
A METHODOLOGICAL ISSUE IN THE MEASUREMENT OF FINANCIAL LITERACY

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ABSTRACT

This study adds to our understanding of financial literacy by examining a methodology issue in how researchers measure financial literacy. Previous studies have failed to allow for the difference between respondents knowing the correct answers to basic knowledge questions and correctly guessing the answers to those questions. Previous studies have also frequently failed to allow respondents to admit not knowing the answer to financial questions posed to them, implicitly not recognizing the difference between one being aware he is lacking in knowledge and one incorrectly thinking that he knows certain information. We address these issues by offering a simple solution to the data collection process that allows for these distinctions to be made.

INTRODUCTION

In order for an individual to function in our increasingly complex modern society, one must develop a basic understanding of investing, insurance, credit and debt management, and other personal finance topics. Knowledge of these topics is often referred to as financial literacy. Unfortunately, the level of financial literacy in modern American society is generally viewed as being unacceptably low. In a press conference on January 22, 2008 President George W. Bush announced that he was responding to the problem with a special presidential advisory group.

Earlier today I signed an executive order establishing the President's Advisory Council on Financial Literacy. I have asked people from the business world, the faith world, the non-profit world, to join this council in order to come up with recommendations as to how to better educate

people from all walks of life about matters pertaining to their finances and their future.

... if we want America to be as hopeful a place as it can be, we want people owning assets. We want people investing. We want people owning homes. But oftentimes, to be able to do so requires literacy when it comes to financial matters. And sometimes people just simply don't know what they're looking at and reading. And it can lead to personal financial crisis, and that personal financial crisis, if accumulated to too many folks, hurts our country.

Concern about the level of financial literacy has been developing for many years, and is a topic that has been actively explored by the academic community. Research into this topic has resulted in an extensive body of literature being developed to explain the general public's level of financial literacy. Many of these studies have focused on observed behavior of individuals or have focused on surveys that have allowed researchers to ascertain survey respondents' level of financial knowledge in one or more of the areas of personal finance. A discussion of this literature follows below.

The results of most academic surveys on financial literacy show respondents answering about half of the survey questions correctly, indicating a relatively low level of knowledge on personal finance topics. But does only being right about half the time imply that the respondents are wrong about half the time? Where many researchers have failed to correctly interpret their own results is that they have simply treated responses as being correct or incorrect. Understanding responses on a survey of factual knowledge is much more complex than that.

This study adds to our understanding of financial literacy by examining a methodology issue in how researchers measure financial literacy. Previous studies have failed to allow for the difference between respondents knowing the correct answers to basic knowledge questions and correctly guessing the answers to those questions. Previous studies (see Chen and Volpe, 1998; Volpe, Chen and Liu, 2006; and Worthington, 2006, for example) have also frequently failed to allow respondents to admit not knowing the answer to financial questions posed to them, implicitly not recognizing the difference between one being aware he is lacking in knowledge and one incorrectly thinking that he knows certain information.

These two methodological errors result in previous studies potentially overstating the level of financial literacy and providing an incomplete description of what is contained in "wrong" answers. By correcting for these errors our first

contribution is to broaden the understanding of the level of financial literacy. Our second contribution is to demonstrate that the opportunities for the academic community to educate students and for financial planners to educate clients (and potential clients), are greater than some may have anticipated.

THE FINANCIAL LITERACY LITERATURE

A multitude of studies over the past couple of decades have tried to explain how different personal variables affect (or fail to affect) the financial literacy of individuals. Some of these studies in the current literature focus on general financial literacy, and other studies focus specifically on investing or some other area of personal finance. Many of these studies are based on survey data where respondents address questions of factual knowledge concerning matters of personal financial literacy.

Many studies explore the implication of race and ethnicity on an individual's financial behavior and knowledge, and report significant differences between white and non-white households both in terms of the level of financial literacy and the financial behavior of the households of different ethnic groups. Somewhat echoing the earlier work of Blau and Graham, 1990, both Zhong and Xiao, 1995, and Plath and Stevenson, 2000, observe that the asset mix for African-American households is quite different from that of white households. These researchers assert that this is true even when income levels of white and African-American households are the same. Plath and Stevenson go on to observe that the primary financial asset of black households is life insurance—not stocks or mutual funds. That finding is consistent with Badu, Daniels, and Salandro, 1999, reporting that black households tend to make portfolio choices that involve selecting lower returning assets. These researchers note black households particularly avoid stocks, and that this behavior is unlikely to help close the net worth gap between black and white families. Keister, 2000, comes to a similar conclusion.

In one of the few academic studies to include Hispanics as a separate demographic group, Yao, Gutter, and Hanna, 2005, find that whites have greater financial risk tolerance for taking “some risk” than blacks, who in turn have greater risk tolerance for “some risk” than Hispanics. However, these researchers also find that when considering taking “substantial risk,” Hispanics were most likely to accept the higher level of risk and whites were the least likely to do so. These researchers hypothesize that Hispanics forming the two extreme ends of risk tolerance may be

a result of “the large diversity of backgrounds within the Hispanic category” in their study.

However, the significance of ethnicity in financial matters is rejected in some studies. Chen and Volpe, 1998, do not find race to be significant in explaining financial literacy in their study. Coleman, 2003, studies the proportion of net worth held in risky assets and finds that differences between ethnic and racial groups is not major. But Coleman also observes that Hispanics have a smaller proportion of net worth in risky assets.

The connection between gender and financial literacy is another area of interest for many researchers. This connection has become so well known that it is even being discussed in the personal finance section of *The Wall Street Journal* (Clements, 2008). Gender is often argued as being important in two ways. First, gender is thought to be important because some studies have shown a major difference in the overall financial knowledge of men versus women (Worthington, 2006). Second, various studies (see Bajtelsmit and Bernasek, 1996; Bajtelsmit, Bernasek, and Jianakoplos, 1999; Hallahan, Faff, and McKenzie, 2004) often suggest that gender is important in terms of general risk aversion. In particular it is noted that as evidenced by a preference for safer investments, women are less likely to engage in risky investing behavior. This could explain why women have relatively less interest in the stock market than do men, and could also explain why women seem to be less knowledgeable about investing. Even when compared to men who are similar in all other significant characteristics, both Bajtelsmit, Bernasek, and Jianakoplos, 1999, and Hariharan, Chapman, and Domian, 2000, note that women are less likely to invest in risky assets.

Some studies find other variables besides ethnicity and gender to be important in explaining financial literacy. Chen and Volpe, 1998, find the level of income to be important in financial literacy, while Hallahan, Faff, and McKenzie, 2004, find income and wealth to be more important in understanding risk tolerance. Those two studies seem to be consistent with Waggle and Englis, 2000, finding that higher net worth investors invest more in equities than lower net worth groups. Worthington, 2006, discovers significance in the levels of income, savings and mortgage debt in predicting financial literacy.

Employment status is found by some researchers to be important in predicting financial literacy. Chen and Volpe, 1998, find that persons with significant work experience seem more knowledgeable on financial issues than those with little or no work experience. Worthington, 2006, finds that the employed are more knowledgeable about financial issues than the unemployed. Among the

employed he further finds that those who are employed in professional positions or own small businesses are more financially literate than the farm workers he surveyed.

Zhong and Xiao, 1995, Bodie and Crane, 1997, and Waggle and Englis, 2000, conclude that the level of education is a significant variable in explaining the ownership of stocks and bonds by investors. Shaw, 1996, and Hallahan, Faff, and McKenzie, 2004, find a correlation between increased education and increased risk tolerance. However, Yao, Gutter, and Hanna, 2005, believe that education increases awareness of the financial markets, but personal willingness to accept risk is not changed by education. Specifically focusing on financial education, Dolvin and Templeton, 2006, assert that mandatory financial education seminars for workers result in “improved risk management” by those employees.

Based on surveys of university students, two studies, Volpe, Chen, and Pavlicko, 1996; and Chen and Volpe, 1998, show business majors have a higher degree of financial literacy than non-business majors.

Even marital status appears in the literature as an explanatory variable for the level of financial literacy. Hallahan, Faff, and McKenzie, 2004, find marital status to be significant in measuring risk tolerance, with unmarried persons exhibiting a higher level of risk tolerance. Blending gender and marital status, Yao, Gutter, and Hanna, 2005, note that married females exhibit the lowest level of risk tolerance and unmarried males have the highest level of risk tolerance. However, marital status is rejected as being significant in determining asset allocation by Bodie and Crane, 1997, and by Waggle and Englis, 2000.

Age is another variable found by some to be important in explaining financial literacy. Chen and Volpe, 1998, point out that most of the students participating in their study are young and in the early stages of their life cycle. As such they have little or no experience with topics like life insurance or investments. Yet, Worthington, 2006, indicates age is important in terms of financial literacy. Yao, Gutter, and Hanna, 2005, find that risk tolerance is inversely related to age.

THE METHODOLOGICAL ISSUE

When research surveys of factual knowledge are conducted, a series of questions in a polychotomous answer format are commonly used with persons being asked to identify the correct response to each question. Such questions have one correct response and multiple “distractors” that are incorrect answers. The multiple-

choice examination is a familiar format to most people, and it is easy for researchers to grade for results.

Psychometric theory argues that the more distractors one uses in designing a survey or examination, then the greater the reliability of the results from the test. However, the distractors only enhance the reliability of the survey instrument if the distractors are well chosen. Poorly selected distractors that are never selected by respondents, add nothing to the reliability of the results. Research by Wesman (1971) into ascertaining the appropriate number of distractors for a given question indicates that three or four good distractors are about right. This number is what is commonly seen on university multiple-choice examinations. However, Sidick, Barrett and Boverspike (1994) have argued that as few as two distractors may be adequate if they are good distractors.

Assuming that the distractors are credible and are not so obvious that a person without knowledge on the subject can avoid them, respondents who do not know the answer to a question can certainly guess at the answer. If a group of persons with no knowledge on a topic answer a multiple choice examination on that subject, there will be correct answers marked by pure random chance. How many correct answers? If the questions are structured with a polychotomous answer format so that there are five possible answers to each question, the average score on the test by uninformed respondents should be 20 percent. If persons with no knowledge receive a score of 20, this raises the average test score for respondents higher than it would be if the person with no knowledge actually received a score of zero.

Furthermore, for those persons taking a test who do have knowledge of the subject area, it is possible that some of these people will get some answers correct because they know some answers but also guess at other questions where they get lucky and select the correct answer. These persons scores are also overstated and contribute to a higher average score for all respondents.

The problem of persons correctly guessing answers on questions on which they have no knowledge, is what has caused some evaluators to apply an adjustment formula to allow for answers that have been guessed correctly. Students taking examinations such as the SAT and GMAT are warned that there is a penalty for incorrect answers, so random guessing will probably hurt them with a grade penalty. The formula for making such an adjustment is simply

$$\text{Adjusted Score} = C - [I / (n-1)]$$

where C is the number of correct answers, I is the number of incorrect answers, and n is the number of available answers on each question. On a test with five possible answers on each question, the average random score of test takers with no knowledge of the subject should be 20 percent. However, the adjusted score for these people would be

$$20 - [80 / (5-1)] = 20 - 20 = 0$$

indicating that zero is the correct score for a person who knows nothing on the topic and is only guessing.

In a multiple choice test it is probable that participants will attempt to answer each question unless there is a penalty for wrong answers. However, for a student completing a voluntary financial literacy survey for an academic researcher, penalizing a score for wrong answers will have no meaning to the survey participant. Therefore, there is no disincentive for a survey participant to refrain from guessing. The students are asked to “complete the survey” and they do exactly that.

There is no indication in the finance literature that previous researchers have been adjusting (penalizing) survey respondent scores for wrong answers. Therefore, respondents who have correctly guessed at answers have been able to raise their individual scores and the average score of the group under study. This implies that the level of financial literacy reported in previous studies is probably somewhat overstated.

However, simply adjusting the scores for wrong answers is not the entire solution to understanding the level of financial literacy. While such an adjustment can more accurately describe the percentage of correct responses coming from actually having knowledge (as opposed to lucky guessing), it does not assist the researcher in understanding the responses viewed as being incorrect. A person may select an incorrect answer either because he does not know the correct answer or because he thinks he knows the answer but is wrong.

The difference between the two cases may be an unimportant subtlety to a person who is only seeking to determine what percentage of respondents select the correct answer. But it is a significant difference to the educators and to the researchers who realize that the first individual (who realizes he does not know the answer) is less likely to make a bad decision based on inaccurate knowledge, because this individual is aware that he does not know the answer. This is also a person who is potentially open to learning because he is aware that he does not know the information. On the other hand the second individual (who incorrectly

thinks he has accurate knowledge) is susceptible to taking actions based on mistakenly believing that he has adequate knowledge. He is also less likely to seek out new knowledge or respond to the opportunity to be taught because he believes he already has the knowledge he needs.

To address this issue we suggest that one of the response options on polychotomous questions examining the level of financial knowledge should be an option that allows the respondent to say “I don’t know.” This is an approach commonly used in opinion surveys. (For example see Bogart, 1967; Francis and Busch, 1975; Poe, Seeman, McLaughlin, Mehl and Dietz, 1988; Goldsmith, 1989; Sanchez and Morchio, 1992; Mondak, 2001; Krosnick, Holbrook, Berent, Carson, Hanemann, Kopp, Mitchell, Presser, Ruud, Smith, Moody, Green and Conaway, 2002; and Schaeffer and Presser, 2003.) By giving financial literacy survey respondents such an option, researchers can provide a legitimate means to admit not knowing an answer. This eliminates any perceived pressure to guess a randomly selected answer.

We believe that when financial literacy is involved, it is not merely an “academic” exercise to note that there are at least three potential responses to any question. Of course for many questions there is a correct answer and there is an incorrect answer. But the third potential response of “I do not know” is equally valid and equally important.

OUR DATA

In Spring 2007 a group of junior and senior-level undergraduate business students at the University of Houston—Clear Lake were asked to complete a survey on their knowledge of several personal finance topics. Student participation was on a voluntary basis. Participants were asked to provide no personal information that might identify them other than the demographic data discussed below that was needed to describe the overall population participating in the survey. We were able to collect and analyze 170 completed surveys for this study.

The first 18 questions of the 68 question survey seek to obtain demographic information (e.g., gender and ethnicity) and some basic data establishing each individual’s use of selected financial services (e.g., checking accounts and credit cards). The other 50 items in the survey are a set of questions seeking to determine each individual’s knowledge of a set of selected key areas of personal finance. The survey consists of ten questions on each of the topics of investments, personal

income taxation, credit and debt management, risk management, and retirement planning.

For our survey we allow students to acknowledge that they do not know the answer on 48 of the 50 questions. (Two of the investments questions do not give that option.) We assert that our decision to structure the survey this way impacts both the number of correct and incorrect answers, resulting in a more accurate measure of financial literacy. This response option eliminates the need to guess at an answer, reducing the number of cases where a correct answer is guessed. This approach also allows us to delve more deeply into the non-correct responses.

OUR RESULTS

Data are reported in this table using some of the demographic characteristics reported in the previous literature to establish the similarity of our sample group with those that have been examined in previous studies. A demographic breakdown of the respondents shows 64 males and 106 females. The survey group also includes 12 African-Americans, 28 Hispanics, 102 non-Hispanic whites, and 28 persons who defined themselves as being in other ethnic groups. (All of the other ethnic groups represented in our data had nine or fewer persons and are not reported separately.) Only four percent of the participants are under age 21; 45 percent are ages 21-25; 41 percent are ages 26-40; and 10 percent are over 40.

A descriptive summary of the data presented in Table 1 describes the use of basic financial services by survey respondents. The data indicate that the 170 participants in our survey have a reasonably good level of familiarity with basic financial services, suggesting that they are not all that different from an adult population.

As may be observed from the data provided in Table 1, virtually every student surveyed is the primary account holder on a checking account. Also nearly every student holds an ATM or debit card and about 80 percent of them hold credit cards in their own names. Approximately one-fourth of all survey participants have their own brokerage accounts and about half have some form of retirement accounts. (There was a virtual absence of retirement accounts by persons who did not fit into the three ethnic groups shown in Table 1.) For persons in the three major ethnic groups completing in the survey, the only observable major difference between groups is that Hispanics seem to be less inclined to hold brokerage accounts.

Table 1: Use of Financial Services with Service in Users Name (stated as percentage)*						
	Checking account	Savings account	ATM/ debit card	Credit card	Brokerage account	Retirement account
Females	91.5	86.8	98.1	79.3	23.6	50.9
Males	96.9	82.8	95.3	81.3	29.7	50.0
African-American	100	91.7	100	83.3	33.3	66.7
Hispanic	89.3	82.1	100	85.7	10.7	60.7
White, non-Hispanic	93.1	89.2	96.1	80.4	35.3	53.9
* 28 participants (roughly 16 percent of survey respondents) who fall into non-discussed ethnic groups are included in the total values and in the male and female measurements but not in separate ethnic groupings.						

Table 2 presents the summary of the results of our survey indicating for each topic area the average percentage of correct responses, the average incorrect response rate, and the average selection rate of the “I don’t know” response. The overall results of the financial literacy questions are reasonably consistent with the data from other studies in the literature that survey the financial literacy of university students. The participants in our survey had an overall average correct response rate of 46.6 percent. This score may be compared to other surveys measuring the financial literacy of university students where Volpe, Chen and Pavlicko, 1996, report an average correct score of 44 percent and Chen and Volpe, 1998, report an average correct score of 53 percent. The consistency of the percentage of correct answers between our survey and previous studies adds to the validity of our results.

We argue it is simplistic to take 100 percent, subtract the 46.6 percent average correct response rate, and then conclude that we have an average incorrect response rate of 53.4 percent. In fact students only choose an incorrect response an average of 37.0 percent of the time. The “I don’t know” choice on the various questions is selected an average of 16.4 percent of the time. Failure to have an “I don’t know” option would have masked the fact that nearly one-third of the non-correct responses are from people who knew that they had a knowledge deficiency

on the topic at hand. Furthermore, had these students had to guess an answer because of an absence of an “I don’t know” option, some would have correctly guessed the correct answers on some questions. This would have falsely raised the “correct” response rate.

In Table 2 when separating the survey questions into personal finance topic areas, more significant differences emerge. Clearly the best topic area for our respondents is credit and debt management. The questions on credit and debt have the highest level of correct responses and the lowest level of incorrect responses and admitted lack of knowledge. This is consistent with about 80 percent of the survey participants indicating that they have a credit card in their own name.

Table 2: Responses by topic area (stated in percentage)			
Section of survey	Correct answers	Incorrect answers	“I don’t know”
Overall	46.6	37.0	16.4
Investments	55.7	31.3	13.0
Income tax	30.9	49.9	19.2
Credit/debt	62.0	29.1	8.9
Insurance	49.9	35.7	14.4
Retirement	34.2	38.1	27.7

Income taxation is the weakest area in terms of correct and incorrect responses. We are struck by the student who wrote a note to us that none of our possible answers are correct on Question #35, which asked about the taxation of gains from the sale of an owner-occupied residence. In straightening us out he (incorrectly) informed us that capital gains from the sale of a home must be rolled over into a new home within 18 months or the gains are taxable. About 73.5 percent of the respondents missed this question, with only 11.2 percent getting it correct. 15.3 percent of the respondents admitted that they did not know the answer. As is true for the entire topic area, inaccurate knowledge about taxes is common. Despite a median participant age of over 25 and the majority of these people being employed (as evidenced by their retirement accounts), taxes are a mystery to these 170 people.

Table 3 presents the data based upon responses by gender. Overall the percentage of correct responses by males and females is almost exactly the same, but

we note that the average scores for males shows them to be both right and wrong slightly more often than women.

Table 3: Responses by gender (stated in percentage)			
Section of survey	Correct answers	Incorrect answers	"I don't know"
Overall	46.6	37.0	16.5
Males	47.3	38.3	14.4
Females	46.1	36.1	17.8
Investments	55.7	31.3	13.0
Males	60.9	29.5	9.6
Females	52.5	32.8	15.1
Income tax	30.9	49.9	19.2
Males	29.3	54.4	16.3
Females	33.4	45.7	20.9
Credit/debt	62.0	29.1	8.9
Males	62.3	29.3	8.4
Females	61.9	28.9	9.2
Insurance	49.9	35.7	14.4
Males	47.3	38.7	14.1
Females	51.4	34.1	14.5
Retirement	34.2	38.1	27.7
Males	32.7	43.9	23.4
Females	35.2	34.5	30.3

The strongest area for both genders is in credit and debt management, with both groups getting slightly better than 60 percent of the answers correct. The greatest difference in the correct answers between men and women is in the area of investments, where men score much higher. However, women have a higher percentage of correct answers in three of the five subject areas. These findings are consistent with results previously reported by Chen and Volpe, 1998; 2002, where

they find men to be more knowledgeable about investing, but women to be more knowledgeable in other area of personal finance.

The data in Table 3 indicate females are more likely (though some times only very marginally) than males to indicate they did not know answers in all five area of study. This fact may be related to males having a larger percentage of incorrect responses in every category except investing.

The “I don’t know” option is selected more frequently by both genders in the area of retirement planning. This is surprising given that half of the students already have retirement accounts and the majority of the participants in the survey are over age 25.

Table 4 reports the data for each of the three major ethnic groups participating in the survey. Overall non-Hispanic whites had the highest percentage of correct answers and the lowest percentage of incorrect answers. African-Americans stood out as having the best accuracy percentage in three of the five categories, and had the second best rate in the other two categories.

For all three ethnic groups one notes that credit and debt management is their strongest area, and income taxation is their weakest area. Whites are particularly stronger than the other two groups in knowledge about investing.

Among the three reported ethnic groups Hispanics were more likely than either African-Americans or non-Hispanic whites to choose the “I don’t know” option in all five categories of financial literacy under study. Overall African-Americans are less likely to choose that option, which may contribute to their having the highest overall percentage of incorrect responses.

Table 4: Responses by ethnicity (stated in percentage)*			
Section of survey	Correct answers	Incorrect answers	“I don’t know”
Overall	46.6	37.0	16.5
African-Amer	47.8	40.2	12.0
Hispanic	42.8	38.2	19.0
White, non-Hisp	49.9	33.7	16.4
Investments	55.7	31.3	13.0
African-Amer	48.3	37.1	14.6
Hispanic	43.2	37.2	19.6
White, non-Hisp	63.4	25.2	11.4

Table 4: Responses by ethnicity
(stated in percentage)*

Section of survey	Correct answers	Incorrect answers	"I don't know"
Income tax	30.9	49.9	19.2
African-Amer	28.3	56.7	15.0
Hispanic	23.9	56.1	20.0
White, non-Hisp	34.1	46.1	19.8
Credit/debt	62.0	29.1	8.9
African-Amer	65.8	28.4	5.8
Hispanic	61.1	28.9	10.0
White, non-Hisp	66.2	26.4	7.4
Insurance	49.9	35.7	14.4
African-Amer	52.5	40.8	6.7
Hispanic	50.7	34.3	15.0
White, non-Hisp	51.4	34.2	14.4
Retirement	34.2	38.1	27.7
African-Amer	41.7	40.0	18.3
Hispanic	35.4	34.2	30.4
White, non-Hisp	35.6	36.1	28.3
* 28 participants (roughly 16 percent of survey respondents) who fall into non-discussed ethnic groups are included in the total values and in the male and female measurements but not in separate ethnic groupings.			

SUMMARY

Previous research into the area of financial literacy has explored whether or not persons could correctly answer fundamental questions relating to personal finance topics. As a group the studies have reported an unacceptably low level of financial literacy.

This study has explored the methodological issue of giving people the opportunity to admit not knowing the answer to factual questions on a survey rather than forcing them to guess answers. The use of this option helps to more accurately

understand the level of financial literacy by reducing the number of false correct responses and by separating the non-correct responses into those people with inaccurate knowledge and those who admit having no knowledge on a topic. The separation of persons into those with inaccurate knowledge and those with a lack of knowledge should be particularly important to educators concerned with financial literacy.

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