Heterogeneous Default Effects on Retirement Saving

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Sledgehammers or precision instruments

Heterogeneous default effects on retirement saving*

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Abstract

This paper uses a randomized experiment in a representative sample from the Dutch population to investigate the effect of various defaults on retirement saving. In light of the Dutch pension system, with high contributions that afford generous income replacement but no flexibility other than the timing of retirement, we consider defaults that encourage *less* saving as well as more. The aggregate effects of defaults at deviations from the status quo are symmetric and large: they increase the fraction that either suspends or doubles premium payments for three years by 22 percentage points (pp) on a base of less than 10%. The status quo default is less powerful, raising the fraction by 6–13pp from a baseline around 60%. Rich survey data on demographics and preferences matched with administrative records of wealth and forecasted pensions indicate that the different default effects are driven by different groups. A default of *increased* saving disproportionately affects those with self-control issues, but has a smaller effect on individuals prone to procrastination. Moreover, this is the only default that interacts with variables related to preparedness for retirement, with a larger effect on those with high housing wealth and high adequate expenditure goals. The saving reduction default affects women more strongly and has a weaker effect on university graduates.

Key words: defaults, retirement saving, pensions, heterogeneous effects

JEL-codes: D14, D31, D91, H55, J14

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1 Introduction

The ability to steer decisions by means of choice architecture in general and defaults in particular is one of the most influential insights offered by behavioral economics or indeed any field of economics over the past 20 years. Nudging units that aim to incorporate results from the behavioral literature into policy have been established in countries like the U.K., U.S., Australia, Germany and the Netherlands since 2010 (Benartzi et al., 2017). The attraction of using the way in which choices are presented to alter behavior stems from the fact that it imposes no restrictions and is often more cost-effective than financial incentives or outright bans (Benartzi et al., 2017; Dinner et al., 2011).

Choice architecture has been applied to important social issues, such as organ donation and retirement saving.[1] Against the backdrop of widespread and persistent worries that Americans do not save adequately for retirement (Benartzi and Thaler, 2013), a large literature documents that automatic enrolment in saving vehicles substantially increases participation of new employees (Choi et al., 2004; Madrian and Shea, 2001). Such saving in retirement accounts does not crowd out other saving (Chetty et al., 2014). Based on this evidence, default enrolment has been coded into law in the 2006 U.S. Pension Protection Act, the Kiwisaver Act in New Zealand and the 2007 U.K. Pension Act (Carroll et al., 2009). This paper takes a broader view and investigates default effects on retirement saving in a context in which participation in pension plans is mandatory and participants may save *too much* rather than too little. We use a randomized experiment to estimate the effectiveness of defaults to increase or reduce pension contributions or to stick to the status quo. Rich background data on demographics, personality traits and pension entitlements paint a uniquely detailed picture of heterogeneity in the effects of these different types of defaults.

[1] For organ donation, see Kessler and Roth (2012); Howard (2007); Abadie and Gay (2006); Johnson and Goldstein (2003) among others.

The data are collected in the LISS panel, a representative sample from the Dutch population. The Dutch pension system is characterized by high contribution rates, around 20% of pre-tax salary is saved automatically for retirement (Bovenberg and Meijdam, 2001), and little flexibility. In addition to the public pension that covers everybody who lives and works in the Netherlands, workers participate in pension funds organized at the level of the industry or large firm. They cannot influence their pension during the accumulation phase: there is no possibility to opt out or influence the contribution level or investment strategy. While inflexible, with an average net replacement rate of 80% Dutch pensions provide relatively generous income replacement at retirement (Knoef et al., 2016). Furthermore, they allow most individuals to accumulate sufficiently high entitlements to afford and exceed their reported expenditure goals (De Bresser and Knoef, 2015).

We elicit preferences for temporary adjustments of premium payments ranging from a five year suspension to five years of double contributions.[2] The questions have been developed to be as clear and straightforward as possible, since cognitive costs have been proposed as a potential explanation for default effects (Blumenstock et al., 2018). The options are presented in terms of changes to net current and pension income and are actuarially fair given the sex and age of the respondent. Moreover, the menu of seven choices is presented in two steps that combine suspensions and extra contributions respectively. A random half of respondents receives each of these question orders[3] and a separate randomization assigns them to 'no default' (50% of the sample), 'status quo default' or 'three year change' (25% each). The mode of an online survey fits the topic of pensions, since Dutch employees have access to an online dashboard with information on their current and projected future enti-

[2]The survey items that elicit preferences for flexibility have been designed in cooperation with the Authority for Financial Markets (AFM) to cover the range of policy options considered by the Dutch government at the time the survey was designed (March–April 2018).

[3]We test for the influence of question order, suspension followed by extra payments and vica versa, because the existing evidence indicates that the way questions unfold can strongly affect responses. Beshears et al. (2017) shows that the option of delayed saving reduces contributions to retirement accounts when presented together with immediate saving. Earlier research, in which delayed saving was only presented after respondent opted against current saving, found the opposite (Thaler and Benartzi, 2004).

tlements. That environment will likely be used as the venue through which actual decisions are made if flexibility is implemented in the future. As in Altmann et al. (2018), our survey instrument probably limits the importance of procrastination as driver for default effects, since all respondents are forced to make a choice.

Whereas all previous literature focuses on using defaults to boost saving by individuals who are poorly prepared for retirement, we contribute by analyzing the power of defaults that nudge people towards *lower* pension saving or towards the status quo. A clean randomization allows estimation of these various default effects on the distribution of choices. Such wide perspective is especially important because the effects of defaults on the distribution of outcomes in a non-binary setting are complex and key to their aggregate effect. Defaults may motivate some to save more and others less, such that the net effect is zero (Altmann et al., 2018; Carroll et al., 2009). Knowledge of the effect of defaults on the distribution of saving is thus a prerequisite for a discussion of their welfare effects (Bernheim et al., 2015). A second contribution of the present study is an investigation of effect heterogeneity along all margins suggested in prior work, rather than basic demographics such as income and gender (Carroll et al., 2009; Agnew et al., 2008; Choi et al., 2004). Certain margins are directly relevant for the welfare effects of defaults, e.g. those related to preparedness for retirement. Our survey data contain detailed information on the expected retirement age and expenditure goals in retirement and matched administrative records add wealth and projected future pension entitlements. Moreover, the survey includes information on personality traits such as self-control issues (impulsiveness), patience and procrastination that relate to the mechanism underlying default effects.

The results show that defaults are more effective in shifting people away from the status quo than towards it and that they are equally powerful in raising and lowering the saving rate. Making a three year reduction or increase in payments the default results in a 22pp increase in the fraction choosing those options, up from under 10%. The 'no change'-default,

on the other hand, has an effect of 6–13pp on a baseline around 60%. While defaults at other values than the status quo have similar aggregate effects, the effect heterogeneity is markedly different. For an *increase* in premium payments, defaults work best for impulsive individuals and less well for those who tend to procrastinate (despite the fact that they cannot postpone their decision). Moreover, this is the only frame in which the default interacts with pension-related variables: it has a stronger effect for those with high housing wealth relative to current income and a high level of adequate expenditures in retirement. For a temporary *suspension* of premiums the only significant interactions are that women respond more strongly to defaults and university graduates are less affected. The *status quo* default has a weaker effect for those with higher incomes and for homeowners, but only if the other alternatives are suspensions of premiums. While financial planning ability does not interact with any of the defaults, it does negate the effect of question order.

The estimates suggest that different behavioral explanations may drive default effects in different frames. Such variation makes it difficult to predict welfare effects. If the main goal is to improve retirement preparedness in a system in which responsibility lies with the individual, the results show that defaults would help those with self-control issues save. However, the evidence on whether defaults sway the right people in the Dutch system is mixed. While those who want to spend relatively generously in retirement are also more receptive to be nudged into higher saving, the same is true for those who can generate high income from real estate (and hence may not need additional savings). Furthermore, variables related to retirement do not interact significantly with the default for lower premiums, even though a large share of the sample saves too much relative to their own expenditure goals.

The rest of the paper is organized as follows. Section 2 describes the survey instrument by which we measure preferences for pension premium flexibility. It also provides a description of the experiment and summary statistics. Section 3 contains the results and section 4 concludes.

2 Data

2.1 Survey instrument

The data have been collected in the Longitudinal Internet Study in the Social Sciences (LISS panel), administered by CentERdata.[4] This panel is recruited through address-based sampling (no self-selection), and households without a computer and/or internet connection receive an internet connection and computer for free. This roughly nationally representative household panel (Van der Laan, 2009) receives online questionnaires on different topics each month. Panel members receive an incentive when they complete a questionnaire.

The survey instrument measuring preferences for flexibility in pension premiums was the first question in its survey. It has been designed in collaboration with the Authority for Financial Markets to elicit preferences over the full range of policy-relevant options while limiting complexity for respondents. It separates the choice between 7 alternatives ranging from a 5-year suspension of pension premiums to 5 years of extra contributions into two steps, one for suspensions and one for extra contributions. The order of these two subquestions was randomized and defaults were only offered for the first decision. For the suspension followed by extra payments the questions read (emphasis in original):

> **Temporary premium-stop**
>
> At the moment you and your employer both pay pension premiums every month. This happens automatically.
>
> Imagine that in a **new** pension system it would be possible **temporarily suspend premiums** for your pension. This is also called a 'temporary premium-stop'. You would receive a higher net salary during the period in which you do not pay premiums, but you will also receive lower net pension payments for the rest of your life once you are retired.
>
> **Why this possibility?**
>
> A temporary premium-stop can be useful to pay off a debt more quickly or to finance expenditures on children.

[4] For more information we refer to `http://www.lissdata.nl/lissdata/` and Scherpenzeel (2011).

The consequences of this decision

Below you find the consequences of your decision for someone with your income and age. You see by how much the net income that you currently receive would increase and how much your pension income would be reduced. We took into account your salary from a previous questionnaire and we assume that your salary will remain fixed.

You can decide not to pay pension premiums for 1, 3 or 5 years. What would you choose at the moment?

[*Default treatment:* The option 'no premium-stop'/'3 year premium-stop' has been selected already.]

1	2	3	4
No premium-stop	**1 year premium-stop**	**3 year premium-stop**	**5 year premium-stop**
Net monthly current income: *no change*	Net monthly current income: €267[a] *more* for 1 year	Net monthly current income: €267[a] *more* for 3 years	Net monthly current income: €267[a] *more* for 5 years
Net monthly pension income: *no change*	Net monthly pension income: €29[a] *less* for the rest of your life	Net monthly pension income: €88[a] *less* for the rest of your life	Net monthly pension income: €146[a] *less* for the rest of your life
○ [⊙]	○	○ [⊙]	○

[a] Sample average, respondents were presented with an approximation based on current income and age.

[*If respondent chooses 1: no premium-stop*]

Temporary extra premium

At the moment you and your employer both pay pension premiums every month. This happens automatically.

Imagine that in a **new** pension system it would be possible **temporarily increase premium payments** for your pension. You would receive a lower net salary during the period in which you pay higher premiums, but you will also receive higher net pension payments for the rest of your life once you are retired.

Why this possibility?

Temporary extra premium payments can be useful to save more for later, or to fill a gap in pension entitlements.

The consequences of this decision

Below you find the consequences of your decision for someone with your income and age. You see by how much the net income that you currently receive would decrease and how much your pension income would increase. We took into ac-

count your salary from a previous questionnaire and we assume that your salary will remain fixed.

You can decide to pay extra pension premiums for 1, 3 or 5 years. What would you choose at the moment?

1	2	3	4
No extra premium	**1 year extra premium**	**3 year extra premium**	**5 year extra premium**
Net monthly current income: *no change*	Net monthly current income: €267[a] *less* for 1 year	Net monthly current income: €267[a] *less* for 3 years	Net monthly current income: €267[a] *less* for 5 years
Net monthly pension income: *no change*	Net monthly pension income: €29[a] *more* for the rest of your life	Net monthly pension income: €88[a] *more* for the rest of your life	Net monthly pension income: €146[a] *more* for the rest of your life
○	○	○	○

[a] Sample average, respondents were presented with an approximation based on current income and age.

A random half of the sample was presented with the questions as quoted above, the other half received the reverse order with extra payments preceding suspension of premiums. Moreover, an independent randomization assigned half of the respondents to 'no default' and a quarter to each of two defaults: the status quo and a 3-year change in premiums. The income changes are approximately actuarially fair and take into account the current income, which determines premiums, and age of the respondent. They are also economically meaningful: the inter-quartile range for the change in current income is €117–362, or 7–15% of net personal income.

2.2 Descriptives of preferred premium flexibility

Table 1 presents the distribution of the final choices after two subquestions. The survey unearths substantial variation in preferences, since even the extreme options are chosen by non-trivial fractions of respondents. Overall, 58% opt to keep their pension premium unchanged. The remaining 42% is split roughly evenly between lower and higher payments. Among those who choose to temporarily suspend premium payments there is considerable variation in the preferred duration: 8% of the total want to stop contributions for 1 year and

Table 1: Descriptives of outcome variable: temporary suspension or increase of pension premium

		Fraction choosing different options						
		Suspension				Extra premium		
	N	5 years	3 years	1 year	No change	1 year	3 years	5 years
Suspension frame	831	0.05	0.10	0.10	0.59	0.03	0.06	0.07
Extra frame	752	0.04	0.02	0.06	0.57	0.03	0.16	0.13
No default	790	0.05	0.03	0.10	0.59	0.03	0.07	0.11
Default: no change	377	0.04	0.04	0.06	0.68	0.02	0.10	0.06
Default: 3 yr susp.	219	0.04	0.26	0.09	0.47	0.04	0.05	0.06
Default: 3 yr extra	197	0.04	0.01	0.05	0.45	0.02	0.31	0.12
Total	1583	0.05	0.06	0.08	0.58	0.03	0.10	0.10

11% choose 3 or 5 years. Those in favor of extra payments, on the other hand, tend to go for longer periods with only 3% choosing 1 year and 20% 3 or 5 years.

The descriptives in Table 1 suggest that both question order and defaults affect decisions. 25% of respondents who first saw the suspension question choose to stop paying premiums, compared with 12% of the subsample that first received the option to increase payments. Similarly, 16% in the 'suspension'-frame opt for additional payments, compared with 32% in the 'extra premium'-frame. Default effects are large too, especially for those defaults that do not correspond to the status quo. Relative to the 'no default' group, making the status quo the default increases the fraction choosing that option by 9 percentage points (pp) to 68%. The other defaults increase the corresponding fractions by 23pp and 24pp respectively.

Figure 1 shows how preferences for flexibility vary with age and household income. Older individuals are more likely to keep payments fixed, 65% of respondents around age 60 compared with 50% of those around 30 choose that option. This age gradient largely reflects differences in the fraction that prefers to pay higher premiums, which declines from 30% around age 30 to 20% around age 60. For household income the data suggest that higher incomes are associated with lower proclivity to change premiums, in particular with less

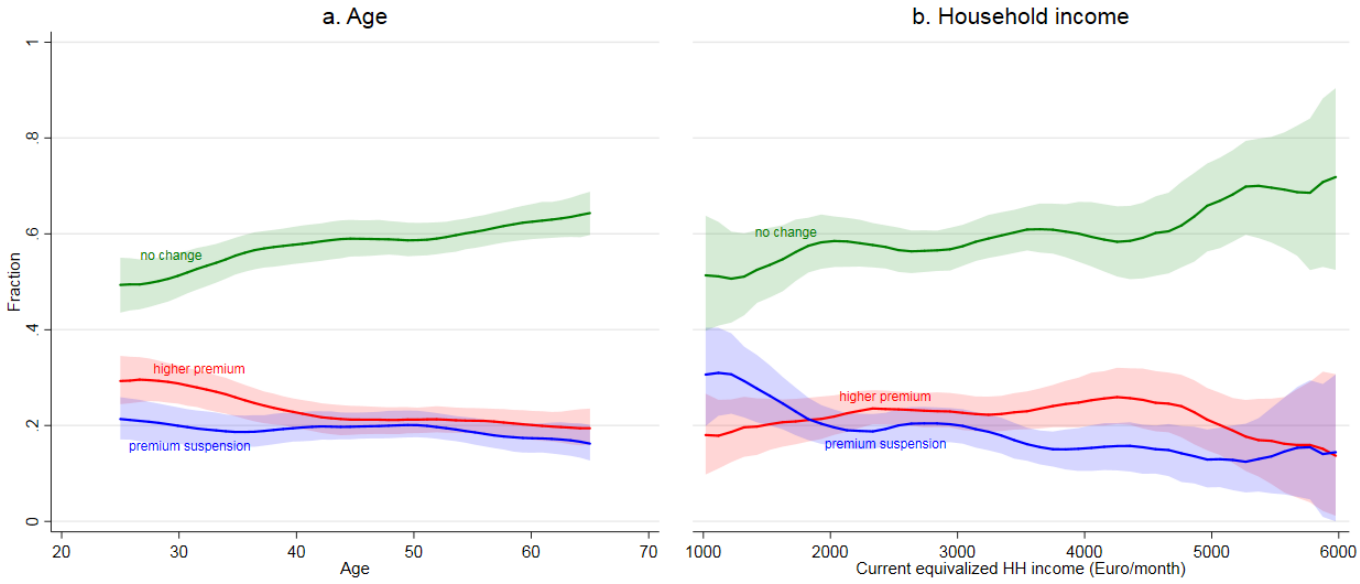

Figure 1: Kernel regressions of choice for premium flexibility on age and net equivalized household income from administrative data (shaded areas are 95% confidence bands; income equivalized to 1-person household)

appetite to suspend payments.

One potential drawback of introducing defaults in an online questionnaire is the possibility that respondents might click through without reading the question. This would compromise data quality and allow participants to claim the financial reward for completing the survey with minimal effort. However, question-level timestamp data reported in Appendix A suggest that this did not happen. The median time spent on the relevant items is 65 seconds and few respondents clicked through without reading, since the first decile is 25 seconds. Furthermore, quantile regressions at p10, p25, p50, p75 and p90 show that differences between those who did and did not receive a default are quantitatively small and mostly statistically insignificant. For individuals who were dealt the suspension question followed by extra premiums only two effects are significant. The first decile is 9 seconds lower in the 3 year suspension-default (baseline: 28 seconds) and the ninth decile is 23 seconds lower for the no change-default (baseline: 159 seconds) relative to those who did not get a default. Differences are even

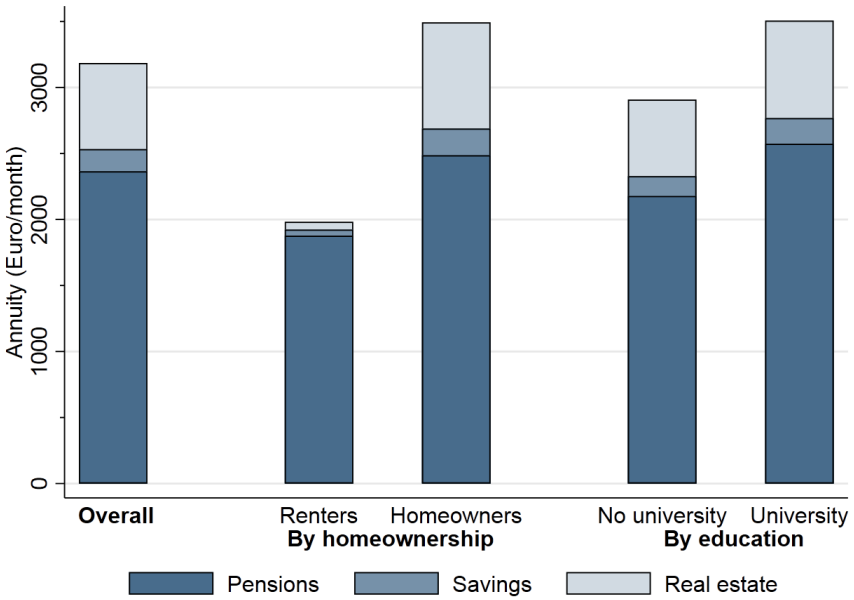

Figure 2: Average predicted annuities from different components of total wealth (household level, equivalized to 1-person household)

smaller for those who first received the extra premium question.[5] These estimates show that respondents took their time to answer the question and did not use defaults as shortcuts.

2.3 Descriptive statistics of covariates

The novelty of this paper lies in the combination of a clean experiment and a representative panel for which we can simultaneously analyze effect heterogeneity over all margins that previous work suggests may be relevant. These include both survey measures of personality and preferences and administrative information on current income, wealth and projected pensions in retirement.

Starting with pensions and wealth, Figure 2 confirms that combined public and private pensions are by far the most important source of income in retirement for our sample of salary workers. Overall, the average forecasted pension annuity is 2365 Euro per month, or

[5]For p25 and p90 some coefficients on the default treatments are significant, but the linear combinations that are relevant for the question order 'extra premium, suspension' are $6.6 - 9.4 = -2.8$ seconds and $-36.4 + 38.9 = 2.5$ seconds respectively and not significant.

74% of the total attainable income if all wealth would be annuitized. Property accounts for most of the rest, adding another 650 Euro to the monthly annuity, and other savings do not play an important role. Splitting the sample by homeownership, we find that renters do not hold other types of wealth in lieu of real estate. Homeowners also have substantially higher pensions and non-housing savings on average and these differences are larger than those across education levels. Annuities are high in absolute terms and relative to current income and expenditure goals reported by the respondents. As reported in Appendix B, the average replacement rate relative to current net household income is 80% if we only take pensions into account and 105% based on all wealth. On average pension annuities exceed self-reported minimal and adequate expenditures by 75% and 51% respectively and only 8% are predicted to fall short of their minimal expenditures. All in all our data corroborate the notion that most Dutch employees save more than adequately for retirement and that those savings are locked into illiquid pensions and real estate.

In addition to pensions and wealth, appendix B also presents descriptive statistics and balance tests for variables derived from surveys. Covariate balance is satisfactory even over the relatively large number of interactions considered (we include a complete set of interactions between the question order and default treatments). Besides variables such as gender, income and education, we also observe a relatively rich set of personality traits that have been proposed to explain default effects. All traits are elicited by self-identification with a short statement, a method which has been shown to provide meaningful measures that predict economic outcomes (Ameriks et al., 2003, 2007; Gathergood, 2012). Impatience, impulsiveness and procrastination are particularly relevant. At 9% the incidence of impulsiveness in our sample is close to the 11% reported for the U.S. (Ameriks et al., 2007) and the 9% for the U.K. (Gathergood, 2012). Impatience and procrastination are more prevalent in the sample: 29% indicate that they discount the future heavily and 20% say they do not tend to do chores immediately.

3 Results

The Dutch pension system, with its substantial savings that are rigidly imposed on participants, provides an interesting setting to examine whether default effects vary across different types of inter-temporal tradeoffs. In particular, we estimate the effects of defaults separately for suspension of pension premiums and for a temporary increase in payments. After discussing the main effects, we provide a detailed description of effect heterogeneity.

3.1 Main effects

Table 2 contains the main effects of question order and four different defaults – 'no change' and 'adjust premiums for 3 years' for a temporary suspension of contributions and for additional payments. These marginal effects are calculated from estimates for a multinomial logit model of respondents' final decisions as summarized in Table 1. The top row describes the baseline choices of the subsample that received the question order 'suspension; extra premium' and did not see a default. In this group, 64% choose not to change their pension premium. 19% suspend their premium, mostly for one year, and 17% opt for additional payments, mostly for three or five years.

The effects of question order, conditional on being in the 'no default'-treatment, are large. Changing the initial question to extra payments instead of suspension of premiums reduces the fraction that pick a one-year suspension or constant premiums by 6 and 9 percentage points (pp) respectively. These individuals decide to increase their premium for three (+5pp) or five (+9pp) years instead. It is interesting to see that question order has such a strong effect on the fraction that want to keep their premium fixed, since that alternative is present in both choice sets.

The effects of defaults are stronger when the default is *not* the status quo. For the group that first received the premium suspension question, a default of 'no change' raises the

Table 2: Effect of question order and defaults on choice for temporary suspension of premiums or additional payments

	Dependent variable: choice for temporary suspension or increase of pension premium						
	Suspension				Extra premium		
	5 years	3 years	1 year	No change	1 year	3 years	5 years
Baseline[a]	0.04	0.03	0.12	0.64	0.04	0.06	0.07
	(0.0113)	(0.00919)	(0.0188)	(0.0284)	(0.0109)	(0.0143)	(0.0154)
Order: extra premium / suspension[b]	0.0248	-0.00232	-0.0635***	-0.0922**	-0.000733	0.0452*	0.0887***
	(0.0189)	(0.0141)	(0.0244)	(0.0422)	(0.0167)	(0.0239)	(0.0286)
Order: suspension / extra premium							
Suspension default: no change	-0.0300*	0.00430	-0.0769***	0.128***	-0.00729	0.0335	-0.0515***
	(0.0176)	(0.0170)	(0.0238)	(0.0402)	(0.0145)	(0.0224)	(0.0191)
Suspension default: 3 years	-0.0255	0.215***	-0.0472*	-0.118***	0.00322	-0.00411	-0.0232
	(0.0174)	(0.0313)	(0.0252)	(0.0413)	(0.0153)	(0.0175)	(0.0216)
Order: extra premium / suspension							
Extra premium default: no change	0.00316	0.000318	-0.0129	0.0571	-0.00779	0.0126	-0.0525*
	(0.0193)	(0.0146)	(0.0218)	(0.0433)	(0.0138)	(0.0277)	(0.0276)
Extra premium default: 3 years	-0.0101	-0.0168	-0.0233	-0.138***	-0.00918	0.221***	-0.0235
	(0.0176)	(0.0111)	(0.0196)	(0.0434)	(0.0132)	(0.0367)	(0.0295)
N				1583			
Log-likelihood				-2067.20			

Robust standard errors in parentheses, clustered at household level (1381 clusters).
* significant at 10%; ** significant at 5%; *** significant at 1%

[a] Predicted probability of outcome for baseline combination of treatments. Baseline question order: suspension followed by temporary increase. Baseline default: no default.

[b] Conditional on default-treatment 'no default'.

fraction picking that alternative by 13pp (from a baseline of 64%). The default of 'three-year suspension', on the other hand, more dramatically increases its prevalence by 22pp from a base of 3%. Most of this shift comes from 'no change' (-12pp). We observe a similar pattern in the sample that first saw the 'extra premium'-question. In that sample making the status quo the default raises the fraction choosing it by an insignificant 6pp (we cannot reject the null that the effect of the status quo default is the same as in the suspension group). The default of three years of extra payments is much more influential, increasing the fraction opting for that alternative by 22pp. Again, the single most important alternative that people switch away from is the status quo (-14pp).

The estimates confirm previous literature in that choice architecture has a powerful effect on decisions when it comes to increasing retirement saving. We show that the same is true when *lowering* premiums and that defaults are most influential when they do *not* refer to the status quo. The symmetry in the effects of defaults for premium suspensions and extra premiums is striking. The next section explores whether these aggregate effects are also driven by similar groups in the sample.

3.2 Heterogeneity in default effects

We analyze which groups are susceptible to defaults by means of linear probability models. These models explain an indicator for choosing the particular alternative that corresponds to a default: a three-year suspension, three years extra premiums or no change in either the suspension or extra premium frame. Each model includes the indicator for the relevant default, all dimensions of heterogeneity that have been proposed in previous literature and a full set of interactions between the default indicator and covariates. These variables capture demographics, personality traits and projections of the pension income available at retirement.

Table 3: Heterogeneity in default effects – default not at status quo

	Type of default					
	3 yr suspension			3 yr extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
$\mathbb{I}\{\text{default}\}$	0.220*	0.199	0.135	0.209	0.160	0.280*
	(0.129)	(0.133)	(0.127)	(0.161)	(0.182)	(0.167)
Interactions (variable $\times \mathbb{I}\{\text{default}\}$)						
log(annuity)–log(minimal exp.): 0.36–0.70			0.0422			-0.162
			(0.0961)			(0.107)
log(annuity)–log(minimal exp.): ≥ 0.70			-0.0444			0.0250
			(0.0909)			(0.123)
log(annuity)–log(minimal exp.): missing			0.203*			-0.155
			(0.106)			(0.110)
Replacement rate: 0.70–0.87		0.0496			0.0143	
		(0.0869)			(0.102)	
Replacement rate: ≥ 0.87		0.0719			0.110	
		(0.0906)			(0.103)	
Replacement rate: missing		-0.269			0.0110	
		(0.214)			(0.279)	
Income: €2729–4112	0.0536	0.0402	0.0985	0.0718	0.0837	0.0687
	(0.0940)	(0.0974)	(0.0913)	(0.109)	(0.111)	(0.109)
Income: $\geq$ €4112	0.106	0.100	0.141	0.0306	0.0463	0.0166
	(0.109)	(0.111)	(0.110)	(0.121)	(0.122)	(0.120)
Income: missing	0.0800	0.373*	-0.0558	0.125	0.160	0.204
	(0.109)	(0.215)	(0.127)	(0.157)	(0.297)	(0.169)
Age: 41–53	0.0702	0.0588	0.0762	-0.0252	-0.0173	-0.0179
	(0.0839)	(0.0866)	(0.0821)	(0.0969)	(0.100)	(0.0972)
Age: 54–65	0.0706	0.0686	0.0926	0.0358	0.0355	0.0361
	(0.0740)	(0.0754)	(0.0715)	(0.104)	(0.106)	(0.103)
Female	0.145*	0.146*	0.149*	-0.0224	-0.0243	-0.0174
	(0.0775)	(0.0775)	(0.0774)	(0.0921)	(0.0917)	(0.0899)
Education: university	-0.179**	-0.178**	-0.181***	0.104	0.0941	0.0812
	(0.0704)	(0.0722)	(0.0703)	(0.0858)	(0.0865)	(0.0857)
Homeowner	-0.114	-0.115	-0.118	0.0187	0.0306	0.0383
	(0.0858)	(0.0862)	(0.0852)	(0.0989)	(0.101)	(0.0997)
Risk aversion	-0.00311	-0.0189	0.00167	-0.0560	-0.0582	-0.0427
	(0.0654)	(0.0692)	(0.0658)	(0.0758)	(0.0757)	(0.0770)
Impulsiveness	0.108	0.129	0.0947	0.383***	0.380***	0.406***
	(0.127)	(0.130)	(0.123)	(0.119)	(0.125)	(0.123)
Impatience	0.0114	0.00152	0.0287	-0.135	-0.141*	-0.131
	(0.0725)	(0.0744)	(0.0731)	(0.0827)	(0.0844)	(0.0812)
Fin. planning easy	-0.0575	-0.0470	-0.0496	-0.0931	-0.0882	-0.0923
	(0.0723)	(0.0731)	(0.0734)	(0.0802)	(0.0817)	(0.0807)
Procrastination	0.0295	0.0318	0.0256	-0.174*	-0.176*	-0.181*
	(0.0789)	(0.0801)	(0.0813)	(0.0921)	(0.0953)	(0.0936)
R-squared	0.16	0.17	0.18	0.15	0.15	0.16
N	751	751	751	656	656	656

Robust standard errors in parentheses, clustered at household level (704 and 624 clusters respectively). Main effects of covariates are reported in Appendix C, Table C1.
* significant at 10%; ** significant at 5%; *** significant at 1%

Tables 3 and 4 report estimates for the default indicator and its interactions with covariates. Table 3 presents estimates for alternatives that are not the status quo, for which the aggregate effects are identical (both defaults increase the prevalence of that option by 22pp). While there is substantial heterogeneity for both choices, the relevant variables do not overlap. In the context of a reduction in pension saving, the default is particularly effective for women. For them the effect is 15pp larger than for men. University education, on the other hand, reduces the impact by 18pp. The corresponding interactions are smaller in magnitude and statistically insignificant for the increase in premiums. Personality traits play a more important role in that setting, in particular impulsiveness which increases the effectiveness of the default by around 39pp. Procrastination matters too, decreasing the effect by 18pp, despite the fact that respondents were forced to make a choice. When it comes to nudging the Dutch to save more for retirement, defaults are less effective for those who are prone to dither and particularly powerful for those who act first and think later.

Defaults affect different groups depending on whether the choice is to save more or less for retirement. These results remain unchanged if we control for pensions, measured either by tertiles of the replacement rate of pensions relative to current income or by tertiles of the difference between pension annuities and expenditure goals (models b and c in Table 3). Moreover, the interactions between defaults and pensions mostly have small point estimates and are all insignificant. We extended the models from Table 3 with the gap between statutory and expected retirement age; separate replacement rates from pensions and savings and from real estate; and self-reported minimal and adequate retirement expenditures. None of these variables related to retirement timing, resources or goals interact significantly with the default dummy in the equation explaining the choice for a three year suspension of pension premiums. There are significant interactions for extra payments. In particular, those with a relatively high replacement rate from real estate, 10% of current income or more, are more sensitive to defaults for additional contributions (the treatment effect is about 25pp larger).

Those with relatively high minimal expenditures are less sensitive to defaults (-34pp) and those with high adequate expenditures are more sensitive (29–35pp). However, these interactions are not significant in models that do not control for demographics and personality and are thus less robust across specifications than the heterogeneity described in Table 3. Estimates of the extended models are available on request.

Table 4 shows heterogeneity in default effects for the status quo. The left panel corresponds to the sample that first received the choice between keeping their premium constant and temporarily suspending it. In contrast to both defaults in Table 3, in this case income and homeownership are the relevant margins of heterogeneity. The status quo default is less effective for the middle and high income tertiles and for homeowners, the treatment effect is reduced by 22–28pp for these groups. Results are robust to controlling for pension wealth, which does not interact significantly with the the default effect. However, standard errors are large, so economically meaningful interactions with pensions cannot be ruled out. The right panel of Table 4 describes effect heterogeneity for the sample that first chose between a constant premium and a temporary increase. None of the interactions are significant for that frame and all but the highest income tertile have considerably smaller point estimates. Extended models confirm that there is no significant heterogeneity in the effect of status quo defaults along timing, resources and expenditure goals, regardless of whether we control for demographics and personality (estimates available on request).

While Tables 3 and 4 focus on the interactions of defaults with covariates, Appendix C contains estimates of the main effects of those background variables. These associations show that income is negatively associated with interest in the three-year suspension of premiums: that option is chosen 6pp less frequently in the top two thirds of the income distribution compared to the bottom. No other demographic variable or personality trait is significantly related to interest in the saving reduction. For pensions, those in the middle of the distribution of annuities in excess of expenditure goals are 5pp less likely than those in the bottom to

Table 4: Heterogeneity in default effects – default at status quo

	Type of default: no change					
	Suspension			Extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
$\mathbb{I}\{\text{default}\}$	0.530***	0.689***	0.612***	-0.0741	-0.126	0.135
	(0.147)	(0.163)	(0.167)	(0.191)	(0.213)	(0.218)
Interactions (variable × $\mathbb{I}\{\text{default}\}$)						
log(annuity)–log(minimal exp.): 0.36–0.70			0.0572			-0.196
			(0.133)			(0.149)
log(annuity)–log(minimal exp.): ≥ 0.70			-0.0521			-0.183
			(0.157)			(0.154)
log(annuity)–log(minimal exp.): missing			-0.164			-0.310**
			(0.125)			(0.147)
Replacement rate: 0.70–0.87		-0.170			0.221*	
		(0.114)			(0.124)	
Replacement rate: ≥ 0.87		-0.190*			0.0241	
		(0.115)			(0.132)	
Replacement rate: missing		0.427*			0.00972	
		(0.230)			(0.336)	
Income: €2729–4112	-0.251**	-0.230*	-0.284**	0.0618	0.0318	0.0557
	(0.119)	(0.121)	(0.123)	(0.132)	(0.135)	(0.133)
Income: ≥ €4112	-0.225*	-0.240*	-0.253*	0.208	0.185	0.195
	(0.131)	(0.132)	(0.140)	(0.146)	(0.150)	(0.153)
Income: missing	-0.138	-0.685***	-0.0441	0.240*	0.299	0.357**
	(0.121)	(0.240)	(0.132)	(0.144)	(0.327)	(0.153)
Age: 41–53	0.117	0.0794	0.131	0.0682	0.0608	0.0673
	(0.106)	(0.107)	(0.107)	(0.112)	(0.112)	(0.111)
Age: 54–65	-0.0219	-0.0601	-0.0380	-0.124	-0.135	-0.129
	(0.108)	(0.110)	(0.112)	(0.119)	(0.120)	(0.118)
Female	0.00803	-0.00304	0.00750	-0.0596	-0.0780	-0.0681
	(0.0846)	(0.0855)	(0.0848)	(0.100)	(0.102)	(0.0994)
Education: university	-0.0920	-0.103	-0.110	0.0881	0.116	0.0702
	(0.0881)	(0.0889)	(0.0911)	(0.0963)	(0.0992)	(0.0962)
Homeowner	-0.232**	-0.252***	-0.223**	-0.0553	-0.0904	-0.0335
	(0.0943)	(0.0951)	(0.0976)	(0.131)	(0.128)	(0.131)
Risk aversion	-0.0986	-0.0929	-0.109	0.0278	0.0399	0.0247
	(0.0850)	(0.0854)	(0.0851)	(0.0917)	(0.0914)	(0.0918)
Impulsiveness	-0.0414	-0.0449	-0.0458	-0.118	-0.118	-0.124
	(0.177)	(0.185)	(0.181)	(0.164)	(0.174)	(0.165)
Impatience	-0.00201	-0.0182	-0.00130	0.159	0.165	0.153
	(0.0975)	(0.100)	(0.100)	(0.108)	(0.110)	(0.111)
Fin. planning easy	0.0157	0.0151	0.0173	0.0723	0.0719	0.0523
	(0.0840)	(0.0839)	(0.0844)	(0.0927)	(0.0930)	(0.0948)
Procrastination	0.0178	0.0514	0.00721	-0.0397	-0.0216	-0.0467
	(0.0911)	(0.0922)	(0.0921)	(0.117)	(0.119)	(0.117)
R-squared	0.09	0.09	0.10	0.08	0.09	0.09
N	751	751	751	656	656	656

Robust standard errors in parentheses, clustered at household level (704 and 624 clusters respectively). Main effects of covariates are reported in Appendix C, Table C2.
* significant at 10%; ** significant at 5%; *** significant at 1%

cut contributions. However, those in the top third do not make significantly different choices compared to those in the bottom. Preferences for additional retirement savings are not related to pension wealth either. While age is not related to the choice for a three-year suspension, middle aged respondents are 7pp less likely than those aged 25–40 to choose to spend more on their pension. Impulsiveness and ease with financial planning also matter. Though the default effect in this setting is strongest for those who are rash, impulsive respondents are 8pp *less* likely to pick extra payments keeping the default treatment constant. Similarly, those who think financial planning is easy are also 9pp less likely to select extra premiums. All these patterns are corroborated in the extend models that include more pension-related variables (estimates available on request). The only pension-related variable that correlates with interest in switching away from the status quo is the timing of retirement: those who expect to retire more than 2.5 years *before* the statutory retirement age are 8pp more likely to opt for extra payments, presumably to counteract the actuarial adjustment to benefits that early retirement entails.

As is the case for the interactions, Table C2 shows that the choice to keep pensions unchanged is associated with different background variables depending on whether the other option is to reduce or increase savings. Middle and high income individuals are 22pp more likely than their lower income peers to stick with the status quo when their first choice is between that and suspending premiums. However, there is no such difference when the alternative is to pay more instead. The oldest age group is 13pp more likely not to change contributions rather than pay more and those with university education choose that option 16pp less frequently, but there are no such differences for the suspension sample. One relationship that is common to both samples is that between risk aversion and maintaining the status quo: those who are not willing to take financial risks are 8–12pp more likely not to change their premium. Homeownership also goes in the same direction for both samples, homeowners prefer the status quo more often, but this is statistically significant only in the

premium suspension-frame. Extending the models with more pension-related variables does not change these main effects and none of those variables are themselves significant (estimates available on request).

3.3 Heterogeneity in question order effects

While the main focus of this study is on defaults, we briefly investigate whether question order, the other aspect of choice architecture manipulated in the experiment, affects the same groups that are sensitive to defaults. Appendix D contains estimates of linear probability models in which indicators for choosing any suspension of premiums or any increase are regressed on a question order dummy, covariates and the interaction of the two. In order to rule out any interactions with defaults, the sample is limited to the half that did not get a default. The only heterogeneity in the order effect runs along financial planning: those who report that financial planning is easy are significantly less affected by question order. Facility with financial planning does not interact significantly with the default effect.

4 Conclusion

The effectiveness of defaults to increase retirement saving in an environment in which undersaving is the dominant concern has been demonstrated repeatedly in academic research (e.g. Madrian and Shea, 2001; Choi et al., 2002, 2004, 2005; Carroll et al., 2009 for the U.S. and Blumenstock et al., 2018 for Afghanistan). The present paper sheds new light on defaults by separately estimating their influence when it comes to reducing, increasing or maintaining constant pension premiums in an institutional context in which oversaving is as relevant as undersaving: the Netherlands in 2018. Moreover, detailed information on demographics and personality traits allow investigation of all margins of heterogeneity that have been proposed in relation to the power of defaults. Matched administrative records of pension and

non-pension wealth illuminate whether default effects vary with preparedness for retirement, which is key to assessing welfare effects.

We measure preferences for flexibility in pension premiums among employees in the LISS panel, a representative sample from the Dutch population. The Dutch pension system imposes a high saving rate on employees: they automatically contribute 20% of gross income to public and private pensions with no discretion regarding participation, contribution rate or investment portfolio. Those contributions generate high projected pensions: the average net replacement rate relative to current income is 80% and only 8% is forecasted to accumulate insufficient entitlements to afford their self-reported minimal expenditures during retirement. Respondents choose between the status quo of constant premiums and options ranging from a five-year suspension of premiums to doubling contributions for five years. The consequences of those choices are expressed in terms of changes to current net personal income and to pension benefits in retirement, which are calculated to be realistic and actuarially neutral based on the income and age of the respondent. Furthermore, choices are elicited in two steps to lighten response burden, with random assignment to suspensions followed by increased payments or the other way around. An independent randomization assigns half of the sample to 'no default' and a quarter to each of the 'status quo' and 'three years change'-defaults. Question-level timestamp data indicate that defaults do not compromise data quality, since respondents do not use them as shortcuts to quickly click through to the next question.

Defaults are particularly effective when they do not refer to the status quo, raising the proportion that adjusts premiums either up or down by 22pp from a base between 3 and 10%. The status quo is the most popular alternative, around 60% of the sample opt for it, yet the corresponding default effect of 6–13pp is smaller both in absolute and relative terms. Default effects are highly heterogeneous and the relevant dimensions of heterogeneity vary depending on whether the default refers to the status quo or to an increase or reduction in saving. In the context of *increasing* retirement saving, the one setting considered in previous research,

we find that the personality traits of impulsiveness and to a lesser degree procrastination interact significantly with the effectiveness of defaults. They influence behavior more strongly for impulsive individuals, for whom the effect size is 38pp larger than for peers with no self-control issues, and are less likely to tempt those who are prone to procrastinate to save more (-18pp). Interestingly, neither of these traits matter in the context of a temporary *reduction* in saving. In that setting defaults interact most strongly with education: they are significantly less effective for those with university education (-18pp). Defaults affect women's decisions to cut back on pension saving more (+15pp). Even for the status quo, we find that variation in default effects is different depending on whether the other alternatives involve increasing or reducing retirement savings. If the alternative is to reduce savings, homeowners respond less strongly to the status quo default than renters (-23pp). Those in the top two thirds of the income distribution are also less sensitive (-23–28pp). Neither of these differences are statistically significant for the increased savings-group and the point estimate for homeowners is also substantially smaller.

For the status quo and suspension of premiums, we find no statistically significant heterogeneity in default effects across the distributions of the timing of retirement, retirement savings or expenditure goals. The default of extra payments does interact with aspects of preparation for retirement. It affects choices more strongly for those with high holdings in real estate, a group that can already look forward to relatively high income in retirement. Moreover, defaults are less potent for those with high minimal expenditure goals, but more powerful for those with high adequate expenditures. Heterogeneity across demographics and personality is robust to the inclusion or omission of retirement variables. The variation with real estate wealth and expenditure goals in retirement is less robust: it is only apparent if we control for the other covariates.

The main message of our analysis is that retirement saving is extremely sensitive to choice architecture, both when it comes to increasing and decreasing saving. This is true even though

we aim to make the choice as straightforward as possible, presenting its consequences in terms of changes to net income and splitting it into two steps to limit the number of alternatives. Existing behavioral models that explain default effects by time-varying costs of opting out, e.g. Choi et al. (2003), cannot explain our findings, because respondents are forced to make a decision and cannot postpone. Procrastination does matter, but actually renders the default of extra saving *less* effective. The finding that defaults strongly push those prone to self-control issues to save more for retirement may lead to substantial welfare gains in a system in which the individual is responsible for retirement preparedness and under-preparation is the main concern. However, in the Dutch system defaults are not an effective means to target those with low wealth and pension entitlements. In fact, our results suggest that those who are already wealthy are most likely to be nudged by defaults to save even more. On the other hand, the same is true for those who want to maintain high expenditures after retirement.

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A Effect of treatment on response time

Table A1: Effects of defaults and question order on response time in seconds (response time is specific to the relevant question on pension premium flexibility)

a. Descriptives

				Quantiles				
	N	Mean	Std. Dev.	p10	p25	p50	p75	p90
Response time (sec.)	1583	104	327	25	41	65	96	153

b. Quantile regressions

	p10	p25	p50	p75	p90
$\mathbb{I}$ {Order: extra premium, suspension}	-1.203	4.248	0.656	5.627	9.617
	(3.267)	(3.471)	(4.404)	(8.110)	(17.250)
$\mathbb{I}$ {Default: no suspension}	-3.100	-2.730	0.196	-1.693	-23.176**
	(3.949)	(3.176)	(4.251)	(5.818)	(10.317)
$\mathbb{I}$ {Default: 3 years suspension}	-8.567**	-3.231	-0.009	8.607	3.130
	(3.530)	(3.618)	(4.263)	(9.570)	(20.343)
$\mathbb{I}$ {Order: extra premium, suspension}	1.180	-0.649	-8.434	3.308	7.0450
$\times\mathbb{I}$ {Default: no suspension}	(5.715)	(4.708)	(5.934)	(10.185)	(23.537)
$\mathbb{I}$ {Order: extra premium, suspension}	5.185	-0.366	-2.314	0.554	-22.179
$\times\mathbb{I}$ {Default: 3 years suspension}	(5.296)	(5.341)	(6.784)	(13.427)	(28.147)
$\mathbb{I}$ {Default: no extra premium}	0.765	4.512	1.447	-4.127	-6.086
	(4.284)	(3.606)	(3.930)	(6.942)	(18.663)
$\mathbb{I}$ {Default: 3 years extra premium}	2.390	6.606**	3.901	-4.050	-36.398***
	(3.636)	(3.318)	(4.592)	(5.762)	(11.424)
$\mathbb{I}$ {Order: extra premium, suspension}	2.249	-7.182	3.622	5.778	27.249
$\times\mathbb{I}$ {Default: no extra premium}	(5.465)	(5.031)	(6.172)	(11.925)	(39.847)
$\mathbb{I}$ {Order: extra premium, suspension}	-9.814	-9.392*	0.211	8.894	38.864*
$\times\mathbb{I}$ {Default: 3 years extra premium}	(6.359)	(5.220)	(6.404)	(10.448)	(22.192)
Constant	27.599***	40.170***	63.319***	93.636***	158.755***
	(2.068)	(2.141)	(3.405)	(4.993)	(10.022)
N	1583	1583	1583	1583	1583

Robust standard errors in parentheses, clustered at household level (1381 clusters)
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

B Descriptive statistics

Table B1: Descriptive statistics and balance tests for variables obtained from administrative data

				Balance tests[a]	
	N	Mean	Std. Dev.	F-stat	p-value
Personal income (monthly)	1280	3650	2040	1.59	0.11
Household income (monthly)	1280	4021	1827	0.88	0.54
Equivalized HH income (monthly)	1280	3114	1255	0.86	0.56
Annuities (Euro/month; HH level equivalized to 1 person)					
Pensions	1275	2365	710	1.23	0.27
Pensions + savings	1176	2533	875	1.19	0.30
Pensions + savings + real estate	1176	3185	1224	1.84	0.06
Replacement rates (annuity/current household income)					
Pensions	1256	0.80	0.22	0.53	0.85
Pensions + savings	1160	0.85	0.25	1.14	0.33
Pensions + savings + real estate	1160	1.05	0.32	1.29	0.24
Log(annuities) – log(minimal expenditures)					
Pensions	849	0.56	0.44	0.89	0.53
Pensions + savings	779	0.62	0.46	0.92	0.51
Pensions + savings + real estate	779	0.83	0.51	1.39	0.19
Log(annuities) – log(adequate expenditures)					
Pensions	869	0.41	0.43	1.26	0.25
Pensions + savings	794	0.47	0.45	1.17	0.31
Pensions + savings + real estate	794	0.68	0.50	1.72	0.08

[a] Tests of the null hypothesis that all slopes are jointly zero in equation

$$
\begin{aligned}
y = \beta_0 &+ \beta_1 \mathbb{I}\{\text{Order: extra premium, suspension}\} \\
&+ \beta_2 \mathbb{I}\{\text{Default: no suspension}\} + \beta_3 \mathbb{I}\{\text{Default: 3 years suspension}\} \\
&+ \beta_4 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: no suspension}\} \\
&+ \beta_5 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: 3 years suspension}\} \\
&+ \beta_6 \mathbb{I}\{\text{Default: no extra premium}\} + \beta_7 \mathbb{I}\{\text{Default: 3 years extra premium}\} \\
&+ \beta_8 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: no extra premium}\} \\
&+ \beta_9 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: 3 years extra premium}\} + \varepsilon
\end{aligned}
$$

Table B2: Descriptive statistics and balance tests for variables based on survey data

				Balance tests[a]	
	N	Mean	Std. Dev.	F-stat	p-value
Female	1583	0.48	0.50	0.63	0.78
Age	1583	46.0	11.3	1.83	0.06
Lives with partner	1583	0.72	0.45	0.59	0.80
Homeowner	1583	0.78	0.42	1.24	0.26
Head of household	1583	0.71	0.45	0.62	0.78
Number of children	1583	0.85	1.08	0.99	0.45
Marital status					
Married	1583	0.54	0.50	1.17	0.31
Separated	1583	0.11	0.31	1.74	0.07
Widow	1583	0.01	0.11	0.89	0.54
Never married	1583	0.33	0.47	1.05	0.40
Education					
Low	1583	0.14	0.34	0.42	0.92
Middle	1583	0.35	0.48	0.54	0.84
High	1583	0.50	0.50	0.79	0.63
Other	1583	0.01	0.12	1.28	0.24
Expenditure goals in retirement (Euro/month; HH level equivalized to 1 person)					
Minimal expenditures	1014	1440	597	1.14	0.33
Adequate expenditures	1036	1666	672	1.02	0.42
Personality (ordinal scales)					
Risk aversion (1–7)	1463	3.5	1.7	2.30	0.01
Impulsiveness (1–7)	1532	2.2	1.4	1.68	0.09
Impatience (1–7)	1533	3.4	1.7	1.39	0.19
Financial planning easy (1–7)	1528	3.6	1.8	1.21	0.28
Procrastination (1–5)	1558	1.8	0.9	0.99	0.44
Personality (binary indicators)					
Risk aversion	1463	0.48	0.50	2.06	0.03
Impulsiveness	1532	0.09	0.29	0.86	0.56
Impatience	1533	0.29	0.45	0.75	0.67
Financial planning easy	1528	0.54	0.50	1.13	0.33
Procrastination	1558	0.20	0.40	1.01	0.43

[a] Tests of the null hypothesis that all slopes are jointly zero in equation

$$
\begin{aligned}
y = \beta_0 &+ \beta_1 \mathbb{I}\{\text{Order: extra premium, suspension}\} \\
&+ \beta_2 \mathbb{I}\{\text{Default: no suspension}\} + \beta_3 \mathbb{I}\{\text{Default: 3 years suspension}\} \\
&+ \beta_4 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: no suspension}\} \\
&+ \beta_5 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: 3 years suspension}\} \\
&+ \beta_6 \mathbb{I}\{\text{Default: no extra premium}\} + \beta_7 \mathbb{I}\{\text{Default: 3 years extra premium}\} \\
&+ \beta_8 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: no extra premium}\} \\
&+ \beta_9 \mathbb{I}\{\text{Order: extra premium, suspension}\} \times \mathbb{I}\{\text{Default: 3 years extra premium}\} + \varepsilon
\end{aligned}
$$

C Main effects in linear probability models of premium flexibility

Table C1: Main effects from linear probability models for default effects – default not at status quo

	Type of default					
	3 yr suspension			3 yr extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
log(annuity)–log(minimal exp.): 0.36–0.70			-0.0451**			0.0415
			(0.0223)			(0.0430)
log(annuity)–log(minimal exp.): $\geq$ 0.70			0.0189			0.00249
			(0.0344)			(0.0419)
log(annuity)–log(minimal exp.): missing			-0.0229			0.0367
			(0.0257)			(0.0408)
Replacement rate: 0.70–0.87		0.00476			0.0269	
		(0.0216)			(0.0392)	
Replacement rate: $\geq$ 0.87		0.0196			-0.0213	
		(0.0222)			(0.0394)	
Replacement rate: missing		0.152			-0.00675	
		(0.172)			(0.133)	
Income: €2729–4112	-0.0608**	-0.0585**	-0.0598**	0.0143	0.00733	0.0130
	(0.0252)	(0.0253)	(0.0245)	(0.0418)	(0.0424)	(0.0417)
Income: $\geq$ €4112	-0.0567*	-0.0509	-0.0579*	0.00234	-0.00865	0.00504
	(0.0332)	(0.0325)	(0.0330)	(0.0462)	(0.0478)	(0.0460)
Income: missing	-0.0227	-0.161	-0.0125	0.00758	0.00949	-0.00681
	(0.0311)	(0.174)	(0.0332)	(0.0457)	(0.134)	(0.0546)
Age: 41–53	0.00108	0.00320	-0.000122	-0.0726**	-0.0735**	-0.0732**
	(0.0193)	(0.0197)	(0.0195)	(0.0359)	(0.0364)	(0.0365)
Age: 54–65	0.00434	0.00676	0.00499	-0.0613	-0.0591	-0.0601
	(0.0203)	(0.0205)	(0.0200)	(0.0389)	(0.0395)	(0.0394)
Female	-0.000626	0.000794	-0.000549	-0.0174	-0.0194	-0.0156
	(0.0210)	(0.0210)	(0.0211)	(0.0313)	(0.0315)	(0.0314)
Education: university	0.0238	0.0202	0.0211	0.0388	0.0436	0.0383
	(0.0172)	(0.0171)	(0.0174)	(0.0281)	(0.0287)	(0.0288)
Homeowner	0.0103	0.0145	0.00874	0.00144	-0.00520	0.00201
	(0.0228)	(0.0227)	(0.0233)	(0.0401)	(0.0407)	(0.0399)
Risk aversion	-0.0222	-0.0207	-0.0205	-0.0300	-0.0298	-0.0346
	(0.0167)	(0.0165)	(0.0168)	(0.0272)	(0.0274)	(0.0280)
Impulsiveness	0.0444	0.0465	0.0502	-0.0791**	-0.0768**	-0.0804**
	(0.0441)	(0.0442)	(0.0443)	(0.0383)	(0.0386)	(0.0386)
Impatience	0.00332	0.00329	-0.00137	-0.0259	-0.0266	-0.0259
	(0.0223)	(0.0227)	(0.0228)	(0.0318)	(0.0320)	(0.0327)
Fin. planning easy	0.0133	0.0125	0.0113	-0.0946***	-0.0943***	-0.0948***
	(0.0169)	(0.0178)	(0.0169)	(0.0304)	(0.0305)	(0.0304)
Procrastination	0.0219	0.0206	0.0230	0.0119	0.0119	0.0125
	(0.0240)	(0.0238)	(0.0241)	(0.0369)	(0.0374)	(0.0371)
N	751	751	751	656	656	656

Robust standard errors in parentheses, clustered at household level (704 and 624 clusters respectively).
* significant at 10%; ** significant at 5%; *** significant at 1%

Table C2: Main effects from linear probability models for default effects – default at status quo

	Type of default: no change					
	Suspension			Extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
log(annuity)–log(minimal exp.): 0.36–0.70			0.0269			0.0365
			(0.0712)			(0.0716)
log(annuity)–log(minimal exp.): $\geq$ 0.70			0.0429			0.0664
			(0.0665)			(0.0742)
log(annuity)–log(minimal exp.): missing			0.142**			0.149**
			(0.0628)			(0.0671)
Replacement rate: 0.70–0.87		-0.00211			-0.0677	
		(0.0580)			(0.0623)	
Replacement rate: $\geq$ 0.87		0.0495			0.0484	
		(0.0572)			(0.0631)	
Replacement rate: missing		-0.0956			0.0818	
		(0.167)			(0.191)	
Income: €2729–4112	0.228***	0.228***	0.242***	0.0117	0.0351	0.0154
	(0.0594)	(0.0604)	(0.0596)	(0.0643)	(0.0652)	(0.0637)
Income: $\geq$ €4112	0.207***	0.211***	0.223***	4.7e-5	0.0229	0.00925
	(0.0651)	(0.0666)	(0.0649)	(0.0708)	(0.0723)	(0.0710)
Income: missing	0.145**	0.258	0.0726	-0.00971	-0.0783	-0.0892
	(0.0647)	(0.165)	(0.0712)	(0.0720)	(0.189)	(0.0810)
Age: 41–53	-0.0743	-0.0751	-0.0814	0.0264	0.0296	0.0405
	(0.0533)	(0.0538)	(0.0536)	(0.0590)	(0.0601)	(0.0594)
Age: 54–65	-0.0167	-0.0149	-0.00803	0.130**	0.127**	0.145**
	(0.0532)	(0.0538)	(0.0533)	(0.0579)	(0.0588)	(0.0584)
Female	-0.0151	-0.0129	-0.0135	0.0427	0.0500	0.0440
	(0.0456)	(0.0463)	(0.0458)	(0.0484)	(0.0490)	(0.0483)
Education: university	-0.0369	-0.0395	-0.0297	-0.165***	-0.173***	-0.155***
	(0.0441)	(0.0448)	(0.0443)	(0.0496)	(0.0498)	(0.0497)
Homeowner	0.135**	0.137**	0.132**	0.0777	0.0989*	0.0682
	(0.0548)	(0.0554)	(0.0554)	(0.0578)	(0.0597)	(0.0574)
Risk aversion	0.119***	0.119***	0.124***	0.0836*	0.0871*	0.0807*
	(0.0412)	(0.0413)	(0.0413)	(0.0455)	(0.0456)	(0.0460)
Impulsiveness	-0.0535	-0.0499	-0.0629	-0.0429	-0.0329	-0.0413
	(0.0766)	(0.0762)	(0.0767)	(0.0848)	(0.0857)	(0.0849)
Impatience	-0.0450	-0.0502	-0.0412	-0.0187	-0.0213	-0.00289
	(0.0480)	(0.0485)	(0.0479)	(0.0519)	(0.0519)	(0.0527)
Fin. planning easy	0.00638	0.00514	0.00983	0.0679	0.0680	0.0826*
	(0.0440)	(0.0444)	(0.0440)	(0.0465)	(0.0468)	(0.0472)
Procrastination	0.0362	0.0337	0.0442	-0.00805	-0.00568	-0.00971
	(0.0510)	(0.0511)	(0.0503)	(0.0568)	(0.0570)	(0.0565)
N	751	751	751	656	656	656

Robust standard errors in parentheses, clustered at household level (704 and 624 clusters respectively).
* significant at 10%; ** significant at 5%; *** significant at 1%

D The effect of question order

Table D1: Interactions from linear probability models for question order effects

	Any suspension			Any extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
$\mathbb{I}$ {Order: extra premium / suspension}	-0.189*	-0.278**	-0.174	-0.0518	0.0514	-0.0463
	(0.115)	(0.132)	(0.130)	(0.121)	(0.145)	(0.141)
Interactions (variable $\times$ $\mathbb{I}$ {Order: extra premium / suspension})						
log(annuity)–log(minimal exp.): 0.36–0.70			0.0522			-0.0200
			(0.104)			(0.0993)
log(annuity)–log(minimal exp.): $\geq$ 0.70			-0.162*			0.00809
			(0.0957)			(0.0992)
log(annuity)–log(minimal exp.): missing			0.0327			-0.0244
			(0.0908)			(0.0895)
Replacement rate: 0.70–0.87		0.0730			-0.00567	
		(0.0811)			(0.0894)	
Replacement rate: $\geq$ 0.87		0.104			-0.0621	
		(0.0818)			(0.0871)	
Replacement rate: missing		0.140			-0.645*	
		(0.337)			(0.350)	
Income: €2729–4112	0.135	0.144*	0.131	0.0966	0.0613	0.101
	(0.0845)	(0.0846)	(0.0857)	(0.0855)	(0.0870)	(0.0855)
Income: $\geq$ €4112	0.126	0.137	0.135	0.100	0.0615	0.0982
	(0.0939)	(0.0957)	(0.0935)	(0.0955)	(0.0968)	(0.0954)
Income: missing	0.152*	0.0836	0.109	0.0709	0.654*	0.0875
	(0.0919)	(0.332)	(0.101)	(0.0972)	(0.343)	(0.107)
Age: 41–53	-0.0649	-0.0594	-0.0758	-0.0897	-0.101	-0.0961
	(0.0723)	(0.0728)	(0.0716)	(0.0815)	(0.0816)	(0.0832)
Age: 54–65	0.0230	0.0316	0.0262	-0.0853	-0.0916	-0.0891
	(0.0734)	(0.0745)	(0.0734)	(0.0793)	(0.0805)	(0.0800)
Female	-0.0452	-0.0330	-0.0465	0.0339	0.0185	0.0360
	(0.0651)	(0.0656)	(0.0649)	(0.0682)	(0.0700)	(0.0679)
Education: university	-0.0371	-0.0429	-0.0341	0.102	0.114*	0.105
	(0.0598)	(0.0602)	(0.0609)	(0.0654)	(0.0654)	(0.0664)
Homeowner	-0.0425	-0.0248	-0.0269	0.140*	0.0978	0.142*
	(0.0829)	(0.0862)	(0.0839)	(0.0793)	(0.0818)	(0.0792)
Risk aversion	0.0829	0.0827	0.0687	-0.0168	-0.0149	-0.00860
	(0.0586)	(0.0584)	(0.0585)	(0.0618)	(0.0620)	(0.0621)
Impulsiveness	-0.0591	-0.0586	-0.0755	-0.0950	-0.101	-0.104
	(0.116)	(0.116)	(0.115)	(0.108)	(0.108)	(0.106)
Impatience	-0.0855	-0.0852	-0.0873	0.0880	0.0726	0.0868
	(0.0694)	(0.0700)	(0.0700)	(0.0692)	(0.0692)	(0.0695)
Fin. planning easy	0.143**	0.142**	0.136**	-0.127**	-0.133**	-0.130**
	(0.0580)	(0.0585)	(0.0577)	(0.0633)	(0.0631)	(0.0638)
Procrastination	-0.0124	-0.0105	-0.00342	0.0935	0.0896	0.0975
	(0.0731)	(0.0733)	(0.0714)	(0.0716)	(0.0728)	(0.0720)
N	701	701	701	701	701	701

For each of models a, b and c both equations are estimated simultaneously.
Robust standard errors in parentheses, clustered at household level (656 clusters).
* significant at 10%; ** significant at 5%; *** significant at 1%

Table D2: Main effects from linear probability models for question order effects

	Any suspension			Any extra payments		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
log(annuity)–log(minimal exp.): 0.36–0.70			-4.64e-4			-0.00386
			(0.0732)			(0.0631)
log(annuity)–log(minimal exp.): $\geq$ 0.70			0.0775			0.0152
			(0.0744)			(0.0622)
log(annuity)–log(minimal exp.): missing			-0.0531			-0.0276
			(0.0668)			(0.0568)
Replacement rate: 0.70–0.87		-0.0362			0.0354	
		(0.0611)			(0.0537)	
Replacement rate: $\geq$ 0.87		-0.0485			-0.0344	
		(0.0583)			(0.0514)	
Replacement rate: missing		-0.139			0.490**	
		(0.233)			(0.213)	
Income: €2729–4112	-0.192***	-0.196***	-0.196***	-0.114**	-0.107**	-0.116**
	(0.0627)	(0.0633)	(0.0633)	(0.0530)	(0.0536)	(0.0535)
Income: $\geq$ €4112	-0.164**	-0.173***	-0.171***	-0.120**	-0.115**	-0.122**
	(0.0664)	(0.0671)	(0.0664)	(0.0576)	(0.0584)	(0.0574)
Income: missing	-0.186***	-0.0842	-0.138**	-0.0330	-0.511**	-0.0141
	(0.0652)	(0.231)	(0.0696)	(0.0641)	(0.211)	(0.0686)
Age: 41–53	0.110**	0.105**	0.112**	0.0508	0.0604	0.0524
	(0.0530)	(0.0533)	(0.0532)	(0.0516)	(0.0516)	(0.0522)
Age: 54–65	0.0393	0.0334	0.0319	-0.0198	-0.00797	-0.0226
	(0.0536)	(0.0537)	(0.0539)	(0.0484)	(0.0486)	(0.0482)
Female	0.0409	0.0351	0.0400	-0.0853**	-0.0837*	-0.0854**
	(0.0462)	(0.0462)	(0.0458)	(0.0422)	(0.0430)	(0.0424)
Education: university	0.0677	0.0732*	0.0566	0.0353	0.0331	0.0312
	(0.0440)	(0.0441)	(0.0448)	(0.0420)	(0.0420)	(0.0423)
Homeowner	-0.107*	-0.114*	-0.117**	-0.0552	-0.0447	-0.0579
	(0.0579)	(0.0591)	(0.0584)	(0.0538)	(0.0535)	(0.0543)
Risk aversion	-0.119***	-0.123***	-0.118***	0.00105	-7.95e-4	7.01e-4
	(0.0422)	(0.0420)	(0.0417)	(0.0389)	(0.0390)	(0.0388)
Impulsiveness	0.124	0.122	0.139*	-0.0498	-0.0466	-0.0449
	(0.0835)	(0.0832)	(0.0830)	(0.0602)	(0.0597)	(0.0600)
Impatience	0.132***	0.132**	0.125**	-0.0855**	-0.0707*	-0.0875**
	(0.0510)	(0.0516)	(0.0510)	(0.0409)	(0.0412)	(0.0404)
Fin. planning easy	-0.0447	-0.0463	-0.0463	-0.00808	-3.63e-4	-0.00874
	(0.0440)	(0.0444)	(0.0436)	(0.0401)	(0.0393)	(0.0402)
Procrastination	0.0483	0.0495	0.0439	-0.0978**	-0.0935**	-0.100**
	(0.0567)	(0.0576)	(0.0553)	(0.0412)	(0.0420)	(0.0422)
N	701	701	701	701	701	701

For each of models a, b and c both equations are estimated simultaneously.
Robust standard errors in parentheses, clustered at household level (656 clusters).
* significant at 10%; ** significant at 5%; *** significant at 1%