children	Number of children in the household
Married/Married, living separately/Divorced/Single/Widowed	DV
Low school-leaving certificate	DV, Secondary school [<i>Haupt-/ Volks-schule</i>]
Mid school-leaving certificate	DV, Junior high school [<i>Realschule</i>]
High school-leaving certificate	DV, High school [<i>Abitur, Fachhoch-schulreife</i>]
No vocational training/Vocational training/University degree/Civil servant/Self-employed	DV
East German	DV
Economic consumer characteristics	
Net income	Household net income per month
1 st income quintile	DV, Range: 0–1,100 €
2 nd income quintile	DV, Range: 1,106–1,690 €
3 rd income quintile	DV, Range: 1,700–2,300 €
4 th income quintile	DV, Range: 2,304–3,000 €
5 th income quintile	DV, Range: 3,001–40,000 €
Wealth	Household net wealth = Assets held in savings accounts, building society contracts, bonds, equity and real estate funds, innovative financial instruments, and private pension contracts
Savings account/Building society contract/Bonds/Equity and real estate funds/Financial innovations /Debt	DV indicating ownership
Real estate owner	DV
Psychological/behavioral consumer characteristics	
Saving motive: Bequest/Debt/Old-age provision/Major purchase/Children's education/Precautionary saving/Real estate purchase/Use state subsidies/Traveling	Importance of saving motive; Range from 0 = “not important at all” to 10 = “very important”
Risk-seeking coefficient	Risk-seeking attitude (min = 0; max = 40)
Character: Calm/Set in his or her ways/Open to change/Optimistic/Pessimistic/Self-confident/Happy	Character self-assessment; Range from 0 = “not applicable at all” to 10 = “fully applicable”

Table 1 (continued)

Variable	Definition
Character: Planner type	Character self-assessment; Range from 0 = “live for the moment” to 10 = “plan the future”
Character: Decent decision maker	Character self-assessment; Range from 0 = “impulsive decision maker” to 10 = “decent decision maker”
Financial literacy: Compounding/Inflation/Diversification	DV, = 1 if the corresponding question is answered correctly
Financial literacy score	Mean score on financial literacy questions (min = 0; max = 3)
Financial literacy high score	DV, = 1 if all financial literacy questions are answered correctly
Tax advisor	DV, = 1 if household has tax bill prepared by tax advisor
Financial conversations with colleagues/friends/neighbors/relatives/none of the above	DV
Financial conversations with financial advisors	DV, = 1 if household receives financial advice from financial advisors at banks, insurance companies, or financial intermediaries
Financial conversations with nonprofessionals	DV, = 1 if household receives financial advice from friends, relatives, colleagues, or neighbors
Follow financial advice	How strongly does respondent follow advice from financial advisor, range from 0 = “not at all” to 10 = “fully”

Note: DV = Dummy variable.

Table 2**Questions on Financial Literacy**

Compounding	<i>“Suppose you had 100€ in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than 102€, exactly 102€, less than 102€?”</i>
Inflation	<i>“Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?”</i>
Diversification	<i>“Do you think that the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund.”</i>

Source: SAVE 2005 Questionnaire (translated from German).

Table 3Mean Values and *t* Tests on Differences of Consumer Groups I and II

Variable	Group I Mean	Group II Mean	Difference in Means	<i>t</i> -Stat.	<i>p</i> -Value	
Sociodemographic consumer characteristics						
Age	44.59	45.21	0.62	-0.44	0.66	
Gender (female)	0.51	0.52	0.01	-0.12	0.90	
Household size	3.09	2.91	-0.18	1.02	0.31	
Number of children	1.65	1.94	0.29	-1.60	0.11	
Married	0.68	0.68	-0.00	0.07	0.94	
Married, living separately	0.01	0.02	0.01	-0.70	0.49	
Single	0.16	0.17	0.01	-0.23	0.82	
Divorced	0.13	0.10	-0.03	0.71	0.48	
Widowed	0.01	0.02	0.01	-0.70	0.49	
Low school-leaving certificate	0.34	0.35	0.01	-0.21	0.83	
Mid school-leaving certificate	0.28	0.37	0.09	-1.51	0.13	
High school-leaving certificate	0.38	0.28	-0.10	1.74	0.08	*
No vocational training	0.10	0.10	-0.00	-0.05	0.96	
Vocational training	0.62	0.71	0.09	-1.62	0.11	
University degree	0.23	0.11	-0.12	2.53	0.01	***
Civil servant	0.13	0.08	-0.05	1.06	0.29	
Self-employed	0.10	0.07	-0.03	0.74	0.46	
East German	0.14	0.26	0.12	-2.19	0.03	**
Economic consumer characteristics						
Net income	2,863	2,413	-450	2.07	0.04	**
1 st income quintile	0.12	0.11	-0.01	0.09	0.93	
2 nd income quintile	0.13	0.17	0.04	-0.85	0.39	
3 rd income quintile	0.22	0.24	0.02	-0.43	0.67	
4 th income quintile	0.18	0.27	0.09	-1.65	0.10	*
5 th income quintile	0.35	0.20	-0.15	2.69	0.01	***
Wealth	52,558	40,683	-11,875	2.04	0.04	**
Savings account	0.70	0.55	-0.15	2.40	0.02	**
Building society contract	0.49	0.45	-0.04	0.56	0.58	
Bonds	0.21	0.08	-0.13	3.12	0.00	***
Equity and real estate funds	0.45	0.29	-0.16	2.71	0.01	***
Real estate	0.62	0.52	-0.10	1.42	0.16	
Financial innovations	0.13	0.04	-0.08	2.44	0.02	**
Debt	0.49	0.57	0.08	-1.18	0.24	
Real estate owner	0.62	0.52	-0.10	1.42	0.16	

Table 3 (continued)

Variable	Group I Means	Group II Means	Difference in Means	<i>t</i> -Stat.	<i>p</i> -Value	
Psychological/behavioral consumer characteristics						
Saving motive						
Bequest	2.88	3.45	0.57	-1.42	0.16	
Old-age provision	7.82	8.24	0.42	-1.42	0.16	
Major purchase	5.20	5.74	0.54	-1.60	0.11	
Pay off debt	5.48	5.80	0.32	-0.63	0.53	
Children's education	5.37	6.27	0.90	-2.21	0.03	**
Precautionary saving	7.33	7.92	0.60	-2.19	0.03	**
Real estate purchase	5.64	4.78	-0.87	1.64	0.10	*
Use state subsidies	5.03	4.78	-0.25	0.53	0.60	
Traveling	4.67	4.70	0.03	-0.07	0.94	
Risk-seeking coefficient	16.61	9.20	-7.41	6.28	0.00	***
Character:						
Calm	6.28	6.13	-0.15	0.45	0.65	
Set in his/her ways	6.08	6.01	-0.07	0.20	0.84	
Open to change	6.88	6.39	-0.49	1.72	0.09	*
Optimistic	7.11	6.73	-0.38	1.31	0.19	
Pessimistic	3.03	3.50	0.47	-1.50	0.14	
Self-confident	6.53	6.60	0.07	-0.27	0.79	
Happy	7.42	7.28	-0.14	0.55	0.58	
Planner type	6.60	6.87	0.27	-1.03	0.30	
Decent decision maker	5.46	5.61	0.15	-0.48	0.63	
Financial literacy:						
Compounding	0.94	0.94	0.00	0.06	0.95	
Inflation	0.89	0.96	0.07	-1.89	0.06	*
Diversification	0.69	0.67	-0.02	0.27	0.79	
Mean on all three questions	2.52	2.57	0.05	-0.52	0.60	
Financial conversations						
with financial advisor	0.35	0.48	0.13	-2.15	0.03	**
with colleagues	0.08	0.12	0.04	-1.08	0.28	
with friends	0.27	0.31	0.04	-0.77	0.44	
with neighbors	0.01	0.03	0.02	-1.28	0.20	
with relatives	0.24	0.36	0.12	-1.96	0.05	**
with none of the above	0.40	0.21	-0.19	3.38	0.00	***
Follow financial advice	3.08	3.12	0.04	-0.23	0.82	
Number of observations	104	143				

Note: Own calculation based on SAVE 2005 and 2006 (imputed data). A one-sided *t*- test is used to test whether the difference in means is zero (* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$).

Table 4

Results of Separate Probit Regressions for Purchase of Endowment Insurance Before Enactment of the German Retirement Income Act on January 1, 2005, and Afterward

Variable	Consumer Group I			Consumer Group II	
	Coeff.	Std. Err.		Coeff.	Std. Err.
Age	0.0884	0.0528	*	0.0021	0.0321
Age ²	-0.0010	0.0006	*	0.0000	0.0004
Female	-0.0977	0.1547		-0.0251	0.1039
Married	0.1407	0.2223		0.2234	0.1199
Number of children	-0.0405	0.0697		0.0913	0.0397
East German	-0.7113	0.2160	***	0.0477	0.1156
High school-leaving certificate	-0.1067	0.2240		0.1533	0.1360
University degree	0.4012	0.2529		-0.4386	0.1841
Unemployed	0.1230	0.1849		-0.1247	0.1155
Income					
1 st quintile	0.0594	0.3124		-0.0939	0.1681
2 nd quintile	-0.0673	0.2607		0.0120	0.1560
4 th quintile	0.0785	0.2340		0.0966	0.1463
5 th quintile	0.0597	0.2415		0.0330	0.1709
Wealth	0.0000	0.0000		0.0000	0.0000
Wealth ²	0.0000	0.0000		0.0000	0.0000
Savings account	-0.1374	0.1808		0.1484	0.1068
Building society contract	0.4171	0.1735	**	0.3803	0.1102
Bonds	0.5767	0.2766	**	0.2465	0.2009
Equity and real estate funds	0.5410	0.1948	***	0.2973	0.1305
Financial innovations	0.9507	0.3480	***	0.0656	0.2450
Real estate owner	0.1794	0.1713		-0.0256	0.1106
Saving motives					
Bequest	0.0288	0.0297		0.0370	0.0185
Old-age provision	0.0600	0.0364	*	0.0538	0.0248
Major purchase	0.0020	0.0325		0.0348	0.0228
Pay off debt	-0.0495	0.0231	**	-0.0456	0.0144
Children's education	-0.0058	0.0289		0.0132	0.0185
Precautionary saving	-0.0171	0.0372			
Real estate purchase	-0.0074	0.0227			
Use state subsidies	0.0226	0.0259		-0.0286	0.0166
Traveling	-0.0052	0.0300		-0.0196	0.0194
Financial literacy					
Compounding	0.4869	0.3125		0.3436	0.1891
Inflation	-0.2155	0.2520		0.4878	0.2061
Diversification	-0.1286	0.1733		-0.0392	0.1075

Table 4 (continued)

	Consumer Group I			Consumer Group II		
Variable	Coeff.	Std. Err.		Coeff.	Std. Err.	
Risk-seeking coefficient	-0.0186	0.0066	***	-0.0041	0.0069	
Tax advisor	0.3076	0.1664	*	0.1471	0.1042	
Financial conversations						
with nonprofessionals	-0.0952	0.1587		0.1308	0.1028	
with financial advisor	0.0428	0.1657		0.1734	0.1028	
Constant	-3.5512	1.2717	***	-3.0695	0.7736	***
Number of observations		923			1,770	
Pseudo R ²		0.2567			0.1123	

Note: Own calculation based on SAVE 2005 and 2006 (weighted and imputed data). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5

Results of Pooled Probit Regression for Purchase of Endowment Insurance Before Enactment of the German Retirement Income Act on January 1, 2005, and Afterward

Variable	Primary Effect			2005 Interaction Term	
	Coeff.	Std. Err.		Coeff.	Std. Err.
Age	0.0861	0.0521	*	-0.0757	0.0613
Age ²	-0.0010	0.0006	*	0.0009	0.0007
Female	-0.1198	0.1500		0.0675	0.1823
Married	0.1421	0.2186		0.0726	0.2488
Number of children	-0.0488	0.0677		0.1553	0.0779
East German	-0.6913	0.2116	***	0.7378	0.2415 (*)
High school-leaving certificate	-0.0489	0.2165		0.1884	0.2553
University degree	0.3628	0.2435		-0.7853	0.3032 (*)
Not employed	0.1230	0.1801		-0.2729	0.2135
Income					
1 st quintile	-0.0091	0.3157		-0.1096	0.3606
2 nd quintile	-0.0852	0.2586		0.1051	0.3000
4 th quintile	0.0296	0.2262		0.0216	0.2660
5 th quintile	0.0169	0.2300		-0.0103	0.2808
Wealth	0.0000	0.0000		0.0000	0.0000
Wealth ²	0.0000	0.0000		0.0000	0.0000
Savings account	-0.1584	0.1756		0.3109	0.2048
Building society contract	0.3782	0.1675	**	-0.0125	0.1992
Bonds	0.5375	0.2635	**	-0.3599	0.3292
Equity and real estate funds	0.5457	0.1864	***	-0.2231	0.2251
Financial innovations	0.9204	0.3426	***	-0.9458	0.4204 (*)
Real estate owner	0.1683	0.1684		-0.1872	0.2007
Saving motives					
Bequest	0.0208	0.0288		0.0187	0.0341
Old-age provision	0.0553	0.0349		0.0113	0.0432
Major purchase	0.0027	0.0318		0.0407	0.0391
Pay off debt	-0.0496	0.0225	**	0.0037	0.0267
Children's education	-0.0041	0.0281		0.0119	0.0336
Precautionary savings	-0.0115	0.0363		0.0074	0.0444
Real estate purchase	-0.0020	0.0220		-0.0014	0.0263
Use state subsidies	0.0244	0.0250		-0.0561	0.0299
Traveling	-0.0038	0.0294		-0.0168	0.0351
Financial literacy					
Compounding	0.4677	0.3029		-0.1004	0.3573
Inflation	-0.2542	0.2455		0.7101	0.3177
Diversification	-0.1577	0.1670		0.0899	0.1983

Table 5 (continued)

Variable	Primary Effect			2005 Interaction Term	
	Coeff.	Std. Err.		Coeff.	Std. Err.
Risk-seeking coefficient	-0.0168	0.0064	***	0.0136	0.0093
Tax advisor	0.2922	0.1604	*	-0.1366	0.1903
Financial conversations:					
with nonprofessionals	-0.0635	0.1543		0.1829	0.1846
with financial advisor	0.0285	0.1597		0.1398	0.1892
Constant	-3.4523	1.2644	***	0.1644	1.4889
Number of observations	2,693				
Pseudo R ²	0.1570				

Note: Please see Table 6 for a summary of the interaction effects. Own calculation based on SAVE 2005 and 2006 (imputed data). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6

Summary of Significant Interaction Effects of Pooled Probit Regression for Purchase of Endowment Insurance Before Enactment of the German Retirement Income Act on January 1, 2005, and Afterward

Variable		Mean	Std. Dev.	Min	Max
East German	Interaction effect	0.0571	0.0535	0.0002	0.2866
	Std. Error	0.0877	0.0638	0.0010	0.3168
University degree	Interaction effect	-0.0946	0.0719	-0.3090	-0.0005
	Std. Error	0.1060	0.0512	0.0010	0.3620
Financial innovations	Interaction effect	-0.1697	0.0968	-0.3643	-0.0027
	Std. Error	0.2160	0.0993	0.0048	0.5213

Note: Own calculation based on SAVE 2005 and 2006 (imputed data). Number of observations = 2,693.

REFERENCES

- Alesina, A., and Fuchs-Schündeln, N., 2007, Good-Bye Lenin (or Not?): The Effect of Communism on People's Preferences, *American Economic Review*, 97(4): 1507-1528.
- Anderson, D. R., and J. R. Nevin, 1975, Determinants of Young Marrieds' Life Insurance Purchasing Behavior: An Empirical Investigation, *Journal of Risk and Insurance*, 42(3), pp. 375–387.
- Börsch-Supan, A., M. Coppola, L. Essig, A. Eymann, and D. Schunk, 2008, The German SAVE Study—Design and Results, MEA Studie No. 6, Mannheim Research Institute for the Economics of Aging.
- Browne, M., and K. Kim, 1993, An International Analysis of Life Insurance Demand, *Journal of Risk and Insurance*, 60(4), pp. 616–634.
- Brunsbach, S., and O. Lang, 1998, Steuervorteile und die Rendite des Lebensversicherungssparens, *Jahrbücher für Nationalökonomie und Statistik*, 217, pp. 185–213.
- Bucher-Koenen, T., 2009, Financial Literacy and Private Old-Age Provision in Germany—Evidence from SAVE 2008, MEA Discussion Paper No. 192-2009, Mannheim Research Institute for the Economics of Aging.
- Bundesministerium für Finanzen [Federal Ministry of Finance], 2005a, Das Alterseinkünftegesetz: Gerecht für Jung und Alt, Bundesministerium für Finanzen, Berlin, June 2005.
- Bundesministerium für Finanzen [Federal Ministry of Finance], 2005b, Circular IV C 1 - S 2252 - 337/05, Bundesministerium für Finanzen, Berlin, December 12, 2005.
- Bundesverband Deutscher Banken [Association of German Banks], 2008, Ökonomische Bildung und Finanzplanungskompetenz, Bundesverband Deutscher Banken, Berlin, June 2008.
- Carson, J. M., and S. G. Fier, 2009, Catastrophes and the Demand for Life Insurance, Working Paper, World Wide Web: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1333755.
- Carson, J. M., R. E. Dumm, and A. P. Liebenberg, 2009, A Dynamic Analysis of the Demand for Life Insurance, paper presented at the Annual Meeting of the American Risk and Insurance Association (ARIA) in Providence, Rhode Island, August.
- Chang, M. L., 2005, With a Little Help from My Friends (And My Financial Planner), *Social Forces*, 83(4), pp. 1469–1497.
- Dorfman, M. S., 2002, *Introduction to Risk Management and Insurance—Seventh Edition* (Upper Saddle River, NJ: Prentice Hall).

- Ferber, R., and L. C. Lee, 1980, Acquisition and Accumulation of Life Insurance in Early Married Life, *Journal of Risk and Insurance*, 47(4), pp. 132–152.
- Fortune, P., 1973, A Theory of Optimal Life Insurance: Development and Tests, *Journal of Finance*, 28(3), pp. 587–600.
- Gandolfi, A. S., and L. Miners, 1996, Gender-Based Differences in Life Insurance Ownership, *Journal of Risk and Insurance*, 63(4), pp. 683–693.
- German Insurance Association (GDV), 2006, Half-Year Comparison: Life Insurers Achieve Growth in Sales/Strong Increase in Annuity Business, Press Release, World Wide Web: http://www.gdv.de/Presse/Pressearchiv_Linkliste/Pressemeldungen_2006_Uebersichtsseite/inhaltsseite19837.html (accessed April 1, 2010).
- German Insurance Association (GDV), 2009a, *Die Deutsche Lebensversicherung in Zahlen—Geschäftsentwicklung 2008* [Report on the German Life Insurance Market—Business Development in 2008] (Berlin: German Insurance Association).
- German Insurance Association (GDV), 2009b, *Statistical Yearbook of German Insurance*, (Berlin: German Insurance Association).
- Hakansson, N. H., 1969, Optimal Investment and Consumption Strategies Under Risk, an Uncertain Lifetime, and Insurance, *International Economic Review*, 10(3), pp. 443–466.
- Hakansson, N. H., 1970, Optimal Investment and Consumption Strategies Under Risk for a Class of Utility Functions, *Econometrica*, 38(5), pp. 587–607.
- Hau, A., 2000, Liquidity, Estate Liquidation, Charitable Motives, and Life Insurance Demand by Retired Singles, *Journal of Risk and Insurance*, 67(1), pp. 123–141.
- Hogarth, J. and M. Hilgert, 2002, Financial Knowledge, Experience and Learning Preferences: Preliminary Results from a New Survey on Financial Literacy, *Consumer Interest Annual*, 48.
- Jappelli, T., and L. Pistaferri, 2003, Tax Incentives and the Demand for Life Insurance: Evidence from Italy, *Journal of Public Economics*, 87(7-8), pp. 1779–1799.
- Lewis, F. D., 1989, Dependents and the Demand for Life Insurance, *American Economic Review*, 79(3): 452–466.
- Leinert, J., and G. G. Wagner, 2004, Konsumentensouveränität auf Vorsorgemärkten eingeschränkt—Mangelnde „Financial Literacy in Deutschland“, DIW Wochenbericht, 30, pp. 427–432, Deutsches Institut für Wirtschaftsforschung, Berlin.
- Li, D., F. Moshirian, P. Nguyen, and T. Wee, 2007, The Demand for Life Insurance in OECD Countries, *Journal of Risk and Insurance*, 74(3), pp. 637–652.

- Lusardi, A., and O. S. Mitchell, 2006, Financial Literacy and Planning: Implications for Retirement Wellbeing, Pension Research Council Working Paper 1, The Wharton School.
- Mannheim Research Institute for the Economics of Aging (MEA), 2001–2008, Spar- und Finanzanlageverhalten privater Haushalte (SAVE) [Saving and Financial Investment of Private Households]. World Wide Web: http://www.mea.uni-mannheim.de/mea_neu/index_d.html.
- Mauch, P., 1994, Lebensversicherung und Steuerrecht: eine ökonomische Analyse, in: U. Fehl and P. Oberender, eds., *Schriften zur Nationalökonomie* (Bayreuth: P.C.O.-Verlag), Band 14.
- McFadden, D., 1973, Conditional Logit Analysis of Qualitative Choice Behavior, in: P. Zarembka (ed.), *Frontiers in Econometrics* (New York: Academic Press), pp. 105–142.
- Merton, R. C., 1969, Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case, *The Review of Economics and Statistics*, 51(3), pp. 247–257.
- Merton, R. C., 1971, Optimum consumption and portfolio rules in a continuous-time model, *Journal of Economic Theory*, 3(4), pp. 373–413.
- Moore, D., 2003, Survey of Financial Literacy in Washington State: Knowledge, Behavior, Attitudes, and Experiences, Technical report 03-39, Social and Economic Sciences Research Center, Washington State University.
- Müller, A., 1998, *Erklärung der Lebensversicherungsnachfrage anhand ökonomischer und psychologischer Einflussfaktoren* (Karlsruhe: Verlag Versicherungswirtschaft).
- Neumann, S., 1969, Inflation and Saving Through Life Insurance, *Journal of Risk and Insurance*, 36(5), pp. 567–582.
- Norton, E. C., H. Wang, and C. Ai, 2004, Computing Interaction Effects and Standard Errors in Logit and Probit Models, *Stata Journal*, 4(2), pp. 154–167.
- Sauter, N., J. Walliser, and J. Winter, 2010, Tax Incentives, Bequest Motives and Life Insurance Demand: Evidence from two Natural Experiments in Germany, CESifo Working Paper No. 3040, CESifo GmbH, Munich.
- Schunk, D., 2008, A Markov Chain Monte Carlo Algorithm for Multiple Imputation in Large Surveys, *Advances in Statistical Analysis*, 92(1), pp. 101–114.
- Showers, V. E., and J. A. Shotick, 1994, The Effects of Household Characteristics on Demand for Insurance: A Tobit Analysis, *Journal of Risk and Insurance*, 61(3), pp. 492–502.

- Sommer, M., 2005, Trends in German Households' Portfolio Behavior—Assessing the Importance of Age- and Cohort-Effects, MEA Discussion Paper No. 082-05, Mannheim Research Institute for the Economics of Aging.
- Tigges, P., Rieger, A., Jonitz, L., Brengelmann, J., and Engel, R. R., 2000, Risk Behavior of East and West Germans in Handling Personal Finances, *Journal of Behavioral Finance*, 1(2), pp. 127–134.
- Uhlig, H., 2008, The Slow Decline of East Germany, *Journal of Comparative Economics*, 36(4), pp. 517–541.
- Wähling, S., J. Trumpfheller, and J.-M. Graf, 1993, Die Nachfragemotive nach Kapitallebensversicherungen und ihre Struktur, *Versicherungswirtschaft*, 3, pp. 173–180.
- Waldow, T., 2002, Die Bewertung der gemischten Kapitallebensversicherung, in: Berliner Reihe, *Versicherungswissenschaft in Berlin*, Heft 22.
- Walliser, J., and J. Winter, 1998, Tax Incentives, Bequest Motives and the Demand for Life Insurance: Evidence from Germany, Discussion Paper No. 99-28, Sonderforschungsbereich 504, University of Mannheim.
- Yaari, M. E., 1965, Uncertain Lifetime, Life Insurance, and the Theory of the Consumer, *Review of Economic Studies*, 32(2), pp. 137–150.
- Zietz, E. N., 2003, An Examination of the Demand for Life Insurance, *Risk Management and Insurance Review*, 6(2), pp. 159–191.

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