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Matthias Giesecke and Guanzhong Yang[1]

Are Financial Retirement Incentives More Effective if Pension Knowledge is High?

Abstract

We elicit preferences for retirement timing in a laboratory experiment. Subjects make retirement choices under different payoff schemes that introduce variation in financial incentives. Testing ceteris paribus conditions of the financial incentive alone shows a considerable delay of retirement once early retirement becomes financially less attractive. However, varying available information as another treatment parameter reveals considerable heterogeneity in the functioning of these incentives. Subjects who are explicitly informed about the expected pension wealth respond more strongly to financial incentives compared to those who only know their pension annuity. We conclude that the financial consequences of retirement choices become more salient to the decision maker once being informed on a forward-looking measure of pension benefits.

JEL Classification: C91, H55, J26

Keywords: Retirement age; financial incentives; information treatment; pension knowledge; financial literacy

September 2016

1 Matthias Giesecke, RWI and IZA; Guanzhong Yang, UDE. *– We are grateful to Jeannette Brosig-Koch, Colin Green, Timo Heinrich, Christoph Helbach, Reinhold Schnabel, and numerous seminar participants for helpful comments as well as Thomas Bauer and Wim Kösters for supporting the recruitment of older workers. We also thank Fernanda Martinez Flores and Anja Rösner for excellent research assistance. Financial support from the German Research Foundation (DFG) is gratefully acknowledged (SCHN553/1-1).**– All correspondence to: Matthias Giesecke, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany, e-mail: matthias.giesecke@rwi-essen.de*

1 Introduction

Aging populations are a challenge for retirement security and pension funds. The steep rise of expected years in retirement across OECD countries involves the necessity to delay employment exit and retirement.[1] Policies that aim at postponed retirement, as for example in the U.S. or Germany, usually restrict access to public pensions by raising the normal retirement age and imposing benefit reductions in case of early retirement. While such a financial incentive can induce people to stay in gainful employment for further years, a key issue is that retirement choices require pension knowledge based on complex information. Learning more about the perception and understanding of financial incentives is crucial to implement retirement policies successfully.

The current state of the literature is that financial incentives are a fairly reasonable way to influence the timing of retirement.[2] The quasi-experimental literature does not coincide in all details but by and large there is widespread agreement that people respond to retirement incentives. However, recent studies have stressed that misinformed individuals do respond to perceived (but incorrect) pension information (Chan and Stevens, 2008) and that the reaction to financial incentives not only depends on their size but also on their perception (Liebman and Luttmer, 2015). One further remarkable result is that the stepwise introduction of information letters on individual expected pension payments, the annual U.S. Social Security Statements, has increased pension knowledge but had no effect on actual retirement behavior (Mastrobuoni, 2011). Whether there is no reason to change retirement choices because workers already behave optimally or whether the information contained in the pension statement is not sufficient to improve their retirement decisions remains an open question.

[1] Between 1970 and 2014, OECD estimates indicate an increase of average years in retirement across all OECD countries from 15 to 22 years among women and from 11 to 18 years among men (OECD, 2015). For a recent demonstration of the manifold challenges of an aging population and its consequences for retirement security in the U.S., see Poterba (2014).

[2] Examples are Mitchell and Fields (1984); Börsch-Supan and Schnabel (1999); Blundell et al. (2002); Coile et al. (2002); Baker et al. (2003); Asch et al. (2005); Mastrobuoni (2009); Hanel (2010); Hanel and Riphahn (2012); Manoli and Weber (2016); Giesecke (2016). These studies differ by country, observation period, data source and methods, but come to very similar conclusions.

In this paper we aim to contribute to the resolution of this puzzle. We test whether people respond differently to financial incentives once the net present value of pension benefits makes the financial consequences of a given retirement age more salient. In contrast to only knowing the annuity, we investigate whether retirement choices differ if people can draw on explicit information about the present value of their expected pension wealth (EPW hereafter). This piece of information is not included in the U.S. Social Security Statements or similar information letters in other countries.[3] For this purpose we establish an ideal experiment where participants (N: 318) are asked to make choices about their retirement age. Subjects are randomly assigned to different schemes of financial incentives and information provision. Variation in financial incentives is induced by confronting subjects with two alternative payoff structures of pension benefits. Variation in pension knowledge is obtained by facing subjects with two different information regimes: while all subjects know their pension annuity, only some are informed about the forward-looking EPW.

The controlled environment of the laboratory allows us to test ceteris paribus conditions on information provision and the resulting differences in the functioning of financial incentives. Some parameters are difficult to control outside the laboratory and since valid data are not available it would not be possible to resolve the puzzle raised above without this type of experimental test. To make the experimental situation as realistic as possible, the design is couched into the institutional setting of the German public pension system.[4] Moreover, a considerable share of participants is sampled from older workers in close distance to retirement. Our experimental design builds on the one by Fatas et al. (2007), who test retirement decisions in an experimental framework. While they test how the distribution of benefits over time (lump-sum vs. annuity)[5] affects retirement

[3]Information letters in the U.S. or Germany only include expected benefits at the normal retirement age and selected early retirement ages. They do not report the present value (EPW). An overview on pension information statements across countries is available in Larsson et al. (2009).

[4]All experiments are conducted in Essen, Germany. The experimental payoffs are proportional to average pension benefits in Germany and financial incentives (benefit reductions or premia) are anchored to the German public pension system.

[5]They find that a lump-sum payment rather than annuity benefits is more effective in delaying the retirement decisions.

outcomes, we extend this approach by investigating the combined effect of financial incentives and information provision on retirement timing. To the best of our knowledge, this experimental test of retirement decisions is a novel one.

The results indicate that, in line with previous quasi-experimental estimates for Germany (e.g. Hanel, 2010; Giesecke, 2016), individuals delay their retirement choices considerably in response to financial incentives. Strikingly, individuals react less to these incentives if they are not informed about the EPW and only know their pension annuity. This piece of evidence is important in resolving the puzzle of why typical information letters on expected pension payments do not affect actual retirement behavior. Inducing a stronger response in retirement choices requires information on a forward-looking measure of pension benefits, making the financial consequences of retirement choices become more salient to the decision maker. Importantly, this can improve the effectiveness of financial incentives in policies that aim at raising the retirement age.

Our paper also adds to the literature on financial decision-making abilities and financial literacy (see Lusardi and Mitchell, 2014, for a recent review). Many studies have shown a positive link between financial literacy and retirement planning or wealth accumulation (Ameriks et al., 2003; Lusardi and Mitchell, 2007; Bucher-Koenen and Lusardi, 2011; van Rooij et al., 2012). It has also been made clear that people have time-inconsistent preferences concerning their payout of retirement savings (lump-sum vs. annuity, see Schreiber and Weber, 2016) and that they do have difficulties in valuing annuities (Brown et al., 2016). Based on this literature and our concern of whether people are able to calculate forward-looking incentive measures from future earnings and pension benefits, we shed more light on how retirement decisions depend on grasping basic actuarial principles. In this paper we examine the ability to understand the concept of the EPW and to calculate it with all relevant information at hand. If financial literacy is high, we find that - especially older workers - are more likely to maximize benefits. Retirement planning is enhanced once people understand the patterns that determine their pension wealth as a function of the retirement age.

The plan of this paper is as follows. Section 2 provides the experimental design, the variation of treatment parameters, and hypotheses to be tested. Section 3 describes details on the experimental procedures and the recruitment process of older workers. Section 4 outlines the results and section 5 concludes.

2 Experimental Design

Our experimental design aims to elicit preferences for the retirement age under alternating schemes of financial incentives and information treatments. The experiment is framed as an individual retirement decision of late-career working individuals who repeatedly decide whether to retire immediately or to continue working.[6] The design implicitly allows for the presence of labor (and income) although we do not explicitly model it. This involves the assumption that participating subjects are indifferent between a marginal change in the utility from labor income and disutility from labor.[7]

2.1 Retirement Decisions in the Laboratory

The point of departure is at age 58. Participating subjects are asked whether to work or to retire in the following year. Subjects who decide to retire will receive pension benefits as an annuity starting at age 59. The annuity is a function of the retirement age and is paid for the remaining lifetime. The actual lifetime of each subject is determined by a random process based on recent mortality tables covering the entire German population

[6]The design is conceptually anchored to the option value approach of Stock and Wise (1990) where people reevaluate their retirement decision in each period, depending on the present value of expected utility from discounted streams of labor income and pension benefits.

[7]Modeling labor in the laboratory involves several drawbacks. First, we do not know the relative proportion of utility from labor income (consumption) to disutility from labor (the price of leisure) and thus assuming indifference seems reasonable during the experimental procedure. Second, while real effort tasks are easily implemented, their power in eliciting preferences is limited to the extent that it remains unclear what type of behavior they reveal. Since work involves multidimensional aspects (e.g. ambition, boredom, excitement, fatigue), these may take effect into manifold directions (see van Dijk et al., 2001, for a discussion). Holding everything but financial incentives from pension benefits constant, including labor income, allows to test ceteris paribus conditions in an experimental framework kept as simple as possible.

(Federal Statistical Office, 2012). Survival probabilities are averaged for men and women and participants are explicitly informed about them in the instructions (see table F.3.2.1, appendix F). Retirement is defined as an absorbing state and thus no further work is possible after retirement. Subjects who decide to continue working one additional year and survive the respective year will face the same work-retirement decision again in the following year. The repeated decision situation implies that they have grown older by one year (now: age 59), having to decide again whether to work at that age or to retire instead.

The decision situation recurs as long as the subject keeps working and neither retires nor dies. However, decisions are restricted to a maximum of 12 decisions in the age window 58 - 69. At age 69, participants can decide for the last time whether they want to retire immediately or to continue working given that they have not retired before and are still alive. If they chose to continue working in this last period, they mandatorily retire at age 70. Subjects who decide to continue working but do not survive at that time do not receive any pension benefits.[8] The decision situation yields a zero payoff in this case.[9] We consider these observations as right-censored since the choice of the retirement age remains unobserved.

Subjects are informed about their survival status after each period. Once subjects have retired, an additional survival year yields one further year of pension benefits. After subjects have actively decided upon work and retirement over 12 periods, they passively receive information concerning their survival status and benefit payments. The experiment ends after all subjects have died.[10]

[8]These subjects die before retiring and thus cannot receive any benefits by definition.

[9]Subjects may still receive a positive total payoff from further parts of the experiment, including correct answers to incentivized math questions and a risk aversion test based on paired lottery choices (see section 3).

[10]We restrict subjects to live no longer than 100 years. This assumption is necessary because the mortality tables end at age 100. Based on our random draw, the maximum survival age was 96.

2.2 The Baseline Treatment: Declining EPW

The payoff structure of the baseline treatment is characterized by an EPW that declines over age. The EPW is defined as the sum of all future pension benefits as a function of the retirement age, calculated as the product of the pension annuity times the life expectancy at the current age. The baseline payoff structure is illustrated graphically in figure 1 (dashed line) and with corresponding numerical values in the left panel of table 1 (BASELINE). A subject who decides to retire at age 58 will receive a pension annuity of 11,047.59 token (laboratory units) which translates into an EPW of 272,655 token (24.68 x 11,047.59 = 272,655).[11] [12] After reaching a peak value at age 60, the EPW monotonically declines (from 280,785 to 190,934 token). This payoff structure is illustrated graphically in figure 1 (dashed line).

Subjects who survive the 58th living year and decide not to retire face a new decision situation as summarized in the left panel of table 2 (BASELINE). Now, at age 59, all values of the EPW are updated conditional on having survived one additional year.[13] As long as individuals keep working and do not retire the EPW is updated conditional on having survived at each subsequent age.[14]

[11] To make the framing as realistic as possible, laboratory token reflect real Euro values for average pensions in the German public pension system. The payoff structure is anchored to the 2014 annuity value (28 EUR) of an employee who has contributed to the German pension system for 40 years at average earnings and retires at age 65. This person is a theoretical construct but fairly well approximates typical attributes of German retirees. Since average annual labor earnings are subject to contributions that yield one "earnings point" and the current annuity value in Germany is 28 Euros/earnings point, the calculation is as follows: 40 years x one earnings point x 28 = 1120 Euro of monthly pension benefits. Thus, for a person who retires at age 65 pension benefits add up to 13440 Euros. The current annuity value is fixed each year, mostly depending on population growth and inflation rate.

[12] To make these token feasible for real payoffs, we convert them by the factor 1/15,000 (students) and 1/10,000 (older workers). Please see section 3 for details.

[13] The calculation is as follows: $EPW_a = EPW_{a-1}/\pi$, where EPW_a is the expected present value for the current age, EPW_{a-1} is the expected present value for the previous age and π denotes the specific survival probability. For example, in the second decision round, retirement at age 59 yields an EPW of $276,505/0.9929 = 278,482$.

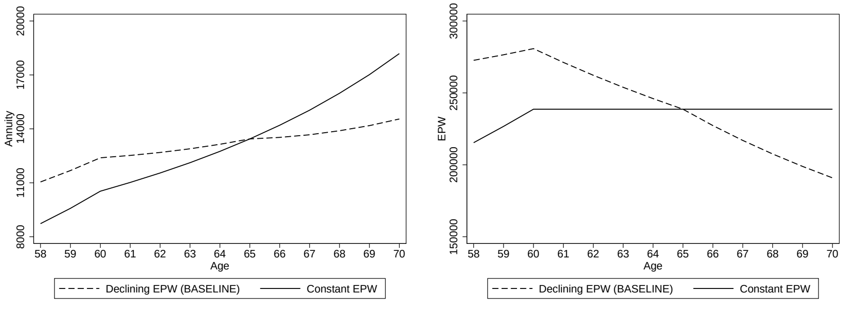
[14] Participating subjects are provided with 13 payoff tables for each current age, i.e. from age 58 to 70. Details are provided in the instructions, table F.3.2.2 - F.3.2.14 in appendix F.

Table 1: Payoff Structure at Age 58.

		Declining EPW (BASELINE)			Constant EPW		
Age	LE (Years)	Annuity	EPW	Factor	Annuity	EPW	Factor
58	24.68	11047.59	272655	1	8727.6	215397	0.79
59	23.84	11681.29	276505	1	9578.66	226734	0.82
60	23.005	12390.55	280785	1	10531.97	238667	0.85
61	22.175	12522.55	271213	1	11019.84	238667	0.88
62	21.36	12687.22	262272	1	11545.37	238667	0.91
63	20.55	12891.48	253901	1	12117.99	238667	0.94
64	19.745	13142.73	246049	1	12748.45	238667	0.97
65	**18.945**	**13440**	**238667**	**1**	**13440**	**238667**	**1**
66	18.155	13526.06	227302	1	14202.36	238667	1.05
67	17.38	13671.53	216970	1	15038.69	238667	1.1
68	16.595	13895.81	207537	1	15980.18	238667	1.15
69	15.835	14180	198889	1	17016	238667	1.2
70	15.075	14549.34	190934	1	18186.67	238667	1.25

Note: LE: Life Expectancy. The reference person is assumed to retire at age 65 (factor = 1), having contributed at the average earnings level for 40 years, evaluated at the current (2014) annuity value of 28 Euros/earnings point (40 x 1 x 28 x 12 = 13440 Euro).

Figure 1: Pension Benefits as a Function of the Retirement Age.



(a) Pension Annuity

(b) Expected Pension Wealth (EPW)

Source: Own graph.

Note: The figure illustrates pension benefits as used in the experimental test from the perspective of age 58 (table 1). The intersection refers to the reference person where the two payoff structures yield identical annuities of 13,440 experimental token per year.

Table 2: Payoff Structure at Age 59.

Age	LE (Years)	Declining EPW (BASELINE) Annuity	EPW	Factor	Constant EPW Annuity	EPW	Factor
59	23.84	11681.29	278482	1	9578.66	228355	0.82
60	23.005	12390.55	282793	1	10531.97	240374	0.85
61	22.175	12522.55	273152	1	11019.84	240374	0.88
62	21.36	12687.22	264147	1	11545.37	240374	0.91
63	20.55	12891.48	255717	1	12117.99	240374	0.94
64	19.745	13142.73	247808	1	12748.45	240374	0.97
65	**18.945**	**13440**	**240374**	**1**	**13440**	**240374**	**1**
66	18.155	13526.06	228928	1	14202.36	240374	1.05
67	17.38	13671.53	218522	1	15038.69	240374	1.1
68	16.595	13895.81	209021	1	15980.18	240374	1.15
69	15.835	14180	200312	1	17016	240374	1.2
70	15.075	14549.34	192299	1	18186.67	240374	1.25

Note: LE: Life Expectancy. The reference person is assumed to retire at age 65 (factor = 1), having contributed at the average earnings level for 40 years, evaluated at the current (2014) annuity value of 28 Euros/earnings point (40 x 1 x 28 x 12 = 13440 Euro).

2.3 Intervention I: Financial Incentives

To investigate how financial incentives affect retirement decisions we contrast the baseline treatment to an alternative payoff structure which is characterized by a constant EPW. According to the right panel of table 1, subjects who decide to retire immediately (in the first round of the experiment) receive an annual pension of 8,727.60 token. After age 60, the EPW remains constant over age at 238,667 token. In contrast to the baseline treatment, this payoff structure is actuarially neutral.

The question is whether individuals tend to work longer and retire later under constant EPW (adjustment factor > = < 1) in contrast to the baseline payoffs with declining EPW (adjustment factor = 1). The adjustment factor is the only parameter that is varied between the two payoff structures, holding everything else constant.[15] This implies that we

[15]The two payoff structures only differ by an adjustment factor which is a 3% reduction rate for every year of retirement previous to the normal retirement age of 65 (i.e. "early retirement") and a 5% premium for every year of retirement after age 65. The real adjustment rates from the German pension system (3.6% reduction and 6% premium respectively) are reduced by 20% to account for time

only alternate the slope of the EPW as a function of the retirement age. The fundamental difference between the two payoff structures is apparent from figure 1. At the reference age of 65, the two payoff profiles intersect because they generate an identical pension annuity of 13,440 Euros per year. The baseline treatment (declining EPW, dashed line) produces a higher EPW at each retirement age below the intersection and a lower one above the intersection. Thus, retirement at early ages (58 - 64) is financially more attractive in the baseline treatment. However, at higher ages (66 -70) retirement is financially more attractive when facing the payoff structure involving a constant EPW.

Under both schemes of financial incentives the EPW increases between age 58 and 60 and then declines (Factor = 1) or remains constant (Factor > = < 1). The purpose of this pattern is to isolate retirement decisions from risk attitudes.[16] It enables us to distinguish strongly risk-averse subjects who retire as early as possible (corner solution at age 58) from expected payoff maximizers who retire at age 60 (peak value/unique maximum: declining EPW) or between age 60 - 70 (non-unique maximum under constant EPW). Aside from this detail, our design reflects the long-standing German retirement window with old age pensions available early at age 60 or 63 and a normal retirement age that is currently shifted from 65 to 67.

2.4 Intervention II: Information on the EPW

The major contribution of this paper is to show how the functioning of financial incentives differs across information treatments. Learning more about this source of heterogeneity is important because the perception of financial incentives may depend on whether the decision maker is informed about the expected present value of pension wealth (EPW).

preferences. Since discounting cannot be adequately modeled in the laboratory test, we oppose the time value of money (discount rate) to actuarial adjustments (benefit reduction rate or premium rate) because these two parameters naturally offset each other. The 20% reduction calculates as the discount factor $\sum_{t=1}^{T} \frac{1}{(1+\delta)^t} = \sum_{t=1}^{19} \frac{1}{(1.02)^t} = 0.83$ (rounded to 0.8), given that the average German retiree currently receives benefits for $T = 19$ years after entering retirement (German Federal Pension Insurance, 2014) and assuming a discount rate of $\delta = 2\%$.

[16]To investigate risk attitudes in further detail, we collect two measures of risk preferences (see section 3).

We aim to test whether this type of information influences the choice of the retirement age.

For this purpose, we distinguish three levels of information provision. First, the BASIC treatment provides subjects only with annual pension benefits (as a function of the retirement age), remaining life expectation (in years) according to each retirement age and conditional survival probabilities. Based on this information, subjects have all relevant information at hand to calculate the EPW from the perspective of any age. To make a decision based on the EPW, however, they must be capable to understand the concept and to calculate it.

Second, subjects in the INFO treatment receive similar information as in the BASIC treatment but are additionally endowed with numerical values of the EPW and a short explanation of how it is calculated (underlined paragraph in the instructions). Providing this key information makes the payoff structure of the two systems transparent. Subjects who are not able to calculate the EPW by themselves can use this information for the choice of their retirement age.

Finally, we introduce an INFO PLUS treatment. Subjects receive similar information as in the INFO treatment but are additionally endowed with an explanation of the economic meaning of the EPW. In this treatment, the instructions include an explicit verbal statement on how the payoff structure evolves over age to further facilitate the comprehension also for those subjects who have difficulties to grasp the payoff structure in terms of numbers. Since retirement outcomes do not significantly differ between INFO and INFO PLUS treatments, these are uniformly summarized as INFO treatments in the subsequent presentation of results.

2.5 Sensitivity Analysis

2.5.1 Subject Pool

While university students are easy to recruit (existing subject pool and standardized recruitment process), conducting the experiment on older workers substantially improves the external validity of our results. The experiment is framed as a work-retirement trade-off which is realistically faced by a group of actively employed persons who are, per definition, in close distance to retirement. 25% of our total observations are obtained from actively employed older workers of age 45 - 58. These workers have obtained a substantial amount of work experience and and are likely to have made some retirement considerations. We thus test for differential retirement behavior of this group compared to students.

2.5.2 Decision Structure

So far, we have outlined a sequential decision structure where people move from one period to another and repeatedly evaluate their retirement decision. This is an extension of the approach taken by Fatas et al. (2007), who test one-stage retirement decisions in the laboratory. To provide an anchor point to this study, we also compare one-stage decisions to sequential ones. This allows to investigate behavioral differences under two framings of an otherwise identical decision.

One-stage treatments differ only to the extent that they involve a modified decision structure, asking subjects to decide upon their retirement age only once and for all. They are offered a menu of retirement ages from 58 to 70 from which to choose. Aside from the (ex ante) one-stage choice, everything else (annuities, life expectancy etc.) remain unchanged with subjects facing the same payoff structure under a given scheme of financial incentives. Thus, the underlying decision problem is identical under both one-stage and sequential decisions.

2.6 Treatment Overview

In total, the experiment consists of 14 treatments as summarized in table 3. The treatment variables split into financial incentives (declining vs. constant EPW), information provision (BASIC vs. INFO), and the interaction of the two. To ensure the functioning of the experimental setting, in each treatment only one parameter is varied while holding everything else constant. All subjects are randomly assigned to treatments.

Table 3: Treatment Overview.

STUDENTS										
	BASIC		INFO		INFO PLUS		BASIC		INFO PLUS	
Treatment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EPW	DEC	CON	DEC	CON	DEC	CON	DEC	CON	DEC	CON
Decision	SEQ	SEQ	SEQ	SEQ	SEQ	SEQ	ONE	ONE	ONE	ONE
N Subjects	24	24	24	24	24	24	24	24	23	24
OLDER WORKERS (Age 45-58)										
	BASIC		INFO PLUS							
Treatment	(11)	(12)	(13)	(14)						
EPW	DEC	CON	DEC	CON						
Decision	SEQ	SEQ	SEQ	SEQ						
N Subjects	19	20	20	20						

Note: DEC: Declining EPW. CON: Constant EPW. SEQ: Sequential Decisions. ONE: One-Stage Decisions.

2.7 Hypotheses

We test two central hypotheses that each divide into two sub-hypotheses. Hypotheses 1a and 1b are based on the theoretical expectation that individuals make retirement decisions using forward-looking measures (see e.g. Burtless, 1986; Krueger and Meyer, 2002) and that financial incentives influence retirement choices, the latter being the principal finding of the quasi-experimental literature (as summarized in the introduction). Based on this expectation, hypotheses 1a and 1b are formulated in a way that presumes identical outcomes under two different schemes of information provision:

Hypothesis 1a *Consider basic information (BASIC): In contrast to the baseline treatment (declining EPW) individuals choose a higher retirement age, on average, when confronted to the constant EPW.*

Hypothesis 1b *Consider further information (INFO/INFO PLUS): In contrast to the baseline treatment (declining EPW) individuals choose a higher retirement age, on average, when confronted to the constant EPW.*

The general assumption is that individuals make retirement decisions under complete information about their retirement benefits and are able to calculate their retirement incentives. However, if information is incomplete and gaining knowledge on the computation of retirement incentives is costly, then retirement outcomes may differ by information and pension knowledge. Since recent studies have raised concerns about the ability to calculate forward-looking incentive measures (Mastrobuoni, 2011) and to value annuities (Brown et al., 2016) we also test whether retirement decision making differs across information treatments within a given payoff structure. Hypotheses 2a and 2b presume that information on the EPW does not influence retirement decisions:

Hypothesis 2a *Under declining EPW (baseline), retirement timing does not differ, on average, across information treatments (BASIC vs. INFO).*

Hypothesis 2b *Under constant EPW, retirement timing does not differ, on average, across information treatments (BASIC vs. INFO).*

3 Experimental Procedures

A total of 318 subjects participated in the computer based experiment using z-tree (Fischbacher, 2007). The experimental sessions were conducted between December 2014 and February 2016 at the *Essener Labor für experimentelle Wirtschaftsforschung* (elfe).[17]

[17]Three sessions with older workers (13 subjects) were conducted outside of the laboratory using mobile computers, leaving everything else unchanged. We used polling booths to ensure that participants were isolated from each other throughout the experiment.

3.1 Subject Pool and Recruitment Process

The pool of participants splits into 239 students (bachelor and master level) from the University of Duisburg-Essen and 79 older workers (age 45 - 58) in active employment.[18] We used the standard electronic recruitment procedures via ORSEE (Greiner, 2004) to collect the subject pool of university students.

To recruit older workers, we sent invitation emails to about 3350 employees with workplaces nearby the laboratory (in the region of Essen, Germany). This included about 350 non-scientific staff members at the University of Duisburg-Essen[19] and 3000 public administration workers in the cities of Essen, Gelsenkirchen, Bottrop and Oberhausen.[20] We only sent messages to professional email accounts (available on the institutions' homepages) to ensure that people are actively employed.

The invitation email very generally stated the purpose to recruit older workers for participation in a scientific study on retirement behavior. The message also stated that participants could earn money depending on their individual decision making throughout the experimental procedure. We made clear that our research is of public interest only, has no commercial background and is conducted on behalf of the German Science Foundation (DFG). We finally asked recipients who fulfill all participation criteria (age 45 - 58, German speaking, in active employment) to respond if they are interested in participation.

We collected responses and then made appointments for the experiment. To raise the participation rate we offered appointments very flexibly, leaving us with about 3 participants per session on average. A few days in advance of each arranged appointment we sent an information email to participants, including a reminder and all relevant details

[18]Our target number of subjects was 240 students and 80 older workers. In each group, we lost one observation due to no-shows. Key characteristics of the two groups are summarized in table 7 (students) and table 8 (older workers).

[19]We sent messages to available email addresses in all areas of administration (e.g. finance and controlling, employment services, student issues, maintenance service and science management).

[20]Again, we sent emails to all available addresses of the respective cities and thus from all fields of public administration (e.g. finance department, department for legal matters, public library, museums, communication and public relations department, public construction authority).

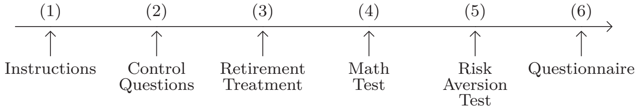
(day, time, location plan). The effective participation rate was 2.4% (79/3350).

While not representative for the German population (see table 8, appendix B, for socio-economic details), the subject pool of older workers has useful properties for the experiment. First of all, it encompasses a group of older workers in close distance to retirement. In contrast to the typical student subject they are likely to have made some retirement planning. Second, these people are only contacted if they have an active email account in one of the mentioned institutions and are thus actively employed by definition. And finally, respondents do have a basic level of computer literacy which ensures that they are able to go through the computer-based procedure.

3.2 Sequence of Events

All treatments include the same sequence of events, splitting into six subsequent steps (figure 2). Participants first read the instructions[21] while having the opportunity to pose clarifying questions (part 1). To ensure that everybody understands the instructions and the general proceeding, participants have to answer four control questions (part 2). The actual decision part is the core of the experiment (part 3), including the treatments summarized in table 3.

Figure 2: Sequence of Events.



The retirement decision part is followed by three incentivized math questions (part 4) to test the ability of calculating the EPW. From the results of these questions we construct a financial literacy score (0 = low financial literacy; 3 = high financial literacy) that is used to further analyze the understanding of actuarial considerations underlying the decision problem (see appendix E). The score yields information on whether people are at least able to make payoff maximizing decisions although they may have other preferences.

[21]The experimental instructions are provided in appendix F.

In part 5 we conduct a test to elicit risk preferences as proposed by Holt and Laury (2002). Participants are offered ten paired lotteries as summarized in table 6 (appendix A). The corresponding choices have real monetary consequences and are thus incentive compatible. We map these choices into a measure of risk attitudes on a scale from 0 (very risk-averse) to 10 (very risk-loving). We use this measure to control for risk attitudes in subsequent regressions.[22]

The final step is a questionnaire on socio-economic questions (part 6). Among students, we asked for age, sex, number of siblings, final school grade (German Abitur), field of studies, number of semesters studied and whether at least one parent is already retired. Among older workers, the questionnaire comprised age, sex, number of children, marital status, education, employment, employment of spouse and household net income. All subjects, both students and older workers, were asked to report their ex-post satisfaction with the experienced retirement system (0 - 10), their risk attitude (0 - 10) and health status (0 - 10). The two subject pools are summarized according to these variables in table 7 (students) and 8 (older workers) in appendix B.

The instructions were handed out to the subjects before the beginning of the experiment without mentioning the existence of the second part. At the end of the experiment, subjects were privately paid with an exchange rate of 15,000 units (students) and 10,000 units (older workers) of laboratory token = 1 EUR (around USD 1.12 at that time). The experiment took less than 90 minutes and the average payoff among students was 18.8 EUR (around 21.1 USD), ranging between a minimum of 1.6 EUR and a maximum of 32.4 EUR. The average payoff among older workers was 28.1 EUR (about 31.5 USD), ranging between a minimum of 1.5 EUR and a maximum of 43.9 EUR. The expected payoffs are real average hourly wages that intend to reflect opportunity costs and are thus 50% higher for older workers. To further ensure a functioning incentive structure, we did not pay a lump-sum amount/show-up fee. Payoffs depended only on retirement decisions, the

[22]To check the quality of this risk measure we also asked participants to self-assess their risk attitudes in the final questionnaire. We asked the "general risk question" (terminology of Dohmen et al., 2011) identical to the survey question in the German SOEP (ordinal scale from 0 - 10). In line with Dohmen et al. (2011), the two measures of risk attitudes (revealed risk: paired lottery choices; stated risk: general risk question) significantly correlate (corr. coefficient: 0.17; p-value: 0.003).

number of correct answers on math questions, paired lottery choices of the risk-aversion test, and luck concerning the number of survival periods.

4 Results

The main results outlined in section 4.1 and 4.2 are based on 223 total observations from sequential decisions. Those parts of the analysis that look at retirement decisions alone, i.e. tests and graphs, exclude 19 right-censored[23] observations and leave us with a total of 204 observations.

4.1 Financial Incentives and Information Provision

Treatment comparisons show a significant difference in retirement timing of 2.4 years between the two schemes of financial incentives but only if people are informed about the EPW (table 4, column 1 and 2). A payoff structure that makes early retirement less attractive (constant EPW) induces a large delay of the retirement age in comparison to the baseline treatment (declining EPW). In light of this result, which is strongly in line with the quasi-experimental retirement literature, we do not reject hypothesis 1b. However, we do reject 1a because the measured difference is small and insignificant in the BASIC information treatment.

A graphical summary of the main result[24] in figure 3 illustrates how retirement choices differ between the two payoff structures in BASIC treatments (panel a) and in INFO treatments (panel b). Under declining EPW (solid line: red), retirement is characterized by a remarkable peak at age 60 with only few retirement entries after age 65. Under constant EPW (dashed line: blue) retirement choices are rather evenly distributed across the age window 58 - 70 and are more pronounced at higher ages.

[23]Observations are right-censored, if subjects decide to continue working but do not survive the current age. In this case, subjects do not reveal their actual choice of the retirement age. For more details, see section 2.1.

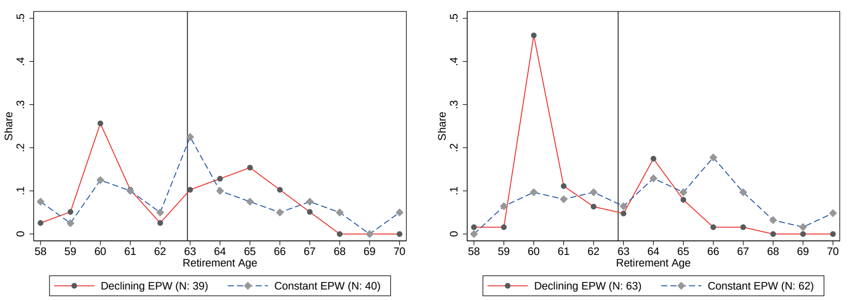
[24]Detailed graphical evidence (histograms) on all results is provided in appendix D.

Table 4: Differences in Retirement Decisions: Non-Parametric and Parametric Tests.

	(1) BASIC		(2) INFO		(3) Decl. EPW		(4) Const. EPW	
	Decl. EPW	Const. EPW	Decl. EPW	Const. EPW	BASIC	INFO	BASIC	INFO
	(Hypothesis 1a)		(Hypothesis 1b)		(Hypothesis 2a)		(Hypothesis 2b)	
Mean								
Ret. Age	62.6	63.2	61.6	64.0	62.6	61.6	63.2	64.0
N (Group)	39	40	63	62	39	63	40	62
Difference	0.6		2.4		1.0		0.8	
z-stat. (p-val.)	.657(.511)		4.63(.000)		1.90(.058)		1.40(.162)	
t-stat. (p-val.)	.903(.370)		5.22(.000)		2.09(.039)		1.35(.179)	
N	79		125		102		102	
Total Obs.	204				204			

Source: Own calculations based on experimental data.
Note: z-statistic: non-parametric Wilcoxon rank-sum test. t-statistic: two-sample t-test on differences in means. 19 censored observations are excluded from the sample.

Figure 3: Differences in Retirement Decisions: Graphical Evidence.



(a) BASIC (N:79) (b) INFO (N:125)

Source: Own calculation based on experimental data.
Note: Shares are related to the total number of observations within each group (see legend). The vertical line indicates the sample mean retirement age. 19 censored observations are excluded from the sample.

Despite some similarities of the principal patterns across information treatments, the amount of available information induces substantial differences in retirement decision making. Comparing the two panels in figure 3 makes clear that not only the peak at age

Table 5: Financial Incentives, Information Provision, and Retirement Decisions.

	Baseline Estimates: Sequential Retirement Decisions					
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Variables						
Constant EPW	0.466	0.462	0.585	0.452	0.360	0.354
INFO	-0.915*	-0.953*	-0.980*	-0.834	-0.862*	-0.786
Constant EPW X INFO	1.740**	1.773**	1.813**	1.781**	1.868***	1.876**
Right-Censored Observation		-1.976***		-1.847***	-2.007***	-2.017***
Subject Pool (Older Workers = 1)				0.791**	0.816**	0.974
Revealed Risk Preferences (0-10)					0.264***	0.264***
Self-Reported Health Status (0-10)					0.202*	0.205*
Male						0.105
Age in Years						-0.006
Financial Literacy Score (0-3)						-0.064
Constant	62.488***	62.672***	62.615***	62.311***	59.628***	59.794***
N	223	223	204	223	223	223

Source: Own calculations based on experimental data. Note: Reported values are coefficients from OLS regressions. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Censored observations are either excluded from the sample (specification 3) or controlled for.

60 (declining EPW) is more pronounced in INFO treatments. It also suggests that the shift of retirement entries towards higher ages (constant EPW) is larger once people are informed about the EPW.

OLS estimates of the treatment effect, conditional on a range of additional variables, are in line with previous tests and graphical evidence (table 5).[25] Our preferred estimate of the treatment effect is a retirement delay of 1.9 years among those who face a constant EPW relative to the baseline and are explicitly informed about it (interaction term, specification 6). This estimate is robust against subject pool, risk preferences, health status, gender, age (a measure of distance to retirement), and financial literacy.

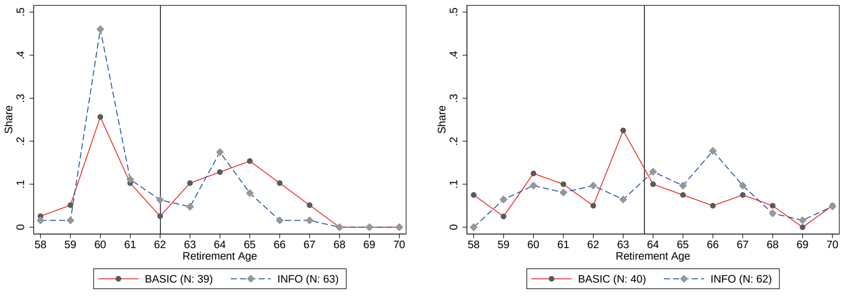
4.2 The Role of Available Information

Two things are important when looking at differential retirement outcomes across information treatments (BASIC vs. INFO) while holding the payoff structure constant. First,

[25] In all regressions, the dependent variable is the retirement age distributed between 58 - 70. The financial incentive treatment is a dummy = 1 under constant EPW and = 0 under declining EPW. The information treatment is a dummy = 1 under INFO and = 0 under BASIC. The interaction term is defined as the product of the two treatment indicators.

a measurable difference in retirement outcomes only occurs for subjects who face a declining EPW but not for those under constant EPW (table 4, column 3 and 4). Second, the measured difference under declining EPW is mostly driven by the peak value at age 60. This becomes visible in figure 4 (left panel), showing that this unique payoff maximizing retirement age is chosen by 46% of subjects in the INFO treatment while only 26% make this choice in the BASIC treatment. We thus reject hypothesis 2a, meaning that people are significantly more likely to chose the payoff maximizing peak value under declining EPW once they are explicitly informed about the EPW (t-statistic: 2.09). Under constant EPW, we do not find such differences across information treatments and thus hypothesis 2b is not rejected. The latter finding is rather unsurprising since, under constant EPW, retirement should be evenly distributed across age in both BASIC and INFO treatments.

Figure 4: The Role of Available Information: Graphical Evidence.



(a) Declining EPW (N:102) (b) Constant EPW (N:102)

Source: Own calculation based on experimental data.
Note: Shares are related to the total number of observations within each group (see legend). The vertical line indicates the sample mean retirement age. 19 censored observations are excluded from the sample.

Strikingly, subjects recognize payoff patterns differently depending on whether explicit information on the EPW is available or not. They tend to move towards a benefit maximizing retirement age once they become aware of the payoff structure. What we can learn is that informing people about an economically meaningful forward-looking measure can make financial incentives more effective. Policies that aim at raising the retirement age by making early retirement financially less attractive (e.g. by benefit reductions) would exhibit a higher responsiveness if less people only react to their own perceived but incorrect pension incentives (a phenomenon first noted by Chan and Stevens, 2008).

4.3 Sensitivity Analysis

We now examine the sensitivity of the main results against two sources of heterogeneity outlined in section 2.5 (all results in appendix C). First, the subject pool includes university students (mean age: 23.8) who have not started their working career while older workers (mean age: 51.6) have much more work experience and are in closer distance to retirement. We therefore analyze retirement decisions separately for the two groups. Second, we alternate the decision structure among students, testing for differences between the baseline design (sequential decisions) and one-stage decisions. These checks shed more light on effect heterogeneity and show how the relationship between financial incentives and retirement behavior is linked to financial literacy and risk preferences.

4.3.1 Subject Pools: Students vs. Older Workers

Investigating the two subject pools in more detail reveals that older workers are adversely selected in terms of financial literacy. When taking this type of selection into account, tests of retirement decisions within separate subject pools yield results that are consistent to the previous overall findings for both groups.

In the student sub-sample, these tests document a significant retirement delay of 2.6 years in the INFO treatment which does not resemble for those in the BASIC treatments, showing only a small and insignificant difference (table 9). Corresponding OLS estimates (table 10) report the treatment effect conditional on further variables such as family background (N siblings, parental retirement status) and education (final school grade, field of studies, N semesters) which are available for students only. The estimated difference between the two payoff schemes ranges between 2.2 and 2.6 years within the INFO treatments and is insignificant within the BASIC treatments.

The same holds for older workers in close distance to retirement. These participants also choose to retire at higher ages on average when facing a constant EPW, but as for students the response is limited to those who are explicitly informed about the EPW (table 9, column 3 and 4). Since joint estimation including financial incentives, information, and the interaction is not feasible due to the small sample (total N:79), we further stratify the estimation sample by information treatments. As for students and in line with previous results, OLS estimates document a retirement delay between 1.9 and 2.3 years (table 11) in the INFO treatments and no significant difference in the BASIC treatments (table 12). The estimated treatment effect in the INFO treatments is robust against adding variables on family background (specification 6), education (7), and employment (8) but the analysis is limited to the extent that the sample size is rather small (N = 40) with only few degrees of freedom which is apparent in specification (9) and (10).

The smaller and less precisely estimated difference among older workers is not only due to the small number of observations but also because older workers are adversely selected in terms of financial literacy. This can be shown by taking a closer look at the financial literacy score (0 - 3), constructed from three incentivized math problems of computing the EPW. [26] It reveals that the mean of correct answers is 2.1 among students but only 1.5 among older workers (see table 7 and 8, appendix B) Further evidence on this point is provided in table 16, showing a significant difference in the share of three (out of three) correct answers among students (74%) and older workers (50%). Using a narrow definition of financially literate older workers, namely only those with three correct answers, reveals a large and significant difference in retirement timing for declining vs. constant EPW of 3.3 years (table 9, column 4, squared brackets). Taking this type of selection into account is important since grasping the concept of the EPW and the ability of its calculation is influential for the outcomes of our experiment.

[26] For details on these questions, see appendix E. The ability to answer all three questions correctly is distributed very differently across information treatments and subject pools (table 16 appendix E). Only in the INFO treatments a considerable share of participants is able to give three correct answers while this seems virtually impossible in the BASIC treatments.

4.3.2 One-Stage Decision Structure

The difference in retirement timing between the two payoff schemes is large (about 4 years) and significant when participants face one-stage decisions, irrespective of information provision (table 13). Once again, these results are consistent to those documented from OLS estimates (table 14). The indication is, first, a larger response to financial incentives compared to sequential decisions and second, that information provision (INFO vs. BASIC) does not considerably change retirement outcomes under one-stage decisions. This result is surprising to the extent that knowing the EPW is essential to maximize benefits. This result challenges the previous findings of smaller (or even zero) effects in BASIC treatments, but we show that the finding is driven by risk preferences.

We first test for differences between BASIC treatments under sequential vs. one-stage decisions (students only). Remarkably, the differential response is induced by a significant difference between treatments with constant EPW (difference: 3.6 years, p-value (rank-sum): 0.000) while treatments with declining EPW do not significantly differ (difference: 0.4 years, p-value (rank-sum): 0.553).

Since the risk attitude is a parameter that may jointly vary with the decision structure, we test for differential risk preferences under treatments with sequential versus one-stage decision structure. The results of this exercise (table 15) show that subjects are more prone to take risks in their retirement decision making once facing one-stage decisions.[27] They state themselves to be more risk loving under one-stage decisions (left panel) while this is not the case for overall risk preferences from paired lottery choices (right panel).[28]

Given that the underlying decision problem is identical in both sequential and one-stage decisions, the higher willingness to take risks seems to be a reasonable explanation for the larger response to financial incentives. Under one-stage decisions, poorly informed subjects (BASIC) behave differently depending on the payoff structure. Some subjects do

[27]Taking risks means choosing a higher retirement age, given that the remaining lifetime is uncertain. Choosing a higher retirement age may coincide to a potentially short period of receiving the annuity (until death). At the extreme end, people receive a zero payoff if they die before entering retirement.

[28]This result also makes clear that subjects are randomly assigned to treatments with respect to overall risk preferences.

have an intuitive idea of the payoff structure once the underlying patterns are sufficiently clear (peak value at age 60 under declining EPW, figure 1 and 3). Once these patterns are not clear, as for the constant EPW, they tend to make more risky choices under one-stage decisions and chose higher retirement ages on average.

5 Conclusions

We provide experimental evidence on the effect of financial incentives on retirement decisions under different schemes of information provision. We show that making the financial consequences of retirement decisions more salient in terms of a forward-looking measure of pension benefits does have a considerable impact on the functioning of financial incentives and corresponding retirement choices. Previous research has shown that retirement behavior is not influenced if people are only informed about the recurrent payment (annuity) of pension benefits that corresponds to a specific retirement age (Mastrobuoni, 2011). Whether the "no reaction" is due to the fact that people already behave optimally or if the type of information is not sufficient to improve retirement behavior is an open question and this paper contributes to resolve this puzzle.

Relative to the baseline scenario our intervention is a 3% benefit reduction for each year of retirement previous to the normal retirement age and a 5% premium thereafter, thus making early retirement financially less attractive. Our preferred estimate of the difference between two payoff structures is a retirement delay of 1.9 years, conditional on risk attitude, health status, gender, distance to retirement (age), and financial literacy. What this means is that the average contribution years of the typical German retiree (35.1 years in 2014 German Federal Pension Insurance, 2015, p. 131) would be extended by more than 5%. By and large, these experimental results are in line with quasi-experimental estimates for Germany (e.g. Hanel, 2010; Giesecke, 2016). However, the relationship only holds for those who are explicitly informed about the expected pension wealth while the effects are small and largely insignificant once people only know their annuity. These results are robust across subject pools, documenting consistent behaviors of student subjects and older workers in close distance to retirement.

Interestingly, if no information on the expected pension wealth as a forward-looking measure for pension wealth is available then revealed retirement choices bunch at age 60, 63, 65 and 67. The corresponding spikes, most notable when facing the constant EPW (see figure 3), are commonly known retirement ages in the universe of the German public pension system.[29] Studies on the U.S. social security system have drawn different conclusions about the role of social norms in retirement decision making. While Lumsdaine et al. (1996) conclude that social norms are an important explanation why so many people retire at specific ages, in contrast, Asch et al. (2005) argue that social norms seem not to play a role in retirement timing. The striking result from our experiment is that both can be true, depending on whether people know what they do. People who are poorly informed about actuarial considerations of the retirement decision tend to make choices that are anchored to perceived reference points. These are usually set out by long-standing social security rules that establish what people consider to be a good age to retire, especially if they do not foresee the financial consequences.

We conclude that the financial consequences of retirement choices become more salient once the decision maker is informed about a forward-looking measure of pension benefits. Typical information letters, for example the U.S. Social Security statements or similar ones in Germany, only include information on expected annuities and these seem not to influence retirement behavior.[30] How to influence retirement behavior and how to delay job exits are relevant questions at times of aging societies. Probably the most important implication from this study is that programs aiming to raise the retirement age are more effective once the perception and understanding of financial incentives is improved.

[29] These are either early retirement ages or normal retirement ages, depending on pension type and individual characteristics such as employment history and health status.

[30] New evidence on information letters in Germany, very similar to the ones in the U.S., suggests that they stimulate increased retirement savings (Dörrenberg et al., 2016). This is another pathway how people optimize without changing the retirement age.

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A Risk Aversion Test

In this test, subjects are asked to choose between lottery A and B across ten different settings. Throughout these settings, the payoffs remain constant within lotteries but the probability of the high payoff (initially small, prob = 1/10) increases across decisions while the probability of the low payoff (initially high, prob = 9/10) decreases. The difference between the two payoffs is larger in lottery B. For example, subjects who choose lottery B in the first decision are very risk-loving while only very risk-averse subjects choose lottery B in the second last decision. Risk-neutral individuals choose lottery A in the first four decisions and switch to lottery B thereafter. This is so because lottery A yields the higher expected payoff throughout decision 1 - 4 while lottery B yields the higher expected payoff throughout decision 5 - 10 (see last column of table 6).

Table 6: Ten Paired Lottery Choices.

Lottery A				Lottery B				Expected Payoff
Prob.	High Payoff	Prob.	Low Payoff	Prob.	High Payoff	Prob.	Low Payoff	Difference
1/10	2.00	9/10	1.60	1/10	3.85	9/10	0.10	1.17
2/10	2.00	8/10	1.60	2/10	3.85	8/10	0.10	0.83
3/10	2.00	7/10	1.60	3/10	3.85	7/10	0.10	0.50
4/10	2.00	6/10	1.60	4/10	3.85	6/10	0.10	0.16
5/10	2.00	5/10	1.60	5/10	3.85	5/10	0.10	-0.18
6/10	2.00	4/10	1.60	6/10	3.85	4/10	0.10	-0.51
7/10	2.00	3/10	1.60	7/10	3.85	3/10	0.10	-0.85
8/10	2.00	2/10	1.60	8/10	3.85	2/10	0.10	-1.18
9/10	2.00	1/10	1.60	9/10	3.85	1/10	0.10	-1.52
1	2.00	0	1.60	1	3.85	0	0.10	-1.85

Source: (Holt and Laury, 2002). Note: Payoffs shown are for student subjects and inflated by factor 1.5 for older workers (thus: 3.00, 2.40, 5.80 and 0.15 EUR). The share of consistently revealed preferences in the overall sample is 82.5% (i.e. at most one switch between option A and option B).

B Descriptive Statistics

Table 7: Descriptive Statistics: Students

	Full Sample		By Treatment Status			
	Mean	Min/Max	Mean		Diff.	t-stat(p-val)
			DECLINING EPW	CONSTANT EPW		
Dependent Variable						
Retirement Age	62.7	58/70	61.4	63.9	2.5	7.10(.000)
Socio-Demographic Variables						
Male	0.53	0/1	.52	.53	.01	.19(.849)
Age	23.8	18/37	24.1	23.5	.6	1.52(.131)
N Siblings	1.5	0/10	1.45	1.6	.15	1.04(.298)
Parents Retired	0.18	0/1	.17	.18	.01	.31(.758)
Self-Reported Health (0-10)	7.9	1/10	7.8	8.0	.2	.90(.368)
Education						
Grade Abitur	2.4	1/4	2.4	2.4	0	.09(.930)
N Semesters at University	6	1/15	6.2	5.8	.4	.92(.360)
Field of Studies						
Economics	.36	0/1	.37	.35	.02	.32(.752)
Engineering	.08	0/1	.08	.08	0	.22(.827)
Natural Sciences/Math	.13	0/1	.12	.15	.03	.73(.465)
Medicine	.02	0/1	.03	.01	.02	1.36(.174)
Sociology	.04	0/1	.06	.03	.03	1.30(.193)
Humanities	.16	0/1	.13	.18	.05	1.22(.223)
Teaching Degrees	.16	0/1	.14	.16	.02	.15(.880)
Other	.05	0/1	.07	.04	.03	.87(.386)
Risk and Math						
Stated Risk Preferences (0-10)	4.7	0/9	4.5	4.8	.3	1.20(.232)
Revealed Risk Preferences (0-10)	4.3	0/9	4.2	4.4	.2	.89(.372)
Financial Literacy Score (0-3)	2.1	0/3	2.1	2.1	0	.12(.903)
Payoff Experiment (EUR)						
Payoff Part I (Decision)	14.6	0/27.3	15.7	13.6	2.1	2.29(.023)
Payoff Part II (Math + Risk)	4.2	0/6.8	4.5	3.9	.6	2.51(.013)
Total Payoff (Part I + II)	18.8	1.6/32.4	20.2	17.5	2.7	2.80(.006)
N	239		119	120		

Source: Own calculations based on experimental data (students).

Table 8: Descriptive Statistics: Older Workers

	Full Sample		By Treatment Status			
	Mean	Min/Max	Mean: DECLINING EPW	Mean: CONSTANT EPW	Diff.	t-stat(p-val)
Dependent Variable						
Retirement Age	63.3	58/70	62.6	63.9	1.3	1.95(.055)
Socio-Demographic Variables						
Male	.44	0/1	.38	.50	.12	1.03(.308)
Age	51.6	45/58	51.6	51.5	.1	.07(.942)
N Siblings	1.5	0/6	1.3	1.6	.3	1.20(.232)
N Children	1.5	0/5	1.2	1.8	.6	2.26(.026)
Marital Status						
Married	.67	0/1	.64	.69	.05	.55(.583)
Divorced	.13	0/1	.13	.13	0	.04(.966)
Partnership (Living Together)	.14	0/1	.13	.15	.02	.28(.783)
Single	.06	0/1	.10	.03	.07	1.42(.161)
Self-Reported Health (0-10)	7.3	3/10	7.3	7.4	.1	.24(.813)
HH Net Income/10,000 EUR	4.85	1/10	4.38	5.26	.88	1.77(.080)
Education						
School Type						
13 Yr. School (Abitur)	.62	0/1	.51	.72	.21	1.97(.053)
10 Yr. School (Realschule)	.28	0/1	.39	.18	.21	2.11(.038)
9 Yr. School (Hauptschule)	.10	0/1	.10	.10	0	.04(.970)
Further Education						
University Degree	.46	0/1	.44	.47	.03	.34(.731)
Vocational Training	.50	0/1	.51	.50	.01	.11(.911)
No Further Educ.	.04	0/1	.05	.03	.02	.60(.547)
Employment and Work						
Employment Status						
Employee	.75	0/1	.69	.80	.11	1.09(.277)
Civil Servant	.24	0/1	.28	.2	.08	.85(.400)
Self-Employed	.01	0/1	.03	0	.03	1.01(.314)
Occupation						
Administration/Management	.61	0/1	.61	.60	.01	.14(.890)
Controlling/Finance	.05	0/1	.08	.03	.05	1.05(.299)
Technician/Engineer	.09	0/1	.08	.09	.01	.36(.722)
Other Occupation	.25	0/1	.23	.28	.05	.45(.656)
Leading Position	.39	0/1	.31	.48	.17	1.53(.131)
Full Time Work	.87	0/1	.82	.93	.11	1.40(.167)
Partner Employment						
Full Time	.63	0/1	.64	.63	.01	.15(.884)
Part Time	.17	0/1	.10	.22	.12	1.47(.146)
No Partner	.20	0/1	.26	.15	.11	1.17(.245)
Risk and Math						
Stated Risk Preferences (0-10)	4.4	0/10	4.5	4.4	.1	.30(.761)
Revealed Risk Preferences (0-10)	4.6	0/10	4.7	4.6	.1	.24(.815)
Financial Literacy Score (0-3)	1.5	0/3	1.4	1.6	.2	.71(.481)
Payoff Experiment (EUR)						
Payoff Part I (Decision)	22.4	0/35.2	23.0		21.8 1.2	.56(.579)
Payoff Part II (Math + Risk)	5.7	0/10.3	5.9	5.5	.4	.61(.541)
Total Payoff (Part I + II)	28.1	1.5/43.9	28.9	27.3	1.6	.69(.493)
N	79		39	40		

Source: Own calculations based on experimental data (older workers).
Note: Mean household income is calculated ignoring missing values from refused answers.

C Sensitivity Analysis: Results

Table 9: Further Testing: Retirement Decisions by Subject Pool.

	STUDENTS				OLDER WORKERS			
	(1) BASIC		(2) INFO		(3) BASIC		(4) INFO	
	Decl. EPW	Const. EPW	Decl. EPW	Const. EPW	Decl. EPW	Const. EPW	Decl. EPW	Const. EPW
Mean								
Ret. Age	62.0	62.4	61.5	64.1	63.5	64.1	62.0[61.4]	63.9[64.8]
N (Group)	22	21	44	42	17	19	19[7]	20[12]
Difference	0.4		2.6		0.6		1.9[3.4]	
z-stat. (p-value)	.61(.545)		4.22(.000)		.13(.897)		1.79(.074)[2.36(.018)]	
t-stat. (p-value)	.51(.614)		4.87(.000)		.67(.509)		2.12(.041)[2.61(.018)]	
N	43		86		36		39[19]	
Total Obs.					204			

Source: Own calculations based on experimental data (separate sub-samples of students and older workers).

Note: z-statistic: non-parametric Wilcoxon rank-sum test. t-statistic: two-sample t-test on differences in means. 19 censored observations are excluded from the sample. Results in squared brackets (INFO) are for the sub-sample of older workers who have a financial literacy score equal to 3, meaning that all three answers to math questions are correct.

Table 10: Students Sub-Sample: Regression Analysis.

	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Variables						
Constant EPW	0.417	0.498	0.426	0.485	0.425	0.516
INFO	-0.313	-0.313	-0.477	-0.316	-0.373	-0.345
Constant EPW X INFO	1.896**	1.896**	2.215**	1.919**	1.969**	1.717*
Right-Censored Observation		-1.963***		-2.000***	-2.010***	-2.376***
Revealed Risk Preferences (0-10)				0.051	0.053	0.056
Self-Reported Health Status (0-10)					0.076	0.064
Male						0.108
Age in Years						-0.113
N Siblings						0.129
Parents Retired						0.417
Final School Grade (1-4)						0.155
N Semesters at University						0.025
Field of Studies						
Economics						REF
Engineering						0.698
Natural Sciences/Math.						1.099
Medicine						1.496
Sociology						2.503
Humanities						0.270
Teaching Degrees						1.047
Other						0.344
Financial Literacy Score (0-3)						-0.007
Constant	61.750***	61.914***	61.955***	61.914***	61.140***	62.599***
N	144	144	129	144	144	144

Source: Own calculations based on experimental data. Note: Reported values are coefficients from OLS regressions. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Censored observations are either excluded from the sample (specification 3) or controlled for.

Table 11: Older Workers' Sub-Sample: Regression Analysis (INFO).

	(1)	(2)	(3)	(4)	(5)
Treatment Variable					
Constant EPW	1.950**	1.850**	1.850**	2.018**	1.977**
Right-Censored Observation		-2.000		-1.316	-1.369
Revealed Risk Preferences (0-10)				0.382**	0.392**
Self-Reported Health Status (0-10)					0.056
Constant	61.900***	62.000***	62.000***	60.169***	59.740***
N	40	40	39	40	40

	(6)	(7)	(8)	(9)	(10)
Treatment Variable					
Constant EPW	2.195**	2.332**	2.200**	1.968	2.626
Right-Censored Observation	-1.125	-0.081	-1.477	-3.909	-3.648
Revealed Risk Preferences (0-10)	0.480**	0.246	0.391**	0.075	0.133
Self-Reported Health Status (0-10)	-0.076	0.047	0.009	-0.305	-0.444
Male				1.232	0.749
Age in Years				0.212	0.148
Family Background					
N Children	-0.132			-0.244	-0.322
Marital Status					
Married	REF			REF	REF
Divorced	0.279			0.198	0.370
Partnership (Living Together)	2.317			2.417	2.655
Single	0.485			-0.744	-1.009
Partner Activity					
Full Time Employment	REF			REF	REF
Part Time Employment	0.773			-0.391	-0.200
No Partner	-2.239			-2.083	-1.846
HH Net Income					0.063
Education					
School Education					
13 Yrs. School (Abitur)		REF		REF	REF
10 Yrs. School (Realschule)		0.560		-0.798	0.160
9 Yrs. School (Hauptschule)		-2.663		-3.232	-2.737
Further Education					
University Degree		REF		REF	REF
Vocational Training		-0.443		-1.738	-1.881
No Further Educ.		-2.206		0.627	0.022
Employment and Work Environment					
Full Time			-0.273	2.150	3.510
Leading Position			-0.885	-1.296	-1.629
Occupation					
Employee			REF	REF	REF
Civil Servant			0.263	-0.654	0.042
Self-Employed			-1.875	-0.239	1.309
Financial Literacy Score (0-3)				-0.202	0.020
Constant	60.294***	60.610***	60.503***	53.325***	54.832***
N	40	40	40	40	36

Source: Own calculations based on experimental data (older workers). Note: Reported values are coefficients from OLS regressions. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Censored observations are either excluded from the sample (specification 3) or controlled for.

Table 12: Older Workers' Sub-Sample: Regression Analysis (BASIC).

	(1)	(2)	(3)	(4)	(5)
Treatment Variable					
Constant EPW	0.479	0.383	0.635	0.297	0.771
Right-Censored Observation		-1.731		-1.929	-1.406
Revealed Risk Preferences (0-10)				0.652***	0.473**
Self-Reported Health Status (0-10)					0.721***
Constant	63.421***	63.603***	63.471***	60.570***	55.740***
N	39	39	36	39	39
	(6)	(7)	(8)	(9)	(10)
Treatment Variable					
Constant EPW	1.241	0.791	0.838	1.484	1.344
Right-Censored Observation	-0.855	-2.260	-1.632	-2.308	-1.930
Revealed Risk Preferences (0-10)	0.469**	0.517**	0.515**	0.676**	0.612*
Self-Reported Health Status (0-10)	0.743***	0.658**	0.729***	0.760**	0.856**
Male				0.714	-0.293
Age in Years				-0.077	-0.125
Family Background					
N Children	-0.124			-0.095	-0.213
Marital Status					
Married	REF			REF	REF
Divorced	-1.071			-1.569	-1.308
Partnership (Living Together)	-0.244			-0.441	-0.881
Single	0.411			0.642	2.055
Partner Activity					
Full Time Employment	REF			REF	REF
Part Time Employment	0.858			1.306	1.665
No Partner	2.163			3.027	2.733
HH Net Income					0.009
Education					
School Education					
13 Yrs. School (Abitur)		REF		REF	REF
10 Yrs. School (Realschule)		-1.408		-1.734	-1.505
9 Yrs. School (Hauptschule)		-0.815		-1.416	-0.409
Further Education					
University Degree		REF		REF	REF
Vocational Training		0.013		0.115	-0.284
No Further Educ.		3.324		2.941	1.797
Employment and Work Environment					
Full Time			-0.460	-0.470	-1.144
Leading Position			-0.337	-1.368	-0.987
Occupation					
Employee			REF	REF	REF
Civil Servant			0.073	1.412	1.273
Self-Employed			–	–	–
Financial Literacy Score (0-3)				-0.663	-0.213
Constant	54.980***	56.430***	55.978***	59.197***	62.124***
N	39	39	39	39	36

Source: Own calculations based on experimental data (older workers). Note: Reported values are coefficients from OLS regressions. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Censored observations are either excluded from the sample (specification 3) or controlled for.

Table 13: Further Testing: One-Stage Retirement Decisions (Students only).

	BASIC		INFO	
	Declining EPW	Constant EPW	Declining EPW	Constant EPW
Mean Ret. Age	61.4	65.8	60.9	64.3
N (Group)	24	24	23	24
Difference	4.4		3.4	
z-stat. (p-value)	4.09(.000)		3.85(.000)	
t-stat. (p-value)	5.13(.000)		4.67(.000)	
N	48		47	

Source: Own calculations based on experimental data (students). Note: Tests are two-sample Wilcoxon rank-sum test (z-statistic) and a two-sample t-test on differences in means (t-statistic). There are no censored observations in one-stage decisions (ex ante retirement choice).

Table 14: One-Stage Decision Sub-Sample: Regression Analysis (Students only).

	BASIC				
	(1)	(2)	(3)	(4)	(5)
Treatment Variable					
Constant EPW	4.417***	4.227***	4.448***	4.473***	5.783***
Revealed Risk Preferences (0-10)		0.239	0.266	0.317	0.088
Self-Reported Health Status (0-10)			0.415*	0.377	0.713**
Male				-1.204	0.360
Age in Years				0.049	-0.326
N Siblings					0.162
Parents Retired					2.024
Final School Grade (1-4)					0.126
N Semesters at University					0.373
Field of Studies					
Economics					REF
Engineering					2.480
Natural Sciences/Math.					6.463**
Medicine					2.302
Sociology					0.403
Humanities					0.191
Teaching Degrees					1.919
Other					1.793
Financial Literacy Score (0-3)					-0.200
Constant	61.375***	60.528***	57.080***	56.652***	58.366***
N	48	48	48	48	48

	INFO				
	(1)	(2)	(3)	(4)	(5)
Treatment Variable					
Constant EPW	3.380***	3.380***	3.166***	3.202***	3.037***
Revealed Risk Preferences (0-10)		0.003	0.125	0.030	0.009
Self-Reported Health Status (0-10)			0.356*	0.299	0.324
Male				0.966	0.269
Age in Years				-0.045	0.158
N Siblings					0.449
Parents Retired					-2.372*
Final School Grade (1-4)					-0.296
N Semesters at University					0.013
Field of Studies					
Economics					REF
Engineering					1.085
Natural Sciences/Math.					-0.670
Medicine					-1.776
Sociology					-1.277
Humanities					-0.879
Teaching Degrees					0.990
Other					-0.849
Financial Literacy Score (0-3)					-0.204
Constant	60.870***	60.855***	57.643***	59.054***	55.826***
N	47	47	47	47	47

Source: Own calculations based on experimental data (students). Note: Reported values are coefficients from OLS regressions. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. There are no censored observations in one-stage decisions (ex ante retirement choice).

Table 15: Decision Structure and Risk Preferences: Constant EPW/BASIC (Students only).

	Stated Risk (Questionnaire)		Revealed Risk (Paired Lottery Choices)	
	SEQUENTIAL	ONE-STAGE	SEQUENTIAL	ONE-STAGE
Mean				
Risk Attitude (0-10)	4.4	5.5	4.5	4.3
N (Group)	24	24	24	24
Difference	1.1		.2	
z-stat. (p-value)	1.78(.076)		.19(.850)	
t-stat. (p-value)	1.93(.060)		.41(.680)	
N (Total)	48		48	

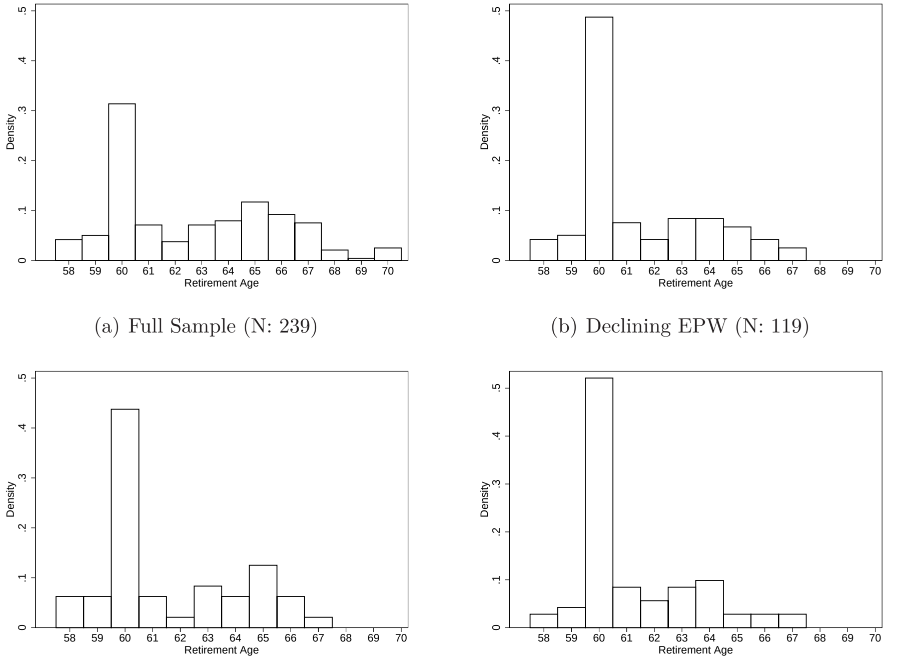
Source: Own calculations based on experimental data (students).

Note: z-statistic: non-parametric Wilcoxon rank-sum test. t-statistic: two-sample t-test on differences in means. Both stated and revealed risk preferences are mapped into a scale from zero (very risk averse) to 10 (very risk loving).

D Detailed Results: Graphical Evidence

D.1 Histograms: Students

Figure 5: Retirement Decisions across Information Treatments: Declining EPW.



(a) Full Sample (N: 239)

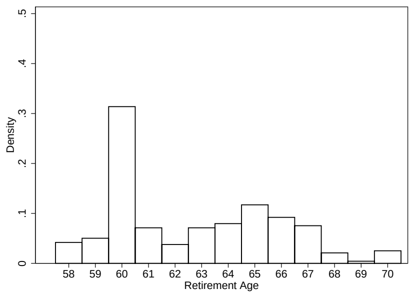
(b) Declining EPW (N: 119)

(c) Declining EPW: BASIC (N: 48)

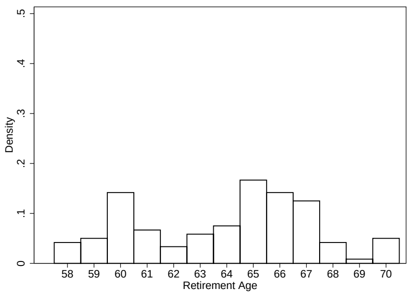
(d) Declining EPW: INFO (N: 71)

Source: Own calculation based on experimental data (students).

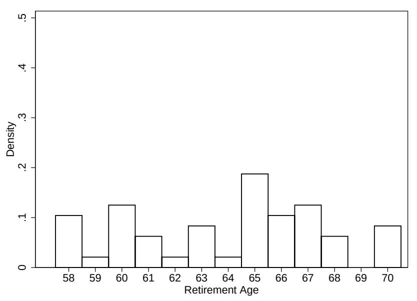
Figure 6: Retirement Decisions across Information Treatments: Constant EPW.



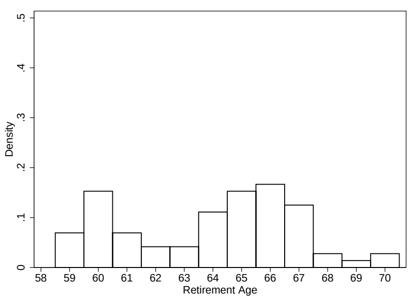
(a) Full Sample (N: 239)



(b) Constant EPW (N: 120)



(c) Constant EPW: BASIC (N: 48)

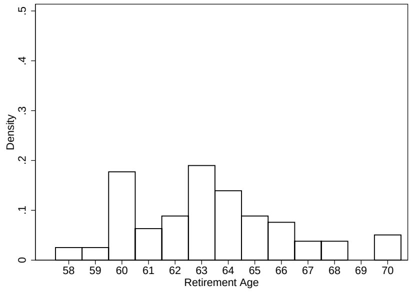


(d) Constant EPW: INFO (N: 72)

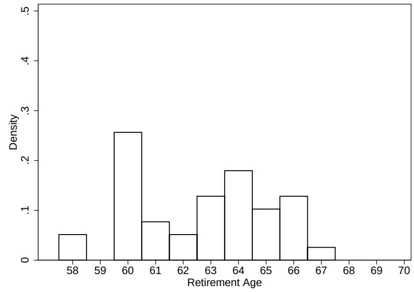
Source: Own calculation based on experimental data (students).

D.2 Histograms: Older Workers

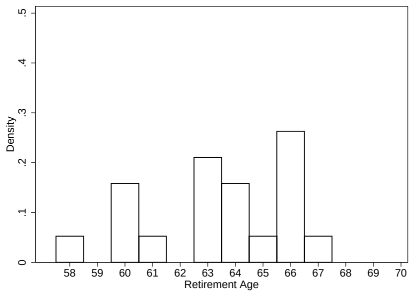
Figure 7: Retirement Decisions across Information Treatments: Declining EPW.



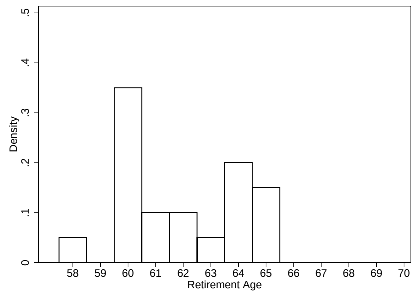
(a) Full Sample (N: 79)



(b) Declining EPW (N: 39)



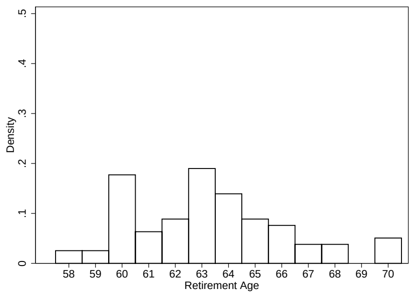
(c) Declining EPW: BASIC (N: 19)



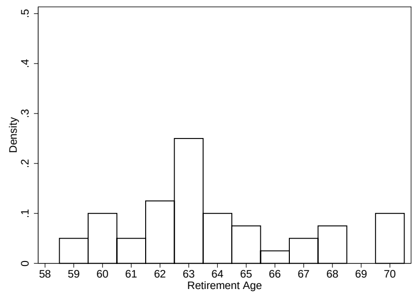
(d) Declining EPW: INFO (N: 20)

Source: Own calculation based on experimental data (older workers).

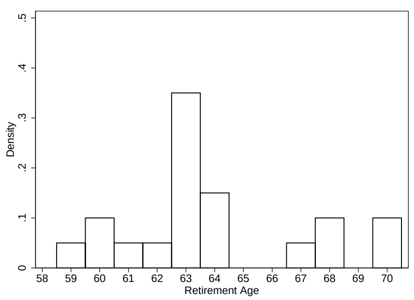
Figure 8: Retirement Decisions across Information Treatments: Constant EPW.



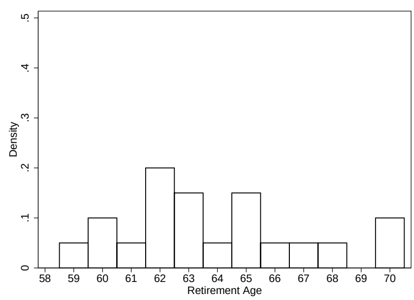
(a) Full Sample (N: 79)



(b) Constant EPW (N: 40)



(c) Constant EPW: BASIC (N: 20)



(d) Constant EPW: INFO (N: 20)

Source: Own calculation based on experimental data (older workers).

E Financial Literacy Score (0 - 3)

After their retirement decision, subjects are asked to solve three math problems related to the computation of the EPW. The financial literacy score used in parts of the analysis is based on the number of correct answers (= 0 if none of the answers is correct; ... ; = 3 if all three answers are correct). If a correct answer is provided within 120 seconds, they earn 1.00 EUR (students) and 1.50 EUR (older workers) for each question. If no correct answer is provided within 120 seconds, the payoff is zero. All three questions involve calculating the EPW from different perspectives:

1. You are 58 years old. What is the exact amount of your EPW (in experimental token) if you retire immediately? Hint: The EPW equals the sum of all future pension benefits for the average remaining living years, given that you have reached the specific age (here: 58).
2. You are 61 years old. What is the exact amount of your EPW (in experimental token) if you retire immediately?
3. You are 58 years old. What is the exact amount of your EPW (in experimental token) if you plan to retire at age 61?

Table 16: Financial Literacy Score (0 - 3).

	Full Sample		BASIC		INFO	
	Students	Older Workers	Students	Older Workers	Students	Older Workers
0 Correct Answers (%)	.11	.32	.27	.56	.01	.08
Difference in Mean	.21		.29		.07	
z-stat. (p-value)	4.23(.000)		3.21(.001)		2.59(.010)	
t-stat. (p-value)	4.35(.000)		3.33(.001)		2.64(.009)	
1 Correct Answer (%)	.11	.11	.22	.13	.04	.10
Difference in Mean	0		.09		.06	
z-stat. (p-value)	.02(.982)		1.21(.228)		1.42(.155)	
t-stat. (p-value)	.02(.982)		1.21(.230)		1.55(.143)	
2 Correct Answers (%)	.33	.32	.50	.31	.21	.33
Difference in Mean	.01		.19		.12	
z-stat. (p-value)	.16(.871)		2.03(.042)		1.52(.130)	
t-stat. (p-value)	.16(.871)		2.05(.042)		1.52(.130)	
3 Correct Answers (%)	.45	.25	.01	0	.74	.50
Difference in Mean	.20		.01		.24	
z-stat. (p-value)	3.06(.002)		.64(.524)		2.91(.004)	
t-stat. (p-value)	3.10(.002)		.64(.526)		2.97(.003)	
N	239	79	96	39	143	40

Source: Own calculations based on experimental data.
Note: Results are from incentivized math questions after retirement decisions (calculation of the EPW). Reported values are respective shares in the two sub-samples of students and older workers. z-statistic: non-parametric Wilcoxon rank-sum test. t-statistic: two-sample t-test on differences in means.

F Instructions

The instructions are translated from the original German version. They are provided separately for sequential decisions (section F.1) and for one-stage decisions (section F.2). To keep it short, the exchange rate of Euro/laboratory token is mentioned both for students (1/15,000) and older workers (1/10,000). The instructions also include the two payoff structures at once, mentioning numbers for the constant EPW followed by those for the declining EPW in squared brackets. Concerning information treatments, the BASIC treatment excludes the last two paragraphs, the INFO treatment excludes the last paragraph and the INFO PLUS treatment includes the full text.

F.1 Instructions: Sequential Decisions

Welcome to the Experiment!

<u>Preliminary Note</u>

You are participating in a study of decision-making behavior in the context of experimental economics. During the study you and the other participants will be asked to make decisions. You can earn money in this experiment. How much money you earn depends on your decisions and on the course of the experiment. Your individual payoff is determined as follows: you receive 1 Euro for 15,000/10,000 experimental token. You are provided with detailed instructions about this in the following.

All participants are paid in cash directly after the experiment one by one. To ensure this, please remain seated after the experiment until your cabin number is called.

Throughout the experiment, no participant will receive information about the other participants' identities. All decisions are therefore made anonymously. Should you have questions, please give a sign to alert one of the laboratory's employees who will help you.

No communication among participants is allowed during the experiment; breaking this rule will lead to an immediate exclusion from the experiment.

Please read the following instructions completely and thoroughly. Please only start the computer-based program (by clicking on the start button) once you have read the instructions and clarified open questions. As soon as you start the program, we kindly ask you to answer some questions concerning the experiment. Once all participants have correctly answered these questions, the experiment begins.

Description of the Decision

Throughout the experiment you are repeatedly asked to decide whether you want to continue working or to retire. The experiment consists of several periods and in each of these periods you grow older by one year. While moving from one period to another, i.e. in each experimental year, you are exposed to a positive probability to die. Your survival probability is based on real mortality tables from the Federal Statistical Office. From table F.3.1.1 you can infer the probability to reach a specific age, conditional on having reached the previous age (see survival table).

At the beginning of the experiment you are 58 years old and you have continuously worked until that age. Now you have to decide for the first time whether you want to continue working or to retire immediately. In each period, you have 120 seconds of time to make your decision.

If you decide not to continue working and thus to retire immediately then you receive a recurrent payment starting at the year of retirement throughout your remaining lifetime – your pension annuity. Laboratory token thereby reflect real average pensions in Germany. Your remaining lifetime is drawn from a random process which is based on real survival probabilities. Table F.3.1.1 shows that a person who has reached age 58 will reach age 59 with a probability of 99.29%. Statistically, this means that 99.29 out of 100 persons of age 58 will celebrate their 59th birthday.

As long as you decide not to retire and thus to continue working you do not receive a pension annuity. Whether you reach the subsequent age (here: age 59) is based on the same process as described above.

The decision situation continuously repeats as long as you have not retired given that you have survived the respective periods. In this case you move on to age 59 and are asked again whether you want to continue working or to retire immediately. At the maximum, you can work until age 70. After the decision age window (beyond age 70), survival is still determined individually for each period. After each period, you are informed about your survival status and the current payoff from pension benefits. The program ends as soon as the last participant has died.

Your individual payoff from the experiment is determined by the pension annuity, multiplied by the number of survival periods. You do not receive labor earnings in this experiment and thus the payoff from the retirement decision is zero if you die before retiring.

All relevant information concerning the retirement decisions are summarized in the payoff tables F.3.1.2 - F.3.1.14 [F.3.2.2 - F.3.2.14] (see payoff tables). For example, table F.3.1.2[F.3.2.2] shows that retirement at age 58 yields a pension annuity of 8727.60[11047.59] experimental token in each remaining living year. Further, retirement at higher ages yields a corresponding higher pension annuity, given that the person is still alive. The decision situation is provided for each current age in a separate table.

Within decision tables, the life expectancy reports average remaining years to live, conditional on having reached the respective age. For example, if you have reached age 63 you can expect to live another 20.55 years on average.

— INSTRUCTIONS END: BASIC —

The expected pension wealth (EPW) in the decision tables is determined by the sum of all future pension annuity payments over the remaining living years, conditional on having reached the respective age. Thus, the EPW calculates as the product of the pension annuity and life expectancy, adjusted by survival probabilities. For example, the EPW at age 60 calculates as 10531.97 times 23.005 = 242288[12390.55 times 23.005 = 285045] experimental token. Important: From the perspective of age 58 the EPW at age 60 calculates as 10531.97 times 23.005 times 0.9921 times 0.9929 = 238667[12390.55 times 23.005 times 0.9921 times 0.9929 = 280785] experimental token (rounded to integer values).

— INSTRUCTIONS END: INFO —

Note: Between age 60 and 70 the retirement system is actuarially neutral[not actuarially neutral]. This means that the EPW is constant[declining] in this age bracket. If a higher retirement age is chosen, a larger pension annuity is paid for fewer remaining living years on average. If a lower retirement age is chosen, a smaller pension annuity is paid for more remaining living years on average. However, for all ages between 60 and 70 the EPW is identical[However, for all ages between 60 and 70, the EPW is declining].

— INSTRUCTIONS END: INFO PLUS —

F.2 Instructions: One-Stage Decisions

Welcome to the Experiment!

Preliminary Note

— SEE INSTRUCTIONS ON SEQUENTIAL DECISIONS ABOVE (SECTION F.1) —

Description of the Decision

In the experiment you are asked to choose a retirement age once and for all. At the beginning of the experiment you are 58 years old and you have continuously worked until that age. Now you have to decide at which age you want to stop working and to enter retirement. You have 24 minutes of time to make your decision.

You receive a recurrent payment starting at the year of retirement throughout your remaining lifetime – your pension annuity. Laboratory token thereby reflect real average pensions in Germany.

In each experimental year you are exposed to a positive probability to die. Your survival probability is based on real mortality tables from the Federal Statistical Office. From table F.3.1.1 you can infer the probability to reach a specific age, conditional on having reached the previous age (see survival table). Your remaining lifetime is drawn from a random process which is based on real mortality tables. Table F.3.1.1 shows that a person who has reached age 58 will reach age 59 with a probability of 99.29%. Statistically, this means that 99.29 out of 100 persons of age 58 will celebrate their 59th birthday.

At the maximum, you can work until age 70. After the decision age window (beyond age 70) survival is still determined individually for each period.

Your individual payoff from the experiment is determined by the pension annuity multiplied by the number of survival periods. You do not receive labor earnings in this experiment and thus the payoff from the retirement decision is zero if you die before retiring.

All relevant information concerning the retirement decisions are summarized in the payoff tables F.3.1.2 - F.3.1.14 [F.3.2.2 - F.3.2.14] (see payoff tables). For example, table F.3.1.2[F.3.2.2] shows that retirement at age 58 yields a pension annuity of 8727.60[11047.59] experimental token in each remaining living year. Further, retirement at higher ages yields a corresponding higher pension annuity, given that the person is still alive. The decision situation is provided for each current age in a separate table.

Within decision tables, the life expectancy reports average remaining years to live, conditional on having reached the respective age. For example, if you have reached age 63 you can expect to live another 20.55 years on average.

— Instructions end: BASIC —

The expected pension wealth (EPW) in the decision tables is determined by the sum of all future pension annuity payments over the remaining living years, conditional on having reached the respective age. Thus, the EPW calculates as the product of the pension annuity and life expectancy, adjusted by survival probabilities. For example, the EPW at age 60 calculates as 10531.97 times 23.005 = 242288[12390.55 times 23.005 = 285045] experimental token. Important: From the perspective of age 58 the EPW at age 60 calculates as 10531.97 times 23.005 times 0.9921 times 0.9929 = 238667[12390.55 times 23.005 times 0.9921 times 0.9929 = 280785] experimental token (rounded to integer values).

— Instructions end: INFO —

Note: Between age 60 and 70 the retirement system is actuarially neutral[not actuarially neutral]. This means that the EPW is constant[declining] in this age bracket. If a higher retirement age is chosen, a larger pension annuity is paid for fewer remaining living years on average. If a lower retirement age is chosen, a smaller pension annuity is paid for more remaining living years on average. However, for all ages between 60 and 70 the EPW is identical[However, for all ages between 60 and 70, the EPW is declining].

— Instructions end: INFO PLUS —

F.3 Appendix of Tables

Decision tables are identical for sequential and one-stage decisions. We provide them separately for constant EPW (section F.3.1) and declining EPW (section F.3.2). The tables include maximum information (INFO and INFO PLUS). For the BASIC treatments we only excluded the EPW (gray-colored column).

F.3.1 Constant EPW

Survival Table

Table F.3.1.1: Survival Probability

59	**60**	**61**	**62**	**63**	**64**	**65**	**66**
0.9929	0.9921	0.9915	0.9909	0.9903	0.9893	0.9886	0.9875
67	**68**	**69**	**70**	**71**	**72**	**73**	**74**
0.9865	0.9856	0.9842	0.9828	0.9811	0.9792	0.9769	0.9738
75	**76**	**77**	**78**	**79**	**80**	**81**	**82**
0.9706	0.9669	0.9628	0.9576	0.9524	0.9466	0.9398	0.9323
83	**84**	**85**	**86**	**87**	**88**	**89**	**90**
0.9247	0.9147	0.9043	0.8924	0.8782	0.8647	0.8456	0.8346
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**
0.8112	0.7972	0.779	0.7603	0.741	0.7213	0.7011	0.6806
99	**100**						
0.6599	0.6389						

Table F.3.1.2: Current Age 58

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
58	8727.60	24.68	215397
59	9578.66	23.84	226734
60	10531.97	23.005	238667
61	11019.84	22.175	238667
62	11545.37	21.36	238667
63	12117.99	20.55	238667
64	12748.45	19.745	238667
65	13440.00	18.945	238667
66	14202.36	18.155	238667
67	15038.69	17.38	238667
68	15980.18	16.595	238667
69	17016.00	15.835	238667
70	18186.67	15.075	238667

Table F.3.1.3: Current Age 59

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
59	9578.66	23.84	228355
60	10531.97	23.005	240374
61	11019.84	22.175	240374
62	11545.37	21.36	240374
63	12117.99	20.55	240374
64	12748.45	19.745	240374
65	13440.00	18.945	240374
66	14202.36	18.155	240374
67	15038.69	17.38	240374
68	15980.18	16.595	240374
69	17016.00	15.835	240374
70	18186.67	15.075	240374

Table F.3.1.4: Current Age 60

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
60	10531.97	23.005	242288
61	11019.84	22.175	242288
62	11545.37	21.36	242288
63	12117.99	20.55	242288
64	12748.45	19.745	242288
65	13440.00	18.945	242288
66	14202.36	18.155	242288
67	15038.69	17.38	242288
68	15980.18	16.595	242288
69	17016.00	15.835	242288
70	18186.67	15.075	242288

Table F.3.1.5: Current Age 61

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
61	11019.84	22.175	244365
62	11545.37	21.36	244365
63	12117.99	20.55	244365
64	12748.45	19.745	244365
65	13440.00	18.945	244365
66	14202.36	18.155	244365
67	15038.69	17.38	244365
68	15980.18	16.595	244365
69	17016.00	15.835	244365
70	18186.67	15.075	244365

Table F.3.1.6: Current Age 62

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
62	11545.37	21.36	246609
63	12117.99	20.55	246609
64	12748.45	19.745	246609
65	13440.00	18.945	246609
66	14202.36	18.155	246609
67	15038.69	17.38	246609
68	15980.18	16.595	246609
69	17016.00	15.835	246609
70	18186.67	15.075	246609

Table F.3.1.7: Current Age 63

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
63	12117.99	20.55	249025
64	12748.45	19.745	249025
65	13440.00	18.945	249025
66	14202.36	18.155	249025
67	15038.69	17.38	249025
68	15980.18	16.595	249025
69	17016.00	15.835	249025
70	18186.67	15.075	249025

Table F.3.1.8: Current Age 64

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
64	12748.45	19.745	251718
65	13440.00	18.945	251718
66	14202.36	18.155	251718
67	15038.69	17.38	251718
68	15980.18	16.595	251718
69	17016.00	15.835	251718
70	18186.67	15.075	251718

Table F.3.1.9: Current Age 65

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
65	13440.00	18.945	254621
66	14202.36	18.155	254621
67	15038.69	17.38	254621
68	15980.18	16.595	254621
69	17016.00	15.835	254621
70	18186.67	15.075	254621

Table F.3.1.10: Current Age 66

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
66	14202.36	18.155	257844
67	15038.69	17.38	257844
68	15980.18	16.595	257844
69	17016.00	15.835	257844
70	18186.67	15.075	257844

Table F.3.1.11: Current Age 67

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
67	15038.69	17.38	261372
68	15980.18	16.595	261372
69	17016.00	15.835	261372
70	18186.67	15.075	261372

Table F.3.1.12: Current Age 68

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
68	15980.18	16.595	265191
69	17016.00	15.835	265191
70	18186.67	15.075	265191

Table F.3.1.13: Current Age 69

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
69	17016.00	15.835	269448
70	18186.67	15.075	269448

Table F.3.1.14: Current Age 70

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
70	18186.67	15.075	274164

F.3.2 Declining EPW

Survival Table

Table F.3.2.1: Survival Probability

59	**60**	**61**	**62**	**63**	**64**	**65**	**66**
0.9929	0.9921	0.9915	0.9909	0.9903	0.9893	0.9886	0.9875
67	**68**	**69**	**70**	**71**	**72**	**73**	**74**
0.9865	0.9856	0.9842	0.9828	0.9811	0.9792	0.9769	0.9738
75	**76**	**77**	**78**	**79**	**80**	**81**	**82**
0.9706	0.9669	0.9628	0.9576	0.9524	0.9466	0.9398	0.9323
83	**84**	**85**	**86**	**87**	**88**	**89**	**90**
0.9247	0.9147	0.9043	0.8924	0.8782	0.8647	0.8456	0.8346
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**
0.8112	0.7972	0.779	0.7603	0.741	0.7213	0.7011	0.6806
99	**100**						
0.6599	0.6389						

Table F.3.2.2: Current Age 58

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
58	11047.59	24.68	272655
59	11681.29	23.84	276505
60	12390.55	23.005	280785
61	12522.55	22.175	271213
62	12687.22	21.36	262272
63	12891.48	20.55	253901
64	13142.73	19.745	246049
65	13440.00	18.945	238667
66	13526.06	18.155	227302
67	13671.53	17.38	216970
68	13895.81	16.595	207537
69	14180.00	15.835	198889
70	14549.34	15.075	190934

Table F.3.2.3: Current Age 59

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
59	11681.29	23.84	278482
60	12390.55	23.005	282793
61	12522.55	22.175	273152
62	12687.22	21.36	264147
63	12891.48	20.55	255717
64	13142.73	19.745	247808
65	13440.00	18.945	240374
66	13526.06	18.155	228928
67	13671.53	17.38	218522
68	13895.81	16.595	209021
69	14180.00	15.835	200312
70	14549.34	15.075	192299

Table F.3.2.4: Current Age 60

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
60	12390.55	23.005	285045
61	12522.55	22.175	275327
62	12687.22	21.36	266250
63	12891.48	20.55	257753
64	13142.73	19.745	249781
65	13440.00	18.945	242288
66	13526.06	18.155	230750
67	13671.53	17.38	220262
68	13895.81	16.595	210685
69	14180.00	15.835	201907
70	14549.34	15.075	193830

Table F.3.2.5: Current Age 61

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
61	12522.55	22.175	277688
62	12687.22	21.36	268533
63	12891.48	20.55	259963
64	13142.73	19.745	251923
65	13440.00	18.945	244365
66	13526.06	18.155	232729
67	13671.53	17.38	222150
68	13895.81	16.595	212491
69	14180.00	15.835	203638
70	14549.34	15.075	195492

Table F.3.2.6: Current Age 62

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
62	12687.22	21.36	270999
63	12891.48	20.55	262350
64	13142.73	19.745	254236
65	13440.00	18.945	246609
66	13526.06	18.155	234866
67	13671.53	17.38	224190
68	13895.81	16.595	214443
69	14180.00	15.835	205508
70	14549.34	15.075	197287

Table F.3.2.7: Current Age 63

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
63	12891.48	20.55	264920
64	13142.73	19.745	256727
65	13440.00	18.945	249025
66	13526.06	18.155	237166
67	13671.53	17.38	226386
68	13895.81	16.595	216543
69	14180.00	15.835	207521
70	14549.34	15.075	199220

Table F.3.2.8: Current Age 64

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
64	13142.73	19.745	259503
65	13440.00	18.945	251718
66	13526.06	18.155	239732
67	13671.53	17.38	228835
68	13895.81	16.595	218885
69	14180.00	15.835	209765
70	14549.34	15.075	201374

Table F.3.2.9: Current Age 65

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
65	13440.00	18.945	254621
66	13526.06	18.155	242496
67	13671.53	17.38	231473
68	13895.81	16.595	221409
69	14180.00	15.835	212184
70	14549.34	15.075	203697

Table F.3.2.10: Current Age 66

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
66	13526.06	18.155	245566
67	13671.53	17.38	234403
68	13895.81	16.595	224212
69	14180.00	15.835	214870
70	14549.34	15.075	206275

Table F.3.2.11: Current Age 67

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
67	13671.53	17.38	237611
68	13895.81	16.595	227280
69	14180.00	15.835	217810
70	14549.34	15.075	209098

Table F.3.2.12: Current Age 68

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
68	13895.81	16.595	230601
69	14180.00	15.835	220993
70	14549.34	15.075	212153

Table F.3.2.13: Current Age 69

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
69	14180.00	15.835	224540
70	14549.34	15.075	215559

Table F.3.2.14: Current Age 70

Age	Pension Annuity	Average Remaining Life Expectancy (Years)	Expected Total Pension Income
70	14549.34	15.075	219331