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Running Head: DIMENSIONALITY OF RISK PERCEPTION

Dimensionality of Risk Perception: Factors Affecting Consumer Understanding and Evaluation of Financial Risk

Ivo Vlaev[1]

Nick Chater[1]

Neil Stewart[2]

[1]University College London, England

[2]University of Warwick, England

Correspondence concerning this article should be addressed to Ivo Vlaev (i.vlaev@ucl.ac.uk).

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Abstract

This article describes two studies of the factors affecting consumer understanding of financial risk. The first study investigated factors affecting people's perception and comprehension of information about the risks related to retirement investments. First, we asked the respondents to list possible risk factors related to investment in a pension plan. Then, we obtained ratings of different factors (like the perceived level of knowledge about an investment), which could affect perception of the risk of financial products and retirement investment decisions. Finally, we asked the subjects to rate eleven different descriptions presenting risk information about the same financial product. The risk information framing that received highest rating presented risk as variation between minimum and maximum values with an average in between. The second study demonstrated that the risk framing that received highest ranking also prompts more stable risk preferences over three months testing period in comparison to standard measures of risk aversion. Thus, the second study corroborated the importance of the findings in the first study and also indicated that, although people can exhibit stable risk preferences if we ask them the right questions, these preferences are very specific to the risk domain.

Keywords: Risk perception; Risk preferences; Financial risk; Consumers of financial products

It has become clear in the last decades of decision making research that in many circumstances the financial decisions made by consumers tend to be sub-optimal. Among other things, there appears to be mismatches between consumers' understanding of risk, their attitudes to risk, and their financial decisions. Here, we explore these issues, with a practical focus on implications for the financial services industry. We focus on attitudes to risk, personal investment and pension decisions among the general population, rather than considering the beliefs, attitudes and decisions of highly experienced investors or professional fund-managers.[2]

This research has implications for a financial environment, in which consumers are increasingly expected to take command of their own pension and investment decisions. In relation to these circumstances, there has been a strong focus from governments on improving consumers' financial literacy. There also appears to be an underlying view (based on traditional economic theory) that education will improve financial decision-making. Analysis of existing research literature on the role of learning and education, however, suggests that people cannot learn rational preferences, particularly with regard to risky financial decisions in experimental setting (Humphrey, 2001; Kagel & Levin, 1986; Loewenstein, 1999; Slovic & Tversky, 1974). In order to converge to a rational equilibrium, learning requires endless trials and practical experience of success and failure. Relying on such learning is impractical for many aspects of consumer financial decision-making, because of the relative infrequency of having to make such decisions in real life. One might hope that learning acquired from one financial decision might allow more optimal decision-making in another. In fact, psychological research suggests that transfer of learning across situations is surprisingly

[2] We undertook this work on consumer understanding of risk, both from a mathematical and from a psychological standpoint, with the help of the Actuarial Profession's Personal Financial Planning Committee in United Kingdom. This work was also supported by a grant from the Institute of Actuaries (London, UK). We would like to thank members of the actuarial profession Alan Goodman, Martin Hewitt, Ian Woods, and John Taylor for their comments and suggestions. The second study was also supported by Economic and Social Research Council grant R000239351.

weak. Even when subjects are explicitly informed that their experience on one task is relevant to a second task, they often learn the wrong lesson from the first task (Bassoc, Wu, & Olseth, 1995). Often, people need to be given specific rules and simple heuristics on how to behave rationally in various situations where financial choices are made. In this respect, Tversky and Kahneman suggest that "people rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations" (1974, 35). Importantly, the proper understanding and application of these principles and rules depends on how financial information is presented.

Next we outline previous findings pertaining to the main factors that underlie real-world investment decisions: issues concerning how risk information is presented. A vast number of studies have considered the impact of how information is presented, or *framed* (e.g., Kahneman, Tversky, & Slovic, 1982; Kahneman & Tversky, 2000). These experiments are helpful in considering how information might be presented in order for consumers to make rational decisions. A particular important aspect of framing, in the context of real-world financial decision making, is how risk preferences can be influenced not only by the characteristics of each individual product or option, but by how that option relates to other available options. One example of this phenomenon is *prospect relativity* (Stewart, Chater, Stott, & Reimers, 2003). Stewart et al. (2003) found that the set of options from which an option was selected almost completely determined the choice, which suggests that prospects of the form "*p* chance of *x*" are valued relative to one another. They demonstrated this effect in certainty equivalent estimation task (the amount of money for certain that is worth the same to the person as a single chance to play the prospect) and in selection of a risky prospect. Vlaev and Chater (2006) find similar results in a very different context, where people play the strategic Prisoner's Dilemma games, indicating the generality of this effect.

There have been other experiments that have also investigated the effect of the set of available options in decisions under risk. Birnbaum (1992) demonstrated that the skew of the distribution of options offered as certainty equivalents for simple prospects, influences the selection of a certainty equivalent. In particular, prospects were less valued in the positively skewed option set where most values were small, compared to when the options were negatively skewed and hence most values were large. Similar results were obtained by Mellers, Ordóñez, and Birnbaum (1992), who measured participants' attractiveness ratings and buying prices (to obtain the opportunity to play the prospect for real) for a set of simple binary prospects of the form "*p* chance of *x*."

Effects of this type suggest that people's risk preferences are not absolute, but are, to some degree at least, relative to the range of available options (see Stewart, Chater & Brown, 2006, for model of risky choice that assumes relative judgments only).

There is, of course, a huge literature on effects of presentation and framing of information about risk and uncertainty. People tend to be more sensitive to decreases in their wealth than to increases. The disutility of losing £100 is roughly twice the utility of gaining £100 (Kahneman & Tversky, 1979). Moreover, there is a tendency to be *myopic* because frequent evaluations prevent the investor from adopting the most appropriate strategy over a long time horizon, resulting in *myopic loss aversion*. In particular, experimental evidence (e.g. Tversky & Kahneman, 1992, Thaler, Tversky, Kahneman, & Schwartz, 1997) suggests that individuals elect more risky options when a long-term horizon is imposed externally. Also, myopic loss averse investors accept risks more willingly when they evaluate their investments less often. Investors, therefore, seeking the most frequent feedback and more information take the least risks and achieve the lowest returns. Investors also tend to accept more risks when all payoffs increase enough to eliminate losses. In addition, people overweight small probabilities, so if a decision is framed in such a way as to indicate a small probability of

incurring losses, then these small probabilities will loom larger, and will also be additionally magnified by loss aversion (Tversky & Kahneman, 1992).

Some of these 'presentation' effects appear because, instead of having reasonably well articulated values fitting different tasks into the same analytic framework, most individuals have only rather basic and fuzzy preferences (Loomes, 1999). People also tend to devise various rules of thumb for handling the different problems presented to them, drawing on salient characteristics and cues suggested by the nature and framing of the problems; and they then stick with those rules unless and until they produce solutions which jar sufficiently to call for some reassessment (Gigerenzer & Goldstein, 1996). Moreover, the very fuzziness of their underlying preferences may allow a number of different rules of thumb or heuristics devised for a range of different decision tasks to co-exist quite peacefully, without the individuals themselves ever being aware they are doing anything that theorists might regard as inconsistent.

Studies of real financial decision making under risk support this view and demonstrate that employees who elect to take charge of their own investment portfolios generally find the task difficult (Benartzi & Thaler, 2002). Indeed, given the complexity of the problem of choosing an appropriate investment portfolio to fit one's own circumstances and personal risk preferences, it is not that surprising that people tend to follow simple strategies or heuristics. Thus, Benartzi and Thaler (2002) found that when individuals have three choices ranging from low risk to high risk, they found a significant tendency to pick the middle choice. Thus, people viewing choices A, B, and C, will often find B more attractive than C. Yet, those viewing choices B, C, and D, will often argue that C is more attractive than B (Simonson & Tversky, 1992). This illustrates that choices are not rational according to standard economic criteria. When choice problems are hard, people often (sensibly) resort to simple rules of thumb to help them cope.

Other studies have shed light on how people allocate their retirement funds across various investment vehicles (Benartzi & Thaler, 1998, 2001). They find evidence that when an employee is offered a number of funds to choose from in their retirement plan, there is a tendency towards dividing the money evenly among the funds offered. The asset allocation an investor chooses will therefore depend strongly on the array of funds offered in the retirement plan. Thus, in a plan that offered one equity fund and one bond fund, the average allocation is likely to be 50% equities, but if another equity fund were added, the allocation to equities would jump to two thirds. The findings by Benartzi and Thaler (1998, 2001) illustrate that investors have ill-formed preferences about their investments, which again is consistent with the idea that preferences are constructed (Slovic, 1995).

These findings raise the concern that investors do not gain much when they personally select their portfolio. Benartzi and Thaler (2002) corroborated this conclusion in a study that showed that most participants rate their own portfolio (they have chosen for themselves, or customised for them by experts) as less attractive than the portfolio of the median participant.

There are a few conclusions from this earlier research we summarised here. Although improving financial literacy is undoubtedly an important goal, it cannot be relied on to achieve the objective of optimal decision-making. On the other hand, the means by which information is presented to consumers strongly influences the decisions they make. Indeed, the way information about financial risk is presented, would affect how people understand and evaluate their investment opportunities. This would eventually affect their choices. Yet little existing experimental research has focused on people's understanding of financial risk associated with investments relating to retirement pension provision.

Our studies aimed to explore how the general population understand risk in relation to real financial products, and to help provide some suggestions on how to communicate investment risk to consumers of financial products, which is likely to be a crucial issue, in the

light of the ubiquity of framing effects. We chose “saving for retirement” as the subject on which the first study to be based. Retirement investment is also a key area of the financial services industry, and therefore our results could be relevant to professionals and applied researchers. Study 1 investigated people's understanding of financial investment risk related to retirement pension provision. This study explored which dimensions of investment risk are most important and how information about such risks should be presented. Study 2 tested whether the risk presentation that was evaluated as most understandable also prompts more stable risk preferences (over time) in comparison to standard measures of risk aversion. Thus, this second study aimed to substantiate the importance of the findings in the first study.

1. Study 1: Understanding of financial risk

Risk is a complex notion, even in the (practical) finance community where various measures are used like the Sharpe ratio (known also as *reward-to-variability ratio*, Sharpe, 1975), VaR (mean and variance based) (Coombs, 1975), and many other measures of financial risk exist like, for example, *pure risk* based on aspiration criterion and probability of failure (for a review of such concepts see Lopes 1987; Sokolowska & Pohorille, 2000). Even finance theorists are not entirely clear what the underlying risk dimensions are, and they usually examine risk measures for practical application in finance without essential connection to the normative decision theories (Szegö 2002; Artzner, Delbaen, Eber, & Heath, 1999; Luce, 1980; Sarin, 1987).

People’s everyday conception of risk is likely to be even less precise---particularly as risk arises not merely in finance, but also in areas like health, environment, etc. The concept of risk, therefore, will inherit even more conceptual complexity from this very breath of application. People's understanding of financial risk has been examined in several studies.

Slovic (1972) studied investment decisions and discovered that people conceptualise risk is numerous ways, and that variance of returns is not a reliable predictor of risk taking. In particular, Slovic showed that in decision making under uncertainty, people use rules such as minimizing possible below-target return or maximizing possible gain. This finding was corroborated by Gooding's (1975) study of investors' perceptions of the risks and returns of common stocks, which revealed significant differences between professionals and non-professional investors. In addition, Slovic's later research in risk perception discovered various factors that affect risk perception, such as the potential for large or catastrophic losses, unpredictability of outcomes, knowledge or familiarity, and affective or emotional reactions (Slovic, Fischhoff, & Lichtenstein, 1985; Slovic, 1987).

More recent studies of have investigated psychological factors affecting both risk perception and the actual investment decisions. MacGregor, Slovic, Dreman & Berry (2000) showed that imagery (images) and affect influence financial judgment when investors evaluate stocks in different industries. In particular, affective ratings (e.g., good-bad and strong-weak) predicted anticipated industry-sector returns as well as the probability of buying an initial public offering within an industry sector. Olsen (1997) revealed that the perceptions of financial risk of both experts (chartered financial analysts) and non-experts (individual investors actively managing their personal portfolios) is multidimensional and includes four factors: potential for large loss, potential for below-target returns, the feeling of control, and the level of knowledge about an investment. The only difference between the two groups was the sensitivity of non-professional investors to the potential for large loss.

Most of the recent research on risk perception has asked respondents to evaluate potential sources of risk along several characteristics and these responses are analyzed to derive a number of underlying risk dimensions (this methodology is known as the *psychometric paradigm*). MacGregor and Slovic (1999) used this method to study the

relationship between financial judgments and perceived characteristics of investments such as risk, return and return/risk relationship. That study revealed that professional financial advisors conceptualize the risk of various asset types in terms of price and volatility (i.e., as postulated by standard financial theory), but these experts are also affected by contextual (domain-specific) factors characteristic for specific investment class (e.g., whether the investment is mutual fund, blue chip stock, U.S. Savings Bond, foreign bond). Moreover, this study showed that financial advisors include in their risk assessments factors like the stress associated with monitoring the performance of an investment (asset), predictability of an investment's performance, potential loss-of-capital, and perceived adequacy of regulation. Thus, financial advisors appeared to perceive financial risk in multidimensional terms that are similar to those used by lay people in evaluating other risks in life such as health and safety risks (see Slovic, 1987, for research in these domains).

1.1 Aims and objectives

None of the existing research has focused on people's understanding of financial risk associated with investments related to retirement pension provision. Our study aimed to address this question and, in addition, generate suggestions how to communicate risk to (laymen) consumers of financial products. The main focus of this study was to find the most suitable way to present information about investment risk. We also aimed to explore which dimensions of risk are perceived as most important.

1.2. Details of the survey

1.2.1. Participants

There were 56 adult participants – 24 males with average age around 35 (ranging from 19 to 59), and 23 females with average age around 40 (ranging from 19 to 59) while 9 respondents did not identify their gender and age (in the survey we used age brackets instead of asking for respondents' precise age). All respondents were paid £10 for their participation.

1.2.2. Method

This was a questionnaire study with three main sections (the whole questionnaire is presented in Appendix 1). In the first part, following Olsen (1997), we asked the respondents to list those things that first come into their mind when they think about the risk related to the investment in a stakeholder pension plan. That is, what factors (issues) come to mind when they think of what might cause your income in retirement to vary. They had to list the factors and then rank them in the order of importance.

In the second part, following Slovic (1987), we tried to obtain some more detailed quantification also of the "unknown" (i.e., with the perceived level of knowledge about an investment) rather than "dread" aspect of people's perception of the risk of financial products. There were 21 questions (presented in Appendix 1), which are related to different factors that could affect people's perception of the risk of financial products and their retirement investment decisions. For each of question, the respondents were asked to think about the extent to which their decisions might be affected and circle the appropriate number on the scale from 1 (not at all affected) to 7 (very much affected). The "unknown" was described in the various questions as unfamiliarity with the products (e.g., UK vs. foreign stock); lack of trust in the products (e.g., people might not believe in equities because they are unpredictable in general), the product provider (bank or investment fund), the particular company, or the

financial adviser; lack of knowledge about (trust in) the particular industry (e.g., energy, telecom); lack of confidence in the economy and/or markets (systematic risk); and also feeling of control over the course of the investment (e.g., ability to control loss or to change the investment strategy). Our goal was to assess the dimensions on which people fear taking out various financial products, and our conjecture was that fear may relate to factors that are unknown or unfamiliar to them. We could also assess the relative importance of this risk aspect, in relation to the "dread" elements like chance of losing money. These 21 questions were designed with the assistance of a team of professional actuaries and financial advisers who suggested additional risk factors that they observed in their practice to concern investors and members of the public.

In the third section of the questionnaire, which was the main focus of this study, we tried to find the most appropriate way to present information about investment risk. In particular, we asked people to rate on a scale from 1 to 7, different ways risk information about investment in the same financial product (a particular fund) is presented according to three criteria: (a) prefer to see risk information, (b) feel most comfortable with, and (c) is most clear. These three criteria were suggested as essential in communication of risk information by a team of experts in personal financial advice, who were also members of the actuarial profession. Note that the financial product had identical risk return characteristics in all information frames, and the only difference was how information about the risk was presented. This method of manipulating risk framing has not been used before in the context of testing risky financial decision making.

Appendix 1 presents each information frame in the third part of the survey. Question 1 presented risk purely in relational terms on a scale from 1 indicating the least risky investment to 5 indicating the most risky investment (this is the most popular method used by financial advisors, financial service providers, and financial institutions selling investment products);

while Questions 2–11 presented risk as variants on the stochastic forecast theme – as probability for minimum, average, and maximum possible return, potential for below-target returns, etc. Most question use a verbal (words and numbers) description of risk except question 11, in which we added a graphical element in the way financial risk is communicated. Duklan and Martin (2002) argue that such integration of text, numbers, and graphics, is a key principle of effective communication of financial ideas. Duklan and Martin also argue that actuaries should use more often such graphics as a tool for communicating financial concepts effectively to the public.

The instruction at the beginning of the questionnaire in Part III presents the hypothetical financial circumstances related to the individual and the investment: annual salary is £20,000 and the individual saves £2,000 every year until retirement with the goal to achieve retirement income £10,000 in today's money (assuming that this target will be increased each year to cover expected inflation). We projected the retirement income one can expect after 35 years of investment. In order to calculate the projected figures for each question, we assumed lognormal rate of return in the stock market. This projected lognormal distribution was used to calculate the probability of achieving the target income (as in question 6 for example). A consulting team of professional actuaries suggested the basis for the forecasting to be 2.5% for Inflation, 1.5% real return on Low Risk asset (we assume bonds here), 4.5% real return on High Risk asset (assuming stocks), and 15% annual volatility. This distribution of the equities investment is calculated as follows. Assuming a variable annual interest rate with mean μ and standard deviation σ, the expected return on an *n*-year investment is also log normally distributed with mean μ^n and standard deviation $\sigma = \mu^{2n}(((\sigma^2/\mu^2)+1)^{n-1})$.

Note that there are various types of risky assets, like bonds and equities for example, but in reality these various investment vehicles differ mainly in their risk-return

characteristics. Therefore, we simply described the characteristics of these two assets – the High Risk Asset and the Low Risk Asset, rather than labelling them explicitly as bonds and equities.

In summary, in this task we were looking at the 'same' decision, through a number of formats with identical risk return characteristics. Thus, the only difference between the formats was how information about the risk was presented, which has not been used before in testing framing effects on risky financial decision making.

1.3. Results

Table 1 presents the results from the first part of the questionnaire, which is a summarised listing of the issues indicated as most important (ranked first) by 41 respondents (the other 12 did not answer this question). Olsen (1997) used similar methodology.

INSERT TABLE 1 AROUND HERE

As can be seen, responses related to the stock market volatility dominate in importance. The first two categories accounted for 56% of all top rankings and usually included some reference to a market or economic condition that could cause a loss in terms of the value of the investment. Appendix 2 presents a list of the top ranked issues grouped according to the categories presented in Table 1. Issues mentioned only once are not included.

Table 2 presents the results from the third part of the questionnaire, which asked the respondents to evaluate the twenty two aspects (presented as question 1 to 22) of financial risk. The highest score was for the question (risk factor) related to the possibility for very large loss in relation to the amount of money invested (for example, due to large drop in share prices). Slovic (1987) also identified the potential for large or catastrophic losses as a very important qualitative factor contributing to perception of risk. The last column presents the

paired-samples *t*-test of the difference between the total score of each risk factor and the total score of the highest ranking factor (which received 5.70 mean score). We used the paired-samples *t*-test procedure, because it compares the means of two variables for a single group n our study (this test computes the differences between values of the two variables for each case and tests whether the average differs from 0). The top risk factor (related to the possibility for very large loss in relation to the amount of money invested) was rated significantly higher than all other factors and all these differences were statistically significant ($p < .05$) as shown in Table 2. (An α level of .05 was used for all statistical tests in this article, but for informational value we also report the exact *p* value of each test.)

INSERT TABLE 2 AROUND HERE

Another very important risk factor (ranked second) was the feeling of loss of control over the course of the investment. The third issue according to the rank order of importance appears to be the possibility that the investment does not increase in value and as a result the individual might not obtain the desired retirement income. In general, there was not a very substantial difference between the evaluations of the various risk factors – the average responses vary between 3.8 and 5.6. These results indicate that all factors (issues) that were included in the questionnaire were perceived as relatively important determinants of risky financial decision making.

Table 3 presents the average results for each risk frame included in the third part of the questionnaire according the three dimensions for evaluation. In general, the participants found all our risk framings as relatively useful, informative, and suitable---the average ratings were not very dissimilar across the eleven risk framings along the three criteria (for example on *usefulness* the minimum rating is 3.92 while the maximum is 4.92). Question (framing) 4 received the highest rating on average. This framing presented risk as variation between certain minimum and maximum values with some average in between, which is a good

balance between parsimony, informativeness, and clarity in comparison to other highly ranked contenders, like for example questions 1, 7, and 11 (see Appendix 1 for their description). The last column presents the paired-samples *t*-test of the difference between the total mean score of each risk frame and the total score of risk frame 4 (with the highest average score). Frame 4 was ranked significantly higher than all other frames and all these differences were statistically significant as shown in Table 3 ($p < .05$).

INSERT TABLE 3 AROUND HERE

Note that frames 1 and 7 received higher rating than question 4 on how understandable is the risk information. Frame 1 received higher ranking because it is the only frame that does not use numerical information, but at the same time it is the longest and most detailed description of the financial risks associated with the target financial product. On other hand, frame 7 was the shortest description (amongst the eleven frames); and hence this frame was seen as very understandable due to its simplicity. For example, frame 7, which received the highest rating on the Understandable dimension, describes the risk simply as "a 90% chance that you will get back at least the amount of money you put in the fund." These two frames (1 and 7), however, did not score very high on the other two rating dimensions. Obviously, frame 4 struck the best balance within the three rating scales and accumulated the highest total score.

1.4. Discussion

The self-reported risk factors were in line with our expectations concerning people's worries about investment risks, and revealed few surprises. The most frequently reported risks were related to stock market volatility and general economic uncertainty, which was also observed in previous studies like the one by Olsen (1997), who derived similar risks related to

investments in general. The new aspect of our test was to replicate these findings in the context of an investment in a stakeholder pension plan. Thus, similar issues (aspects of risk) were perceived (by consumers) to cause variability of investment returns in general and retirement income in particular.

The second test, which asked people to evaluate the potential factors that could affect people's perception of the risk of financial products providing retirement investment, showed more interesting tendencies. This study demonstrated that the top ranking risk factors were related to the possibility for very large loss of the invested money (similarly to Slovic, 1987), the feeling of loss of control over the course of the investment, and the possibility that your investment does not increase in value so that you do not reach your target retirement income. These results indicate that these issues should be the first to be addressed by financial services providers when dealing with private investors and members of the public in general.

Finally, our third test, which could be seen as the main focus of this study, indicated the most suitable way to present information about investment risk to the consumers of financial products. This test also aimed to suggest the best way to communicate financial risk to laymen consumers of financial products. What was really original in this test was the framing of the risk characteristics of one particular financial product in eleven different ways. We are not aware of another example in the literature, which investigates perception of risk using this method. The information framing that received highest overall rating presented risk as variation between certain minimum and maximum values with an average in between, which is a good balance between parsimonious, informative, and clear way to present risk information. In general, the results from this test showed that on average the participants found most risk framings as relatively useful, informative, and suitable. In order to verify the validity of the ranking, and in particular, to double check whether question 4 was indeed perceived as better (than usual) way to present risk information, we designed an additional

test that pits this frame against well established (in the literature) ways to probe risk preferences. The next section describes this study.

2. Study 2: Stability of risk preferences

This study tested whether the risk framing that received highest ranking in the third part of the first study, also prompts more stable risk preferences over three months testing period in comparison to standard measures of risk aversion discussed in the literature. We expected that the presentation of risk as variation between minimum, mean, and maximum possible returns on investment, would have high temporal stability in comparison to other measures due to its high score on usefulness, comprehensibility, and suitability. Thus, this study aimed to corroborate the importance of the findings in the first study, but also showed that people can have stable risk preferences if we ask the right questions specific to the risk domain.

This second study also tested the stability of various measures of risk aversion. There has been considerable interest in recent years in investigating the structure of human risk preferences for various choice domains like economic, social, environmental, or health risks (Gooding, 1975; Olsen, 1997; Slovic, 1987; Slovic, Fischhoff, & Lichtenstein, 1985). The seminal work of Kahneman and Tversky (1979; Tversky & Kahneman, 1974) also gave birth to the whole new domain of behaviour finance (Thaler, 1993; 1999) and researchers concentrated particularly in studying choice behaviour in various financial activities (e.g., Benartzy & Thaler, 2001, 2002; Read & Loewenstein, 1995). There is extensive evidence that risky decisions of this type are affected by various factors like framing (Tversky & Kahneman, 1981), the procedures used to elicit risk preferences (Tversky, Slovic, & Kahneman, 1990), or whether the risk is described as a gamble or as a mean and variance (Webber, 1997).

This burst of research activities, however, hardly addressed directly the simple questions to what extent our preference for financial risk are stable trait of our 'financial personality' or a by-product of the particular financial situation we are facing each time we make some risky financial decision.

There are two strands of research on measuring risk aversion. Some use either hypothetical questions or experimental gambling data, and most restrict attention to forms of risk in which both gains and losses are possible. Other researchers estimate the risk aversion parameter empirically for individual households using survey data on real financial behaviour like investment in risky assets or insurance purchases. Our study was designed as a survey (questionnaire), in which we used various published in the literature hypothetical measures of risk preferences. These measures have been used before in both experimental and survey based methods.

2.1. Details of the survey

2.1.1. Participants

Eighty-eight respondents were recruited through subject panel in the Warwick University Departments of Psychology (participants who volunteered to participate in our studies on previous tests and agreed to be included in our database for future contacts), and through public advertisements. Each participant was paid £10 for participation in the study. Sixty-nine respondents returned the second survey after three months and the reported results are based on this sample. Fifty-five per cent of these participants were students and 45% were employed. There were 41 female and 28 male participants. The average age was 28.8 (s.d.

12.0), ranging from 18 to 65. The mean age for females was 27.9 (s.d. 10.7) and for males 30.2 (s.d. 13.7).

2.1.2. Method

We used ten different measures of risk aversion, presented in Appendix 3, in order to measure the stability of preferences across three months period. These measures represented the full spectrum of explicit self-report hypothetical measures used in the literature like simple direct questions, abstract gambles, investment decisions, and future salary risks.

2.1.2.1. Questions 1-4 (Direct Risk, Direct Concern, Relative Risk, Relative Concern)

These questions are rather simple and direct measures, because there are results showing that simple intuitive measures of risk preferences could be more powerful predictors of portfolio allocation than sophisticated measures based one economic theory (Kapteyn & Teppa, 2002). Two of these questions measured risk attitudes with the basic questions "How much risk are you prepared to take?" (Direct Risk) or "How much are you concerned about your financial future?" (Direct Concern) and the participants had to answer on a scale from 1 (not at all) to 5 (very much) to what extend they agree with these statements. There were also two questions about how people perceive their level of risk aversion in relation to other people – "Are you more or less willing to take risks than the average person?" (Relative Risk) or "Are you more or less concerned about your financial future than the average person?" (Relative Concern) and the participants had to answer on the following scale: 1 - much less, 2 – less, 3 - the same as the average, 4 – more, and 5 - much more.

2.1.2.2. Question 5 (Income Gamble)

Question 5 is a well-known test by Barsky, Juster, Kimball, and Shapiro (1997), who constructed a measure of risk aversion by asking respondents about their willingness to gamble on lifetime income. By contrast, experiments in the existing literature ask people to gamble over spending or consumption and typically involve stakes that have little impact on lifetime resources. However, a gamble whose outcome is too small to be meaningfully related to consumption should not require a risk premium, on normative grounds, and therefore is not a good measure of economic risk preference. So the principal requirement for a question aimed at measuring risk aversion according to Barsky et al. is that it must involve gambles over lifetime income. In addition, after pre-testing, Barsky et al. concluded that survey respondents would better understand income than consumption lotteries. The three questions in this test, in the first paragraph and then in (a) and (b), separate the respondents into four distinct risk preference categories, depending on the combinations of their answers (see Question 5 in Appendix 3): (1) reject the risk to cut the (family) income by one-third in the first question and also reject the risk in (b) to cut the income by one-fifth (20%); (2) reject the risk for one-third income cut in the first question but accept the possibility for one-fifth cut in (b); (3) accept the possibility for one-third income cut in the first question but reject the one-half cut risk in (a); and (4) accept both possibilities for one-third income cut in the first question and one-half cut in (a). These four categories can be ranked by risk seeking without having to assume a particular functional form for the utility function and Barsky et al. (1997) provide four numerical indices of relative increasing risk seeking corresponding to each category respectively: 0.11, 0.36, 0.68, and 1.61. In the original study by Barsky et al., their measure was significantly correlated with various demographic factors, and it was positively

related to risky behaviors, including smoking, drinking, failing to have insurance, and holding stocks rather than treasury bills.

2.1.2.3. Question 6: Investment

Question 6 is using the risk presentation format that received highest rating in Study 1 (which expected to reveal more stable risk preferences in comparison to the other methods described here). Here again we formulated the question as a long-term saving/investment decision task related to retirement income provision. The participants were given the opportunity to either invest their money safely in bonds, or make a riskier stock market investment, which stand to make more money but might loose some money too. They were asked how much of the pension fund would they invest in safe bonds and how much they would you invest in the risky stock market. A table (see Appendix 3) shows the likely outcomes for different bond/stock mixtures. The question showed the expected retirement income and its variability. The possible variability of the retirement income was explained by referring to the 95% and respectively 5% confidence intervals of the income variability, i.e. maximum and minimum possible values of the income, for which there is 5% chance to be more than the higher or less than the lower value respectively. On each row of the table these two values were placed on the both sides of the average expected retirement income. The confidence intervals were expressed also in verbal terms using the words very likely. For example, the participants were informed that it is very likely (95% chance) that their income will be below the higher value and above the lower value, and that these two values change depending on the proportion of the investment in equities.

In order to derive plausible figures for the various economic variables, we implemented a simple econometric model into a spreadsheets Monte Carlo simulator that

calculates the likely impact of changes in each variable on the other four variables. For example, this model can derive what retirement income can be expected from certain savings, investment risk, and years to retirement (time horizon), or what are the possible potential investment options that could lead to the preferred retirement income. The sort of basis the professional actuaries suggested was 2.5% for Inflation, 1.5% real return on bonds, 4.5% real return on stocks, and 15% annual volatility. The relationship between the annual allocations and the expected returns can be described with two underlying parameters, which are mean (savings) and variability (of future returns). The Monte Carlo simulator allows one to select the annual investment amount and the proportion of ones savings invested in the risky stock market (lognormal rate of return) rather than the bonds. The simulators gives a possible pension one can expect after different years of investment. It is assumed that an annuity that provides 1/14th of the lump sum saved each year is purchased. The distribution of the equities investment is calculated as follows. Assuming a variable annual interest rate with mean μ and standard deviation σ, the expected return on an *n*-year investment is also log normally distributed with mean μ^n and standard deviation

$$\sigma = \mu^{2n}(((\sigma^2/\mu^2)+1)^{n-1}) \quad (1)$$

All projected pension numbers (in pounds) were inflation adjusted, i.e., given in terms of today's money. This adjustment is important when comparing figures for different age groups. We have made this example realistic, by predicting the likely size of a pension from savings of £3000 per year for four different age groups: 18-29 (38 participants), 30-39 (12 participants), 40-49 (11 participants), and 50+ (8 participants). In order to accomplish this scheme, we sent different version of the survey to each of the four different age groups. Thus, every participant received different figures in the table for Question 6 depending on his/her age group (the other nine questions were the same for age groups), which gave realistic figure of possible retirement income at the age of 65 after 45, 35, 25, and 15 years of investment

respectively. The example included in Appendix 3 showed the projected retirement income for the 30 years old age group (i.e., after 35 years of investment).

2.1.2.4. Question 7 (Positive Variance) and Question 8 (Negative Variance)

Questions 7 and 8 test for mean-variance type of risk aversion in the gain and loss domains respectively. Each subject had to select one from among five gambles. As shown in Appendix 3, each gamble had two possible outcomes, each occurring with 50% probability. Gamble 1 had a sure payoff, or loss, of £1600 depending on the treatment. The expected value in the positive version increased by £200 for each additional gamble, and the standard deviation also increased. Here the level of risk is represented as the standard deviation of expected payoff. Participants who were extremely risk averse would sacrifice expected payoff to avoid variance, choosing the sure bet. A moderately risk-averse individual would choose an intermediate bet (Gambles 2–4). However, risk-neutral or risk-seeking person would choose Gamble 5, with an expected return/loss of £2400. Thus, a risk-neutral person will maximize expected payoff by choosing Gamble 5, while a risk-seeking person will choose a higher-risk option even if it involves the same or lower expected payoff, so any risk-seeking person will also choose Gamble 5. This test is taken from the literature where it was used to measure sex differences in attitudes toward financial risk (Eckel & Grossman, 2002). In the original version of the loss framing, some of the gambles are positive and some negative, while in our test we made the gambles to be either all positive (gain domain) or all negative (loss domain). For the purpose of analysis, similarly to Eckel and Grossman (2002), we treated the number of the subjects' gamble choice as a continuous variable. The number of the gamble is an index measure of the (continuous) underlying risk level associated with the gambles. Thus, choices are discrete, but not categorical. Eckel and Grossman (2002) point out that, alternatively, the

analysis could be conducted using the coefficient of variation of the gamble chosen by the participant, which is a monotonic transformation of the gamble number, with results identical to using the gamble number itself.

2.1.2.5. Question 9 (Positive Gambles) and Question 10 (Negative Gambles)

Questions 9 and 10 use a set of standard gambles, which ask people to choose between a save amount and a risky bet (*p* chance of *x*) offering a higher gain with certain probability or nothing. Participants were asked to imagine making choices between playing a gamble to receive an amount of money and taking a smaller amount for sure. Each pair of options was presented as two pie charts. The two regions of the pie chart representing the risky bet indicate the two probabilities for gain versus nothing respectively (see Appendix 3). Such gambles are used to measure risk aversion in most laboratory settings. For example, Shubert, Brown, Gysler, and Brachinger (1999) used similar gambles to test whether women are more risk averse than men in financial decision-making. In our test, we used four payoff magnitudes (£100, £200, £300, and £400) and four probabilities (20%, 40%, 60%, and 80%). Each payoff was combined with each of the four probabilities, thus creating sixteen gambles in total. A sure amount for each of gamble was generated by using Equation 2.

$$y = x\, p^{1/\gamma} \qquad (2)$$

where *y* is the sure amount and the prospect is a "*p* chance of *x*." γ (gamma) describes the curvature of a hypothetical power law utility function, $u(x) = x_{\gamma}$. γ = 1 for a risk-neutral person. Smaller values of γ denote greater risk aversion. For each *x*, four values of γ were used. The values 0.35, 0.50, 0.65, and 0.80 were used to generate sure amounts for the gambles. Thus, the "risky" gambles were generated using the values 0.35 and 0.50, which makes the prospects seem comparatively unattractive. "Safe" gambles were generated using

the values of 0.65 and 0.80. (For the population used in this study, we observed values of γ in this range in an unpublished study from our laboratory. The values of γ were deduced from choices between simple prospects and sure amounts.) The idea here was that a more risk-averse person will tend choose the sure amounts in the "risky" gambles and the prospects in the "safe" gambles, while a more risk seeking person will tend to choose also prospects in the "risky" gambles. Of course, very risk-averse individual will choose only the sure amounts and very risk seeking person would choose only the prospects. The values of γ we used were intended to allow for participants in the middle of the risk-aversion continuum to choose a mixture of sure amounts and risky prospects.

The assignment of values of γ to gambles was such that a given value of γ occurred only once for each probability, and only once for each prospect amount. To map the whole surface of possible combinations between the four levels of probability, prospect amount, and gamma, we needed a set of 64 gambles (4x4x4). This required four different versions of the 16 gambles test (presenting all participants with all 64 gambles would have been too demanding task). In order to accomplish this design, the participants in each age group (discussed in the previous section describing the investment question) were randomly assigned to one of the four versions. Appendix 4 presents the full list of 64 gambles as they were divided in four different subsets. In our test, the indicator of risk aversion was the proportion of risky picks among the sixteen gambles.

2.2. Results

The mean risk taking for each measure in the two tests is reported in Table 4. For the purpose of analysis, we treated the number of the respondents' gamble choice as a continuous variable. The rank number of the answer, or the gamble, is an index measure of the

(continuous) underlying risk level associated with the particular measure (e.g., the gambles in Questions 7 and 8). Choices are discrete but not categorical. For example, for Questions 7 and 8, we could have conducted the alternative analysis using the coefficient of variation of the gamble chosen by the subject, which is a monotonic transformation of the gamble number, with results identical to using the gamble number itself. The means presented in Table 4 indicate more or less risk neutral to risk-averse behaviour. Thus, the Direct Risk measure shows preferences in the middle of the scale, while the Direct Concern measure indicates that people are rather worried about their financial future. Relative Risk and Relative Concern indicate that the participants were as much risk takers and concerned about the financial future as the average person. The Income Gamble shows that the participants were risk-averse (recall that the risk seeking range covers the continuum defined by the coefficients 0.11, 0.36, 0.68, and 1.61). The Investment test suggests risk-neutrality (the underlying choice range is from 1 to 11), while the Positive Variance and Negative Variance tests indicate risk-neutral and risk-averse preferences respectively (choice range is from 1 to 5). Finally, the Positive Gambles test demonstrate risk-averse preferences, while the Negative Gambles indicate risk-seeking preferences (in both the risk preference measure is the proportion of risky picks, which varies from 0 to 1). Note that this risk-seeking behaviour in the domain of losses indicated by the Negative Gambles test conforms to the well-established prospect theory's value function (Kahneman & Tversky, 1979), which describes human risk preferences as risk-averse for gains and risk-seeking for losses.

INSERT TABLE 4 AROUND HERE

Table 5 presents the correlations between the measures in the first test and the second test conducted after three months. We used the Spearman's correlation coefficients because some of the measures were quantitative variables and some were variables with ordered categories (like Questions 1-4 for example). All correlations between the same measures

across time were significant except for the Positive Gambles, but the strongly correlated measures (higher than 0.50) were Direct Concern asking directly how much they worry about their financial future (r = 0.59), Relative Concern asking how much people worry about their financial future in relation to others (r = 0.57), the Income Gamble (r = 0.60), and our Investment test (r = 0.63). The strongest correlation indicating highest risk preference stability was for the investment question, which was even higher than the more normatively justified measures proposed by Barsky et al. (1997) (Income Gamble) and Eckel and Grossman (2002) (r = 0.40 for the Positive Variance test and r = 0.31 for the Negative Variance test).

INSERT TABLE 5 AROUND HERE

Surprisingly the elaborated method for measuring risk preference developed by Barsky at al. (1997) did not show better temporal stability than our investment risk framing and also it did not correlate significantly with other risk measures across time except with the Investment question (r = 0.33). Our investment measure significantly correlated across time with three other measures: Direct Risk (r = 0.25), Relative Risk (r = 0.41), and Positive Gamble (r = 0.36), thus demonstrating better construct validity. Note that the Positive Variance test significantly correlated with four other risk measures: Direct Risk (r = 0.29), Relative Risk (r = 0.33), and Investment (r = 0.38), and Negative Variance (r = 0.32), but its temporal stability was not very high (r = 0.40). Thus, in summary, our investment risk measure demonstrated the best overall performance.

In general, the correlations between the different measures across time (presented in Table 5) are relatively low and only few were statistically significant. Thus, this study showed that although people can have stable preferences over time (if we ask them the right questions), these preferences are very specific to the risk domains and the particular questions.

Table 6 presents the correlations between the ten risk preference measures in the first test only, while Table 7 presents the correlations between the measures in the second test. The measures that have the highest number of significant cross-correlations with other measures in both tests (in other words, have high test-retest validity) are the mean-variance based measures Investment (three and four significant cross-correlations in the first and second test respectively and most notably with Relative Risk and Positive Variance in both tests) and Positive Variance (five and four significant cross-correlations in the first and second test respectively, and with Relative Risk, Investment, and Negative Variance in both tests). This result indicates that one particular frame of presenting information about financial risk, the mean-variance based one, taps much deeper into some genuine underlying risk preferences that could also be detected, in a more or less distorted way, by other tests. This cross-domain correlation suggests that risk preferences measured using mean-variance based measures can be used as an indicator of risky behaviour in other financial domains.

INSERT TABLE 6 AROUND HERE

INSERT TABLE 7 AROUND HERE

Relative Risk correlated significantly with three other measures in both tests (presented in Table 6 and Table 7 respectively): Direct Risk, Investment, and Positive Gambles. This indicates another possible stable measure of risk aversion, which implies that people tend to judge their risk attitudes relative to other people (by doing some sort of social comparison) instead of using some absolute risk scale.

Another significant correlation replicated in both tests was the negative correlation between the Positive Gambles and the Negative Gambles. This result suggests that the participants who were risk-seeking for gains were also risk-averse for losses, which is a behaviour explained by a value function that is steeper for losses (which leads to loss aversion) (see Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) The basic risk-

aversion of gains and risk-seeking for losses comes out of Kahneman and Tversky's prospect theory due to a kink in the value function at the reference point (i.e., the status quo wealth). But it is not clear, of course, why this correlation should occur at the level of the individual---in prospect theory terms, this means that the curvature of the positive and negative parts of the value function are correlated.

Note, however, that the Negative Variance measure demonstrated significant positive correlation with the Positive Variance measure in both tests, which could be due to the very close similarity between the two measures (they were identical except for a few words in the instruction). In these two questions, the participants could easily remember what were their answers and thus try to be consistent; while in the in the Positive and Negative Gambles, it is much harder to remember in how many, out of sixteen seemingly random gambles, one has chosen the risky prospects.

Interestingly, the Barsky et al. (1997) sophisticated and normatively justified test showed very modest performance by correlating significantly with none of other measures in the first test and with only two measures in the second test presented in Table 7 (Investment and Negative Gambles). Barsky et al. reported that their measure was significantly correlated with various risky behaviors, including smoking, drinking, failing to have insurance, and holding stocks. It is yet to be investigated to what degree our investment based measure correlates with such risky behaviours.

2.3. Discussion

Our conclusion is that it is always better to use a multidimensional measure of risk aversion (Grable & Lytton, 1999) by employing various questions; or at least one should use a domain specific mean-variance based measure for risk aversion, because it is much easier to

conceptualise and people seem to naturally represent risk as variability (i.e., risk implies upside potential at the cost of downside potential). The mean-variance based measure comes closer to the way people naturally think about the overall risk in a given activity or situation, instead of simple gambles with probabilities, which is much harder to conceptualise (see Weber, 1997 for a discussion of this issue and how people differ in the extend to which they weigh upside vs. downside potential, which can be even considered as an individual difference characteristic). And if one uses probabilities, then it would be best if intuitive values are used like 50% or 99% for example (like in Questions 7 and 8 here). Note that some theorists also consider risk-return trade-off models more intuitively satisfying than expected utility measures (see again Weber, 1997, for a review). Early risk-return models in finance also equated risk with variance and such formalisation is compatible with quadratic utility function according to Markowitz (1952).

Grable and Lytton (1999) lament the lack of an instrument by which financial advisors can assess the risk preferences of investors and note the reliance of these advisors on demographic characteristics to assess risk attitudes. In this respect, we think that the design of our Investment mean-variance based measure could be used as a reasonable test of risk aversion, which can be used by financial advisors to give people optimal advice. For example, using interactive financial software, one could fix the saved amount and just let the individual to manipulate the risk level and observe the projected effects on the future income/pension (with minimum/downside and maximum/upside potential fixed at 99% probability and the mean being at 50% chance of course). Fixing the downside and upside potential and 99% probability will also indicate to people the maximum “dread” and “catastrophic” potential which according to Slovic (1987) are vital psychological risk dimensions.

3. Conclusions

This article describes two studies of the factors affecting consumers' understanding of financial risk. The first study investigated factors affecting people's perception and comprehension of information about the risks related to retirement investments. First, we asked the respondents to list possible risks related to the investment in a pension plan. Second, we obtained ratings of potential factors that could affect people's perception of the risk of financial products providing retirement investment. In the third section, we asked people to rate eleven different ways risk information about the same financial product is presented. The second study demonstrated that the risk framing that received highest ranking in the third part of the first study, also prompts more stable risk preferences over three months testing period in comparison to standard measures of risk aversion. Thus, the second test substantiated the importance of the findings in the first study, but also showed that people can have relatively stable risk preferences if we ask them the right questions. This result suggests that risk preferences are very specific to the risk domain.

In summary, we revealed the true (multi)dimensionality of risk perception by asking people to generate and reveal all possible factors affecting consumer understanding and evaluation of financial risk. Even though the results from the first study do not focus on a single issue about risk perception, the three different tests reveal the complex and multifaceted nature of this phenomenon. Thus, these tests uncover the main aspects of investment risk perception and show this complex issue from many angles and points of view.

Much of our research appears to be relevant to work currently being undertaken by the Financial Services Authority in United Kingdom, HM Treasury, and industry bodies. In particular, the findings provide insight into how consumers may react to the frequency and means by which information and advice are presented to them. We believe, therefore, it is

important that current policies on financial consumers' savings are reviewed in the light of these research findings.

It is hoped that sufficient interest will lead to more detailed research that might ultimately result in consumers' needs being met more effectively. This can be achieved if financial advisers and product providers have a better understanding of consumers' attitudes to risk, and apply that knowledge by means of more appropriate business processes and communication methods.

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Appendix 1

Perception of Financial Risk Survey

We are researching people's understanding of financial risk associated with investments related to retirement pension provision in Britain. The results from our study will provide us with some suggestions on how to communicate investment risk to consumers of financial products especially with relation to their stakeholder pension plans. The questionnaire is organised in three parts, which will take you around 30 min. to complete. In the first part, we ask you to describe your understanding of financial risk; in the second part, we would like you to evaluate different ways of presenting information about financial risk; and in the third part you have to estimate to what extent your perception of financial risk is affected by various factors.

Part I. How do you understand financial risk?

Imagine that you are considering whether to save for your retirement using a stakeholder pension which provides a number of different investment options and you have to select the one which is most suitable for you. The company managing your stakeholder pension plan will offer a range of different funds. Each fund will hold one or more types of investment, which may include deposits, government bonds, stocks and shares. You need to choose the funds in which your pension plan will be invested, but the insurance company's fund manager will select the individual investments to be held by that fund. For example, you may choose a fund investing in the shares of UK companies, but the fund manager will decide which companies are to be included. Your income in retirement depends on how well these investments perform. Each type of investment is expected to give a different return. When you invest you do not know how each investment will perform, but there are ways in which the expected outcome of different types of investment can be measured. One simple measure is the level of risk associated with each type of investment. The return on higher risk investments is more uncertain – you may do very well or very badly compared to lower risk alternatives and you are likely to see greater fluctuation in the value of your investments over time. On average, however, you should expect high risk investments to provide a higher return over the long term. Lower risk investments will tend to provide lower, more stable returns. You have to consider whether you are prepared to accept a higher degree of risk for your savings or to take a more cautious approach.

In the space below, list those things that first come into your mind when you think about the risk related to the investment of your stakeholder pension plan. That is, what factors come to mind when you think of what might cause your income in retirement to vary. List the factors in the first column and then in the second column rank the in the order of importance. For example if you list five factors, then 1 should be the most important and 5 the least important. Feel free to write as much or as little as you wish (but not anything at all!).

Factor	Importance

more:

Part II. Factors affecting your risk perceptions and financial decisions

The following twenty questions aim to understand to what extent your perception of the risk of financial products affect your retirement investment decisions As in part II, assume you are 30 years old and you are going to retire at 65. You have decided to save £2000 every year until you retire and are thinking about what investments you could make. Listed below are a number of different factors that could affect the decisions you make. For each of them, please think about the extent to which your decisions might be affected and circle the appropriate number on the scale from 1 (not at all affected) to 7 (very much affected).

1. Possibility for very large loss in relation to the amount of money invested (for example, due to large drop in share prices).

Not at all affected						Very much affected
1	2	3	4	5	6	7

2. Unfamiliarity with a type of investment (for example the foreign stock rather than UK stock, or company stocks rather than government bonds).

3. Lack of knowledge about particular investments (for example the investments held and performance of each fund)

4. The unsuitability of particular types of investments (for example some people might not want to invest in shares in principal because they are uncertain).

5. Lack of trust in the particular industry (for example people might believe that telecom or high tech industry is unstable and can crash any time).

6. Lack of trust in the particular company in which you are investing, which might depend on its competitive position, industry type – for example, Microsoft or Enron might be seen as unreliable companies because they have been accused of illegal business conduct.

7. Lack of confidence in the future performance of the economy and/or the stock market. This relates to uncertainty about the growth prospects for the economy or other factors influencing the performance of the stock market, which will affect what your investment is worth.

8. Lack of confidence in the workings of the financial markets (for example arising from concerns over accounting standards).

9. General uncertainty about investment products in general (for example you might feel more comfortable saving in simple products such as deposits or investing in property).

10. Lack of trust in the product provider (the financial services company which sells you the stakeholder pension plan).

11. Lack of trust in the financial adviser who advises you about your savings and investments. (e.g. some people might think that financial advisers may try to sell you products which are not necessarily in your best interests).

12. Feeling of loss of control over the course of the investment (for example, would you know when and be able to change your investments to respond to events affecting financial markets)

13. The worry and anxiety that may be caused if the value of your investment decreases (for example, you can now see daily fluctuations in the value of your investment)

14. The fact that investing for a pension is complex process and something you are not used to doing.

15. Concern as to whether you will lose state benefits to which you would otherwise be entitled if you did not save for your retirement.

16. The possibility that, event if your investment increases in value, it may still not be enough to provide a proper style of living after retirement in case of investment loss.

17. The possibility that your investment does not increase in value so that you do not reach your target retirement income.

18. The fear that you might be making a wrong decision (for example, the investment might not perform well and you would have been better off choosing another investment or not saving at all).

19. The fear that you may not be able to meet the saving commitment of £2000 a year in future years or that you will not be able to access your savings until retirement.

20. The liquidity of your investment – how easily you could get your cash, which is affected by the ability to sell quickly, the degree of investor interest, capital markets trade volume, and so on.

21. Equity or fairness of the risk-benefit distributions. Where there is a risk involved it is much more acceptable if the risk is confined to individuals who have a potential for personal gain from taking the risk. Are you (and your dependants) taking the risk that everybody else takes in order to obtain the expected benefits or others might get away with lesser risk?

22. Likelihood that cost of life (prices) will go extremely high due to high inflation, which will make you savings unable to cover your life needs (in other words, the prices might increase so much so your pension would not be enough to provide you).

Part III. Presentation of financial risk information

Imagine that you are 30 years old and you are going to retire at 65. Here you are offered the opportunity to invest your savings in a fund that will eventually provide you with a retirement pension. This investment fund is characterized as moderately risky because it invests 30% of your savings in Low Risk Assets while the other 70% of your savings are invested in a High Risk Assets offering a higher expected return but with greater uncertainty in the range of outcomes. Note that these figures take into account the possible future inflation. Assume also that your annual salary is £20,000 and you save £2,000 every year until you retire (this is allowing for a contribution from your employer and tax relief on the amount you pay). Let’s presume also that your planned retirement income is £10,000 in today's money (in other words your target will be increased each year to cover expected inflation) before tax. Here there are twelve ways (point 1 to 12 below) in which risk information about this particular fund and your investment could be expressed and we ask you to read them through carefully and at the end we ask you to rate on a scale from 1 to 7, different ways risk information is presented according to three criteria:

- How risk information is most useful for you to make financial decisions related to your retirement pension provision (which means how useful is this risk related information for you in helping you think about your financial future).
- How risk information is most understandable (which means whether you could straightforwardly interpret what the information is telling you about your finances).
- How suitable for you is the proposed fund after risk information is described in these terms.

Here there are 11 ways of describing your retirement investment:

1. Your investment can be rated on a scale from 1 to 5 indicating on overall, how risky is the investments. For example, 1 is least risky and 5 is most risky investment. These ratings of the risky investments (or funds) can also be described in the following way:

    1. Very Cautious – provides steady return with minimal fluctuations.
    2. Cautious – provides steady returns however they will experience some degree of price fluctuations.
    3. Balanced – offers good growth potential, but is subject to average levels of price fluctuations.
    4. Adventurous – returns may be expected to be higher over longer terms but will be subject to greater fluctuations.
    5. Speculative – offers excellent growth potential over the long term but may be subject to very significant (wider) return fluctuations in the shorter term.

According to this scale your investment fund (described at the beginning) can be rated as number 3 or as "Balanced" investment. Note that this information just says that one investment than riskier than another and higher risk is expected to produce higher returns but with bigger variability of these returns. This risk rating does not provide a numerical forecasting of expected future return.

2. The precise amount of your pension is unpredictable, because of possible variation in investment performance, but it is very likely (more than 95% chance, i.e. the 5^{th} percentile) that your retirement income cannot get below certain minimum, which for your fund is £4,153 (so here we show you the minimum possible return).

3. The precise amount of your pension is unpredictable, but if you invest in this fund, then on average (50% chance) you can get more than £9,825 annual retirement income (i.e., what is the median expected pension).

4. The precise amount of your pension is unpredictable, because of possible variation in investment performance, but it is very likely (more than 95% chance) that it will be between certain minimum and maximum values with some average in between. For instance, if you invest in this fund, then it is very likely (95 percent chance) that your annual retirement income will be more than £4,153 and less than £23,248, and on average (50 percent chance) you can get more than £9,825 (thus here we show you minimum, average, and maximum possible returns).

5. When you invest in the fund there is 10% chance getting less than you put in (save). Here we show you the chance of a loss of the accumulated investment so that you get less money back from your pension fund than the amount you paid in.

6. There is 50% chance that you might not get the desired £10,000 annual pension (thus your investment will earn a return below what you expect your target).

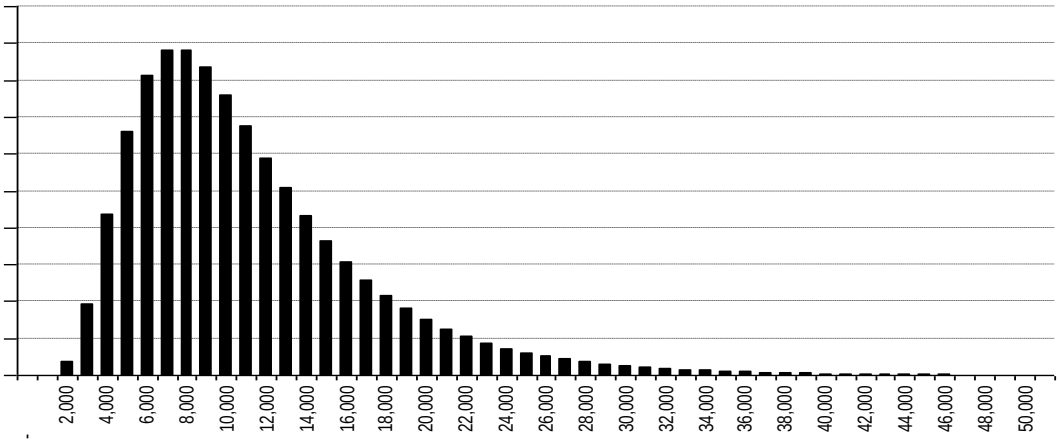
7. There is a 90% chance that you will get back at least the amount of money you put in the fund.

8. If you invest in the fund, then there is relatively high potential (above 87% chance) that you will gain 10% return (interest rate) on your invested savings. Here we present the probability of gain – how likely is it that you will gain certain return on your savings for retirement.

9. If you invest in this fund, there is less than 10% chance that your invested savings will not cover your basic needs after retirement so that you will not be able to provide yourself (with food, health, and shelter, which estimated to cost at least £5,000 per year) after retirement.

10. There is a 48% chance that you will be able to receive £10,000 annual pension – this is the probability that you can get your target retirement income.

11. The graph bellow presents the probability distribution of the possible annual retirement incomes that you can get from your investment in the fund. In particular, each bar on the graph represents a retirement income and how likely is to achieve that income in comparison with the other possible incomes after you retire. In other words, higher the bars are, more likely is to get that income relative to the other incomes.



After you have read statements 1 to 11 (which were for the same investment described at the beginning) use the scales bellow (ranging from 1 to 7) to indicate (by circling one of the numbers on each scale) *how useful* (from 1-not at all useful to 7-very useful) and *how understandable* (from 1-not at all understandable to 7-perfectly understandable) is the risk information presented in each statement. In the third column, rate *how suitable* for you is the proposed fund after risk information is described in these terms (from 1-not at all suitable to 7-perfectly suitable).

Statement	How Useful	How Understandable	How suitable is the fund
1	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
2	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
3	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
4	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
5	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
6	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
8	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
9	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
10	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
11	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7

Appendix 2

Risk factors ranked first by the respondents and grouped according to the factors

Respondent	Written description of the risk	Factor
1	Stock market volatility	Stock market volatility (35%), i.e., related to possibility for large loss
2	Market performance – recent IT revolution has made the stock markets	
3	Much more volatile	
4	Security of investment	
5	Stock market performance	
6	Long term evolution of the financial markets and the stock exchange	
7	Large, global stock market slumps	
8	Fluctuations in the market	
9	Stock market fluctuations	
10	Market performance	
11	Safety of investment (stock volatility?)	
12	Fall in stock market	
13	Stock market crash	
14	Previous company performance	
15	ISAs	
16	Stock market variability and potential crash	
17	Value of my home	Economic uncertainty (22%)
18	Economic environment	
19	Interest rates	
20	General cost of living	
21	World's and specifically UK's economy	
22	Interest rate fluctuations	
23	Recession	
24	UK economy	
25	Overall economic conditions – growth of economy	
26	Ever increasing oil and gas prices affect the cost of living	
27	Amount I invest each month	Saved amount (exposure) (11%)
28	Monthly investment cost	
29	What can I afford to invest as % of income	
30	How high you put in £££. The risk of what you are investing in.	
31	Maintain up standard of living – meet bills	
32	Practices of investment company	Characteristics of the investment company (11%)
33	Capability of the fund manager	
34	Type of fund	
35	Recent pension funds crash	
36	Trust in the fund manager and the investment strategies	
37	Loosing my job	Salary/job uncertainty (7%)
38	Redundancy	
39	Working period / Retirement age	
40	Guarantees of income to live on	Others (15%)
41	To risk about pension is very dangerous for my future	
42	Not really understanding the product, therefore no control over how much I need to invest	
43	I would want to be more involved and in control of high rise investments	
44	Death of partner	
45	Me and my family's health (if in serious health problems, would wish to sell my stock)	
46	War	

Appendix 3

Measures of risk aversion used in the second study

(1) Please indicate here how much risk you are prepared to take on a scale from 1 (not at all – only sure outcomes) to 5 (very much):

Answer: _____

(2) How much are you concerned about your financial future? Indicate on a scale from 1 (not at all) to 5 (very much):

Answer: _____

(3) Are you more or less willing to take risks than the average person?
Indicate using the following scale:
1 - much less
2 - less
3 - the same as the average
4 - more
5 - much more

Answer: _____

(4) Are you more or less concerned about your financial future than the average person?
Indicate using the following scale:
1 - much less
2 - less
3 - the same as the average
4 - more
5 - much more

Answer: _____

(5) Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50–50 chance it will double your (family) income and a 50–50 chance that it will cut your (family) income by a third. Would you take the new job? Answer with YES or NO here:

Answer: _____

If your answer to this question is "yes," then answer only question (a) and if your answer is "no," then answer only question (b).

(**a**) Suppose the chances were 50–50 that it would double your (family) income, and 50–50 that it would cut it in half. Would you still take the new job? Answer with YES or NO here:

Answer: _____

(b) Suppose the chances were 50–50 that it would double your (family) income and 50–50 that it

would cut it by 20 percent. Would you then take the new job? Answer with YES or NO here:

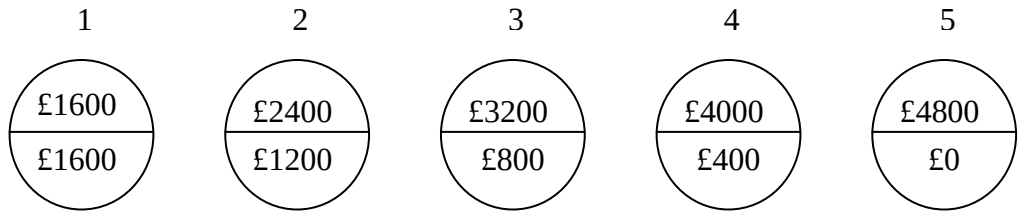
Answer: _____

(6) Imagine you are saving for a pension. You can either invest your money safely in bonds and get a fixed rate or interest, or make a riskier stock market investments which stand to make you more money but might loose you some money too. How much of your pension fund would you invest in safe bonds and how much would you invest in the risky stock market (company shares)? The table below shows the likely outcomes for different bond/stock mixtures. The average column says what you can get on average. You are very unlikely to do worse than the minimum and very unlikely to do better than the maximum (only 5% of the time). We've made this example realistic, by predicting the likely size of a pension from savings of £3000 per year for 35 years. Which mixture would you choose? Please tick one of the rows of the table below:

Tick one	*Bond/Stock mixtures*	*Expected Retirement Income*		
		Minimum	*Average*	*Maximum*
	100% bonds, 0 % stocks	11,000	11,000	11,000
	90% bonds, 10 % stocks	10,750	11,500	13,000
	80% bonds, 20 % stocks	10,500	12,500	15,000
	70% bonds, 30 % stocks	10,250	14,000	17,500
	60% bonds, 40 % stocks	10,000	15,000	20,000
	50% bonds, 50 % stocks	9,750	16,500	23,000
	40% bonds, 60 % stocks	9,500	18,000	26,500
	30% bonds, 70 % stocks	9,000	20,000	31,000
	20% bonds, 80 % stocks	7,500	22,000	36,000
	10% bonds, 90 % stocks	7,000	24,000	42,000
	0% bonds, 100 % stocks	3,500	26,000	49,500

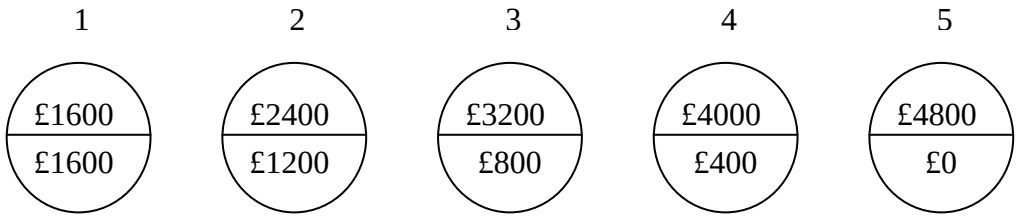
(7) In this decision task, you have to select one from among five gambles. Each gamble has two possible outcomes, each occurring with 50% probability. The five gambles are displayed below as pie charts. The upper and lower region of each pie chart corresponds to a 50% chance of winning the amount written in each region. Imagine that a spinner is attached to the centre of the pie chart. For example, if the imaginary spinner is spun and the pointer lands in the upper region of gamble 1, the outcome would be a win of £1600. If the pointer lands in the lower region, the outcome would also be a win of £1600. Gamble 5 can bring you £4800 if the pointer lands in the upper region or £0 if the pointer lands in the lower region. Please choose which gamble (1 to 5) you'd feel most comfortable to play and circle the corresponding number.

Make this decision as you would do if you had to play these gambles for real.

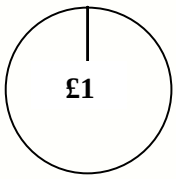
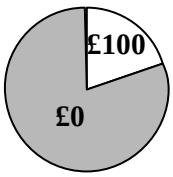
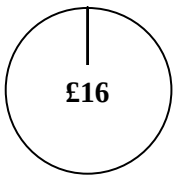
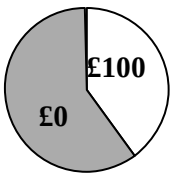
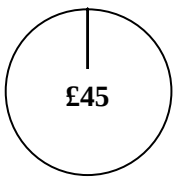
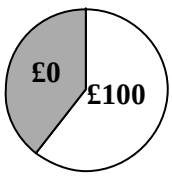
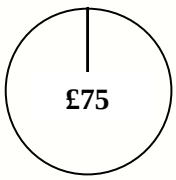
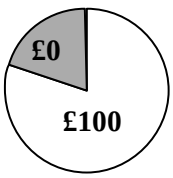


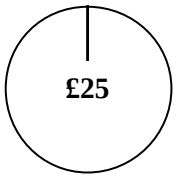
(8) Now imagine that you are confronted with the same gambling situation, but you can only loose money rather than gaining, or in the best possible case you can break even by not loosing. In this decision task, you have to select one from among the same five gambles you saw before. However, the upper and lower region of each pie chart corresponds to a 50% chance of LOOSING the amount written in each region. For example gamble 1 has a sure loss of £1600 because both regions of the pie chart can make you loose £1600 each, while gamble 5 can make you loose £4800 if the pointer lands in the upper region or £0 if the pointer lands in the lower region. Please choose which gamble (1 to 5) you'd feel most comfortable to play and circle the corresponding number. You do not need to be consisted with your previous choices.

Make this decision as you would do if you had to play these gambles for real.



(9) Imagine choosing between "receiving £30 for certain" or a "50% chance of winning £100". Which option would you choose? Here you would have to imagine making choices between playing a gamble to receive an amount of money and taking a smaller amount for sure. Each pair of options is presented as two pie charts. Again, imagine that a spinner is attached to the centre of the pie chart and after spinner is spun you will receive the money written in the region where and the pointer lands. As you can see, the pie charts on the left will always give you a certain amount while the pie charts on the right offer either a bigger amount or zero (the two regions represent the two probabilities). Please circle the pie chart you would prefer (the sure amount or the gamble) in each pair. Note that there are no correct answers and your choice is a matter of personal preference, but try to choose which option (sure amount or a gamble) you would prefer if this choice was made for real.

Sure Amount	Gamble
	
	
	
	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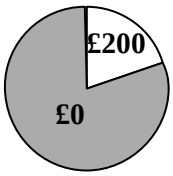
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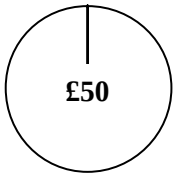
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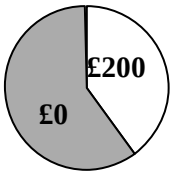
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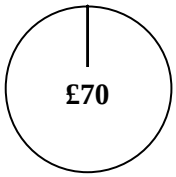
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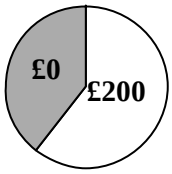
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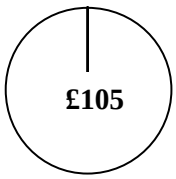
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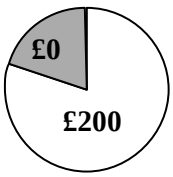
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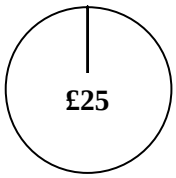
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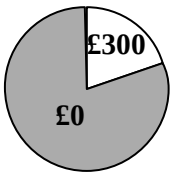
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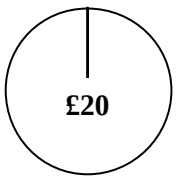
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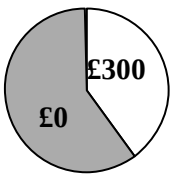
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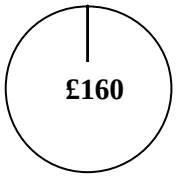
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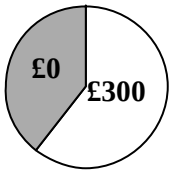
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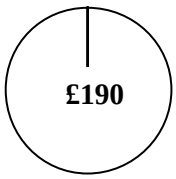
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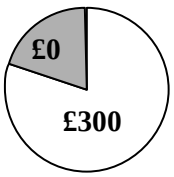
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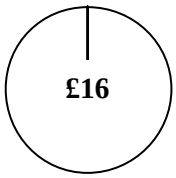
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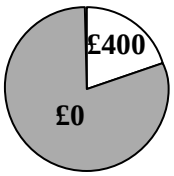
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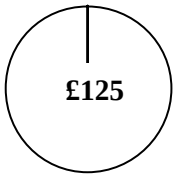
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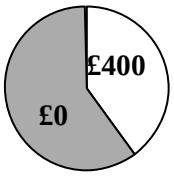
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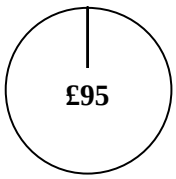
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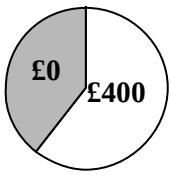
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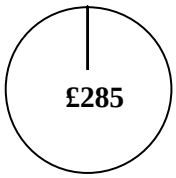
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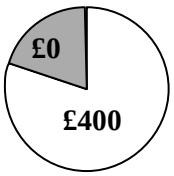
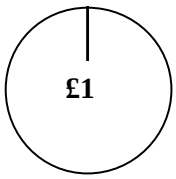
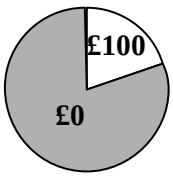
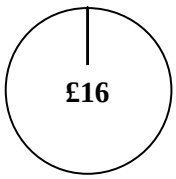
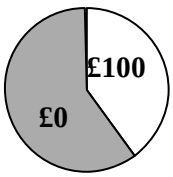
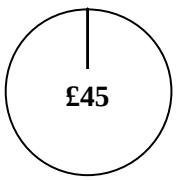
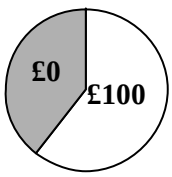
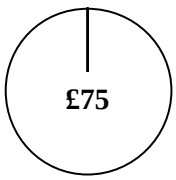
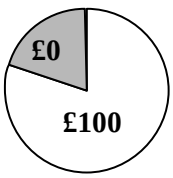
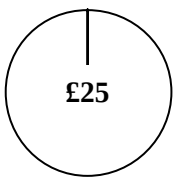
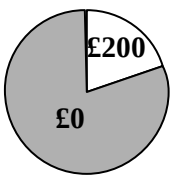
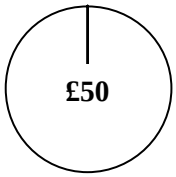

£0
£400

(10) Now imagine choosing between "loosing £30 for certain" or a "50% chance of loosing £100" (and hence there is a 50% chance of not loosing anything). Which option would you choose? Here you would have to imagine making choices between playing a gamble that can make you loose an amount of money and loosing a smaller amount for sure. Each pair of options is again presented as two pie charts. Please circle the pie chart you would prefer (sure loss or loss gamble) in each pair. Note that there are no correct answers and your choice is a matter of personal preference, but try to choose which option (sure loss or gamble) you would prefer if this choice was made for real. You do not need to be consisted with your previous choices.

Sure Loss	Loss Gamble
	
	
	
	
	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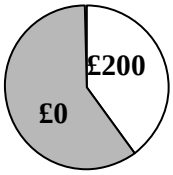
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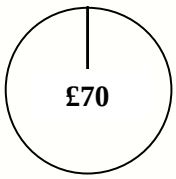
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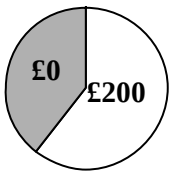
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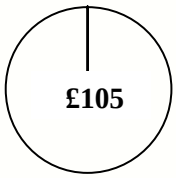
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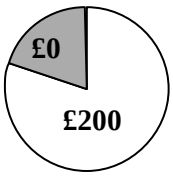
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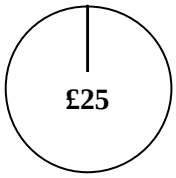
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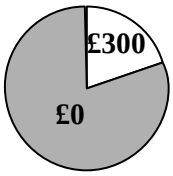
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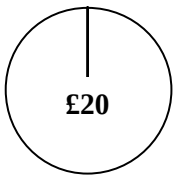
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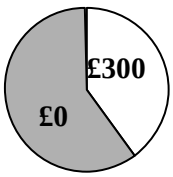
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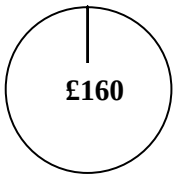
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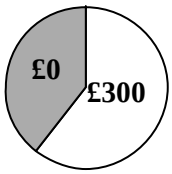
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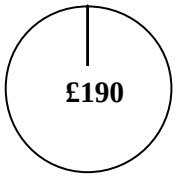
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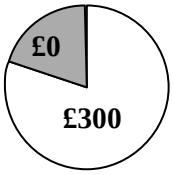
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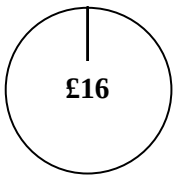
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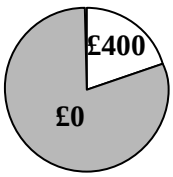
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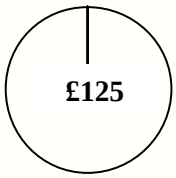
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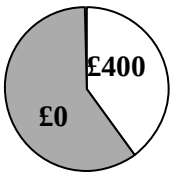
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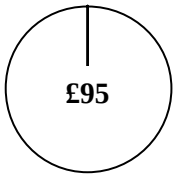
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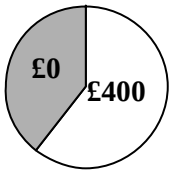
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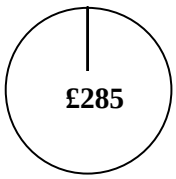
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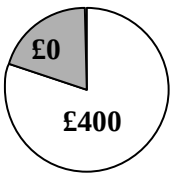
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Appendix 4

List of 64 gambles used for the four versions of Questions 9 and 10 in Study 2

Version	Gamble	*x*	*p*	*y*	γ
1	1	1	0.2	100	0.35
	2	16	0.4	100	0.50
	3	45	0.6	100	0.64
	4	75	0.8	100	0.78
	5	25	0.2	200	0.77
	6	50	0.4	200	0.66
	7	70	0.6	200	0.49
	8	105	0.8	200	0.35
	9	25	0.2	300	0.65
	10	20	0.4	300	0.34
	11	160	0.6	300	0.81
	12	190	0.8	300	0.49
	13	16	0.2	400	0.50
	14	125	0.4	400	0.79
	15	95	0.6	400	0.36
	16	285	0.8	400	0.66
2	1	4	0.2	100	0.50
	2	30	0.4	100	0.76
	3	25	0.6	100	0.37
	4	70	0.8	100	0.63
	5	2	0.2	200	0.35
	6	30	0.4	200	0.48
	7	90	0.6	200	0.64
	8	150	0.8	200	0.78
	9	40	0.2	300	0.80
	10	75	0.4	300	0.66
	11	110	0.6	300	0.51
	12	160	0.8	300	0.35
	13	35	0.2	400	0.66
	14	30	0.4	400	0.35
	15	210	0.6	400	0.79
	16	255	0.8	400	0.50
3	1	8	0.2	100	0.64
	2	7	0.4	100	0.34
	3	55	0.6	100	0.85
	4	65	0.8	100	0.52
	5	8	0.2	200	0.50
	6	65	0.4	200	0.82
	7	45	0.6	200	0.34
	8	140	0.8	200	0.63
	9	3	0.2	300	0.35
	10	50	0.4	300	0.51
	11	135	0.6	300	0.64
	12	225	0.8	300	0.78
	13	55	0.2	400	0.81
	14	100	0.4	400	0.66
	15	145	0.6	400	0.50

	16	210	0.8	400	0.35
4	1	13	0.2	100	0.79
	2	25	0.4	100	0.66
	3	35	0.6	100	0.49
	4	55	0.8	100	0.37
	5	17	0.2	200	0.65
	6	15	0.4	200	0.35
	7	105	0.6	200	0.79
	8	130	0.8	200	0.52
	9	12	0.2	300	0.50
	10	95	0.4	300	0.80
	11	70	0.6	300	0.35
	12	215	0.8	300	0.67
	13	4	0.2	400	0.35
	14	65	0.4	400	0.50
	15	180	0.6	400	0.64
	16	305	0.8	400	0.82

Table 1. Suggested characteristics of investment risk.

Characteristic Category	Percentage of Time Mentioned First
Stock market volatility	35%
Economic uncertainty	22%
Saved amount (exposure)	11%
Characteristics of the investment company	11%
Salary/job uncertainty	7%
Others	15%

Note: The median number of attributes mentioned per respondent was three.

Table 2. Average ratings for the risk factors included in the third part of the questionnaire (the questions are ranked in a descending order according to the mean). The last column presents the paired-samples *t*-test of the difference between the total score of each risk factor and the total score of the highest ranking factor (which received 5.70 mean score).

Risk Factor	Mean	*t*-test (*df* = 55)	
		t	*p*
Possibility for very large loss in relation to the amount of money invested.	5.70 (1.49)	-	-
Feeling of loss of control over the course of the investment.	5.20 (1.31)	2.05	.0456
The possibility that your investment does not increase in value so that you do not reach your target retirement income.	5.20 (1.49)	2.58	.0127
The possibility that your investment may still not be enough to provide a proper style of living after retirement.	5.16 (1.63)	2.04	.0459
Lack of trust in the financial adviser.	5.13 1.36	2.27	.0274
Lack of knowledge about particular investments.	5.07 (1.23)	2.73	.0084
Likelihood that cost of life (prices) will go extremely high due to high inflation, which will make you savings unable to cover your life needs.	5.04 (1.32)	2.62	.0115
Lack of confidence in the future performance of the economy and/or the stock market.	4.95 (1.33)	3.03	.0037
Lack of trust in the product provider.	4.93 (1.54)	2.59	.0121
The fear that you might be making a wrong decision.	4.86 (1.46)	3.20	.0023
Lack of trust in the particular company in which you are investing.	4.66 (1.48)	4.07	.0002
The unsuitability of particular types of investments.	4.64 (1.43)	4.53	.0000
Lack of trust in the particular industry.	4.64 (1.38)	4.61	.0000
The worry and anxiety that may be caused if the value of your investment decreases.	4.63 (1.36)	3.65	.0006
Equity or fairness of the risk-benefit distributions.	4.39 (1.04)	5.62	.0000
Concern as to whether you will lose state benefits to which you would otherwise be entitled if you did not save for your retirement.	4.30 (1.52)	5.34	.0000
Unfamiliarity with a type of investment.	4.29 (1.52)	8.09	.0000
The fact that investing for a pension is complex process and something you are not used to doing.	4.21 (1.66)	5.73	.0000
The liquidity of your investment.	4.04 (1.39)	5.89	.0000
General uncertainty about investment products in general.	3.95 (1.65)	6.29	.0000
The fear that you may not be able to meet the saving commitment of £2000 a year.	3.88 (1.70)	5.81	.0000

Lack of confidence in the workings of the financial markets.	3.79 (1.36)	7.45	.0000

Standard deviations within parentheses.

Table 3. Mean ratings for each risk frame (question) included in the second part of the questionnaire (the questions are ranked in a descending order according to the Total Score). The last column presents the paired-samples *t*-test of the difference between the total mean score of each risk frame and the total score of risk frame 4 (with the highest average score).

Risk Frame	Useful	Understandable	Suitable	Total Score	*t*-test (*df* = 55)	
					t	*p*
4	5.05	5.02	4.43	14.5	-	-
	(1.63)	(1.69)	(1.31)	(4.00)		
7	4.20	5.32	3.66	13.2	2.10	.0405
	(1.66)	(1.69)	(1.59)	(3.75)		
11	4.58	4.91	3.85	13.0	2.19	.0331
	(1.93)	(2.04)	(1.78)	(5.50)		
1	3.84	5.21	3.98	13.0	2.32	.0238
	(1.75)	(1.81)	(1.58)	(4.17)		
9	4.43	4.79	3.52	12.7	2.84	.0063
	(1.71)	(1.41)	(1.49)	(3.41)		
5	4.21	4.91	3.48	12.6	2.92	.0051
	(1.59)	(1.55)	(1.43)	(3.38)		
10	4.40	4.93	3.49	12.5	2.82	.0067
	(1.46)	(1.51)	(1.64)	(3.65)		
3	4.04	4.75	3.68	12.5	3.70	.0005
	(1.39)	(1.50)	(1.36)	(3.29)		
2	4.09	4.71	3.48	12.3	4.17	.0001
	(1.62)	(1.60)	(1.29)	(3.37)		
6	4.02	5.02	3.11	12.1	3.91	.0003
	(1.77)	(1.65)	(1.40)	(3.35)		
8	3.96	4.07	4.02	12.1	3.90	.0003
	(1.55)	(1.32)	(1.21)	(3.57)		

Standard deviations within parentheses.

Table 4. Mean risk levels chosen for each measure (question) in the two tests.

Risk Measure	Test	
	First	Second
Direct Risk	2.83	2.72
	(0.82)	(0.76)
Direct Concern	3.70	3.64
	(1.08)	(1.08)
Relative Risk	2.90	2.88
	(0.86)	(0.87)
Relative Concern	3.16	3.12
	(0.88)	(0.92)
Income Gamble	0.53	0.55
	(0.45)	(0.44)
Investment	5.49	5.25
	(1.88)	(1.93)
Positive Variance	2.55	2.58
	(1.09)	(1.01)
Negative Variance	2.09	2.04
	(1.25)	(1.18)
Positive Gambles	0.39	0.42
	(0.26)	(0.26)
Negative Gambles	0.70	0.65
	(0.29)	(0.29)

Standard deviations within parentheses.

Table 5. Spearman's rho correlations between the first test and the second test conducted after three months (N = 69).

	Second Test									
First Test	Direct Risk	Direct Concern	Relative Risk	Relative Concern	Income Gamble	Investment	Positive Variance	Negative Variance	Positive Gambles	Negative Gambles
Direct Risk	**.28***	-.13	.30*	-.06	.10	.23	.19	.00	-.12	-.07
Direct Concern	-.07	**.59****	.03	.49**	.15	-.13	-.09	-.01	-.07	-.02
Relative Risk	.43**	.05	**.49****	.08	.06	.21	.35**	.14	-.03	-.26*
Relative Concern	-.21	.45**	.02	**.57****	.06	-.01	.02	.10	.02	.05
Income Gamble	.20	.20	.23	-.01	**.60****	.33**	.17	.18	.17	-.20
Investment	.25*	.15	.41**	-.15	.09	**.63****	.36**	.08	.07	-.19
Positive Variance	.29*	-.08	.33**	-.21	.20	.38**	**.40****	.32**	-.17	-.06
Negative Variance	.22	-.12	.12	-.14	.02	.06	.10	**.31****	.00	-.08
Positive Gambles	-.04	.07	-.35**	-.07	.13	-.26*	-.32**	-.19	**.20**	.06
Negative Gambles	-.22	-.26*	.02	-.15	-.16	.08	.24*	-.03	-.15	**.33****

Correlation is significant at the 0.05 level (2-tailed).
Correlation is significant at the 0.01 level (2-tailed).

Table 6. Spearman's rho correlations between the measures used in the first test (N = 69).

	First Test									
First Test	Direct Risk	Direct Concern	Relative Risk	Relative Concern	Income Gamble	Investment	Positive Variance	Negative Variance	Positive Gambles	Negative Gambles
Direct Risk	–									
Direct Concern	-.09	–								
Relative Risk	.58**	.02	–							
Relative Concern	-.05	.58**	-.15	–						
Income Gamble	.23	-.01	.12	-.01	–					
Investment	.15	.01	.33**	-.01	.14	–				
Positive Variance	.46**	-.20	.34**	-.19	.17	.28*	–			
Negative Variance	.07	-.20	.13	-.11	-.03	-.01	.25*	–		
Positive Gambles	-.12	.02	-.13	-.01	-.05	-.35**	-.33**	-.02	–	
Negative Gambles	.00	-.16	-.10	.01	-.10	.12	.10	-.18	-.43**	–

Correlation is significant at the 0.05 level (2-tailed).
Correlation is significant at the 0.01 level (2-tailed).

Table 7. Spearman's rho correlations between the measures used in the second test conducted after three months (N = 69).

	Second Test									
Second Test	Direct Risk	Direct Concern	Relative Risk	Relative Concern	Income Gamble	Investment	Positive Variance	Negative Variance	Positive Gambles	Negative Gambles
Direct Risk	–									
Direct Concern	.06	–								
Relative Risk	.55**	.11	–							
Relative Concern	-.12	.43**	.04	–						
Income Gamble	.18	.18	.16	.01	–					
Investment	.39**	.10	.51**	-.20	.25*	–				
Positive Variance	.18	.04	.39**	-.02	.01	.31*	–			
Negative Variance	.16	.16	.14	.02	.14	.18	.29*	–		
Positive Gambles	-.13	.04	-.03	-.17	.18	.04	.02	.18	–	
Negative Gambles	-.08	.00	-.22	-.01	-.25*	.06	-.33**	-.16	-.39**	–

Correlation is significant at the 0.05 level (2-tailed).
Correlation is significant at the 0.01 level (2-tailed).