Developing new financial literacy measures to better link financial capability to outcomes

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Executive Summary

The aim of this project was to develop a pilot study and 'proof of concept' to identify sets of questions and a method to reliably and accurately measure individuals' financial capabilities. In this 'proof of concept' we focused on three key financial decisions which are sufficiently comprehensive to predict financial capability in a variety of contexts but sufficiently limited to enable efficient consumer surveying. The three financial decisions were choices of loans, insurance and investments. We developed and tested a scoring model to measure financial capability from any combination of correct and incorrect answers to the identified questions.

We accomplished our aim by means of a four-stage research approach:

Stage 1: Literature review. From the extensive, multi-disciplinary literature on financial literacy, we identified 31 potentially predictive questions using a taxonomy to map numeracy skill, financial concepts, specific product features, personality traits and preferences or attitudes to each of the three financial decisions of interest.

Stage 2: First experts' survey. We recruited a sample of 84 financial literacy experts (from a list held by Financial Literacy Australia) and used Best-Worst Scaling (BWS) (Louviere, Flynn and Marley 2015) to determine how well the experts thought the 31 questions would discriminate various aspects of financial literacy for each of the three specific financial decisions. We used the Best minus Worst choice counts to identify seven discriminating questions for assessing the capability of individuals to make decisions on loans, insurance and investments, respectively. Experts gave high ranking to self-reported attitudes and personal traits as well as objective knowledge, suggesting that financial capability is related to personality traits, attitudes and habits as well as objective knowledge of financial 'facts' like compound interest or inflation.

Stage 3: Consumer survey. We designed and administered a survey to a random sample of 1,000 consumers from a major Australian web panel. The survey asked participants to answer:
a) three financial decision questions on loans, insurance and investments that had unambiguously correct answers
b) the three sets of seven (not mutually exclusive) discriminating questions considered by experts to be highly informative
c) the remaining 12 of the 31 potentially predictive questions considered least informative by experts
d) other questions on numeracy, product knowledge, demographics and personal characteristics that let us compare survey participants with the general population and survey results from earlier related studies.

Stage 4: Second experts' survey. We designed and administered a survey to a sample of 51 financial literacy experts (drawn from the list held by Financial Literacy Australia as well as academic experts) who we asked to evaluate particular combinations of correct and incorrect answers for each of the seven discriminating questions (relating to financial decisions for either loans, insurance or investments). The experts chose the two most informative questions/answers for judging consumer capability to make decisions about either loans, insurance or investments. They also told us whether they would judge any individual who gave that combination of seven correct and incorrect answers to the questions as financially capable of making a decision on loans or insurance or

investment (yes or no). This allowed us to develop a scoring model that assigns a financial capability score to any combination of possible answers to the seven discriminating questions for loans, insurance or investment decisions. We then tested the discriminating power of the experts' capability scores using the responses we obtained in the consumer survey.

We found that:
1. Relevant questions differed across the three financial decisions, indicating that a one-size-fits-all financial literacy instrument is likely not to be sufficient.
2. Relevant questions included both objectively assessable knowledge and psychological traits and attitudes.
3. We could summarise the financial capability judgments of the sample of financial literacy experts in a statistical scoring model that we then could (and did) use to score the financial capability for loans, insurance and investment decisions of the individuals in the consumer survey.
4. The experts' scoring model performed well under two tests. First when comparing individuals' actual capability scores with the range and frequency of scores that would occur if the same number of people had answered the seven financial capability questions completely randomly, without using any financial skill or knowledge, we found that the expert scoring model did not assign scores at random and the surveyed consumers were rated as exhibiting financial skill and knowledge in their answers but at different rates for loans, insurance and investments. Second, we found that the scoring model assigned a higher average probability of financial capability for decisions about loans, insurance and investment to consumers who could correctly answer an objective test question on each of these topics in the consumer survey. The average probability of expert-scored capability is between 6 and 12 percentage points higher for the group answering correctly and this difference is statistically significant.

This project created new resources for financial literacy research:
1. **Financial Capability Measurement Catalogue** – a comprehensive bibliography of sources of financial literacy and capability questions
2. **Financial Knowledge and Attitudes Checklist** – a mapping from specific financial knowledge, skills, and personal traits to capability for decisions specifically relating to loans, insurance and investments, as examples of foundational financial decisions.
3. **General Financial Capability Inventory for Loans, Insurance and Investments** – a set of 31 representative questions that comprehensively appraises financial capability for loans, insurance and investment.
4. **Loans, Insurance and Investment Capability Inventories** – sub-inventories of seven prioritised questions that effectively measure consumer financial capability to make decisions on each of loans, insurance and investments.
5. **Consumer Capability Scales** – scoring methods to rate individuals' capability using their answers to the Loans, Insurance and Investment Capability Inventories.

1. Overview of Research Project

A growing body of literature has focused on ways to measure financial literacy using survey questions (OECD 2011, World Bank 2013, Lusardi and Mitchell 2014). Currently, there is little agreement on which questions to ask to measure financial capability (the focus of this project), or on how to combine the answers to the questions into an overall index of financial capability. Thus, not surprisingly, diverse streams of academic and applied research have not been assimilated. The purpose of this research project is to take a first step towards such an assimilation.

To begin this process, we undertook a literature review, collating a comprehensive list of questions previously used to measure one or more aspects of financial capability. We identified 31 questions based on coverage, minimal overlap and non-redundancy. Next we surveyed experts on how to prioritize the selected questions according to their usefulness for predicting the financial capability of consumers specifically in relation to consumer decisions about loans, investments and insurance. We used this survey of experts to identify seven discriminating questions for each type of consumer decision. We then developed a scoring system for financial capability with respect to loans, insurance and investment decisions. We asked another group of experts to make judgements about consumer capability regarding each of loans, insurance and investments based on patterns of correct and incorrect answers to the seven prioritised questions. After that we scored actual consumers on their capability to make these three financial decisions using the system inferred from expert judgements. We then tested the power of these consumer-specific scores to predict the financial capability of individuals for loan, investment and insurance decisions.

2. Research Objectives

Our practical objective was to use statistical methods to develop subsets of financial literacy survey questions that best relate financial capability to specific financial decisions – loans, insurance and investments. The prioritised questions should be useful to measure capability for these decisions, diagnose difficulties and suggest remedial education. In this way we tried to improve the depth and efficiency of financial literacy research and extend its practical applications.

Our project addressed National Financial Literacy Strategy 2014–17 Priority 5: Improve research measurement and evaluation. "Financial literacy is a combination of financial knowledge, skills, attitudes and behaviours necessary to make sound financial decisions, based on personal circumstances, to improve financial wellbeing." (Australian Government 2014, p. 6). Despite the breadth of this definition, many financial literacy instruments used today only test fairly narrowly defined objective knowledge and omit relevant psychological traits, attitudes and demographics (Fernandes et al. 2014). In addition, most survey instruments do not test consumer understanding of crucial features of particular financial products (Bateman et al. 2014).

Thus, it appears that to better understand and more accurately predict financial behaviour, financial literacy questions (measures) need to cover not only numeracy and basic knowledge, but also specific product knowledge, attitudes, psychological traits, life experiences and acquired skills. However, if all these things can (and do) contribute to financial literacy, this poses a problem for researchers and educators. In many cases, collecting large amounts of

information about each person in surveys is not feasible, and what seems initially to be informative often turns out to be irrelevant after analysis.

Thus, the purpose of this research was to identify a sufficiently comprehensive set of discriminating survey questions, and a method to reliably and accurately measure individuals' financial capability to take out or purchase loans, insurance and investments, whilst at the same time being a small enough set to be useful when lengthy consumer surveying is not possible. We achieve this objective through development of specific survey instruments for which we also provide tests of usefulness.

3. Research Methods

We used a four-stage research approach to achieve our objectives:

Stage 1: Literature review
This stage focused on identifying a comprehensive set of potentially diagnostic and predictive questions about financial literacy from past and current sources. Specifically, we reviewed relevant academic and applied literature that measures financial literacy and decision-making skills. From these sources, including the ANZ Survey (ANZ and the Social Research Centre 2011), OECD INFE Questionnaire (OECD 2011), Financial Capability Survey (World Bank 2013) and a wide range of academic work, we collected questions and measures. We edited this collection by eliminating overlapping and redundant questions.

Stage 2: First experts' survey.
This stage focused on financial decisions with known correct answers and on which financial literacy questions experts think best discriminate who will make correct decisions. In particular, we consulted with Financial Literacy Australia to identify three consequential financial choices. Financial decisions can be divided into (non-exclusive) types that:
1. require specific numeric skills
2. require product-specific knowledge
3. are influenced by certain psychological traits and attitudes
4. depend on personal circumstances.
Some examples include transacting, borrowing (loans), risk bearing (investments), budgeting, risk pooling (insurance) and evaluating complex combinations of these (choosing financial products).

The three financial decisions we focused on were loans, insurance and investments; these encompass a large range of consequential financial choices. In addition, we restricted the study to these topics because were able to design a question to test consumer skill in each of these areas that had a correct answer that did not change for individuals with different preferences or circumstances. We determined how well experts thought the questions and measures identified in Stage 1 would discriminate the various aspects of financial literacy related to these three specific financial decisions. To do this, we designed and implemented a Case 1 Best–Worst Scaling (BWS) survey (Louviere, Flynn and Marley, 2015, Chapter 2), and administered the survey to a panel of 84 experts drawn from the list held by Financial Literacy Australia. Participants in the survey were asked to choose the two questions in each set that were, respectively, the 'Best' and the 'Worst' at identifying how well people should perform

on each of the three financial decisions being studied.[1] In this approach, individuals choose the Best and Worst (most/least identifying) options in comparison sets that were selected to ensure statistical balance and power (Balanced Incomplete Block Designs or BIBDs). The method creates a ranking of all possible questions by their discriminatory power.

Stage 3: Consumer survey
This stage focused on consumer financial literacy levels and good or bad financial decisions. Specifically, we designed and implemented a field trial survey to assess:
1. how well we could discriminate financial literacy levels in a sample of consumers who made three financial decisions of research interest – loans, insurance and investments
2. how well questions and measures identified in earlier stages of the project can predict the consumers' decision quality (good or bad) on each of the three financial decisions.

To do this, we designed an online survey administered to over 1,000 consumers who were randomly sampled from a major Australian web panel. We asked survey participants questions about
1. numeracy and product knowledge
2. themselves (e.g., socio-demographics, attitudes, experiences, life events)
3. the three financial decision questions that had good or bad answers.

We offered small incentives for correct (good) decisions.

Stage 4: Second experts' survey
This stage focused on trying to better understand and model how experts evaluated combinations of correct and incorrect answers to the seven questions identified in Stage 2. We designed a Case 2 Best–Worst Scaling (BWS) survey (discussed later in Section 3.2) to study how a sample of 51 experts drawn from a list held by Financial Literacy Australia supplemented by a number of academic experts decided whether a set of correct and incorrect answers to the seven questions identified in Stage 2 indicated that the person who answered the questions was financially capable or not on that topic. We also asked the sample of experts to choose which of the questions/answers they thought would most and least predict the described person's capacity to make good decisions about loans, insurance or investments. This allowed us to infer how financially capable the sample of experts thinks a person with a given combination of right and wrong answers would be with respect to the particular decision. The goal here was to develop a scoring function that summarised expert opinion. We used the scoring function derived in this stage to score (measure) each consumer in the Stage 3 field trial survey.

In what follows we discuss aspects of the research approach in greater detail.

3.1 How we identified previously used questions with a literature review

We collected academic, public agency and financial industry publications that included detailed lists of financial capability measures. Appendix A lists the sources of measures in the **Financial Capability Measurement Catalogue**. We sorted questions from these various surveys and reports into subsets using the taxonomy developed in the **Financial Knowledge and Attitudes Checklist**, Appendix B. Our goal was to have at least one question on each

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[1] BWS is a choice-based measurement method based on random utility theory (Thurstone 1927; McFadden 1974). BWS extends Thurstone's (1927) method of paired comparisons to multiple comparisons of sets of objects of interest (in our case, the objects are questions). BWS typically requires many fewer comparisons than all pairs; it can be used in online surveys and is widely used by academics/practitioners.

numeracy skill, financial concept, specific financial product feature, personality trait, preference or attitude relevant to the three financial decisions – loans, insurance and investments. As far as possible, we selected questions that were succinct, clear, unambiguous and not redundant. In some cases, such as dividend payments on stocks and insurance purchases, there were no relevant questions in our collected sources, so we wrote new questions. In addition, on the advice of practitioners working with retail clients, we expanded the taxonomy in the **Financial Knowledge and Attitudes Checklist** to include budgeting skills and ability to assess the suitability of financial products and added relevant questions. (Question numbers in the first column of the **Financial Knowledge and Attitudes Checklist** [page 38] map each concept to the 31 questions in the **General Financial Capability Inventory for Loans, Insurance and Investments** reported in Table 4.1 below.)

We limited the final number of questions to 31 because we planned to survey financial literacy experts using a Case 1 Best–Worst Scaling (BWS) to prioritise the questions. Specifically, Case 1 BWS uses Balanced Incomplete Block Designs (BIBDs) to assign the questions to comparison sets. Numbers greater than 31 either require significantly more comparison sets or significantly larger comparison sets (i.e., more questions per set). Keeping both the number of sets and the size of the sets to a reasonable number is important when one is studying experts, who, by definition, are busy people with limited time budgets. That is, we wanted to maximise participation and completion rates in the expert survey because we expected relatively small samples. In addition, this project is a proof of concept and pilot test of the proposed approach; hence, it is more important to ensure that we have identified the majority of questions that could matter than possibly inadvertently omitting one that could matter.

We reserved demographic information questions (e.g., personal income or formal education) for the consumer survey. While often correlated with financial capability, demographic information does not reliably discriminate financially capable or incapable individuals: individuals with high education and high income can be low in financial capability, and vice versa. At the same time, collecting demographic information alongside financial capability measures helps identify target groups for education or advice programs.

3.2 How we prioritised the identified questions

After identifying the 31 key questions for the **General Financial Capability Inventory for Loans, Insurance and investments**, we needed input from experienced financial literacy experts to prioritise them. Our aim was to try to find a smaller subset of questions that effectively measure financial capability for loans, investments and insurance decisions. To do this, we collected information from an expert panel drawn from a Financial Literacy Australia list of people who are active in the financial literacy community. We asked the experts to evaluate questions assigned to small, carefully constructed sets. As noted, to do this we used a BIBD to make 31 multiple comparison sets. This approach ensures reliable results because each set had exactly six questions for the expert sample to compare; each question occurred and co-occurred with every other question equally often;[2] and each question appeared in each order (1 to 6 from left to right or top to bottom) to control for potential order effects.[3]

Each expert participating in the survey evaluated one of two versions of comparison sets. We randomly assigned the 31 comparison sets without replacement to two versions of the survey:

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[2] The advantages of such a design are discussed by Louviere, Flynn and Marley (2015, Chapter 2).
[3] The particular BIBD we used is known as a 'Youden' design.

one had 15 sets and the other had 16 sets. We also randomly assigned survey participants to one of the two versions, and imposed a quota constraint to ensure approximately equal sample sizes in each of the two versions. Table 3.1 shows an example comparison set from the 31 sets. For each choice set, experts evaluated the relative informativeness of each of the six questions for measuring financial capability relative to loans, investments or insurance decisions. Experts chose the most (Best) and least (Worst) informative questions in each comparison set (i.e., they made two choices). We used the experts' choices to prioritise the questions in terms of their relative informativeness (details discussed later).

Table 3.1: Example comparison set – 'first experts' survey'

What we want you to do in this section of the survey is fairly simple. We will show you 15 (16) sets of six questions. Each question has been used by researchers previously to measure some aspect of Financial Literacy. As noted above, the focus of this section is on <decision X>. What we want you to tell us in each of 15 (16) sets that follows is:

1. If you could ask ONLY ONE question to learn about how financially literate a person is about <decision X>, which ONE do you think would be the MOST informative?
2. If you could ask ONLY ONE question to learn about how financially literate a person is about <decision X>, which ONE do you think would be the LEAST informative?

Now, we will blackout those two choices, and ask two more questions:

1. If you could ask ONLY ONE question to learn about how financially literate a person is about <decision X>, which ONE do you think would be the MOST informative? (i.e., 2nd most)
2. If you could ask ONLY ONE question to learn about how financially literate a person is about <decision X>, which ONE do you think would be the LEAST informative? (i.e., 2nd least)

That's all there is to it! The sets may look repetitive, but please rest assured that no two sets are alike even though you will see the same questions appear from time-to-time. The sets are scientifically designed to insure that we can capture how you prioritize the questions and measure your priorities on a ratio scale like miles, kilometres, pounds or kilos.

MOST informative question	2nd MOST informative question	Set Number 1	LEAST informative question	2nd LEAST informative question
☐	☐	A bat and ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? a) 1 cent b) 5 cents c) 10 cents d) 11 cents e) 20 cents f) 100 cents g) 1 dollar	☐	☐
☐	☐	Which of the following represents the biggest risk of getting a disease? a) 1% b) 10% c) 5%	☐	☐
☐	☐	An investment with a high return is likely to be high risk a) True b) False	☐	☐
☐	☐	A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. a) True b) False	☐	☐
☐	☐	Suppose you own shares in an Australian company. Which of the following is true about the tax you will pay on dividend income? a) The dividend income is taxed at a fixed rate of 15% b) If the divided carries franking credits, you are eligible for a tax offset for the company tax already paid c) If the dividend carries franking credits, you pay no tax on the dividend d) The dividend income will not be taxed.	☐	☐
☐	☐	Which asset listed below normally should fluctuate in value the most over time? a) Savings accounts b) Stocks c) Bonds	☐	☐

A total of 84 financial literacy experts agreed to participate and returned the survey. (We label this survey the 'first experts' survey'.) Appendix C, Table C1 reports the characteristics of the experts who participated in the prioritisation survey.[4]

We analysed the first experts' survey choices using simple counts.[5] For each of the 31 questions we calculated the total number of times a specific question was chosen as most informative (Best) and as least informative (Worst). We then adjusted (weighted) those totals to take into account the frequency of occurrence of each of the questions across all the choice sets observed by the sample of experts. This gave us the probability of experts choosing each question as Best or Worst, given its associated probability of occurrence. We subtracted the weighted Worst counts from the weighted Best counts to produce difference scores for each question.[6] In the end, this let us rank each question against every other question in order of relative informativeness. This method of Best–Worst Scaling (BWS) is widely used to identify key decision factors by marketing academics and practitioners and applied economists.[7] As we later discuss in Section 4, Research Results, we sorted these scores to find the questions that best appraised financial capability for each of the three financial decisions.

Table 4.2 reports the **Loans, Insurance and Investment Capability Inventories** which lists seven discriminating questions for assessing the capability of individuals to make decisions on loans, insurance and investments.

3.3 How we developed statistical models that describe how experts view the informativeness of each question

The BWS results allowed us to identify seven key questions for each of the three financial decisions of interest (loans, insurance and investments). The next step was to design another survey (i.e., 'second experts' survey') to model how another sample of experts evaluated combinations of incorrect and correct answers on the sets of seven financial capability questions.

Specifically, answers to each of the seven questions associated with loans, insurance and investment decisions can be correct or incorrect. (In the case of attitude and personality questions, we defined a 'correct' answer to be a scale selection of 8 or above in the desired personality trait or attitude). Thus, exactly $2^7 = 128$ possible combinations of answers can be observed in any sample or population of consumers. These combinations range from all incorrect to all correct, with every possibility in between. We seek to understand how experts will evaluate these combinations to decide whether a person represented by some combination of the seven correct or incorrect answers is financially capable of making the financial decision in question (i.e., loans, insurance and investments).

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[4] The complete first experts' survey can be found at http://survey.confirmit.com/wix9/p3075081399.aspx

[5] As noted by Louviere, Flynn and Marley (2015), this simple analytical approach is justified by virtue of the fact that the Balanced Incomplete Block Design (BIBD) and associated Best (most informative) and Worst (least informative) choices represent a crosstab (contingency) table, with the choices each being one 'side' of that table. Thus, the choice counts are what are known in discrete multivariate statistics as 'marginals'. Louviere and Woodworth (1983) and Louviere, Hensher and Swait (2000) show that these marginal are estimates of the unknown parameters in the Luce (1959) choice model, and can be used to estimate the parameters of a conditional logit choice model (McFadden 1974).

[6] Discussed in Louviere, Flynn and Marley 2015, Chapter 2.

[7] The original paper demonstrating this use was Finn and Louviere (1992).

To do this we used a particular type of experimental design to construct sets of hypothetical consumers who each differ in their combinations of correct and incorrect answers to the seven questions.[8] By using this design, we can model the importance of the correct and incorrect answers independently for each of the seven questions.

Financial Literacy Australia emailed people on its mailing list and invited them to participate in the second experts' survey. We randomly assigned experts who agreed to participate to one of three conditions (loans, investments or insurance) without replacement, subject to equal quotas of individuals for each decision. This produced a final sample of 51 people, with 17 people assigned randomly to each of the three decisions (loans, insurance and investments). We asked each expert participant to tell us which of the seven questions and associated answers were most and least informative about the hypothetical people's financial capability to make the financial decision. We also asked them to evaluate each hypothetical person's set of answers to the seven questions as a whole, and tell us whether they thought the hypothetical person was financially capable (yes or no) to make the financial decision in question. The instructions and questions asked in relation to one hypothetical consumer (Person 1 of 8) are shown below. Expert respondents to the survey evaluated eight hypothetical people. Table C1, Appendix C reports the characteristics of the 51 experts who participated in the second survey.[9]

Introduction to the Survey

This survey is about financial capability. Specifically, we used an earlier survey to identify seven key questions from the many previously used to measure types of financial literacy, in various academic and industry surveys. This survey focuses on these seven key questions.

What we would like you to do is fairly simple. We will show you eight different people. Each person is profiled in terms of their test scores on the seven key questions. Because each of the seven questions have objectively correct answers, we describe each person's test results for each question as either "Correct" (✓) or "Incorrect" (✗). Each person has a different combination or pattern of correct and incorrect test results. What we would like you to do is to answer three simple questions about each person:

1. Tell us (i.e., "choose") which combination of question and test result you consider to be the **most informative** about the person's degree of financial capability for making investment decisions;
2. Tell us (i.e., "choose") which combination of question and test result you consider to be the **least informative** about the person's degree of financial capability for making investment decisions; and
3. Tell us whether you think the person is **sufficiently financially capable** to make investment decisions (yes or no).

That's all there is to it!

The questions about the eight people are followed by a small number of questions about you to allow us to compare the answers of different types of people (e.g., financial planners with academics, males with females, etc). The survey software we use assigns a completely anonymous ID to you automatically, and this ID CANNOT be associated with you. So, you can feel confident that your answers to these questions are strictly anonymous.

The whole survey should take around 10-15 minutes to complete at a maximum.

Your participation in this survey will help to better understand how people like you think about the value of financial capability questions.

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[8] The type of design is called an 'Orthogonal Main Effects Plan' (OMEP) and has the property that the values 'correct' and 'incorrect' for each of the seven questions vary independently of one another across the eight hypothetical consumers.

[9] The complete second experts' survey can be found at http://survey.confirmit.com/wix/1/p3076283201.aspx

Please choose what you think is most informative and least informative (question and answer together) in each column below.

Questions asked to measure Person 1's degree of financial capability in regards to making investment decisions:	Test Results	MOST Informative	LEAST Informative
Q1. Normally, which of these assets exhibits the highest fluctuations over time? a) Savings accounts b) Shares c) Bonds	✖	○	○
Q2. If you own shares in an Australian company, which of the following is true about the dividend payments you receive. a) The payment would be the same dollar amount every year b) The payment may vary from year to year c) The payment would be a fixed percentage of the share price d) The payment would rise and fall with interest rates	✔	○	○
Q3. It is usually possible to reduce the risk of investing in the share market by buying a wide range of shares. a) TRUE b) FALSE	✔	○	○
Q4. If you invest $1,000 in a managed fund (e.g., a property trust, share trust, equity trust, growth trust, imputation trust or balanced trust), is it possible to have less than $1,000 when you withdraw your money? a) Yes b) No	✔	○	○
Q5. Is an investment with a high return likely to be high risk? a) Yes b) No	✔	○	○
Q6. If a friend inherits $10,000 today and her sibling inherits $10,000 three years from now, who will be richer in three years because of the inheritance? a) My friend b) Her sibling c) They will be equally rich	✔	○	○
Q7. If you own shares in an Australian company, which ONE of these statements is true about the tax you will pay on dividend income? a) The dividend income is taxed at a fixed rate of 15% b) If the divided carries franking credits, you are eligible for a tax offset for the company tax already paid c) If the dividend carries franking credits, you pay no not taxed d) The dividend income is not taxed on the dividend	✔	○	○
Is Person 1 sufficiently financially capable to make investment decisions?	○ Yes ○ No		

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As before, we expressed the most (Best) and least (Worst) choices as counts, and focused on the most minus least counts to measure how informative participants thought each question and answer combination was. These counts produce a common measurement scale for all of the question levels (7 questions by 2 answers = 14 total levels), so we can measure the informativeness of each question and answer pair. Because the sample sizes are the same for all three decisions and there are no missing data, no weighting is required.[10]

Answers to the extra question deciding if the hypothetical person was financially competent (yes or no) also can be counted and used to estimate statistical choice models. Statistical choice models assume that experts participating in the survey weight each of the seven questions by their relative informativeness and then compute an overall score for the set of answers. The choice model assumes that the experts then use the overall score they have computed to decide if the hypothetical person is financially capable or not. We use the statistical choice model to back out the size of the weights given by the experts to each question from the observed choices of experts participating in the survey.

Having inferred the weights used by the experts to evaluate the questions in the hypothetical survey, we can use the weights to predict the expected expert score of any person who answers the seven questions. In this way we used the choice model weights to score the financial capability of consumers to make loans, insurance and investments decisions in the

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[10] The most and least informative questions are based on what is known as Case 2 Best–Worst Scaling (Louviere, Flynn and Marley, 2015, Chapter 3), while the yes/no financial capability questions rely on Case 3 Best–Worst Scaling (Louviere, Flynn and Marley, Chapter 4), also called 'Discrete Choice Experiments' (DCEs) (Louviere, Hensher and Swait, 2000). Case 2 Best–Worst Scaling (BWS) allows one to measure all the questions and their answers (correct/incorrect) on a common scale.

third (consumer) survey based on their answers to the seven questions. In Section 4 we discuss how we checked these scores using other statistical strategies.

3.4 How we applied the model results to the consumer survey

As noted earlier, in Stage 3 we collected data from a sample of consumers drawn from the general Australian population. We asked the sample of consumers to make three hypothetical financial decisions (on loans, insurance and investments) – for which there was an unambiguous correct answer – and the seven questions prioritised by experts as most pertinent to each of the three financial decisions of interest. We also surveyed participants on the remaining 12 of the 31 questions identified at Stage 1, and a range of demographic variables. Appendix C, Table C2 summarises the characteristics of the participants in the consumer survey. Appendix C, Table C3 summarises the answers to all questions in the consumer survey.[11] The first three questions in Appendix C Table C3 are those we designed and implemented to test financial capability for loans, insurance and investment decisions.

We used the choice model outcomes discussed in Section 2 to predict a loan, an investment and an insurance capability score for each consumer in the survey, based on their answers to the prioritised seven questions. This score is a measure of the experts' views of how financially competent they think a person is, based on their answer profile. That is, each person's 'score' is the expected score that the model predicts the sample of experts should assign to the person. We describe these results in detail in Section 4, Research Results.

4. Research Results

Stage 1 began the project by collecting questions previously used by academics and practitioners to measure aspects of financial literacy. We identified a list of questions by reviewing as much of the global literature on this topic as possible. This resulted in the final list of 31 questions shown in Table 4.1, the **General Financial Capability Inventory for Loans, Insurance and Investments**.

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[11] The complete consumer survey can be found at http://survey.confirmit.com/wix/p3076383363.aspx

Table 4.1: General Financial Capability Inventory (GFCI) for Loans, insurance and Investment – 31 questions identified in comprehensive global literature review

1. A bat and ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

   a) 1 cent
   b) 5 cents
   c) 10 cents
   d) 11 cents
   e) 20 cents
   f) 100 cents
   g) 1 dollar

2. In a lake there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take to cover half the lake?

   a) 16 days
   b) 24 days
   c) 25 days
   d) 32 days
   e) 26 days
   f) 22 days
   g) 47 days

3. In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize are 1%. What is your best guess about how many people would win a $10.00 prize if 1,000 people each buy a single ticket from BIG BUCKS?

   Correct answer: 10

4. Suppose you put $100 into a savings account with a guaranteed interest rate of 2% per year. You make no further payments in to this account and withdraw no money. How much would be in your account at the end of five years?

   a) More than $110
   b) Exactly $110
   c) Less than $110

5. Which of the following numbers represents the biggest risk of getting a disease?

   a) 1 in 100
   b) 1 in 1,000
   c) 1 in 10

6. Is an investment with a high return likely to be high risk?

   a) Yes
   b) No

7. Is it usually possible to reduce the risk of investing in the share market by buying a wide range of stocks and shares?

   a) Yes
   b) No

8. If an investor spreads their money among different assets, does the risk of losing a lot of money:

   a) Increase
   b) Decrease
   c) Stay the same

9. Suppose a friend inherits $10,000 today and her sibling inherits $10,000 three years from now. Who will be richer in three years because of the inheritance?

   a) My friend
   b) Her sibling
   c) They will be equally rich

10. Suppose you have $10,000 of your own money available to invest in a savings or investment. Which ONE of the following savings or investment offers would appeal to you most?

    a) A guaranteed return of $12,000 in 5 years (capital + interest)
    b) A 5-year investment with an expected return in the range of $0 to $100,000
    c) A 5-year investment with an expected return in the range $8,000 to $14,000

11. Do you see yourself as "a person who is generally willing to take risks, or do you try to avoid taking risks?"

    To answer please score yourself between 0 and 10. A score of 0 means you are "completely unwilling to take risks" and a score of 10 means you are "very willing to take risks". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

12. How well does the statement "I abstain from things today so that I will be able to afford more tomorrow" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

13. How well does the statement "I set long term financial goals and strive to achieve them" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

14. How well does the statement "I know the right sources to consult to make wise financial decisions" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

15. How well does the statement "I tend to live for today and let tomorrow take care of itself" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

16. How well does the statement "Sometimes I can't stop myself from doing something, even if I know it is wrong" describe you as a person?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

17. How well does the statement "I keep a close personal watch on my financial affairs" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

18. How well does the statement "I believe I can succeed at most any endeavour to which I set my mind" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

19. Suppose you want to make a $1,000 purchase with your credit card. The retailer tells you that you will be charged an extra 2% fee for using your credit card. Your sister buys the same item in the shop next door for $1000. She is charged a flat rate $15 fee for using her credit card. Who paid a higher credit card fee?

    a) You
    b) Your sister

20. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan is less.

    a) True
    b) False

21. Suppose you have a savings account at a bank, which ONE of these statements about the tax you will pay on interest income is correct?

    a) The interest income is not taxed
    b) The interest income is taxed at a fixed rate of 15%
    c) The interest income is included in your taxable income
    d) The total amount in your savings account will be included in your taxable income.

22. Suppose you own shares in an Australian company. Which ONE of these statements is true about the tax you will pay on dividend income?

    a) The dividend income is taxed at a fixed rate of 15%
    b) If the divided carries franking credits, you are eligible for a tax offset for the company tax already paid
    c) If the dividend carries franking credits, you pay no tax on the dividend
    d) The dividend income is not taxed

23. Suppose the interest rate on your savings account is 1% per year and inflation is 2% per year. After 1 year, how much can you buy with the money in this account?

    a) More than today
    b) Exactly the same
    c) Less than today

24. Suppose you own shares in an Australian company. Which ONE statement is true about the dividend payments you receive?

    a) The dividend payment would be the same dollar amount every year
    b) The dividend payment may vary from year to year
    c) The dividend payment would be a fixed percentage of the share price
    d) The dividend payment would rise and fall with interest rates

25. If you buy a bond of firm B, which ONE of these statements is correct?

    a) You own a part of firm B
    b) You loaned money to firm B
    c) You are liable for firm B's debt

26. Suppose you owe $3,000 on your credit card. You pay a minimum payment of $30 each month. If the annual percentage rate is 12% (or 1% per month), how many years would it take you to eliminate your credit card debt if you made no additional new charges?

    a) Less than 5 years
    b) Between 5 and 10 years
    c) Between 10 and 15 years
    d) The debt is never repaid

27. Suppose each person below has the same amount of annual income after tax, which ONE needs the greatest amount of life insurance?

    a) A young single woman with two young children
    b) A young single woman with no children
    c) An elderly retired man whose wife also is retired
    d) A young married man with no children

28. Normally, the value of one of the assets below should fluctuate the most over time. Which ONE is it?

    a) Savings accounts
    b) Stocks
    c) Bonds

29. Is the following statement true or false? "If you invest $1,000 in a managed fund (like a property trust, share trust, equity trust, growth trust, imputation trust or balanced trust), it is possible to have less than $1,000 when you withdraw your money."

    a) True
    b) False

30. How well does the statement "Before I buy something I carefully consider whether I can afford it" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

31. How well does the statement "I regularly check that my credit cards, insurance and investments still meet my needs" describe you personally?

    To answer please score yourself between 0 and 10. A score of 0 means "does not describe me at all" and a score of 10 means "describes me perfectly". If you think your score is not exactly 0 or 10, use values between 0 and 10 to score yourself.

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Based on the answers to the Best–Worst Scaling questions from the sample of financial literacy experts, we obtained the weighted observed choice totals for the Most and Least important questions. Higher choice totals indicate that the questions were deemed to be more informative by the experts. Figure 4.1 displays the relative ranking of each question. Appendix D, Table D1 details the weights, choice totals and exact ranks.

Figure 4.1: Experts' rankings of questions by financial decision topic
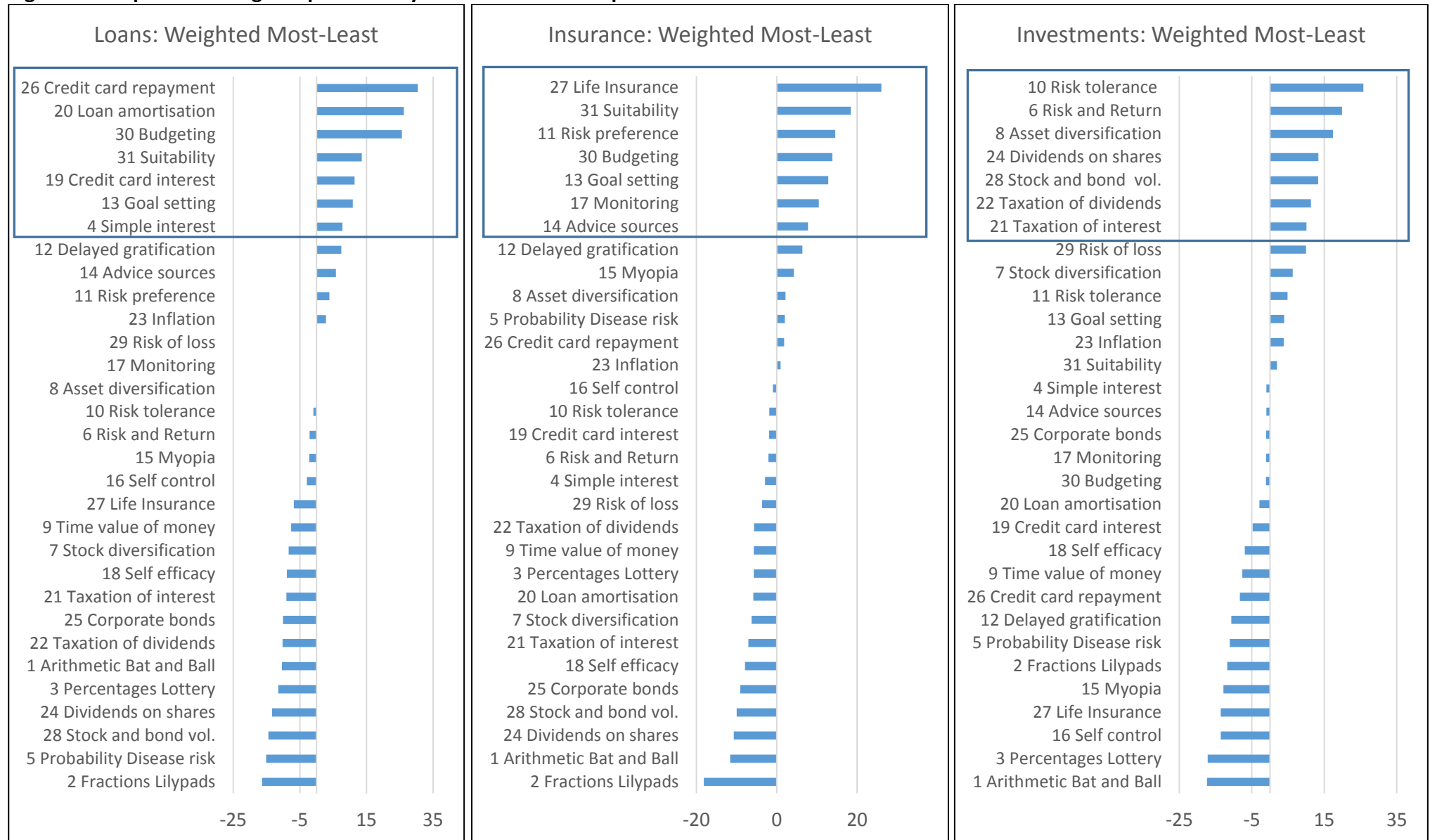
Notes: Figures show experts' relative informativeness scores of 31 questions from the General Financial Capability Inventory. Scores are based on weighted counts of the number of times experts ranked each question as most (least) informative for assessing financial capability for decisions on loans, insurance or investments. Question numbers are from the **General Financial Capability Inventory**, Table 4.1.

Experts preferred questions closely connected with the related financial decision. In the case of loans, for example, experts gave priority to an understanding of repayment schedules, interest charges, and budgeting. Similarly, the key areas of knowledge for investments were risk and diversification, and understanding the features of risky securities, such as dividends. Then again, the seven preferred insurance capability questions reflect the fact that few previously published financial literacy questions target insurance decisions capability: the one question directly on insurance decisions was ranked highest by the experts, and this question we wrote ourselves to fill a gap in published studies.

Experts gave high rankings to self-reported attitudes and personal traits, as well as to objective knowledge. This outcome confirms evidence presented by several recent academic studies, and the views practitioners expressed to us directly – that, for many financial decisions, capability is as much related to personality traits, attitudes and habits as it is to objective knowledge of financial 'facts' such as compound interest. In the case of loans and insurance, experts selected attitudinal questions on budgeting (i.e., the tendency to ask "Can I afford this purchase?") and suitability (i.e., the tendency to ask "Is this financial product right for my needs?") to be in the top seven most informative questions. For investment decision capability, the top ranked questions measure a personal risk tolerance, but the other highly ranked questions all test objective knowledge. The fact that 68% of respondents in our expert sample interacted directly with consumers may have influenced this outcome.

We selected seven of the highest-ranked questions for each of the three financial decisions, for which there are clear objective correct or incorrect answers. We restricted our choice to seven questions with objectively correct answers because this group included most of the clearly preferred questions and also let us build a fairly simple model of how experts evaluated particular combinations of correct and incorrect answers for each question as important for financial capability. For example, a question about personal risk tolerance, although highly ranked, did not satisfy this criteria, because good financial decisions depend on an individual satisfying their own preferences – no risk tolerance level is objectively more correct than any other. In two other instances we made a replacement to ensure the coverage of a key concept i.e., capacity for delayed gratification for loan decisions and understanding of time value of money for investment decisions. Table 4.2 lists the seven selected questions for each of the three decisions, 4.2A (loans), Table 4.2B (insurance) and Table 4.2C (investments).

Table 4.2: Loans, Insurance and Investment Capability Inventories (LIICI)

Table 4.2A: Most informative questions for loan decisions

L1. You put $100 into a savings account with a guaranteed interest rate of 2% per year. You make no more payments into this account and you withdraw no money. How much would be in the account at the end of five years? a) More than $110 b) Exactly $110 c) Less than $110
L2. How well does this statement describe you as a person? "I abstain from things today so that I will be able to afford more tomorrow." *Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.*
L3. How well does this statement describe you as a person? "I regularly check that my credit cards, insurance and investments still meet my needs." *Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.*
L4. How well does this statement describe you as a person? "Before I buy something I carefully consider whether I can afford it" *Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.*
L5. You make a $1000 purchase with your credit card. The retailer tells you that she charges an extra 2% fee to use your credit card. The shop next door sells your sister the same item for $1000 and charges her a flat rate of $15 to use her credit card. Who pays the higher credit card fee? a) You. b) Your sister.
L6. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. a) True b) False
L7. You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an annual percentage rate of 12% (or 1% per month), how many years will it take to eliminate your credit card debt if you make no additional new charges? a) Less than 5 years b) Between 5 and 10 years c) Between 10 and 15 years d) The debt is never repaid

Notes: Rankings of questions from highest to lowest on Most-Least scores (Figure 4.2) L7; L6; L4; L3; L5; L1; L2. We selected a question on delayed gratification (L2) over the slightly higher ranked question on financial goal setting (question 13 from Table 4.1) to ensure at least one measure of this important trait.

Table 4.2B: Most informative questions for insurance decisions

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INS1. How well does this statement describe you as a person? "I tend to live for today and let tomorrow take care of itself."
Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.

INS2. How well does this statement describe you as a person? "I keep a close personal watch on my financial affairs."
Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.

INS3. How well does this statement describe you as a person? "Before I buy something I carefully consider whether I can afford it" *Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.*

INS4. How well does this statement describe you as a person? "I set long term financial goals and strive to achieve them."
Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.

INS5. If the interest rate on your savings account is 1% per year and inflation is 2% per year, after 1 year how much can you buy with the money in this account?
a) More than today
b) Exactly the same
c) Less than today

INS6. How well does this statement describe you as a person? "I regularly check that my credit cards, insurance and investments still meet my needs."
Please use a scale from 0 to 10, where 0 means "does not describe me at all" and a 10 means "describes me perfectly". Use values in-between to indicate where you fall on the scale.

INS7. If each of the following persons has the same amount of annual income after tax, who needs the most life insurance?
a) A young single woman with two young children
b) A young single woman without children
c) An elderly retired man, with a wife who is also retired
d) A young married man without children

Notes: Rankings of questions from highest to lowest on Most-Least scores (Figure 4.2) INS7; INS6; INS3; INS4; INS2; INS1; INS5. We selected a slightly lower ranked question on inflation (INS5) over the question on risk preference (question 11 from Table 4.1) because there is no objectively "more correct" risk preference score.

Table 4.2C: Most informative questions for investment decisions

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INV1. Normally, which of these assets exhibits the highest fluctuations over time?
a) Savings accounts
b) Stocks
c) Bonds

INV 2. If you own shares in an Australian company, which of the following is true about the dividend payments you receive?
a) The payment would be the same dollar amount every year
b) The payment may vary from year to year
c) The payment would be a fixed percentage of the share price
d) The payment would rise and fall with interest rates

INV 3. It is usually possible to reduce the risk of investing in the share market by buying a wide range of shares.
a) True
b) False

INV 4. If you invest $1,000 in a managed fund (e.g. a property trust, share trust, equity trust, growth trust, imputation trust or balanced trust), is it possible to have less than $1,000 when you withdraw your money?
a) Yes
b) No

INV 5. Is an investment with a high return likely to be high risk?
a) Yes
b) No

INV 6. If a friend inherits $10,000 today and her sibling inherits $10,000 three years from now, who will be richer in three years because of the inheritance?
a) My friend
b) Her sibling
c) They will be equally rich

INV 7. If you own shares in an Australian company, which ONE of these statements is true about the tax you will pay on dividend income?
a) The dividend income is taxed at a fixed rate of 15%
b) If the dividend carries franking credits, you are eligible for a tax offset for the company tax already paid
c) If the dividend carries franking credits, you pay no tax on the dividend
d) The dividend income is not taxed

Notes: Rankings of questions from highest to lowest on Most-Least scores (Figure 4.2) INV5; INV2; INV1; INV7; INV4; INV3; INV6. We selected a question on the time value of money (INV6) over the ambiguous question on asset diversification (question 8 from Table 4.1). While time value of money was ranked lower than several other questions, we again judged that it was important to include one question on this critical aspect of investment evaluation.

In the second experts' survey, we asked the participants to indicate the informativeness of correct and incorrect answers for each of the seven chosen questions (for each financial decision). (Appendix D, Table D2 reports counts obtained from the second experts' survey.) Figure 4.2 shows these relative rankings in descending order of Most minus Least counts for loans, insurance and investment decision capability. Each panel lists 14 correct or incorrect answers for each of the top seven questions. For the self-reported attitudes and personal traits, we treated ratings of eight or above as 'correct' and ratings below eight as 'incorrect' answers. For question INS1 ("I tend to live for today and let tomorrow take care of itself") we reversed the rating scale, counting disagreement with the statement as 'correct'.

This sample of experts rated objective knowledge questions as most important for loan capability. Figure 4.2 indicates that they concurred that the most informative questions for Loans were questions L6 (incorrect) and L7 (correct), that relate to repayments on the most important forms of household borrowing, mortgages and credit cards. Question L6 tests knowledge of the interest burden of long-term amortisation ("A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. T/F") and L7 tests understanding of credit card repayment schedules ("You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an annual percentage rate of 12% (or 1% per month), how many years will it take to eliminate your credit card debt if you make no additional new charges?")

For Insurance decision capability, the most informative questions related to financial product suitability INS6 (correct) ("I regularly check that my credit cards, insurance and investments still meet my needs.") and the need for insurance INS7 (correct and incorrect equally informative) ("... who needs the most life insurance..."). These choices suggest that this sample of experts viewed the capacity to make sound decisions about insurance as depending first on detailed product knowledge and then on more general attitudes and skills.

In the case of Investments, the most informative questions tested objective knowledge of risky asset investments. The choices of key questions are consistent with an understanding of modern portfolio theory. Not knowing about the risk-return trade off (INV5 incorrect), not understanding stock diversification (INV3 incorrect) and understanding the relative volatility of deposits, stocks and bonds (INV1 correct) is highly indicative of an individual's capability for investment decisions, according to these experts.

Figure 4.2: Most minus Least counts for the top seven discriminating questions by correct/incorrect answers
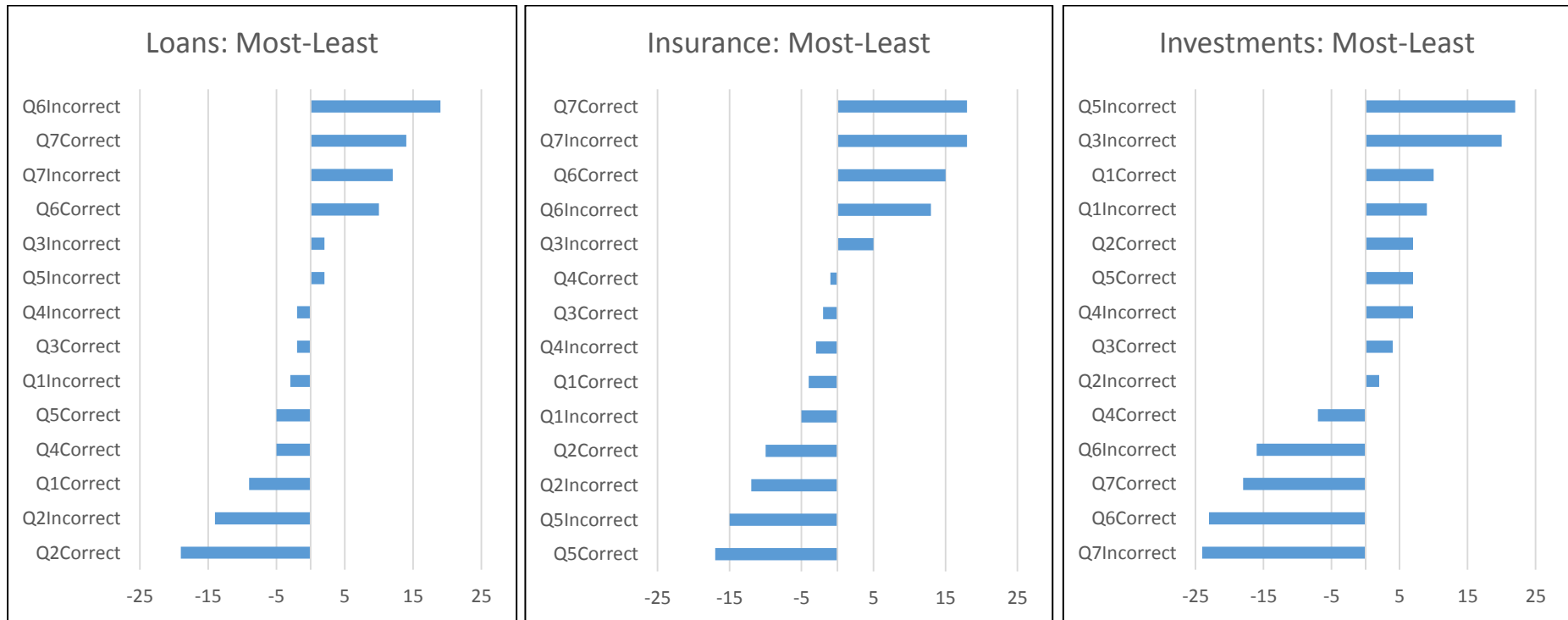
Our next goal was to use the experts' judgements of the financial capability of the hypothetical individuals they evaluated in the choice experiment to construct individual capability scores for loan, insurance and investment decisions. This scoring can be applied to any individual's answers to the **Loans, Insurance and Investments Inventory** to predict how the sample of experts was likely to judge their level of capability to make loan, insurance or investment decision.

We calculated a weighting scheme for the sets of seven questions from the answers the experts provided in the second experts' survey (see Table 4.3). Using this weighting scheme we were then able to calculate three summary capability scores for every consumer, depending on how that consumer answered the sets of seven questions (for loans, insurance and investments). The capability scores give us a metric for how an expert would rate an individual consumers' capability to decide on loans, insurance and investments. The technical details of how we calculated the weighting schemes and capability scores are discussed in Appendix D; we concentrate on the results in this section.

The results confirm that a consumer who can answer the question correctly will receive a higher capability score from the experts than a consumer who cannot answer correctly, but that some questions matter more than others. All questions have positive weights associated with them, as Table 4.3 shows. More specifically, for investments all questions were judged by the experts to be approximately equally important for predicting capability, resulting in almost equal weights. However, experts judged that for loans, questions L6 and L7, and for insurance questions INS5 and INS7, were particularly powerful for discriminating between capable and incapable consumers. The magnitude of the weights the experts assigned to these questions also reveal that getting question L6 correct is 'worth' more than answering all of L1, L2 and L3 correctly. The same high value applies to INS7.

Table 4.3: Consumer Capability Scales: expert-assigned topic and question weights for loans, insurance and investment decisions

	Loans	Insurance	Investments
Q1	0.182	0.032	0.603
Q2	0.422	0.222	0.514
Q3	0.171	0.371	0.627
Q4	0.360	0.351	0.627
Q5	0.233	0.620	0.514
Q6	0.837	0.518	0.572
Q7	0.775	0.885	0.569

We calculated capability scores for each respondent to the consumer survey using the method outlined in the appendix. These capability scores ranged from 0 to 1, with a higher score indicating higher expert evaluation of capability.

Next we applied two tests to evaluate the performance of the experts' capability scores (that is, the scoring model). First we evaluated the scores by testing them against a neutral (random) benchmark. Second we compared the scoring model predictions with decisions on loan, insurance and investments collected in the consumer survey. Both of these

evaluations confirm that the scoring model provides useful information on consumer capability for decisions on loans, insurance and investments.

The first evaluation shows whether the expert weighting scheme (the scoring approach) effectively identifies differences between consumers. To do this we compared the frequency and range of consumers' expert capability scores computed for the respondents to the consumer survey with the frequency and range of scores that would occur if the same number of people had (hypothetically) answered the sets of seven financial capability questions completely randomly, without using any financial skill or knowledge and had these random responses scored using the expert weighting scheme. When we compare the distribution of actual consumers' scores with the hypothetical random scores, we can deduce whether consumers are scoring lower (less capable), or higher (more capable) more often than would occur if they answered randomly.[12]

This comparison showed that the expert weighting scheme did not assign scores at random. The expert scoring scheme rated surveyed consumers as exhibiting more financial skill and knowledge in their answers than if the questions were answered randomly. The scheme also rated skills differently for loans, insurance and investments. Figure 4.3 compares the percentiles of the distribution of actual consumer capability scores with the percentiles of the neutral benchmark distribution. If respondents had answered the sets of seven questions randomly, we would have observed only 20% of respondents with a score above the 80th percentile, 10% of respondents with a score above the 90th percentile and so on. In contrast, we see that for loans, almost twice this many (41%) of respondents achieve a score that is above the 80th percentile of the theoretical distribution of scores, whereas for investments, almost 69% score above the 80th percentile of the theoretical distribution of investments scores. In other words, Figure 4.3 shows that the expert scoring scheme is not making merely random assignments of capability.

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[12] To compute the benchmark, we took every possible pattern of answers to the seven key questions, assuming that every pattern is equally likely, and scored them using the weights from Table 4.3 and the method detailed above. We then calculated the frequency, or probability, of each possible score to get a benchmark probability distribution of scores.

Figure 4.3: Comparison of expert-assigned capability scores for survey respondents with scores for hypothetical random answers – percentage of respondents that score above the respective percentiles of the hypothetical benchmark distribution
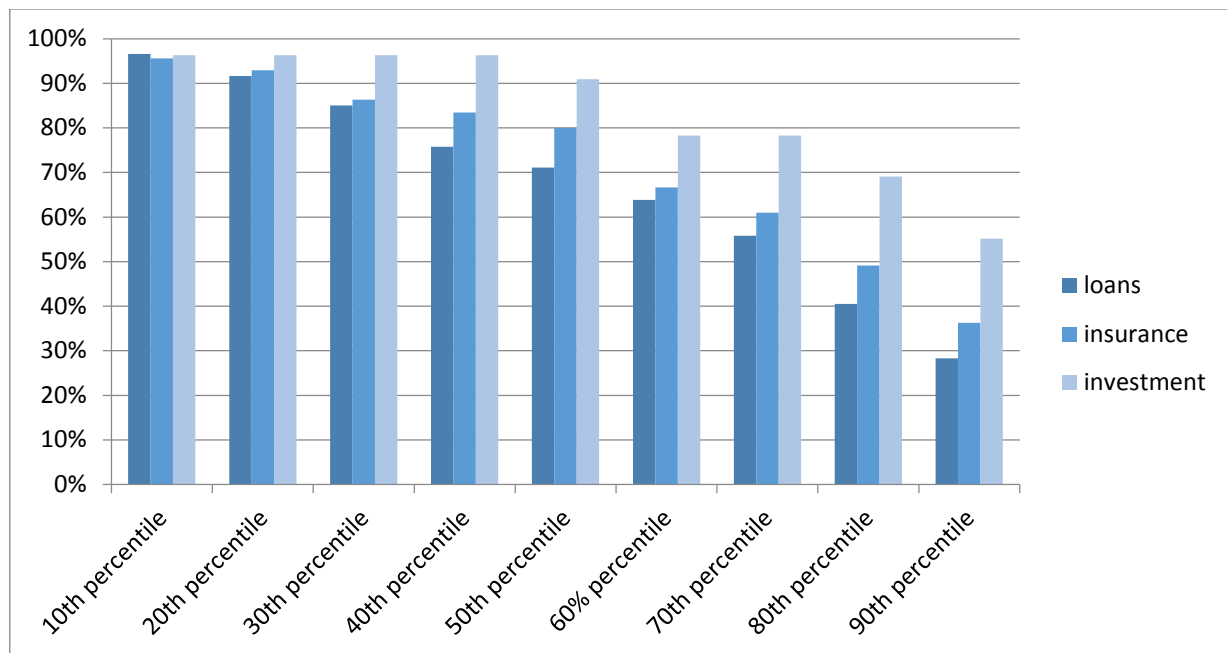
Second, we measure whether, on average, the expert weighting scheme correctly distinguishes consumers who choose the right answer in a test of their loan, insurance and investment capability from those who choose the wrong answer. We assess the capability of survey respondents using financial decision questions that have objectively correct or incorrect answers. Appendix C, Table C3 reports all consumer responses to these test questions. For clarity, we set them out here:

- **Loans**: You have a large outstanding credit card debt that is being charged a high rate of interest. Recently, you inherited some money unexpectedly and you are thinking about what to do with it. Which of the following options would be the best action?
    o Use your inheritance to pay off your credit card debt now, to get rid of the high interest charges.
    o Put your inheritance in a separate savings account because it is hard to save up large amounts of money.

- **Insurance**: You are not married, not in a relationship and have no dependents. You recently started a new full time job and moved your superannuation account to a new superannuation fund. Your new superannuation fund asks you if you would like to stay with the default life insurance settings. The default life insurance involves regular premiums deducted from your superannuation contributions and pays a standard amount if you pass away. Should you:
    o Stay with the default life insurance settings.
    o Opt out of life insurance altogether.
    o Increase your life insurance cover.
    o Decrease your life insurance cover.

- **Investments**: You are thinking about investing in the share market. Which of the following should you do?
  - Buy shares in one blue chip company.
  - Spread your money across a variety of shares in different companies.

Results from the consumer survey showed that, for loans and investments, a very high number of respondents (89.9% and 87.3%, respectively) gave the correct answers to the test questions, whilst only 39.3% of respondents answered the insurance test question correctly.

Using the expert scoring scheme and the consumers' responses to the sets of seven loan, insurance and investment questions, we calculated the probability that each consumer would be labelled as "capable" using the weighting scheme for loans, insurance and investments. For each respondent to the consumer survey, and for each of loans, insurance and investments, the probability of being labelled capable varies between 0 and 1 depending on how the respondent answered the related set of seven questions and the weight for each answer. (We refer to these probabilities as "capability probabilities" from now on).

Then using each of the three objective test questions above, we divided the consumer survey respondents into groups according to whether they answered the test question correctly ("correct" group) or incorrectly ("incorrect" group). We then compared the average of the experts' capability probabilities for the correct group, with the average of the experts' capability probabilities of incorrect group. If the weighting scheme is truly discriminating, the average capability probability of the "correct" group should be higher than the average capability probability of the "incorrect" group.

We found that the average capability probability assigned by the expert weighting scheme to the survey respondents who answered the test question correctly was higher than the average probability assigned by the expert weighting scheme to the respondents who answered incorrectly.

For all three financial decisions, the expert scoring scheme assigned much lower probabilities (statistical significance $p<.01$) of being capable to the "incorrect group" (those consumers who answered the test question incorrectly) than to the "correct group" (those consumers who answered to test question correctly).
- The average expert scored probability of being capable of making a **loan** decision was **11%** higher for the "correct" group than the average probability of being capable for the "incorrect group".
- The average expert scored probability of being capable of making an **insurance** decision was **6%** higher for the "correct" group than the average probability of being capable for the "incorrect group".
- The average expert scored probability of being capable of making an **investment** decision was **12%** higher for the "correct" group than the average probability of being capable for the "incorrect group".[13]

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[13] If we compare these results with a naive model that assigns equal weights to all questions (but operates on the same scale), we find that, for all three decisions, the experts' models have higher predictive power for correct/incorrect answers than the naive model.

Overall, the 'proof of concept' scoring model (expert weighting scheme) performed well under these two tests. In particular, the model consistently identified differences between consumers and, the scoring functions obtained were predictive of financial capability to make decisions about loans, insurance and investments relative to a naïve model that assigns equal weights to each question.

Summarising, our four-stage approach identified seven questions for each financial topic that were judged by our sample of experts to have discriminatory power, reported in the **Loans, Insurance and Investments Capability Inventory (LIICI)**. The second experts' survey allowed us to develop a scoring function (expert weighting scheme) for the LIICI, the **Consumer Capability Scales (CCS)** in Table 4.3, to assess respondents' financial capability based on answers to the **LIICI**. Our application of this scoring function to the consumer survey data generates probabilities of financial capability that are between 6-12 percentage points higher on average for consumers who pass a simple objective test than for those who fail. These results show that the scoring functions we obtained differentiate between consumers' financial capability to make a decision about loans, insurance and investments on the basis of their responses to 3 sets of 7 financial literacy questions. Thus, the **LIICI** and **CCS** can be used separately or together as simple tools for researchers and practitioners to distinguish between consumers.

5. Discussion and Conclusions

This project addressed National Financial Literacy Strategy 2014–17 Priority 5: Improve research measurement and evaluation. We are motivated by the view that "Financial literacy is a combination of financial knowledge, skills, attitudes and behaviours necessary to make sound financial decisions, based on personal circumstances, to improve financial wellbeing." (Australian Government 2014, p. 6,).

We recognise that despite the breadth of this definition, the three most frequently used questions in standard financial literacy surveys by Lusardi and Mitchell (Lusardi and Mitchell 2011, 2014) only capture narrowly defined objective knowledge and leave out relevant cognitive abilities, psychological traits, attitudes and demographics (Fernandes et al. 2014; Earl et al. 2015). However, in many cases, collecting such a large amount of general information about each person is not feasible; and factors that appear initially to be informative turn out to be irrelevant after analysis. Practitioners and educators need sets of questions or measures that are practical and economical to implement and provide a sufficient set of information to better understand what is associated with financial capability and produce reliable and accurate predictions for individuals. Thus, we sought to identify a set of key questions and a method to predict financial capability related to financial decisions about loans, investments and insurance.

We achieved this aim via a four-stage approach:
1) We identified relevant questions and measures that influence financial capability in the context of loans, insurance and investment decisions through a comprehensive literature review.
2) We narrowed the set of questions down to seven for each financial decision by using answers provided by financial experts in a Best–Worst Scaling approach

where the experts had to choose the questions/measures that discriminate most/least between financially capable and incapable consumers.

3) In a second survey of financial experts we used the Best–Worst Scaling method to develop a scoring model that assigns a financial capability score to any combination of possible answers to the respective previously defined seven questions.

4) We tested the experts' scoring function using responses from a consumer survey.

This study has led us to three new insights into financial capability measurement. Firstly, the set of relevant and predictive questions differs between the three financial decisions, indicating that a one-size-fits-all model is unlikely to be sufficient. Secondly, the questions identified as most pertinent questions to evaluating financial capability for loan, insurance and investment decisions include psychological traits and attitudes, confirming previous findings that financial capability encapsulates much more than objectively assessable knowledge. Thirdly, the ability of financial experts to assess consumers' financial capability can be summarized in a scoring model that assigns a higher average likelihood of capability to consumers who get the answers to a set of three questions in Loans, Insurance, and Investment correct that those who answer incorrectly. The average probability of expert-scored capability is between 6 and 12 percentage points higher for the group answering correctly and this difference is statistically significant.

This project has created new resources for financial literacy research:
1. The **Financial Capability Measurement Catalogue** – a comprehensive bibliography of global sources of financial literacy and capability questions: Appendix A.
2. **Financial Knowledge and Attitudes Checklist** – a mapping from specific financial knowledge, skills, and personal traits to capability for decisions specifically relating to loans, insurance and investments, as examples of foundational financial decisions: Appendix B.
3. **General Financial Capability Inventory for Loans, Insurance and Investments** – a set of 31 representative questions that comprehensively appraises financial capability for loans, insurance and investments: Table 4.1
4. **Loans, Insurance and Investment Capability Inventories** – sub-inventories of seven prioritised questions that most effectively appraise consumer financial capability to make decisions on each topic: Table 4.2
5. **Consumer Capability Scales** – simple scoring methods to rate individuals' capability using their answers to the Loans, Insurance and Investment Capability Inventories: Table 4.3.

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Appendix A: Financial Capability Measurement Catalogue

This list catalogues publically available academic, financial industry and international agency sources of financial capability measures reviewed for this project.

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Appendix B: Financial Knowledge and Attitudes Checklist

Table B1: Key skills and influences for three foundational financial decisions

GFCI no.	Numeracy skill / finance concept	Loans (e.g. credit card)	Insurance (e.g. car insurance)	Investment (e.g. share market)
1.	Arithmetic	x	x	x
2.	Fractions/proportions	x	x	x
3.	Percentages	x	x	x
4.	Compounding/discounting	x		x
5.	Probabilities		x	x
6.	Variance/volatility			x
7. 8.	Diversification			x
9.	Time value of money	x		x
	Personal attitude / trait			
10. 11.	Risk tolerance		x	x
12.	Time preference	x	x	x
13.	Propensity to plan	x	x	x
14.	Confidence in information search	x	x	x
15. 16.	Conscientiousness/impulse	x	x	x
17. 18.	Self-efficacy/locus of control	x	x	x
	Product knowledge			
19.	Fees (fixed and variable)	x	x	x
20.	Interest charges	x		
21. 22.	Tax			x
23.	Inflation	x		x
24.	Dividends			x
25.	Shares vs bonds			x
26.	Repayment schedule	x		
27.	Valuation		x	
28. 29.	Volatility			x
	Budgeting/suitability			
30.	Within budget	x	x	x
31.	Suitability	x	x	x
	Demographics			
	Age	x	x	x
	Education	x	x	x
	Past experience	x	x	x
	Information sources	x	x	x
	Household structure	x	x	x
	Income/wealth	x	x	x

Notes: Column 1 shows suggested questions from the General Financial Capability Inventory (Appendix C) measuring the items in column 2. The crosses indicate that the questions are relevant to the particular financial decision in question.

Appendix C: Survey Results

Table C1: Characteristics of participants in experts' surveys

	1st Survey (n = 84)		2nd Survey (n = 51)	
Gender				
Male	34	40.5%	26	51.0%
Female	50	59.5%	25	49.0%
Age (years)				
18–29	3	3.6%	5	9.8%
30–39	14	16.7%	11	21.6%
40–49	24	28.6%	9	17.6%
50–59	31	36.9%	18	35.3%
60–69	10	11.9%	8	15.7%
70 and over	2	2.4%	0	
Occupation				
Financial adviser/planner	9	10.7%	3	5.9%
Financial counsellor	9	10.7%	4	7.8%
Community worker	12	14.3%	3	5.9%
Social worker	2	2.4%	0	
Educator	13	15.5%	9	17.6%
Academic/researcher	5	6.0%	17	33.3%
Financial markets prof	6	7.1%	3	5.9%
Public policy	3	3.6%	4	7.8%
other	25	29.8%	8	15.7%
Direct contact with consumers				
Yes	57	67.9%	18	35.3%
Respondents	84		51	

Table C2: Characteristics of participants of the consumer survey

Participant characteristics	Numbers of observations in survey (n = 1004)				
Gender			**Housing Tenure**		
male	479	47.7%	Rent	302	30.1%
female	525	52.3%	Own	594	59.2%
Age			Live with someone else	108	10.8%
18–24 years	100	10.0%	**Super Fund Member**		
25–29 years	95	9.5%	Yes, not SMSF	641	63.8%
30–34 years	88	8.8%	Yes, only SMSF	72	7.2%
35–39 years	100	10.0%			
40–44 years	97	9.7%	Yes, SMSF and other	23	2.3%
45–49 years	94	9.4%	No	243	24.2%
50–54 years	93	9.3%	Do not know	25	2.5%
55–59 years	82	8.2%	**HELP(HECS) debts/student loans**		
60–64 years	78	7.8%	yes	157	15.6%
65–69 years	61	6.1%	no	847	84.4%
70–74 years	43	4.3%	**Outstanding debt (obs = 157)**		
75 years and over	73	7.3%	less than $10,000	46	4.6%
Country of birth			$10,000–19,999	46	4.6%
Australia	738	73.5%	$20,000–29,999	29	2.9%
New Zealand	20	2.0%	$30,000–39,999	16	1.6%
United Kingdom, Channel Islands, Isle of Man	95	9.5%	$40,000–49,999	4	0.4%
North-West Europe (excl. United Kingdom, Channel Islands, Isle of Man)	12	1.2%	$50,000–59,999	7	0.7%
			$60,000–69,999	4	0.4%
Mediterranean countries	9	0.9%	$70,000 and more	5	0.5%
Eastern Europe	12	1.2%	**Self-Description**		
China	12	1.2%	Organized		
India	11	1.1%	A lot	339	33.8%

Left column

	Count	%
Asian country other than China and India	55	5.5%
Other (Please specify)	40	4.0%
Marital status		
Never married and not living in a long term (de facto) relationship	258	25.7%
Widowed	45	4.5%
Divorced	98	9.8%
Separated but not divorced	32	3.2%
Married	457	45.5%
Living in long term relationship (de facto)	114	11.4%
Financial decision		
I am	581	57.9%
some else	94	9.4%
some and I equally	329	32.8%
Support Financially		
1	425	42.3%
2	326	32.5%
3	119	11.9%
4 or more	134	13.3%
Highest level of school		
Year 12 or equivalent	725	72.2%
Year 11 or equivalent	69	6.9%
Year 10 or equivalent	168	16.7%
Year 9 or equivalent	21	2.1%
Year 8 or equivalent	10	1.0%
Year 7 or equivalent	4	0.4%
Year 6 or below	5	0.5%
Did not go to school	2	0.2%
Highest post-school qualification		

Right column

	Count	%
Somewhat	534	53.2%
A little	108	10.8%
Not at all	23	2.3%
Responsible		
A lot	546	54.4%
Somewhat	400	39.8%
A little	51	5.1%
Not at all	7	0.7%
Hardworking		
A lot	454	45.2%
Somewhat	438	43.6%
A little	85	8.5%
Not at all	27	2.7%
Careless		
A lot	24	2.4%
Somewhat	122	12.2%
A little	449	44.7%
Not at all	409	40.7%
Thorough		
A lot	303	30.2%
Somewhat	565	56.3%
A little	124	12.4%
Not at all	12	1.2%
Purchasing behaviour		
Spend too much money		
Very often	38	3.8%
Often	86	8.6%
Sometimes	354	35.3%

	Count	%		Count	%
PhD	17	1.7%	Rarely	427	42.5%
Master Degree or equivalent	70	7.0%	Never	96	9.6%
Graduate Diploma and Graduate Certificate from university or equivalent	69	6.9%	Don't know	3	0.3%
Bachelor Degree or equivalent	251	25.0%	**Buy things on impulse**		
Advanced Diploma and Diploma from university/TAFE or equivalent	116	11.6%	Very often	31	3.1%
Certificate or equivalent from TAFE or equivalent	231	23.0%	Often	86	8.6%
None of the above	250	24.9%	Sometimes	410	40.8%
Employment status			Rarely	413	41.1%
Employed full time	392	39.0%	Never	63	6.3%
Employed part time	185	18.4%	Don't know	1	0.1%
Unemployed	63	6.3%	**Buy things you hadn't planned to buy**		
Not in the labour force – Stay-at-home parent or caregiver	67	6.7%	Very often	28	2.8%
Not in the labour force – Full-time student	38	3.8%	Often	81	8.1%
Not in the labour force – Retired	211	21.0%	Sometimes	469	46.7%
Not in the labour force – Other	48	4.8%	Rarely	372	37.1%
Weekly(annual) gross personal income			Never	53	5.3%
Negative income	14	1.4%	Don't Know	1	0.1%
Nil income	78	7.8%	**Buy things you don't really need**		
$1–199 ($1–10,399)	68	6.8%	Very often	24	2.4%
$200–299 ($10,400–15,599)	63	6.3%	Often	66	6.6%
$300–399 ($15,600–20,799)	115	11.5%	Sometimes	374	37.3%
$400–599 ($20,800–31,199)	133	13.2%	Rarely	408	40.6%
$600–799 ($31,200–41,599)	117	11.7%	Never	131	13.0%
$800–999 ($41,600-–51,999)	89	8.9%	Don't know	1	0.1%
$1,000–1,249 ($52,000–64,999)	93	9.3%			

	Count	%
$1,250–1,499 ($65,000–77,999)	69	6.9%
$1,500–1,999 ($78,000–103,999)	100	10.0%
$2,000 or more ($104,000 or more)	65	6.5%
Weekly(annual) gross household income		
Negative income	18	1.8%
Nil income	41	4.1%
$300–399 ($15,600–20,799)	86	8.6%
$400–599 ($20,800–31,199)	94	9.4%
$600–799 ($31,200–41,599)	106	10.6%
$800–999 ($41,600–51,999)	101	10.1%
$1,000–1,249 ($52,000–64,999)	81	8.1%
$1,250–1,499 ($65,000–77,999)	81	8.1%
$1,500–1,999 ($78,000–103,999)	144	14.3%
$2,000–2,499 ($104,000–129,999)	100	10.0%
$2,500–2,999 ($130,000–155,999)	66	6.6%
$3,000–3,499 ($156,000–181,999)	30	3.0%
$3,500–3,999 ($182,000–207,999)	27	2.7%
$4,000–4,999 ($208,000–259,999)	15	1.5%
$5,000 or more ($260,000 or more)	14	1.4%
Frequency of bankruptcy		
0	954	95.0%
1	31	3.1%
2	11	1.1%
3	3	0.3%
4	0	
5	2	0.2%
More than 5	2	0.2%

Risk taker (0 = completely unwilling to take risks; 10= very willing to take risks).

	Count	%
0	59	5.9%
1	54	5.4%
2	122	12.2%
3	124	12.4%
4	87	8.7%
5	187	18.6%
6	123	12.3%
7	117	11.7%
8	86	8.6%
9	24	2.4%
10	21	2.1%

Risk taker in financial matters (as above).

	Count	%
0	100	10.0%
1	92	9.2%
2	125	12.5%
3	123	12.3%
4	84	8.4%
5	165	16.4%
6	108	10.8%
7	99	9.9%
8	65	6.5%
9	20	2.0%
10	23	2.3%

Patience (0= extremely impatient; 10 = very patient)

	Count	%
0	14	1.4%
1	12	1.2%
2	31	3.1%

Income vs expenses			3		47	4.7%
My expenses were far greater than my income	121	12.1%	4		66	6.6%
My expenses were slightly greater than my income	181	18.0%	5		176	17.5%
My expenses and my income were equal	195	19.4%	6		119	11.9%
My income was slightly greater than my expenses	372	37.1%	7		191	19.0%
My income was far greater than my expenses	135	13.4%	8		201	20.0%
Housing tenure			9		96	9.6%
Rent	302	30.1%	10		51	5.1%

Table C3: Summary of all questions and all responses to the consumer survey

Questions		Responses	N	%
Scenario 1: You have a large outstanding credit card debt that is being charged a high rate of interest. Recently, you inherited some money unexpectedly and you are thinking about what to do with it. Which of the following options would be the best action?	1	Use your inheritance to pay off your credit card debt now to get rid of the high interest charges	902	89.8%
	2	Put your inheritance in a separate savings account because it is hard to save up large amounts of money	102	10.2%
Scenario 2: You are not married, not in a relationship and have no dependents. You recently started a new full time job and moved your superannuation account to a new superannuation fund. Your new superannuation fund asks you if you would like to stay with the default life insurance settings. The defaults life insurance involves regular premiums deducted from your superannuation contributions and pays a standard amount if you pass away.	1	Stay with the default life insurance settings	450	44.8%
	2	Opt out of life insurance altogether	395	39.3%
	3	Increase your life insurance cover	82	8.2%
	4	Decrease your life insurance cover	77	7.7%
Scenario 3: You are thinking about investing in the share market. Which of the following should you do?	1	Buy shares in one blue chip company	128	12.7%
	2	Spread your money across a variety of shares in different companies	876	87.3%
You put $100 into a savings account with a guaranteed interest rate of 2% per year. You make no more payments into this account and you withdraw no money. How much would be in the account at the end of five years?	1	More than $110	645	64.5%
	2	Exactly $110	236	23.5%
	3	Less than $110	123	12.3%
You make a $1,000 purchase with your credit card. The retailer tells you that she charges an extra 2% fee to use your credit card. The shop next door sells your sister the same item for $1,000 and charges her a flat rate of $15 to use her credit card. Who pays more?	1	You	825	82.2%
	2	Your sister	179	17.8%

A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.	1	True	868	86.5%
	2	False	136	13.5%
You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an annual percentage interest rate of 12% (or 1% per month), how many years will it take to eliminate your credit card debt if you make no additional new charges?	1	Less than 5 years	55	5.5%
	2	Between 5 and 10 years	200	19.9%
	3	Between 10 and 15 years	259	25.8%
	4	You will never eliminate your credit card debt	490	48.8%
I abstain from things today so that I will be able to afford more tomorrow (How well do the following statements describe you as a person?)	0	0	28	2.8%
	1	1	12	1.2%
	2	2	35	3.5%
	3	3	38	3.8%
	4	4	36	3.6%
	5	5	176	17.5%
	6	6	102	10.2%
	7	7	160	15.9%
	8	8	212	21.1%
	9	9	102	10.2%
	10	10	103	10.3%
I regularly check that my credit cards, insurance and investments still meet my needs (How well do the following statements describe you as a person?)	0	0	61	6.1%
	1	1	16	1.6%
	2	2	20	2.0%
	3	3	42	4.2%
	4	4	41	4.1%
	5	5	141	14.0%
	6	6	92	9.2%
	7	7	134	13.3%
	8	8	175	17.4%
	9	9	123	12.3%

	10	10	159	15.8%
Before I buy something I carefully consider whether I can afford it (How well do the following statements describe you as a person?)	0	0	7	0.7%
	1	1	5	0.5%
	2	2	9	0.9%
	3	3	13	1.3%
	4	4	27	2.7%
	5	5	97	9.7%
	6	6	73	7.3%
	7	7	130	12.9%
	8	8	189	18.8%
	9	9	181	18.0%
	10	10	273	27.2%
I tend to live for today and let tomorrow take care of itself (How well do the following statements describe you as a person?)	0	0	132	13.1%
	1	1	74	7.4%
	2	2	134	13.3%
	3	3	122	12.2%
	4	4	92	9.2%
	5	5	172	17.1%
	6	6	80	8.0%
	7	7	83	8.3%
	8	8	59	5.9%
	9	9	21	2.1%
	10	10	35	3.5%
I keep a close personal watch on my financial affairs (How well do the following statements describe you as a person?)	0	0	8	0.8%
	1	1	3	0.3%
	2	2	12	1.2%
	3	3	13	1.3%
	4	4	19	1.9%
	5	5	106	10.6%

	6	6	79	7.9%
	7	7	118	11.8%
	8	8	187	18.6%
	9	9	188	18.7%
	10	10	271	27.0%
I set long-term financial goals and strive to achieve them (How well do the following statements describe you as a person?)	0	0	33	3.3%
	1	1	12	1.2%
	2	2	22	2.2%
	3	3	26	2.6%
	4	4	46	4.6%
	5	5	171	17.0%
	6	6	103	10.3%
	7	7	149	14.8%
	8	8	190	18.9%
	9	9	121	12.1%
	10	10	131	13.0%
If the interest rate on your savings account is 1% per year and inflation is 2% per year, after 1 year how much can you buy with the money in this account?	1	More than today	84	8.4%
	2	Exactly the same	133	13.2%
	3	Less than today	787	78.4%
If each of the following persons have the same amount of annual income after tax, who needs the most life insurance?	1	A young single woman with two young children	832	82.9%
	2	A young single woman without children	44	4.4%
	3	An elderly retired man, with a wife who is also retired	102	10.2%
	4	A young married man without children	26	2.6%
Normally, which of these assets exhibits the highest fluctuations over time?	1	Savings accounts	86	8.6%
	2	Shares	859	85.6%
	3	Bonds	59	5.9%
If you own shares in an Australian company, which of the following is true about the dividend payments you receive?	1	The payment would be the same dollar amount every year	26	2.6%

	2	The payment may vary from year to year	771	76.8%
	3	The payment would be a fixed percentage of the share price	93	9.3%
	4	The payment would rise and fall with interest rates	114	11.4%
It is usually possible to reduce the risk of investing in the share market by buying a wide range of shares.	1	True	858	85.5%
	2	False	146	14.5%
If you invest $1,000 in a managed fund (e.g., a property trust, share trust, equity trust, growth trust, imputation trust or balanced trust), is it possible to have less than $1,000 when you withdraw your money?	1	Yes	802	79.9%
	2	No	202	20.1%
Is an investment with a high return likely to be high risk?	1	Yes	944	94.0%
	2	No	60	6.0%
If a friend inherits $10,000 today and her sibling inherits $10,000 three years from now, who will be the richer in three years because of the inheritance?	1	My friend	621	61.9%
	2	Her sibling	141	14.0%
	3	They will be equally rich	242	24.1%
If you own shares in an Australian company, which ONE of these statements is true about the tax you will pay on dividend income?	1	The dividend income will be taxed at a fixed rate of 15%	173	17.2%
	2	If the dividend carries franking credits, you are eligible for a tax offset for the company tax already paid	591	58.9%
	3	If the dividend carries franking credits, you pay no tax on the dividend income	169	16.8%
	4	The dividend income is not taxed	71	7.1%
On a scale of 1 to 7, where 1 means very low and 7 means very high, how would you assess your understanding of finance?	1	1 Very low	39	3.9%
	2	2	69	6.9%
	3	3	115	11.5%
	4	4 About average	345	34.4%
	5	5	249	24.8%
	6	6	159	15.8%
	7	7 Very high	28	2.8%

Buying shares in a single company usually provides a safer return than buying units in a managed share fund.	1	True	83	8.3%
	2	False	562	56.0%
	3	Do not know	359	35.8%
Assets – do you own?				
(Cash) bank accounts, currency, CDs, notes.	1		892	88.8%
(Fixed interest) bonds, debentures, term deposits.	1		184	18.3%
(Equities) shares, units in trusts, mutual funds, warrants, convertibles, derivatives.	1		295	29.4%
(property – own home)	1		560	55.8%
(Other property) listed and unlisted property trusts, investment properties.	1		138	13.7%
(Superannuation) in defined benefit funds, accumulation schemes, large superannuation funds, self-managed superannuation	1		632	62.9%
Private businesses) farms, family businesses etc.	1		39	3.9%
(Other) such as collectibles, home contents, vehicles.	1		489	48.7%
Debts – do you owe?				
Outstanding credit card or store card balances	1		355	35.4%
Car loans, hire purchase agreements or other personal loans	1		136	13.5%
Home loans (mortgages)	1		292	29.1%
Loans to purchase investment properties or other investment loans (such as loans to buy financial assets or shares)	1		86	8.6%
Overdrafts or business loans	1		22	2.2%
Other loans (such as, amounts you borrowed from family or friends but excluding HECS/HELP)	1		71	7.1%
I don't have any debts	1		403	40.1%
Insurance cover				
Car insurance – third party (Have you ever purchased any insurance policies?)	1	Yes	537	53.5%
	2	No	359	35.8%
	3	NA	108	10.8%

Car insurance – comprehensive (Have you ever purchased any insurance policies?)	1	Yes		791	78.8%
	2	No		150	14.9%
	3	NA		63	6.3%
Home insurance (Have you ever purchased any insurance policies?)	1	Yes		614	61.2%
	2	No		280	27.9%
	3	NA		110	11.0%
Home contents insurance (Have you ever purchased any insurance policies?)	1	Yes		703	70.0%
	2	No		237	23.6%
	3	NA		64	6.4%
Life insurance (Have you ever purchased any insurance policies?)	1	Yes		335	33.4%
	2	No		587	58.5%
	3	NA		82	8.2%
Total and permanent disability insurance (Have you ever purchased any insurance policies?)	1	Yes		189	18.8%
	2	No		691	68.8%
	3	NA		124	12.4%
Income protection insurance (Have you ever purchased any insurance policies?)	1	Yes		180	17.9%
	2	No		699	69.6%
	3	NA		125	12.5%
Travel insurance (Have you ever purchased any insurance policies?)	1	Yes		548	54.6%
	2	No		370	36.9%
	3	NA		86	8.6%
Health insurance (Have you ever purchased any insurance policies?)	1	Yes		635	63.2%
	2	No		310	30.9%
	3	NA		59	5.9%
Funeral insurance (Have you ever purchased any insurance policies?)	1	Yes		80	8.0%
	2	No		819	81.6%
	3	NA		105	10.5%
Car insurance – third party (Do you CURRENTLY have any insurance policies?)	1	Yes		372	37.1%
	2	No		538	53.6%
	3	NA		94	9.4%

Car insurance – comprehensive (Do you CURRENTLY have any insurance policies?)	1	Yes	719	71.6%
	2	No	224	22.3%
	3	NA	61	6.1%
Home insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	538	53.6%
	2	No	368	36.7%
	3	NA	98	9.8%
Home contents insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	649	64.6%
	2	No	301	30.0%
	3	NA	54	5.4%
Life insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	240	23.9%
	2	No	698	69.5%
	3	NA	66	6.6%
Total and permanent disability insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	149	14.8%
	2	No	762	75.9%
	3	NA	93	9.3%
Income protection insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	123	12.3%
	2	No	775	77.2%
	3	NA	106	10.6%
Travel insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	169	16.8%
	2	No	744	74.1%
	3	NA	91	9.1%
Health insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	549	54.7%
	2	No	403	40.1%
	3	NA	52	5.2%
Funeral insurance (Do you CURRENTLY have any insurance policies?)	1	Yes	75	7.5%
	2	No	844	84.1%
	3	NA	85	8.5%

Appendix D: Background to Research Results

Table D1: Summary of the Most (informative) and Least (informative) questions by Question and Decision (loans, insurance, investments); Stage 2, first experts' survey

Questions	Weights	Weighted Most–Least counts		
		Loans	Insurance	Investment
(1) A bat and ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?	1.16	−10.42	−11.57	−17.36
(2) In a lake there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take to cover half the lake?	0.91	−16.32	−18.13	−11.78
(3) In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize are 1%. What is your best guess about how many people would win a $10.00 prize of 1,000 people each buy a single ticket from BIG BUCKS?	0.95	−11.45	−5.73	−17.18
(4) Suppose you put $100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments in to this account and you don't withdraw any money. How much would be in the account at the end of five years?	0.97	7.77	−2.91	−0.97
(5) Which of the following numbers represents the biggest risk of getting a disease?	1.01	−15.11	2.01	−11.08
(6) Is an investment with a high return likely to be high risk?	1.05	−2.09	−2.09	19.87
(7) Is it usually possible to reduce the risk of investing in the share market by buying a wide range of stocks and shares?	1.05	−8.37	-6.28	6.28
(8) If an investor spreads their money among different assets, does the risk of losing money increase, decrease or stay the same?	1.09	0.00	2.18	17.40
(9) Suppose a friend inherits $10,000 today and her sibling inherits $10,000 three years from now. Who will be richer in three years because of the inheritance?	0.95	−7.63	−5.73	−7.63
(10) Suppose you have $10,000 of your own money available to invest in a savings or investment. Which ONE of the following savings or investment offers would appeal to you most?	0.92	−0.92	−1.84	25.81
(11) Do you see yourself as 'a person who is generally willing to take risks, or do you try to avoid taking risks?"	0.97	3.89	14.57	4.86

Questions	Weighted Most–Least counts			
	Weights	Loans	Insurance	Investment
(12) How well does the statement "I abstain from things today so that I will be able to afford more tomorrow" describe you personally?	1.07	7.47	6.40	−10.66
(13) How well does the statement "I set long term financial goals and strive to achieve them" describe you personally?	0.99	10.88	12.86	3.96
(14) How well does the statement "I know the right sources to consult to make wise financial decisions" describe you personally?	0.97	5.83	7.77	-0.97
(15) How well does the statement "I tend to live for today and let tomorrow take care of itself" describe you personally?	1.07	−2.13	4.27	−12.80
(16) How well does the statement "Sometimes I can't stop myself from doing something, even if I know it is wrong" describe you as a person?	0.97	−2.91	−0.97	−13.60
(17) How well does the statement "I keep a close personal watch on my financial affairs" describe you personally?	1.05	0.00	10.46	-1.05
(18) How well does the statement "I believe I can succeed at most any endeavour to which I put my mind" describe you personally?	0.99	−8.90	−7.91	−6.92
(19) Suppose you want to make a $1000 purchase with your credit card. The retailer tells you that you will be charged an extra 2% fee for using your credit card. Your sister buys the same item in the shop next door for $1000. She is charged a flat rate $15 fee for using her credit card. Who paid a higher credit card fee?	0.95	11.45	−1.91	−4.77
(20) A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan is less. a) True b) False	0.97	26.22	−5.83	−2.91
(21) Suppose you have a savings account at a bank, which ONE of these statements about the tax you will pay on interest income is correct? a) The interest income is not taxed b) The interest income is taxed at a fixed rate of 15% c) The interest income is included in your taxable income d) The total amount in your savings account will be included in your taxable income.	1.01	-9.07	−7.05	10.07
(22) Suppose you own shares in an Australian company. Which ONE of these statements is true?	1.13	−10.20	−5.67	11.33

Questions	Weights	Weighted Most–Least counts		
		Loans	Insurance	Investment
(23) Suppose the interest rate on your savings account is 1% per year and inflation is 2% per year. After 1 year, how much can you buy with the money in this account?	0.95	2.86	0.95	3.82
(24) Suppose you own shares in an Australian company. Which ONE statement is true about the dividend payments you receive?	0.89	−13.37	−10.70	13.37
(25) If you buy a bond of firm B, which ONE of these statements is correct?	1.01	−10.07	−9.07	−1.01
(26) Suppose you owe $3,000 on your credit card. You pay a minimum payment of $30 each month. If the annual percentage rate is 12% (or 1% per month), how many years would it take you to eliminate your credit card debt if you made no additional new charges?	0.92	30.42	1.84	−8.30
(27) Suppose each person below has the same amount of annual income after tax, which ONE needs the greatest amount of life insurance?	1.13	−6.80	26.06	−13.60
(28) Normally, the value of one of the assets below should fluctuate the most over time. Which ONE is it?	1.11	−14.43	−9.99	13.32
(29) Is the following statement true or false? "If you invest $1,000 in a managed fund (like a property trust, share trust, equity trust, growth trust, imputation trust or balanced trust), it is possible to have less than $1,000 when you withdraw your money"	0.91	0.00	−3.63	9.97
(30) How well does the statement "Before I buy something I carefully consider whether I can afford it", describe you personally?	1.07	25.60	13.86	−1.07
(31) How well does the statement "I regularly check that my credit cards, insurance and investments still meet my needs", describe you personally?	0.97	13.60	18.45	1.94

Notes: Weights adjust Most-Least counts for the number of times the question appeared in the experimental design. In the last three columns, positive numbers indicate relatively more informative questions (i.e., chosen by experts as "most informative" relatively more often than "least informative"). Figure 4.1 in the main report graphs these results.

Table D2: Best–Worst totals obtained by the second experts survey

Questions	Values	Loans			Insurance			Investments		
		Most	Least	M–L	Most	Least	M–L	Most	Least	M–L
Q1	Incorrect	15	18	−3	7	12	−5	13	4	9
	Correct	13	22	−9	4	8	−4	11	1	10
Q2	Incorrect	9	23	−14	1	13	−12	5	3	2
	Correct	6	25	−19	2	12	−10	9	2	7
Q3	Incorrect	4	2	2	6	1	5	20	0	20
	Correct	3	5	−2	0	2	−2	6	2	4
Q4	Incorrect	6	8	−2	2	5	−3	10	3	7
	Correct	6	11	−5	7	8	−1	4	11	−7
Q5	Incorrect	8	6	2	10	25	−15	28	6	22
	Correct	1	6	−5	6	23	−17	16	9	7
Q6	Incorrect	21	2	19	15	2	13	2	18	−16
	Correct	10	0	10	19	4	15	1	24	−23
Q7	Incorrect	17	5	12	28	10	18	4	28	−24
	Correct	17	3	14	29	11	18	7	25	-18

Method for calculating expert weights

We can simply count the number of Yes (i.e. fictional respondent being judged as capable) decisions for each value of each question, as shown in Table D3 below. Each value (correct/incorrect response) occurs four times across the eight combinations from the Orthogonal Main Effects Plan (OMEP). So, the maximum count that could be observed is 17 x 4 = 68 if every expert said "Yes" to a particular question value every time they "saw" it. So, not surprisingly, we see fewer than 68 choices in the table below, reflecting the fact that the expert participants in the survey were making trade-offs between questions, as we expected them to do. The first three columns of counts are the raw counts of "Yes" for each question and associated value. The last three columns are differences in Correct minus Incorrect counts. These latter three columns are an approximate measure of the influence that each question had on the "Yes" and "No" financial capability choices. So, for Loans, the large effects were for Questions 7, 6 and 2. For Insurance, it was Questions 5, 6 and 7. And, for Investments, it was Questions 4, 7, 2 and 5.

Table D3: Summary of Yes/No financial capability decisions by experts (counts)

Question 1	Loans	Insure	Invest	Loans (correct –incorrect)	Insure (correct –incorrect)	Invest (correct –incorrect)
Incorrect	25	29	15	2	3	9
Correct	27	32	24			
Question 2						
Incorrect	21	28	13	10	5	13
Correct	31	33	26			
Question 3						
Incorrect	23	27	11	6	7	17
Correct	29	34	28			
Question 4						
Incorrect	22	26	11	8	9	17
Correct	30	35	28			
Question 5						
Incorrect	22	23	13	8	15	13
Correct	30	38	26			
Question 6						
Incorrect	16	25	12	10	11	15
Correct	36	36	27			
Question 7						
Incorrect	17	19	12	18	23	15
Correct	35	42	27			

We can use the results in Table D3 above or their disaggregate equivalents (Yes(capable) = 1 and No(incapable) = 0) for each of the eight OMEP combinations for each expert participant) to estimate statistical models that describe how the expert participants chose to vote Yes or No. We used effects coding for levels of the questions (correct=1, incorrect=-1) and provide results of an aggregate logit model in Table 4.3 in the main report. We included an intercept in the estimation of the aggregate logit model (not reported in the table) to account for the fact that experts might have a general tendency to judge respondents as being more or less capable or incapable: The intercepts are equal to –0.601 for loans, –0.162 for insurance, and –1.146 for investments. Their negative signs reveal that, on average, experts tend to judge the fictive respondents as being not financially capable. (Note that for investments we had to add two artificial observations equalling prior weights to ensure convergence of the model.)

We used the individual question weights obtained from the aggregate logit model to calculate for each consumer in the consumer survey a capability score for Loans, Insurance, and Investments, respectively. More specifically, we recoded each consumer's answers to the seven questions for Loans, Insurance and Investments to equal correct (1) or incorrect (–1). We then multiplied each model estimate in Table 4.3 by the associated recoded answers and summed the products and the respective intercept. For each person we exponentiated this number and divided it by the maximally achievable sum (i.e., all seven answers =

correct, or = 1; the maximally achievable serves as a common denominator that allows us to compare all consumers). This gives us a capability score for each respondent as follows:

For loans the maximally achievable score can be calculated as:
$\exp(-0.601+0.182*1+0.422*1+0.171*1+0.360*1+0.233*1+0.837*1+0.775*1) = 10.794$.

Consider, for example, Respondent 1 who answers Question 1 and Question 4 incorrectly, but the remaining questions correctly and would therefore receive a score of:
$\exp(-0.601+0.182*(-1)+0.422*1+0.171*1+0.360*(-1)+0.233*1+0.837*1+0.775*1)/10.794 = 0.338$.

Similarly, Respondent 2 who answers all questions except for Question 7 correctly would receive a score of:
$\exp(-0.601+0.182*1+0.422*1+0.171*1+0.360*1+0.233*1+0.837*1+0.775*(-1))/10.794 = 0.212$.

Therefore, despite getting two questions wrong, Respondent 1 would receive a higher financial capability score due to the differences in discriminatory power of the different questions.