# Calibrating Financial Confidence: The Role of Finance Education and Mathematical Confidence

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A person's confidence in their financial capability can have significant effects on their financial decision-making. In particular, research has shown that misplaced confidence can lead to unwanted financial decisions. A crucial project, therefore, when it comes to improving financial outcomes is finding interventions that calibrate people's financial confidence – bringing it into line with their actual capabilities. This paper investigates the relationship between confidence accuracy and two explanatory factors: financial education and mathematical capability. We find that both explanatory factors significantly reduce under-confidence while there is not a robust significant association between these factors and over-confidence.

## Introduction

A person's confidence in their financial capability can have significant effects on their financial decision-making. In particular, research has shown that *misplaced* confidence can lead to unwanted financial decisions. To generalize, being over-confident, so that a person thinks they are more skilled financially than they in fact are, can lead them to take unjustified financial risks that they do not fully understand; while being under-confident, so that a person thinks they are less skilled financially than they in fact are, can lead them to turn down potentially fruitful financial opportunities that they have the capability to undertake.

A crucial project, therefore, when it comes to improving financial outcomes is finding interventions that *calibrate* people's financial confidence – bringing it into line with their actual capabilities. This paper investigates the relationship between confidence accuracy and two explanatory factors: financial education and mathematical capability. These two properties are both associated with improved financial knowledge and financial outcomes. It's natural to ask, therefore, whether they also improve self-awareness of one's financial capability and lead to better calibrated financial confidence.

We construct a model of the calibration of a subject's financial confidence in terms of the relationship between their financial confidence and their financial ability. We find both financial education and mathematical capability are associated with a reduced difference between ability and confidence – in other words, improved financial confidence calibration. To better understand the results, we also apply our models to over-confidence and under-confidence separately. We find that both explanatory factors significantly reduce under-confidence while there is not a robust significant association between these factors and over-confidence.

Given the negative effects associated with financial under-confidence, the fact that mathematics and financial education both reduce it, demonstrates a key area in which they have a role in improving financial wellness. The lack of significant results related to financial over-confidence suggests there is important further work to be done in understanding how to address this problem.

## Background

Misplaced confidence is an important subject of study in psychology in general, known to influence all kinds of decision making (Moore & Healy 2008). An individual's confidence level is to be understood as their belief in their own abilities in a given area (sometimes known as 'self-belief' or 'self-efficacy'). Misplaced confidence occurs when a person's self-belief does not accurately reflect their abilities. This concept has been shown to be of particular significance in financial matters. A person's confidence in their own financial decision-making has been shown

to have a significant effect on a range of financial decisions and outcomes (Allgood & Walstad 2016). Further research investigates whether *misplaced* confidence specifically has additional effects.

One key idea, reinforced by multiple studies, is that over-confidence is associated with engaging in more risky financial behavior. Barber & Odean (2013) bring together a range of research showing that over-confident investors "will trade too much and to their detriment." For example, Barber et. al (2020) find that over-confident investors are more likely to take on additional risk by margin trading, as well as trading less profitably. Kim and Hanna (ms) find that over-confident investors are more likely to invest in crypto-currency – considered by most investment experts a high-risk investment. In other areas, Zhu (2021) finds that over-confident adolescents are more likely to engage in risky financial behavior, while Kim et al (2019) find an association between over-confidence and mortgage delinquency. Ben-David et. al (2013) find that over-confident financial executives are more likely to pursue high risk investment strategies for their companies.

Meanwhile, research has also found a range of negative financial consequences associated with under-confidence. Angrisani (ms) finds that such individuals fare worse with regard to retirement preparations. Ahmad (2019) finds that under-confident investors in developing countries experience worse financial outcomes. Huang et. al (2020) find that it negatively affects market participation in China. Further, Parker et. al (2012) find that low confidence in general is associated with worse retirement planning and fee minimization for investors.

This has made identifying ways to better calibrate confidence an important research task. One natural place to look is *education*. Effective education should not only teach a student about the subject matter, but give them an accurate understanding of their own abilities with regard to the topic. This will position them to effectively seek out new knowledge beyond the scope of the course and be aware of any potential gaps in their knowledge they must navigate around.

A significant body of research has shown that two forms of education are effective at improving financial outcomes: financial education and mathematics education. Comprehensive meta-studies by Kaiser and Menkhoff (2017, 2018) and Kaiser et. al (2020) found that, on the whole, financial education courses have a significant impact on financial literacy and financial outcomes. In addition, research shows that there is a significant relationship between numeracy and positive financial outcomes, and that additional mathematics education has been shown to improve such outcomes (Hastings et. al 2013; Cole et. al 2016; Goodman 2019).

A natural question, then, is whether these forms of education are also effective at calibrating confidence level. Existing research on how financial education affects calibration has yielded mixed results. Zhu (2021) finds that financial education increases levels of under-confidence in

adolescents. However, Kim et al (ms) find that over-confidence levels among US adults, in general, increased from 2009-2018, even as the prevalence of financial education has increased during this period.

To the best of the authors' knowledge, no research has addressed the question of how mathematics affects calibration. It is to address these gaps in our understanding that the present study is directed. However, since research by Levy and Tasoff (2017) identifies a distinctly mathematical role in financial over-confidence, finding that subjects are systematically over-confident in their ability to make compound interest calculations, there is *prima facie* plausibility to the idea that mathematics has a role in financial confidence calibration.

**Research Question and Hypotheses**

Our goal in this paper is to investigate how both financial education and mathematical capability affect financial confidence calibration. We aim to do so using the NFCS dataset, discussed below. This dataset provides a wealth of information on financial education and financial outcomes of US adults. The only information provided by the dataset on subjects' mathematical knowledge, though, is a self-assessment of mathematical ability, which we use as a proxy for mathematical understanding – we believe this self-assessment is a generally reliable though imperfect measure (see Marley-Payne et. al (ms) for further discussion of this measure). For ease of expression, we refer to a subject's self-assessment of their mathematical ability as their *mathematical confidence*, in which terms we state our hypotheses below.

As discussed above, there is compelling theoretical reason to think that both factors can improve calibration. To sharpen our thinking, this can be broken down into a number of more specific hypotheses:

H1: Financial education improves financial confidence accuracy.

H2: Mathematical confidence improves financial confidence calibration.

H3: Financial confidence accuracy improves financial decision making.

The models we construct and apply below are designed to test these hypotheses.

**Data and Model**

This investigation will be based on data contained in the 2018 National Financial Capability Survey (FINRA 2019). The survey provides a comprehensive set of data on the financial situation of adults in the US. Approximately 27,000 adults completed the survey online in 2018. Survey quotas were employed to ensure the survey is demographically representative of the US population.

The survey contains approximately 130 questions – with the precise number depending on answers given by the respondent. It has ten sections: (1) basic demographics; (2) financial attitudes and behaviors; (3) banking and money management; (4) retirement accounts; (5) government benefits; (6) home and mortgages; (7) credit cards; (8) other debt and loans; (9) insurance; and, (10) a financial self-assessment with questions about financial literacy and financial education (FINRA 2019). The national data is weighted to be representative of the national population in terms of age, gender, ethnicity, education, and census division.

Various iterations of this dataset have been used in previous research on financial confidence. Walstad and Allgood (2016) look at the effect of both financial confidence and knowledge on financial outcomes. Kim et. al (ms) look at trends in over-confidence across multiple iterations of this dataset. Further, research on the relationship between education and financial outcomes within this dataset has been performed by Walstad and Wagner (ms) and Marley-Payne et. al (ms). We build our models based on this work.

The key outcome we are concerned with is financial confidence calibration – how well does a person's confidence in their financial abilities match up with their actual financial abilities? They may be over-confident, under-confident, or appropriately confident. In order to measure confidence calibration, we first need to obtain measures of both financial confidence and financial ability. Following previous research, we base a measure of financial confidence on the self-assessment provided in the dataset, in which respondents are asked: "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge?" We normalize these results and take the z-score of a respondent's answer as a measure of their financial knowledge confidence.[1]

The dataset also provides a way to measure actual financial knowledge, as it contains six multiple choice financial literacy questions. We take the z-score score of number of correct answers to these questions as the financial knowledge measure.

Importantly, financial literacy goes beyond simply possessing the relevant knowledge in an academic setting but also being able to employ it in one's decision making. Therefore, we also aim to measure calibration with respect to financial decision making, and the dataset provides us with the resources to do so. The survey asks respondents to self-assess their financial decision making with the question: "How strongly do you agree or disagree with the following statement? – I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses" (respondents again answer on a 1-7 scale). We use the z-score of their answer as the financial decision-making confidence measure.

[1] Here, and in all cases, we use weighted mean and standard deviation to calculate the z-score.

To measure actual decision making, we look at responses to a sample of eight questions from the survey that ask whether respondents took appropriate financial actions. These questions were chosen on the basis of finding beneficial actions that could be performed without requiring significant financial resources. Four questions ask whether respondents took a given beneficial action, while four ask whether respondents avoided a particular negative action. These questions have been used in prior research on financial decision making on this dataset (Marley-Payne et. al ms, Walstad & Wanger ms). For more information on the questions selected, see appendix 1. The combined z-score of beneficial actions taken, and (sign-reversed) negative actions taken was used as the measure of respondent's actual decision making.

There are a number of different ways to use these variables to create a measure of confidence accuracy, leading to the following outcome variables.

1) Confidence Score: This is the difference between the confidence z-score and ability z-score; a positive value indicates over-confidence while a negative value indicates under-confidence.
2) Calibration: This is the absolute value of confidence score; a high value indicates low confidence accuracy while a low value indicates high confidence accuracy
3) Categorical Over Confidence: A dummy variable with value 1 if a respondent's confidence level is above the median while their knowledge level is below the median and value 0 otherwise.
4) Categorical Under Confidence: A dummy variable with value 1 if a respondent's confidence level is below the median while their knowledge level is above the median and value 0 otherwise.

Variables (1) and (3) are based on the models used in Kim et. al (ms) in their analysis of over-confidence in the same dataset. Variables (2) & (4) are natural extensions of these measure that allow us to gain further information. Note that there are two versions of each of these variables, one concerning financial knowledge measures and the other financial decision making.

As discussed in our study goals, our model requires explanatory variables related to both finance and math capability. The dataset contains a range of information as to the financial education received by respondents. Following previous models by Walstad and Wagner (ms) and Marley-Payne et. al (ms), we'll use a measure of whether a respondent took a financial education course as an explanatory variable in our model: this will be a dummy variable with a value of 0 or 1.

The survey provides a question on mathematical confidence which allows us to measure mathematical capacity. The question asks respondents to rate their mathematical ability on a scale of 1-7. As discussed above, this is the only variable related directly to mathematics,

included in the survey. Following Marley-Payne et. al (ms), we will use the response to this question as an additional explanatory variable, taking an integer value between 1 and 7.

We introduce a number of controls to our model – these cover demographic factors such as gender, race, age group, income, education, and census region. We treat each response option as a dummy variable. In addition, our preliminary analysis revealed that military status had a significant effect on outcomes, so we control for this also. A full list of the variables in our model is provided in in appendix 1. We include all variables used in the survey weighting as controls, so we don't have to weight the regression analysis – reducing the standard errors in our results.

We performed regression analysis on the entire dataset to see if there was a significant correlation between either of our independent variables and each of the outcome variables described above. For the confidence score and calibration outcomes, we use OLS linear regression; for the categorical over- and under-confidence outcomes, we use logistic regression.

In addition, we wanted to see whether the effects were different for over-confident and under-confident individuals. To do this we classified individuals as over-confident if their confidence score was above zero and as under-confident if it was below zero. Then we performed regression analysis, with calibration as the outcome variable, on the set of over-confident and under confident individuals separately.

Finally, we checked the relationship between confidence calibration (with regard to financial knowledge) and financial outcomes. We performed OLS linear regression analyses taking our measures of confidence calibration as independent variables and overall financial actions, positive actions, and negative actions separately as outcomes. It should be noted that for positive score, we used the z-score of actions taken while for negative score, we used the sign reversed z-score. In other words, for both scores, a positive value indicates better than average financial behavior while a negative value indicates below average.

**Results**

To begin discussing the results, we'll look at key figures from regressions that involve the confidence score and categorical measures as explanatory variables. These are displayed in table 1.

| | Math Confidence | Financial Education |
|---|---|---|
| Financial Knowledge Confidence Score | 0.07*** | 0.04* |

| | | |
|---|---|---|
| Categorical Over-Confident | 0.20*** | 0.03 |
| Categorical Under-Confident | -0.09*** | -0.26*** |
| Financial Decision Making | | |
| Confidence Score | 0.12*** | 0.15*** |
| Categorical Over-Confident | 0.35*** | 0.44*** |
| Categorical Under-Confident | -0.11*** | -0.23*** |

*Table 1: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*

Overall, we find that both math confidence and financial education have a statistically significant positive association with financial confidence score for both knowledge and decision making, indicating an increasing level of confidence relative to ability. The positive coefficients for the categorical measure of over-confidence and negative coefficients for under-confidence again suggest that the factors increase confidence relative to ability. Being high math confidence or taking finance education makes one less likely to be under-confident and, in most cases, more likely to be over-confident. That is, increasing math confidence and taking financial education courses are both associated with a decrease in under-confidence but are not associated with a decrease in over-confidence.

The decision results and knowledge results display the same general pattern. The direction of effect is the same in each case, while the only difference with significance level is that the coefficient for finance education is in this case significant for the categorical over-confidence outcome. In other words, finance education doesn't seem increase over-confidence with regard to financial knowledge, but does increase over-confidence with regard to financial decision-making.

The results for the calibration measures of confidence are displayed in table 2:

| | Math Confidence | Financial Education |
|---|---|---|
| Financial Knowledge | | |
| Calibration (all) | -0.02*** | -0.04*** |
| Calibration (Over- Confident) | 0.00 | -0.02 |
| Calibration (Under- Confident) | -0.02*** | -0.06*** |
| Financial Decision Making | | |
| Calibration (all) | -0.05*** | -0.04*** |
| Calibration (Over- Confident) | 0.01 | 0.01 |
| Calibration (Under- Confident) | -0.07*** | -0.06*** |

*Table 2: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*

The negative coefficients for calibration show that the two factors increase the *accuracy* of confidence level, bringing the confidence z-score closer to the knowledge z-score. Perhaps the most revealing results are found in the bottom two rows, which show what happens when the model is applied to the over-confident and under-confident individuals separately. The two independent variables have a statistically significant effect reducing under-confidence; they do not have any significant effect on over-confidence. This suggests that though the factors increase confidence overall, this is mostly a matter of reducing under-confidence, rather than exacerbating over-confidence. This is backed up by the fact that the explanatory factors are associated with an overall increase in accuracy.

We also look at the relationship between different measures of confidence and financial outcomes. The results for confidence score and categorical measures are displayed in table 3.

| Coefficients (by outcome variable) | | | |
|---|---|---|---|
| Explanatory Variable | Decision Score | Positive Score | Negative Score |
| Confidence Score | 0.01 | 0.05 *** | -0.03*** |
| Over Categorical | -0.03 | 0.18*** | -0.23*** |
| Under Categorical | -0.14 *** | -0.21*** | -0.02 |

*Table 3: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*

There are some interesting results worth unpacking. In interpreting these results it's important to remember that negative score is the *sign-reversed* z-score of number of negative actions taken. Therefore, a negative value indicates taking more than the average number of negative actions, while a positive value indicates taking fewer than the average. Also recall that in these regressions, we only use the knowledge-based measures of confidence accuracy. The results for confidence score tell us that having higher confidence relative to knowledge increases predicted positive actions taken but also increases negative actions. The fact there is no statistically significant value for overall decision score suggests these two effects more or less cancel each other out.

This pattern is backed up by the results for the categorical measures. Over-confidence is associated with increased positive behavior and increased negative behavior, while under-confidence is associated with a *decrease* in positive behavior, and no significant effect on negative behavior. Interestingly, over-confidence has no significant association with decision score, while under-confidence has a significant negative effect.

Further light is shed on this when we look at the key results associated with the calibration variables, displayed in table 4.

| | Coefficients (by outcome variable) | | |
|---|---|---|---|
| Explanatory Variable | Decision Score | Positive Score | Negative Score |
| Calibration (All) | -0.08 *** | -0.03*** | -0.11*** |
| Calibration (Over) | -0.07 *** | 0.02 | -0.14*** |
| Calibration (Under) | -0.12 *** | -0.10*** | -0.08*** |

*Table 4: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*

In general, more accurate confidence calibration is associated with better financial outcomes across virtually all measures, as shown by the statistically significant negative coefficients. The one exception is the coefficient for positive behavior among over-confident individuals, which is positive, though not significant at the 5% level. When we combine this with the coefficients for confidence score and categorical over-confidence for positive behavior – both positive and significant – this suggests that increased confidence is associated with increased positive behavior, even when the confidence is misplaced.

**Discussion**

These results show that both math confidence and financial education have a significant impact on confidence accuracy, with regard to both knowledge and action. Referring back to our hypotheses, we can see that both H1 and H2 are partially validated. Both factors improve both overall confidence calibration and reduce under-confidence, in line with the hypotheses. However, neither factor reduces over-confidence, contrary to what the hypotheses predict. Even this partial result is significant, however. Though much research focuses on problems with over-confidence, it's known that under-confidence is also associated with negative financial outcomes – a result we confirm here. This shows an important benefit associated with math and finance education. It is, nonetheless, a potential cause for concern that these factors appear ineffective at reducing over-confidence. A worthwhile goal for future education interventions is thinking purposefully about how they might address students' over-confidence.

When looking at the relationship between confidence accuracy and outcomes, H3 is also partially validated. Overall, increased confidence accuracy leads to improved financial decision making in line with the hypothesis. The only exception here is that over-confidence is associated with increased positive financial behavior, contrary to the hypothesis. One should be cautious about

drawing conclusions about potential benefits of over-confidence, however, since over-confidence has a much stronger association with negative behavior than under-confidence. Though the dataset does not provide us with the ability to compare the size of impact of the various behaviors, it's plausible to think that the risks linked to the negative behaviors may be greater than the benefits of the positive behaviors. For example, the downside to getting charged interest on credit card debt is much higher than the upside to depositing a comparable sum of money in a savings account. Clearly, though, this is a topic that merits further investigation.

One limitation of the study is that the only variable available with regard to math is a measure of confidence – in other words a subjective self-assessment. Along with general worries about the reliability of such measures, in this case it's highly plausible that math over(/under)-confidence could be correlated with financial over(/under)-confidence as a result of a person's general self-confidence level. For this reason, it would be valuable to gain information on alternative measures of a person's mathematical capacity and education level to relate to financial confidence calibration. The fact that despite this potential confounding factor, math confidence was found to increase the accuracy of financial confidence levels suggests this is a useful avenue for research.

**References**

Ahmad, M. (2020). Does underconfidence matter in short-term and long-term investment decisions? Evidence from an emerging market. *Management Decision*.

Allgood, S., & Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviors. *Economic inquiry*, *54*(1), 675-697.

Angrisani, M., & Casanova, M. (2019). What you think you know can hurt you: under/over confidence in financial knowledge and preparedness for retirement. *Journal of Pension Economics and Finance*, 1-16.

Barber, B. M., Huang, X., Ko, K. J., & Odean, T. (2020). Leveraging overconfidence. *Available at SSRN 3445660*.

Barber, B. M., & Odean, T. (2013). The behavior of individual investors. In *Handbook of the Economics of Finance* (Vol. 2, pp. 1533-1570). Elsevier.

Ben-David, I., Graham, J. R., & Harvey, C. R. (2013). Managerial miscalibration. *The Quarterly Journal of Economics*, *128*(4), 1547-1584.

Cole, S., Paulson, A., & Shastry, G. K. (2016). High school curriculum and financial outcomes: The impact of mandated personal finance and mathematics courses. *Journal of Human Resources*, *51*(3), 656-698. doi:10.3368/jhr.51.3.0113-5410r1

FINRA (2019). The State of U.S. Financial Capability: The 2018 National Financial Capability Study. *FINRA Investor Foundation.* Retrieved from https://www.usfinancialcapability.org/downloads/NFCS_2018_Report_Natl_Findings.pdf

Goodman, J. (2019). The labor of division: Returns to compulsory high school math coursework. *Journal of Labor Economics*, *37*(4), 1141-1182.

Hastings, J., Madrian, B., & Skimmyhorn, W. (2012). *Financial literacy, financial education and economic outcomes* (18412). Cambridge, MA: National Bureau of Economic Research.

Huang, H., Yuan, J., Lin, G., & Chi, J. (2020). Underestimation of financial literacy and financial market participation. *Journal of the Asia Pacific Economy*, 1-26.

Kaiser, T., & Menkhoff, L. (2017). *Does financial education impact financial literacy and financial behavior, and if so, when?* The World Bank.

Kaiser, T., & Menkhoff, L. (2018). Financial Education in Schools: A Meta-Analysis of Experimental Studies.

Kaiser, T., Lusardi, A., Menkhoff, L., & Urban, C. J. (2020). *Financial education affects financial knowledge and downstream behaviors* (No. w27057). National Bureau of Economic Research.

Kim, K. T., & Hanna, S. D. (ms). Investment literacy, overconfidence and cryptocurrency investment

Kim, K. T., Lee, S. T., & Hanna, S. D. (ms) Has Financial Knowledge Increased in the United States?

Levy, M. R., & Tasoff, J. (2017). Exponential-growth bias and overconfidence. *Journal of Economic Psychology*, *58*, 1-14.

Marley-Payne J., Davidson A. and Dituri P. (ms) The Combined Effects of Financial Education and Mathematical Confidence: Findings from the 2018 National Financial Capability Survey.

Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological review*, *115*(2), 502.

Parker, A. M., De Bruin, W. B., Yoong, J., & Willis, R. (2012). Inappropriate confidence and retirement planning: Four studies with a national sample. *Journal of Behavioral Decision Making*, *25*(4), 382-389.

Walstad & Wagner (ms) The Effects of Financial Education on the Financial Behaviors of Gen Z, Gen Y, and All Generations.

Zhu, A. Y. F. (2020). Financial Literacy Types and Financial Behaviors Among Adolescents: Role of Financial Education. *Journal of Financial Counseling and Planning*.

**Appendix 1: Variable Specification**

Our regression models use the following variables, all taken from the 2018 NFCS survey data:

| Name | Description | Value | Survey Source |
|---|---|---|---|
| | | | Explanatory Variables |
| *Math Con* | Measure of subjective mathematical confidence | Integer between 0 and 7 | M1_2 |
| *Finance* | Total number of finance education course taken | Integer between 0 and 3 | M21_1, M21_2_2015, and M21_3 |
| | | | Outcome Variables + Components |
| *Emergency* | Assesses whether subject has every set aside an emergency fund | Dummy variable | J5 |
| *Savings* | Assesses whether subject has a savings account | Dummy variable | B2 |
| *Investment* | Assesses whether subject has non-retirement investments | Dummy variable | B14 |
| *Retirement* | Assesses whether subject has calculated retirement needs | Dummy variable | J8/J9 |
| *Positive Score* | Assesses total positive actions taken | Integer between 0 and 4 | Sum of Emergency, Savings, Investment and Retirement values |
| *Overdraw* | Assesses whether subject occasionally overdraws checking account | Dummy Variable | B4 |
| *Credit Card Interest* | Assesses whether subject has been charged credit card interest in past 12 months | Dummy Variable | F2_2 |
| *Payday* | Assesses whether subject has taken out payday loan in past 5 years | Dummy Variable | G25_2 |
| *Pawn* | Assesses whether subject has used pawn shop in past 5 years | Dummy Variable | G25_4 |
| *Negative Score* | Assesses total negative actions taken | Integer between 0 and 4 | Sum of Overdraw, Credit Card Interest, Payday and Pawn |
| *Knowledge Confidence* | Subject's self-assessment of their financial knowledge | Integer between 0 and 10 | M4 |
| *Decision Confidence* | Subject's self-assessment of their financial decision making | Integer between 0 and 10 | M1_1 |
| *Decision Score* | z-score of positive score – z-score of negative score | Continuous | Positive Score, Negative Score |
| *Confidence Score (knowledge)* | z-score of knowledge confidence – z-score of knowledge | Continuous | Knowledge confidence, knowledge |

| | | | |
|---|---|---|---|
| *Confidence Score (decision)* | z-score of decision confidence – z-score of decision score | Continuous | Decision confidence, Decision score |
| *Confidence Calibration (knowledge/decision)* | Absolute value of confidence score (knowledge/decision) | Continuous | Confidence Score (knowledge/decision) |
| *Over Confidence Categorical (knowledge/decision)* | True if confidence (knowledge/decision) is above median and ability (knowledge/decision) is below median | Dummy Variable | Knowledge confidence, knowledge /Decision confidence, Decision score |
| *Under Confidence Categorical (knowledge/decision)* | True if confidence (knowledge/decision) is below median and ability (knowledge/decision) is above median | Dummy Variable | Knowledge confidence, knowledge /Decision confidence, Decision score |
| | | | Control Variables |
| *Female* | Subject is female | Dummy (reference male) | A3 |
| *Minority* | Subject belongs to a minority group | Dummy (reference non-minority) | A4A_new_w |
| *Married* | Subject is married | Dummy (reference not married) | A6 |
| *No HS* | Subject did not complete high school | Dummy (reference graduate degree) | A5_2015 |
| *High School* | Subject completed high school | Dummy (reference graduate degree) | A5_2015 |
| *Some College* | Subject attended some college | Dummy (reference graduate degree) | A5_2015 |
| *Associate's* | Subject has associate degree | Dummy (reference graduate degree) | A5_2015 |
| *Bachelor's* | Subject has bachelor's degree | Dummy (reference graduate degree) | A5_2015 |
| *Children* | Subject has children | Dummy (reference no children) | A11 |
| *Military* | Subject's family is or was in military | Dummy | AM21 |
| *< $25k* | Income is below $25k | Dummy (reference income 150k+) | A8 |

| | | | |
|---|---|---|---|
| *$25-50k* | Income is $25-50k | Dummy (reference income 150k+) | A8 |
| *$50-75k* | Income is $50-75k | Dummy (reference income 150k+) | A8 |
| *$75-150* | Income is $75-150 | Dummy (reference income 150k+) | A8 |
| *New England* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *Mid Atlantic* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *East North Central* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *West North Central* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *South Atlantic* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *East South Central* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *West South Central* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |
| *Mountain* | Subject lives in census region | Dummy (reference Pacific) | CENSUSDIV |

**Appendix 2: Descriptive Data**

| | Mean | Standard Deviation |
|---|---|---|
| Female | 0.51 | 0.5 |
| Minority | 0.36 | 0.48 |
| Age | | |
| 18-24 | 0.12 | 0.32 |
| 25-34 | 0.18 | 0.39 |
| 35-44 | 0.16 | 0.37 |
| 45-54 | 0.17 | 0.37 |
| 55-64 | 0.18 | 0.38 |
| 65+ | 0.19 | 0.39 |
| Married | 0.51 | 0.5 |
| Education | | |
| No high school | 0.03 | 0.17 |
| High school | 0.28 | 0.45 |
| Some College | 0.28 | 0.45 |
| Associates Degree | 0.11 | 0.31 |
| Bachelor's Degree | 0.18 | 0.39 |
| Graduate Degree | 0.11 | 0.31 |
| Have children | 0.36 | 0.48 |
| Military | 0.14 | 0.35 |
| Income | | |
| <$25% | 0.23 | 0.42 |
| $25-50k | 0.26 | 0.44 |
| $50-75k | 0.19 | 0.39 |
| $75-150k | 0.26 | 0.44 |
| $150k+ | 0.06 | 0.24 |
| Census Region | | |
| New England | 0.05 | 0.21 |
| Mid Atlantic | 0.13 | 0.34 |
| East North Central | 0.14 | 0.35 |
| West North Central | 0.06 | 0.25 |
| South Atlantic | 0.2 | 0.4 |
| East South Central | 0.06 | 0.23 |
| West South Central | 0.12 | 0.32 |
| Mountain | 0.07 | 0.26 |
| Pacific | 0.16 | 0.37 |
| Positive Actions | | |
| Emergency | 0.49 | 0.5 |
| Savings | 0.71 | 0.45 |
| Investment | 0.32 | 0.47 |

| | | |
|---|---|---|
| Retirement Plan | 0.32 | 0.46 |
| Negative Actions | | |
| Overdraw | 0.29 | 0.46 |
| Credit Card Interest | 0.60 | 0.49 |
| Pay Day | 0.16 | 0.37 |
| Pawn | 0.20 | 0.40 |
| Ability Measures | | |
| Positive Score | 1.83 | 1.28 |
| Negative Score | 1.25 | 1.18 |
| Knowledge Score | 3.00 | 1.68 |
| Explanatory Variables | | |
| Finance Ed | 0.20 | 0.40 |
| Math Con | 5.48 | 1.76 |
| Confidence Measures | | |
| Knowledge Con | 4.96 | 1.62 |
| Decision Con | 5.63 | 1.68 |
| Categorical Over Con | 0.12 | 0.32 |
| Categorical Under Con | 0.07 | 0.26 |
| Categorical Over Con Decision | 0.06 | 0.24 |
| Categorical Under Con Decision | 0.25 | 0.43 |

## Appendix 3: Regression Results

A. Confidence Knowledge Regressions

| | Confidence Score | Calibration | Over Categorical | Under Categorical | Over Calibration | Under Calibration |
|---|---|---|---|---|---|---|
| (Intercept) | -1.11 *** | 0.92 *** | -4.52 *** | -1.83 *** | 0.47 *** | 1.16 *** |
| | (0.05) | (0.03) | (0.16) | (0.16) | (0.04) | (0.04) |
| Math Con | 0.07 *** | -0.02 *** | 0.20 *** | -0.09 *** | 0.00 | -0.02 *** |
| | (0.00) | (0.00) | (0.01) | (0.01) | (0.00) | (0.00) |
| Finance | 0.04 * | -0.04 *** | 0.03 | -0.26 *** | -0.02 | -0.06 *** |
| | (0.02) | (0.01) | (0.05) | (0.06) | (0.02) | (0.01) |
| Female | 0.20 *** | -0.04 *** | 0.17 *** | -0.14 ** | 0.02 | -0.02 |
| | (0.01) | (0.01) | (0.04) | (0.05) | (0.01) | (0.01) |
| Minority | 0.18 *** | 0.08 *** | 0.36 *** | -0.18 ** | 0.12 *** | 0.06 *** |
| | (0.02) | (0.01) | (0.05) | (0.06) | (0.01) | (0.01) |
| 18-24 | 0.13 *** | 0.08 *** | 0.39 *** | 0.51 *** | 0.17 *** | -0.00 |
| | (0.03) | (0.02) | (0.08) | (0.10) | (0.02) | (0.02) |
| 25-34 | 0.27 *** | 0.14 *** | 0.69 *** | 0.31 *** | 0.26 *** | 0.01 |
| | (0.02) | (0.02) | (0.07) | (0.09) | (0.02) | (0.02) |
| 35-44 | 0.13 *** | 0.10 *** | 0.41 *** | 0.45 *** | 0.16 *** | 0.05 * |
| | (0.02) | (0.02) | (0.08) | (0.09) | (0.02) | (0.02) |
| 45-54 | -0.04 | 0.05 *** | 0.05 | 0.49 *** | 0.06 ** | 0.04 |
| | (0.02) | (0.01) | (0.08) | (0.08) | (0.02) | (0.02) |
| 55-64 | -0.02 | 0.01 | 0.03 | 0.17 * | 0.02 | -0.01 |
| | (0.02) | (0.01) | (0.07) | (0.08) | (0.02) | (0.02) |
| Married | -0.02 | -0.02 * | -0.11 * | -0.02 | -0.04 ** | -0.00 |
| | (0.02) | (0.01) | (0.05) | (0.06) | (0.01) | (0.01) |
| No HS | 0.44 *** | 0.16 *** | 0.76 *** | -0.70 *** | 0.37 *** | 0.03 |
| | (0.05) | (0.03) | (0.14) | (0.18) | (0.04) | (0.04) |
| High School | 0.51 *** | 0.08 *** | 0.97 *** | -0.72 *** | 0.26 *** | -0.02 |
| | (0.03) | (0.02) | (0.08) | (0.09) | (0.02) | (0.02) |
| Some College | 0.30 *** | 0.02 | 0.50 *** | -0.17 * | 0.12 *** | 0.00 |
| | (0.02) | (0.02) | (0.08) | (0.08) | (0.02) | (0.02) |
| Associate's | 0.24 *** | -0.02 | 0.24 * | -0.26 ** | 0.07 ** | -0.02 |
| | (0.03) | (0.02) | (0.10) | (0.10) | (0.03) | (0.02) |
| Bachelor's | 0.07 ** | -0.02 | 0.05 | -0.17 * | 0.01 | -0.01 |
| | (0.02) | (0.02) | (0.08) | (0.08) | (0.02) | (0.02) |
| Children | 0.11 *** | 0.02 * | 0.27 *** | -0.21 *** | 0.07 *** | -0.02 |
| | (0.02) | (0.01) | (0.05) | (0.06) | (0.01) | (0.01) |
| Military | 0.21 *** | 0.09 *** | 0.59 *** | -0.27 *** | 0.17 *** | 0.00 |
| | (0.02) | (0.01) | (0.06) | (0.08) | (0.02) | (0.02) |
| Income < $25k | 0.00 | 0.08 *** | 0.02 | 0.33 ** | 0.06 | 0.13 *** |
| | (0.03) | (0.02) | (0.11) | (0.12) | (0.03) | (0.03) |
| $25-50k | 0.04 | 0.00 | 0.06 | 0.40 *** | -0.03 | 0.07 ** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.03) | (0.02) | (0.11) | (0.12) | (0.03) | (0.02) |
| $50-75k | 0.01 | -0.02 | 0.09 | 0.36 ** | -0.06 | 0.04 |
| | (0.03) | (0.02) | (0.11) | (0.12) | (0.03) | (0.02) |
| $75-150 | 0.07 * | 0.02 | 0.28 ** | 0.14 | 0.02 | 0.03 |
| | (0.03) | (0.02) | (0.10) | (0.11) | (0.03) | (0.02) |
| New England | 0.07 ** | -0.01 | 0.06 | -0.34 *** | 0.02 | -0.03 |
| | (0.03) | (0.02) | (0.08) | (0.09) | (0.02) | (0.02) |
| Mid Atlantic | 0.11 ** | -0.00 | 0.20 * | -0.39 ** | 0.04 | -0.03 |
| | (0.03) | (0.02) | (0.10) | (0.12) | (0.03) | (0.03) |
| East North Central | 0.10 *** | -0.04 * | 0.09 | -0.17 | -0.01 | -0.03 |
| | (0.03) | (0.02) | (0.08) | (0.09) | (0.02) | (0.02) |
| West North Central | 0.02 | -0.03 | -0.07 | -0.29 *** | -0.03 | -0.03 |
| | (0.03) | (0.02) | (0.08) | (0.09) | (0.02) | (0.02) |
| South Atlantic | 0.14 *** | 0.00 | 0.11 | -0.32 *** | 0.05 * | -0.02 |
| | (0.02) | (0.02) | (0.07) | (0.08) | (0.02) | (0.02) |
| East South Central | 0.18 *** | 0.00 | 0.26 ** | -0.50 *** | 0.05 * | -0.02 |
| | (0.03) | (0.02) | (0.09) | (0.11) | (0.03) | (0.03) |
| West South Central | 0.11 *** | -0.03 | 0.12 | -0.38 *** | 0.02 | -0.06 * |
| | (0.03) | (0.02) | (0.09) | (0.11) | (0.03) | (0.03) |
| Mountain | 0.02 | -0.07 *** | -0.22 ** | -0.25 ** | -0.07 ** | -0.06 ** |
| | (0.03) | (0.02) | (0.08) | (0.08) | (0.02) | (0.02) |
| N | 27091 | 27091 | 27091 | 27091 | 14621 | 12470 |
| AIC | 83003.50 | 57403.19 | 17368.99 | 13760.59 | 31874.01 | 23910.96 |
| BIC | 83257.92 | 57657.60 | 17615.20 | 14006.80 | 32109.30 | 24141.32 |
| Pseudo R2 | 0.06 | 0.03 | 0.08 | 0.03 | 0.07 | 0.02 |
| *** p < 0.001; ** p < 0.01; * p < 0.05. | | | | | | |

B. Confidence Decision Making Regressions

| | Confidence Score | Calibration | Over Categorical | Under Categorical | Over Calibration | Under Calibration |
|---|---|---|---|---|---|---|
| (Intercept) | -2.00 *** | 1.34 *** | -7.53 *** | 0.24 * | 0.21 *** | 1.61 *** |
| | (0.04) | (0.03) | (0.27) | (0.10) | (0.05) | (0.03) |
| Math Con | 0.12 *** | -0.05 *** | 0.35 *** | -0.11 *** | 0.01 | -0.07 *** |
| | (0.00) | (0.00) | (0.02) | (0.01) | (0.00) | (0.00) |
| Finance | 0.15 *** | -0.04 *** | 0.44 *** | -0.23 *** | 0.01 | -0.06 *** |
| | (0.02) | (0.01) | (0.06) | (0.04) | (0.02) | (0.01) |
| Female | -0.04 ** | 0.01 | -0.23 *** | 0.20 *** | -0.02 | 0.02 |
| | (0.01) | (0.01) | (0.06) | (0.03) | (0.01) | (0.01) |
| Minority | 0.13 *** | 0.04 *** | 0.45 *** | -0.19 *** | 0.08 *** | 0.02 |
| | (0.01) | (0.01) | (0.06) | (0.04) | (0.01) | (0.01) |
| 18-24 | 0.06 * | 0.08 *** | 0.74 *** | 0.23 *** | 0.25 *** | 0.02 |
| | (0.03) | (0.02) | (0.13) | (0.06) | (0.03) | (0.02) |
| 25-34 | 0.24 *** | 0.10 *** | 1.30 *** | 0.02 | 0.28 *** | 0.03 |
| | (0.02) | (0.01) | (0.11) | (0.05) | (0.02) | (0.02) |
| 35-44 | 0.19 *** | 0.07 *** | 0.92 *** | 0.05 | 0.25 *** | 0.01 |
| | (0.02) | (0.02) | (0.12) | (0.05) | (0.02) | (0.02) |
| 45-54 | 0.12 *** | 0.04 ** | 0.53 *** | 0.01 | 0.19 *** | 0.01 |
| | (0.02) | (0.01) | (0.12) | (0.05) | (0.02) | (0.02) |
| 55-64 | 0.01 | 0.06 *** | 0.33 ** | 0.06 | 0.09 *** | 0.05 ** |
| | (0.02) | (0.01) | (0.12) | (0.05) | (0.02) | (0.02) |
| Married | -0.05 ** | -0.00 | -0.14 * | 0.06 | -0.02 | 0.01 |
| | (0.01) | (0.01) | (0.07) | (0.03) | (0.01) | (0.01) |
| No HS | 0.41 *** | 0.04 | 1.08 *** | -1.36 *** | 0.18 *** | 0.03 |
| | (0.04) | (0.03) | (0.19) | (0.14) | (0.04) | (0.04) |
| High School | 0.32 *** | -0.05 ** | 0.85 *** | -0.52 *** | 0.12 *** | -0.09 *** |
| | (0.02) | (0.02) | (0.12) | (0.05) | (0.03) | (0.02) |
| Some College | 0.29 *** | -0.08 *** | 0.61 *** | -0.30 *** | 0.08 *** | -0.12 *** |
| | (0.02) | (0.01) | (0.11) | (0.05) | (0.03) | (0.02) |
| Associate's | 0.17 *** | -0.07 *** | 0.21 | -0.10 | 0.06 * | -0.09 *** |
| | (0.03) | (0.02) | (0.14) | (0.06) | (0.03) | (0.02) |
| Bachelor's | 0.03 | -0.02 | 0.12 | 0.04 | 0.02 | -0.02 |
| | (0.02) | (0.01) | (0.12) | (0.05) | (0.03) | (0.02) |
| Children | 0.27 *** | -0.03 ** | 0.48 *** | -0.38 *** | 0.10 *** | -0.08 *** |
| | (0.01) | (0.01) | (0.07) | (0.04) | (0.01) | (0.01) |
| Military | 0.21 *** | 0.00 | 1.06 *** | -0.37 *** | 0.09 *** | -0.04 * |
| | (0.02) | (0.01) | (0.07) | (0.05) | (0.02) | (0.02) |
| Income < $25k | 0.72 *** | -0.13 *** | 1.20 *** | -0.94 *** | 0.33 *** | -0.22 *** |
| | (0.03) | (0.02) | (0.19) | (0.07) | (0.04) | (0.02) |

| | | | | | | |
|---|---|---|---|---|---|---|
| $25-50k | 0.55 *** | -0.19 *** | 0.71 *** | -0.24 *** | 0.19 *** | -0.23 *** |
| | (0.03) | (0.02) | (0.19) | (0.06) | (0.04) | (0.02) |
| $50-75k | 0.37 *** | -0.17 *** | 0.58 ** | 0.07 | 0.12 ** | -0.18 *** |
| | (0.03) | (0.02) | (0.19) | (0.06) | (0.04) | (0.02) |
| $75-150 | 0.25 *** | -0.10 *** | 0.91 *** | 0.10 | 0.10 ** | -0.12 *** |
| | (0.03) | (0.02) | (0.18) | (0.06) | (0.04) | (0.02) |
| New England | 0.08 ** | -0.04 * | -0.00 | -0.19 *** | -0.01 | -0.05 * |
| | (0.02) | (0.02) | (0.12) | (0.06) | (0.03) | (0.02) |
| Mid Atlantic | 0.08 * | -0.02 | 0.08 | -0.17 * | -0.01 | -0.02 |
| | (0.03) | (0.02) | (0.14) | (0.07) | (0.03) | (0.03) |
| East North Central | 0.10 *** | -0.02 | 0.09 | -0.22 *** | 0.02 | -0.03 |
| | (0.03) | (0.02) | (0.12) | (0.06) | (0.03) | (0.02) |
| West North Central | 0.08 *** | -0.02 | 0.15 | -0.13 * | 0.05 | -0.05 * |
| | (0.02) | (0.02) | (0.11) | (0.05) | (0.03) | (0.02) |
| South Atlantic | 0.13 *** | -0.04 * | 0.16 | -0.24 *** | 0.03 | -0.05 ** |
| | (0.02) | (0.01) | (0.10) | (0.05) | (0.02) | (0.02) |
| East South Central | 0.25 *** | -0.01 | 0.45 *** | -0.44 *** | 0.12 *** | -0.07 ** |
| | (0.03) | (0.02) | (0.12) | (0.07) | (0.03) | (0.02) |
| West South Central | 0.21 *** | -0.01 | 0.19 | -0.31 *** | 0.07 ** | -0.04 |
| | (0.03) | (0.02) | (0.12) | (0.07) | (0.03) | (0.02) |
| Mountain | 0.07 ** | -0.05 ** | -0.25 * | -0.14 ** | -0.00 | -0.06 ** |
| | (0.02) | (0.02) | (0.11) | (0.05) | (0.02) | (0.02) |
| N | 27091 | 27091 | 27091 | 27091 | 9000 | 18091 |
| AIC | 77541.98 | 55755.97 | 9784.95 | 29681.64 | 16313.34 | 38062.27 |
| BIC | 77796.40 | 56010.39 | 10031.16 | 29927.85 | 16533.59 | 38304.16 |
| Pseudo R2 | 0.13 | 0.03 | 0.17 | 0.08 | 0.11 | 0.05 |
| *** p < 0.001; ** p < 0.01; * p < 0.05. | | | | | | |

C. Overall Outcomes Regressions

| | Confidence Score | Calibration | Over Categorical | Under Categorical | Over Calibration | Under Calibration |
|---|---|---|---|---|---|---|
| (Intercept) | 1.42 *** | 1.49 *** | 1.42 *** | 1.43 *** | 1.31 *** | 1.64 *** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) |
| Confidence | 0.01 | -0.08 *** | -0.03 | -0.14 *** | -0.07 *** | -0.12 *** |
| | (0.00) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| Female | -0.08 *** | -0.08 *** | -0.08 *** | -0.08 *** | -0.05 ** | -0.12 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) |
| Minority | -0.12 *** | -0.11 *** | -0.12 *** | -0.12 *** | -0.10 *** | -0.14 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| 18-24 | -0.42 *** | -0.41 *** | -0.42 *** | -0.41 *** | -0.43 *** | -0.37 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 25-34 | -0.54 *** | -0.53 *** | -0.54 *** | -0.54 *** | -0.51 *** | -0.53 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) |
| 35-44 | -0.48 *** | -0.47 *** | -0.48 *** | -0.48 *** | -0.48 *** | -0.45 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) |
| 45-54 | -0.39 *** | -0.38 *** | -0.39 *** | -0.38 *** | -0.38 *** | -0.38 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| 55-64 | -0.14 *** | -0.14 *** | -0.14 *** | -0.14 *** | -0.15 *** | -0.12 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Married | 0.07 *** | 0.06 *** | 0.07 *** | 0.07 *** | 0.07 *** | 0.06 ** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| No HS | -0.81 *** | -0.79 *** | -0.80 *** | -0.81 *** | -0.66 *** | -0.90 *** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) | (0.05) |
| High School | -0.44 *** | -0.43 *** | -0.44 *** | -0.44 *** | -0.31 *** | -0.55 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Some College | -0.35 *** | -0.35 *** | -0.35 *** | -0.35 *** | -0.25 *** | -0.43 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Associate's | -0.25 *** | -0.25 *** | -0.25 *** | -0.25 *** | -0.18 *** | -0.30 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Bachelor's | -0.04 * | -0.04 * | -0.04 * | -0.04 * | 0.01 | -0.07 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Children | -0.23 *** | -0.23 *** | -0.23 *** | -0.23 *** | -0.22 *** | -0.24 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| Military | -0.11 *** | -0.10 *** | -0.10 *** | -0.11 *** | -0.11 *** | -0.06 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Income < $25k | -1.22 *** | -1.21 *** | -1.22 *** | -1.22 *** | -1.19 *** | -1.22 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| $25-50k | -0.82 *** | -0.82 *** | -0.82 *** | -0.82 *** | -0.78 *** | -0.86 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| $50-75k | -0.54 *** | -0.54 *** | -0.54 *** | -0.53 *** | -0.54 *** | -0.53 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| $75-150 | -0.31 *** | -0.30 *** | -0.31 *** | -0.30 *** | -0.31 *** | -0.28 *** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| New England | -0.06 ** | -0.06 ** | -0.06 ** | -0.06 ** | -0.01 | -0.11 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mid Atlantic | -0.04 | -0.04 | -0.04 | -0.05 | 0.00 | -0.09 * |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.04) |
| East North Central | -0.05 * | -0.05 * | -0.04 * | -0.05 * | -0.01 | -0.08 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West North Central | -0.03 | -0.03 | -0.03 | -0.03 | -0.01 | -0.06 * |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| South Atlantic | -0.08 *** | -0.08 *** | -0.08 *** | -0.08 *** | -0.04 | -0.12 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) |
| East South Central | -0.15 *** | -0.15 *** | -0.15 *** | -0.16 *** | -0.07 * | -0.26 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West South Central | -0.15 *** | -0.15 *** | -0.15 *** | -0.16 *** | -0.11 *** | -0.20 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mountain | -0.02 | -0.02 | -0.02 | -0.02 | 0.00 | -0.05 * |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| N | 27091 | 27091 | 27091 | 27091 | 14621 | 12470 |
| R2 | 0.35 | 0.35 | 0.35 | 0.37 | 0.31 | 0.42 |
| AIC | 65326.25 | 65183.78 | 65326.83 | 65276.59 | 35033.25 | 30030.97 |
| BIC | 65572.46 | 65429.99 | 65573.04 | 65522.80 | 35260.96 | 30253.90 |
| | | | | | | *** p < 0.001; ** p < 0.01; * p < 0.05. |

D. Positive Outcomes Regressions

| | Confidence Score | Calibration | Over Categorical | Under Categorical | Over Calibration | Under Calibration |
|---|---|---|---|---|---|---|
| (Intercept) | 1.18 *** | 1.18 *** | 1.15 *** | 1.17 *** | 1.05 *** | 1.35 *** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) |
| Confidence | 0.05 *** | -0.03 *** | 0.18 *** | -0.21 *** | 0.02 | -0.10 *** |
| | (0.00) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| Female | -0.13 *** | -0.12 *** | -0.12 *** | -0.12 *** | -0.12 *** | -0.12 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| Minority | -0.03 * | -0.02 | -0.03 * | -0.02 | -0.01 | -0.06 ** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| 18-24 | -0.08 *** | -0.08 *** | -0.08 *** | -0.07 *** | -0.04 | -0.13 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 25-34 | -0.11 *** | -0.10 *** | -0.11 *** | -0.10 *** | -0.02 | -0.25 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) |
| 35-44 | -0.18 *** | -0.17 *** | -0.18 *** | -0.17 *** | -0.15 *** | -0.20 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 45-54 | -0.17 *** | -0.17 *** | -0.17 *** | -0.16 *** | -0.16 *** | -0.17 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| 55-64 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Married | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.03 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| No HS | -0.74 *** | -0.72 *** | -0.73 *** | -0.73 *** | -0.63 *** | -0.80 *** |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.05) |
| High School | -0.41 *** | -0.38 *** | -0.40 *** | -0.39 *** | -0.29 *** | -0.50 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Some College | -0.29 *** | -0.28 *** | -0.28 *** | -0.28 *** | -0.19 *** | -0.37 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Associate's | -0.24 *** | -0.23 *** | -0.23 *** | -0.23 *** | -0.18 *** | -0.26 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Bachelor's | -0.05 ** | -0.05 * | -0.05 * | -0.05 ** | -0.01 | -0.06 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Children | -0.07 *** | -0.06 *** | -0.07 *** | -0.06 *** | -0.04 * | -0.11 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| Military | 0.19 *** | 0.20 *** | 0.18 *** | 0.19 *** | 0.30 *** | 0.03 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Income < $25k | -1.32 *** | -1.32 *** | -1.32 *** | -1.31 *** | -1.33 *** | -1.27 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) | (0.03) |
| $25-50k | -0.90 *** | -0.90 *** | -0.90 *** | -0.89 *** | -0.88 *** | -0.90 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| $50-75k | -0.61 *** | -0.61 *** | -0.61 *** | -0.60 *** | -0.63 *** | -0.58 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| $75-150 | -0.29 *** | -0.29 *** | -0.29 *** | -0.29 *** | -0.28 *** | -0.31 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |

| | | | | | | |
|---|---|---|---|---|---|---|
| New England | -0.06 ** | -0.06 ** | -0.06 ** | -0.06 ** | -0.04 | -0.08 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mid Atlantic | -0.06 * | -0.06 * | -0.06 * | -0.06 * | -0.03 | -0.10 ** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) |
| East North Central | -0.07 *** | -0.07 *** | -0.07 *** | -0.07 *** | -0.06 * | -0.08 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West North Central | -0.02 | -0.02 | -0.02 | -0.03 | -0.03 | -0.02 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| South Atlantic | -0.06 *** | -0.05 ** | -0.06 ** | -0.06 ** | -0.05 | -0.07 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| East South Central | -0.10 *** | -0.09 *** | -0.10 *** | -0.10 *** | -0.06 | -0.16 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West South Central | -0.12 *** | -0.11 *** | -0.11 *** | -0.12 *** | -0.10 *** | -0.13 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mountain | -0.01 | -0.01 | -0.00 | -0.01 | -0.01 | -0.00 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| N | 27091 | 27091 | 27091 | 27091 | 14621 | 12470 |
| R2 | 0.31 | 0.30 | 0.31 | 0.32 | 0.28 | 0.37 |
| AIC | 66583.28 | 66683.01 | 66575.74 | 66583.72 | 36468.17 | 29874.98 |
| BIC | 66829.49 | 66929.22 | 66821.95 | 66829.93 | 36695.87 | 30097.91 |
| *** p < 0.001; ** p < 0.01; * p < 0.05. | | | | | | |

E. Negative Outcomes Regressions

| | Confidence Score | Calibration | Over Categorical | Under Categorical | Over Calibration | Under Calibration |
|---|---|---|---|---|---|---|
| (Intercept) | 1.21 *** | 1.32 *** | 1.24 *** | 1.24 *** | 1.16 *** | 1.40 *** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) | (0.04) |
| Confidence | -0.03 *** | -0.11 *** | -0.23 *** | -0.02 | -0.14 *** | -0.08 *** |
| | (0.00) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| Female | -0.00 | -0.01 | -0.01 | -0.01 | 0.05 ** | -0.07 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| Minority | -0.17 *** | -0.17 *** | -0.17 *** | -0.18 *** | -0.14 *** | -0.17 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| 18-24 | -0.59 *** | -0.59 *** | -0.59 *** | -0.60 *** | -0.65 *** | -0.46 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 25-34 | -0.76 *** | -0.76 *** | -0.76 *** | -0.77 *** | -0.80 *** | -0.61 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 35-44 | -0.60 *** | -0.59 *** | -0.60 *** | -0.61 *** | -0.62 *** | -0.53 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| 45-54 | -0.46 *** | -0.45 *** | -0.46 *** | -0.45 *** | -0.45 *** | -0.44 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| 55-64 | -0.24 *** | -0.24 *** | -0.24 *** | -0.24 *** | -0.25 *** | -0.21 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Married | 0.09 *** | 0.09 *** | 0.09 *** | 0.09 *** | 0.10 *** | 0.06 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| No HS | -0.56 *** | -0.55 *** | -0.56 *** | -0.58 *** | -0.44 *** | -0.65 *** |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.05) |
| High School | -0.31 *** | -0.32 *** | -0.31 *** | -0.33 *** | -0.22 *** | -0.40 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Some College | -0.28 *** | -0.29 *** | -0.28 *** | -0.29 *** | -0.21 *** | -0.33 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Associate's | -0.17 *** | -0.18 *** | -0.17 *** | -0.18 *** | -0.11 *** | -0.22 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Bachelor's | -0.01 | -0.02 | -0.01 | -0.02 | 0.03 | -0.06 * |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.02) |
| Children | -0.31 *** | -0.31 *** | -0.30 *** | -0.31 *** | -0.31 *** | -0.27 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) |
| Military | -0.36 *** | -0.36 *** | -0.35 *** | -0.36 *** | -0.49 *** | -0.13 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Income < $25k | -0.66 *** | -0.64 *** | -0.66 *** | -0.65 *** | -0.60 *** | -0.70 *** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.03) |
| $25-50k | -0.43 *** | -0.43 *** | -0.43 *** | -0.43 *** | -0.37 *** | -0.50 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) | (0.03) |
| $50-75k | -0.26 *** | -0.26 *** | -0.26 *** | -0.26 *** | -0.24 *** | -0.28 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) | (0.03) |
| $75-150 | -0.20 *** | -0.20 *** | -0.20 *** | -0.21 *** | -0.23 *** | -0.15 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |

| | | | | | | |
|---|---|---|---|---|---|---|
| New England | -0.03 | -0.04 | -0.03 | -0.04 | 0.03 | -0.10 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mid Atlantic | -0.01 | -0.01 | -0.01 | -0.01 | 0.03 | -0.04 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) |
| East North Central | 0.00 | -0.01 | -0.00 | -0.00 | 0.05 | -0.05 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West North Central | -0.03 | -0.03 | -0.03 | -0.03 | 0.01 | -0.08 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| South Atlantic | -0.07 *** | -0.07 *** | -0.07 *** | -0.07 *** | -0.01 | -0.12 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| East South Central | -0.15 *** | -0.15 *** | -0.15 *** | -0.15 *** | -0.06 | -0.26 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| West South Central | -0.13 *** | -0.14 *** | -0.13 *** | -0.14 *** | -0.08 * | -0.19 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| Mountain | -0.02 | -0.03 | -0.03 | -0.02 | 0.02 | -0.08 ** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) |
| N | 27091 | 27091 | 27091 | 27091 | 14621 | 12470 |
| R2 | 0.27 | 0.27 | 0.27 | 0.28 | 0.27 | 0.31 |
| AIC | 67613.53 | 67446.19 | 67490.90 | 67670.89 | 37135.62 | 29805.79 |
| BIC | 67859.74 | 67692.40 | 67737.11 | 67917.10 | 37363.33 | 30028.72 |
| *** p < 0.001; ** p < 0.01; * p < 0.05. | | | | | | |