

Undergraduate student financial literacy interventions: Medium term evidence of retention and decay

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Abstract

University represents a significant transition period for students as they seek, and gain, independence, including financial independence. This appears to be an ideal teachable moment to deliver financial education that improves financial literacy to support the choices that growing financial independence requires. We report medium-term empirical evidence, three years after the completion of a semester unit, evidence notably absent in the literature. We find significant objective and subjective financial literacy effects given completion of the unit sustained, with modest decay, three years after completion. No evidence is found linking completion with over-confidence, as has previously been suggested. Effects on behaviour and behaviour intentions are less robust over time as boosts reported immediately after completion dissipate three years hence, though in absolute terms positive behaviours remain high. Finally, students overall appear more discerning with financial information sources but those completing the unit maintain higher (lower) ratings of authoritative sources (informal sources).

Version: 10th February 2018

Keywords: Financial literacy; financial education interventions; household finance; consumer finance

JEL: D14 - Household Saving; Personal Finance, I21 - Analysis of Education; A20 Economic Education and Teaching of Economics: General, I20 Education and Research Institutions: General.

Acknowledgements: I gratefully acknowledge the funding grant from Financial Literacy Australia and the support of Robert Drake in the grant process. Thanks to seminar participants at Queensland University of Technology, in particular Chrisann Lee and Laura de Zwaan and also participants at the Australasian Finance and Banking Conference, 2017. Thanks also to the excellent research assistance provided by Jacqui Whale.

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1 Introduction

The first year of university represents a significant milestone for young adolescents as they transition to adulthood with all the opportunities and responsibilities that this entails, including financial. Important aspects of “autonomy will be laid down during the college years” (Shim et al. 2010, 1458). While acquiring the knowledge and skills that will enable themselves to take on these responsibilities most students remain financially dependent but identify becoming financially independent as a key marker of adulthood (Arnett 2000). The undergraduate years of university appear to present an ideal teachable moment where financial education interventions can be offered to enable acquisition of financial knowledge and skills, and the development of financial attitudes and financial behaviours that coincide, or precede, the choices that this financial independence requires. It has been suggested that “an urgent need” exists for countries to improve the financial literacy¹ of students at all levels (OECD 2017b) with a need to add such courses to university curricula (Lusardi and Wallace 2013). It is therefore surprising that evidence in this area is sparse, in particular regards longer term impacts of university financial education interventions. This is the primary contribution of this paper which provides evidence on financial literacy, and financial behaviour intentions, for those who completed an optional semester-length personal financial education unit, up to three years after unit completion, relative to a control group. Gerrans and Heaney (in press) review the sample at the end of the unit and identify clear positive effects for those completing the unit in financial literacy, intentions to perform positive financial behaviours, and self-assessed ability and confidence in making financial decisions. This paper presents an assessment of longer term impacts and assessment of persistence or depreciation in financial literacy, as a cognitive resource, performance of positive financial behaviours and intentions, and confidence in financial information search.

¹ We note the disparity in scope of definitions of financial literacy. In this paper financial literacy is used to refer to ‘a distinct and different construct from financial decision-making, financial behaviour, financial outcome/well-being, and financial education’ (Finke and Huston, 2014). We prefer the definition of financial literacy as “a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions.” (Remund, 2010: 284).

Expectations for the impact of financial education interventions are informed by evidence described as not “compelling” (Kaiser and Menkhoff 2017, 612). On the one hand the documented correlation between measured financial literacy and positive financial outcomes (e.g. Hastings, Madrian, and Skimmyhorn 2013; Miller et al. 2014) has “done much to confirm the causal impact of financial literacy on economic decision-making” (Lusardi and Mitchell 2014, 37). Lusardi, Michaud, and Mitchell (2017) suggest that, in addition to wealth differences due to permanent income and chance, they can “attribute another 30–40 percent of wealth inequality to financial knowledge” via the “endogenous variation in the returns that people can obtain on their savings, particularly on information-intensive assets” (Lusardi, Michaud, and Mitchell 2017, 433). However, following their meta-analysis Fernandes, Lynch, and Netemeyer (2014) caution that the strength of the relationship is weak when omitted variable bias is controlled for. Further, the evidence for the long-term effects of financial education *interventions*, or *manipulated* financial literacy is less clear (Fernandes, Lynch, and Netemeyer 2014). Similarly while Miller et al. (2014) suggest that financial education positively impacts some specific behaviours, including savings and record keeping, they nonetheless echo the caution suggesting there remains substantial disagreement over the efficacy of financial education. In the most recent and comprehensive meta-analysis Kaiser and Menkhoff (2017) are somewhat more optimistic arguing “financial education has a strong positive impact on financial literacy with an [small Cohen] effect size of 0.26” while the impact of financial education on financial behaviour, while positive and significant, didn’t reach the small effect threshold (Cohen 1988).

Kaiser and Menkhoff (2017) suggest that their more positive results can be attributed, most importantly, to better control for program effectiveness in their analysis, in addition to the inclusion of more recent studies. Kaiser and Menkhoff (2017) also highlight the heterogeneity in effectiveness of intervention, notably for “low income clients”, which they attribute to “these individuals are more difficult to educate” (Kaiser and Menkhoff 2017, 622). The result is consistent with Lusardi, Michaud, and Mitchell (2017) who predict that “not everyone benefits

from greater financial sophistication, some consumers will rationally remain financially ignorant” (Lusardi, Michaud, and Mitchell 2017, 473). That is, acquisition of financial literacy is a choice.

While financial literacy can be accumulated it can also depreciate due to obsolescence or decay (Lusardi and Mitchell 2014). Fernandes, Lynch, and Netemeyer (2014) estimate significant decay rates suggesting that while effect sizes from interventions increase with length of intervention, no financial literacy or financial behaviour is significantly associated with a financial education intervention, irrespective of instruction length, 24 months after its delivery. This is a considerably higher rate than the baseline depreciation rate of six percent per annum assumed by Lusardi, Michaud, and Mitchell (2017) who model the trade-off in the marginal benefits of financial knowledge acquisition against the costs of acquisition and knowledge depreciation. Kaiser and Menkhoff (2017) suggest that some of the empirical evidence inconsistency may also be due to the timing of measurements (e.g. measurement delay) given observed decay effects.

As discussed in the following section, which reviews evidence of financial intervention effects within a university context, no such evidence is available for decay rates over longer time periods. The available evidence on effect sizes within this setting is restricted to immediately post intervention. We are therefore able to provide much needed evidence of effect sizes for financial literacy and financial behaviour intentions three years after the intervention. Having done so, the third section provides a description of the student sample and describes the scales and instruments used. The fourth section presents the method and analysis before a final section concludes with a discussion of findings, caveats, and suggestions for future work.

2 University Financial Education Interventions

The meta-analyses discussed in the introduction provide useful evidence of the efficacy of financial education interventions but, notably, university level interventions are largely absent. For example, the recent and most comprehensive review by Kaiser and Menkhoff (2017) include

only nine studies based on university students with seven evaluating specific interventions.²

Amagir et al. (in press) review education programs for children and adolescents but only include four university interventions, separate to those in Kaiser and Menkhoff (2017).³

Evidence of the impact of university level financial education courses is a mixture of cross-sectional surveys, which rely on an indication of prior study at a university, or individual intervention evaluations at a specific university. The former do not permit pre-post comparisons and typically are unable to control for course duration or quality. An example is Peng et al. (2007) who find a positive association between completion of a college level personal finance course and investing knowledge using a sample drawn from a U.S. mid-western university. Lyons (2008) similarly uses a college sample and finds lower incidence of credit card problems for those who had completed, or were currently completing, a college course. Mandell (2009) reports *lower* levels of financial literacy among students who reported that they had completed a personal money management or personal finance course though there was no control for baseline respondent characteristics and no tests of significance. Xiao, Serido, and Shim (2012) restrict their analysis to a student sub-sample with a credit card and find positive effects for those who had completed a university level personal finance course on subjective credit knowledge, but not objective knowledge. Xiao, Serido, and Shim (2012) also report that completing a university level personal financial management class is *positively* associated with risky credit behaviours in their sample. Again, without baseline information it is difficult to attribute the result to the outcome of an intervention. Wagner (2015) uses the U.S. National Financial Capability Study (NFCS) and find positive effects for college level courses in terms of positive long-term behaviours (e.g. having an emergency fund, investments outside of workplace retirement savings) more so than short-term behaviours (e.g. covering bills, paying credit card in full). The advantage of these

² The following studies examine specific college level interventions: (Brugiavini et al. 2015; DeLaune, Rakow, and Rakow 2010; Gerrans and Heaney in press; Goldsmith and Goldsmith 2006; Peng et al. 2007; Skimmyhorn et al. 2016; Yetter and Suiter 2015) Two additional studies include university education as an explanatory variable in estimations: (Mandell 2009; Xiao, Serido, and Shim 2012)

³ (Anderson and Card 2015; Borden et al. 2008; Bowen and Jones 2006; Maurer and Lee 2011)

studies includes their generally large sample size but a limitation is the inability to control for heterogeneity in quality, topics taught, and baseline information of participants.

Evidence drawn from individual interventions has the advantage of providing specific detail of the course and delivery but most are limited to short-term evaluations, normally immediately post course including evaluation of: a two-day, pass-fail credit unit (Gross 2005); a 90 minute seminar (Borden et al. 2008); two lectures (Bowen and Jones 2006); and a 2.5 hour course (Yetter and Suiter 2015). Each report positive effects on knowledge, attitudes, or positive behaviour intentions. DeLaune, Rakow, and Rakow (2010) report positive knowledge outcomes from peer (student) delivered presentations to first-year undergraduates immediately after a 90-minute presentation. Brugiavini et al. (2015) notably utilise a randomised-control experiment (RCT) using both a field and laboratory setting. They report positive outcomes from pre-post measures following a 20-minute presentation. Maurer and Lee (2011) compare a semester length family economics class with one-hour, peer delivered, credit and budgeting counselling sessions. While they report comparable outcomes the pre-post periods are not comparable between the two treatments leaving interpretation unclear. Goldsmith and Goldsmith (2006) provide evidence of benefits for students enrolled in a semester length class, though analysis is restricted to group averages with no ability to control for individual characteristics. Fox, Keown, and Staten (2013) discuss evidence from several U.S. colleges where positive outcomes are attributed to college counselling clinics. Skimmyhorn et al. (2016) report positive pre-post effects for financial knowledge, self-efficacy, and financial risk tolerance from a semester length course. Notably they found only marginal differences in relative treatment effectiveness between a “rule of thumb” based approach and a “principles based approach” to delivery though they caution the practical difficulty encountered differentiating the treatments between samples. Skimmyhorn et al. (2016) suggest the relationship between financial knowledge and self-efficacy “warrants further attention” given their result that improvements in self-efficacy outstripped knowledge improvements. None of the papers examining specific interventions provide evidence over

periods other than pre-post intervention which is the objective of this paper. The next section reviews the survey and sample construction with a review of the sample composition over time.

3 Survey and Student Profile

A detailed description of the unit analysed in this paper can be found in Gerrans and Heaney (in press) and supplementary appendix 1 provides a summary of unit structure and coverage. There is no difference between those enrolled in the unit and their peers in terms of age, domestic/international split, and academic performance using entry scores, though males and those from science majors were more likely to enrol (Gerrans and Heaney in press). A control group was formed from the broader population who chose not to enrol in the unit to enable an assessment of the effect of unit completion. The original sample consisted of 865 students (332 Unit, 533 Control) who completed a pre-course (baseline) survey. Of these, 282 in the Unit group completed both pre- and post-survey along with 200 students from the control group. Table 1 presents a baseline comparison of the Unit and Control group which suggests that they were, as suggested with the administrative records, very similar in terms of key characteristics.

<Insert Table 1>

The students with pre and post surveys in 2013 were invited to complete a survey in November 2014, 2015, and 2016. The survey instrument was supplemented with new scales but the same set of knowledge, attitudes, and behaviours have been tracked and form the basis of the analysis in this paper. The 2014 and 2015 surveys were incentivised with entry into prize draws for one of three \$50 gift vouchers for completions. The 2016 survey was incentivised with a \$25 voucher for a completed survey. Students enrolled in the unit were originally given unit credit of one percent for completion though they were able to opt out.

3.1 Population and sample profile

While the context of being in transition makes undergraduate students a compelling population they “are an admittedly special population” (Brugiavini et al. 2015, 4). Being a university student

places an individual in a higher education performance level than the general population. For example, only 37 percent of Australian 25-34 year olds have a bachelor's degree. In the Australian system, students more commonly remain with the family during studies. In the current sample 71 percent of the pooled unit and control samples (n=865: unit 332; control 533) live at home at baseline and 67 percent do so three years later. A majority have no debt (79 (77) percent of the unit (control) group at baseline) which reduces to 64 (61) percent three years later. This is comparable to other evidence which suggests that the proportion of Australian undergraduate students with a loan is between 25 and 30 percent depending on whether full or part-time respectively (Bexley et al. 2013). Credit card usage is notably different between Australia and U.S. students where the previously literature is dominated. In the U.S. 56 percent of students have a credit card (Cellini and Darolia 2016) whereas in Australia the proportion with a credit card is between nine and 19 percent depending on whether full-time or a part-time student (Bexley et al. 2013). Student debt (for education) is also structured differently in Australia where loan repayments are income contingent, repaid via the tax-system, with the debt balance indexed to inflation.⁴ On average, a larger proportion of Australian students accumulate a student debt though the average annual amount is lower than their U.S. counterpart.⁵

Most students while classified as full-time have part-time employment (67% unit, 66 percent control), and of those working the most common number of hours worked is 10-20 hours per week (48 percent unit, 44 percent control). Given the compulsory nature of the Australian retirement savings system, a majority of students (61 percent unit, 63 percent control), by virtue

⁴ Domestic students apply for a "Commonwealth supported place" and the cost is split between the Commonwealth government and the student. The student component, which varies by course, can be paid upfront or the student can use a HECS-HELP loan. This debt does not attract interest but is indexed to the consumer price index and is repaid via the Australian Taxation Office. Currently the threshold for beginning prepayment is a taxable income of AUD\$55,874. At this level four percent of taxable income is levied as a repayment which increases to eight percent for an income of \$103,766. For a summary of the rules see

http://studyassist.gov.au/sites/StudyAssist/HelpfulResources/Documents/2017_HECS-HELP_Booklet_ACC.pdf

⁵ In Australia (U.S.) 79 (62) percent of undergraduate students have a student loan debt with an average annual amount of US\$4,017 (US\$4,330). Both are lower than the UK (92 percent, average maintenance loan of US\$5612, tuition loan of US\$10,824). (See Table B5.4 in OECD 2017a)

of having been employed at some stage, have a retirement savings account at baseline.⁶ When asked whether they agreed with the statement “I have complete responsibility for making financial decisions that impact me” the mean score on a strongly disagree (1) to strongly agree (7) scale was 4.5. In summary, the pattern above suggests the average student is very much in transition, experiencing some independence and beginning to experience some of the opportunities and responsibilities of financial independence.

3.2 Key Survey Measures

3.2.1 Financial Literacy - Objective

Two measures of financial literacy were estimated across each wave. Supplementary Appendix II contains the full set of questions. A “Basic” measure comprised four questions: the impact of compounding (compounding); inflation (inflation); time value of money (TVM); and an inflation/money illusion (money illusion). These questions are derived from Lusardi and Mitchell (2009) and van Rooij, Lusardi, and Alessie (2011) which have been utilised in national surveys (e.g. the US Health and Retirement Study and De Nederlandsche Bank Household Survey). The set of questions comprising the Advanced scale are also from the same source and include: the relative risk between shares and bonds (risky assets); returns over the long term (returns assets); volatility over the long term (volatility); and the result of diversification (diversification). A third scale was administered based on the 13-item scale developed by Fernandes, Lynch, and Netemeyer (2014) (FLN) which incorporates the Advanced scale plus questions related to investing and mutual funds (four), bonds (one), diversification (one), retirement savings (one), and debt (credit card, mortgage). As the scale was not administered in the pre-survey no isolated benefit can be assessed pre-post but a relative comparison can still be made of each group.

⁶ In Australia superannuation is the retirement savings product similar to the US 401(k) with the key difference being employers are required to make mandatory contributions for employees of 9.5% of wages to the employee’s superannuation account as long as the employee earns \$450 in a month.

3.2.2 Subjective Financial Literacy and Financial Behaviours

In addition to the three objective financial literacy measures, subjective self-assessments of financial literacy were also included. Allgood and Walstad (2016) provide evidence that objective and subjective financial literacy are both influential in predicting financial behaviours. Students rated two knowledge dimensions: knowledge of what is required to invest in financial assets (Investing Knowledge); and knowledge of what is required to invest in Superannuation (Super Knowledge) from extremely poor (1) to extremely good (7) was used. Using the same scale students rated their ability to make financial decisions (Decision Making Ability) and were also asked how satisfied they were with their ability to manage their personal finances (Satisfaction Managing Finances) from very dissatisfied (1) to very satisfied (7).

3.2.3 Additional Correlates of Financial Literacy

Previous empirical studies have identified a range of financial literacy correlates that were also included in the surveys as controls. Self-assessed maths ability was included given the demonstrated relationship between numeracy and financial literacy (e.g. Bateman et al. 2012; Fernandes, Lynch, and Netemeyer 2014; Lusardi 2012; von Gaudecker 2015). Measures for the Big-Five personality domains were also included: Agreeableness; Extraversion; Openness; Neuroticism and Conscientiousness (John, Donahue, and Kentle 1991). Measures of risk tolerance and future time perspective were also included using the scales developed by Jacobs-Lawson and Hershey (2005). Indicators were included for whether the student had completed prior studies in a related subject (accounting, finance, business): at high-school; since; or both. Finally, a measure of how much financial matters were discussed at home was included to capture possible socialisation effects (Shim et al. 2010) which may be positively related to a student's financial literacy.

3.3 Pre, Post-Surveys and Respondent Attrition

Over a three-year span attrition in respondents which can compromise the analysis if the composition of the Unit and Control groups change both within and between groups. A total of

2,072 surveys were completed by 865 students over the period. Respondents were grouped by the maximum number of surveys completed and one-way ANOVA tests estimated followed by individual t-tests of group means, with Bonferroni adjustment, of mean test scores for those with one, two, three, four and five surveys. The overall F-test for Basic mean scores for the Control group was significant (2.79, p-value 0.0275) but only one significant⁷ paired difference was observed where those with four surveys had a higher baseline score (3.20 vs 2.75). For the Advanced means, neither the overall F-test was significant or any individual paired comparison.

The same tests were undertaken for the subjective financial literacy measures. The only significant result was for Satisfaction Managing Finances with the Control group (F-test 4.28, p-value < 0.01) with one significant paired difference where mean scores for those with four surveys was significantly higher than the one only mean (5.3 vs 4.5). There was no significant difference in the gender composition by number of surveys completed. Of the Big-5 personality traits no significant differences were suggested in terms of Agreeableness and Openness. In the other traits some differences were suggested but not consistently or large in absolute terms.

Conscientiousness scores were significantly different by number of surveys completed within the Control group where those completing four or five surveys scored higher than those with one (3.80 vs 3.50, max score of five). Those who completed five surveys had a lower mean Extraversion score (2.9 vs 3.5) than those completing one and Neuroticism mean scores were significantly different for those with one and three surveys in the Control group.

A final analysis employed a multinomial logistic regression to examine which characteristics predict those who complete one, two, three, four, or five surveys. Table 2 presents the estimated relative risk ratios for dropping out, or not completing each of two to five surveys relative to one survey. In addition to the summary variables previously reported (indicators for Unit enrolment, Female, study major, whether studied accounting/finance/business previously) other student

⁷ All references to statistical significance is at 95% confidence level unless otherwise stated.

characteristics were included: baseline financial literacy; maths ability; Big-Five personality domains; future time perspective, and whether financial matters were discussed at home.

<Insert Table 2>

The results suggest there was a greater likelihood that those in the Unit group to complete the follow up surveys, though this was not true when it came to the three-year (2016) survey. Apart from characteristics suggested in the previous one-way ANOVA tests (higher Conscientiousness more likely, higher Extraversion less likely) significant differences appear isolated to a particular number of surveys rather than across each number. There is a suggestion that those with higher Basic scores complete more surveys though this is only significant for two or four relative to one survey completed. Each of the estimations that follow control for each of the above variables to minimise potential bias from systematic differences in propensity to complete surveys.

4 Method and Analysis

4.1 Estimators and controls

We first examine the objective financial literacy measures (Basic and Advanced) and isolate the effect of unit completion and its persistence. The correlation between the two measures is modest (0.34) indicating that they measure similar but different constructs. The regression framework attempts to reduce the impact of non-random selection and attrition by estimating a multilevel mixed-effects model with individual random effects (Vittinghoff et al. 2010, 390). In addition to using the raw score we follow van Rooij, Lusardi, and Alessie (2011) and construct an index using the iterated principal component method to extract a Bartlett factor score. Whereas van Rooij, Lusardi, and Alessie (2011) use indicators for “don’t know” responses here these are scored as the probability of a correct answer excluding the “don’t know” option which can be considered an equivalent approach (von Gaudecker 2015). Given repeated observations, estimating a factor score presents a choice of which sample to estimate the factor structure with:

pre, post, or both.⁸ We use two specifications. The first estimates a factor score using the pooled sample across the two groups, but separately within surveys, and the second pools both groups and surveys. Moeller (1998) cautions of the pitfalls when standardizing in longitudinal studies. Standardizing across individuals within each pre and post time period produces a zero mean at both times (the first factor estimation presented in the tables), even though we may expect an increase over time for the unit group. Alternatively, when standardising across individuals across the Pre and Post-assessments (the second estimation tabulated) “the information about the time-point-specific relative rank-order gets mixed with the mean-level change” (Moeller 1998, 2).

The regression includes predictors for: demographics (Female, Age, Ethnicity); financial demographics (Assets, Income, Debt); and study characteristics (Major, and Previous Study – High school, High School and Since); the Big 5 personality traits; risk attitude (Risk Tolerance), future time perspective (FTP), a measure of numeracy using a self-assessment of maths ability (Maths Ability), and exposure to informal financial education socialisation via discussion of finances at home (Discussed). Indicators were also included for enrolment in the Unit (Control as the base), and for survey wave. The interaction of these terms isolates the difference in financial literacy for those enrolled at completion of the unit and each follow-up survey. As the FLN financial literacy measure was only added in 2014 no ability to compare a pre-post unit completion effect is possible but average scores can nonetheless be compared.

4.2 Results

Estimation results are presented in Table 3. The significance, or otherwise, of the controls is comparable to Gerrans and Heaney (in press). Noteworthy is the persistent negative female coefficient, higher scores for those with a commerce first-major⁹, significant positive coefficients for Maths Ability, Assets, Age, those with previous studies (High School and since), and

⁸ In addition to the issue of repeat observations is the question of whether the scale is estimating the same latent financial literacy measure for those in the Unit group.

⁹ While consistent with a large body of evidence some exceptions have been reported, for example Mandell and Klein (2009) found those who study science, social science or engineering, rather than those who study business or economics with better scores and female students.

Discussed but only for the Advanced score. Asian ethnicity students scored lower on the Advanced measure and FLN measures. Figure 1 utilises the estimated results to present predicted scores for each survey for those in the Unit and Control groups to illustrate the four unit and survey interaction estimates. The spike in scores for those in the Unit group at unit completion (Post) is observed for both Basic and Advanced scales. To estimate an effect size we follow Feingold (2013) who suggest “the standard deviation of the outcomes rather than of difference scores should be used to ensure comparability of effect sizes”. Consistent with this approach we adjust the Post*Unit coefficient by the pooled standard deviation of scores at baseline. Estimated confidence intervals also follow Feingold (2015) by first determining the confidence intervals for the Post*Unit coefficients which are then adjusted by the pooled standard deviation of baseline scores. The effect size for Basic exceeds the benchmark for a small effect immediately at the end of the unit.¹⁰ For example, for the raw Basic score the effect size is 0.37 (95 percent confidence levels (CIs) 0.20-0.54) and 0.34 (CIs 0.18-0.51) using the pooled samples factor score. For the Advanced scale, the effect size is medium: 0.59 (CIs 0.42-0.76) using the raw score and 0.54 (CIs 0.36-0.72) using the pooled samples factor score.

<Insert Table 3>

The suggestion of a decay effect after the 2013-post coefficient is not supported by a joint test of the interaction coefficients which fails to reject equality (Raw scores Basic: χ^2 (3df) 4.83, p-value 0.1848; Advanced χ^2 (3df) 5.27, p-value 0.1464). Tests of equality of various pairings of coefficients (e.g. Post*Unit vs 2016*Unit) suggests one significant difference: between the Post-2013 and 2014 for Basic within the Control group. All other comparisons are not significant. The mean effect size for the raw score of Basic remains small (0.25, CIs 0.0614-0.41) and the Advanced score medium (0.53, CIs 0.29-0.78). The estimations for the FLN measures, which were only assessed from 2014 onwards, suggest that one year after completion of the unit those in the Unit had significantly higher scores. The effect size is small (0.21, CIs 0.04-0.370 using the

¹⁰ Following (Cohen 1988) 0.2 represents a small effect, 0.5 a medium effect, and 0.8 a strong effect.

raw FLN score). While a pre-post comparison is not possible, recall no significant differences between the groups were estimated at baseline for either the Basic or Advanced scores.

The successive survey coefficients (Post-2013 to Year 3, 2016) identify the average time trend. The raw score estimates (first column for Basic or Advanced estimates) are positive and generally significant. The third column estimates are also similarly positive and significant, recalling that these factor scores are from a pooling of all individuals and surveys, suggesting a general drift up for those in the Control group. This could reflect a learning effects from the survey itself or reflect an accumulation of financial literacy through students' experience over the period. The significant Unit completion effects (i.e. the interaction coefficients) are in addition to these increasing scores. To reconcile the second column results in both the Basic and Advanced recall these factor scores pool within survey. The negative coefficients reflect that performance of the control group is worse after baseline relative to the unit group. Thus the results are consistent but reflect the effects of the respective sample pooling used for factor estimation.

4.3 Gender differences

Estimations by gender (raw scores), reported in Table 4, highlight that for the Basic scale significant effects appear isolated to females. Equality of coefficients for females is rejected at the 95 percent confidence level but not 90 percent. Paired tests of coefficients suggest a decay with the 2014 and 2016 estimates lower than 2013-Post. For Advanced, there is no decay evidence for males but each subsequent survey interaction coefficient is lower for females.

<Insert Table 4>

4.4 Summary – Unit Effects and Objective Financial Literacy

The estimated results suggest the overall estimated effects immediately after the course are sustained three-years after completion. However, estimations by gender suggest a depreciation for female students in Advanced scores. Notwithstanding, effects at each survey after the baseline assessment support a significant positive effect for unit completion.

<Insert Figure 1>

4.5 Under and Over-confidence in Objective Measures

At the end of the set of Basic and Advanced questions students were asked how many questions they thought they had answered correctly. This number minus the number of correct answers can be interpreted as a measure of confidence. A positive (negative) value indicates a student who is over (under) confident. That is, they think they have more (less) correct responses than is true. Those with the correct number of correct responses are classified as “calibrated”. Willis (2013) suggests that providing further information may lead to an over-confidence or “illusion of knowledge”. The estimation provides evidence as to whether this is evident either immediately after the unit or sustained in subsequent surveys. A multinomial logit model was estimated with the three confidence groups using the same set of variables as previous plus two additional variables. The first is the financial literacy score and the second is the number of questions answered with a “don’t know” response as it is assumed that a student answering the number of correct answers would exclude questions they had answered with a don’t know.

The results in Table 5 suggest students are generally calibrated. One exception is where the likelihood of over-confidence (2013-Post) increases but this is not associated with the Unit group. Those completing the unit do not have a higher likelihood of over-estimating the number of correct answers. Where the coefficients are significant the likelihood is reduced for either being under or over confident relative to having the correct number (calibrated).

<Insert Table 5>

4.6 Financial Literacy Subjective Assessments

Of the subjective financial literacy scores, the two knowledge based (Investing, Superannuation) have the highest correlation (0.65) similar to the correlation between the two general subjective assessments (Decision Making Ability, Satisfaction Managing Finances) of 0.60. The correlation between pairings of knowledge and general subjective assessments is lower, between 0.38 and 0.48. The highest correlation between objective and subjective measures is 0.37 (Advanced and

Investing) and lowest between Basic and Superannuation (0.13). Thus objective and subjective scales appear to measure similar but distinct constructs as do the various subjective scales.

Each subjective measure was used in turn as the outcome with the same set of predictors as for the objective regressions. Figure 2 plots predicted assessments by gender and sample based on the estimated results presented in Table 6 and by gender in Table 7. The results have similarities with the objective assessments previously reported with some notable differences. A gender difference is again evident in the subjective estimations. Female students consistently rate themselves lower in each assessment, though it is not significant for day-to-day decision making. Scores are significantly higher for commerce and science majors relative to those with humanities majors. A general positive association is observed for assets and income, those scoring higher on conscientiousness, future time perspective, those with previous studies, higher math ability, and those who discussed with the family have higher subjective assessments. Higher levels of debt, higher scores on neuroticism, and Asian ethnicity students had lower subjective score.

<Insert Table 6>

The Post-2013*Unit coefficient is significant and positive for each measure. Completing the unit increased self-assessments which is observed in the spike in predicted assessments in 2013-Post in Figure 2. The estimated effect size is small for financial decision making ability immediately after the unit (0.17, CIs 0.03-0.31) and remains so in 2016 (0.21, CIs 0.01-0.41). The three other self-assessments have a larger effect size immediately after the unit. For investing knowledge (0.89, CIs 0.74-1.03) and superannuation knowledge (0.99, CIs 0.84-1.15) the effect sizes can be classified as strong and for satisfaction managing personal finances the effect size is medium (0.67, CIs 0.53-0.81). However, subsequent years' coefficients are lower suggesting a decay in subjective assessments though effect sizes remain medium three years after the unit is completed. A test of the equality of all coefficients is not rejected for decision making ability and satisfaction managing finances. Tests for the 2013-Post and 2016 coefficients also do not reject equality. For

investing and superannuation knowledge the tests do reject equality and 2016 coefficients are significantly lower than the 2013-Post coefficients.

4.6.1 Financial Literacy Subjective Assessments by Gender

When each estimation is made within gender, reported in Table 7, the significant unit and survey interactions appear robust only for female students. At least a small to medium effect size is estimated for female students across the self-assessments across surveys. Immediately after the unit was completed the effect size for financial decision making was small for female students (0.24, CIs 0.04-0.44) and tests reject a difference in effect sizes over subsequent surveys. For satisfaction managing finances the medium effect size for female students immediately after the unit (0.75, CIs 0.55-0.95) is maintained through subsequent surveys and a formal test of equality of effects is not rejected. For males there is no significant effect for financial decision making immediately after the unit or subsequently. For satisfaction managing finances for males, the medium effect size immediately after the unit becomes small and not significant by 2016.

<Insert Table 7>

For both the superannuation and investing knowledge effect sizes are strong immediately after the unit for female students (1.01, CIs 1.21-1.91 and 1.08, CIs 1.28-1.91 respectively). However, subsequent effect sizes are significantly lower. A test for equality is rejected and a test between the 2013 and 2016 coefficients support the latter as significantly lower. Notwithstanding, the effect sizes remain medium in 2016 for investing and superannuation knowledge for females (0.61, CIs 0.44-1.43 and 0.53, CIs 0.22-1.32 respectively). For male students effect sizes remain significant, and small, for investing knowledge in 2016 (0.41, CIs 0.10-1.31). For superannuation, while the effect size remains positive in 2016 it is not significant.

<Insert Figure 2>

4.7 Subjective assessments and source of confidence

In each of the subjective rating estimations in Table 6 the objective financial literacy coefficient is positive, and significant, suggesting self-ratings have a basis in objective financial literacy.¹¹

This appears stronger for the two knowledge assessments (investing, superannuation) than the application oriented assessment (decision making ability) and overall (satisfaction managing finances). Within gender, Table 7, objective financial literacy is again significant for the two knowledge scores but for decision making ability objective financial literacy is only significant for males and for satisfaction managing finances only for females.

To further explore the basis of the improvements in subjective ratings as per Brugiavini et al. (2015) we classify the changes in each objective and subjective measure as either increased, unchanged, or decreased between pre and post surveys and separately between the pre and 2016 (three year) assessments. Each of the eight cross-tabulation of objective and subjective changes produce nine permutations. For example, both measures increase between surveys or one increases while the other decreases, etc. These nine groups can be consolidated into three. The first is a calibrated group where objective and subjective scores change in the same direction. Another group has those whose subjective score increases and the objective score either decreases or does not change, or where the subjective score does not change but the objective score decreases. To varying degrees this group is characterized as an over-confident group. The remaining group includes those with an increase in objective score and unchanged or decreased subjective score, or where the objective score is unchanged but the subjective score decreases. This group is characterized as an under-confident group. Cross-tabulations, for those enrolled in the unit, are presented in Figures S1 and S2 in Supplementary Appendix III.

In all but one of 16 cross-tabulations (four subjective and two objective scores), the calibrated group is the largest. This varies from a high of 59 percent, for changes in Advanced and Superannuation compared between pre and post surveys, to a low of 41 percent, for Basic and

¹¹ The financial literacy measure included in the estimation is the residual or unexplained financial literacy from a regression of the Advanced measure and the remaining set of predictors used in the objective regressions.

Satisfaction Managing Finances changes for pre and three year surveys. One exception is the pairing of Advanced and Financial Decision Making Ability for pre and three year surveys where the largest group is the under-confident group. Evidence doesn't support the view that those completing the unit develop a misplaced, or unfounded, source of confidence. In none of the pairings is the over-confident group the dominant one.

However, there does remain a non-trivial over-confident group where changes in subjective scores do not appear grounded. The highest proportion is 43 percent, when comparing the Basic and Superannuation pre and post scores, and the lowest is 17 percent, when comparing the Advanced and Financial Decision Making, pre and post scores. Various factors may be at play for different permutations. One is that the objective measures may not capture adequately what drives the subjective measures, or vice-versa. Finally, when comparing the pre-three year and pre-post over-confident groups the former is most commonly, with one exception, smaller suggesting the over-confidence, to the extent it is evident, fades. What is also concerning, is that it is the "under-confident" group which tends to be the one that becomes larger, in all but one case. Speculating again, it could be that confidence gained from unit completion fades, notwithstanding objective knowledge retained. It could also be that increased objective knowledge raises awareness of other shortfalls. Further research could gainfully investigate both.

The claim by Willis (2013) is that it is the completion of the financial education offerings that leads to over-confidence. If so we should be able to see this for those who complete the unit relative to their peers. As a further investigation the three mutually exclusive groups identified above were combined with a fourth group, namely those who did not complete the post survey. A multinomial regression of these four groups was estimated with a more parsimonious set of predictors: an indicator for unit completion; whether the student had previous studies in the area which, following the same argument; would pre-dispose to over-confidence, an indicator for gender with an expectation that females will be less over-confident; the big-five personality traits; and baseline objective and subjective scores. The tabulations are provided in the Supplementary

Appendix III, Tables S1 (pre to post) and 2 (pre to three year). In none of the cases is the likelihood of being in the over-confident group higher for those completing the unit. In fact, there is more evidence suggesting the likelihood is *lower* for this group relative to peers. There is also no evidence that over-confidence is any more likely for those with previous related studies.

4.8 Positive Financial Behaviours

Students scored performance of four positive financial behaviours over the previous 6-months (3-months for the Post-survey): 1) tracked spending (Track) ; 2) established a financial goal(s) (Goal); established a budget or spending plan (Budget); and 4) ensured/checked had enough set aside for an emergency (Emergency). The baseline probability (Pre) to perform each of the behaviours (reported at the top of Table 8) is high. The lowest (65 percent) is for Budget and 71 percent (Emergency) for the Unit group. For Track, both groups have very high baseline behaviour rates (90 percent and 92 percent for Unit and Control groups respectively).

A multilevel logistic mixed model was estimated for each behaviour and Table 8 presents the odds that a student performed the behaviour. First, the performance of each behaviour is generally higher for Conscientiousness, Openness, FTP, and those who discussed family finances more frequently at home (Discussed). These highlight the role that personality traits and socialisation (Shim et al. 2010) have on financial behaviours. Female students are also more likely to perform the behaviours. Surprisingly, those with previous studies at high school had lower odds for Budget or Emergency whereas those with previous studies at high school and since had higher odds for Goal. The odds of having performed most of the behaviours is positive for Income and Assets. Financial literacy¹² is only positively associated with Track. At baseline, those enrolled in the unit had no difference in odds for all behaviours except Budget which was lower.

<Insert Table 8>

Figure 3 presents the predicted probability of each behaviour for each group and survey based on the estimated results. Notwithstanding the high baseline probabilities a clear increase in the

¹² The measure used is the residual from a regression of financial literacy and the variables described in Table 3

odds is estimated for each behaviour for those in the unit immediately post completion. However, the increase in odds is not maintained over subsequent surveys. Behaviours remain at relatively high levels but the gap between the groups dissipates by 2016. When the same regressions are estimated within gender (not tabulated) the results are maintained. It is possible the pattern observed of a boost immediately post unit completion followed by a decay is different for those who are “more” conscientiousness (score higher) or have more of a future time perspective. To investigate a differential impact by personality, the sample was split by median conscientiousness score and re-estimated (not tabulated) and separately split by median FTP and re-estimated. In each case the same pattern is observed.

<Insert Figure 3>

4.9 Other Positive Behaviours

A further set of questions focussed on a set of positive behaviours proposed by (OECD-INFE 2011), and sought how often (Never (1) to Always (5)) the student engaged in each: “Before buying something I carefully consider whether I can afford it” (Afford); “I pay my bills on time” (Bills); “I keep a close personal watch on my financial affairs” (Watch); and “Before committing to a financial decision I consult independent sources of information/advice”. Baseline frequency rates, reported at the top of the columns in Table 9, are high with Consult the lowest (3.0 for Unit and 3.2 for Control) and Bills the highest (4.5 for both groups). Estimated regression results are presented in Table 9 and the predicted behaviour scores are presented in Figure 4.

<Insert Table 9>

Female students had significantly lower scores on Bills and Watch but significantly higher scores on Consult. There was generally no difference in scores between different majors. Scores for Afford and Consult were significantly higher for Asian students whereas Watch was lower for Asian students. The performance frequency for each behaviour was significant and negatively associated with Debt whereas Income was positive for Watch, and Assets was not significant for any. A number of the personality traits were significant with Conscientiousness and FTP positively associated with each behaviour. Agreeableness was positively associated with Afford

and Bills while Extraversion and Risk Tolerance was negatively associated with Afford and Bills. Having previous studies were not robustly associated with the behaviours though a negative relationship was estimated with Bills. Finally, having discussed family finances at home was positively associated with the frequency of undertaking each behaviour.

An increased frequency is estimated for three of the positive behaviours (Afford, Watch, Consult) for those in the Unit group immediately post course. The effect sizes for Afford and Consult are small (0.21, CIs 0.05-0.33, 0.22 CIs 0.06-0.49 respectively) in part attributable to ceiling effects. The effect size for Watch does not reach the minimum effect size and Bills is not significant. The small effect for Afford is sustained to 2016 whereas for Consult it is no longer significant. In summary, while there is evidence of a sustained increase in some positive financial behaviours the more common result is an immediate post-Unit increase which dissipates.

<Insert Figure 4>

4.10 Information Sources

A final set of questions, based on (OECD-INFE 2011), sought ratings of importance (not at all (1) to extremely (5)) of information sources when making financial decisions grouped as:

Unsolicited (e.g. mail, email, company brochure); Advertisements (e.g. Newspaper, TV advertisement); Independent/Authority (Moneysmart (ASIC), Govt Agency, Financial Counsellor); and Family/Friends. Table 10 presents regression results using rating importance for each information source. Female students rated Family/Friends and Unsolicited sources higher while older students, and those with previous studies (since high school), had significantly lower scores. Agreeableness and FTP were positively associated with each of the information sources ratings. Financial literacy, and having discussed finances at home, were associated with higher Authority scores. Overall, Figure 5 identifies a clear distinction between the importance attached to Unsolicited and Advertisements (both lower) against the two other sources.

A significant increase in the importance of Authority is observed for those in the unit group immediately after completion of the unit. The effect size comfortably exceeds the small

threshold (0.44, CIs 0.26-0.62) and the effect size remains in 2016 (0.26, CIs -0.03-0.56). While Family/Friends and Unsolicited coefficients are significantly lower at unit completion, the effect size does not reach the minimum threshold (-0.17 in both cases). Table 10 reveals that there is in fact a common decline in the importance ratings for both groups for Family/Friends, Advertisements, and Unsolicited. The students reflect a fundamental expectation through their studies – a more discerning mind for information sources. Those completing the course don't have an additional reduction but they do have a reduction in the average score.

<Insert Figure 5, Table 10>

5 Conclusion

This paper has provided much needed longitudinal evidence of the impact of a personal finance unit delivered to university undergraduates. We build on Gerrans and Heaney (in press) by considering assessments three years after students completed a semester long unit relative to their peers who did not complete the unit. Objective and subjective financial literacy were considered given evidence that they are both influential in financial behaviours (Allgood and Walstad 2016). The results identify sustained improvements in objective financial literacy three years after unit completion. The estimated effect sizes (Cohen 1988) for objective measures are small for a Basic scale and medium for an Advanced scale. There is some evidence of decay but this finding is not robust and where it is identified it appears the decay is attributable to a marginal increase in scores for those in the Control group rather than a decrease in the Unit group. There is not evidence of average decay rates comparable to those reported in the meta-analysis of Fernandes, Lynch, and Netemeyer (2014). In terms of subjective measures, positive effects from completing the unit immediately after the unit range from small effect sizes for financial decision making ability to strong effects for the two knowledge items and then overall satisfaction managing finances assessment. As with the objective measures there is some decay, for example strong effects become medium. On closer analysis the positive results for decision making ability and satisfaction appear isolated to female students. For the two knowledge items

results were more robust for female students whereas for males evidence of positive effects were isolated to investing knowledge which declines from medium to small over three years.

No evidence was found linking completion of the unit with over-confidence. Subjective assessments appear broadly grounded in objective financial literacy. However, a non-trivial group of students report a change in subjective ratings not linked to change in objective assessments, with a suggestion that this fades over time. This may indeed be misplaced confidence but future research is needed to explore the experience of students and the role of factors such as change in objective financial literacy in the dynamics of subjective assessments.

Evidence of behaviour change is not as robust over time. While the performance of positive financial behaviours were significantly higher for those in the unit immediately after completion, in many cases these small effects dissipate. The exception is for a small sustained positive effect for checking affordability of purchases, which remained three years after the unit. In some cases the lack of an effect can, in part, be attributed to a ceiling effect because the frequency of behaviour was very high at baseline. However, the pattern of a short-term but not sustained boost to positive performance is more common. In addition to financial literacy, personality traits, preferences, social norms, and values are expected to be reflected in financial behaviours as they were here. Explicit behaviour change was not a nominated outcome of the unit. The offering of the unit implicitly reflects a view of financial literacy “as an endogenous choice variable akin to human capital investment” (Lusardi, Michaud, and Mitchell 2017, 432). Those designing courses choose whether they emphasise positive or normative approaches when it comes to financial behaviours, and choose how explicit they are about this. Future research could usefully investigate this emphasis and its role on subsequent financial behaviours.

Finally, identifying the importance of independent sources of information is important to help decision making once the unit is completed. The importance attached to independent sources was significantly higher (small effect size) immediately after the unit and was maintained three

years after. A notable pattern for all students was a decline in the importance attached to family/friends and unsolicited information sources.

It is worth highlighting those characteristics identified as significant in explaining both the cognitive aspects of financial literacy and the possible predispositions to positive financial behaviours which are not amenable to change by completion of a semester unit. For both the objective and subjective measures, maths ability is a significant predictor. The significance of cognitive skills in explaining economic outcomes has previously been documented (e.g. Lusardi 2012; Smith, McArdle, and Willis 2010). Choosing to focus on improving these skills in the unit is balanced against a desire to reach students in majors where maths ability is not seen as required or a chosen focus of those students. The estimations of behaviour change also highlight the role of several personality traits in explaining reported behaviour. For example, those scoring higher on the conscientiousness trait or those with a stronger future time perspective had higher likelihood of performing behaviours with longer term payoffs. While some traits may not be amenable for interventions, others are. For example, future time perspective interventions have been used to improve health behaviours among university students (Hall and Fong 2003). Research that investigates the combined effects of interventions targeting financial literacy and future time perspective are recommended. Finally, financial socialisation (Shim et al. 2010) is identified as significant in predicting both financial literacy and positive financial behaviours. Having discussed finances at home is positively associated with the advanced objective financial literacy scale, each of the subjective financial literacy items, and the likelihood or frequency of performing each of the positive financial behaviours. Having previous studies in a related field is generally, but not always, associated with higher levels of objective and subjective financial literacy, and financial behaviours. First, this underscores the need to include these characteristics when making evaluations. Second, this highlights an area worth future research focus. How can large education interventions/units such as those delivered at undergraduate level best cater for, and leverage off, these predispositions?

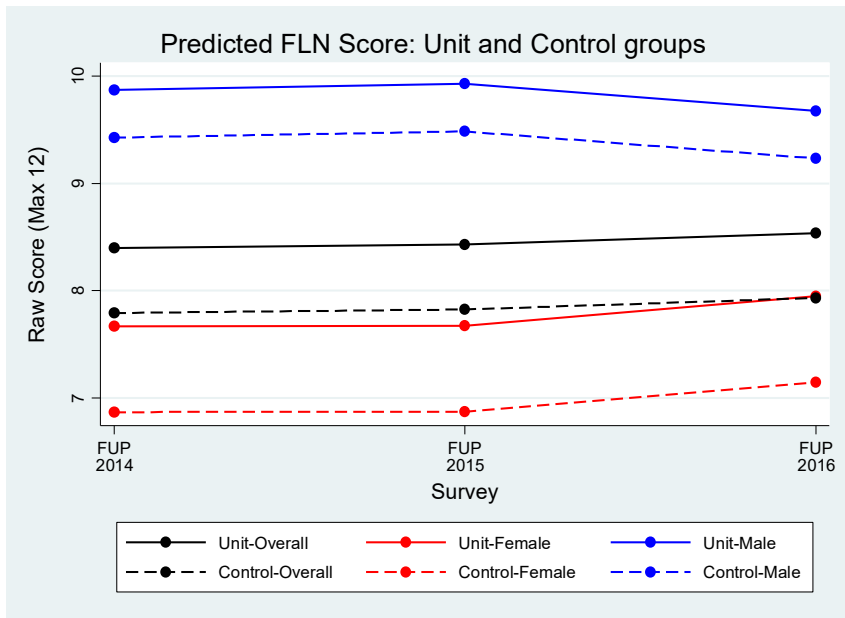
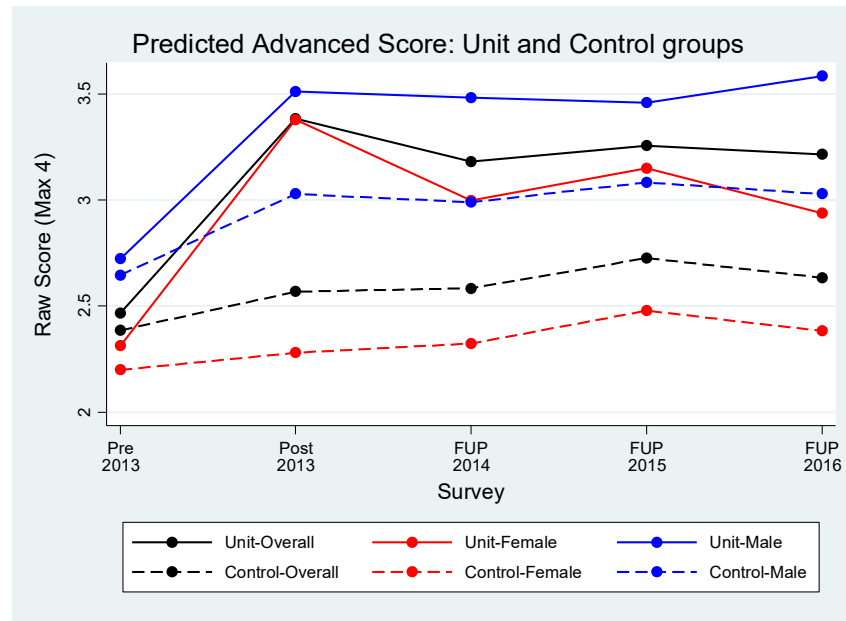
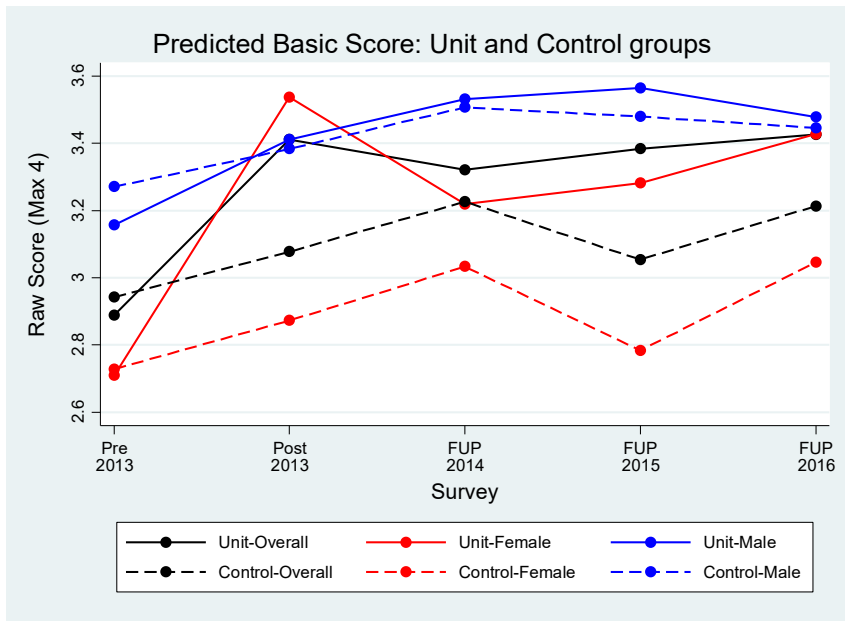


Figure 1 Predicted Raw Financial Literacy Scores Pre and Post by Gender

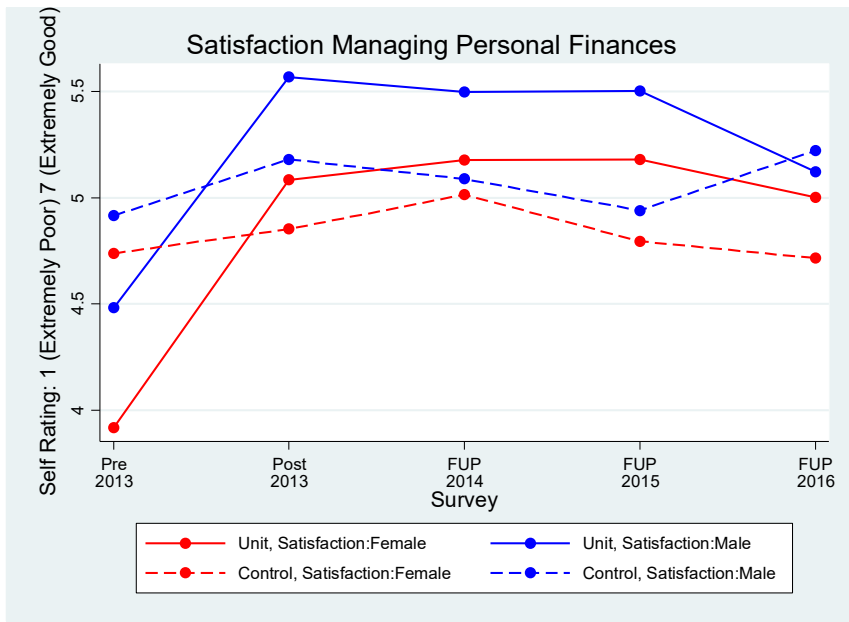
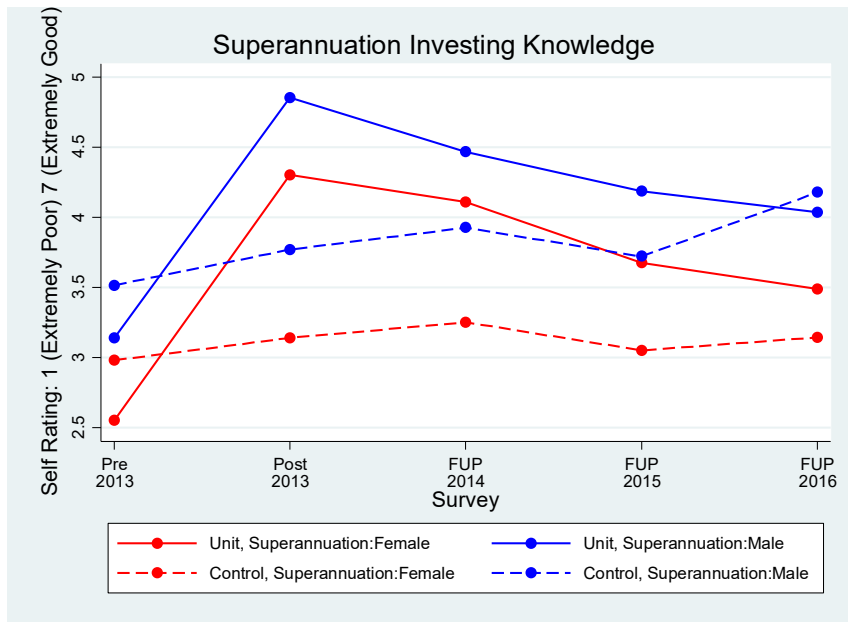
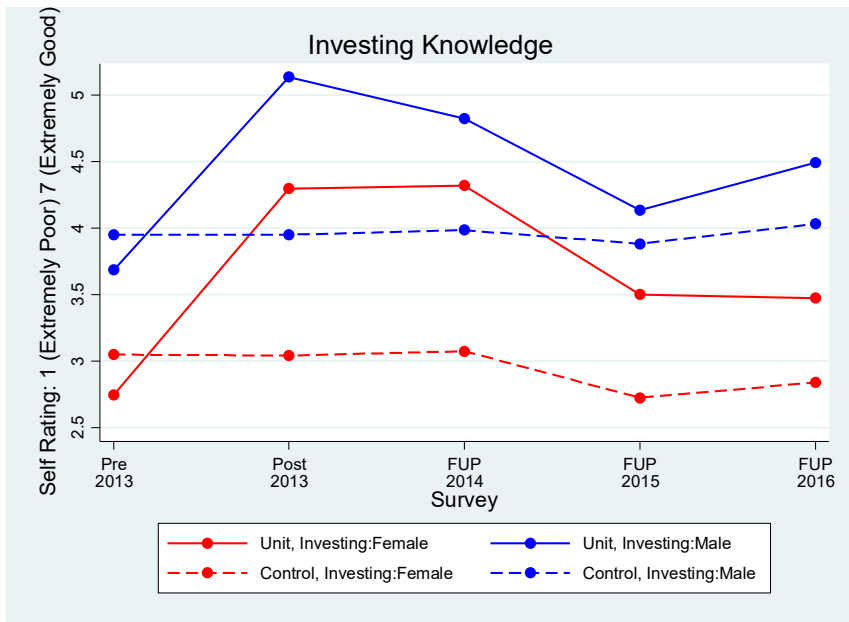
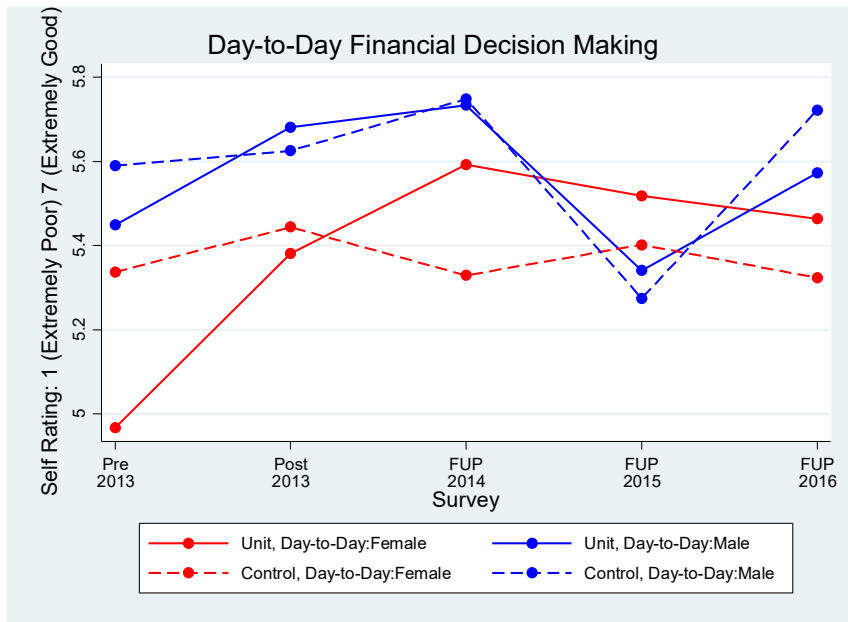


Figure 2 Self Assessments of Day-to-Day Decision Making Ability, Investing Knowledge, Super Knowledge, Satisfaction Managing Finances

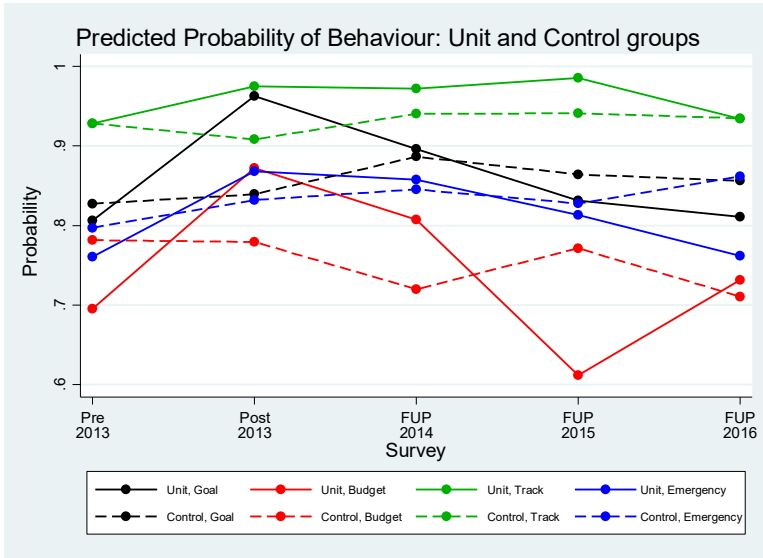


Figure 3 Intention to Perform Core Financial Behaviours

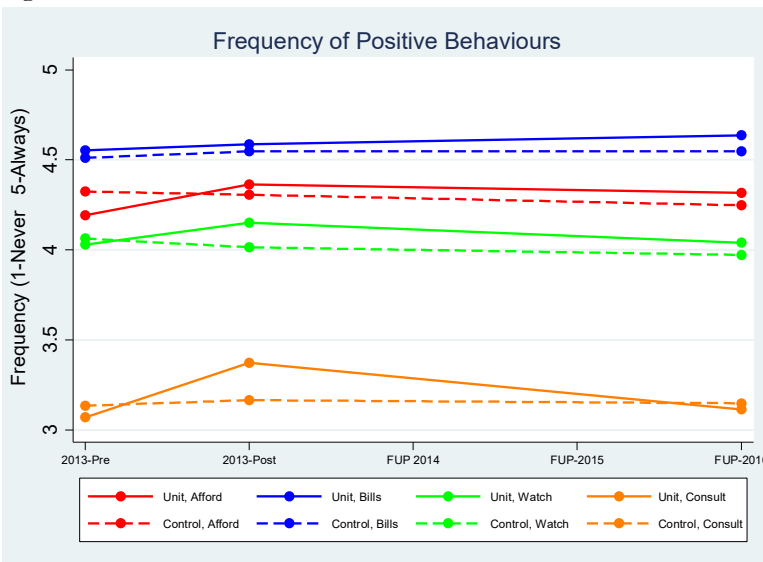


Figure 4 Reported Performance of Positive Financial Behaviours

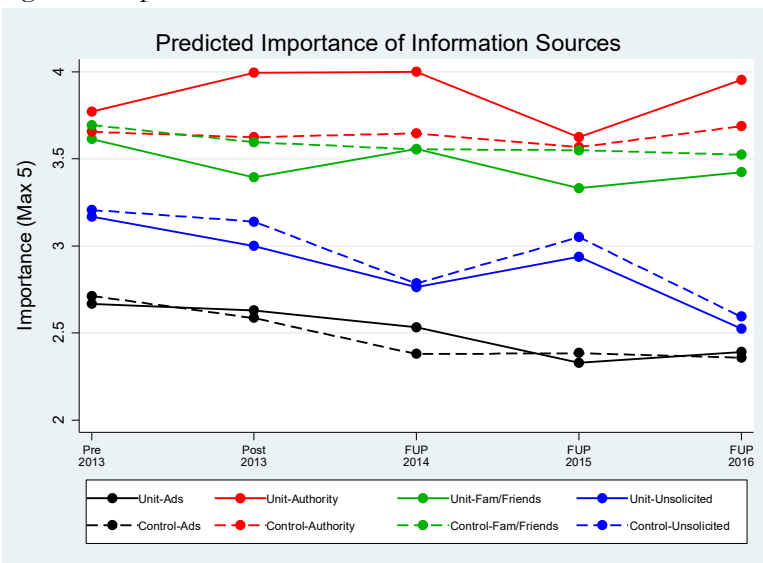


Figure 5 Importance of Information Sources

Table 1 Respondent Summary at Baseline

	Unit	Control
Age (years)	19.6	20.9
Female (percent)	45.2	66.0
Live at home (percent)	71.4	71.9
International students (percent)	8.7	8.1
Have superannuation (percent)	61.4	63.2
Work and study (percent)		
No work, studying fulltime	32.8	34.3
< 10hrs work per week plus study	25.0	28.3
10-20 hours work per week plus study	31.9	29.1
> 20 hours work per week plus study	10.2	8.3
Income (percent)		
< \$10,000	66.3	68.5
\$10,000 - \$24,999	27.1	22.1
>= \$25,000	6.6	9.4
Assets (percent)		
Personal effects only	22.0	32.3
< \$5,000	31.3	24.4
\$5,000-\$19,999	34.3	30.6
>=\$20,000	12.3	12.8
Debt (percent)		
No Debt	79.2	76.5
< \$5,000	11.1	13.7
\$5,000-\$19,999	6.6	6.0
>=\$20,000	3.0	3.8
Previous study (percent)		
No	55.4	49.2
Completed at high school	14.2	19.5
Completed at high school and since	14.5	15.9
Completed only since high school	16.0	15.4
Major (percent)		
Commerce Single/Double	7.5	13.7
Arts/Humanities Single or Double	13.9	22.1
Sciences Single or Double	67.5	37.5
Arts/Humanities and Science	1.2	2.8
Sciences and Arts/Humanities	1.5	8.1
Commerce & Humanities	5.1	8.1
Commerce & Science	3.3	7.7
Science	1.2	2.8
Science & Humanities	1.5	8.1
Ethnicity (percent)		
Other	9.6	9.9
Asian	15.4	24.4
British/European	7.2	10.7
Aust/NZ	67.8	55.0
Total – Baseline (pre)	332	533
2013 - Post	304	212
Follow-up 2014	84	199
Follow-up 2015	48	138
Follow-up 2016	75	147
Total Observations	843	1,229
Students	332	533

Table 2 Likelihood of Completing Different Number of Surveys

This table presents the estimated odds for completing up to five surveys relative to only completing one survey only. Relative risk ratios are reported with robust standard errors reported in brackets clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Two	Three	Four	Five
Unit	9.0039*** (3.6926)	4.3779*** (2.0063)	7.9170*** (4.3475)	2.0767 (1.6689)
Fin. Literacy Basic	1.7247* (0.4841)	1.4912 (0.4425)	2.8808*** (1.0969)	1.5864 (0.6094)
Unit*Fin. Lit. Basic	1.3428 (0.7126)	1.3340 (0.7725)	1.1523 (0.7622)	1.6468 (1.3059)
Fin. Literacy Advanced	0.5926* (0.1631)	0.6816 (0.2113)	1.4679 (0.4726)	1.0646 (0.3983)
Unit*Fin. Lit. Advanced	1.6927 (0.8922)	1.8385 (1.0676)	0.4282 (0.2700)	2.5868 (1.9967)
Female	1.1014 (0.2633)	1.0654 (0.2874)	1.3155 (0.4258)	1.0394 (0.3695)
Major (base Sciences): Commerce Single/Double	1.3856 (0.4867)	0.8397 (0.3518)	0.4716 (0.2615)	0.5145 (0.3547)
Arts/Humanities Single or Double	0.8158 (0.2457)	1.0441 (0.3341)	0.8763 (0.3357)	1.0500 (0.4924)
Arts/Humanities and Science	1.7058 (1.3756)	1.4705 (1.4095)	3.2982 (2.9482)	6.5435** (5.8065)
Sciences and Arts/Humanities	0.9374 (0.4441)	1.2120 (0.6078)	1.0080 (0.5834)	2.8592* (1.5601)
Commerce & Humanities	1.4680 (0.5957)	1.3242 (0.6266)	1.3451 (0.7556)	2.5087 (1.4658)
Commerce & Science	0.7812 (0.3338)	0.5044 (0.2870)	1.6249 (0.7968)	1.4273 (0.9310)
Age	0.9670 (0.0246)	1.0102 (0.0246)	0.9985 (0.0240)	1.0121 (0.0239)
Ethnicity (base Aust/NZ):Other	0.5574* (0.1904)	0.5925 (0.2303)	1.4064 (0.5742)	1.4931 (0.7605)
Asian	0.6433* (0.1700)	0.7153 (0.2073)	0.7993 (0.3038)	0.8434 (0.3379)
British/European	1.1658 (0.3750)	0.9707 (0.3694)	0.8352 (0.3557)	0.3349 (0.2407)
Income	1.1298 (0.1942)	0.6189** (0.1347)	1.0136 (0.2336)	1.1404 (0.2855)
Assets	0.9776 (0.1147)	1.1302 (0.1348)	0.9881 (0.1331)	0.9638 (0.1662)
Debt	0.9401 (0.1353)	0.8719 (0.1449)	0.8992 (0.1770)	0.8046 (0.1642)
Maths ability	1.0171 (0.0951)	1.0218 (0.1075)	1.0801 (0.1181)	1.2963* (0.1924)
Personality (BFI): Extraversion	0.8558 (0.1237)	0.5812*** (0.0988)	0.6982* (0.1286)	0.6488* (0.1515)
Agreeableness	0.7812 (0.1454)	0.8341 (0.1795)	1.3737 (0.3336)	0.6113** (0.1465)
Conscientiousness	1.7336*** (0.3076)	1.6713** (0.3438)	2.5030*** (0.5835)	2.9941*** (0.8610)
Neuroticism	1.0751 (0.1802)	1.3407 (0.2547)	1.4160* (0.2946)	1.3013 (0.2914)
Openness	0.9273 (0.1772)	1.1484 (0.2520)	1.0786 (0.2854)	0.9558 (0.3194)
Risk Tolerance	0.8866 (0.0914)	0.8074* (0.0964)	0.7684** (0.1007)	0.6247*** (0.1053)
FTP	1.0360 (0.0931)	1.1078 (0.1145)	0.9566 (0.1168)	0.9670 (0.1288)
Previous study (base none): High School	1.0988 (0.3258)	1.1567 (0.3557)	0.4304** (0.1800)	1.0082 (0.4237)
High School & Since	1.3041 (0.4097)	0.9805 (0.3631)	0.4891 (0.2130)	0.7331 (0.3603)
Since High School	1.5359 (0.4590)	1.2889 (0.4340)	1.4989 (0.5284)	1.3117 (0.5691)
Discussed	1.0488 (0.1097)	0.9470 (0.1045)	1.1269 (0.1468)	1.1316 (0.1596)
LL			-1117.6	
Chi-2			312.5	
df			124	
Observations			865	
Nagelkerke Pseudo R-Squared			0.343	

Table 3 Financial Literacy and Unit Completion

This table presents maximum likelihood estimates from linear mixed model regressions with individual random effects for three measures of financial literacy estimated three ways. The first measure is estimated as a raw score of correct answers. A second measure (Factor) uses the predicted Bartlett score from a factor analysis using the iterated principal factor method. A third measure (Factor Adj.) is a second factor score where “don’t know” responses have been recoded as the probability of a correct answer by chance in the question. Standard errors (bracketed) are clustered by individual. Significance is noted *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Basic Raw	Basic Factor	Basic Factor Adj.	Advanced Raw	Advanced Factor	Advanced Factor Adj.	FLN Raw	FLN Factor	FLN Factor Adj.
Post-2013	0.1357** (0.0546)	-0.3309*** (0.0813)	0.2105*** (0.0778)	0.1831*** (0.0669)	-0.5500*** (0.0867)	0.1347* (0.0818)			
One-Year 2014	0.2851*** (0.0598)	-0.1875** (0.0883)	0.4127*** (0.0839)	0.1990*** (0.0730)	-0.2428*** (0.0841)	0.2011** (0.0909)			
Two-Year 2015	0.1123 (0.0706)	-0.3286*** (0.0988)	0.1768* (0.0996)	0.3411*** (0.0855)	-0.2359** (0.1070)	0.3790*** (0.0986)	0.0334 (0.1495)	-0.0413 (0.0693)	0.0548 (0.0710)
Three-Year 2016	0.2720*** (0.0669)	-0.3365*** (0.1168)	0.4125*** (0.0935)	0.2491*** (0.0892)	-0.3829*** (0.1293)	0.2468** (0.1058)	0.1401 (0.1503)	-0.1581** (0.0766)	-0.0203 (0.0721)
Unit	-0.0533 (0.0720)	-0.0184 (0.1037)	-0.0243 (0.1016)	0.0809 (0.0870)	-0.0330 (0.1017)	0.0018 (0.1011)	0.6053** (0.2568)	0.0985 (0.1424)	0.1442 (0.1538)
Post-2013*Unit	0.3872*** (0.0884)	0.4367*** (0.1280)	0.5041*** (0.1233)	0.7361*** (0.1060)	0.8195*** (0.1305)	0.7420*** (0.1243)			
One-Year 2014*Unit	0.1482 (0.1193)	0.1943 (0.1747)	0.1748 (0.1682)	0.5163*** (0.1313)	0.4411*** (0.1471)	0.4848*** (0.1618)			
Two-Year 2015*Unit	0.3828*** (0.1138)	0.4022** (0.1672)	0.4707*** (0.1694)	0.4499*** (0.1394)	0.5115*** (0.1798)	0.4084** (0.1652)		-0.0058 (0.1662)	-0.0810 (0.1725)
Three-Year 2016*Unit	0.2660*** (0.1030)	0.3196* (0.1881)	0.2996** (0.1515)	0.4999*** (0.1286)	0.7922*** (0.1783)	0.5797*** (0.1443)		0.2584* (0.1563)	0.1786 (0.1567)
Female	-0.2001*** (0.0620)	-0.3379*** (0.0891)	-0.3172*** (0.0854)	-0.2323*** (0.0705)	-0.1823** (0.0795)	-0.1664** (0.0768)	-1.1767*** (0.2421)	-0.4879*** (0.1158)	-0.4871*** (0.1141)
Commerce Major (base Sciences):	0.0847 (0.0970)	0.0803 (0.1433)	0.0561 (0.1416)	0.5677*** (0.0980)	0.3629*** (0.1297)	0.4001** (0.1257)	1.2761*** (0.3178)	0.5283*** (0.1446)	0.5269*** (0.1472)
Arts/Humanities	-0.0690 (0.0794)	-0.1723 (0.1159)	-0.1311 (0.1128)	-0.0882 (0.0877)	-0.1063 (0.1000)	-0.0847 (0.0968)	-0.4221 (0.3262)	-0.1814 (0.1471)	-0.2275 (0.1472)
Arts/Humanities & Science	-0.0365 (0.2149)	-0.1684 (0.3192)	-0.1237 (0.3147)	-0.0604 (0.2150)	-0.0877 (0.2338)	-0.0904 (0.2298)	-0.3376 (0.6620)	-0.1266 (0.2678)	-0.1205 (0.2659)
Sciences & Arts/Humanities	-0.0204 (0.1247)	-0.0680 (0.1843)	-0.0792 (0.1778)	0.0507 (0.1571)	0.0376 (0.1583)	0.0581 (0.1536)	-0.6863 (0.5012)	-0.2736 (0.2103)	-0.2684 (0.2064)
Commerce & Humanities	0.0696 (0.1073)	0.0165 (0.1517)	0.0387 (0.1505)	0.4516*** (0.1161)	0.4817*** (0.1312)	0.4896*** (0.1250)	1.0805*** (0.3827)	0.4895*** (0.1737)	0.4986*** (0.1699)
Commerce & Science	0.1613 (0.1376)	0.1985 (0.1802)	0.1715 (0.1778)	0.4481*** (0.1472)	0.3794** (0.1586)	0.4028** (0.1581)	0.1019 (0.4569)	0.0650 (0.2144)	0.0660 (0.2153)
Age	0.0178*** (0.0040)	0.0282*** (0.0060)	0.0265*** (0.0056)	0.0342*** (0.0054)	0.0274*** (0.0067)	0.0270*** (0.0063)	0.0849*** (0.0170)	0.0374*** (0.0076)	0.0361*** (0.0075)
Ethnicity (base Aust/NZ): Other	0.0703 (0.0925)	0.1080 (0.1333)	0.1300 (0.1296)	-0.2130* (0.1135)	-0.3246** (0.1318)	-0.3055** (0.1267)	-0.1115 (0.3249)	-0.0704 (0.1375)	-0.0982 (0.1398)

Asian	-0.1055 (0.0768)	-0.1009 (0.1112)	-0.0821 (0.1068)	-0.2275*** (0.0820)	-0.2622*** (0.0944)	-0.2542*** (0.0906)	-0.7524** (0.2923)	-0.3622*** (0.1297)	-0.3628*** (0.1294)
British/European	0.0745 (0.0923)	0.1653 (0.1284)	0.1796 (0.1217)	-0.0468 (0.1069)	-0.0632 (0.1153)	-0.0603 (0.1125)	0.1606 (0.3609)	0.1084 (0.1573)	0.1232 (0.1546)
Income	0.0273 (0.0354)	0.0651 (0.0538)	0.0501 (0.0501)	-0.0137 (0.0414)	-0.0565 (0.0512)	-0.0530 (0.0479)	-0.0349 (0.1046)	0.0107 (0.0504)	0.0019 (0.0486)
Assets	0.0890*** (0.0250)	0.0985*** (0.0377)	0.1113*** (0.0355)	0.0905*** (0.0284)	0.0833** (0.0345)	0.0887*** (0.0326)	0.2535*** (0.0875)	0.0922** (0.0403)	0.1066*** (0.0402)
Debt	-0.0257 (0.0245)	-0.0238 (0.0381)	-0.0212 (0.0348)	-0.0439 (0.0293)	-0.0689* (0.0368)	-0.0578* (0.0340)	-0.1093 (0.0729)	-0.0691** (0.0344)	-0.0526 (0.0328)
Maths Ability	0.1515*** (0.0241)	0.1667*** (0.0342)	0.1652*** (0.0327)	0.0866*** (0.0288)	0.0901*** (0.0327)	0.0922*** (0.0315)	0.4321*** (0.1078)	0.1783*** (0.0489)	0.1804*** (0.0489)
BFI Personality: Extraversion	-0.1062*** (0.0374)	-0.1405** (0.0548)	-0.1603*** (0.0534)	-0.0896** (0.0407)	-0.1294*** (0.0455)	-0.1305*** (0.0440)	-0.3421** (0.1419)	-0.1528** (0.0597)	-0.1740*** (0.0607)
Agreeableness	-0.0849* (0.0502)	-0.1580** (0.0727)	-0.1581** (0.0717)	-0.1022* (0.0554)	-0.0967 (0.0631)	-0.1102* (0.0601)	-0.5161*** (0.1943)	-0.2005** (0.0864)	-0.2040** (0.0854)
Conscientiousness	0.0177 (0.0448)	0.0170 (0.0640)	0.0279 (0.0624)	0.1029** (0.0515)	0.1129* (0.0596)	0.0995* (0.0571)	-0.3005* (0.1709)	-0.0870 (0.0751)	-0.0899 (0.0749)
Neuroticism	-0.1223*** (0.0453)	-0.1693*** (0.0646)	-0.1736*** (0.0636)	-0.0561 (0.0485)	-0.0739 (0.0540)	-0.0757 (0.0528)	-0.4675*** (0.1668)	-0.1925** (0.0748)	-0.1959*** (0.0744)
Openness	0.0359 (0.0556)	0.0875 (0.0804)	0.0888 (0.0780)	-0.0631 (0.0640)	-0.0809 (0.0687)	-0.0808 (0.0662)	-0.0214 (0.2122)	0.0207 (0.0930)	0.0388 (0.0935)
Risk Tolerance	-0.0181 (0.0226)	-0.0479 (0.0326)	-0.0399 (0.0313)	0.0529** (0.0247)	0.0589** (0.0279)	0.0467* (0.0269)	0.1411* (0.0773)	0.0551 (0.0371)	0.0430 (0.0363)
FTP	-0.0165 (0.0249)	-0.0234 (0.0354)	-0.0236 (0.0347)	0.0983*** (0.0273)	0.0819** (0.0323)	0.0826*** (0.0311)	0.1569 (0.1030)	0.0452 (0.0476)	0.0477 (0.0465)
Previous study (H School, base none):	0.0611 (0.0756)	0.1717 (0.1050)	0.1742* (0.1023)	0.2753*** (0.0867)	0.2067** (0.0955)	0.2240** (0.0932)	0.3635 (0.2783)	0.1489 (0.1222)	0.1870 (0.1193)
High School & Since	-0.0192 (0.0816)	0.0686 (0.1143)	0.0732 (0.1130)	0.1615* (0.0920)	0.1383 (0.1166)	0.1442 (0.1132)	0.3098 (0.2989)	0.0919 (0.1471)	0.0944 (0.1463)
Since High School	0.0871 (0.0724)	0.1233 (0.1057)	0.1238 (0.1038)	0.1112 (0.0829)	0.1261 (0.0938)	0.1155 (0.0905)	0.0779 (0.2734)	0.0885 (0.1256)	0.0862 (0.1277)
Discussed	0.0371 (0.0277)	0.0212 (0.0396)	0.0230 (0.0387)	0.1305*** (0.0297)	0.1043*** (0.0357)	0.1117*** (0.0346)	0.0897 (0.1070)	0.0451 (0.0468)	0.0458 (0.0471)
Constant	2.4194*** (0.4174)	-0.2857 (0.5902)	-0.6353 (0.5796)	0.6752 (0.4580)	-1.0798** (0.5158)	-1.3655*** (0.4989)	7.6931*** (1.6907)	-0.2969 (0.7688)	-0.3353 (0.7662)
Variance (individual)	0.3461	0.6698	0.6722	0.4057	0.4294	0.4132	3.0790	0.6103	0.6030
Variance (residual)	0.4976	1.1129	0.9838	0.7147	1.1172	1.0142	1.6716	0.3685	0.3681
-2LL	-2620.0	-3410.2	-3313.9	-2945.6	-3324.8	-3236.1	-1435.0	-897.0	-895.0
Chi-2	411.7	236.2	376.6	651.7	314.3	471.7	334.3	324.7	321.8
df	35	35	35	35	35	35	29	31	31
Obs	2072	2067	2067	2072	2072	2072	691	691	691
Individuals	865	865	865	865	865	865	407	407	407

Table 4 Financial Literacy and Unit Completion by Gender – Raw Scores

This table presents a gender breakdown of the estimations presented in Table 3. The results are maximum likelihood estimates from linear mixed model regressions with individual random effects for three measures of financial literacy. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Basic		Advanced		FLN	
	Female	Male	Female	Male	Female	Male
Post-2013	0.1450** (0.0725)	0.1133 (0.0760)	0.0813 (0.0813)	0.3831*** (0.1123)		
One-Year 2014	0.3049*** (0.0787)	0.2367*** (0.0848)	0.1243 (0.0912)	0.3442*** (0.1185)		
Two-Year 2015	0.0556 (0.0937)	0.2093** (0.0927)	0.2796*** (0.1055)	0.4378*** (0.1387)	0.0035 (0.2074)	0.0571 (0.1859)
Three-Year 2016	0.3182*** (0.0895)	0.1758** (0.0758)	0.1836 (0.1133)	0.3828*** (0.1360)	0.2793 (0.2063)	-0.1940 (0.1791)
Unit	-0.0188 (0.1022)	-0.1142 (0.1029)	0.1144 (0.1180)	0.0785 (0.1309)	0.8012** (0.3514)	0.4430 (0.3669)
Post-2013*Unit	0.6832*** (0.1263)	0.1414 (0.1169)	0.9849*** (0.1491)	0.4056*** (0.1561)		
One-Year 2014*Unit	0.2053 (0.1775)	0.1380 (0.1372)	0.5615*** (0.1862)	0.4149** (0.1841)		
Two-Year 2015*Unit	0.5176*** (0.1854)	0.2004 (0.1351)	0.5568*** (0.2057)	0.2972 (0.1950)		
Three-Year 2016*Unit	0.4002*** (0.1479)	0.1461 (0.1290)	0.4403** (0.1814)	0.4771*** (0.1768)		
Major (base Sciences):						
Commerce	-0.0376 (0.1415)	0.2050* (0.1239)	0.5644*** (0.1359)	0.5835*** (0.1357)	1.6478*** (0.4465)	0.7942* (0.4451)
Arts/Humanities	-0.1287 (0.1031)	-0.0075 (0.1283)	-0.1902* (0.1096)	0.0271 (0.1487)	-0.4795 (0.4155)	-0.3100 (0.5143)
Arts/Humanities & Science	-0.0209 (0.2467)	-0.0907 (0.4412)	-0.1385 (0.2836)	0.0996 (0.2623)	-0.2191 (0.8480)	-0.7844 (0.7536)
Sciences & Arts/Humanities	0.0026 (0.1582)	-0.0275 (0.1981)	-0.0769 (0.2180)	0.2964 (0.1942)	-0.7901 (0.6164)	-0.3057 (0.7314)
Commerce & Humanities	-0.0175 (0.1451)	0.1853 (0.1475)	0.3074* (0.1619)	0.5999*** (0.1547)	0.8852 (0.6069)	1.1353*** (0.4203)
Commerce & Science	0.3109 (0.3184)	0.1003 (0.1342)	0.4122 (0.3228)	0.4633*** (0.1665)	-0.6318 (0.8956)	0.8392* (0.4954)
Age	0.0164*** (0.0047)	0.0210*** (0.0068)	0.0326*** (0.0066)	0.0380*** (0.0081)	0.0810*** (0.0199)	0.1211*** (0.0272)
Ethnicity (base Aust/NZ):						
Other	0.1546 (0.1253)	-0.0717 (0.1410)	-0.1567 (0.1450)	-0.2977* (0.1753)	0.4314 (0.4149)	-0.8336** (0.4171)
Asian	-0.1457 (0.0959)	-0.0436 (0.1298)	-0.3344*** (0.1105)	-0.0617 (0.1227)	-0.7530** (0.3680)	-0.7231 (0.5064)
British/European	0.0814 (0.1301)	0.0709 (0.1141)	-0.1290 (0.1455)	0.1099 (0.1314)	0.0047 (0.4751)	0.9252** (0.4647)
Income	0.0157 (0.0507)	0.0137 (0.0455)	-0.0007 (0.0547)	-0.0466 (0.0598)	-0.0834 (0.1451)	-0.0229 (0.1319)
Assets	0.0735** (0.0326)	0.1127*** (0.0396)	0.0571 (0.0362)	0.1315*** (0.0453)	0.2118** (0.1061)	0.2259* (0.1262)
Debt	-0.0171 (0.0338)	-0.0300 (0.0356)	-0.0218 (0.0403)	-0.0517 (0.0413)	-0.0297 (0.1000)	-0.1873* (0.1042)
Maths Ability	0.1521*** (0.0292)	0.1271*** (0.0417)	0.0561* (0.0328)	0.1077* (0.0558)	0.4462*** (0.1317)	0.1717 (0.1883)
Personality type (BFI):						
Extraversion	-0.1167** (0.0502)	-0.0883 (0.0546)	-0.0398 (0.0537)	-0.1791*** (0.0634)	-0.4357** (0.1787)	-0.2660 (0.2245)

Agreeableness	-0.1349** (0.0628)	-0.0317 (0.0793)	-0.1519** (0.0704)	-0.0479 (0.0868)	-0.7110*** (0.2344)	0.0282 (0.3286)
Conscientiousness	-0.0002 (0.0601)	0.0495 (0.0672)	0.0993 (0.0674)	0.1175 (0.0804)	-0.2277 (0.2203)	-0.4666* (0.2767)
Neuroticism	-0.1367** (0.0644)	-0.1047* (0.0623)	-0.0975 (0.0632)	-0.0295 (0.0749)	-0.5549*** (0.2083)	-0.4027 (0.2752)
Openness	0.0505 (0.0726)	0.0058 (0.0851)	-0.0420 (0.0842)	-0.1263 (0.0930)	0.0344 (0.2735)	-0.1847 (0.2887)
Risk Tolerance	-0.0630* (0.0323)	0.0254 (0.0298)	0.0239 (0.0338)	0.0843** (0.0367)	-0.0091 (0.1133)	0.3387*** (0.0947)
FTP	-0.0608** (0.0302)	0.0530 (0.0433)	0.0723** (0.0339)	0.1335*** (0.0406)	0.1579 (0.1277)	0.0643 (0.1581)
Previous study (base none):						
High School	0.1390 (0.1028)	-0.0234 (0.1072)	0.3417*** (0.1176)	0.2344* (0.1224)	0.3077 (0.3775)	0.4234 (0.3992)
High School & Since	0.1218 (0.1119)	-0.2179* (0.1203)	0.2733** (0.1200)	0.0442 (0.1337)	0.3144 (0.3993)	0.3334 (0.4832)
Since High School	0.1441 (0.1082)	0.0404 (0.1004)	0.2046* (0.1234)	0.0148 (0.1086)	-0.0090 (0.4063)	0.2385 (0.3671)
Discussed	0.0592 (0.0375)	0.0107 (0.0418)	0.1253*** (0.0386)	0.1355*** (0.0462)	-0.0159 (0.1439)	0.3060* (0.1626)
Constant	2.8034*** (0.5493)	1.8463*** (0.6817)	1.0418* (0.5771)	0.2413 (0.7944)	8.0720*** (2.1565)	6.6675** (2.6369)
Variance (individual)	0.3600	0.3038	0.4514	0.2895	3.3144	2.3491
Variance (residual)	0.5442	0.3968	0.7178	0.6987	2.0110	0.9081
-2LL	-1588.2	-993.1	-1749.8	-1174.4	-941.2	-466.6
Chi-2	261.7	140.9	352.2	290.1	136.7	125.8
df	34	34	34	34	28	28
Obs	1220	852	1220	852	439	252
Individuals	502	363	502	363	256	151

Table 5 Confidence and Unit Completion

This table presents results from a maximum likelihood estimation of multinomial logit mixed model regressions with individual random effects for a measure of under and over-confidence. The relative risk ratios of underestimating or overestimating the number of questions correct are presented relative to the group who are calibrated in that they correctly identified how many questions they had correct. Explanatory variables as described in Table 3. Standard errors (brackets) are clustered by individual with significance reported by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Basic		Advanced	
	Under	Over	Under	Over
Survey				
Post-2013	0.9318 (0.1849)	0.8345 (0.1860)	0.4723*** (0.1073)	3.4238*** (0.7330)
One-Year 2014	0.7869 (0.1720)	0.6383* (0.1543)	0.9541 (0.1820)	0.8352 (0.2213)
Two-Year 2015	0.7840 (0.2026)	0.5944* (0.1766)	0.7354 (0.1616)	0.3809** (0.1469)
Three-Year 2016	0.6629* (0.1595)	0.4105*** (0.1222)	0.6311** (0.1440)	0.7098 (0.2226)
Unit	1.3306 (0.2713)	1.2473 (0.2580)	1.1435 (0.2001)	1.0839 (0.2508)
Post-2013*Unit	0.3841*** (0.1117)	0.4697** (0.1462)	0.3448*** (0.1233)	1.4801 (0.4555)
One-Year 2014*Unit	0.4323** (0.1800)	0.5379 (0.2344)	0.5030** (0.1722)	0.9088 (0.4156)
Two-Year 2015*Unit	0.3398** (0.1718)	0.4636 (0.2547)	0.6527 (0.2677)	0.9312 (0.6210)
Three-Year 2016*Unit	0.6029 (0.2397)	0.5151 (0.2857)	0.5779 (0.2169)	0.9543 (0.4820)
Don't knows	0.6352*** (0.0842)	1.0171 (0.1155)	0.5230*** (0.0307)	0.6371*** (0.0483)
Female	1.9164*** (0.3292)	1.5909*** (0.2709)	2.1817*** (0.3507)	0.8493 (0.1262)
Major (base Sciences):				
Commerce Single/Double	0.4391*** (0.1207)	0.7664 (0.2001)	0.2618*** (0.0638)	0.8431 (0.1888)
Arts/Humanities Single or Double	1.6182** (0.3365)	2.0625*** (0.4471)	0.8250 (0.1427)	1.0744 (0.2228)
Arts/Humanities and Science	0.8621 (0.3618)	0.7156 (0.3406)	0.6906 (0.2909)	0.8946 (0.3750)
Sciences and Arts/Humanities	1.0391 (0.3175)	0.8703 (0.3527)	1.5141 (0.3845)	0.3954** (0.1675)
Commerce & Humanities	0.9385 (0.2519)	0.9597 (0.2983)	0.8853 (0.2534)	1.1063 (0.3370)
Commerce & Science	0.9485 (0.2914)	0.8498 (0.2829)	0.5002** (0.1479)	0.7346 (0.2026)
Age	0.9884 (0.0148)	0.9656* (0.0194)	0.9729** (0.0135)	0.9871 (0.0129)
Ethnicity (base Aust/NZ):				
Other	0.9617 (0.2485)	0.8020 (0.2107)	0.5752*** (0.1235)	0.7669 (0.1850)
Asian	1.5940** (0.3097)	1.1151 (0.2121)	1.0030 (0.1699)	0.9686 (0.1792)
British/European	0.4892*** (0.1287)	0.4826*** (0.1344)	0.9981 (0.2140)	1.3282 (0.3112)
Income	1.0620 (0.1161)	0.9725 (0.1235)	1.2989*** (0.1292)	0.9266 (0.1074)
Assets	0.9153 (0.0663)	0.9912 (0.0813)	0.8520** (0.0548)	0.9413 (0.0695)
Debt	1.0748 (0.0809)	1.1779* (0.1099)	1.0112 (0.0680)	1.0788 (0.0914)

Maths Ability	0.9350 (0.0560)	0.9469 (0.0662)	0.8629*** (0.0494)	1.1316* (0.0775)
Personality type (BFI):				
Extraversion	1.0953 (0.1101)	1.1284 (0.1211)	0.8499* (0.0781)	0.9226 (0.0888)
Agreeableness	1.2367* (0.1576)	1.5014*** (0.2170)	1.1340 (0.1290)	1.1120 (0.1384)
Conscientiousness	0.8402 (0.1061)	0.7922* (0.1002)	1.0974 (0.1285)	0.9215 (0.1038)
Neuroticism	1.5029*** (0.1727)	1.3140** (0.1698)	1.0737 (0.1081)	0.9370 (0.1022)
Openness	0.8839 (0.1257)	0.7879* (0.1117)	0.8647 (0.0989)	1.1856 (0.1585)
Risk Tolerance	0.9827 (0.0650)	0.9969 (0.0704)	0.9054* (0.0539)	0.9437 (0.0610)
FTP	0.9556 (0.0583)	1.1538** (0.0780)	1.0289 (0.0576)	0.9962 (0.0595)
Previous study (base none):				
High School	1.1186 (0.2193)	1.3913* (0.2742)	1.0068 (0.1680)	0.9579 (0.1885)
High School & Since	0.8639 (0.1962)	1.5771** (0.3513)	1.0433 (0.2242)	1.3021 (0.2801)
Since High School	0.7892 (0.1619)	0.7735 (0.1766)	1.0743 (0.1915)	0.8544 (0.1595)
Discussed	0.9794 (0.0679)	1.0653 (0.0811)	0.9146 (0.0643)	1.0655 (0.0748)
-2LL		-1958.5		-1829.2
Obs		2072		2072
Individuals		865		865

Table 6 Self-Assessments of Financial Literacy Components

This table presents results from a maximum likelihood estimation of linear mixed model regressions with individual random effects for subjective measures of financial literacy. Each outcome is measure on a seven point Likert scale which for the first three columns are from Extremely Poor (1) to Extremely Good (7) and the last column from Very Dissatisfied (1) to Very Satisfied (7). The measure of financial literacy used is the residual from a regression of each respective measure of financial literacy and the set of variables as described in Table 3. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Financial Decision Making Ability	Investing Knowledge	Superannuation Knowledge	Satisfaction Managing Finances
Survey				
Post-2013	0.0851 (0.0651)	0.0032 (0.0800)	0.1983** (0.0797)	0.1637** (0.0712)
One-Year 2014	0.0536 (0.0663)	0.0366 (0.0928)	0.3253*** (0.0925)	0.2449*** (0.0787)
Two-Year 2015	-0.0513 (0.0816)	-0.2300** (0.1026)	0.1303 (0.1192)	0.0620 (0.0950)
Three-Year 2016	0.0457 (0.0880)	-0.1061 (0.1120)	0.3284*** (0.1210)	0.0994 (0.1063)
Unit	-0.2516*** (0.0802)	-0.3034*** (0.0999)	-0.4274*** (0.1015)	-0.6687*** (0.0932)
Post-2013*Unit	0.2215** (0.0916)	1.4810*** (0.1237)	1.5249*** (0.1224)	0.9695*** (0.1029)
One-Year 2014*Unit	0.4140*** (0.1068)	1.3501*** (0.1569)	1.1190*** (0.1689)	0.9045*** (0.1395)
Two-Year 2015*Unit	0.2486 (0.1526)	0.8290*** (0.2157)	0.9324*** (0.2308)	1.0680*** (0.1758)
Three-Year 2016*Unit	0.2681** (0.1325)	0.8734*** (0.1981)	0.5736*** (0.2162)	0.7733*** (0.1810)
Fin. Lit. Resids	0.0692** (0.0321)	0.1938*** (0.0316)	0.1553*** (0.0345)	0.0721** (0.0309)
Female	-0.0895 (0.0722)	-0.4072*** (0.0862)	-0.1919** (0.0856)	-0.1362* (0.0806)
Major (base Sciences):				
Commerce	0.1457 (0.0926)	0.5413*** (0.1428)	0.4570*** (0.1357)	0.3305*** (0.1189)
Arts/Humanities	-0.0158 (0.0883)	-0.0936 (0.1096)	-0.0729 (0.1109)	0.1618* (0.0980)
Arts/Humanities & Science	0.1231 (0.2640)	-0.2780 (0.2687)	-0.5698** (0.2269)	0.0712 (0.2473)
Sciences & Arts/Humanities	-0.0478 (0.1735)	-0.0492 (0.1784)	-0.1252 (0.1530)	0.2100 (0.1571)
Commerce & Humanities	0.2175** (0.0945)	0.2357 (0.1442)	0.2656* (0.1422)	0.2176 (0.1407)
Commerce & Science	0.0954 (0.1278)	0.3440** (0.1560)	0.3233* (0.1667)	0.1943 (0.1400)
Age	0.0081 (0.0056)	0.0312*** (0.0083)	0.0403*** (0.0071)	0.0103 (0.0064)
Ethnicity (base Aust/NZ):				
Other	0.0240 (0.0967)	-0.0905 (0.1300)	-0.1347 (0.1246)	0.1004 (0.1167)
Asian	-0.2723*** (0.0787)	-0.1096 (0.1017)	-0.3196*** (0.0991)	-0.3533*** (0.0882)
British/European	-0.0244 (0.0927)	-0.0972 (0.1352)	-0.2578** (0.1281)	0.0065 (0.1190)
Income	0.1267*** (0.0398)	0.0312 (0.0533)	0.2098*** (0.0558)	0.0517 (0.0495)
Assets	0.1125*** (0.0292)	0.1807*** (0.0356)	0.1816*** (0.0381)	0.1305*** (0.0332)
Debt	-0.0806*** (0.0290)	-0.0431 (0.0389)	-0.0466 (0.0422)	-0.1078*** (0.0408)
Maths Ability	0.2835***	0.1685***	0.1254***	0.1798***

	(0.0291)	(0.0330)	(0.0337)	(0.0305)
Personality type (BFI):				
Extraversion	-0.0037 (0.0445)	-0.0363 (0.0537)	0.0320 (0.0517)	-0.0928* (0.0516)
Agreeableness	-0.0355 (0.0521)	-0.0839 (0.0694)	-0.0466 (0.0678)	-0.0382 (0.0617)
Conscientiousness	0.2928*** (0.0551)	0.1368** (0.0664)	0.1364** (0.0655)	0.3534*** (0.0598)
Neuroticism	-0.0147 (0.0484)	-0.1522*** (0.0583)	-0.0751 (0.0618)	-0.1832*** (0.0538)
Openness	-0.0073 (0.0618)	0.0472 (0.0725)	0.0527 (0.0725)	-0.0591 (0.0690)
Risk Tolerance	0.0132 (0.0257)	0.2724*** (0.0331)	0.2267*** (0.0342)	0.0316 (0.0316)
FTP	0.1392*** (0.0276)	0.1443*** (0.0333)	0.1315*** (0.0350)	0.1111*** (0.0314)
Previous study (base none):				
High School	0.0299 (0.0813)	0.5443*** (0.1045)	0.2406** (0.1024)	0.1211 (0.0961)
High School & Since	0.2150*** (0.0795)	0.7509*** (0.1256)	0.0888 (0.1191)	0.1996* (0.1065)
Since High School	0.0858 (0.0804)	0.3302*** (0.1036)	0.1644 (0.1029)	0.0982 (0.0948)
Discussed	0.1082*** (0.0318)	0.2561*** (0.0391)	0.1631*** (0.0393)	0.2074*** (0.0343)
Constant	1.3901*** (0.4481)	-0.8305 (0.5587)	-1.2437** (0.5392)	1.9281*** (0.4785)
Variance (individual)	0.3772	0.6162	0.5199	0.5070
Variance (residual)	0.6101	1.0887	1.2022	0.8418
-2LL	-2802.0	-3380.9	-3424.5	-3129.1
Chi-2	486.6	1537.5	1224.8	711.8
df	36	36	36	36
Obs	2072	2072	2072	2072
Individuals	865	865	865	865

Table 7 Day to day Financial Decision Making, Financial Knowledge, Super Knowledge, and Satisfaction Managing Finances - Gender

This table re-estimates Table 6 within each gender. Results are presented from a maximum likelihood estimation of linear mixed model regressions with individual random effects for a measure of confidence. Each outcome is measure on a seven point Likert scale which for the first three columns are from Extremely Poor (1) to Extremely Good (7) and the last column from Very Dissatisfied (1) to Very Satisfied (7). The measure of financial literacy used is the residual from a regression of each respective measure of financial literacy and the set of variables as described in Table 3. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Financial Decision Making Ability		Investing Knowledge		Superannuation Knowledge		Satisfaction Managing Finances	
	Female	Male	Female	Male	Female	Male	Female	Male
Post-2013	0.1066 (0.0807)	0.0360 (0.1093)	-0.0081 (0.1026)	0.0014 (0.1274)	0.1603 (0.1015)	0.2540** (0.1281)	0.1152 (0.0900)	0.2650** (0.1132)
One-Year 2014	-0.0080 (0.0803)	0.1589 (0.1151)	0.0251 (0.1134)	0.0352 (0.1624)	0.2713** (0.1197)	0.4102*** (0.1483)	0.2769*** (0.0980)	0.1724 (0.1305)
Two-Year 2015	0.0649 (0.1025)	-0.3151** (0.1303)	-0.3246** (0.1303)	-0.0663 (0.1621)	0.0713 (0.1483)	0.2047 (0.1981)	0.0574 (0.1176)	0.0242 (0.1530)
Three-Year 2016	-0.0136 (0.1158)	0.1322 (0.1227)	-0.2098 (0.1347)	0.0818 (0.1933)	0.1633 (0.1469)	0.6618*** (0.1982)	-0.0220 (0.1302)	0.3058* (0.1730)
Unit	-0.3701*** (0.1104)	-0.1399 (0.1227)	-0.3040** (0.1301)	-0.2659* (0.1570)	-0.4297*** (0.1321)	-0.3768** (0.1586)	-0.8206*** (0.1251)	-0.4338*** (0.1408)
Post-2013*Unit	0.3068** (0.1272)	0.1953 (0.1396)	1.5570*** (0.1788)	1.4489*** (0.1764)	1.5924*** (0.1602)	1.4596*** (0.1844)	1.0522*** (0.1420)	0.8200*** (0.1514)
One-Year 2014*Unit	0.6333*** (0.1434)	0.1245 (0.1626)	1.5473*** (0.2005)	1.1026*** (0.2476)	1.2874*** (0.2262)	0.9181*** (0.2486)	0.9847*** (0.1898)	0.8438*** (0.2038)
Two-Year 2015*Unit	0.4858** (0.1887)	0.2068 (0.2347)	1.0791*** (0.2866)	0.5184 (0.3294)	1.0536*** (0.3261)	0.8420** (0.3395)	1.2046*** (0.2291)	0.9962*** (0.2759)
Three-Year 2016*Unit	0.5099*** (0.1705)	-0.0085 (0.2054)	0.9368*** (0.2535)	0.7286** (0.3066)	0.7754*** (0.2808)	0.2345 (0.3319)	1.1055*** (0.2400)	0.3338 (0.2712)
Fin. Lit. Resids	0.0488 (0.0367)	0.1085* (0.0619)	0.1557*** (0.0388)	0.2418*** (0.0548)	0.1298*** (0.0398)	0.1868*** (0.0637)	0.0834** (0.0394)	0.0433 (0.0509)
Major (base Sciences):								
Commerce Single/Double	0.1153 (0.1226)	0.2207 (0.1483)	0.1883 (0.2067)	0.9822*** (0.1922)	0.2406 (0.1876)	0.7485*** (0.1980)	0.1017 (0.1725)	0.7398*** (0.1507)
Arts/Humanities Single or	-0.0588 (0.1045)	-0.0218 (0.1742)	-0.2329* (0.1311)	0.2246 (0.2182)	-0.1665 (0.1406)	0.1350 (0.1896)	0.0575 (0.1158)	0.2174 (0.1846)
Arts/Humanities and Science	0.1717 (0.2810)	-0.0636 (0.5714)	-0.3095 (0.3378)	-0.3117 (0.3718)	-0.7279** (0.2862)	-0.3516 (0.3683)	-0.0358 (0.2993)	0.2869 (0.4294)
Sciences and Arts/Humanities	-0.3718 (0.2288)	0.4802** (0.1896)	-0.1551 (0.2273)	0.0949 (0.2721)	-0.1730 (0.1969)	-0.0109 (0.2312)	-0.0719 (0.1958)	0.6767*** (0.2500)
Commerce & Humanities	0.1037 (0.1343)	0.3342** (0.1317)	0.1114 (0.1717)	0.4742* (0.2488)	0.0722 (0.1766)	0.5960*** (0.2203)	-0.0059 (0.1896)	0.5106*** (0.1965)
Commerce & Science	-0.3080 (0.2687)	0.2417 (0.1531)	0.1574 (0.3134)	0.5008*** (0.1856)	0.2158 (0.2642)	0.4096* (0.2159)	-0.1742 (0.2601)	0.3685** (0.1651)
Age	0.0060 (0.0065)	0.0189** (0.0096)	0.0304*** (0.0100)	0.0379*** (0.0138)	0.0384*** (0.0089)	0.0475*** (0.0123)	0.0106 (0.0065)	0.0144 (0.0144)
Ethnicity (base Aust/NZ):								
Other	0.0937	-0.0968	0.1539	-0.5114***	-0.0439	-0.2896*	0.1556	0.0139

	(0.1351)	(0.1351)	(0.1875)	(0.1630)	(0.1734)	(0.1568)	(0.1729)	(0.1394)
Asian	-0.3265***	-0.1273	-0.0053	-0.2786*	-0.2708**	-0.4230***	-0.3786***	-0.2553*
	(0.1023)	(0.1213)	(0.1328)	(0.1531)	(0.1289)	(0.1569)	(0.1123)	(0.1407)
British/European	-0.0457	0.0638	-0.1089	-0.0044	-0.3479**	-0.0450	-0.1186	0.3157*
	(0.1139)	(0.1525)	(0.1633)	(0.2174)	(0.1704)	(0.1922)	(0.1519)	(0.1685)
Income	0.1642***	0.0594	0.0862	-0.0918	0.2100***	0.2014**	0.0881	-0.0092
	(0.0482)	(0.0661)	(0.0718)	(0.0755)	(0.0758)	(0.0814)	(0.0675)	(0.0730)
Assets	0.0637*	0.1889***	0.1591***	0.2210***	0.2192***	0.0968*	0.0991**	0.1762***
	(0.0364)	(0.0475)	(0.0435)	(0.0602)	(0.0498)	(0.0557)	(0.0418)	(0.0556)
Debt	-0.0347	-0.1500***	-0.0470	-0.0243	-0.0203	-0.0830	-0.0349	-0.2183***
	(0.0388)	(0.0452)	(0.0493)	(0.0608)	(0.0561)	(0.0644)	(0.0516)	(0.0663)
Maths Ability	0.2600***	0.3294***	0.1416***	0.2029***	0.1045***	0.1296**	0.1422***	0.2538***
	(0.0334)	(0.0514)	(0.0407)	(0.0580)	(0.0396)	(0.0620)	(0.0356)	(0.0511)
Personality type (BFI):								
Extraversion	-0.0387	0.0647	-0.0308	-0.0035	0.0283	0.0204	-0.0877	-0.0841
	(0.0550)	(0.0699)	(0.0678)	(0.0806)	(0.0669)	(0.0804)	(0.0646)	(0.0806)
Agreeableness	-0.0543	-0.0280	-0.0751	-0.0871	-0.0479	-0.0528	0.0091	-0.1236
	(0.0687)	(0.0786)	(0.0866)	(0.1119)	(0.0874)	(0.1008)	(0.0815)	(0.0928)
Conscientiousness	0.2861***	0.3180***	0.0688	0.2838***	0.1020	0.2178**	0.3504***	0.3768***
	(0.0730)	(0.0790)	(0.0882)	(0.1048)	(0.0867)	(0.0997)	(0.0744)	(0.0966)
Neuroticism	-0.0141	-0.0323	-0.2010***	-0.0591	-0.1699**	0.0543	-0.1988***	-0.1801**
	(0.0605)	(0.0781)	(0.0755)	(0.0920)	(0.0810)	(0.0932)	(0.0643)	(0.0916)
Openness	0.0221	-0.1045	0.0807	-0.0937	0.1082	-0.1190	-0.0411	-0.1340
	(0.0762)	(0.0995)	(0.0895)	(0.1214)	(0.0930)	(0.1199)	(0.0852)	(0.1045)
Risk Tolerance	0.0224	0.0034	0.2776***	0.2550***	0.2467***	0.1961***	0.0367	0.0369
	(0.0350)	(0.0376)	(0.0462)	(0.0476)	(0.0406)	(0.0584)	(0.0403)	(0.0514)
FTP	0.1344***	0.1342***	0.1385***	0.1427**	0.1245***	0.1447**	0.0868**	0.1452***
	(0.0349)	(0.0441)	(0.0399)	(0.0567)	(0.0412)	(0.0603)	(0.0388)	(0.0519)
Previous study (base none):								
High School	0.0119	0.0643	0.6723***	0.4063***	0.3473**	0.0812	0.1703	0.0284
	(0.1099)	(0.1196)	(0.1364)	(0.1573)	(0.1372)	(0.1553)	(0.1304)	(0.1404)
High School & Since	0.1382	0.2957***	0.7495***	0.7801***	-0.0710	0.3221*	0.1938	0.1728
	(0.1241)	(0.1072)	(0.1774)	(0.1772)	(0.1728)	(0.1657)	(0.1433)	(0.1561)
Since High School	0.0951	0.1162	0.3329**	0.3985***	0.2052	0.1526	-0.0186	0.1997
	(0.1110)	(0.1160)	(0.1558)	(0.1329)	(0.1490)	(0.1388)	(0.1430)	(0.1269)
Discussed	0.1245***	0.0755*	0.2764***	0.2227***	0.1831***	0.1424**	0.2360***	0.1648***
	(0.0417)	(0.0440)	(0.0516)	(0.0585)	(0.0476)	(0.0647)	(0.0456)	(0.0493)
Constant	1.6024***	0.9884	-0.8818	-1.3859	-1.1733*	-1.1379	1.8987***	1.6515**
	(0.5748)	(0.7115)	(0.7020)	(0.9646)	(0.6974)	(0.8919)	(0.6059)	(0.7704)
Variance (individual)	0.3772	0.3198	0.6372	0.5116	0.5624	0.3961	0.4907	0.4440
Variance (residual)	0.6258	0.5627	1.0730	1.0843	1.1534	1.2483	0.8612	0.7938
-2LL	-1660.1	-1110.9	-1986.9	-1372.9	-2004.8	-1400.6	-1847.1	-1255.9
Chi-2	305.3	271.0	648.6	683.2	656.4	554.1	372.1	444.5
df	35	35	35	35	35	35	35	35
Obs	1220	852	1220	852	1220	852	1220	852
Individuals	502	363	502	363	502	363	502	363

Table 8 Core Financial Behaviours and Unit Completion

This present estimated odds ratio for reported behaviours in the previous six-months: established financial goals; established/reviewed a budget; tracked expenditure; and established/reviewed available emergency funds. Results are presented from a maximum likelihood estimation of logistic mixed model regressions with individual random effects. The measure of financial literacy used is the residual from a regression of financial literacy and the set of variables as described in Table 3. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Goal 74.7 (Unit) 80.1 (Control)	Budget 64.8 (Unit) 76.9 (Control)	Track 90.1 (Unit) 91.9 (Control)	Emergency 70.8 (Unit) 78.6 (Control)
Survey				
Post-2013	1.1300 (0.3094)	0.9824 (0.2371)	0.7130 (0.2420)	1.3943 (0.3613)
One-Year 2014	1.9686** (0.6406)	0.6294* (0.1516)	1.2811 (0.5097)	1.6009 (0.4877)
Two-Year 2015	1.4879 (0.5601)	0.9226 (0.2682)	1.2935 (0.6470)	1.3343 (0.4691)
Three-Year 2016	1.3566 (0.5181)	0.5907* (0.1790)	1.1351 (0.5580)	1.9218* (0.7367)
Unit	0.8164 (0.2208)	0.5322*** (0.1249)	0.9993 (0.3318)	0.7323 (0.1897)
Post-2013*Unit	9.8922*** (4.7182)	4.5313*** (1.6209)	5.2428*** (2.6517)	2.0199** (0.7066)
One-Year 2014*Unit	1.4000 (0.7290)	3.7090*** (1.6849)	2.5369 (2.1804)	1.5613 (0.8124)
Two-Year 2015*Unit	0.8585 (0.5114)	0.6370 (0.3305)	5.2783* (5.1520)	1.1888 (0.7555)
Three-Year 2016*Unit	0.7723 (0.4533)	2.1716 (1.0380)	0.9839 (0.7506)	0.5257 (0.2812)
Fin. Literacy Residual	0.9700 (0.1047)	0.9322 (0.0891)	1.2897* (0.1725)	0.9498 (0.0991)
Female	1.4592 (0.3644)	1.7030** (0.3603)	2.1094** (0.6636)	1.4423 (0.3480)
Major (base Sciences):				
Commerce Single/Double	1.0921 (0.4499)	1.6022 (0.5476)	1.1894 (0.5248)	2.6499** (1.0468)
Arts/Humanities Single or Double	1.4677 (0.4543)	1.3749 (0.3618)	1.4450 (0.5338)	0.8198 (0.2331)
Arts/Humanities and Science	1.3944 (1.0108)	1.0170 (0.6407)	1.0203 (0.7303)	0.3978* (0.2078)
Sciences and Arts/Humanities	1.1196 (0.5656)	0.6799 (0.2546)	0.8285 (0.4584)	0.5321 (0.2191)
Commerce & Humanities	2.2886* (1.1137)	1.5011 (0.5494)	4.3973** (2.7110)	2.4377* (1.2451)
Commerce & Science	1.1087 (0.5060)	1.7090 (0.7184)	1.6085 (0.9124)	2.3502* (1.0340)
Age	1.0099 (0.0229)	1.0300 (0.0209)	0.9841 (0.0288)	1.0200 (0.0227)
Ethnicity (base Aust/NZ):				
Other	0.8237 (0.3162)	1.7039 (0.5681)	1.3607 (0.6473)	1.8095* (0.6405)
Asian	0.6241* (0.1729)	0.9366 (0.2203)	1.4810 (0.5181)	2.2910*** (0.6431)
British/European	0.6382 (0.2272)	0.4990** (0.1574)	0.7904 (0.3415)	1.4312 (0.5701)
Income	1.5016** (0.2633)	1.2914* (0.1837)	1.4024 (0.3109)	1.7230*** (0.2968)
Assets	1.2925** (0.1371)	1.0773 (0.0950)	1.1679 (0.1695)	1.3596*** (0.1509)
Debt	1.1649 (0.1547)	1.0366 (0.1071)	0.9492 (0.1316)	0.8513 (0.1001)

Maths Ability	0.9610 (0.0918)	1.0944 (0.0889)	1.0226 (0.1266)	0.8331** (0.0748)
Personality type (BFI):				
Extraversion	0.9357 (0.1454)	0.9909 (0.1316)	1.0031 (0.1875)	0.8517 (0.1320)
Agreeableness	1.4973** (0.3012)	1.1978 (0.2009)	1.1485 (0.2660)	1.1408 (0.2077)
Conscientiousness	1.5806** (0.3018)	1.5665*** (0.2497)	1.5124** (0.3104)	1.6209*** (0.2842)
Neuroticism	1.4061** (0.2321)	1.1525 (0.1659)	0.9793 (0.1919)	1.1399 (0.1801)
Openness	2.3406*** (0.5025)	1.4514** (0.2593)	1.0544 (0.2492)	1.7225*** (0.3339)
Risk Tolerance	1.1663 (0.1201)	0.9390 (0.0712)	1.0788 (0.1359)	1.0813 (0.0944)
FTP	1.4445*** (0.1378)	1.1700* (0.0938)	1.1895 (0.1328)	1.1038 (0.0955)
Previous study (base none):				
High School	0.8466 (0.2537)	0.6061** (0.1508)	1.3270 (0.5060)	0.6104* (0.1648)
High School & Since	2.1452** (0.8011)	0.7998 (0.2410)	0.8607 (0.3605)	0.7390 (0.2514)
Since High School	0.7545 (0.2250)	0.7435 (0.1827)	0.8868 (0.3147)	0.7751 (0.2225)
Discussed	1.3031** (0.1485)	1.3140*** (0.1219)	1.3840** (0.1840)	1.2998** (0.1384)
-2LL	-778.4	-1031.2	-471.1	-905.3
Chi-2	121.0	108.9	67.2	105.4
df	36	36	36	36
Obs	2072	2072	2072	2072
Individuals	865	865	865	865

Table 9 Frequency of Positive Behaviours

This table present estimations from a maximum likelihood estimation of a linear mixed model regression with individual random effects of responses to how often the following behaviours are performed: The four behaviour statements were: “Before buying something I carefully consider whether I can afford it” (Afford); “I pay my bills on time” (Bills); “I keep a close personal watch on my financial affairs” (Watch); and “Before committing to a financial decision I consult independent sources of information/advice” (Never (1) to (Always (5)). Baseline mean scores are shown at the top of columns. The measure of financial literacy used is the residual from a regression of the raw Advanced scale and the set of variables as described in Table 3. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Afford 4.2 (Unit) 4.3 (Control)	Bills 4.5 (Unit) 4.5 (Control)	Watch 4.0 (Unit) 4.1 (Control)	Consult 3.0 (Unit) 3.2 (Control)
Survey: Post-2013	-0.0185 (0.0508)	0.0360 (0.0508)	-0.0474 (0.0614)	0.0303 (0.0807)
Three-Year 2016	-0.0768 (0.0715)	0.0366 (0.0598)	-0.0901 (0.0736)	0.0132 (0.0998)
Unit	-0.1327** (0.0628)	0.0416 (0.0525)	-0.0343 (0.0670)	-0.0666 (0.0879)
Post-2013*Unit	0.1907*** (0.0704)	-0.0015 (0.0699)	0.1707** (0.0821)	0.2739** (0.1101)
Three-Year 2016*Unit	0.2027* (0.1199)	0.0466 (0.0953)	0.1015 (0.1169)	0.0313 (0.1653)
Fin. Literacy	-0.0134 (0.0248)	0.0199 (0.0224)	0.0315 (0.0258)	-0.0010 (0.0381)
Female	-0.1960*** (0.0597)	-0.0137 (0.0480)	-0.1079* (0.0615)	0.1546* (0.0821)
Major (base Sciences)Commerce Single/Double	-0.0728 (0.0987)	0.0218 (0.0842)	0.0232 (0.1015)	-0.1279 (0.1320)
Arts/Humanities Single or Double	0.0262 (0.0698)	-0.0650 (0.0642)	-0.1175 (0.0779)	-0.1455 (0.0949)
Arts/Humanities and Science	0.1282 (0.1813)	0.1095 (0.1247)	-0.0444 (0.1642)	-0.4358* (0.2480)
Sciences and Arts/Humanities	0.1352 (0.1084)	0.0921 (0.0993)	-0.0240 (0.1370)	-0.2462 (0.1612)
Commerce & Humanities	0.1083 (0.1052)	0.1550* (0.0855)	-0.0158 (0.1034)	0.1092 (0.1431)
Commerce & Science	0.0521 (0.1261)	-0.0953 (0.1236)	-0.0700 (0.1211)	0.1941 (0.1895)
Age	0.0034 (0.0061)	0.0002 (0.0044)	0.0100** (0.0050)	0.0221*** (0.0066)
Ethnicity (base Aust/NZ): Other	0.0976 (0.0809)	-0.0134 (0.0754)	0.0475 (0.0893)	0.1081 (0.1239)
Asian	0.1706*** (0.0655)	0.0267 (0.0563)	-0.1186* (0.0696)	0.1542* (0.0923)
British	-0.0038 (0.1083)	0.0692 (0.0813)	-0.1667 (0.1056)	0.0671 (0.1338)
European	0.0421 (0.1170)	-0.0254 (0.1040)	0.0016 (0.1191)	-0.1992 (0.1580)
Income	-0.0692 (0.0441)	0.0229 (0.0326)	0.1083*** (0.0400)	-0.0603 (0.0523)
Assets	-0.0188 (0.0262)	0.0264 (0.0220)	0.0071 (0.0261)	0.0454 (0.0351)
Debt	-0.0606* (0.0337)	-0.0799*** (0.0271)	-0.0536* (0.0319)	-0.0792** (0.0390)
Maths Ability	0.0539** (0.0216)	0.0500** (0.0203)	0.0349 (0.0244)	-0.0465 (0.0285)
Personality type (BFI):Extraversion	-0.1143*** (0.0356)	-0.0583* (0.0310)	-0.0570 (0.0382)	-0.0163 (0.0483)
Agreeableness	0.1036** (0.0450)	0.0699* (0.0392)	0.0357 (0.0500)	-0.0120 (0.0599)
Conscientiousness	0.2056*** (0.0431)	0.1929*** (0.0385)	0.3367*** (0.0475)	0.1101* (0.0610)
Neuroticism	-0.0186	0.0086	-0.0071	-0.0179

	(0.0402)	(0.0324)	(0.0437)	(0.0558)
Openness	0.1097**	-0.0410	-0.0205	0.0574
	(0.0510)	(0.0425)	(0.0507)	(0.0661)
Risk Tolerance	-0.0821***	-0.0583***	-0.0242	0.0336
	(0.0244)	(0.0204)	(0.0246)	(0.0338)
FTP	0.1176***	0.0645***	0.1319***	0.1815***
	(0.0240)	(0.0217)	(0.0248)	(0.0297)
Previous Study (Base: None) High School	0.0275	-0.1171**	0.0367	-0.1009
	(0.0715)	(0.0590)	(0.0707)	(0.0977)
High School & Since	0.0089	-0.1401**	-0.0387	0.0404
	(0.0732)	(0.0705)	(0.0765)	(0.1055)
Since High School	-0.0191	-0.0507	-0.0080	0.0853
	(0.0680)	(0.0622)	(0.0743)	(0.0943)
Discussed	0.0792***	0.0530**	0.1246***	0.1221***
	(0.0254)	(0.0238)	(0.0292)	(0.0367)
Constant	2.5546***	3.3561***	1.6811***	1.1661**
	(0.3713)	(0.3228)	(0.3935)	(0.5016)
Variance (individual)	-0.6478	-0.9578	-0.6690	-0.4549
Variance (residual)	-0.4750	-0.5142	-0.3648	-0.0500
-2LL	-1865.1	-1689.5	-1983.3	-2447.9
Chi-2	188.6	114.3	244.8	162.8
df	33	33	33	33
Obs	1603	1603	1603	1603
Individuals	865	865	865	865

Table 10 Information Sources, Confidence in Information Search and Unit Completion

This table present estimations from a maximum likelihood estimation of a linear mixed model regression with individual random effects. Five groups of information sources are based on their assessed level of importance (Not at all Important (1) to Extremely Important (5)) using ten different information items. The measure of financial literacy used is the residual from a regression of the raw Advanced scale and the set of variables as described in Table 3. Standard errors (bracketed) are clustered by individual and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Ads	Authority	Family & Friends	Unsolicited	Confidence Info.Search
Survey					
Post-2013	-0.1278** (0.0530)	-0.0307 (0.0379)	-0.0988** (0.0450)	-0.0666* (0.0374)	
One-Year 2014	-0.3345*** (0.0557)	-0.0085 (0.0453)	-0.1395*** (0.0445)	-0.4227*** (0.0373)	
Two-Year 2015	-0.3291*** (0.0681)	-0.0880 (0.0578)	-0.1445** (0.0672)	-0.1559** (0.0786)	0.0168 (0.0666)
Three-Year 2016	-0.3545*** (0.0689)	0.0328 (0.0572)	-0.1705*** (0.0638)	-0.6130*** (0.0516)	0.0168 (0.0744)
Unit	-0.0456 (0.0536)	0.1157*** (0.0409)	-0.0808 (0.0526)	-0.0371 (0.0439)	0.2960*** (0.0947)
Post-2013*Unit	0.0891 (0.0718)	0.2529*** (0.0519)	-0.1220* (0.0627)	-0.1030* (0.0531)	
One-Year 2014*Unit	0.1985** (0.0966)	0.2365*** (0.0695)	0.0832 (0.0759)	0.0174 (0.0739)	
Two-Year 2015*Unit	-0.0101 (0.1282)	-0.0582 (0.1235)	-0.1383 (0.1149)	-0.0756 (0.1504)	
Three-Year 2016*Unit	0.0781 (0.1207)	0.1496* (0.0869)	-0.0214 (0.1016)	-0.0311 (0.0844)	
Fin. Lit. Resids	-0.0437** (0.0210)	0.0515*** (0.0158)	0.0068 (0.0175)	0.0250 (0.0162)	0.0808* (0.0453)
Female	0.0634 (0.0470)	0.0479 (0.0365)	0.1394*** (0.0448)	0.1472*** (0.0380)	-0.1931** (0.0984)
Major (base Sciences):					
Commerce Single/Double	0.0903 (0.0685)	0.0611 (0.0574)	-0.1281* (0.0674)	-0.0546 (0.0637)	0.5111 (0.3124)
Arts/Humanities Single or Double	0.0600 (0.0615)	0.0318 (0.0454)	-0.0169 (0.0573)	0.0439 (0.0471)	0.2622 (0.2422)
Arts/Humanities and Science	0.0360 (0.1209)	-0.0146 (0.1212)	-0.1181 (0.0906)	0.0303 (0.0886)	0.3831 (0.3185)
Sciences and Arts/Humanities	-0.1504 (0.1001)	0.0308 (0.0716)	0.1248 (0.0914)	-0.0249 (0.0823)	-0.0779 (0.2512)
Commerce & Humanities	-0.0756 (0.0791)	0.1570*** (0.0597)	-0.1244 (0.0994)	-0.0146 (0.0707)	0.7129*** (0.2207)
Commerce & Science	-0.0168 (0.0935)	0.1062 (0.0675)	-0.0667 (0.0918)	0.0163 (0.0718)	0.5802*** (0.2061)
Age	0.0033 (0.0057)	0.0038 (0.0035)	-0.0103*** (0.0037)	-0.0134*** (0.0032)	0.0257* (0.0153)
Ethnicity (base Aust/NZ):					
Other	0.1288* (0.0779)	-0.0366 (0.0531)	0.0366 (0.0709)	0.0880 (0.0576)	-0.4662** (0.2076)
Asian	0.2419*** (0.0526)	-0.0282 (0.0416)	0.2500*** (0.0502)	0.0629 (0.0467)	-0.0706 (0.1936)
British/European	-0.0417 (0.0714)	-0.1386** (0.0643)	-0.0080 (0.0714)	-0.1127** (0.0557)	0.6581*** (0.2191)
Income	-0.0134 (0.0319)	0.0355 (0.0263)	0.0411 (0.0305)	-0.0229 (0.0260)	-0.1195 (0.0738)
Assets	-0.0543*** (0.0204)	-0.0176 (0.0166)	0.0054 (0.0192)	-0.0365** (0.0168)	0.0539 (0.0562)
Debt	-0.0121 (0.0251)	-0.0093 (0.0187)	0.0213 (0.0213)	0.0031 (0.0205)	-0.0971* (0.0510)
Maths Ability	-0.0105 (0.0177)	0.0173 (0.0152)	-0.0123 (0.0169)	0.0269* (0.0155)	0.1844** (0.0862)

Personality type (BFI):					
Extraversion	0.0711** (0.0309)	-0.0394* (0.0224)	0.1011*** (0.0285)	0.0491** (0.0238)	-0.0603 (0.0984)
Agreeableness	0.1008*** (0.0378)	0.0757** (0.0323)	0.0850** (0.0360)	0.1401*** (0.0312)	-0.3362** (0.1424)
Conscientiousness	-0.0085 (0.0388)	0.0077 (0.0285)	-0.0718** (0.0331)	0.0207 (0.0314)	0.1934* (0.1055)
Neuroticism	0.0361 (0.0333)	-0.0049 (0.0249)	0.0577* (0.0335)	0.0231 (0.0265)	-0.3970*** (0.1093)
Openness	-0.0305 (0.0444)	-0.0149 (0.0328)	-0.0036 (0.0365)	-0.0777** (0.0303)	0.1071 (0.1217)
Risk Tolerance	0.0385* (0.0207)	-0.0043 (0.0153)	-0.0075 (0.0165)	0.0514*** (0.0161)	0.2492*** (0.0521)
FTP	0.0688*** (0.0189)	0.0752*** (0.0164)	0.0423** (0.0176)	0.0383*** (0.0147)	0.0847 (0.0672)
Previous study (base none):					
High School	0.0275 (0.0598)	0.0408 (0.0437)	-0.0802 (0.0535)	0.0091 (0.0486)	0.1870 (0.1944)
High School & Since	0.0675 (0.0628)	0.0044 (0.0487)	-0.0089 (0.0616)	-0.0457 (0.0548)	0.2917 (0.2223)
Since High School	-0.0390 (0.0580)	0.0452 (0.0417)	-0.1349** (0.0624)	-0.0948** (0.0478)	0.0236 (0.1593)
Discussed	-0.0132 (0.0216)	0.0478*** (0.0158)	0.0400* (0.0212)	-0.0056 (0.0178)	0.0272 (0.0661)
Constant	1.7470*** (0.2972)	2.7939*** (0.2456)	2.9733*** (0.2954)	2.4619*** (0.2681)	1.6441 (1.1524)
Variance (individual)	0.1489	0.0961	0.1699	0.1032	0.3636
Variance (residual)	0.3959	0.2323	0.2940	0.2645	0.2852
-2LL	-2245.9	-1712.2	-2029.6	-1835.1	-282.1
Chi-2	208.3	201.8	192.8	616.8	175.5
df	36	36	36	36	29
Obs	2072	2072	2072	2072	252
Individuals	865	865	865	865	151

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Supplementary Appendix I: Organisation of unit

Course Overview

Managing Your Personal Finances, was developed to meet the requirements of a “broadening unit” offered by the Business School. Students are required to complete four broadening units drawn from any discipline outside that of their degree program. The unit had no pre-requisites and was developed for first-year second-semester. There were 11 weeks of lectures and tutorials as well as a mid-semester exam and a final exam. The two exams were a mixture of multiple choice and short answer questions. The unit assessment included marks for tutorial participation (10%), weekly reflective journal (10%), group assignment (15%), mid semester (20%), final exam (45%).

There are ten topics covered in lectures: the financial planning process; savings; debt; personal taxation; investments and diversification; rent or buy: home ownership; insurance; consumer law; behavioural finance; and long-term planning – retirement, marriage and; a review topic in week 11. Delivery of the lectures was shared between the authors, who also designed the unit and two lawyers who conducted the consumer law lecture. Each week, approximately 105 minutes were set aside for lectures and 45 minutes were available for the weekly tutorials.

The tutorials were managed by three individuals, two tutors who had completed their finance major and one PhD student working in the finance area. The tutorial participation grade was based on contributions to weekly assigned readings and questions drawn from a text, videos, websites and additional articles.

A key objective of the unit was the development of a personal financial plan which required collation of personal financial information. To ensure no contravention of financial services legislation covering provision of personal financial advice, it was emphasised that no personal advice was provided through the unit and that it was not expected that personal financial data was shared. The personal financial plan was therefore a personal document and not submitted for assessment.

The personal financial plan was facilitated by a weekly reflective journal. The weekly reflective journal included questions related to particular aspects of the task of developing a personal financial plan. Students posted their reflections on the questions in a graded online journal. Examples of actual questions asked included:

1. What is your experience of price changes?
2. How should inflation be included in your personal financial plan?
3. The text suggests that debt allows you to better smooth your life time consumption. Do you think it makes sense for an undergraduate student to borrow to finance their time at university?

The group assignment included two key tasks. The first was evaluating the financial position of a young couple utilising financial ratios introduced in the unit. The second required application and analysis of time value of money principles using online calculators to solve savings and loan calculations.

The book “Your Money Milestones”, by Moshe Milevsky, was the required text. It was chosen from a large range of personal finance texts because of its strong thematic approach, which was set around key money milestones and its incorporation of simple mathematic principles (addition, subtraction, division and multiplication) as a means of illustrating application of personal finance principles. The book also blends research from the personal finance literature, which provides a strong evidence based approach to the topics. Finally, the text emphasised the pivotal role of human capital in consideration of personal financial decisions.

Supplementary Appendix II: Financial Literacy Scales

Basic Financial Literacy

1. (Compounding) Suppose you had \$100 in a savings account and the interest rate is 20 per cent per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?

Ans: More than \$200; Exactly \$200; Less than \$200; Don't know

2. (Inflation) Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, how much would you be able to buy with the money in this account?

Ans: More than today; Exactly the same; Less than today; Don't know

3. (Time Value of Money) Assume a friend inherits \$10,000 today and his sibling inherits \$10,000 3 years from now. Who is richer because of the inheritance?

Ans: My friend; His sibling; They are equally rich; Don't know

4. (Money Illusion) Suppose that in the year 2020, your income has doubled and prices of all goods have doubled too. In 2020, how much will you be able to buy with your income?

Ans: More than today; Exactly the same; Less than today; Don't know

Advanced Financial Literacy

1. (Risky Assets) Is the following statement true or false? Shares are normally riskier than bonds.

Ans: True; False; Do not know

2. (Returns Assets) Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return?

Ans: Savings account; Shares; Bonds; Don't know

3. (Volatility Assets) Considering a long time period (e.g. 10 or 20 years), which asset normally displays the highest fluctuations?

Ans: Savings account; Shares; Bonds; Don't know

4. (Diversification Assets) When an investor spreads his/her money among different assets, does the risk of losing money:

Ans: Increase; Decrease; Stay the same; Don't know

FLN (Fernandes, Lynch, and Netemeyer 2014)

1) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy:

Ans: More than today with the money in this account; Exactly the same as today with the money in this account; Less than today with the money in this account; Don't know.

2) Do you think that the following statement is true or false? "Bonds are normally riskier than shares."

Ans: True, False, Don't know

3) Considering a long time period (for example 10 or 20 years), which asset described below normally gives the highest return?

Ans: Savings accounts; Shares; Bonds; Don't know.

4) Normally, which asset described below displays the highest fluctuations over time?

Ans: Savings accounts; Shares; Bonds; Don't know.

5) When an investor spreads his money among different assets, does the risk of losing a lot of money:

Ans: Increase; Decrease; Stay the same; Don't know.

6) Do you think that the following statement is true or false? "If you were to invest \$1000 in a share managed fund, it would be possible to have less than \$1000 when you withdraw your money."

Ans: True; False; Don't know.

7) Do you think that the following statement is true or false? "A share managed fund combines the money of many investors to buy a variety of shares."

Ans: True; False; Don't know.

8) After age 65, you have to withdraw at least some money from your superannuation fund.

Ans: True; False; Don't know.

9) Do you think that the following statement is true or 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."

Ans: True; False; Don't know.

10) Suppose you had \$100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?

Ans: More than \$200; Exactly \$200; Less than \$200; Don't know.

11) Which of the following statements is correct?

Ans: Once one invests in a managed fund, one cannot withdraw the money in the first year; Managed funds can invest in several assets, for example invest in both shares and bonds; Managed funds pay a guaranteed rate of return which depends on their past performance; None of the above; Don't know .

12) Which of the following statements is correct? If somebody buys a bond of firm B:

Ans: He owns a part of firm B; He has lent money to firm B; He is liable for firm B's debts; None of the above; Don't know.

13) Suppose 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 would it take to eliminate your credit card debt if you made no additional new charges?

Ans: Less than 5 years; Between 5 and 10 years; Between 10 and 15 years; Never; Don't know.

Numeracy (Fernandes, Lynch, and Netemeyer 2014)

1) Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number? Of the values below, which is the most likely outcome?

Ans: 157; 298; 512; 754; 919; The above answers are all equally likely; I do not know.

2) 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?

Ans: 1; 2; 10; 100; 110; The answers above are equally likely; I do not know.

3) If the chance of getting a disease is 20 out of 100, this would be the same as having a _____% chance of getting the disease.

Ans: 0.02; 0.2; 2; 2.0; 20; 25; 200; I do not know.

4) In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets of ACME PUBLISHING SWEEPSTAKES win a car?

Ans: 0.001%; 0.01%; 0.1%; 1.0%; 1.1%; None of the above; I do not know.

5) If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1,000?

Ans: 1; 10; 11; 50; 100; 110; 1,000; I do not know

Consumer Confidence in Financial Information Search (Fernandes, Lynch, and Netemeyer 2014)

For each of the statements below please indicate to what extent you disagree or agree that they describe you: 1=strongly disagree to 6=strongly agree.

(1) I am confident in my ability to recognize a good financial investment.

(2) I know what investments to look for to get the most return on my money.

(3) I know the right questions to ask when making financial investment decisions

(4) I have the skills required to make sound financial investments.

(5) I know the right sources to consult to make wise financial decisions

Supplementary Appendix III: Objective and Subjective Financial Literacy Change

The size of the markers reflects the relative weighting, within gender, of each scatter point. Each graph presents a combination of the change in objective and change in subjective financial literacy where the change is measured either from the Pre survey to the Post or the Pre survey to the Three year survey.

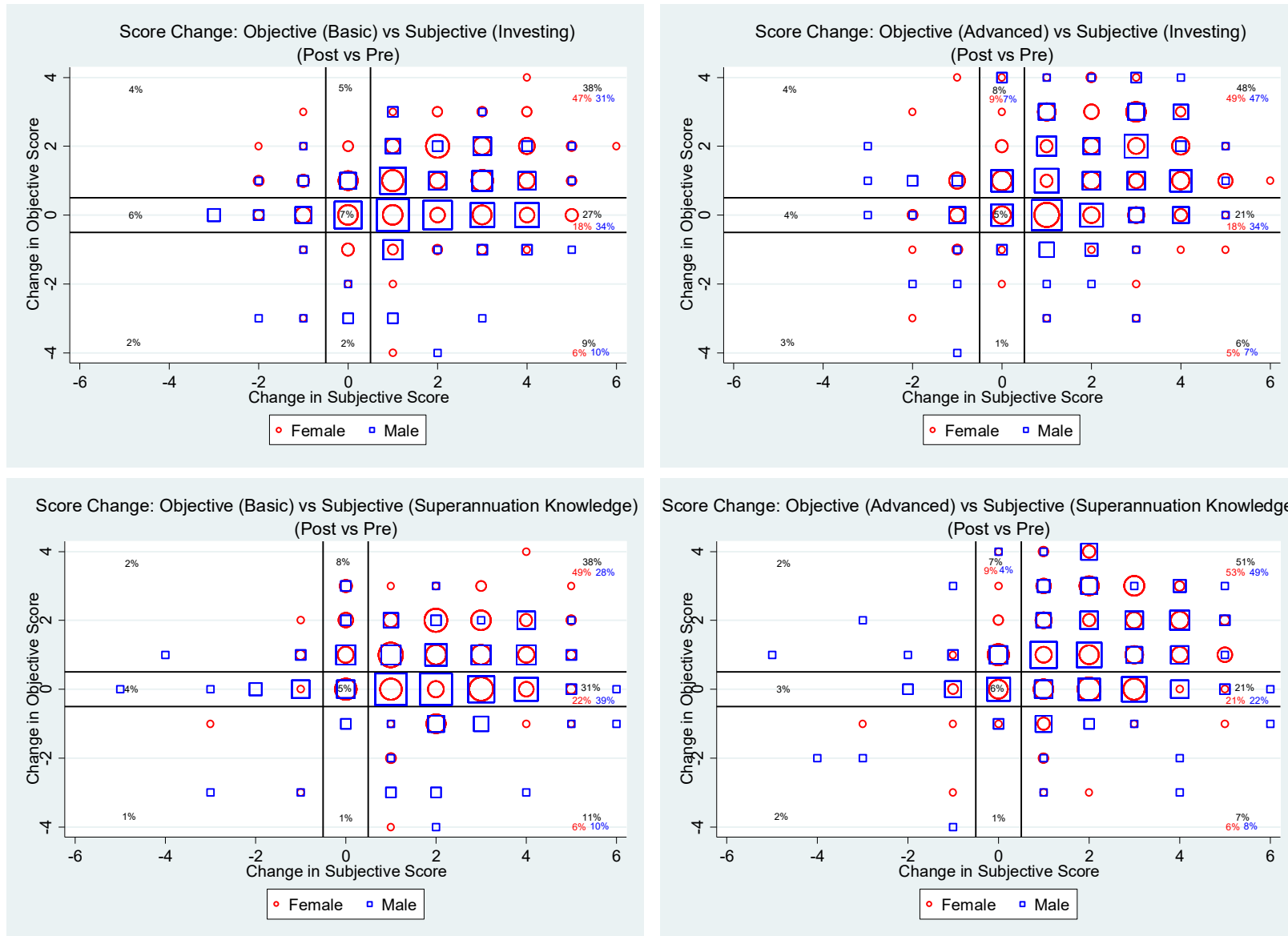


Figure 6 Change in Subjective (Knowledge) and Objective Financial Literacy Scores: Pre-Post Surveys

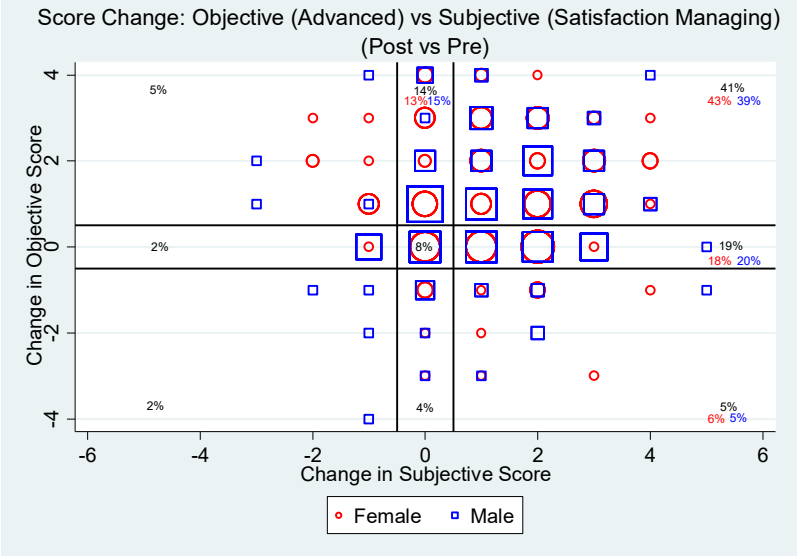
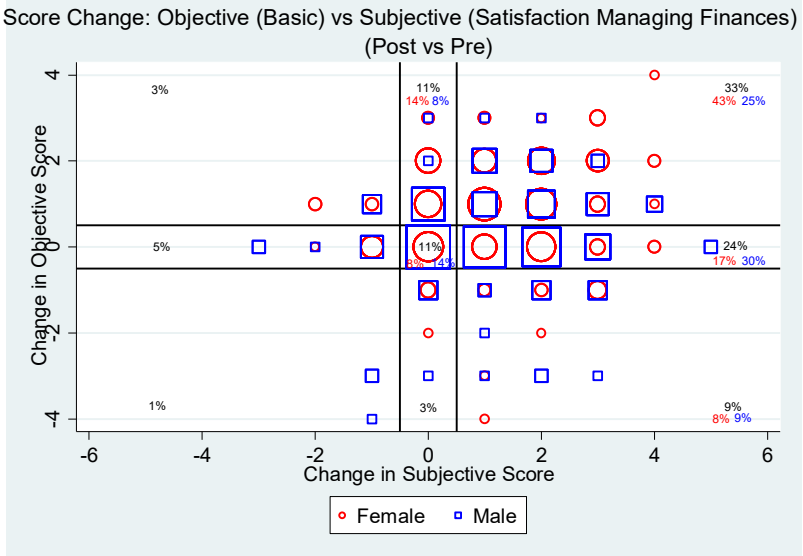
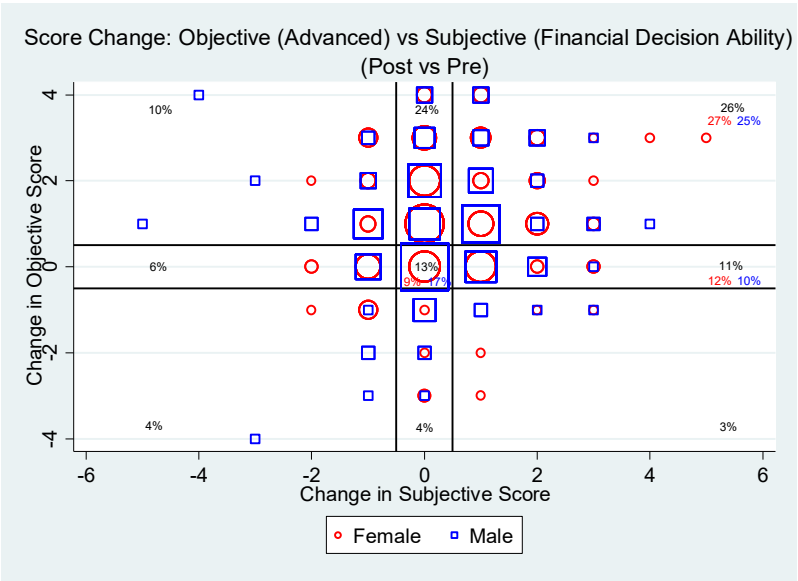
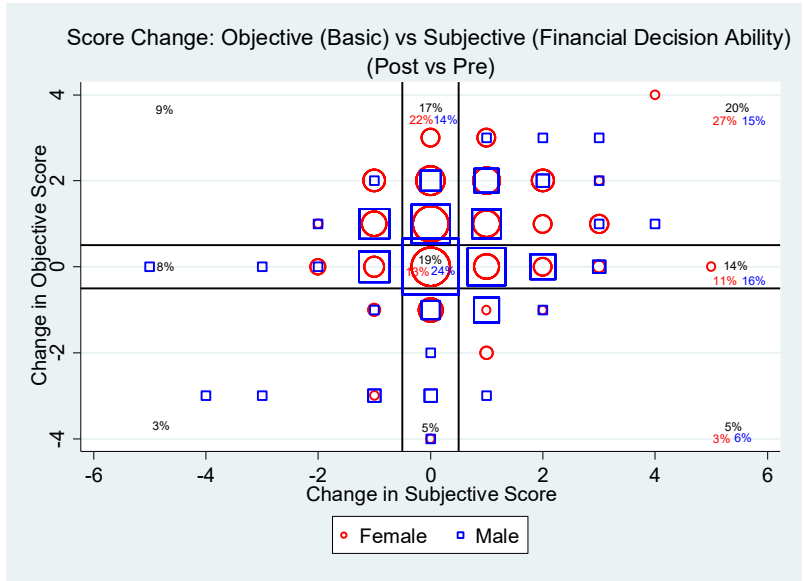


Figure 7 Change in Subjective (Ability and Satisfaction) and Objective Financial Literacy Scores: Pre-Post Surveys

Table S1 Calibration of Subjective and Objective Financial Literacy Change: Pre-Post

This table reports the relative risk ratio from a multinomial regression of the change in subjective scores compared with the change in objective scores for Post relative to Baseline. Two objective financial literacy scores are considered: Basic and Advanced. Four subjective financial literacy scores are considered: Investing knowledge; Superannuation knowledge; Financial decision making ability; and Satisfaction managing finances. Three mutually exclusive groups are groups are: 1) Not Supported Over Rated Subjective - Those whose subjective score increased where the objective score decreased or remained the same; 2) Not Supported Under Rated Subjective - Those whose subjective score decreased where the objective score increased or remained the same; 3) Calibrated – Those whose subjective score and objective score either both increased, both decreased, or both were unchanged; 4) Those who did not complete the Post survey (to control for attrition). All other variables are as reported in the Baseline survey. Robust standard errors are reported in brackets and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Basic Investing	Advanced Knowledge	Basic Super Knowledge	Advanced Knowledge	Basic Decision Making	Advanced Decision Making	Basic Satisfaction	Advance Managing
Not Supported Over Rated Subjective								
Unit	1.0788 (0.2731)	0.5342** (0.1357)	1.2834 (0.3246)	0.5214*** (0.1260)	0.7202 (0.1888)	0.4832*** (0.1282)	0.8479 (0.2118)	0.5376** (0.1365)
Female	0.6956 (0.1811)	1.1048 (0.2955)	0.4722* (0.1224)	0.9437 (0.2382)	0.7484 (0.2055)	1.5138 (0.4263)	0.8310 (0.2085)	1.2253 (0.3127)
Extraversion	0.9400 (0.1564)	1.1997 (0.2002)	1.0309 (0.1719)	1.4094** (0.2269)	1.3933* (0.2457)	1.4355** (0.2532)	1.0730 (0.1772)	1.2830 (0.2114)
Agreeableness	1.0140 (0.2146)	1.3417 (0.2912)	1.1365 (0.2410)	1.4110* (0.2918)	0.6354* (0.1435)	1.2651 (0.2907)	0.8771 (0.1820)	1.2652 (0.2665)
Conscientiousness	0.9368 (0.1834)	0.4661*** (0.0969)	1.2702 (0.2514)	0.6780** (0.1324)	1.0985 (0.2329)	0.8119 (0.1772)	1.0959 (0.2149)	0.6743* (0.1363)
Neuroticism	1.0196 (0.1858)	1.0162 (0.1901)	1.2436 (0.2271)	1.2019 (0.2150)	1.0697 (0.2070)	1.1927 (0.2355)	1.0109 (0.1835)	1.1740 (0.2168)
Openness	0.9107 (0.1938)	1.2882 (0.2790)	1.0258 (0.2179)	1.2324 (0.2579)	1.3028 (0.2944)	1.1542 (0.2633)	1.1482 (0.2407)	1.0910 (0.2324)
Previous study (base none)								
High School	1.0904 (0.3657)	0.7610 (0.2627)	0.6469 (0.2140)	0.5485* (0.1806)	0.6322 (0.2267)	0.5617 (0.2052)	0.6753 (0.2172)	0.5963 (0.1946)
High School and	1.3502 (0.4908)	0.9292 (0.3366)	0.6343 (0.2186)	0.6616 (0.2159)	0.7605 (0.2889)	0.8627 (0.3188)	0.7742 (0.2641)	1.0059 (0.3382)
Since High School	1.5876 (0.5022)	0.5164* (0.1813)	0.8748 (0.2769)	0.3655*** (0.1230)	1.5409 (0.4940)	0.7399 (0.2671)	1.3780 (0.4196)	0.3977*** (0.1344)
Base Objective	3.7813*** (0.5902)	2.8464*** (0.3624)	4.4795* (0.7381)	2.3996*** (0.2778)	2.5997* (0.4250)	1.7453*** (0.2121)	2.9669*** (0.4419)	2.2009*** (0.2542)
Base Subjective	0.6636*** (0.0560)	0.7898*** (0.0697)	0.7196* (0.0631)	0.9086 (0.0763)	0.5387* (0.0572)	0.7064*** (0.0712)	0.7168*** (0.0605)	0.8501* (0.0737)
Not Supported Under Rated Subjective								
Unit	0.2802*** (0.0745)	0.3213*** (0.0840)	0.3369* (0.0953)	0.3139*** (0.0904)	1.3203 (0.3222)	1.7064** (0.4121)	0.6418 (0.1735)	0.7198 (0.1871)
Female	1.8769** (0.5394)	1.8564** (0.5177)	0.8907 (0.2645)	1.3769 (0.4131)	1.2031 (0.3051)	1.9745*** (0.4895)	1.4838 (0.4143)	1.3396 (0.3570)
Extraversion	0.7856 (0.1404)	1.2747 (0.2293)	0.7868 (0.1478)	1.2780 (0.2508)	0.8173 (0.1349)	1.0130 (0.1635)	1.1492 (0.1973)	1.4697** (0.2510)
Agreeableness	0.9191 (0.2002)	0.9739 (0.2116)	1.0992 (0.2527)	1.2582 (0.2991)	0.7535 (0.1520)	1.1179 (0.2221)	0.8720 (0.1886)	0.9631 (0.2044)
Conscientiousness	1.0106 (0.2230)	0.6095** (0.1336)	1.5878* (0.3793)	1.0377 (0.2521)	0.9261 (0.1873)	0.9073 (0.1794)	1.0095 (0.2234)	0.7386 (0.1580)
Neuroticism	1.0207 (0.2063)	1.1507 (0.2278)	1.0687 (0.2251)	1.0201 (0.2167)	0.9031 (0.1626)	1.0343 (0.1823)	0.9738 (0.1886)	1.2481 (0.2351)
Openness	0.9025 (0.2120)	1.3169 (0.3112)	0.8984 (0.2185)	1.1820 (0.2998)	1.1216 (0.2399)	0.8025 (0.1705)	1.0220 (0.2319)	0.8854 (0.1986)
Previous study (base none)								
High School	1.6322 (0.5419)	1.9706** (0.6621)	2.1510* (0.7330)	2.4734** (0.8803)	1.0118 (0.3087)	1.3453 (0.4129)	1.1072 (0.3586)	1.1737 (0.3804)
High School and	1.2454 (0.4461)	1.0706 (0.3914)	1.5444 (0.5648)	1.5463 (0.6079)	0.7967 (0.2515)	1.0934 (0.3545)	1.0345 (0.3544)	1.4037 (0.4935)
Since High School	1.1822 (0.4248)	1.0832 (0.3635)	1.0762 (0.4035)	1.0948 (0.4059)	0.9616 (0.3115)	1.2850 (0.3839)	0.9766 (0.3459)	0.7045 (0.2288)
Base Objective	0.7756** (0.0944)	1.8735*** (0.1672)	0.6561* (0.0843)	0.7731** (0.0878)	0.5433* (0.0623)	0.6879*** (0.0640)	0.5961*** (0.0717)	0.7938** (0.0761)
Base Subjective	1.5449*** (0.1310)	0.8144* (0.0880)	1.7601* (0.1550)	2.1423*** (0.2050)	2.3383* (0.2894)	2.7407*** (0.3439)	1.9738*** (0.2219)	2.1551*** (0.2341)
Did Not Reply								
Unit	0.0343***	0.0327***	0.0402*	0.0351***	0.0448*	0.0509***	0.0348***	0.0357***

	(0.0091)	(0.0086)	(0.0106)	(0.0090)	(0.0119)	(0.0133)	(0.0095)	(0.0096)
Female	0.9560	1.2151	0.6700*	1.0156	0.7978	1.2862	0.8691	1.0510
	(0.2323)	(0.2912)	(0.1608)	(0.2366)	(0.1857)	(0.2951)	(0.2035)	(0.2441)
Extraversion	1.2477	1.5925***	1.2994*	1.6687***	1.4513*	1.5480***	1.4942***	1.7095***
	(0.1879)	(0.2396)	(0.1917)	(0.2456)	(0.2128)	(0.2277)	(0.2220)	(0.2548)
Agreeableness	1.0446	1.1723	1.1491	1.2959	0.8663	1.1820	0.9936	1.1671
	(0.1948)	(0.2192)	(0.2105)	(0.2375)	(0.1588)	(0.2148)	(0.1831)	(0.2146)
Conscientiousness	0.5283***	0.3652***	0.6522*	0.4943***	0.5600*	0.5207***	0.6154***	0.4868***
	(0.0956)	(0.0675)	(0.1162)	(0.0878)	(0.0993)	(0.0936)	(0.1113)	(0.0890)
Neuroticism	0.9004	0.9686	0.9593	0.9988	0.8892	0.9692	0.8595	1.0240
	(0.1501)	(0.1588)	(0.1575)	(0.1607)	(0.1429)	(0.1557)	(0.1414)	(0.1670)
Openness	0.9865	1.2291	1.0026	1.1484	1.1841	1.0281	1.0966	1.0267
	(0.1943)	(0.2376)	(0.1941)	(0.2187)	(0.2248)	(0.1964)	(0.2122)	(0.1977)
Previous study (base none)								
High School	1.2261	1.2004	1.1551	1.1120	0.8965	0.9752	0.9652	0.9677
	(0.3624)	(0.3627)	(0.3330)	(0.3253)	(0.2464)	(0.2756)	(0.2697)	(0.2784)
High School and	1.4158	1.1461	1.2381	1.1447	1.0312	1.1863	1.2760	1.4674
	(0.4555)	(0.3711)	(0.3729)	(0.3488)	(0.2982)	(0.3582)	(0.3835)	(0.4673)
Since High School	0.9541	0.6583	0.7778	0.5932*	0.8879	0.7881	0.8880	0.5551**
	(0.2921)	(0.1936)	(0.2288)	(0.1689)	(0.2638)	(0.2289)	(0.2678)	(0.1573)
Base Objective	0.8824	1.1423*	0.8801	1.1020	0.7302*	0.9414	0.8025**	1.0906
	(0.0958)	(0.0880)	(0.0949)	(0.0985)	(0.0784)	(0.0832)	(0.0860)	(0.0973)
Base Subjective	1.0404	1.1334	1.0850	1.1852**	0.9696	1.0725	0.9293	0.9989
	(0.0756)	(0.1071)	(0.0796)	(0.0897)	(0.0873)	(0.0943)	(0.0745)	(0.0792)
Nagelerke	0.506	0.495	0.540	0.497	0.493	0.462	0.491	0.458
-2LL	-864.1	-864.7	-832.6	-849.1	-876.2	-891.9	-877.4	-898.2
Obs	865	865	865	865	865	865	865	865

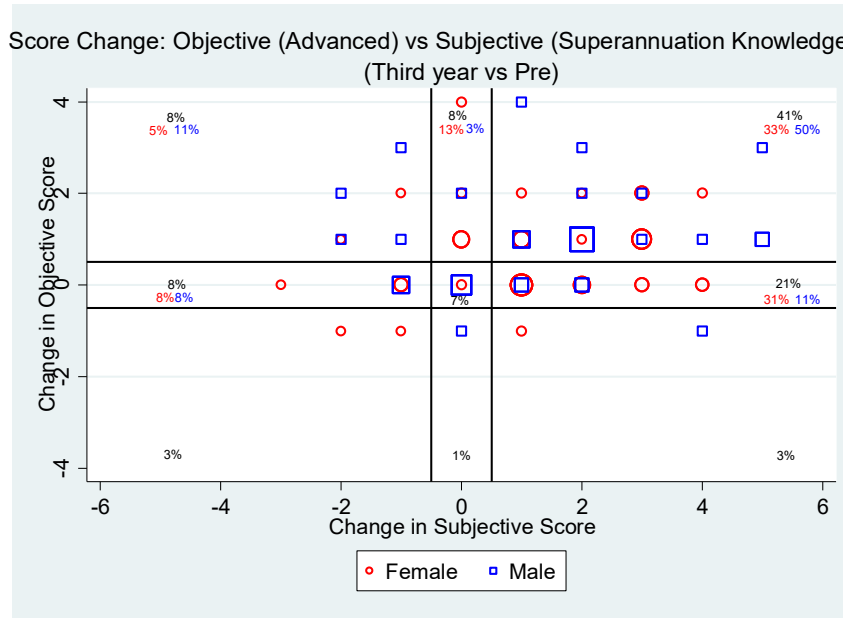
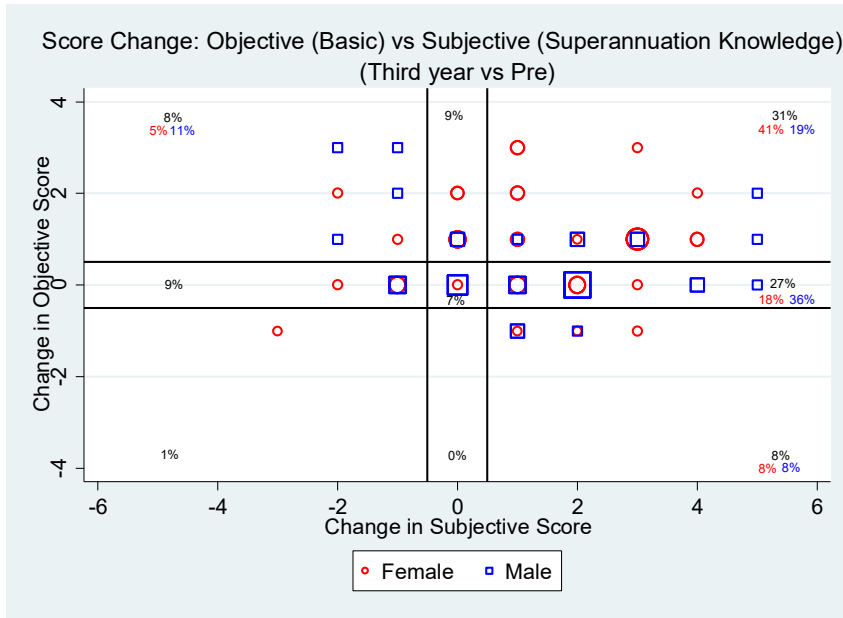
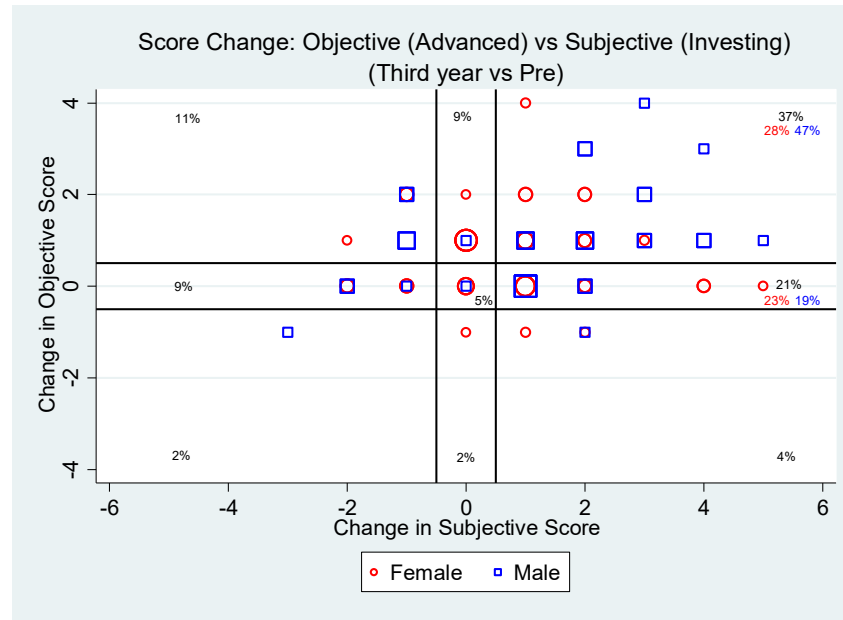
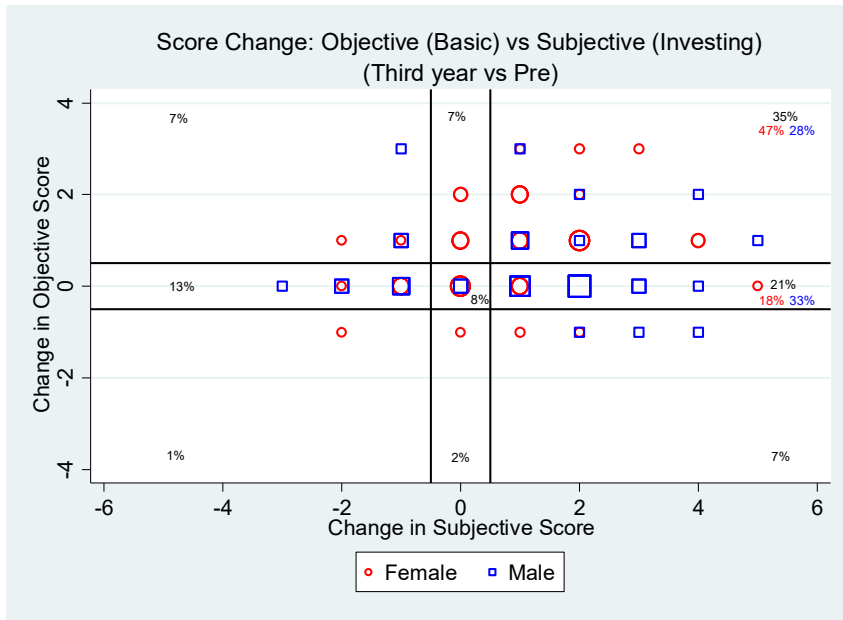


Figure 8 Change in Subjective (Knowledge) and Objective Financial Literacy Scores: Pre-Three Years Surveys

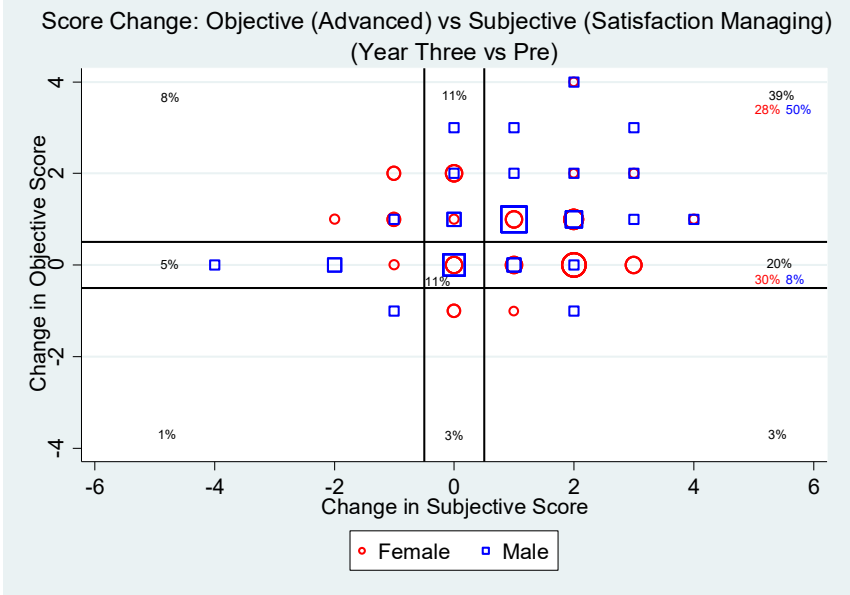
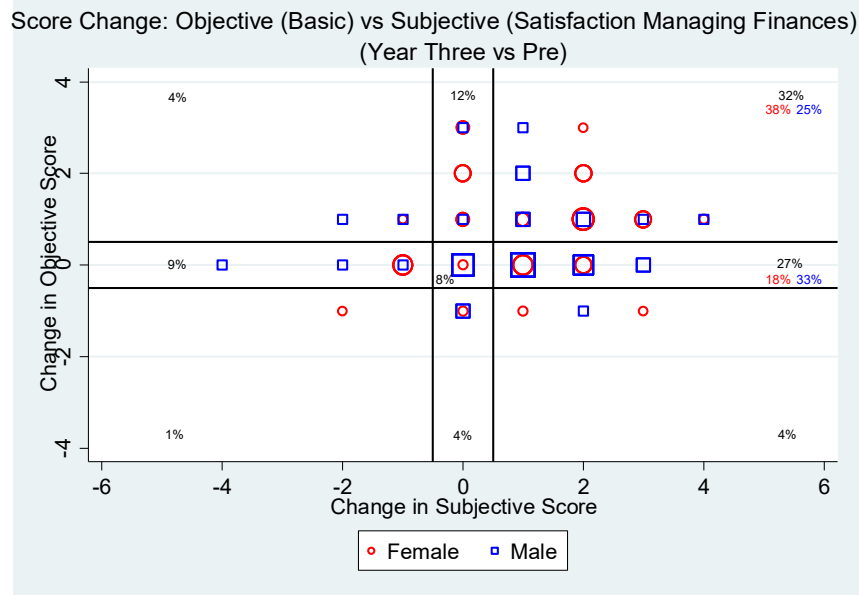
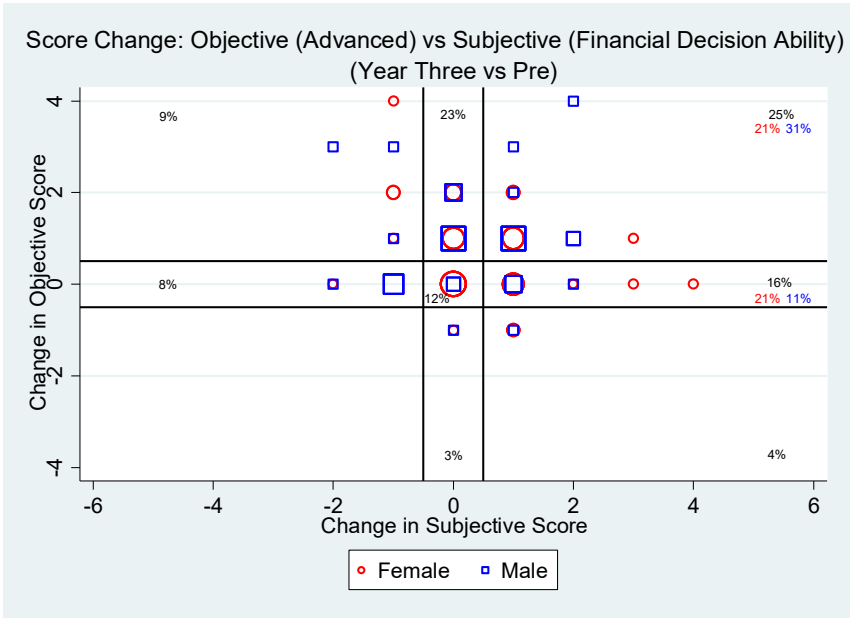
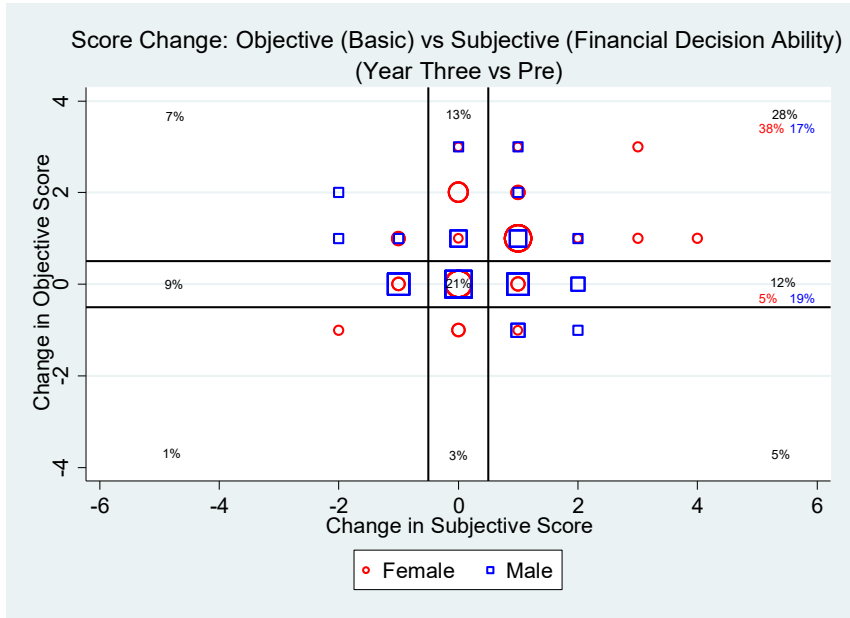


Figure 9 Change in Subjective (Ability, Satisfaction) and Objective Financial Literacy Scores: Pre-Three Years Surveys

Table S2 Calibration of Subjective and Objective Financial Literacy Change: Pre-Year Three

This table reports the relative risk ratio from a multinomial regression of the change in subjective scores compared with the change in objective scores for 2016 relative to Baseline. Two objective financial literacy scores are considered: Basic and Advanced. Four subjective financial literacy scores are considered: Investing knowledge; Superannuation knowledge; Financial decision making ability; and Satisfaction managing finances. Three mutually exclusive groups are groups are: 1) Not Supported Over Rated Subjective - Those whose subjective score increased where the objective score decreased or remained the same; 2) Not Supported Under Rated Subjective - Those whose subjective score decreased where the objective score increased or remained the same; 3) Calibrated – Those whose subjective score and objective score either both increased, both decreased, or both were unchanged; 4) Those who did not complete the Post survey (to control for attrition). All other variables are as reported in the Baseline survey. Robust standard errors are reported in brackets and significance is reported by *** p<0.01, ** p<0.05, * p<0.1.

	Basic Investing Knowledge	Advanced	Basic Super Knowledge	Advanced	Basic Decision Making	Advanced	Basic Satisfaction	Advanced Managing
Not Supported Over Rated Subjective								
Unit	0.6159 (0.2352)	0.9384 (0.3654)	0.8311 (0.3145)	0.5023* (0.1874)	0.4988* (0.2001)	1.0007 (0.4053)	0.7407 (0.2839)	0.8145 (0.3182)
Female	0.5918 (0.2422)	0.7372 (0.3099)	1.2953 (0.5130)	1.7891 (0.6985)	0.7830 (0.3211)	2.0828* (0.9057)	1.2045 (0.4764)	2.5697** (1.0767)
Extraversion	1.4670 (0.3713)	0.8965 (0.2263)	1.0139 (0.2473)	0.8827 (0.2088)	0.9163 (0.2349)	0.8202 (0.2095)	1.3519 (0.3414)	1.0502 (0.2622)
Agreeableness	1.0199 (0.3271)	0.6789 (0.2140)	1.1150 (0.3532)	0.8683 (0.2599)	1.1775 (0.3907)	1.2381 (0.4023)	0.8068 (0.2541)	1.0417 (0.3200)
Conscientiousness	0.8112 (0.2379)	2.2450*** (0.6875)	0.5232** (0.1517)	1.0872 (0.3077)	0.8592 (0.2698)	0.8474 (0.2674)	1.2415 (0.3720)	1.2230 (0.3728)
Neuroticism	0.6613 (0.1865)	1.2351 (0.3511)	0.4264*** (0.1191)	0.7249 (0.1941)	0.8576 (0.2469)	1.1861 (0.3459)	0.7793 (0.2208)	1.0728 (0.3046)
Openness	0.8342 (0.2706)	0.9241 (0.3010)	1.3438 (0.4339)	0.8905 (0.2773)	0.9004 (0.2922)	0.7650 (0.2489)	1.0142 (0.3303)	0.8201 (0.2644)
Previous study (base none)								
High School	1.9624 (1.0280)	0.5514 (0.3214)	1.3025 (0.6162)	0.9841 (0.4634)	0.8317 (0.4213)	0.3950 (0.2304)	2.9987** (1.6667)	0.6204 (0.3389)
High School and since	0.4821 (0.3551)	1.8217 (1.1885)	1.5908 (1.0265)	1.5454 (0.9246)	0.8015 (0.5275)	1.0341 (0.6061)	0.4016 (0.2547)	1.8774 (1.0955)
Since High School	1.8631 (0.9525)	1.5946 (0.8091)	1.2174 (0.5995)	1.7091 (0.8342)	0.7827 (0.4083)	1.3526 (0.6833)	1.0502 (0.5120)	0.8870 (0.4371)
Base Objective Score	3.2750*** (0.8068)	0.6582*** (0.0918)	5.2572*** (1.3864)	1.9615*** (0.3413)	2.7285*** (0.6731)	2.0775*** (0.3951)	3.7226*** (0.9430)	1.8602*** (0.3375)
Base Subjective Score	0.8185 (0.1030)	1.7955*** (0.3329)	0.7448** (0.0986)	0.8123 (0.1048)	0.6865*** (0.0988)	0.6824*** (0.0986)	0.6424*** (0.0863)	0.8263 (0.1112)
Not Supported Under Rated Subjective								
Unit	0.5057* (0.1851)	0.8556 (0.3036)	0.9101 (0.3471)	0.6507 (0.2447)	0.7588 (0.2681)	1.8784* (0.6606)	0.7284 (0.2812)	0.8856 (0.3333)
Female	0.8423 (0.3308)	0.9802 (0.3625)	1.5464 (0.6356)	1.5832 (0.6171)	0.8852 (0.3302)	1.1761 (0.4268)	1.2421 (0.4919)	1.5780 (0.5893)
Extraversion	1.2484 (0.2934)	0.9845 (0.2260)	0.9891 (0.2441)	1.0039 (0.2459)	0.7775 (0.1807)	0.7858 (0.1829)	1.0895 (0.2608)	0.8719 (0.2045)
Agreeableness	1.1848 (0.3430)	1.1425 (0.3305)	1.2765 (0.3892)	1.1823 (0.3594)	1.0959 (0.3091)	1.5668 (0.4500)	1.0062 (0.3015)	1.7110* (0.5106)
Conscientiousness	1.1094 (0.3150)	1.6605* (0.4646)	0.7208 (0.2226)	1.0059 (0.3001)	0.5362** (0.1518)	0.4503*** (0.1290)	1.0601 (0.3181)	0.6862 (0.1995)
Neuroticism	1.0866 (0.2887)	1.3404 (0.3430)	1.0241 (0.2854)	1.1214 (0.3006)	1.2831 (0.3299)	1.1693 (0.2964)	1.6562* (0.4438)	1.2914 (0.3307)
Openness	0.8297 (0.2555)	0.8698 (0.2641)	0.8810 (0.2824)	0.7256 (0.2313)	1.2335 (0.3790)	0.9772 (0.3001)	1.0881 (0.3422)	1.0024 (0.3078)
Previous study (base none)								
High School	1.6545 (0.8027)	1.1086 (0.4864)	0.6923 (0.3489)	0.8972 (0.4394)	0.8748 (0.3955)	1.0101 (0.4413)	2.5449* (1.3541)	1.1528 (0.5098)
High School and since	0.8966 (0.4760)	1.5660 (0.8876)	2.4443 (1.4647)	2.2535 (1.3332)	1.1935 (0.6191)	0.8250 (0.4577)	0.5170 (0.2789)	1.5689 (0.9084)
Since High School	1.4136 (0.7054)	1.0809 (0.5072)	1.0806 (0.5398)	1.5217 (0.7426)	0.9179 (0.4222)	0.9791 (0.4616)	0.9448 (0.4602)	0.6945 (0.3380)

Base Objective Score	0.8099 (0.1301)	1.3846*** (0.1532)	0.8548 (0.1409)	0.6828*** (0.0975)	0.7582* (0.1207)	0.7577** (0.1025)	0.6958** (0.1137)	0.7479** (0.1004)
Base Subjective Score	1.4265*** (0.1585)	0.6483*** (0.0910)	1.7349*** (0.2057)	1.7517*** (0.2077)	2.2540*** (0.3860)	2.3507*** (0.3982)	1.4647*** (0.2130)	1.7692*** (0.2544)
Did not reply								
Unit	0.7931 (0.2063)	1.1242 (0.2776)	1.0678 (0.2857)	0.8783 (0.2185)	0.8832 (0.2125)	1.4436 (0.3685)	0.8229 (0.2216)	0.9721 (0.2370)
Female	0.6634 (0.1954)	0.8221 (0.2162)	1.0081 (0.2907)	1.1519 (0.3060)	0.7136 (0.1890)	1.0110 (0.2613)	0.8618 (0.2431)	1.1495 (0.2870)
Extraversion	1.3187 (0.2333)	1.0923 (0.1780)	1.1004 (0.1918)	1.0867 (0.1817)	1.0155 (0.1632)	1.0038 (0.1626)	1.2401 (0.2231)	1.0888 (0.1748)
Agreeableness	1.0542 (0.2293)	0.9367 (0.1938)	1.1228 (0.2475)	0.9907 (0.2114)	1.0469 (0.2121)	1.1746 (0.2349)	0.9443 (0.2102)	1.1658 (0.2309)
Conscientiousness	0.6282** (0.1304)	0.9170 (0.1777)	0.4522*** (0.0986)	0.6584** (0.1324)	0.5185*** (0.1040)	0.4929*** (0.0998)	0.7813 (0.1694)	0.6742** (0.1325)
Neuroticism	0.6509** (0.1284)	0.8536 (0.1550)	0.5347*** (0.1076)	0.6961* (0.1299)	0.7421 (0.1349)	0.7860 (0.1421)	0.7461 (0.1480)	0.7674 (0.1372)
Openness	0.6522* (0.1487)	0.6783* (0.1456)	0.7690 (0.1757)	0.6343** (0.1400)	0.7740 (0.1641)	0.6882* (0.1485)	0.7467 (0.1753)	0.7022* (0.1486)
Previous study (base none)								
High School	2.1180* (0.8234)	1.4059 (0.4435)	1.4453 (0.4911)	1.5413 (0.5030)	1.3881 (0.4393)	1.3682 (0.4295)	3.2638*** (1.4739)	1.5895 (0.5024)
High School and since	1.7173 (0.6960)	2.8555** (1.2488)	3.5545** (1.7536)	3.4305*** (1.5584)	2.2449** (0.8649)	2.2418** (0.8481)	1.5757 (0.5549)	3.5017*** (1.4980)
Since High School	1.7508 (0.6785)	1.4045 (0.4713)	1.4226 (0.5116)	1.6694 (0.5894)	1.2227 (0.3894)	1.4125 (0.4737)	1.3686 (0.4753)	1.1957 (0.3610)
Base Objective Score	0.9222 (0.1131)	1.0767 (0.0869)	1.0553 (0.1296)	0.8701 (0.0882)	0.8752 (0.1017)	0.8811 (0.0879)	0.9317 (0.1163)	0.8898 (0.0853)
Base Subjective Score	1.1100 (0.0957)	0.8044** (0.0825)	1.1470 (0.1026)	1.1900** (0.1033)	1.0420 (0.0985)	1.0763 (0.1027)	0.8290* (0.0818)	0.9577 (0.0814)
-2LL	-671.0	-677.9	-645.0	-673.8	-665.0	-664.2	-656.2	-672.6
Nagelerke Pseudo-R ²	0.168	0.142	0.232	0.160	0.170	0.173	0.206	0.152
Obs	865	865	865	865	865	865	865	865