Available online at www.sciencedirect.com
ScienceDirect
Journal of Economic Psychology 28 (2007) 31–52
JOURNAL OF Economic Psychology
www.elsevier.com/locate/joep

Framing effects and risk perception: The effect of prior performance presentation format on investment fund choice

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Received 22 April 2005; received in revised form 20 January 2006; accepted 26 January 2006
Available online 22 June 2006

Abstract

Many individuals find it difficult to make decisions about long-term saving e.g. towards retirement. Financial regulators are concerned that providers of financial services can 'cherry pick' past performance information and present this selectively in their promotional materials. However, although prior research shows that past investment performance is generally not useful to retail investors in predicting future returns, these consumers continue to place emphasis on this information in their investment decisions. Because graphical information can be displayed selectively in a self-serving manner, it is important to test for any effect of prior performance presentation format on investor judgements. In this study, we use actual past performance charts in a controlled experiment to investigate whether (i) the format in which information is provided, and (ii) the timescale of the information provided, affects the investment fund choice of ordinary individuals. We find evidence that presenting past information in terms of fund values or percent yields significantly affects investment fund preference and perceptions of risk and return, but that the timescale of past performance information has no such impact. We discuss our results in the light of prior behavioral finance research and suggest policy implications for regulators.

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doi:10.1016/j.joep.2006.01.003

JEL classification: C93; D91; G11

PsycINFO classification: 3920

Keywords: Investment; Behavioral finance; Charts; Framing; Prior performance

1. Introduction

Individuals frequently find it difficult to make judgements and decisions on long-term saving (Clark-Murphy & Soutar, 2004). This is understandable given the complexity and breadth of financial products available. Coupled with various scandals over the mis-selling of financial products (e.g. personal pensions and endowment mortgages in the UK) it is not surprising that one feature that individual investors closely examine is the information on prior performance that is provided in advertisements and promotional materials.

Finance research conducted in the US and the UK over the last 30 years (e.g. Brown & Goetzman, 1995; Carhart, 1997; Fama, 1970; Rhodes, 2000) generally concludes that prior performance information does not necessarily predict returns in the future. But if fund managers can point to successful past performance, then poorly informed potential investors may be persuaded through advertising to invest in these funds. Regulators of the market such as the Financial Services Authority (FSA) in the UK and the US Securities and Exchange Commission may require that advertisements explicitly state that past performance is not an indication of future performance, but whether this is as salient as an impressive chart of past performance, is another issue.

This study should be viewed in the context of the worldwide trend towards more individual involvement in the investment decisions of long-term savings plans, either in participant-directed defined contribution savings plans (e.g. the 401(k) and 403(b) plans in the USA) or in 'stakeholder' investment products as in the United Kingdom. The underlying rationale for such a trend may be to provide individuals with more choice since expanding an individual's choice set should not make the rational consumer worse-off (Benartzi & Thaler, 2002), or may be motivated by a desire to reduce the transactions cost involved in long-term savings by reducing reliance on expensive and possibly biased financial advice (Sandler, 2002). Furthermore demographic changes and the worsening dependency ratio have forced governments to reduce reliance on 'pay as you go' state pension schemes and to encourage individuals to take more responsibility for their future. Ordinary individuals must therefore make adequate provision for retirement through long-term saving out of disposable income, and also take more responsibility for investment decisions. However the available evidence suggests that individuals often make insufficient provision for their retirement, find it difficult to make decisions concerning long-term saving, and are easily influenced in these decisions (Benartzi & Thaler, 2001, 2002; Mitchell & Utkus, 2004; Sandler, 2002). Thus placing more responsibility on inexpert and ill-informed individuals is likely to mean that their choice of investment funds will be influenced by the format of past performance charts.

This paper extends prior work on individuals who have invested directly in the stock market (Anderson & Settle, 1996; Clark-Murphy & Soutar, 2004) by drawing on the extant literature on impression management (Bettman & Weitz, 1983). The paper describes a 2×2

repeated measures experiment where the factors are (1) presentation format (fund value vs. % yield) which is varied within-subjects and (2) time horizon (short vs. long) that is varied between-subjects. The experimental materials are based on past actual fund performance, and takes advantage of a natural experiment afforded by the recovery in worldwide equity prices in 2003. The results show that presenting past information in terms of fund values (based on an index) or percent returns or yields significantly affects the fund preference and risk perceptions of individual retail investors. The remainder of this paper contains (1) a discussion of relevant prior research and the experimental predictions, (2) a description of the experimental design, procedures and variables, (3) the results, (4) a discussion of the findings and (5) conclusions, implications and limitations.

2. Prior literature

2.1. Investors use of prior performance data

Seminal work by Tversky and Kahneman (1981) has shown that individuals exhibit a number of heuristics or decision-making 'shortcuts' and biases in making decisions (Slovic, 2000). More recently it has been demonstrated that these effects extend to the area of saving and individual finance decisions (e.g. Benartzi & Thaler, 2001, 2002). Goodman (2004) suggests that consumers don't have the time, inclination or aptitude for finance, while at the same time they worry extensively about their financial welfare and its management. Individual perceptions of risk are clearly relevant in making investment fund choices (Diacon & Ennew, 2001; Jordan & Kaas, 2002; Wärneryd, 2001). A comprehensive review of the lessons from behavioral finance research can be found in Mitchell and Utkus (2004).

In terms of prior performance data, two questions arise. The first is whether persistent investment fund performance exists? (i.e. can a fund manager consistently outperform his/her peers?). The second question, notwithstanding the answer to the first, is whether retail investors rely on past fund performance data? If they do rely on such data, this suggests that prior performance data can, or will, be managed to create a favourable impression, and two variables likely to be relevant are time horizon effects and the presentation of fund choices (Anderson & Settle, 1996; Thaler & Benartzi, 1999).

In terms of the first question, Brown and Goetzman (1995) suggest that most persistence relates to poor fund performance. More recently, Carhart (1997) attributes one year persistence in mutual (unit trust) fund performance to luck and there is insufficient persistence of good performance to actually benefit investors. In the UK, Rhodes (2000) and Sandler (2002) conclude that there is no persistence of relative performance that retail investors can usefully rely upon in choosing investment funds. Of course, the findings that past performance tells the investor little about the future apply only to one characteristic of performance – the expected trend in return or yield. In contrast, past performance charts may be able to convey valuable information about other factors of performance including volatility, seasonality, and the risk of adverse movements. Mitchell and Utkus (2004) attribute many investors' predilection for past performance to behavioral heuristics such as representativeness and availability: patterns suggesting superior performance are constructed from small samples drawn from skill or luck. Furthermore the pervasiveness of past performance data leads to an inevitable reliance on past performance, despite the legal caveats, and may also involve an anchoring effect on any salient 'high' or 'low' points on the chart (Mussweiler & Schneller, 2003; Nelson, 2005).

Key research on the framing effects of past performance information is reported by Thaler and Benartzi (1999) who varied the time horizon of past performance between one year and 30 years. They found that participants who were showed different holding periods made quite different investment decisions in terms of the proportion of a retirement fund devoted to equities.

The UK Financial Services Authority (FSA), cognisant of the research evidence just outlined, published three consultation papers (FSA, 2002, 2003a, 2003b) that proposed changes to reduce the emphasis given to past performance, strengthening warnings and suggested standardised information be included in all financial promotions containing past performance information.

There was however more concern over the use of monetary values in promotions aimed at the mass market. From their own consumer research in the UK, the FSA suggests that monetary values can have a misleading impact on the expectations, understanding and behavior of retail investors. Thus their preference was for information to be presented in the form of discrete annual yields, although following significant concerns from industry, the initial guidance on which they consulted was not implemented (FSA, 2003c). Instead, in June 2004 the FSA introduced rules which specified that, where past performance information is used in advertisements, it must be accompanied by standardised data, in a tabular form, showing discrete annual percentage returns for the previous five years if available. All past performance information must now be qualified with a statement that past performance should not be seen as an indication of future performance (FSA, 2004a). The new rules do not prohibit firms from illustrating past performance in other ways (including charts), although the additional information should not have undue prominence.

In making these recommendations, the regulators have been concerned to ensure that investment managers do not frame information on prior performance in order to affect an individual's inference about future returns. However there has been little research on how prior performance information can be framed to influence individual judgments about risk – and yet it is these risk perceptions (as well as perceived future returns) which affect fund choice and savings decisions.

2.2. Presentational impression management and framing

There is a long established literature on how companies use techniques to present information in a self-serving manner (Bettman & Weitz, 1983). Interestingly, the discretionary choices of graphing corporate accounting information are not subject to strict auditing standards in the US or in the UK (Beattie & Jones, 2000b; Steinbart, 1989). Thus in annual reports companies may select graphs that exhibit measurement distortion. Beattie and Jones (2000a, p. 161) state that:

> 'the most frequently occurring cause of measurement distortion in annual reports is when a graph's axes are correctly drawn, but misrepresent the underlying data. Alternatively, measurement distortion can occur through graphical devices such as a non-zero axis or a broken axis, which cause the rate of change in trend lines to appear greater than is actually warranted.'

Beattie and Jones (2000a) document that financial graphs are often used selectively and graphical formats can exhibit measurement distortion suggesting a more favourable view of financial performance results than is actually warranted.

Impression management through the manipulation of financial information via presentation format relates to the concept of framing information found in the psychology literature. This is because numerous studies have found differences in attitudes and behavior based on framed information and, as with presentation format, information can be framed to be self-serving to the information provider. However, framing means different things to different people and, for example, Druckman (2001a) lists seven different definitions used by various scholars. Commonly, framing experiments treat the critical information in either a positive or negative light, and Levin, Schneider, and Gaeth (1998, p. 150) note that these are "often treated as a relatively homogeneous set of phenomena explained by a single theory, namely prospect theory". Since the development of prospect theory (Kahneman & Tversky, 1979), documenting framing effects has become something of a vogue, and Kuhberger's (1998) meta-analysis is based on a data pool of 136 empirical papers with a total of nearly 30,000 participants.

As the popularity of studies has increased, there have been differences in the decision scenarios and decision frames being manipulated and Levin et al. (1998) respond to the apparent confusion in the literature with a proposed typology of three different kinds of framing effects. The first they term *risky choice framing*. In this type, the outcomes of a decision choice involve options with different risk levels (e.g. a sure thing option vs. a risky option – with both framed either positively or negatively). This type of risky framing manipulation has been shown to affect risk preferences repeatedly ever since the original Asian disease problem posed by Tversky and Kahneman (1981). A further category is termed *goal framing* by Levin et al. (1998). This is where the impact of a persuasive communication has been shown to depend on whether the original message stresses the positive consequences of performing the behavior or the negative consequences of not performing the behavior. The distinguishing feature of goal framing is that both frames promote the same end-behavior. The issue is whether one frame is more persuasive than the other.

The final category described by Levin et al. (1998) and the one of most interest to us is *attribute framing*. This simple case of framing is where a single attribute is framed (as positive or negative) with the framing affecting item evaluation. This is used frequently in marketing, where consumer perceptions of quality depend on the framing manipulation e.g. beef described as 75% lean vs. 25% fat. We believe that attribute framing and the literature on graphical presentation format choice suggest that a type of 'visual framing' can occur, particularly as Mussweiler and Schneller (2003) and Clark-Murphy and Soutar (2004) report that individual investors appear to have a strong preference for stock whose prices have been rising. Visual framing could thus be empirically tested in an experiment to document whether investment decisions are affected where the same underlying data is presented in alternative presentation formats.

2.3. Experimental predictions

Based on the prior literature on retail investors' use of prior performance data and visual framing (incorporating the literature on attribute framing and presentational impression management), we hypothesize that:

H1: Subjects will make different investment fund decisions based on the format of prior performance information shown to them.

H2: Subjects have different perceptions of investment risk based on the format of prior performance information shown to them.
H3: Subjects will make different investment fund decisions based on the timescale of prior performance information shown to them.
H4: Subjects have different perceptions of investment risk based on the timescale of prior performance information shown to them.

3. Methodology and sample

3.1. Method and subjects

A mail field experiment represents a trade-off of potential strengths and weaknesses. As subjects are not supervised, it is possible that some subjects do not follow instructions. Further, mail questionnaires are subject to non-response bias. On the other hand, a mail experiment provides a larger number of potential subjects with more subject heterogeneity.

Our responses were obtained by including two pages in the 8-page quarterly Financial Well-being Survey distributed in April 2004 by the International Institute of Banking and Financial Services (IIBFS) at the University of Leeds. Each year the IIBFS mails a nationally representative sample of 6000 individuals chosen from the United Kingdom Electoral Roll. Responses are used to build up a panel of people who are mailed follow-up surveys on a quarterly basis. The April 2004 survey was one such follow-up, and was sent to a panel of 1325 ordinary individuals throughout the United Kingdom whose details were already on the IIBFS mailing list because they had responded to a survey of registered electors sometime in the preceding 12 months. Of the 1325 questionnaires distributed, allocated randomly into four treatment groups as described in Table 1 below, 292 usable responses to our questions were returned representing a response rate of 22%. Approximately two-thirds of the sample was female and the mean age was 52.4 years.

3.2. Research design and procedures

The experiment used a 2×2 repeated-measures design. The first independent variable was presentation format (fund value vs. % yield) which was varied within-subjects. The second independent variable was the time horizon of the prior performance chart – either a 'long' or 'short' timescale – which was varied between-subjects. The short (long) timescales were respectively set at 12 (45) months running up to 26 March 2004. The interesting aspect about these timescales is that they show very different apparent past performance

Table 1
Summary of research design: format, fund and timescale combinations

Treatment group no.	Data shown using: fund value charts		Data shown using: % yield bar charts	
	FTSE tracker	Fixed interest	FTSE tracker	Fixed interest
1	Long (A)	Short (B)	Long (F)	Short (E)
2	Long (A)	Long (D)	Long (F)	Long (H)
3	Short (C)	Short (B)	Short (G)	Short (E)
4	Short (C)	Long (D)	Short (G)	Long (H)

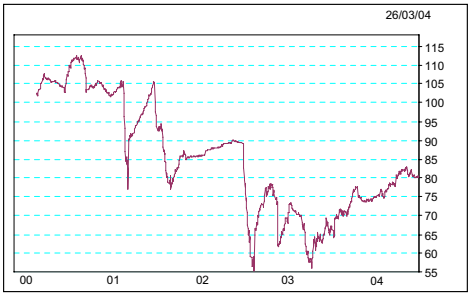
Fund code letters in ( ).

trends. In the case of the equities (which were represented by a FTSE tracker fund, following the Financial Times Stock Exchange 100 index), market values had been falling since mid-2000 and reached a nadir in April 2003. Thus the market had fallen considerably over the previous 45 months (with negative annual yields up to April 2003), but had recovered over the 12 months to 26 March 2004 (with positive annual yields). Chart 1 shows past performance in terms of the index of fund values and Chart 2 shows the same performance in terms of an annual percentage yield reported quarterly: for 45-month (labelled as Funds 'A' and 'F' respectively) and 12-month timescale windows (labelled as Funds 'C' and 'G' respectively). Clearly the different timescales frame equity performance very differently.

In the case of the fixed interest fund, the 45-month past performance window shows a consistent upward trend in fund values (labelled Fund 'D') and positive annual yields (Fund 'H'), while the 12-month performance window (Fund 'B' for fund value and Fund 'E' for % yield) shows no trend, but considerable apparent volatility. These are illustrated in Charts 3 and 4.

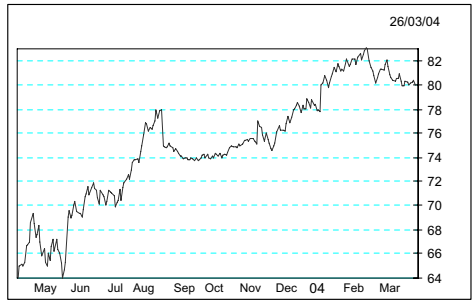
Each respondent was asked to read a brief vignette concerning a friend who had requested their advice. Respondents were told that their friend had already decided to

Fund A (FTSE Tracker Fund): This fund is invested in stocks and shares, and follows the FTSE 100 index.



Source: from FT.com (45 months)

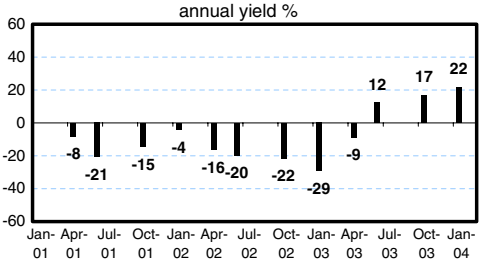
Fund C (FTSE Tracker Fund): This fund is invested in stocks and shares, and follows the FTSE 100 index.



Source: from FT.com (12 months)

Chart 1. Past performance charts (based on an index of fund values) for FTSE 100 tracker fund index up to 26 March 2004 for two timescales: 'Fund A' Long (45 months) and 'Fund C' Short (12 months).

Fund F (FTSE Tracker Fund): This fund is invested in stocks and shares, and follows the FTSE 100 index.



Fund G (FTSE Tracker Fund): This fund is invested in stocks and shares, and follows the FTSE 100 index.

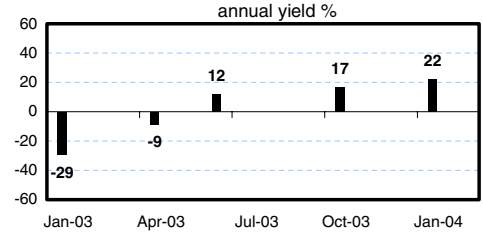
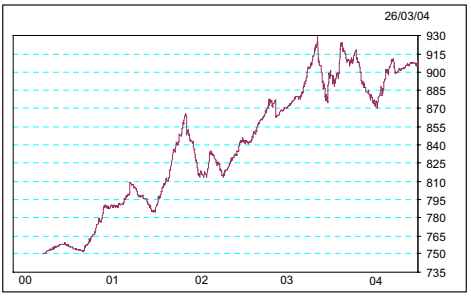


Chart 2. Past performance charts (based on annual % yield) for FTSE 100 tracker fund index up to 26 March 2004 for two timescales: 'Fund F' Long (45 months) and 'Fund G' Short (12 months).

Fund D (Fixed Interest Fund): This fund is invested in fixed interest securities. Investors earn interest and capital is secure.



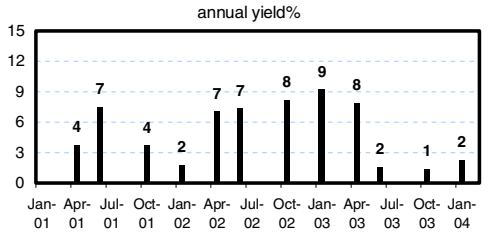
Source: from FT.com (45 months)

Fund B (Fixed Interest Fund): This fund is invested in fixed interest securities. Investors earn interest and capital is secure.

Source: from FT.com (12 months)

Chart 3. Past performance charts (based on an index of fund value) for a fixed interest fund, to 26 March 2004 for two timescales: 'Fund D' Long (45 months) and 'Fund B' Short (12 months).

Fund H (Fixed Interest Fund): This fund is invested in fixed interest securities. Investors earn interest and capital is secure



Fund E (Fixed Interest Fund): This fund is invested in fixed interest securities. Investors earn interest and capital is secure

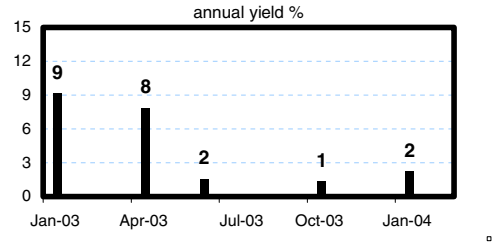


Chart 4. Past performance charts (based on annual % yield) for a fixed interest fund, to 26 March 2004 for two timescales: 'Fund H' Long (45 months) and 'Fund E' Short (12 months).

undertake a programme of regular saving, but wanted advice on the choice between a fixed interest and an equity fund. Respondents were shown a pair of charts (for FTSE tracker and fixed interest funds) side-by-side on the same page, where past performance was presented in terms of an index of fund values with alternative timescale combinations. This resulted in four alternative treatments labelled Funds A–D, as shown in Table 1.

A key objective of the research was to examine whether the actual format of the fund's prior performance chart affects investment fund choice. So respondents were asked to repeat the exercise where the past performance in the two side-by-side charts was represented instead by % yield bar charts (which appeared on the following page of the questionnaire) using the same timescale combination as the pair of fund value charts. Respondents were not told that this information was from the same FTSE tracker and fixed interest funds as in the fund value charts, and the funds were assigned different code letters (as described in Table 1). This resulted in another four alternative treatments labelled Funds E–H, as shown in Table 1. The wording of the two vignettes is provided in Appendix A.

Note that the Fund Value Charts (Funds A through D) show the value of an investment made at the beginning of the time horizon (i.e. 12 or 45 months before) on a daily basis. These were downloaded from www.ft.com using fund performance data from Prudential

plc, a leading UK insurance and pensions provider. For the % Yield charts (Funds E through H in Table 1), the *same* basic information is shown using bar charts of percentage annual yields given quarterly.

The FTSE tracker fund data relate to the Prudential Pension FTSE 100 Tracker Series A Pens (SBFTSP): *Long series*: values (A), %pa bar chart (F); *Short series*: values (C), %pa bar chart (G). The fixed interest fund data relate to the Prudential Pensions Fixed Interest Pens Acc (SBEFIA from www.ft.com): *Long series*: values (D), %pa bar chart (H); *Short series*: values (B), %pa bar chart (E). The source was acknowledged at the base of all charts.

3.3. Dependent and measured variables

Respondents were asked the same seven attitude questions (using a seven point Likert scale) about the perceived risk for each of the funds presented in the questionnaire. These are outlined in Appendix B and deal with the three main types of investor risk perceptions identified in Diacon and Ennew (2001): mistrust (i.e. Question 2: the risk of biased selling information, and Question 6: the trustworthiness of people who sell/manage such funds); downside risk (i.e. Question 3: serious consequences, and Question 4: risk of losing all money); and volatility (i.e. Question 1: how much uncertainty, and Question 5: risk of value going down as well as up). These categories of perceived risk are virtually identical to the three types of risk (namely prudential risk, capital risk, and performance risk respectively) highlighted in consumer research undertaken on behalf of the Financial Services Authority in June 2002 (FSA, 2004b). Respondents were also asked about their perception of the fund's yield in comparison to the interest earned on a low-risk savings account (Question 7).

Subjects then answered the primary dependent variable (Question 8) which was whether they would recommend their friend to invest in either the FTSE tracker fund or the fixed interest fund as a suitable means of investing for her retirement. Three subsidiary questions then asked the maximum amount that the friend should pay for advice from a qualified financial adviser, is it easy to understand the performance charts, and whether information on past performance is helpful in making investment decisions.

3.4. Statistical tests

Tests for differences in risk perceptions and the value of prior performance information are undertaken using repeated measures analysis of variance, where the standard null hypothesis is that mean scores are equal. Repeated measures ANOVA provides analysis of variance when the same measurement is made on each subject under different conditions: in our survey, the questions posed to respondents (subjects) were repeated either four times (in the case of Questions 1–7, for the two types of fund and chart format) or twice (in the case of Questions 8–11, for the two chart formats). Repeated measures ANOVA is more appropriate than standard ANOVA because it takes account of any correlations (and therefore non-independence) between the repeated measures. The methodology then allows for tests on within-subject factors (for example, on the equality of mean scores across the repeated measures) and between-subject factors (that is, of differences in scores for the four independent treatment groups of different timescale combinations of Table 1), and also allows for between-subject interactions.

4. Results

4.1. The value of prior performance information

Some idea of the value of prior performance information to respondents can be gleaned from the answers to Questions 9–11 in Appendix B. The responses are summarised in Table 2. The final two columns show test statistics from repeated measure ANOVA analysis, the first denotes the within-subject test on the equality of the 'fund value' and '% yield' mean scores and the second the between-subject test of the null hypothesis that there is no variation in overall mean scores between the four timescale combinations of Table 1.

When asked what is the maximum that the investor should pay to obtain advice from a qualified financial adviser (Question 9), respondents who answered the question for both 'fund value' and '% yield' measures gave average values of £59.94 and £57.93 respectively, although the within-subject Wilk's Lambda indicates that these mean scores are not statistically different. The between-subject *F*-statistic indicates that there is no significant difference in the average values for the two chart formats over the four timescale combinations: thus the timescale of the fund performance charts does not appear to affect the consumer's willingness to pay for financial advice. Post-hoc Bonferroni tests of the multiple comparisons (which uses *t* tests to perform pairwise comparisons between group means after adjusting for the fact that multiple comparisons are being made) indicate no significant differences between any pair of timescale combinations.

Since subjects were told that the investor was proposing to save £150 per month for at least 10 years, the willingness to pay for financial advice represents an average of around 3.3% of the first year's accumulated fund. However over 45% of respondents in each case indicated that they would not be prepared to pay anything at all for qualified financial advice; thus, the average payment for those who would be prepared to pay something is around £110.

When respondents were asked 'How easy is it to understand the performance charts?' (Question 10) only 28.5% selected one of the top three 'easy' scores on the 7-point scale (i.e. 1–3) when viewing the 'fund value' charts, although this improved to 43.3% for the '%

Table 2
The value of past performance information

Question	*n*	Average scores		Within-subjects	Between-subjects
		'Fund value' format	'% yield' format	Wilks' Lambda (signif.)	*F* (signif.)
9. Maximum amount payable for financial advice £	190	59.9	57.9	0.997 (0.477)	0.089 (0.966)
10. Easy to understand? 1 = easy	229	4.43	3.93	0.907 (0.000)	0.346 (0.792)
11. Helpful in making decisions? 1 = helpful	225	3.44	3.68	0.977 (0.024)	1.606 (0.189)

Within-subject Wilks' Lambda with one degree of freedom: values close to 0 indicate that the mean scores across repeated measures (i.e. between fund value and % yield formats) are different whereas values close to one tests the null that the mean scores are not different.

Between-subject *F* with three degrees of freedom: tests the null that there is no significant difference in the overall mean scores of the repeated measures (i.e. for fund value and % yield formats) between the four treatments groups.

yield' treatment. The within-subject test shows that significantly lower scores on average were given to the '% yield' chart format which indicates that this was easier to understand than the 'fund value' one. Again the between subject and unreported Bonferroni tests indicate no significant differences among the four timescale combinations.

When asked 'Is information on past performance helpful?' (Question 11), 52.4% reported that information was of some help (by selecting one of the top three scores) when viewing the 'fund value' charts but this figure was lower for '% yield' format (47.6%). The fact that one-half of the respondents seem to appreciate some past performance information, in spite of its questionable value in predicting future returns, bears out the testimony of a young male middle-income investor: "You always look at past performance, even if they warn you. You take note of [the warning] but you have to be guided by something" FSA (2003b, p. 25). Again within-subject ANOVA tests show that respondents gave significantly higher average scores in the '% yield' charts, indicating that this format was less helpful than prior performance displayed as an index of fund values. Ironically it appears that respondents believe that the easiest information to understand is also the least helpful in making investment decisions. The between subject and unreported Bonferroni tests indicate no significant differences among the four timescale combinations.

Unfortunately it is not possible to ascertain exactly why many respondents believe that the past performance of fund values is more helpful in making investment decisions than information based on annual percentage returns. Obviously this cannot be because a chart of fund values provides better information on annual yields, since this information is quite difficult to infer from the index; in contrast the annual returns are stated explicitly on the bar charts of % yield. However the substantial differences in risk perceptions elucidated by the two formats (see 4.3 below) suggests that respondents may use past performance charts to evaluate riskiness, and the volatility and downside risk of fund performance is more apparent in the 'fund value' chart format.

4.2. The impact of the format of prior performance information on fund choice (H1)

Out of the 292 responses from the four treatment groups, 201 respondents answered the fund choice question ('Which fund do you recommend as the most suitable means of investing for her retirement?') for both the 'fund value' and the annual '% yield' chart formats. The results are displayed in Table 3a. This shows that 20.9% (42 out of 201) of the respondents preferred the equity fund when shown past performance charts based on an index of fund values, but this fell to 18.4% when they were shown the same performance data using the % annual yield treatment.

Table 3a
Investment fund choice by chart format (Question 8) count and (% of row totals)

	FTSE fund: % yield bar chart treatment	Fixed interest fund: % yield bar chart treatment	Total
FTSE tracker fund: fund value treatment	20 (47.6%)	22 (52.4%)	42 (100%)
Fixed interest fund: fund value treatment	17 (10.7%)	142 (89.3%)	159 (100%)
	37 (18.4%)	164 (81.6%)	201 (100%)

All treatment groups combined.

The interesting feature of Table 3a is that only 80.6% of respondents (the proportion of overall agreement, computed as 20 + 142 = 162 out of 201) made consistent choices between either FTSE tracker or fixed interest fund in both treatments while 19.4% (22 + 17 = 39 respondents) exhibited a preference reversal depending on the treatment. The most significant reversals were the 52.4% of respondents (i.e. 22 out of 42) who switched from the equity to fixed interest fund when the past performance chart changed from 'fund value' to '% yield' bar chart. In contrast only 17 out of 159 (10.7%) switched their recommendation from fixed interest to FTSE tracker when the past performance treatment changed from fund value to % yield.

Table 3b shows the extent to which fund choice agree between the 'fund value' and '% yield' chart formats, broken down by the four treatment groups of Table 1. The figure for the proportion of overall agreement (that is, the proportion of the total respondents who chose the same fund in each chart format) averages 0.806 as previously noted, and varies between 0.75 for group 1 and 0.837 for group 3. Test statistics for the significance of the overall agreement show that the null of no agreement (or agreement only by chance) can be rejected. In the case of Cohen's Kappa, although the figures are low, the significance tests reject the null that agreement is no better than chance in all but treatment group 2. The McNemar chi-squared test assesses marginal homogeneity (that is, equality between corresponding row and column totals): in all cases, we accept the null that marginal frequencies are homogeneous.

The overall agreement between fund choices in the two chart formats masks the large differences in specific agreement between equity FTSE Tracker and fixed interest funds. The figures for the proportion of specific agreement can be interpreted as the estimated conditional probability, given that a respondent has chosen a fixed interest (or FTSE) fund in one format, that he or she will do so when viewing the other chart format (Spitzer & Fleiss, 1974). Table 3b shows that the specific agreement probabilities are much lower for the FTSE Tracker fund than for the fixed interest fund. On average, the FTSE specific agreement probability is only just over 50% and the figure varies substantially (between 0.308 and 0.667) over treatment groups.

The side-by-side presentation of the past performance charts in the questionnaire was not randomised across respondents and/or treatment groups: the FTSE Tracker equity fund chart was always presented on the left of the pair of charts side in the 'fund value' format but appeared on the right in the '% yield' format. Consequently an ordering effect might provide an alternative explanation of the observed preference reversals: those respondents who made left-side choices would then switch their recommendation from

Table 3b
Investment fund choice by chart format (Question 8)

Treatment group	Cases	Proportion of overall agreement	FTSE proportion of specific agreement	Fixed proportion of specific agreement	Cohen's Kappa (signif.)	McNemar test significance
1	52	0.750	0.435	0.840	0.278 (0.042)	0.581
2	52	0.827	0.308	0.901	0.209 (0.129)	1.000
3	49	0.837	0.667	0.892	0.563 (0.000)	0.289
4	48	0.813	0.526	0.883	0.412 (0.004)	0.508
All	201	0.806	0.506	0.879	0.386 (0.000)	0.522

Measures of agreement.

equity (FTSE) to fixed fund as the presentation format changed from 'fund value' to '% yield', while those favouring a right-side choice would switch from fixed to equity. However, were this to be the main explanation, we would expect the phenomenon to be unaffected by the different chart timescales (that is, consistent across the four treatment groups); however the differences in the FTSE specific agreement probabilities illustrated in Table 3b suggest otherwise.

The evidence provides mixed support for the hypothesis H1 that respondents make different investment fund decisions based on the format of prior performance information shown to them. Although the overall level of agreement on fund choice appears to be around 80%, a substantial proportion of respondents changed their minds about the equity fund when the format of the past performance chart was changed. The decision to choose equity (as opposed to fixed interest) funds seems to be rather unstable, and is vulnerable to changes in timescale treatment.

4.3. The impact of the format of prior performance information on risk perceptions (H2)

The results of repeated measure ANOVA tests between the 'fund value' and '% yield' formats for the responses to the seven risk questions in Appendix B are shown in Tables 4a and 4b. The analysis is conducted separately for the FTSE tracker and fixed interest funds for the repeated chart formats. The tables also report the results of within-subject tests (on the equality of the mean scores for the two chart formats) and between-subject tests (that there is no variation in overall mean scores between the four timescale combinations).

Table 4a demonstrates that respondents have markedly different perceptions of the risk and return associated with FTSE tracker fund performance depending on the past performance chart formats. There is a greater perceived risk when performance is expressed in '% yield' terms in the case of Questions 1 'how much uncertainty?', 4 'losing all the money in the investment' and 6 'trustworthy?'. Question 7 indicates that respondents believe the fund's yield is higher when performance is presented in terms of '% yield'. However the perceived risk of receiving biased or unsound advice (Question 2) is significantly lower when past performance is framed in '% yield' terms. The between subject *F*-tests and unreported Bonferroni tests indicate no significant differences in mean scores among the four timescale combinations.

Table 4a
Risk perceptions of past performance for the FTSE tracker fund

Question	*n*	Average scores		Within-subject	Between-subject
		'Fund value' format	'% yield' format	Wilks' Lambda (signif.)	*F* (signif.)
1. How much uncertainty?	216	4.94	5.54	0.849 (0.000)	1.344 (0.261)
2. Unsound or biased advice?	215	5.33	4.92	0.918 (0.000)	0.140 (0.936)
3. Serious consequences?	214	5.83	5.94	0.992 (0.189)	0.196 (0.899)
4. Losing all the money?	216	4.87	5.36	0.910 (0.000)	0.242 (0.867)
5. Value goes down as well as up?	216	5.86	5.96	0.955 (0.315)	1.322 (0.268)
6. Trustworthy?	213	3.81	4.10	0.965 (0.006)	0.199 (0.897)
7. Yield viz-a-viz savings account (1 = lower)	212	4.33	4.63	0.964 (0.006)	1.073 (0.361)

Where 1 = no risk.

Table 4b
Risk perceptions of past performance for the fixed interest fund

Question	*n*	Average scores		Within-subject	Between-subject
		'Fund value' format	'% yield' format	Wilks' Lambda (signif.)	*F* (signif.)
1. How much uncertainty?	219	3.45	3.69	0.986 (0.081)	0.460 (0.711)
2. Unsound or biased advice?	219	4.19	4.22	0.999 (0.721)	0.793 (0.499)
3. Serious consequences?	217	3.66	3.65	1.000 (0.964)	0.420 (0.739)
4. Losing all the money?	218	2.78	2.61	0.989 (0.130)	0.405 (0.749)
5. Value goes down as well as up?	220	3.65	3.46	0.991 (0.159)	0.260 (0.854)
6. Trustworthy?	215	4.08	4.09	1.000 (0.932)	0.614 (0.607)
7. Yield viz-a-viz savings account (1 = lower)	218	4.24	4.24	1.000 (0.928)	0.133 (0.941)

Where 1 = no risk.

In contrast, Table 4b indicates that there are no significant within-subject differences in risk perceptions depending on the format of the past performance of the fixed interest fund and no significant between-subject differences by timescale treatment.

Overall, the evidence suggests strong support for the hypothesis H2 that respondents have different perceptions of risk and return depending on the format of prior performance information shown to them, but only as far as the FTSE equity fund is concerned. In general, respondents generally perceive both risk and return to be higher when past performance of the FTSE fund is illustrated using a bar chart of discrete annual percentage yields, in comparison with a fund value index. Interestingly, this phenomenon does not carry over to fixed interest funds even though the charts of past performance could potentially be very similar in appearance.

Table 4c shows the results of within-subject repeated measures ANOVA tests for the equality of mean scores for the 'fund value' and '% yield' formats for the FTSE fund – for those respondents who exhibited a preference reversal in Table 3a. Although it is impossible to make inferences about causation, the table shows some interesting differences in the

Table 4c
Risk perceptions of past performance for the FTSE tracker fund (preference reversal between 'fund value' and '% yield' treatments)

Question	FTSE to fixed		Fixed to FTSE	
	n	Mean difference[a]	*n*	Mean difference[a]
1. How much uncertainty?	21	−1.38***	15	−0.40
2. Unsound or biased advice?	21	0.09	16	0.82**
3. Serious consequences?	21	−0.57	16	0.18
4. Losing all the money?	21	−1.66***	16	0.81
5. Value goes down as well as up?	21	−0.47*	16	0.50
6. Trustworthy?	21	−0.43	15	−0.27
7. Yield viz-a-viz savings account (1 = lower)	20	−0.40	16	−0.75*

Where 1 = no risk.
Based on repeated measures ANOVA within-subject Wilks' Lambda.
[a] 'Fund value' score − '% yield' score.
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

perceptions of risk between past performance based on the fund value index and % yield or return. In the case of those respondents who switched their recommendation from the FTSE tracker fund to fixed interest when shown the '% yield' past performance format, the significant difference between the mean scores for Questions 1 (uncertainty) and 4 (losing money) were much more negative than those reported in Table 4a, whereas there was no appreciable difference in perceived return (Question 7). In other words, those people who switched their preference from FTSE to fixed interest fund displayed heightened risk perceptions, in terms of uncertainty and the risk of losing all invested money, when past performance is portrayed as a percentage annual return or yield.

In the case of those respondents who switched their recommendation from the fixed interest to the FTSE tracker fund when shown the '% yield' past performance format, the difference in scores on the risk of unsound or biased advice (Question 2) were more positive, while differences in perceived returns on the FTSE fund (Question 7) were more negative, than those differences reported in Table 4a. Thus those subjects who switched from fixed interest to FTSE fund when shown the '% yield' past performance chart reported appreciably lower risk of unsound advice and higher returns for the FTSE tracker fund under the % yield treatment.

The results in Tables 4a–4c provide an interesting insight into the value of past performance charts in terms of perceived risk and return. This is an important issue because, although past performance information is a poor predictor of future returns, it may help in forming perceptions of risk in terms of trust, downside risk and volatility. Since the results reported in Table 7 below show no evidence that risk perceptions are affected by the timescale treatment of these charts, the main differences relate to the format of prior past performance.

4.4. The impact of the timescale of prior performance information on fund choice (H3)

While hypotheses H1 and H2 dealt with the format of past performance charts, hypotheses H3 and H4 explore the likely impact of varying the timescale of the past performance window. Table 1 describes how respondents were shown a pair of past performance charts (for the FTSE tracker and fixed interest funds respectively) where the time horizon for each was varied to be either 12 or 45 months. Each respondent undertook the experiment twice over (using the same pair of timescales) using first the 'fund value' and then the '% yield' formats. Table 5 illustrates the effects of time horizon on the choice between FTSE tracker fund and the fixed interest fund (as in Question 8) showing the percentage of respondents choosing each fund type.

Table 5
Investment fund choice by timescale treatment (Question 8)

Timescale treatment	Fund value chart format		% yield bar chart format	
	FTSE tracker	Fixed interest	FTSE tracker	Fixed interest
1. Long/Short	24.5	73.6	18.9	79.2
2. Long/Long	13.5	86.5	11.5	88.5
3. Short/Short	28.6	71.4	20.4	79.6
4. Short/Long	16.7	83.3	22.9	77.1
All	20.9	79.1	18.4	81.6

Marginal percentages choosing each fund (% of total).

Table 5 demonstrates some superficial variability in fund choice across the four treatment groups, particularly between groups 2 and 3. Group 2 had a long/long time horizon which showed the full bear market for the FTSE and long-term growth in Fixed Interest fund values: in both chart formats, the percentage of respondents choosing the FTSE Tracker fund was substantially lower than the overall percentages reported on the last line. In comparison, Group 3 had a short/short time horizon and thus showed the recovery in the FTSE since May 2003 and volatile Fixed Interest fund values: the percentage of respondents choosing the Tracker fund was appreciably higher, particularly in the case of the 'fund value' format. However the agreement measures reported in Table 3b support the null of no association between fund choice and overall treatment effect. However there are substantial variations in the specific agreement probabilities for the FTSE Tracker fund, particularly for the 'fund value' chart format.

A multivariate analysis on the impact of timescale on fund choice is also undertaken in order to allow for the impact of gender and age on framing effects (Fagley & Miller, 1997; Powell & Ansic, 1997). Table 6 reports the results of a random effects Probit model using the dependent variable y_{ic} – which = 1 (0) if the ith respondent chooses the FTSE tracker (fixed interest) fund for chart format c (where c = 'fund value' or '% yield'). The random effects specification includes an unobservable respondent-specific random component which picks-up other respondent characteristics (in addition to age and gender) that may influence fund choice over the two chart formats. The four chart treatments in Table 1 are denoted by two pairs of dichotomous variables (i) and (iii) for the '% yield' format, and (ii) and (iv) for the 'fund value' format. The test for the irrelevance of timescale is then that the coefficients of (i)–(iv) are jointly zero.

The results in Table 6 show that the hypothesis that the time horizons for the FTSE and fixed interest charts have no impact on choice cannot be rejected since the chi-square statistic (6.21) is only significant at $p < .18$. Although the coefficients for all four timescale variables are negative (so that long timescales reduce the probability of choosing the FTSE fund) the results are rather weak, and confirm that hypothesis H3 is not strongly

Table 6
Random effects probit model; $y_{ic} = 1$ if FTSE tracker fund is chosen $N = 429$, 228 respondents, Wald chi-square = 7.61 ($p = 0.27$)

Variable	Coefficient	t	Significance
Age	0.0037	0.46	0.65
Gender (male = 1)	0.2880	1.05	0.29
FTSE '% yield' timescale 1 = long; 0 = short (i)	−0.6478	−2.05	0.04
FTSE 'fund value' timescale 1 = long; 0 = short (ii)	−0.3184	−1.08	0.28
Fixed interest '% yield' timescale 1 = long; 0 = short (iii)	−0.2671	−0.88	0.38
Fixed interest 'fund value' timescale 1 = long; 0 = short (iv)	−0.5093	−1.69	0.09
Constant	−1.1799	−2.43	0.02
Chi-square test that all (i), (ii), (iii), (iv) = 0	6.21		0.18

Table 7
Variation of risk perceptions by past performance treatment groups: repeated measure ANOVA for four ordered chart formats

Question	Between-subjects F (signif.)	Bonferroni post-hoc tests: significant differences between pairs of treatment groups
1. How much uncertainty? (1 = no risk)	1.897 (0.131)	None
2. Unsound or biased advice?	0.098 (0.961)	None
3. Serious consequences?	0.420 (0.739)	None
4. Losing all the money?	0.646 (0.586)	None
5. Value goes down as well as up?	0.962 (0.412)	None
6. Trustworthy?	0.474 (0.701)	None
7. Yield viz-a-viz savings account (1 = lower)	0.790 (0.501)	None

supported, even after allowing for age, gender and other respondent-specific characteristics.

4.5. The impact of the timescale of prior performance information on risk perceptions (H4)

Between-subject F-tests for variation across the four treatment timescale groups from repeated measures ANOVAs are shown in Table 7 for the seven risk questions in Appendix B. The repeated measures have been analysed in the order in which the chart formats were shown to respondents, namely FTSE 'fund value', fixed 'fund value', fixed '% yield' and FTSE '% yield'.

Table 7 shows that the null that mean risk perceptions are the same across all four timescale treatment groups in Table 1 is accepted for all seven risk perception questions. These results suggest a comprehensive rejection of hypothesis H4 that risk perceptions are affected by the timescale of past performance presentation.

The findings reported in Table 7 provide absolutely no evidence that respondents' perceptions of risk and return are influenced by 'cherry-picking' the time horizon of the charts. So, for example, those respondents who viewed Fund A (the FTSE tracker fund with 45-month time horizon, showing the bear market since mid-2000) had the same average perceptions of risk and return as those who viewed Fund C (the FTSE tracker fund with 12-month horizon, showing the recovery in equities since March 2003).

5. Conclusions, implications and limitations

Governments are keen to encourage individuals to make better provision for retirement through long-term saving and to be more involved in the choice of investment funds, yet prior evidence shows that individuals often make insufficient provision. Individuals find it difficult to make long-term saving decisions in terms of whether or not to save, how much, and in what funds – and are easily influenced in these decisions. Although prior research shows that past investment performance is generally not useful to retail investors in terms of its ability to predict future returns, this study finds that around one-half of consumers appear to place some emphasis on this information in their investment decisions – perhaps because it can inform risk perceptions through some unknown mechanism of selective accessibility (Mussweiler & Schneller, 2003).

This study uses actual past performance charts in a controlled experiment to investigate whether (i) the format in which information is provided, and (ii) the timescale of the information provided, affects an individual's investment fund choice. Because graphical information can be displayed selectively, it is important to test for any effect of prior performance presentation format on investor judgements. We find mixed evidence of the existence of visual framing effects in representing past performance.

We first explore the likely framing effects which can arise when past performance is represented as either an index of fund values or as a percentage return or yield. The analysis indicates strong support for both hypotheses H1 and H2 that the format of past performance charts has a significant impact on fund choice and risk perceptions. In terms of fund choice, respondents were less likely to choose an equity-based fund when past performance is charted using percentage annual yields. Furthermore, over one-half of those who initially recommended the FTSE tracker fund when shown a chart based on an index of fund values switched their choice when the same past performance was presented in terms of discrete annual % yields.

The way in which past performance is presented has a marked impact on the perceived risk and return of equity funds, although not on fixed interest funds. When equity fund performance is expressed as a percentage annual yield (as opposed to an index of fund value) respondents displayed heightened risk perceptions, in terms of uncertainty of return and the risk of losing all invested money as well as higher perceived returns – although they also reported an appreciably lower risk of receiving unsound advice. These differences appear to be strongly associated with fund choice for those respondents who exhibited preference reversal.

In contrast to the findings of Thaler and Benartzi (1999), there is very little evidence that the time horizon of past performance charts has any influence on the choice between an equity fund and a low risk/low return fund, or on risk perceptions. We conducted a controlled experiment where different groups of respondents were shown charts with one of four different 'pairs' of past performance time horizon, where the short time horizons show a very different apparent performance to longer-term ones. The experiment design takes advantage of the natural experiment afforded by the recovery in equity prices almost exactly 12 months before the survey date after a long period of decline. Statistical tests show no support for hypotheses H3 or H4 that there are significant differences between the four groups in terms of their preference for one type of investment fund over an alternative, or in terms of perceived risk or return.

The study finds that there is little or no evidence that respondents' perceptions of risk and return are influenced by 'cherry-picking' the time horizon of the charts to focus on periods of rising fund values as suggested by Clark-Murphy and Soutar (2004). Although this may be an issue when investors have to choose between different fund managers, or decide on fund composition, it does not appear to arise when investors are asked to make a comparatively simple choice between an equity and a fixed interest fund. This finding is encouraging at a time when a long time horizon of past performance for equity-based funds would perforce include evidence of the decline in fund values (or negative annual returns) over the period 1999–2003.

The implications for this study must be viewed in the context of the worldwide trend towards more individual involvement in the investment decisions of long-term savings plans, either in participant-directed defined contribution savings plans (e.g. the 401(k) and 403(b) plans in the USA) or in 'stakeholder' investment products as in the United King-

dom. However the study finds that placing more responsibility on inexpert and ill-informed individuals is likely to mean that their choice of investment funds will be influenced by the format of past performance charts. This will be particularly acute in situations where consumers are asked to choose between an equity fund and a low risk/low return alternative.

The existence of framing effects in relation to past performance charts poses a dilemma for governments (which want to encourage individuals to increase their saving and take more responsibility for investment decisions) and for regulators – which want to ensure that the market for personal financial services operates without consumer detriment. Regulators have been keen to ensure that consumers are not misled by past performance, but have tended to focus excessively on whether past performance is a good predictor of future returns.

One paternalistic solution might be to prohibit illustrations of past performance in fund advertising, or only allow their use when consumers have access to qualified financial advice to overcome the framing effects (Druckman, 2001b). However this research suggests that many consumers find past performance information helpful in making investment decisions, particularly in informing perceptions of the uncertainty of return and the downside risk of losing all the money invested. Consumers may therefore be resentful or suspicious if that information is either withheld or is only available at higher cost.

Clearly the alternative proposed (but not implemented) by the UK Financial Services Authority – to limit past performance charts to the % annual yield format – is not the way forward either since this simply replaces one form of bias with another (and is likely to discourage individuals from investing in equity-based funds). Although care must be taken not to overload consumers with too much information and complexity, and while this wasn't tested in the present study, one possibility to avoid framing effects is to require fund managers and plan providers to present past performance charts in alternative formats (e.g. both as an index of fund values as well as percentage annual returns).

There are of course limitations associated with this study. First and foremost we acknowledge that while we have used actual data, it is by its nature, time specific, and the findings may not generalise to future market trends. Second we used actual market data, and did not include hypothetical market trends in our scenarios, as we reasoned that subjects may have recognised them as incorrect. Testing different trends would also have involved an element of deception, and as a mail field experiment was used we had no way of de-briefing subjects, so for ethical reasons we concluded this was not feasible. Finally, the decision choice in this experiment was a binary one (investing in one or the other fund). While we acknowledge that the results may not generalise to situations where investors could vary the proportion of equities in a portfolio (we leave this to future research), we believe that the decision choice between two funds in a long-term savings plan is not unrealistic and such comparisons are faced by individuals in many real life settings such as the choices faced by investors in so-called 'stakeholder' products in the UK.

Acknowledgements

We are grateful for financial support from the Financial Services Research Forum, and for detailed and helpful comments from the Editor, Gerrit Antonides, two anonymous

reviewers and individual Forum members, especially Professor Nigel Waite. We also acknowledge support with data collection from the International Institute of Banking and Financial Services and research assistance from Karen D'Souza.

Appendix A

Past performance based on an index of fund values

A friend has asked you for some advice on how she should invest money towards her retirement. She intends to make regular contributions to a savings plan of about £150 a month over at least 10 years, which will then be invested in one of two investment funds (which have been labelled Fund A [or C] and Fund B [or D] below). She wants you to help decide which fund to choose.

Please look at the charts below: these show the *most recent* performance of the two funds. The top picture in each chart shows how the value of an investment in the fund has developed over time; the bottom picture shows the fund's annual yield (in terms of % change p.a. in the value of that investment). Of course, the past performance of these funds is not necessarily a reliable guide to their future performance. The time period covered by the charts is shown on the scale at the foot of the lower picture ('04' denotes 2004).

Past performance based on a bar chart of annual percentage yields

Another friend has asked you for some advice on how she should invest money towards her retirement. She intends to make regular contributions to a savings plan of about £150 a month over at least 10 years, which will then be invested in one of two investment funds (which have been labelled Fund E [or H] and Fund F [or G] below). She wants you to help decide which fund to choose.

Please look at the charts below: these show the *most recent* performance of the two funds, in terms of the annual yield (i.e. % change p.a.). Of course, the past performance of these funds is not necessarily a reliable guide to their future performance.

Appendix B. Questions asked about each fund and the choice between two funds

QUESTIONS ABOUT FUND [A–H]

Please circle one of the numbers on the 1 to 7 scale.

1. How much uncertainty is there in terms of the expected return for this product?
(None) 1 2 3 4 5 6 7 (Very high)

2. Is there a risk of receiving unsound and biased information from those who sell or recommend this product?
(No risk) 1 2 3 4 5 6 7 (High risk)

3. How serious could the consequences of owning this product be, should it prove unsatisfactory?
(Not serious) 1 2 3 4 5 6 7 (Very serious)

4. How great is the risk of your friend losing all the money put into this investment product?
(No risk) 1 2 3 4 5 6 7 (Substantial risk)

5. How great is the risk that the value of this investment will go down as well as up?
(No risk) 1 2 3 4 5 6 7 (Substantial risk)

6. How trustworthy are the people who sell and/or manage such plans and funds?
(Completely) 1 2 3 4 5 6 7 (Not at all)

7. How is the fund's yield likely to compare with the interest earned on a building society savings account?
(Much lower) 1 2 3 4 5 6 7 (Much higher)

SOME QUESTIONS ABOUT THE CHOICE BETWEEN FUNDS

8. Which fund do you recommend as the most suitable means of investing for her retirement?
[e.g.] A or B (*please circle one*)

9. What is the maximum amount she should pay for advice from a qualified financial adviser?
£… (*enter total amount*)
(*If you think advice is unnecessary put* £0)

10. How easy is it to understand the above performance charts?
(Very easy) 1 2 3 4 5 6 7 (Very difficult) (*circle one*)

11. Is information on past performance helpful in making investment decisions?
(Helpful) 1 2 3 4 5 6 7 (Useless) (*circle one*)

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