Financial Conduct Authority

Two plus two makes five?

Survey evidence that investors overvalue structured deposits

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Summary

Innovation in retail financial markets has led to increasing product complexity over the past two decades, but there is little evidence of a comparable increase in consumers' financial capability. Over the same period, there have been numerous instances of mis-selling that have led to regulatory action in the UK. When examining whether the market for a particular complex financial product is working well, one of the things regulators need to ask is whether consumers can understand and adequately assess the products they consider buying. There are a number of reasons why investors may struggle to understand and assess complex products, including product features and marketing strategies that exploit behavioural biases, such as focus on headline returns, reference dependence and loss aversion.

In this paper we describe the results of a survey which investigated how well consumers understand and value structured deposits, a class of complex products. Structured deposits are capital-protected term investment products that are widely available to retail investors and whose returns are typically linked to the performance or price movements of an index or basket of securities and calculated according to a pre-set formula. Our survey investigated:

- to what extent investors understand how different types of structured deposits work,
- whether there are systematic biases in investors' evaluation of the expected performance of the structured deposits, and
- whether giving targeted information improves this evaluation.

Methodology

We conducted a survey of 384 retail investors (called "investors" or "respondents") who had previously bought or would consider buying structured deposits or other structured products. Our research design is a stylised setup, as behavioural experiments typically are, and therefore does not aim to fully reflect the real market environment (Iscenko et al., 2014). Our methodology adopts a plausible normative model to measure the extent to which investors can adequately evaluate structured deposits, while leaving open the question as to how investors arrive at their judgement.

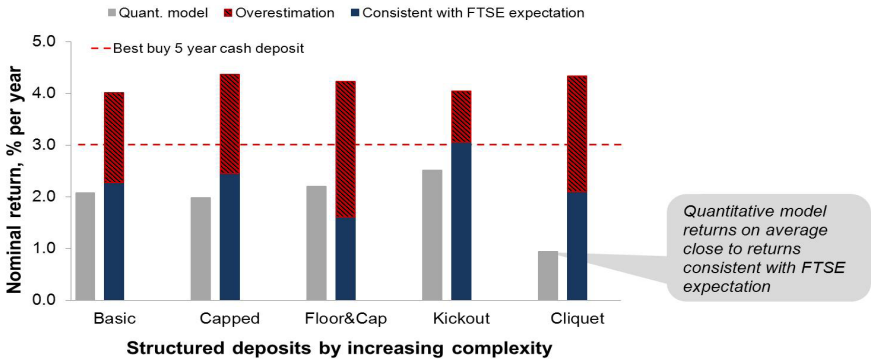
We showed investors hypothetical examples of five popular types of products with returns linked to performance of the FTSE100 stock index. Returns and expected issuer margins were set using quantitative modelling to represent comparable market value. To distinguish between expected returns driven by overall optimism about the market and difficulty in understanding how structured deposit returns derive from an underlying index, we asked investors about their views on the performance of the FTSE100 index over the next five years. We compared investors' expectations about FTSE100 returns with the returns they expected from different structured products. This allowed us to calculate bias in how respondents evaluate the structured deposits relative to the index.

We then asked investors to rank the structured deposits against a range of fixed rate deposits and taking into account the risk of return of the different structured deposits. Finally, we looked at whether various types of disclosure altered respondents' valuations.

Results

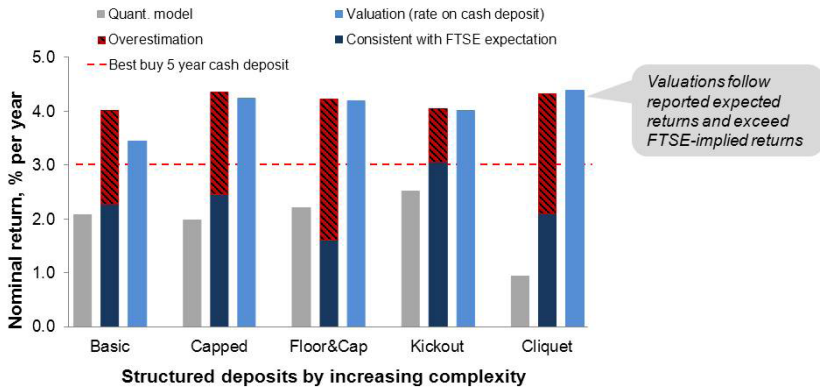
While investors' expectations of the FTSE growth were on average well aligned with the assumptions we used in our model, investors significantly overestimated the expected returns of all structured deposits, including the most simple. We found that investors overestimated expected product returns by 1.9 percentage points per year on average (see Figure 1), adding up to 9.7 percentage points over the five-year term. Investors' expectations are also significantly higher than returns from our quantitative model.

Figure 1. Respondents overestimate expected product returns compared to implied and quantitative model returns



We found that, although all five structured deposits in the survey would have been unlikely to return more than simple fixed-term cash deposits, our respondents did not recognise this. Investors required relatively high rates of return on risk-free cash deposits to value them over and above structured deposits (Figure 2). Around 10% of the valuation in terms of the average required rate on a cash deposit was due to the previous overestimation of structured deposit returns.

Figure 2. Respondents value structured deposits almost as if they were risk-free



The disclosure of likely product returns and risk had some effect on investors' ability to adjust for initial incorrect valuations. Investors who had initially overestimated returns or underestimated risk of return were more likely to adjust their valuations following further information.

'Scenarios' disclosure – giving the investors information on what would happen under hypothetical scenarios – had little effect on product revaluation, while quantitative model returns – telling investors what likely product returns are based on our quantitative model – on average induced a 0.41 percentage point larger devaluation of structured deposits. While bearing in mind that the disclosure came at the end of a long survey when respondents might have felt tired, the relatively minor adjustment of valuations by investors shows that we should be cautious about what can be achieved through providing information.

Conclusions

Why should the regulators care if retail investors prefer structured deposits to less risky alternatives with higher returns? In the current regulatory regime retail investors are able to buy structured deposits without advice, and until MiFID II takes effect, there are also no requirements of fee disclosure or of suitability considerations for advice on structured deposits. Under these circumstances, we would expect that effective competition among providers would deliver best possible returns for investors whatever their individual valuations. However, behavioural biases, combined with features of structured deposits that can exploit these biases, may lead investors to have unrealistically high expectations of product returns and impede their ability to evaluate and compare structured products to each other and against other deposit-based alternatives. Where product designs and distribution strategies exploit consumer weaknesses, consumers are likely to make mistakes in comparing the options, buy overpriced products, and fail to drive effective competition.

Our findings are relevant to FCA policy on structured deposits and we intend to extend the work to explore ways to address the issues raised. Understanding exactly which combinations of product features and behavioural biases drive investors' misperceptions of complex investments is an important topic for future research that would help us understand consumers' ability to make effective choices. While we acknowledge the potential drawbacks of our methodology, including survey bias and modelling of investor expectations, we do not identify them as the cause of the findings. We also believe that our methodology could be improved and the results tested using different tools and research design.

There are several issues related to our findings that need to be considered by policymakers. First, if retail investors have limited ability to assess complex structured deposits, firms need to ask themselves whether they should be using non-advised sales channels to sell these products to retail investors. Where products are sold via advised channels, providers should consider how they can credibly demonstrate that advisors receive the information needed to address the effects of investor biases. Secondly, costs may need to be disclosed as a separate fee rather than deducted from the investment amount or built into the product design, as investors may not take them into account when estimating the realistic returns of the products. Finally, improved disclosure based on various types of targeted information, in particular likely product returns, could be explored as a way to mitigate the high expectations of returns. However, our findings suggest that there are limits to how much can be solved just by providing information.

1. Market background

Innovation in retail financial markets has led to products becoming increasingly complex over the past two decades (Celerier & Vallee, 2014), while no improvements in consumer financial capability have been documented (Lusardi, 2008; 2010; De Meza et al, 2008).[1] It is not clear whether consumers can understand complex products and make good decisions about them. And if they cannot, where do the limits to consumer understanding lie and what can regulators do to improve how consumers' interests are served by the way the market for complex products functions?

The FCA has acknowledged that product complexity can make it difficult for retail consumers to choose the right product for them.[2] Limitations of consumers' ability to absorb and process information on financial products may make it harder for them to compare products and identify the best deals. Additionally, behavioural biases such as extrapolation of past performance, focusing on headline return, loss aversion and exponential compounding bias, may lead to errors in expectations of the value or performance of such products. If expectations systematically deviate from any plausible normative model of rational investors, then consumers may be making bad choices in buying such products and getting poor returns compared to safer alternatives.

Providers, responding to what consumers buy, may further increase consumer ignorance through 'strategic complexity' of products, making it harder for consumers to identify the best deals in the market (Carlin, 2009). Strategic complexity includes complicated charging structures, insufficient or ineffective disclosure, extensive use of financial jargon, and unnecessarily complicated terms and conditions. As a result, product structures become more complex and less standardised, making it more difficult for consumers to evaluate and compare the products with each other and with other alternative products. Providers may also respond to consumer biases and, rather than competing by offering better value, may manufacture and sell products of types where retail consumers tend to make mistakes driven by behavioural biases. If consumers struggle to assess realistic returns and the value of complex products, or to compare across potential substitute products, the competitive pressure on product prices will be weakened.

Structured deposits are a favourable example to study, as they are inherently complex, difficult to compare and yet widely accessible to retail consumers. For example, the following structure would constitute one of the least complex structured deposits: '*You invest £1,000 today for five years. If the FTSE100 Index value is higher in five years than today, you receive half of all the increase in percent terms, plus your initial £1,000. If it is lower than today, you receive back the initial £1,000 invested.*'

1 Henderson and Pearson (2011) provide an overview of potential causes driving this innovation, such as attempts to increase the efficiency of allocation of financial resources, reduce transaction costs, stabilise financial markets by reducing volatility, and reduce the impact of tax and regulation.

2 Erta, Hunt, Iscenko and Brambley (2013).

Structured deposits can be held in a cash ISA wrapper and are generally protected by the Financial Services Compensation Scheme (FSCS). These are typically capital-protected products which are offered to consumers on the basis that they have the potential to earn more than the interest rate on cash through exposure to equity or other non-cash investments. Structured deposits, in particular, are not covered by the commission bans of the *Retail Distribution Review* (RDR), because they are considered deposits rather than investments, making them relatively more attractive to financial advisers as compared to structured capital-at-risk products. Our understanding is that structured deposits are generally subject to income tax in the UK, just as cash deposits.[3] It may also be possible to design structured deposits so that their return is subject to capital gains tax rather than income tax, but for the purpose of our research we assume tax neutrality between structured deposits and cash deposits.[4]

Structured deposits can also combine a variety of features attractive to less sophisticated, risk averse and loss averse investors, such as capital protection, a minimum guaranteed return, and an ability to 'lock-in' returns of different periods. However, investors pay a price for these features that may not be obvious. By investing in equity-based structured deposits rather than equity, investors forego 100% of growth of the asset and the flexibility to sell without incurring significant costs.

The FCA has repeatedly fined structured product providers and voiced concerns about market practices, indicating that the market is not working well for investors. The fines imposed on a major provider of retail structured products, in 2011 and 2014, were related to failings in sales of structured capital at risk products and to misleading promotions of structured deposits. The FCA's Thematic review (2015 TR 15/2) found that the structured products industry was falling short of the FCA's expectations – among other things failing to set sufficient value-for-money standards for the products sold and failing to focus on the interests of investors when designing, developing and bringing products to market.[5]

Academic evidence indicates that investors may systematically fail to correctly estimate the realistic returns and therefore the value of complex retail structured products. Henderson and Pearson (2011) analyse short-term structured equity products (SPARQS) in the US from 1992 to 2005 and find significant overpricing in the market, suggesting that risk-adjusted product returns to investors were negative in expectation. The authors argue that purchasing these securities cannot be consistent with the behaviour of rational investors. Celerier and Vallee (2014) analyse data on European structured products issuance from 2002 to 2010 and find that more complex structured products were on average associated with higher mark-ups to providers and lower returns to investors, which suggests that investors may be making mistakes in buying complex products. An FCA analysis of a large sample of UK retail structured products, including but not limited to those based on the FTSE index, suggested that products issued since 2008 and that had a maturity of "three to five years on average underperformed National Savings & Investments five year deposit rates.[6]

3 The tax treatment for other types of structured product varies from product to product. Returns may be subject to income or capital gains tax, depending on how the product is structured and on whether the returns are economically equivalent to interest.

4 HMRC has addressed the 'disguised interest' issue that would enable certain product structures to exploit tax advantages (HMRC, http://www.hmrc.gov.uk/manuals/saimmanual/saim2810.htm; www.risk.net: "Structured product 'disguised' interest may be subject to higher taxes").

5 Structured Products: Thematic Review of Product Development and Governance. Financial Conduct Authority, March 2015.

6 NS&I Guaranteed Growth Bond and the best available deposit rate at the point of sale used for comparison. It is also noticeable that where there one year kick out clauses were met, the returns were typically higher than the comparable cash rates.

Our main contribution is that, according to our knowledge, this is the first empirical paper to record and analyse investors' expectations of structured product returns.[7] Our approach furthers the understanding of structured products in two main ways. First, we devised a methodology to elicit investor beliefs about the returns of structured products and to analyse the responses, which is an important step in understanding why negative risk-adjusted returns could persist in the market over extended periods of time due to investor misconceptions and biases. We hope that our methodology can be developed for a broader analysis of complexity. Secondly, we focused on potential solutions based on a deeper understanding of the problems that investors face.

7 Chang, Tang, and Zhang (2014) survey investors in Hong Kong and show that they invested more money in to structured products when no suitability check took place. The authors show that investors may not understand structured products well, excessively rely on sales staff to recommend the best decision, and that suitability checks lead to lower amounts invested, especially by less financially capable consumers.

2. Methodology

We ran an online survey to investigate whether retail investors are able to evaluate structured products well and make better decisions based on their evaluation. Each participant answered questions about three out of five hypothetical structured deposits with returns based on the performance of the FTSE100 index and specifically designed to have some of the most popular features in the UK market.

2.1 Structured deposits designed for the survey

We designed five stylised structured deposits of increasing complexity. We drew on FCA's previous analysis in selecting the structures to broadly represent the UK retail market as of early 2013. While the structured deposits marketed in the UK differ in the underlying measure, the term, and other aspects, the majority of them are tied to the performance of the FTSE100 or another index and have a standard duration of five to six years. The products used in this survey resemble structures that were offered by various UK providers at certain points of time, but we modified their design, payoffs and expected issued margins for our research, and therefore they do not represent any specific product offered by any particular provider.

We also simplified certain features to facilitate the comparison and analysis. All our structured deposits have a term of five years, are linked to FTSE100 and, using a basic quantitative model of the expected FTSE performance, were calibrated to embed the same *implicit charge* (expected *issuer margin*) by adjusting the payout profiles.[8] *Implicit charges* are the profit margins charged by the issuers of the structured deposits. The pricing of structured deposits consists of three components: the value of the deposit at maturity, the value of the derivative replicating the payout profile, and the implicit charge. Our quantitative model is based on up-to-date academic analysis of equity risk premium and as such is calibrated lower than some historical models (Dimson, 2013; Gregory, 2011).

The implicit charges differ slightly due to the rounding of the numbers that define payout profiles. The complexity score of the products is defined by the difficulty and the number of features and ranges from low to high.[9] The stylised structured deposits that we used in the survey are summarised in Table 1 and described in detail in Annex 1.

8 See TA1 in Technical Appendix for more details. Technical appendix available online at http://www.fca.org.uk/your-fca/documents/occasional-papers/occasional-paper-no-9-technical-appendix.

9 See TA1 in Technical Appendix

Table 1. Structured deposits designed for the survey vary in complexity and features while the term and the underlying measure are fixed

Structured deposit	Description	Term	Underlying measure	Complexity
Basic	50% of the growth in FTSE100	Fixed five year	FTSE100 value in five years	low
Capped	100% of the growth in FTSE100 up to a 30% cap	Fixed five year	FTSE100 value in five years	low
Cap&floor	Minimum 5% return guaranteed, 30% of the growth in FTSE100 up to a 30% cap	Fixed five year	FTSE100 value in five years	medium
Kickout	4.5% coupon per year as long as the product does not terminate (kickout) early. No return if product fails to kick out in five years.	Fixed five year, with potential automatic kickout from year 2 onwards	FTSE100 value in two, three, four and five years	medium
Cliquet	Total return is a sum of ten half-a-year returns each capped at plus and minus 7% change, but not less than 0% in total	Fixed five year	FTSE100 value every half a year from 6 months to year five	high

Note: see Annex 1 for a detailed description of the products and Technical appendix for the methodology of complexity assessment.

2.2 Structured deposit design and systematic mistakes by investors

From the standard economic perspective, investors' expectations of FTSE-based structured deposits ought to be solely determined by their expectations of the likely FTSE performance over the next five years through the formula that links product returns to the FTSE100 levels. However, investors may find it challenging to make probability and expectation judgements and may not sufficiently understand product mechanics and how they are linked to the FTSE index. While this could lead to vague or even random responses, the conventional assumption would be that, on average, a large sample of people would collectively estimate the returns correctly or nearly so, unless some external factors bias the outcome in a particular direction.

Various features typical in structured products and included in our survey may cause or exacerbate investor mistakes driven by behavioural biases, for example:

- high maximum possible return or a high return cap that is unlikely to ever be reached could create wrong anchors for investors and increase their expectations of returns, for example, as a result of psychological anchoring (Tversky & Kahneman, 1974), which can affect economic decisions (Ariely, Loewenstein, & Prelec, 2003; Stewart, 2009).

- exponential compounding bias may distort the comparison of structured products, whose returns are often expressed over a five-year period, to cash term deposits with annual interest rates (Stango & Zinman, 2009; Kinsey & McAlister, 1981; Lee & Hogarth, 1999; Raynard & Craig, 1993).

- investors may not understand that consecutive changes by the same amount in percent (10% up, then 10% down) are equivalent to an absolute reduction of investment value.

- the protection of initial investment in nominal terms in case of poor stock index performance may be falsely perceived as protection in real terms (i.e. after accounting for inflation) due to anchoring effects and loss aversion.

- investors may also fail to appreciate that FTSE100 is a price-only index and does not reflect stock dividends, which have historically been the major share of FTSE100 stock returns. If some or all these features interact with investor biases, investors included in our survey may expect unrealistically high product returns.

If certain design features can increase investors' expectations of product returns, they would be attractive for competing providers to include in structured products to increase demand and profits. Our research does not enable us to uncover which particular features are associated with systematic errors by investors.[10] We aim to diagnose whether the combinations of features embedded in each of our five products are linked to systematic errors. If systematic errors exist in our stylised products, they could exist in real world products, because they comprise very similar features.

2.3 Modelling implied expected returns of the structured deposits

Investors' expectations of structured deposits may turn out to be different from what their FTSE100 expectations would dictate, if investors do not take into account their FTSE100 expectations or if translating the expectations through product features 'disconnects' the link implied by the payoff formula. To explore whether there are any inconsistencies in investors' expectations, we calculate structured deposit returns that would be consistent with investors' expectations of the FTSE performance (Figure 3) and compare them with investors' reported expected return of the structured deposit. We explain the method in detail in Section TA4 of the Technical Appendix, and focus more on the intuition in this section.

We use a model to estimate the complete distribution of returns for the FTSE for each investor from their estimates of the probability that the FTSE will grow above its current value (6,500) and its expected values in one, two and five years. The matching of just two values to an entire probability distribution requires assumptions about the form of the distribution.

We argue that on average individual expectations of FTSE values, which represent the expectations about the UK economy well, would be consistent with some continuous and single-peaked distribution and for our main analysis we choose the lognormal distribution as the simplest and most popular case to model stock prices, of which the FTSE 100 Index is comprised.[11] We subject this procedure to a variety of checks to show that our main results are robust to the choice of alternative plausible distributions, and that the overestimation of returns cannot be consistently explained by a non-parametric 'worst-case scenario', which makes the most extreme assumptions to maximise the implied product returns.

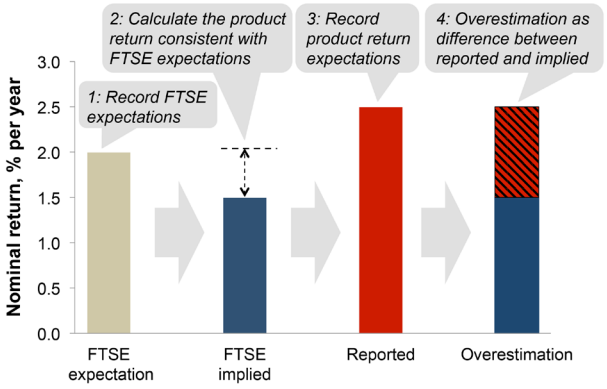
The procedure we conduct enables us to find out whether for each respondent the FTSE-implied return is consistent with the reported expected returns of the structured deposits. We

10 Testing how individual product features influence respondents' decisions about structured products is a potentially fruitful avenue of research, as for instance investigated by Ofir and Wiener (2012) in their working paper.

11 When the continuously compounded returns of a stock are independent and follow normal distribution, then the stock prices follow a lognormal distribution (product of a sequence of draws from a random distribution). The non-normality of returns is a common theme and has led to a series of extensions of the literature over the past decades that aim to incorporate fat tails and asymmetry of returns (Campbell et al, 1997). We acknowledge that using the lognormal distribution does not represent the tails of the empirical distribution well, but we note that the structured deposits we consider do not depend on the tails of the distribution.

calculate the differences by subtracting the FTSE-implied return from the reported expected return. For example, respondent A expects structured deposit 1 to return 3.5% pa over its term and structured deposit 2 to return 2.0% pa. Based on respondent's A beliefs about FTSE performance, we calculated that the FTSE-implied return of structured deposit 1 should be 2.0% pa, and of structured deposit 2 should be 2.5% pa. In this case, we say that respondent A overestimated the return of structured deposit 1 by 1.5% pa, and underestimated the return of structured deposit 2 by 0.5% pa.

Figure 3. An example of how overestimation of expected product return is calculated

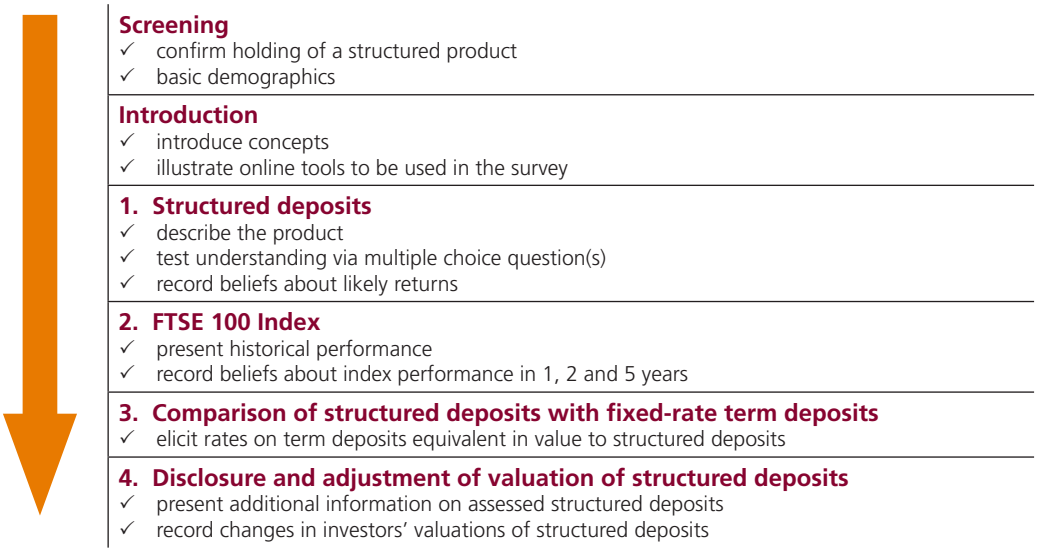


2.4 Survey

Our survey was coded and administered to an online consumer panel by *Research Now*, a research firm, in November and December 2013. Before admitting panellists to the survey we asked a few 'screening' questions about their holdings of financial products. We formulated our questions in a neutral way to identify current or previous structured product holders without accepting too many respondents who would falsely indicate previous holding of structured products just to be admitted to the survey.

The survey consisted of screening, introduction and four parts, in which we measured investor expectations and preferences (Figure 4).

Figure 4. The online survey consists of screening questions, introduction and four assessment parts



Introduction

The introduction started with explaining the rewards for providing quality responses and the main concepts used in the survey, such as structured deposits, risk-free cash term deposits, and the FTSE100 index.[12] We then introduced the online tools that we used later throughout the survey and that were expected to uncover respondents' true expectations using psychological insights. Specifically for this survey we designed two tools: the 'ladder' and the 'slider' that were shown on the screens (see Annex 1 for examples of the slider and the ladder tools). We explained and illustrated how to use the tools to answer questions about expected values and probabilities.

In the ladder tool, people dragged products onto an ordered ladder of options, so that they preferred all options above to the product and preferred the product to all options below. It was designed to take advantage of people's ability to choose rather than value. For perceptual continua, people are good at discriminating between pairs of stimuli, but bad at valuing individual stimuli (Laming, 1997; Stewart, Brown, & Chater, 2005). In the economic domain, choices and valuations can differ, for example, in the preference reversal phenomenon (Lichtenstein & Slovic, 1971, 1973). So we expected response on the ladder tool to generalise better to the choices investors face – the choice of where to invest funds.

The slider tool was used to measure probabilistic beliefs. People are bad at reasoning with probabilities, but do better when they can use natural frequencies such as 'one in ten' (Gigerenzer & Hoffrage, 1995). People are even bad at using percentages (e.g. 25%, compared to 25 out of 100), even though, numerically, these look very similar (Tversky & Kahneman, 1983). For this reason the slider tool did not use probabilities or percentages, but instead used 'times out of 100', and 100 discrete tick points and labels that updated the number of times out of 100 the judged event did and did not happen as the slider moved.

12 We offered a flat fee for completing the survey and an extra reward worth the same as the flat fee for answering product comprehension questions right (60% of the extra reward), as well as for not providing implausible combination of responses in the statements of beliefs (40% of extra reward). The basic reward was known to respondents before they entered the survey and the breakdowns of the extra rewards were shown to respondents in the introduction.

Structured deposits

In the first part of the survey we described the structured deposits and tested through multiple choice questions whether investors had understood them. We asked respondents what they expected the products to pay based on an initial £1,000 investment and the equivalent annual rate of return, for example, *£1,159 in five years (3.0% per year)*, and how likely these products were to outperform two benchmarks, 0% return and a fixed return of 3.0% per year over five years. We presented three products of increasing or at least non-decreasing complexity level to each respondent and allowed them to place the products in the ladder tool. We presented the 'Basic' product to all respondents and then randomly chose between 'Capped' and 'Cap&Floor', and 'Kickout' and 'Cliquet' to achieve an equal quota of each combination. There was a 25% chance of each combination of three products.

FTSE 100 Index

In the second part we explained the FTSE100 index again and presented a chart of its performance since inception in 1984. The FTSE100 index includes the hundred UK companies with the largest market capitalisation and is largely representative of the whole UK stock market. Arguably, most respondents in our sample would have been somewhat familiar with the index as it is reported every day in newspaper and broadcast media reports and our analysis revealed that the vast majority of UK structured products are based on the FTSE index. We then asked investors how they expected the FTSE100 index to perform over the next one to five years. We used the ladder tool to record the expected FTSE value, and the slider tool to record the probability that the FTSE value grows above the to-date value. We presented the expectations of the FTSE100 benchmark in absolute terms for comparison with the usual reporting, which is normally expressed by the index value, and maintained the same primary frame as in the structured deposit ladder in the first part. Given that FTSE100 is a price-only index (it excludes dividends), we refrained from presenting rates of return in percentage terms to prevent potential confusion with typical UK equity returns, which could have misled investors.

Comparison of structured deposits with fixed-rate term deposits

In the third part we asked respondents to compare the same three structured deposits as seen before to risk-free cash deposits. We elicited the interest rates on cash deposits at which respondents would be indifferent between holding a structured deposit or a cash deposit of the same term.

Disclosure and adjustment of valuation

Finally, in the fourth part, we showed three versions of information about likely payouts of the products ('disclosure') under various scenarios and the risk associated with these products. The first two versions – 'Scenarios' and 'Scenarios&Charges' – are variations of information on the product returns given three different FTSE100 performance scenarios (5,000, 7,000 and 8,000). Scenarios&Charges differed from Scenarios only in that it included information on the *implicit charges* of the products (see Annex 1 for sample disclosure documents). While the implicit charge was not expected to directly change the valuation, it may have had an impact on the overall attitude towards the structured deposits. Respondents may have disregarded the fact that all structured deposits have a built-in charge. So we measured the effect of stating the implicit charge on revaluation.

The third version of disclosure ('Payout') contained expected product returns obtained from an quantitative model created by FCA's Complex Products Specialists Team. The version of disclosure presented to each investor was determined in the second stage of randomisation. There was a 25% chance of seeing each of Scenarios and Scenarios&Charges, and a 50% chance of seeing the Payout version, independently of the combination of products assigned.

We closed the survey with a set of questions about respondents' financial position, investment decisions, and satisfaction with the completed survey. We also invited the respondents to leave *verbatim* comments about any potential problems when completing the survey.

3. Data

Sample and removals

Our sample before removals contains 514 retail investors who completed the survey. We admitted respondents according to a pre-selected quota of at least 80% previous or current structured product (structured deposit or SCARP) holders and up to 20% potential buyers. We estimated that approximately 10-15% of retail consumers with investable assets could have held a structured product, either a structured deposit or a SCARP. So our sample is taken from a relatively small share of retail investors.

We removed 130 respondents from our sample: respondents who did not pay sufficient attention (10% of the sample) and respondents who indicated beliefs that were extremely difficult to reconcile with each other (another 15% of the sample).[13] Our consumer panel included a significant number of high-earners and individuals in senior executive positions, for whom our financial incentives were relatively low. Those with above sample-median household income spent slightly less time reading survey screens, but the quality of responses and the expectations of the product returns and the FTSE growth were on average almost identical compared to below-median earners. Less financially sophisticated investors more often gave poor quality responses.[14]

All main results are similar and the conclusions are the same without making any removals and regardless of the cut-off levels chosen for the removals. The mean return overestimation before removals was 1.74% pa, which is slightly lower than the mean in the remaining sample 1.87% pa. The correlations between implied and reported returns are somewhat more pronounced after removals, consistent with removing more low-quality observations.

We expected the ability and level of understanding to be significantly higher among those with plausible combinations of beliefs, so our final results were likely to be an overestimate of just how well our entire sample can evaluate structured deposits. See Section TA2 in the Technical Appendix for more detail on sample selection and removals.

Cleaned sample

In our analysis we used 384 respondents (Table 2). The average age of our sample was 50 years, 59% were men, and around 68% reported having a higher degree. The average household income of our sample was £97,500 (median £68,000) and the respondents reported an above average self-assigned financial expertise score, though overconfidence in investment abilities is associated with poor investment performance (Barber & Odean, 2001).[15]

13 We remove respondents completely if the combinations of reported expectations of the future FTSE100 performance were strongly implausible: expected value higher than 6,500 but the probability of FTSE growing is less than 40%, and expected value lower than 6,500 but the probability of FTSE growing is more than 60%. We removed six further observations for which the implied standard deviation was implausibly high, leading to non-trivial probabilities that the FTSE would increase manifold in five years.

14 Below-average self-assigned financial expertise score is associated with a 0.12-0.15 lower share of correct answers to the questions on probability assessment tools asked in the introduction.

15 Respondents could have been overconfident when evaluating their own financial expertise compared to an average person, but we note that descriptive statistics indicate a relatively sophisticated sample of investors.

Table 2. For most respondents we obtained observations on three products and for some on two products

Structured deposit	Number of responses after removals	Comment
Basic	384	Assessed by 100% of respondents
Capped	192	Assessed by 50% of respondents
Cap&floor	192	Assessed by 50% of respondents
Kickout	174	Assessed by 50% of respondents
Clique	168	Assessed by 50% of respondents
Total	**1,110**	

Note: Removals led to a slightly lower number of observations for Kickout and Clique, as their implied returns additionally depended on one and two year FTSE expectations, of which we had to remove some based on the criteria applied to the five year expectation.

The majority of respondents had fairly well diversified portfolios and more than half claimed that they made the majority of investment decisions themselves or relied on their spouse or partner. 85% reported having held a structured product (either a structured deposit or a structured capital-at-risk product). Most investors that held relatively low complexity structured products indicated having held just above two structured deposit accounts, and found the performance of those accounts to be slightly worse than expected. 78% of previous holders held structured deposits linked to the FTSE or another index. See Table 5 in Annex 2 for more detailed description of the sample.

Compared to average UK structured deposits investors, our sample was younger, and likely to be in a somewhat lower wealth, but not necessarily lower income, segment.[16] Our respondents were better off and more financially sophisticated than the average UK retail investor. We expected the financial sophistication of investors in our sample to be on average higher than that of an average UK retail investor.

16 Data on the demographics of average structured deposits investors is limited. Analysis done by FCA's Complex Products Specialists Team demonstrated that average investor age is 64. Over a third of investors who have purchased products in the last five years were 'Retired with Resources '. Investors with stretched middle incomes made up a further 15% of the investor base.

4. Findings

4.1 Investors' expectations of returns

We found that while the vast majority of investors in our survey understood the basic product features, investors did not seem to understand well how product returns are related to the performance of the underlying measure. The vast majority of investors, especially those without a university degree, reported expectations of structured deposit returns that were inconsistent with their own expectations of the FTSE index growth. This result holds even for the simplest structured deposits. Investors estimated structured deposit returns to be much higher (average 4.15% pa nominal) compared to what would be consistent with their expectations of the FTSE index given our modelling assumptions (2.29% pa nominal), and to the predictions of quantitative model we used to design the structured deposits (1.98% pa nominal).

The average overestimation documented in this survey is notable: 1.87% pa compared to what would be consistent with individual FTSE expectations. To date, there is hardly any previous research available against which to compare our findings and assess their robustness to changes in methodology, but we do not identify the potential drawbacks of our methodology as the likely cause of the findings. We examine all major potential explanations known to us that could reveal the overestimation as a by-product of our techniques or some unobserved factors, such as survey bias, assumption about distributions of expected returns, or investors' previous experiences.[17]

The overestimation also cannot be explained by individual risk preferences or an interaction of FTSE-based structured deposits with the rest of investor's portfolio. In principle, risk preferences should not play a role, as both expected returns of the FTSE100 and of the structured deposits should not be affected by risk. However, some participants may have responded to these specific questions with a more general answer indicating their general preference or liking of these products, which could include information about the risk of the product. Substituting a specific question with a more readily interpretable psychological response is the basis of the heuristics and biases programme (see Kahneman, 2011).

A FTSE-based structured deposit could only be valuable as a *hedge* if the FTSE100 index was negatively correlated with the rest of investor's portfolio, i.e. if FTSE100 and the value of investor's portfolio would be likely to move into opposite directions. Since FTSE100 closely reflects the state of the whole UK economy, it is highly unlikely to move opposite to the value of ordinary retail investors' portfolio.

An alternative explanation of our findings is that the interactions of behavioural biases and product design features that may exacerbate those biases create a bias in investor expectations. For example, the focus on certain product features may have led investors to mistakenly perceive

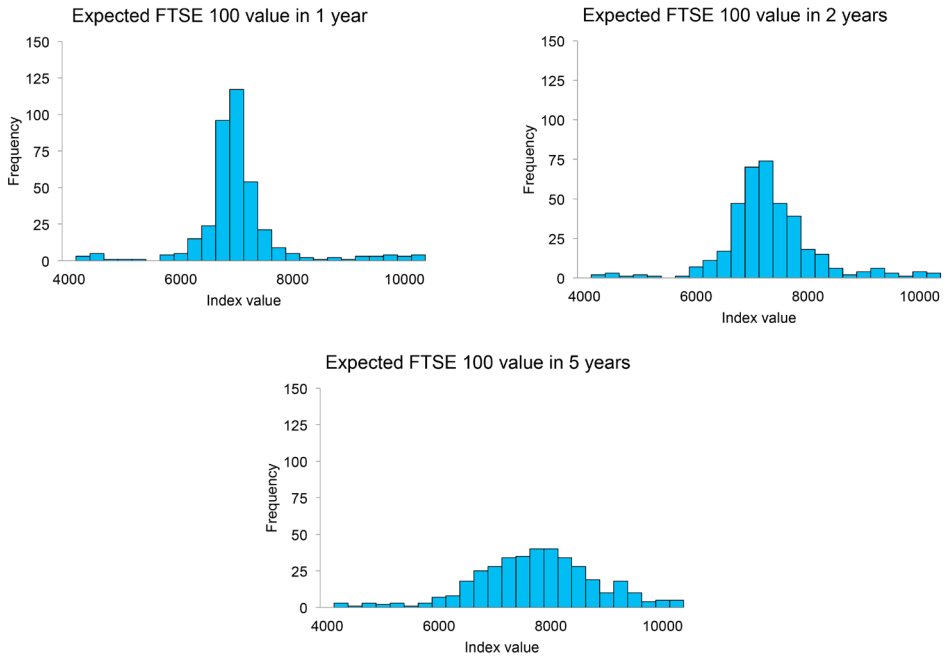
17 See Section 6 Robustness of findings.

that the capital protection and the potential for growth in combination make the products dominate the growth in the FTSE100 index value itself. The index grows at a lower rate than the total equity return, because it excludes dividends, which historically have formed a large share of the return paid by the constituent companies. So some investors could have thought that investment in equity-based structured deposits could return more than the mere growth in the index value. It is also possible that investors do not appreciate that an embedded *implicit charge* reduces product ex-post returns compared to the growth in the FTSE100 index, and so overestimate product returns as if there was no implicit charge.

Investors' expectations of FTSE100 returns

The distributions of FTSE100 values expected by respondents in one, two and five years' time are depicted in Figure 5. At the time of the survey (November 2013) the FTSE100 index value was at approximately 6,500. The average expected FTSE100 values elicited are 6,776 in one year's time (4.3% annual growth), 7,057 in two years (4% annual growth), and 7,487 in five years' time (2.7% annual growth). The distributions become wider and slightly shifted towards higher values with growing time horizon, consistent with overall market uncertainty and growth of the stock market. The trend in annual growth rate suggests that on average respondents expected the FTSE to grow at a higher pace over the next one to two years and then to slow down. Possibly, the economic conditions at the time of the survey may have been seen as feeding into higher growth in the short run, while the anticipated rise in the base interest rate reduced investors' expectations of the growth of equity markets in the medium run.

Figure 5. Respondents' expectations of FTSE100 returns in one, two, and five years vary but on average increase over a longer time horizon



We argue that investors' expectations of future FTSE growth are plausible on average and comparable to historical data as well as results from other surveys. The expected annual growth rates are low compared to typical equity returns, but they are not unexpectedly low given that the FTSE100 is a price-only index and excludes dividend payments. On average investors' expectations, at least in the short run, seem somewhat more optimistic than the assumptions used in the quantitative model. Comparing to historical FTSE performance, the expectations we elicited are consistent with growth way below the levels of high growth in the late 1980s and

1990s and somewhat above the levels of turbulent financial crisis times: the average annual growth rate of the FTSE100 index value over five years was approximately 10% between 1984 and 1998, and dropped to 2.3% between 1999 and 2013.

Our results also seem to be consistent with the findings of a survey of 500 retail investors about FTSE100 growth prospects commissioned by *Société Générale* in 2013.[18] It revealed that investors expected relatively moderate growth of FTSE100 index value over the next six years. Fewer than one in ten expected the benchmark to rise by more than 20% over the next six years, equivalent to at least 90% of investors expecting an annual index growth of no more than 3.1% per year. The average of 2.7% pa over the five years we elicited therefore seems rather high, but is consistent with the findings of the survey.

In our survey, previous structured product holders had somewhat lower expectations of the index growth over five years than non-holders, 2.6% pa compared to 3.3% pa, statistically significant at 1% level. More pessimistic expectations among previous structure deposit holders compared to a random sample of retail investors are consistent with the decision to buy structured deposits: downside protection that structured products typically offer is valuable. The reduced expectation for structured product holders is also consistent with learning from experience: holders have presumably paid more attention to the FTSE performance than non-holders.

Investors' understanding of structured deposits

To check respondents' understanding of structured deposits, we asked one comprehension question for the least complex product (Basic) and two for other products (see Annex 1). The product comprehension questions tested whether investors understand how the products would perform given different levels of the FTSE index. Hypothetical five year and intermediate FTSE values were chosen to highlight the impact of various product features, such as caps, participation rates, early maturity, etc. We offered financial incentives for getting the comprehension questions right.

The share of correct answers ranges between 65% to 80% for all answers except the second question on the Cliquet product. Financial experts and those with higher education were slightly more likely to get the comprehension questions right than non-experts and less educated subjects.

The comprehension questions differed in difficulty, making the relative comparison of understanding across products based on the share of correct answers only approximate. We note that the poor performance in the second question on the Cliquet product (24%) was caused by a calculation-intensive answer and the high overall complexity of the product and was no better than random guesses, which would have led to a 25% chance of choosing any single option.

Investors' expectations of structured deposit returns

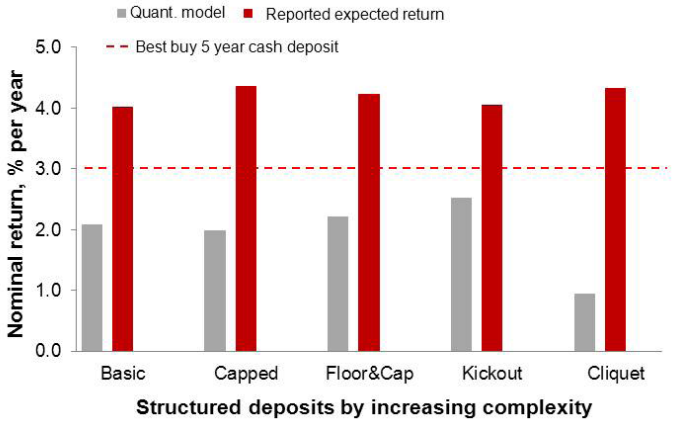
The means of reported returns of all five products range between 4% and 4.3% per year (red bars in Figure 6). The range of reported expected returns is large for every product, ranging from 0% to 7% pa (see Section TA2 in Technical Appendix), consistent with variation of expectations of the FTSE100 across respondents. The distributions of reported expected returns have multiple modes, one of which is just below the 3% rate for four out of five products (horizontal dashed line in Figure 6). Around 70% of all estimates are above the 3% benchmark, indicating that the vast majority of investors expected these products to return

18 The research report is not available online. See the article ' 'SG launches UK Four series as survey shows investors expect 7% from FTSE100' ' on www.risk.net for more details.

more than a best-buy cash deposit. At the individual level, investors estimated the returns of 93% of the structured deposits above the values implied by the quantitative model (grey bars in Figure 6), and estimated the returns of 67% of the structured deposits above their expectation of the growth in FTSE Index value over the next five years (2.6% pa).

The less educated investors reported higher expected returns (4.4% pa) compared to more educated respondents (4% pa), and the difference is statistically significant. The mean reported returns do not differ by the level of financial expertise, by previous holdings of structured products, by making one's own financial decisions, or by household income. We recorded the number of warnings about errors and potential inconsistencies in responses for each respondent. 45% of the respondents saw no warnings at all and 75% of the respondents saw no more than one warning throughout the survey, suggesting that the majority experienced no problems with providing responses, or learned after the first error warning.[19]

Figure 6. Respondents report expectations of structured product returns much exceeding realistic values



While the majority of respondents answered comprehension questions correctly, the low correlation between FTSE implied product returns and reported expected returns (0.10-0.25) indicates that investors did not relate the product returns to the FTSE100 performance well. The correlation is somewhat stronger for better educated respondents and, surprisingly, for those less confident about their own financial expertise. This suggests that respondents with lower levels of education may have found it more difficult to estimate the relationships or more often chose to make a guess instead, and that some respondents erred more when they excessively trusted their intuition or expertise.

To explore which factors are associated with a stronger relationship between expected FTSE100 performance and product returns, we specify an econometric model and run pooled OLS and fixed-effects regressions (Table 6 in Annex 3).[20] Other things equal, a university degree is associated with 0.16 percentage point higher reported return for every 1 percentage point of implied return. Similarly, above-average self-perceived financial expertise is related to 0.19

19 We required the indicated probability that the return will be higher than 3% pa to not be higher than the probability that the return higher than 0%. Every time the respondents violate this condition, we displayed a warning on the screen and ask respondents to adjust their responses. We recorded the number of warnings shown to each respondent as one of the measures of their response quality. We also displayed a warning on the screen if the indicated chance of FTSE growth was above 50%, but the expected value lower than the current value, and vice versa. We recorded the warning but did not mandate an adjustment to the response, because distributions of expectations with certain skew properties, albeit unlikely, could still be consistent with such responses.

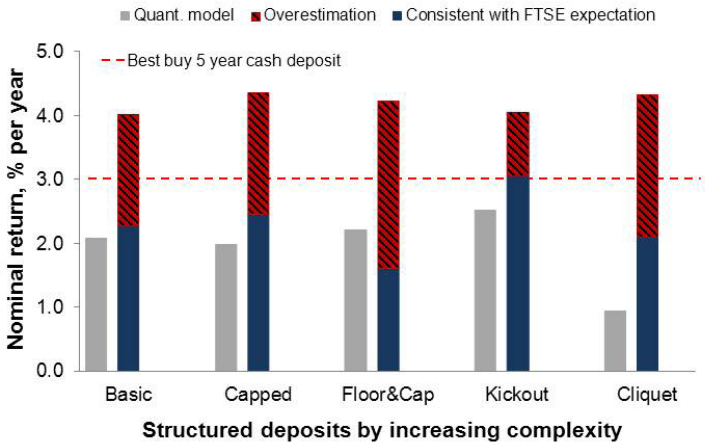
20 The Hausman test does not support the consistency of a random-effects estimator, hence we refrain from running an RE model with respondent-specific control variables.

percentage points lower reported expected return for every 1 percentage point of implied return. Given the average implied return is 2.31% pa, individuals with a university degree on average translate their FTSE expectations into product returns by 0.37 percentage points more precisely compared to investors with no university degree. Those thinking of themselves as above-average financial experts were by 0.44 percentage points less precise in translating their FTSE expectations into product returns.

Overestimation of structured deposit returns

We analyse product return overestimation by respondents compared to what would be consistent with their FTSE expectations. The returns are overestimated for all five products and the overestimation ranges between 1% to 2.5% pa, also being statistically significantly different from zero (red shaded bars in Figure 7).[21] Only 1.6% of respondents did not overestimate any of the three products returns, while 70% of respondents overestimated all products' returns, leading to returns of the products being overestimated in 86% of cases.

Figure 7. Respondents report expected returns of structured deposits that much exceed returns that would be consistent with their individual expectations of the FTSE growth



Overestimation persisted in various subgroups of our sample we might expect to be better, such as the more educated, those with higher self-perceived financial expertise, investors who had previously owned structured deposit products; and even in the group who best understood what they were being asked to do (because they answered all comprehension questions and the probability questions correctly).

The vast majority of the respondents had held structured products recently and may have been influenced by the performance of the products. In fact, investors who had held structured products in the past performed worse than those who had not: they had a statistically significantly larger gap between reported and implied beliefs, which was driven by their lower implied return.

To assess whether positive or negative past experience with structured deposits biases forward-looking expectations, we compared reported returns by the year in which the investors bought their structured deposits and by the current level of satisfaction with the current performance of structured deposits held. We do not find strong evidence that these factors bias reported

21 A Wilxocon sign-rank test of the means of differences between reported and FTSE-implied returns suggests we strongly reject the null of equality (z value 24.0).

expected returns. Investors who bought structured deposits most recently reported slightly higher expectations, but the variation is of a much smaller magnitude than the overestimation of returns across all groups. Also, investors who are relatively more satisfied with their current products reported slightly lower than expected returns of the products presented. While the tests reject the equality of means in both cases, the means of all the groups are above the best buy term deposit rate (3% pa) and above the middle point of the ladder range (3.5% pa).

4.2 Valuation and effects of disclosure

In the previous section we established that the investors we surveyed on average overestimate the expected returns of structured deposits. Expected return includes no adjustment for risk and does not take into account that different investors may value structured deposits differently due to individual preferences, such as risk aversion, tastes for particular payout profiles, or product features. Such preferences may make investors choose safer and less complicated, albeit lower return, products over structured deposits, and the overestimation of expected returns may not have a decisive impact on how investors evaluate structured deposits compared to alternatives.

In this section we document that investors on average are almost indifferent between an uncertain return on a structured deposit and a fixed return on a cash deposit that is equal to the return they expect on the structured deposit, as if they did not require any compensation for taking on risk. As most investors overestimated what structured deposits could return in expectation, they chose structured deposits over practically risk-free fixed-rate cash deposits whose fixed return was higher than the true expected return on the structured deposits.

To test how investors compare the structured deposits presented in the survey, we asked respondents to indicate the level of interest rate on risk-free term deposits for which they would be just willing to trade off the structured deposits. This measure captures respondents' overall valuation of the structured products, rather than just their expectation about the returns. The higher the investor required the risk-free rate to be in exchange for the expected (albeit uncertain) return of a structured deposit, the more valuable the respondent must find that structured deposit. Other things equal, more risk-averse investors would accept a lower guaranteed rate on a cash deposit to forego the expected returns on a structured deposit, compared to less risk-averse investors.

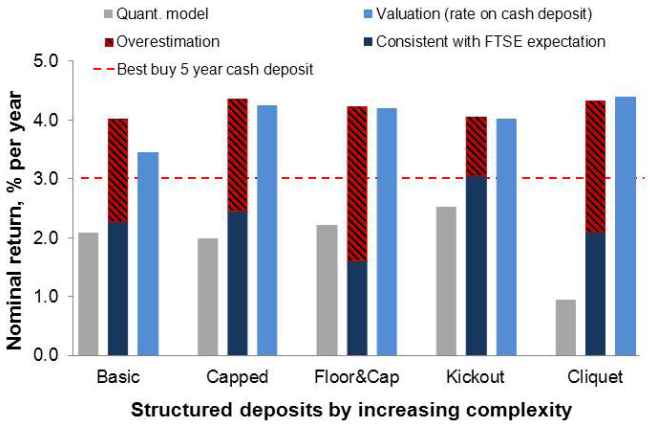
For intuition, assume an investor said that they would prefer structured deposit 1 to a cash deposit of the same term paying fixed 3% pa, but they would take a 3.5% fixed term deposit rather than structured deposit 1. In this case we would infer that their risk-free value equivalent of structured deposit 1 is somewhere between 3% and 3.5%. If the same investor indicated that they expected structured deposit 1 to return 4% pa over its term, we could calculate that they require between 0.5% and 1% pa premium on a risk-free rate to pick the structured deposit over a term bond.

While there are several possible explanations of the high valuations, we show that they can partially be attributed to errors in estimating the expected return. We also show that investors decreased their valuations after being shown disclosure of likely product returns and risk of returns. Those investors who had overestimated returns and underestimated risk adjusted more after disclosure, consistent with the initial valuations being biased. Our findings suggest, however, that disclosure only had limited effect in correcting the misestimation.

Valuation of structured deposits by investors

The average reported valuations of all structured deposits (light blue bars) are presented in Figure 8 and compared to returns obtained from our quantitative model, implied expected returns, and reported expected returns. The average reported valuations of all structured deposits are above the horizontal dashed line, suggesting that on average investors expressed preferences for structured deposits with uncertain returns instead of safe and in expectation superior fixed-rate term deposits. Self-perceived financial experts and less educated respondents report higher valuations across all products than those who assign themselves a below-average financial expertise.

Figure 8. Respondents value structured deposits almost as if they were risk-free



There are several possible explanations why investors would choose structured deposits over seemingly better paying fixed rate term deposits. We show that the high valuations we record are likely to be a sum of perceived product safety, underestimated risk of return, and, notably, of the overestimated expected returns of the products.

First, investors could be risk-seeking. Valuations of structured deposits can be higher than their implied returns without investor mistakes – it is possible that some investors are willing to pay for the gamble additionally, once the return of nominal investment is guaranteed. To explain our results this would need to be true on average across our entire sample: only 5% of respondents valued all three products lower than implied returns, while 60% of respondents overvalued all three products, leading to products being valued higher than implied returns in 79% of cases.

In contrast, economic evidence suggests that most investors are risk-averse, not risk-seeking. Dating back as far as Bernoulli's (1738) resolution to the St Petersburg paradox (see also Arrow, 1965; Pratt, 1964), a core finding in economics is that people tend to be risk averse in the gambling tasks (e.g. Dohmen, Falk, Huffman, & Sunde, 2010; Holt & Laury, 2002, 2005) and in their real economic behaviour (as embodied in the capital asset pricing model, Sharp, 1964; Lintner, 1965; Mossin, 1966). Therefore it is difficult to explain why valuations in our case are higher than the implied returns without allowing for other explanations.

Secondly, investors may misjudge the risk associated with structured deposits. The mean valuations and reported expected returns are close, suggesting that respondents did not subtract any risk premium from expected return, when comparing the value of the product to a

certain payout of fixed-rate term deposit. Full capital protection could potentially exacerbate the perceived 'safety' of the products. It is also possible that valuations and the reported expected returns are close because respondents failed to discriminate between these questions and instead based their response to each on the same underlying variable. This variable could be an affect-based or gut feeling response to the products. That is, in answering either question, respondents simply reported how much they liked each product. We anticipated this above when we explained that people often substitute a possibly hard question for a psychologically easier question (cf. Kahneman and Tversky's heuristics and biases programme and Gigerenzer, Todd, and the ABC group's (1999) adaptive toolbox[22]).

Finally, excessively high valuations could have been caused by the overestimation of product returns as documented in the findings. To investigate this possibility we ran an econometric model (Table 7 in Annex 3).[23] The results suggest that return estimation error is positively related to product valuation, suggesting that errors (accidental or systematic) make investors like the products somewhat more or less than they would without the errors. Our findings indicate that 1 percentage point higher expected return than would be consistent with individual FTSE expectations is associated with 0.20 to 0.23 percentage points higher required rate on a cash deposit for foregoing the return of the structured deposit. Given that mean return overestimation is 1.87% pa, we calculate that errors stemming from product return overestimation are associated with 0.37 to 0.43 percentage point higher valuation on average, or approximately 10% of total average valuation 3.95% pa.

Does disclosure help to correct the mistakes?

Following valuation we presented one piece of additional information to each respondent (disclosure) chosen randomly from three versions we designed. We asked respondents if their valuation of any of the three products changed upwards, downwards or did not change after seeing the additional information. We then allowed the respondents to revalue the three structured deposits. Because the additional information was relevant to evaluating the products seen before, respondents who had initially overvalued one or more products would be likely to adjust valuations correctly, if they paid sufficient attention to this task.

Our analysis and findings on the effects of disclosure, however, should be seen as indicative only: the task was presented at the end of the exercise when participants could have been tired, and we did not incentivise revaluation, potentially leading to a reduced effect. It is also possible that giving the opportunity to revalue could have created an 'experimenter demand effect' where subjects felt that they were supposed to revalue (Zizzo, 2010). So some respondents who revalued the structured deposits may have done it randomly. Finally, respondents may have had the incentive to appear consistent and could have been reluctant to change valuations even if new information changed their views of the structured deposits. In this research we cannot reliably measure the level of attention to disclosure, but we can compare how well different versions of disclosure were understood and what potential misperceptions they could mitigate.

Table 3 summarises what information each version included on expected return, risk, and the implicit charge associated with each structured deposit the respondents saw:

- expected return: all versions of disclosure were expected to bring valuation closer to reported expected return by correcting the overestimation or underestimation.

22 See Todd and Gigerenzer (2000).

23 We prefer the fixed effects model to random effects model for its consistency and easier interpretation of coefficients, and also because we are not focusing on the effects of other control variables on the outcome variable.

- risk: all versions of disclosure were expected to bring valuation closer to reported expected return by correcting the errors in estimating the appropriate risk premium based on the perceived amount of risk.

- implicit charge: only 'Scenarios&Charges' and 'Payout' included information on implicit charges and were expected to reduce valuation by highlighting the hidden costs.

Investors who did not read the disclosure could not have benefited from the information presented to re-assess their product valuations. To compare the effect of different versions of disclosure on those who engaged with it, for the main analysis we chose to remove all respondents who did not view the disclosure screen for at least 10 seconds (11% of the sample) and use 337 respondents.[24] Removing 11% is relatively conservative, and we may have kept individuals that still did not read the disclosure for long enough to make good use of it. So we are likely underestimating the effect of disclosure on those who actually engaged with it.

Table 3: All disclosure versions included different combinations of information on expected return, risk, and the implicit charge

Disclosure version	Expected return	Risk (discount to valuation)	Implicit charge
'Scenarios'	Product returns under various FTSE performance scenarios	Range of likely FTSE performance	Not included
'Scenarios&Charges'	Product returns under various FTSE performance scenarios	Range of likely FTSE performance	Attention to the hidden cost
'Payout'	Modelled expected returns indicate realistic expectations	Modelled probabilities indicate realistic expectations	Attention to the hidden cost

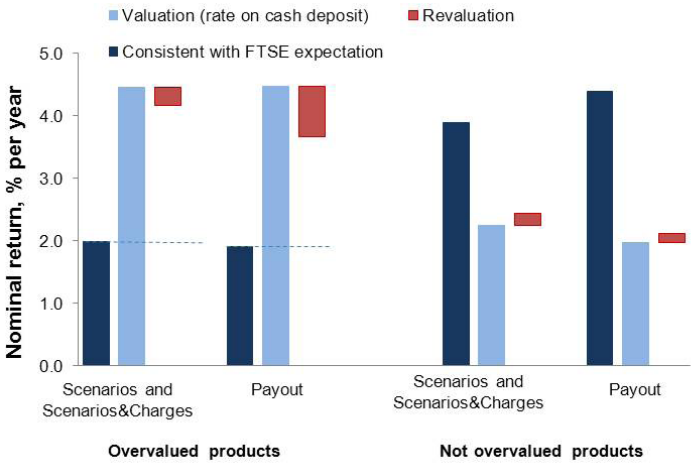
We found that 61% of the 337 respondents revalued at least one out of three products they assessed, and 21% revalued all three products after disclosure. We analysed how revaluation was related to the information shown in each of the version of disclosure. Figure 9 shows how respondents revalued products that were overvalued before disclosure and those that were not.[25] As expected, the size and direction of revaluation is associated with the initial mistakes, consistent with disclosure of additional information being the cause of revaluation. The difference between implied expected return (dark blue) and valuation (light blue) should consist of: (i) the average error in expected return estimation; and (ii) the average required risk premium. If respondents had correctly assessed the risk of return of structured deposits and had not made any mis-estimation of returns on average, we would expect no revaluation, bar any experimenter demand effects.

24 The disclosure screens mainly contained tables with somewhat repetitive information rather than plain text for which we had an estimate of skimming speed. We choose to remove based on 'effective speed': we remove the same percentile (lowest 11 percent) of respondents which we removed for inattention to product descriptions based on the 851 words per minute skimming speed. We show that removing 20% of respondents with shortest reading time of disclosure screens leads to a 5-10 percentage points higher share of respondents who revalued the products among the retained respondents and to a higher correlation between initial errors and revaluation. Similarly, removing 7% of respondents leads to a lower share of those who revalued and to a lower correlation.

25 We choose a conservative way to define overvaluation: we only consider the product to be overvalued if its reported valuation exceeds the implied expected return. By allowing a zero required risk premium we allow for risk-neutrality at risk-aversion, but not for risk-lovingness.

Disclosure of likely product payouts, such as expected return and the chances of receiving at least a certain rate of return, helped respondents more to correct their valuations, especially if they were excessively high, compared to simply stating what the products would return under various FTSE100 performance scenarios. Disclosure of quantitative model returns ('Payout') seems to have reduced the valuation of overvalued products by roughly a one-third compared to the initial difference between the implied expected return and the valuation. The average effect of scenarios disclosure ('Scenarios' and 'Scenarios&Charges') is less than half that magnitude.[26] The revaluation upwards is much smaller than the revaluation downwards for both versions of scenarios disclosure and the Payout version, consistent with the majority having initially overvalued the products. A possible explanation of our finding is that, while presenting scenarios only helps to relate FTSE expectations to product returns, showing expected payouts also addresses the overvaluation that may result from the interaction of product features and investor biases.

Figure 9. Valuations are adjusted in the direction consistent with reducing initial errors



To explore whether observed revaluation is consistent with respondents' initial misperceptions about the products, we regressed the revaluation (which is either positive or negative) on the overestimation of return, the required risk premium, their interaction terms with disclosure version, and control variables (Table 8 in Annex 3).[27] Investors who had high overestimations of expected returns reduce their valuations more, and investors who had not added sufficient risk premiums also reduced their valuations.[28] Having seen the Payout disclosure relative to having seen other versions had the most significant effect on reducing the initial errors – it induced 0.41 percentage point devaluation on average. An initial overestimation of expected return by 1 percentage point led to a 0.12 to 0.15 percentage points devaluation. The version of disclosure seen is not significantly associated with how the magnitude of initial error affected valuation. A 1 percentage point higher initial risk premium is associated with a 0.24 to 0.29 percentage points upwards revaluation. Inversely, someone who failed to require 1 percentage point of risk premium, devalued the structured deposit by 0.24 to 0.29 percentage point after seeing any version of disclosure. Finally, disclosing the implicit charge, which was the same for all

26 We pool both versions of scenarios disclosure for this analysis as they were identical except for the disclosure of the implicit charge, which was only present in 'Scenarios&Charges '.

27 We present the results of both the fixed effects and the random effects models. The Hausman test fails to reject the consistency of the random effects model (prob>χ^2=0.10).

28 Note, the positive coefficient of premium means that a high initial required premium lead to an upwards revaluation, and a low initial required premium to a downwards revaluation.

products in our survey, on average did not have a significant effect on revaluation relatively to fixed-rate cash deposits. The effect of disclosing implicit charges, as intended by the *Packaged Retail Investment and Insurance Products* (PRIIPS) regulation, may, however, be different when products with different charge levels or different product classes are compared.

In summary, the disclosure task being at the end of a lengthy survey could have led to a low-end estimate of attention to and use of disclosure, compared to assessing it in a separate task. In a real world sales environment, disclosure may also lack investors' attention due to a lot of other information, such as marketing material, contractual forms and advice, so its presentation would need to be carefully thought through. That said, a significant share of investors adjusted their valuation of structured deposits after disclosure consistently with correcting some of their initial misperceptions about the products. Telling investors what the likely product returns are was somewhat more effective than explaining what would happen under hypothetical scenarios.

4.3 Robustness of findings

Two major concerns could affect our findings that investors overestimate structured deposit returns and overvalue them: survey bias, and assumptions about distributions of investors' expectations in modelling the beliefs. We argue that the direction of potential survey bias does not overturn our main results, and that our findings are robust to changing assumptions about distributions.

Survey bias

It is possible that our survey design unintentionally framed the responses and led to a survey bias. We discuss the potential objections to our survey methodology and tools in Section TA5 in the Technical Appendix and argue that framing, if it was present, would have had an insufficient effect to explain our findings. We consider:

- the range and the format of the ladder tool, including the 'middle point' effect, and the 'top-end' effect;
- a comparison of responses elicited using a different method that included asking binary questions until sufficient precision of response was achieved ('decision tree'), instead of the ladder tool;
- results from another FCA consumer survey that recorded investors' expectations of structured deposit returns;
- the impact of removing respondents from the analysis who responded 'fifty-fifty' in the probability questions and, more generally, only keeping the 'top performers' as identified through various metrics measuring response quality.

Based on the arguments set out, we argue that we may have overestimated respondents' true expectations of the FTSE performance, underestimated respondents' true expectations of product returns, and, therefore, *underestimated* how much respondents overestimate the expected returns of structured deposits.

Assumptions about distribution of investors' expectations

Our assumptions about the distribution of investors' expectations could have biased the implied product returns and therefore generated the overestimation. To examine whether it did, we

re-fit the data with two alternative distributions (Weibull and Gamma) and also with a non-parametric worst-case scenario distribution.

We show in Section TA4 in the Technical Appendix that our main results are robust to the choice of alternative plausible distributions[29] and demonstrate that the overestimation of returns cannot be consistently explained by assuming any specific distribution of expected FTSE100 index values in five years, including the most extreme distributional assumptions.[30]

29 Main results are unchanged when using a Weibull or Gamma distribution. Using Weibull's distribution instead of lognormal produces an average overestimation of structured product returns of 1.91% pa, compared to returns implied by individual FTSE expectations. Using the Gamma distribution produces an overestimation of 1.95% pa.

30 The 'worst case' scenario test overturns the overestimation for the one uncapped product, 'Basic', but falls short of explaining the overestimation in two other cases. the overestimation was reduced from 10% to 7% for Capped and from 14% to 6% for Cap&Floor over the term of the product. Expected returns of Basic became underestimated by 5% from an overestimation of 11% due to the absence of a return cap.

5. Conclusion

In this paper we assessed how well retail investors understand structured deposits – a relatively safe and widely accessible, but inherently complex retail investment product. Our survey methodology aimed to analyse the problems that retail investors face and focused on links to potential solutions. We measured investor expectations of these product returns and whether they are consistent with investor expectations of the underlying FTSE100 index. We also asked investors to indicate preferences for the hypothetical structured deposits we designed and simple fixed-rate term deposits. Finally, we presented objective information about potential and likely product performance and recorded respondents' reported changes in preferences they indicated earlier.

Overall, our findings suggest that investors' understanding of structured deposits is limited: expected returns are consistently overestimated across all five products, even after controlling for investors' expectations of the underlying index, and also appear to distort the valuations when comparisons to alternative risk-free substitute products are made. Expectations of the product returns should not be systematically higher than expectations of the underlying index, but we find this is the case – the two do not add up, just as two plus two do not add up to five.

Our findings are relevant to FCA policy on structured deposits and we intend to extend the work to explore ways to address the issues raised. The presence of behavioural biases in retail investors, such as extrapolation of past performance, focusing on headline return, loss aversion, exponential compounding bias and others, may explain how product complexity and embedded features lead to inexplicably high expectations of product returns. Understanding exactly which combinations of product features and behavioural biases drive investors' misperceptions of complex investments is an important topic for future research that would help us understand consumers' ability to make effective choices.

While we acknowledge the potential drawbacks of our methodology, including survey bias and modelling of investor expectations, we do not identify them as the cause of the findings. We also believe that our methodology could be improved and the results tested using different tools and research design. Specifically, it would be useful to validate that our findings are robust to adopting alternative designs of our survey tools. Using a graphical interface rather than asking respondents to indicate statistics such as means, as recently suggested by Goldstein and Rothschild (2014), would also test the accuracy of our findings.

There are several issues related to our findings that need to be considered by policymakers. First, if retail investors have limited ability to assess complex structured deposits, firms need to ask themselves whether they should be using non-advised sales channels to sell these products to retail investors. Where products are sold via advised channels, providers should consider how they can credibly demonstrate that advisors receive the information needed to address the effects of investor biases. Secondly, costs may need to be disclosed as a separate fee rather than deducted from the investment amount or built into the products, as investors may

overlook them when estimating the realistic returns of the products. Finally, improved disclosure based on various types of targeted information, in particular likely product returns, could be explored as a way to mitigate the inexplicably high expectations of returns. However, our findings suggest that there are limits to how much can be solved just by providing information.

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Annex 1: Online survey protocol

A1.1 Screening

We invited 12,516 members of *Valued Opinions* consumer panel administrated by market research company *Research Now* to complete a survey on financial products. 7,273 individuals followed the link to the survey and were directed to the screening questions about the holding of financial products. Out of 7,273 respondents 1,205 passed the screening part and were admitted to the survey, out of whom 514 respondents completed the survey. Once a panel member had entered the survey and failed to successfully pass the qualifying criteria (Table 4) in the screening part, it was not possible for the panel member to enter the survey again. We used a digital fingerprinting technology called 'Relevant ID' to ensure that a respondent can only access a survey once.

Table 4. The main screening question required at least 85% of admitted respondents to indicate holdings of structured products without an explicit prompt

Initial question about product holdings	Question if '98 ' chosen in Q1, but not '6 ' or '7 '
Q1. Which of these savings and investment products do you think you may hold or may have held in the past?	**Q1b.** Which of the following other investments do you think you may hold or may have held in the past?
Please select all that apply	Please select all that apply
1. Cash in a current account	**1.** Structured Cash ISAs
2. Instant access savings account	**2.** Growth Deposit plans
3. Instant access Cash ISA What is it?	**3.** Guaranteed Capital Plans
4. National Savings and Investment (NS&I) Bonds	**4.** Guaranteed Stock Market Bonds
5. Fixed term or notice savings account (ISA or non-ISA) What is it?	**5.** Protected Investment Funds
6. Structured deposits What is it?	**6.** Guaranteed Income Bonds
7. Structured investment products with capital at risk What is it?	**7.** Index Bonds
8. Mutual funds including pension funds What is it?	**8.** Guaranteed Equity Bonds
9. Stocks and shares ISA What is it?	**9.** Another investment product not listed here (please specify)
10. Individual company stocks	**10.** None of the Above
11. Other investments	

A1.2 Introduction

The introduction explained the rewards and illustrated the online tools that were used during the survey to indicate responses: the slider and the ladder. We used the ladder tool to elicit

expected returns and valuations and the slider tool to elicit the probabilities throughout the survey. To test respondents' understanding of the tools, we asked questions such as: 'how probable it is that a die will roll a number equal to or greater than four?', 'how likely it is that a randomly drawn card from a deck of cards will be a heart?' and recorded whether the respondents provided correct answers.

A1.3 Structured deposit descriptions and comprehension questions

The product descriptions and the comprehension questions as shown on the screens are provided below.

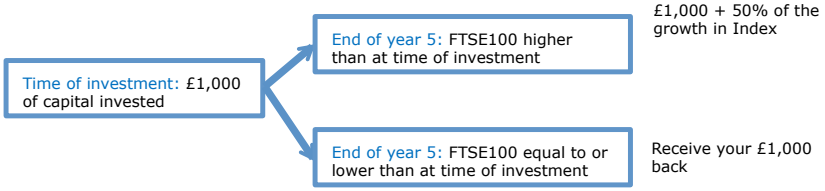
A "Basic" structured deposit

The Plan is designed to repay your initial investment and deliver an additional return linked to the FTSE 100 over a 5 year term.

At the end of 5 years, the plan gives you 50% of any growth linked to the performance of the FTSE 100 Index.

If the FTSE 100 is equal to or lower than its starting level after 5 years, you will receive back only your initial investment.

What you receive:



The table below illustrates what your proceeds and your return would be at maturity based on an initial £1,000 investment. It assumes that the value of the Index starts at 6,500.

Change in FTSE 100 index (value of the index)	Total return at maturity	Payout at maturity per £1,000 invested
+100% (13,000)	*50.0%*	£1,500
+50%	*25.0%*	£1,250
+25%	*12.5%*	£1,125
+10%	*5.0%*	£1,050
No change (6,500)	*0.0%*	*£1,000*
-10%	0.0%	£1,000
-25%	0.0%	£1,000
-50% (3,250)	0.0%	£1,000

Comprehension question 1: If the FTSE100 is 30% higher than its initial level after five years, what total return would you receive? And what would be your payout at maturity, including your initial investment of £1,000?

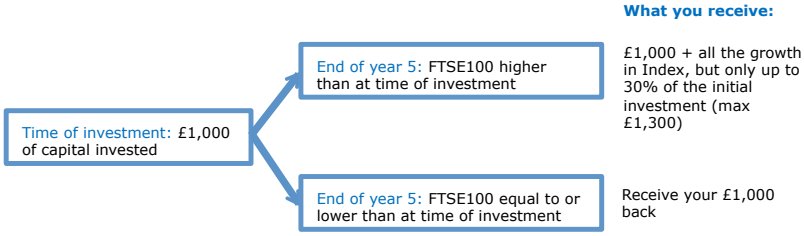
1. 3% total return, £1,030 payout
2. 5% total return, £1,050 payout
3. 15% total return, £1,150 payout
4. 30% total return, £1,300 payout

"Capped" structured deposit

The Plan is designed to repay your initial investment and deliver an additional return linked to the FTSE 100 over a 5 year term.

At the end of 5 years, the plan gives you 100% of any growth linked to the performance of the FTSE 100 Index. The maximum growth you can get back is 30% of the total you invest.

If the FTSE 100 is equal to or lower than its starting level after 5 years, you will receive back only your initial investment.



The table below illustrates what your proceeds and your return would be at maturity based on an initial £1,000 investment. It assumes that the value of the Index starts at 6,500.

Change in FTSE 100 index	Total return at maturity	Payout at maturity per £1,000 invested
+100% (13,000)	*30.0%*	£1,300
+50%	*30.0%*	£1,300
+25%	*25.0%*	£1,250
+10%	*10.0%*	£1,100
No change (6,500)	*0.0%*	*£1,000*
-10%	0.0%	£1,000
-25%	0.0%	£1,000
-50% (3,250)	0.0%	£1,000

Comprehension question 1. If the FTSE100 is higher by 20% than its initial level after five years, what total return would you receive and what would be your payout at maturity, including your initial investment of £1,000?

1. 2% total return, £1,020
2. 10% total return, £1,100
3. 20% total return, £1,200
4. 30% total return, £1,300

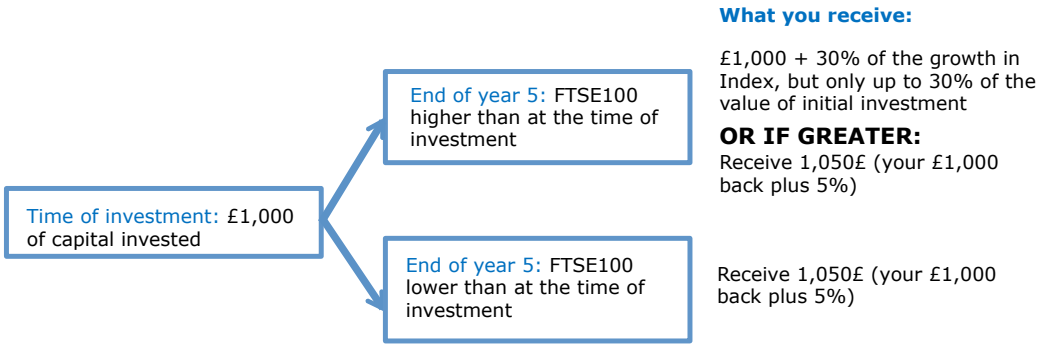
Comprehension question 2. If the FTSE100 is higher by 40% than its initial level after five years, what total return would you receive and what would be your payout at maturity, including your initial investment of £1,000? Please pay careful attention to any maximum return (a cap) on the total amount that can be paid by the product and click the link if you want to remind yourself of the product characteristics.

1. 4% total return, £1,040
2. 20% total return, £1,200
3. 30% total return, £1,300
4. 40% total return, £1,400

'Floor and cap' structured deposit

The Plan is designed to repay your initial investment and deliver an additional return linked to the FTSE 100 over a 5 year term. At the end of 5 years, the plan gives you ***the greater of***

- *a minimum return of 5% on your investment, or*
- *30% of any growth of the FTSE 100 Index as a return, but not more than 30% of your initial investment.*



The table below illustrates what your proceeds and your return would be at maturity based on an initial £1,000 investment. It assumes that the value of the Index starts at 6,500.

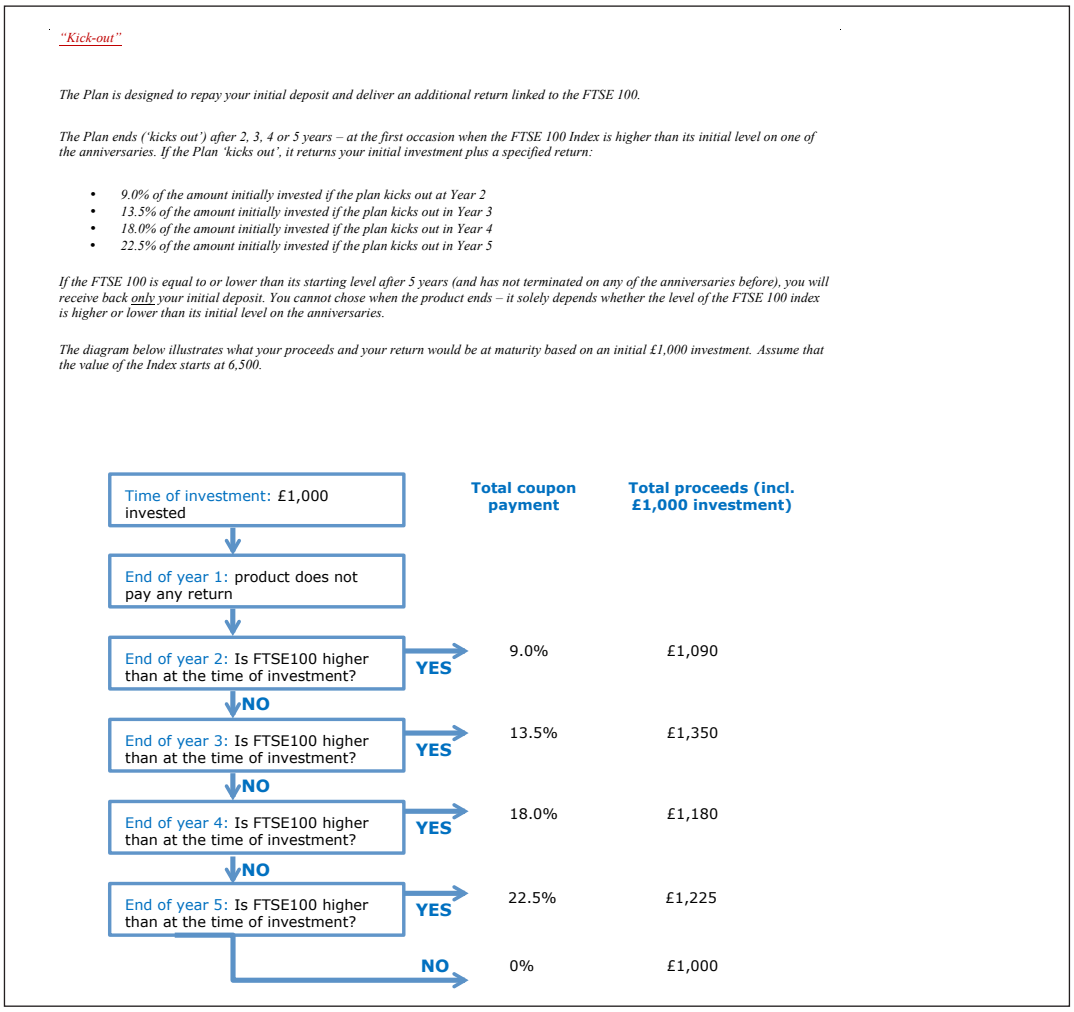
Change in FTSE 100 index	Total return at maturity	Payout at maturity per £1,000 invested
+150%	30.0%	£1,300
+100% (13,000)	30.0%	£1,300
+50%	16.7%	£1,167
+25%	8.3%	£1,083
+10%	5.0%	£1,050
No change (6,500)	*5.0%*	*£1,050*
-10%	5.0%	£1,050
-25%	5.0%	£1,050
-50% (3,250)	5.0%	£1,050

Comprehension question 1. If the FTSE100 is lower by 10% than its initial level after five years, what would the product pay out, including your initial investment of £1,000?

1. -10% total return, £900 payout
2. 0% total return, £1,000 payout
3. 5% total return, £1,050 payout
4. 10% total return, £1,100 payout

Comprehension question 2. If the FTSE100 is higher by 100% than its initial level after five years, what would the product pay out, including your initial investment of £1,000?

1. 5% total return, £1,050 payout
2. 10% total return, £1,100 payout
3. 30% total return, £1,300 payout
4. 100% total return, £2,000 payout



"Kick-out"

The Plan is designed to repay your initial deposit and deliver an additional return linked to the FTSE 100.

The Plan ends ('kicks out') after 2, 3, 4 or 5 years – at the first occasion when the FTSE 100 Index is higher than its initial level on one of the anniversaries. If the Plan 'kicks out', it returns your initial investment plus a specified return:

- *9.0% of the amount initially invested if the plan kicks out at Year 2*
- *13.5% of the amount initially invested if the plan kicks out in Year 3*
- *18.0% of the amount initially invested if the plan kicks out in Year 4*
- *22.5% of the amount initially invested if the plan kicks out in Year 5*

If the FTSE 100 is equal to or lower than its starting level after 5 years (and has not terminated on any of the anniversaries before), you will receive back only your initial deposit. You cannot chose when the product ends – it solely depends whether the level of the FTSE 100 index is higher or lower than its initial level on the anniversaries.

The diagram below illustrates what your proceeds and your return would be at maturity based on an initial £1,000 investment. Assume that the value of the Index starts at 6,500.

Comprehension question 1. The FTSE100 index has risen above its initial level during its third year and then fallen below it again, and it was never above its initial level on any of the anniversary dates. What would the product return at the end of its term, including the initial £1,000 investment?

1. 22.5% total return, £1,225 payout
2. 13.5% total return, £1,135 payout
3. 4.5% total return, £1,045 payout
4. 0% return, £1,000 payout

Comprehension question 2. What happens to the product if the FTSE100 is above its initial level at the end of year one, below it at the end of year two and again above it at the end of year three?

1. The product pays no return and terminates after year 1
2. The product pays out 9% and terminates after year 2
3. The product pays out 13.5% and terminates after year 3
4. The product pays out 13.5% after year 3, terminates after year 5 and pays out 22.5%

"Cliquet" structured deposit

The Plan is designed to repay your initial deposit and deliver an additional return linked to the FTSE 100 over a 5 year term.

The final return from the product is calculated as follows:

- ***Every six months during the five year term** (10 semi-annual observations), the level of the FTSE100 index is observed and the performance over the preceding six months is recorded (growth or fall in per cent);*
- *Performance in any six month period is limited to a **maximum 7% rise, or 7% fall**. The return on your deposit is the sum total of all 10 performance observations.*

The maximum return can be 70%,** and the **minimum return** can be **0%.

The table below illustrates how the sum of percentages over the ten observations translates into your final payout based on initial £1,000 investment.

Overall percentage return	Initial investment	Proceeds on an initial investment of £1,000
70% higher	£1,000	£1,700
30% higher	£1,000	£1,300
No change	£1,000	*£1,000*
-30% lower	£1,000	£1,000
-70% lower	£1,000	£1,000

Comprehension question 1. If the FTSE100 kept growing at 10% per half a year, what would be the total product return, including the initial £1,000 investment?

1. 7% total return, £1,070 payout
2. 50% total return, £1,500 payout
3. 70% total return, £1,700 payout
4. 100% total return, £2,000 payout

Comprehension question 2. If the FTSE 100 kept growing at 10% every first half of a year and then declines by 5% every second half of a year, what would be the total product return including initial £1,000 investment?

1. 10% total return, £1,100 payout
2. 25% total return, £1,250 payout
3. 50% total return, £1,050 payout
4. 100% total return, £2,000 payout

A1.4 Examples of the slider and the ladder tools

Figure 10. Example of the 'slider' tool used to indicate answers to questions about the probabilities

What is the chance that at the end of 5 years this product will pay out more than your initial investment (i.e. more than zero return)? Please click on the scale

or (for the second slider question)

What is the chance that at the end of 5 years this product will pay out more than the best available 5-year term deposit (3.0% per year, total 15.9% return)? Please click on the scale

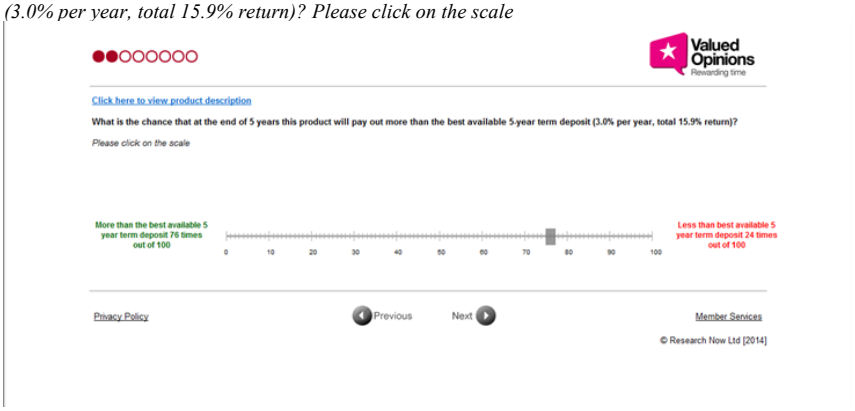
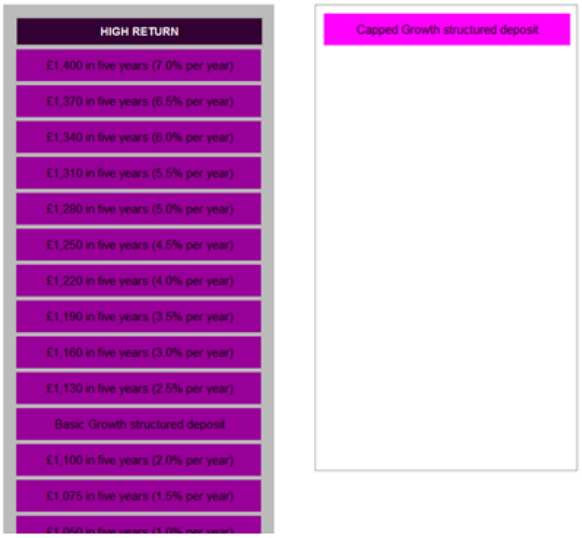


Figure 11. Example of the ladder tool used to indicate answers to questions about expected returns and valuation of products

On average, how much do you realistically expect this product to pay out based on an initial investment of £1,000?

Please drag the product into its appropriate position among the indicated total expected proceeds on an initial £1,000 investment. If you think the deposit will return exactly the amount indicated in one of the boxes, put the deposit either side of it. You cannot drag it on top of the box.

It is worth bearing in mind that you have previously stated that you believe the chance of the product outperforming the best available term deposit (paying 3% per year) is [##] out of 100.



Note: In the ladder tool we chose to present the expectations of structured deposits in both absolute and annual percentage terms, as research generally suggests that monetary expression of investment returns facilitates comprehension, whereas the annual rate of

return enables better comparison with fixed-rate deposits.

A1.5 FTSE100 index

We used the ladder tool to record the expected FTSE value, and the slider tool to record the probability of the FTSE value growing above to-date value (6,500).

Figure 12. The chart of the FTSE Index was presented along side a brief description.

In this section, we will ask you for your beliefs about the future performance of the FTSE 100 index. As you will recall, the FTSE 100 is an index composed of the 100 largest companies listed on the London Stock Exchange. The index is traditionally seen as an indicator of the performance of major companies listed in the UK.

The current level of the FTSE 100 Index is approximately 6,500. Below you can see the to-date historical performance of the FTSE 100 Index.

Figure 13: The Ladder Tool used to indicate answers to questions about expected FTSE growth

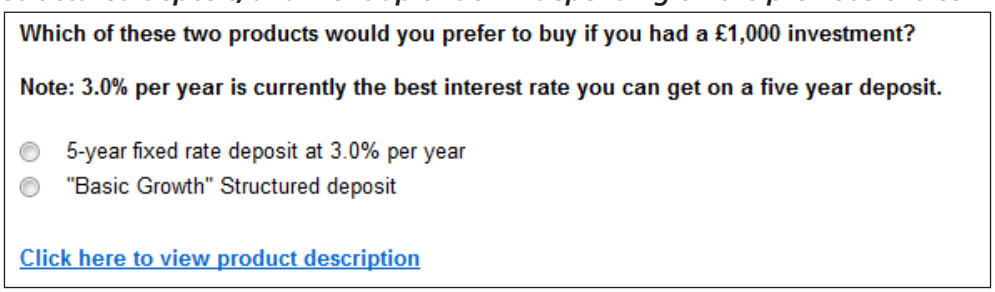
How much would you expect the FTSE 100 Index to be after 1 year, after two years and after 5 years? (bear in mind its current level is around 6,500)

Please drag the FTSE 100 Index icons after 1, 2 and 5 years to its appropriate position among the FTSE amounts

A1.6 Comparison of structured deposits with fixed-rate term deposits

In the third part we asked respondents to value the same three structured deposits as seen in part two in terms of risk-free interest rates on cash deposits. We first ask the respondents to value the Basic product by comparing it to a set of different interest rates (see Figure 14), and then to value all products using the ladder tool. In the ladder tool, we maintain absolute monetary payouts as the primary frame and show annual percentage returns in brackets.

Figure 14. Decision tree: The fixed interest rate was always presented above the structured deposit, and went up or down depending on the previous choice.



A1.7 Disclosure and adjustment of valuation of structured deposits

We showed three versions of information about likely payouts of the products (disclosure) under various scenarios and the risk associated with these products. Examples of disclosure screens are provided below.

Figure 15. Example of 'Scenarios ' and 'Scenarios&Charges ' disclosure. Note: 'Scenarios ' disclosure did not include the last paragraph 'What are the costs ' and otherwise was identical, hence is not presented separately.

This document provides you with additional information about these investment products. It is not marketing material. The information is designed to help you understand the nature of these products and the risks of investing in it. You are advised to read it so that you can take an informed decision about whether to invest.

What is this investment?

In the table below you can see what the payouts of the structured deposits would be under three scenarios. They are aimed to be a fair representation based on reasonable assumptions. They do not represent a forecast of what might happen.

Examples from investing £1,000 when the FTSE 100 Index is 6,500

	Outcome after 5 years		
	Poor performance: FTSE 100 at 5,000	**Medium performance: FTSE 100 at 7,000**	**Good performance: FTSE 100 at 8,000**
'Basic' See description..	You will get back the **£1,000** you paid us, as this is a reduction.	You will receive a payment of **£1,038**, which is ½ times the 7.7% growth in the Index value.	You will receive a payment of **£1,115**, which is ½ times the 23.1% growth in the Index value.
'Floor & cap' See description..	You will get the minimum payout of **£1,050**, as this is a reduction.	You will get the minimum payout of **£1,050**, as 30% of the 7.7% growth in the Index does not exceed the minimum 5% return.	You will receive a payment of **£1,069**, which is 30% of the 23.1% growth in the Index value.
'Cliquet' See description..	You will get back the **£1,000** you paid us, as this is a reduction.	You will receive a payment of **£1,074**, which is ten times the semi-annual growth of 0.74%. (assuming that the Index value grows at the same rate during all ten periods)	You will receive a payment of **£1,210**, which is ten times the semi-annual growth of 2.1%. (assuming that the Index value grows at the same rate during all ten periods)
Five year fixed-rate deposit paying 3.0%per year would return **£1,159** for the term.			

What are the costs?

- The charges you pay are 'built in' by the bank to the product's design.
- You will not pay a separate upfront or on-going fee in order to purchase this product.
- The bank's 'built in charge' on these products is approximately 7.5%. In effect this means, that 92.5% of your investment is the cost of the product and the remaining 7.5% is charged by the bank as a fee for creating and selling the product.

Figure 16. Example of payouts disclosure based on the quantitative model as in 'Payout'.

This document provides you with additional information about structured deposits. The information is designed to help you understand the nature of these products and the risks of investing in it.

How are the expected payouts calculated?

- The expected returns and the probabilities of products paying back more than just invested or more than a safe fixed-rate term deposit are based on financial modelling.
- The modelling makes assumptions about the future performance of the FTSE 100. The assumptions have been made with care and are aimed to be fair, but they do not represent a forecast of what will happen.

Expected payouts of the structured deposits under certain assumptions

Product	Chance product returns more than invested capital*	Chance product returns more than best risk-free deposit**	Expected payout (incl. £1,000 investment)	Total expected return	Expected return per year
'Basic' See description..	47 out of 100	25 out of 100	£1,108	10.79%	2.07%
'Capped' See description..	47 out of 100	35 out of 100	£1,103	10.30%	1.98%
'Kick-out' See description..	68 out of 100	68 out of 100	£1,115***	11.50%***	2.20%
5-year fixed rate deposit at 3.0% per year	100 out of 100	100 out of 100	£1,159	15.9%	3.0%

*For instance, "16 out of 100" means that it can be expected that sixteen times out of a hundred this product would perform at least as well as described in the header of the column.

**Currently 3.0% per year.

*** This number is for a term of five years only for comparability with other products. In fact, the 'Kick-out' product is expected to terminate after two years, with an expected payback of £1,049 incl. capital (4.9% more than invested). For comparison, a two-year fixed rate savings bond pays back £1,042, amounting to a total return of 4.2% for the two years term.

What are the costs?

- The charges you pay are 'built in' by the bank to the product's design.
- You will not pay a separate upfront or on-going fee in order to purchase this product.
- The bank's 'built in charge' on these products is approximately 7.5%. In effect this means, that 92.5% of your investment is the cost of the product and the remaining 7.5% is charged by the bank as a fee for creating and selling the product.

Annex 2: Sample statistics

Table 5. Sample statistics

	VARIABLES	N	mean	Standard deviation	Min	Max
Basic characteristics						
	gender of resp. (1=male)	384	0.59	0.49	0	1
	age of respondent	384	50.4	13.8	22	82
	educ basic	384	0.02	0.13	0	1
	educ gcse	384	0.08	0.27	0	1
	educ a levels	384	0.10	0.30	0	1
	educ tech	384	0.13	0.33	0	1
	educ graduate	384	0.37	0.48	0	1
	educ postgraduate	384	0.31	0.46	0	1
	financial expertise (1 to 5)	384	3.56	0.89	1	6
	household income, £k	384	97.5	107.7	7.5	780.0
Financial product ownership (share)						
	holds structured product or structured deposit	384	0.85	0.36	0	1
	holds personal current account	384	0.98	0.12	0	1
	holds instant access savings	384	0.91	0.28	0	1
	holds term deposit	384	0.70	0.46	0	1
	holds cash ISA	384	0.62	0.49	0	1
	holds S&S ISA	384	0.70	0.46	0	1
	holds mutual funds	384	0.48	0.50	0	1
	holds shares	384	0.60	0.49	0	1
Investment decisions (share)						
	investment decisions oneself	384	0.484	0.5	0	1
	investment decisions – partner	384	0.0599	0.24	0	1
	investment decisions accountant	384	0.0521	0.22	0	1
	investment decisions IFA	384	0.266	0.44	0	1
	investment decisions bank agent	384	0.0521	0.22	0	1

VARIABLES	N	mean	Standard deviation	Min	Max
investment decisions wealth manager	384	0.0573	0.23	0	1
Structured deposits held					
hold structured product (SD or SCARP)	384	0.85	0.36	0	1
number of struct. dep. accounts held	282	2.36	1.39	1	6
satisfaction with struct dep. held (1 to 4)	176	2.28	0.76	1	4
capital invested in structured deposits (£k)	185	84	118.9	2.5	500
Features of SD held (share)					
FTSE linked	140	0.6	0.49	0	1
Index linked	140	0.18	0.38	0	1
ind. stocks linked	140	0.16	0.37	0	1
participation in growth	140	0.23	0.42	0	1
fixed coupon	140	0.11	0.31	0	1
money locked in	140	0.21	0.41	0	1
kickout feature	140	0.05	0.22	0	1
Decision to buy SD (share)					
own research	185	0.39	0.49	0	1
friends	185	0.16	0.37	0	1
bank advisor	185	0.31	0.47	0	1
IFA	185	0.4	0.49	0	1
other reason	185	0.03	0.16	0	1
Attractive features of SD (share)					
alternative to cash	185	0.59	0.49	0	1
good risk-reward combination	185	0.56	0.50	0	1
money locked away	185	0.27	0.44	0	1
diversification	185	0.31	0.46	0	1
other features	185	0.01	0.10	0	1

Note: the number of observations varies because many respondents held structured products other than structured deposits, or were not able to specify a response.

Annex 3: Econometric model and regression output tables

Expected product returns

Subjects' expectations of structured deposit returns are based on their expectations of underlying market returns

For product j and respondent i we regress the reported expected return R_{ij}^{stated} on the implied expected return R_{ij}^{impl}, interaction terms between implied returns and control variables $R_{ij}^{impl}X$ and include fixed effects δ_j in some specifications:

$$R_{ij}^{stated} = \alpha + \beta R_{ij}^{impl} + \gamma R_{ij}^{impl} X_i + \delta_j + \varepsilon_{ij}$$

Hypotheses tested:

$H_0: \beta = 0; H_A: \beta > 0$ $\quad\quad$ $H_0: \gamma = 0; H_A: \gamma > 0$

Table 6. Regression results of reported expected returns on implied expected returns and controls

	(1)	(2)	(3)	(4)	(5)
	Reported expected returns				
VARIABLES	OLS pooled	Individual fixed effects			
implied return	**0.1780*** **	-0.0400	-0.0212	-0.0493	-0.0308
	(0.035)	(0.037)	(0.039)	(0.063)	(0.062)
*implied return * education*				**0.1569** **	**0.1598** **
				(0.071)	(0.070)
*implied return * finexpert*				**-0.1833** **	**-0.1936*** **
				(0.071)	(0.071)
Constant	3.7511***	4.2483***	4.1299***	4.2851***	4.1633***
	(0.108)	(0.084)	(0.096)	(0.081)	(0.094)
product dummies	no	no	yes	no	yes
Observations	1,110	1,110	1,110	1,110	1,110
R-squared	0.029	0.002	0.016	0.021	0.037
Number of respondents		384	384	384	384

Robust standard errors in parenthesis (clustered by individual). *** p<0.01, ** p<0.05, * p<0.1. *education* – education graduate or above; *finexpertise* – self-assigned above-average financial expertise.

Valuation of structured deposits

Valuation of products in terms of value-equivalent fixed interest rate increases with increasing errors in estimation of expected product returns

For product j and respondent i we regress the valuation V_{ij} on the overestimation of expected return $[R_{ij}^{stated} - R_{ij}^{impl}]$, controlling for product dummies $proddum_j$:

$$V_{ij} = \alpha + \beta \cdot [R_{ij}^{stated} - R_{ij}^{impl}] + proddum_j + \varepsilon_{ij}$$

Hypothesis tested:

$H_0: \beta = 0; H_A: \beta > 0$ $\quad$ $H_0: \gamma = 0; H_A: \gamma > 0$

Table 7. Regression results of product valuation on return overestimation

	(1)		(2)	(3)
	Product valuation			
VARIABLES	Pooled OLS		Individual fixed effects	
overestimation of return	**0.2297*** **		**0.2023*** **	**0.2058*** **
	(0.029)		(0.032)	(0.033)
Constant	3.5174***		3.5688***	3.0857***
	(0.090)		(0.061)	(0.085)
product dummies	no		no	yes
Observations	1,110		1,110	1,110
R-squared	0.083		0.086	0.215
Respondents	384		384	384

Robust standard errors clustered by respondent in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Effects of disclosure on valuation

Revaluation is (i) negatively associated with initial return estimation error and (ii) positively associated with initial risk premium required on the structured deposit as compared to fixed interest rate.

For product *j* and respondent *i* we regress the revaluation $Rev_{i,j}$ on the initial expected return overestimation $\left[R_{ij}^{stated} - R_{ij}^{impl}\right]$, the required risk premium $\left[R_{ij}^{stated} - V_{ij}\right]$, their interaction terms with disclosure version dummy $\left[R_{ij}^{stated} - R_{ij}^{impl}\right] \cdot discldum_{ij}$ and $\left[R_{ij}^{stated} - V_{ij}\right] \cdot discldum_{ij}$ and on the individual controls $\boldsymbol{X_i}$:

$$Rev_{i,j} = V_{i,j}^{new} - V_{i,j}$$
$$= \alpha + \beta_1\left[R_{ij}^{stated} - R_{ij}^{impl}\right] + \beta_2\left[R_{ij}^{stated} - V_{ij}\right] + \beta_3\left[R_{ij}^{stated} - R_{ij}^{impl}\right]discldum_{ij}$$
$$+ \beta_3\left[R_{ij}^{stated} - V_{ij}\right]discldum_{ij} + \delta \cdot discldum_{ij} + \boldsymbol{\gamma X_i} + \varepsilon_i$$

Hypotheses tested:

(i) $H_0: \beta_1 = 0$; $H_A: \beta_1 < 0$ (ii) $H_0: \beta_2 = 0$; $H_A: \beta_2 > 0$

Table 8. Regression results of product revaluation on return overestimation, required risk premium, controls, and interaction terms

	(1)	(2)	(3)		(4)	(5)	(6)
	Revaluation						
VARIABLES	Fixed effects				Random effects		
overestimation	**-0.1254*** **	**-0.1526*** **	**-0.1526*** **		**-0.1333*** **	**-0.1499*** **	**-0.1493*** **
	(0.029)	(0.040)	(0.040)		(0.024)	(0.035)	(0.035)
*overest. * discl Payout*		0.0570	0.0570			0.0352	0.0354
		(0.058)	(0.058)			(0.049)	(0.049)
premium	**0.2930*** **	**0.2602*** **	**0.2602*** **		**0.2904*** **	**0.2492*** **	**0.2487*** **
	(0.047)	(0.053)	(0.053)		(0.040)	(0.047)	(0.047)
*premium * discl Payout*		0.0754	0.0754			0.0917	0.0915
		(0.093)	(0.093)			(0.080)	(0.080)
discl 'scenario&-charges'						0.0719	0.0710
						(0.134)	(0.133)
discl Payout						**-0.4035*** **	**-0.4104*** **
						(0.150)	(0.149)
education							0.0325
							(0.121)
held struct product							-0.1045
							(0.152)
Constant	-0.2400***	-0.2360***	-0.2360***		-0.2217***	-0.0489	0.0205
	(0.051)	(0.052)	(0.052)		(0.066)	(0.104)	(0.172)
Observations	979	979	979		979	979	979
R-squared	0.128	0.134	0.134				
Number of respid	337	337	337		337	337	337

Robust standard errors clustered by individual in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
overestimation – overestimation of product return; *premium* – difference between expected return and value-equivalent risk-free rate; *education* – education graduate or above.

Note: 121 observations excluded where respondents failed to read the disclosure screens for at least 10 sec.