

Measuring Financial Literacy and Capability: A Case Study of Indiana University Graduate Students

Executive Summary

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A common assumption is that people who are highly educated and have relatively high expected life-time earnings also tend to have greater financial acumen and capability. In this study, we explore the veracity of this assumption by measuring the financial literacy of Indiana University system graduate students and examining their receptivity to educational programs designed to improve financial well-being. Using a multi-stage research strategy, we begin by developing and administering a survey tool that measures the difference between a graduate student's self-assessed and survey-tested financial literacy. We find significant differences in these measures, with the magnitude of the differences correlated with a student's gender, country of origin and academic discipline. We also find having previously taken a financial planning course leads to stronger alignment between self-assessed and tested financial literacy. In the second stage, we offer a series of voluntary follow-up treatments designed to improve the financial acumen of the initial survey participants. Overall, there was low receptivity to these opportunities. For those who do accept, receptivity to our offerings varies systematically across groups. We find that graduate students in non-quantitative academic disciplines and those who scored relatively high on the financial literacy quiz are most likely to demonstrate interest in educational offerings and attend financial education seminars in person. The lack of engagement by those with low financial literacy scores suggests that innovative programs may be needed to incentivize these graduate students to engage in improving their financial acumen. These programs could include different channels for engagement, different framing of topics, or highly customized guidance and education programs. In the absence of these customized services, financial products that rely heavily on passive auto-features may provide the best chance of helping post-graduate school workers start on the path of achieving financial well-being.

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Introduction

Many individuals pursue a postgraduate degree with the goal of enhancing their human capital and life-time earnings potential. Because graduate students generally demonstrate a relatively high interest in learning, a common assumption is this attribute spills over into life choices not associated with their academic discipline—namely, the desire and ability to enhance their financial capability. But this group is often confronted with a set of constraints—professional, financial and psychological—that may prevent them from developing the financial skill set that adequately protects their human capital investment.

The goals of this study are two-fold. First, we develop a tool that allows us to explore differences in graduate students' self-assessed and benchmark-tested financial literacy. The objective of this tool is to better understand the factors associated with gaps, both perceived and real, in graduate students' financial acumen. Second, we develop a set of education treatments designed to enhance students' financial capability. The objective of this tool is to measure whether financial education offerings improve financial capability. We conduct this study using two voluntary samples of graduate students who were enrolled in the Indiana University system for the 2014 and 2015 academic years.

In this paper, we present first-stage results from research that assesses whether graduate students are receptive to improving their financial acumen and, if so, does engagement tend to improve financial capability. Beginning with our outreach to the full census of the 2014 Indiana University system graduate student population, we find a substantial lack of interest in participating in a program designed to improve financial acumen. Students participating in the study begin by taking a survey that measures the difference between their self-assessed and survey-tested financial literacy. We find significant differences in these measures, with the magnitude of the differences correlated with a student's gender, country of origin and academic discipline. We also find having previously taken a financial planning course leads to stronger alignment between self-assessed and tested financial literacy. In the second stage, we offer a series of voluntary follow-up treatments designed to improve the financial acumen of the initial survey participants. Overall, there was low receptivity to these opportunities. For those who do accept, receptivity to our offerings varies systematically across groups. We find that

graduate students in non-quantitative academic disciplines and those who scored relatively high on the financial literacy quiz are most likely to demonstrate interest in educational offerings and attend financial education seminars in person.

The lack of engagement by those with low financial literacy scores suggests that innovative programs may be needed to incentivize these graduate students to engage in improving their financial acumen. These programs could include different channels for engagement, different framing of topics, or highly customized guidance and education programs. In the absence of these customized services, financial products that rely heavily on passive auto-features may provide the best chance of helping postgraduate school workers start on the path of achieving financial well-being.

Background

Graduate students make relatively large investments in human capital (education). This group, in general, expects to be financially capable of owning a home, saving for retirement, and engaging in a broad range of decisions that enhances their lifetime wealth. Thereby, a reasonable assumption is that graduate students should be highly receptive to financial education programs designed to improve their financial well-being. However, as noted by Lusardi, Michaud and Mitchell (2013), the motivation to invest in improving financial literacy depends on understanding the assessed marginal benefits.

Whether the marginal benefit of investing in financial literacy skills is positive depends on more than the *potential* for personal benefit. Research evidence increasingly suggests that investing time and effort in these programs requires strong assurance that financial literacy programs will improve investment decisions and financial capability. Bernheim & Garrett (2003), Lusardi (2004), Maki (2004) and Bayer, Bernheim & Scholz (2008) have each studied employer-sponsored financial literacy programs and retirement preparedness. Generally, these researchers find evidence of households more heavily weighting their retirement plan portfolios to equity funds. Seligman & Bose (2012) find that this willingness to take more equity risk extends to other investment accounts beyond those offered by employer retirement plans.

Some might argue that more highly educated individuals should not be as likely to make poor decisions regarding investment allocations or minimizing management fees.

Several studies, however, have documented that systematic vulnerabilities exist. Clark and Richardson (2010) focus on complexity of retirement plan investment menu choice available to public K-12 schools workers and find that standardizing and reducing the complexity of the investment menu can simplify the framing of choices available to employees and potentially lead to better outcomes through greater transparency of fee structures. Hastings, Mitchell & Chyn (2011) also document retirement plan fee vulnerabilities and the value of financial literacy for improving outcomes.

Another barrier to improving financial acumen may be lack of *quality* educational offerings. Thus, if high-quality financial education is scarce or perceived to be low quality by graduate students, then the likelihood of students engaging in offerings may be low. Indeed, uniform quality should not be assumed in either the financial education product space or the financial literacy assessment space. Recent research by Lusardi, Mitchell & Curto (2014), Schmeiser & Seligman (2013), and Knoll & Houts (2012) have all employed different methods to evaluate the relative merit of an increasingly standardized and growing battery of questions used to assess financial literacy. Each research approach found that some financial literacy assessment questions are consistently better at measuring financial capability. Hastings, Madrian & Skimmyhorn (2013) consider both financial literacy measures and education outcomes—noting that previous research results across both dimensions have been mixed—and discuss incentives for financial firms to offer consumer educational products. They note in particular that *effective* financial education can improve market conditions by reducing the proportion of naive consumers in financial markets. It can also stabilize demand for financial products over time.

Prior research suggests that graduate students should value and benefit from quality financial education offerings. The goals of this study are to examine whether graduate students can be engaged in improving their financial acumen and, if so, what type of educational offerings are effective. We next give an overview of our research design in terms of method and resulting data. In developing our survey we chose questions validated in the literature cited above.¹

Research design and methods

Our basic design involves treatment and control groups—only a subset of those responding to our initial survey were invited to participate in educational offerings. The basic protocol embeds three stages of engagement. For the first stage, at the beginning of the academic year, we invited all graduate students to take an online survey that measured concerns, interests, life goals and financial literacy. In the second stage, we took a matched random subset of survey takers and offered them the opportunity to attend a financial basics seminar that, among other things, re-measured financial literacy from the initial survey.² In the third stage, we administered a follow-up survey to the full survey group to measure (1) persistence of any improvement in financial capability, and (2) evidence of financial knowledge seeking among the non-seminar population.

Ahead of inviting the Indiana University graduate student population to participate in our survey, we developed a series of 5 x 7 cards announcing the project. The front side of the cards had lighthearted financial literacy questions and the back had a description of what to expect next. We developed three distinct cards in an effort to engage graduate students and encourage discussion with others. Regarding signals of validity, integrity and quality of the effort, the cards prominently featured the Indiana University logo and were placed in orientation packets for incoming graduate students. The human resources department at Indiana University also placed cards at the reception desk of each academic department. An Indiana University project Research Assistant (RA) was assigned to attend graduate student council meetings and other graduate student group meetings of various types across both campuses of the university system. The RA was granted a five-minute slot to discuss the project and potential benefits for graduate students and distributed sets of our cards at each meeting.

Two weeks after the cards were distributed, we emailed 17,819 graduate students an initial invitation to take an online financial well-being and literacy survey.³ The survey design captured information on students' educational characteristics, financial aspirations, learning interests, financial concerns, their familiarity with types of financial

1. Financial literacy items were chosen after consultation with Houts, of Knoll and Houts (2012), and Lusardi of Lusardi and Mitchell (2014), Seligman, of Schmeiser and Seligman (2013) is a part of this research team. We also consulted TIAA Institute fellows and financial counselors to gain feedback on items.
2. These were “early career” financial seminars that focus on the basics of budgeting, savings, and finance.
3. These invitations were designed to resonate with the information on the cards that had been previously distributed.

products and, their overall financial literacy.⁴ The survey was open for one month between mid-September and mid-October, ahead of mid-term examinations. Over this four-week period, we sent the initial invitation and up to four reminder emails, with the latter targeting students who had neither taken the survey nor opted out of email engagement. Our initial engagement result shows that the reminders were valuable in nudging students to take the survey.

From the initial survey population, 2,488 (14%) students began the survey, and 2,098 (12%) completed the survey. Of those taking the survey, 855 (34%) students explicitly declined interest in an in-person seminar opportunity, yielding a target seminar group of 1,633 graduate students from which to match invited and non-invited groups on survey response characteristics.

While this paper primarily describes receptivity to financial education offerings among a population that has above-average expected lifetime earnings, it is part of a larger research protocol that examines the efficacy of financial educational offerings to a group of graduate students who are evaluated ahead of, at time of, and following interaction.⁵

Data and current findings

We combined survey responses and Indiana University administrative data to provide initial insights into the survey participants. Our sample of 2,488 initial survey respondents is comprised of students whose average age is 29.5, and with 84% of the sample comprised of students who are between the ages 20 and 34.⁶

Other characteristics of the sample include:

- 54% of students work at least part time.
- 37% are married or in a domestic partnership.
- 57% are female.
- 74% are U.S. citizens.
- 14% are from China or India (the two largest foreign nationalities).
- 54% are enrolled in a Master's program, 44% in a Doctoral program and 2% are resident post-Doctoral and other advanced students.
- About 25% of students are in professional and technical degree programs.
- Approximately 20% of survey respondents are in quantitative disciplines.
- The average student carries a 9-10 credit course load over the period of our initial survey.
- 16% took a financial education course in high school, 13% took a financial education course as an undergraduate, and 4% have taken courses in both settings.

Table 1 shows that females, student workers and business students are more likely to take the initial survey, while those in quantitative fields are less likely to take the survey.⁷ As a student's academic workload increases (the number of credits taken) a student is less likely to participate in our survey.

Table 1: Propensity to take survey, by group

Group	Propensity of engaging survey
Females	+
Business student	+
Student workers	+
Quantitative field	-
Number of credits taken	-

4. In the prior year we had tested a similar survey on a small subsample of roughly 800 university-system graduate student workers in order to refine the fielding.

5. The educational sessions are conducted by professional counselors who helped develop and test the offerings. We discuss the findings of those treatments in a follow-up paper.

6. 5% of the sample is students who are age 45 or older.

7. We employ a bivariate probit regression routine in the Stata (2013) software package. This allows us to consider the contribution of factors to the likelihood of whether or not someone fills out a survey. Green (2012) offers more background on this estimator.

Graduate student financial attributes and exposure

As part of the survey, we asked students to self-report basic financial and household information. Chart 1 shows that 56% of survey respondents have an outstanding student loan (undergraduate and/or graduate). 52% of survey participants have a graduate student loan and 41% have

an undergraduate student loan. Many participants also have other types of debt that require monthly payments, with about one-third carrying a credit card balance and 23% having either a mortgage or automobile loan.

Chart 1: Propensity to hold debt, by type

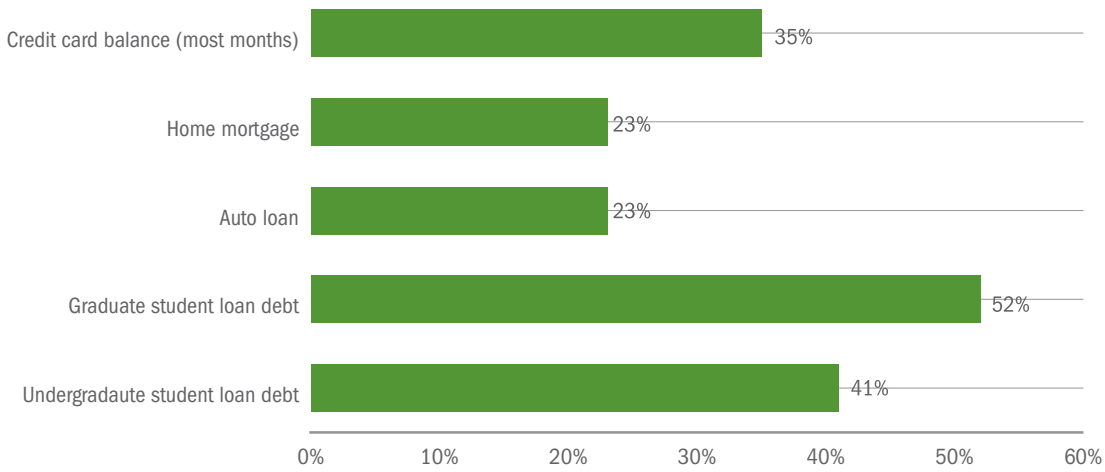
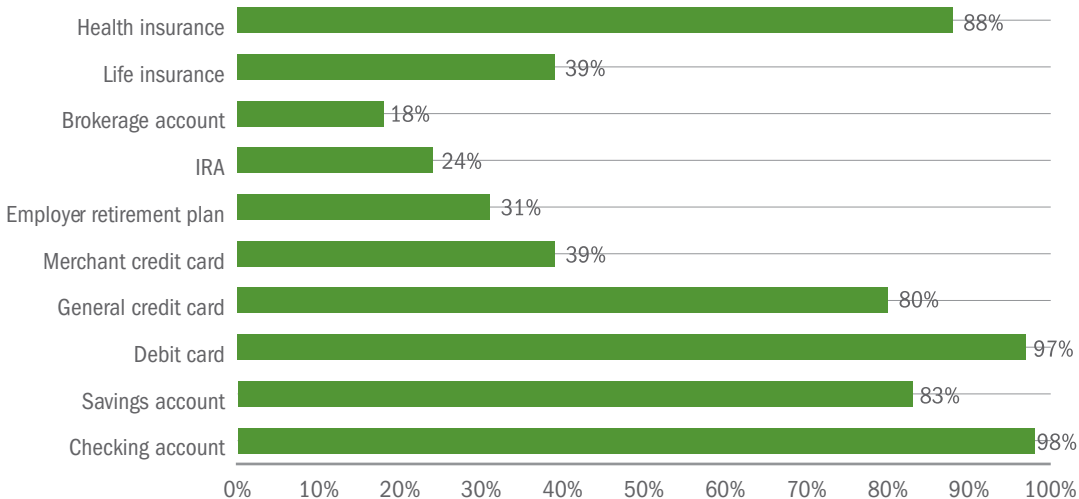


Chart 2 provides information of other types of financial products used by graduate students. Almost all survey respondents report having a basic bank account for checking/debit transactions and over 80% have a basic savings account. Nearly 90% have health insurance and about 40% have life insurance. About 80% have a basic

credit card and 39% have a specialized merchant credit card. 34% percent have some form of retirement account, with 31% having assets in an employment based retirement plan and 24% having savings in an Individual Retirement Account (IRA).

Chart 2: Access to financial markets, by type

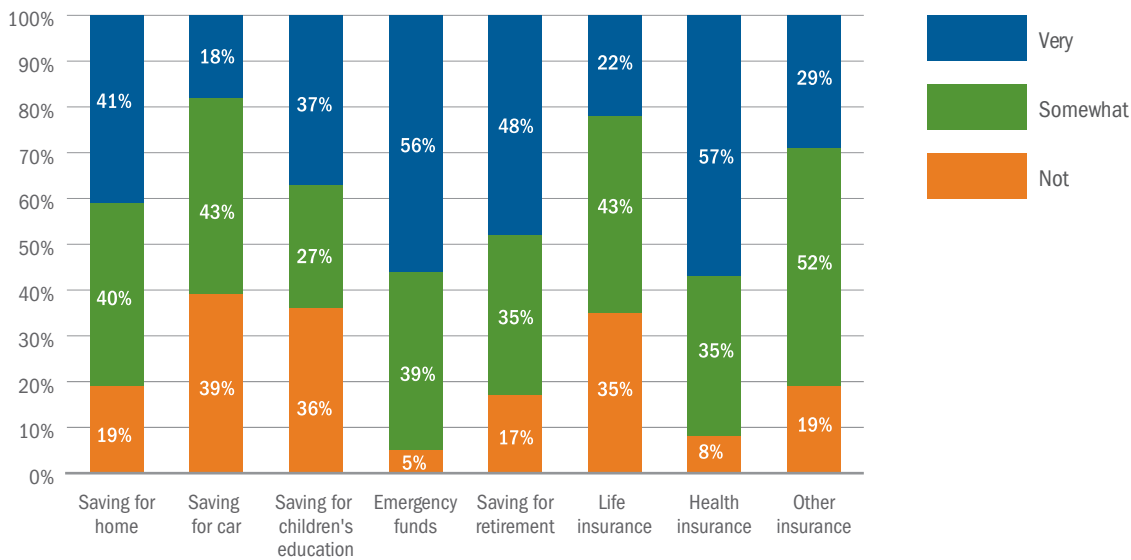


More than two thirds (69%) own a home or plan to within the next ten years.

Chart 3 provides information on the type of saving and insurance that our graduate students feel is important. As might be expected, short-term saving and insurance are considered top priorities by most graduate students, with over 90% viewing health insurance and saving for

emergencies as either very or somewhat important. Over 80% of respondents view saving for a home as important; about 69% of surveyed students already own or plan to buy a home within the next ten years. Over 80% of respondents also consider it important to save for retirement and maintain other types of insurance (car, property, etc.).

Chart 3: Importance of savings and insurance, by type

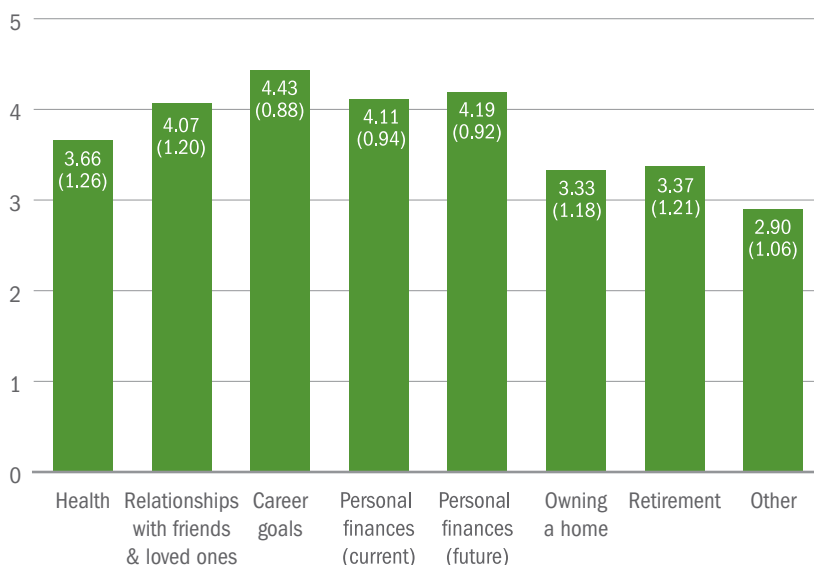


Graduate student concerns

A section of our benchmarking survey focused on career, financial, and lifestyle concerns of graduate students.

Chart 4 provides information on survey respondent's short- and long-term concerns.

Chart 4: Graduate student concerns



Scale: 1: No Concern 2: Little Concern 3: Neutral 4: Some Concern 5: Great Concern. (standard deviation in parenthesis)

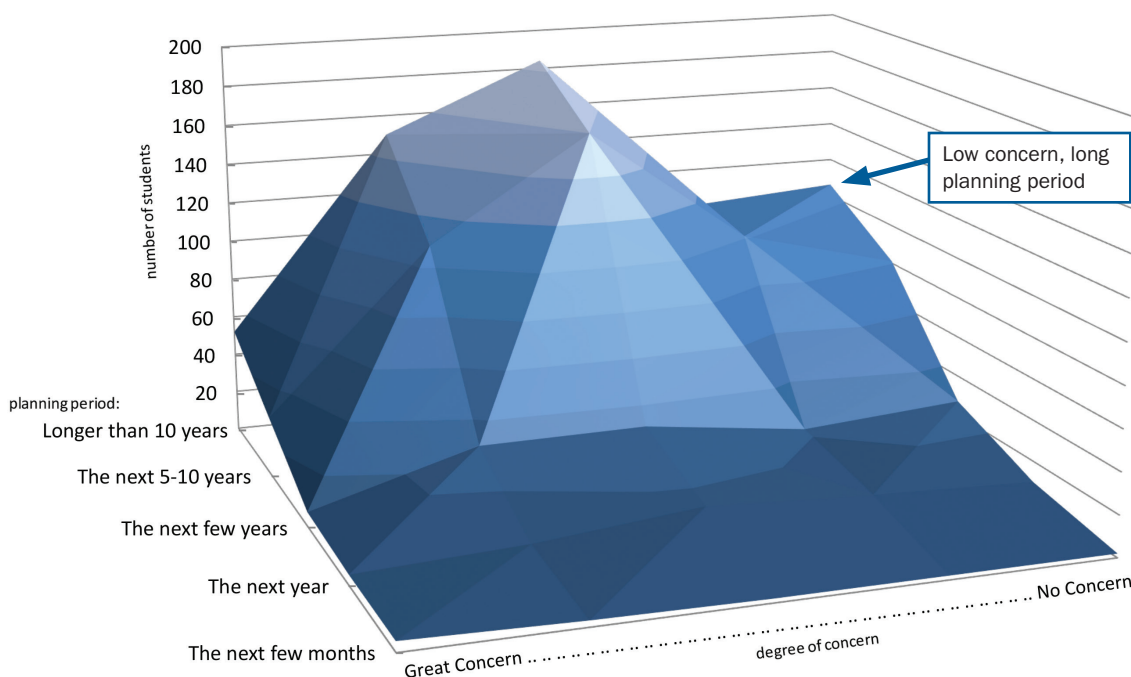
Surveyed graduate students' main concerns are (1) career goals, (2) future finances and (3) current finances — these categories have the highest average measures and lowest variation in response.⁸ These metrics are consistent with the respondents being in graduate school and undertaking a relatively major human capital investment, typically characterized by lower current and higher future earnings. It is interesting to note that, while future finances ranks high as a concern, neither retirement saving nor owning a home rank high on average. These two major lifecycle activities that are directly related to future finances and provide initial evidence of the potential disconnect between graduate student concerns and financial acumen.

To better understand student attitudes towards future finances, we compared that answer with their response regarding the length of their financial planning periods. Surveyed students' average financial time frame response rank is 2.7—somewhere between the next year (2) and

the next few years (3). This average response varies insignificantly when controlling for degree of concern, rising to just 2.8 for those expressing “great concern” and falling to roughly 2.6 for those who are expressing “little” to “no concern” (or neutrality).

Chart 5 provides insights into the distribution of correlation between concern over future finances and a graduate student's planning horizon. The surface plot shows that the mode (most likely) group of respondents is characterized as having a planning horizon over “the next 5-10 years” and expressing “some concern” regarding future finances. However, those having little to no concern (see arrow) about their future finances also have a greater tendency towards longer planning periods. This could signal either financial well-being or low financial acumen.

Chart 5: Relationship between concerns and planning horizon



8. Variation in response is measured via standard deviations (seen in parentheses within the column bar). These measures signal the degree to which students respond similarly. Generally, lower numbers signal broader agreement among the students. Across all categories, the ratio of average response-to-standard deviation is high enough to consider the averages as representing sample sentiments quite well.

Graduate student financial literacy

As part of the survey, we asked respondents to make a self-assessment of their financial acumen (“Financial IQ”). We next asked them a series of standard financial literacy questions and then asked for their assessment of the difficulty of the financial literacy quiz. In total, the average score on our 12-item quiz was 68.3% (or a letter grade of “D”). But students, on average, tend to have a good concept of their abilities, with an average self-assessment score of 67.6%.

One of our research objectives is to explore whether there are significant differences in financial acumen (real and/or self-assessed) based on students’ chosen academic discipline. Pairing survey responses and quiz scores, we find significant differences in quiz scores based on academic differences. Table 2 shows that students in five disciplines scored, on average, at least 70% on the quiz, with Business students achieving the highest average score of 81%. By comparison, students in two academic disciplines scored, on average, below 60%, with Music students having the lowest average score of 57%.

Table 2: Average self-assessed and tested financial acumen, by graduate school

Graduate School	Self-Reported Acumen	Actual Quiz Score	Self-Assessed Quiz Difficulty
College of Arts and Sciences	65%	66%	2.32
Jacobs School of Music	65%	57%	2.46
Kelley School of Business	77%	81%	1.87
Maurer School of Law	73%	73%	2.19
School of Education	64%	65%	2.38
School of Health, Physical Education, and Recreation	65%	63%	2.42
School of Informatics and Computing	71%	64%	2.25
School of Journalism	71%	76%	2.18
School of Library and Information Science	69%	58%	2.46
School of Medicine	63%	69%	2.23
School of Nursing	69%	66%	2.23
School of Optometry	73%	70%	2.26
School of Public and Environmental Affairs	71%	72%	2.20
School of Social Work	64%	61%	2.38
I'd rather not say	63%	63%	2.13

We also find significant differences in average self-assessed versus actual financial acumen for some academic disciplines. There were three academic disciplines where the average student self-assessment was at least 5 percentage points higher than the average quiz score. Of interest is that the disparity between average self-assessment and quiz score is largest for those academic disciplines where students averaged the lowest actual scores. An implication of this finding is that those graduate students who may be in greatest need of financial education and guidance may not be cognizant of that need.

We asked participating students to access the difficulty of the quiz. This measure of the ex-post perception of difficulty has discrete values ranging from 1 to 4, with values of 1 for “very easy” and 4 for “very difficult.” The average post-quiz assessment is 2.3 and a mode score of 2, which is the “somewhat easy” value. Business school students, who on average scored highest on the quiz, were also most likely to consider the test to be easy. By contrast, students in the schools of Music or Library Science scored lowest on the quiz, had the largest average overestimate of ability, and were more likely to consider the quiz difficult.

Graduate student receptivity to improving financial capability

In the second stage of our research protocol, we provide graduate students the opportunity to improve their financial capability by attending a financial educational offering. We invited a sub-group of survey respondents to participate in either a seminar or a webinar.

Of the 1,633 graduate students eligible for invitation, roughly two-thirds (1,101) are included in the treatment group that was invited to attend a financial education seminar or webinar, with the channel of engagement left to their discretion. The remaining third of eligible participants (518) are retained as a control group so as to measure the efficacy of the educational treatment. We matched the treatment and control group populations along the following dimensions: gender, degree of concern regarding financial matters (above- vs. below-average concern), financial literacy quiz score (above vs. below the average score), and academic discipline (quantitative field of study or not).

The invitation to participate offered students the option of selecting one of two mid-day and two early evening times to attend either the seminar or webinar. The seminars were offered at each campus of the Indiana University system and, as an additional incentive, we offered lunch or dinner to students who attended an in-person seminar. We received 178 RSVPs, 110 (62%) students responded that they were interested in attending the seminar and 68 were interested in attending a webinar (38%). Of those who RSVP'd, 44 (40%) attended in person and 19 (28%) attended a webinar.

Table 3 provides an analysis of factors associated with graduate students' willingness to engage in financial education.⁹ We find that, as with the initial survey, females and student workers are significantly more likely to attend a financial education offering. Students with higher quiz scores were significantly more likely to attend a seminar. But neither higher self-assessed ability nor quiz difficulty were significant predictors of a student's likelihood of engaging.

Table 3: Willingness to engage in financial education

Group	RSVP	Webinar	Seminar
Females	+		
Student workers	+		+
Higher self assessment			
Higher quiz score			+
Assessment of difficulty			

9. For the RSVP column we use a bivariate probit. For attendance we employ a multivariate probit regression routine. As noted by Green (2012), this approach allows us to consider the contribution of factors to the likelihood of whether someone comes to a webinar, a seminar, or neither.

Table 4 provides additional information on how perceived and measured financial capability correlate with willingness to engage in deepening financial education. The top four rows compare the perception and performance of all graduate students who took the survey with those who (1) responded to the financial education invitation, (2) responded and attended a webinar, or (3) responded and attended a seminar. Our analysis indicates that the graduate students most likely to engage in a seminar tend to have lower self-assessments and higher test score (*).¹⁰ In particular, these students distinguish themselves by outperforming their self-assessments by statistically meaningful amounts (**).¹¹

The last two rows in Table 4 highlight our analysis of the likelihood of engagement by graduate students in quantitative and non-quantitative fields. We find that those in quantitative academic disciplines tend to distinguish themselves across all dimensions with higher self-assessments and higher quiz scores, and lower post-test difficulty assessments (***) compared to those in non-quantitative fields.¹² This is expected because many dimensions of financial acumen rely on understanding of basic algebraic principles. While those in non-quantitative fields may have these skills, many of these techniques are part of the day-to-day toolkit of quantitative field students.

Table 4: Likelihood of engagement, by quantitative rigor of field of study

	Self Assessment		Test Score		Difficulty Assessment ¹
	Score	Percentage	Score	Percentage	
Students who take survey²	4.70	67.1%	7.79	64.9%	2.47
Students who RSVP Invite	4.55	65.0%	7.87	65.6%	2.67
Students who take webinar RSVP	4.63	66.1%	8.19	68.2%	2.35
Students who take a seminar RSVP	4.51	64.4%**	8.51*	70.9%**	2.41
Students not in quantitative fields³	4.57	65.3%	7.63	63.6%	2.55
Students in quantitative fields	5.15***	73.6%	8.53***	71.1%	2.18***

Notes: 1—average scores are between “somewhat easy” (2) and “somewhat difficult” (3)
 2—this is the base group for comparisons among the top four rows
 3—this is the base group for comparisons among the bottom two rows

10. As with the measure of *degree of agreement*, our regression analysis allows us to consider how consistent the pattern of responses is in the observed relationship between seminar attendance and the [low self-assessment/high test score] pattern. The “*” indicates a 90 percent statistical confidence level or better

11. The “**” notations in the table document results that are robust at the 95 percent statistical confidence level or better. Intuitively, given footnote 5, it makes sense that the relationship [low self-assessment/high test score] would be stronger, simply because it is more straightforward, relying on two measures instead of three.

12. All of the “***” results are statistically robust at the 99 percent confidence level or better.

Conclusions and next steps

This paper examines graduate students' willingness to engage in improving their financial capability and acumen. Using a sample of Indiana University graduate students, we find low receptivity to engaging in financial education opportunities. For those students who do accept, we find that receptivity to our offerings varies systematically across groups. Graduate students in non-quantitative academic disciplines and those who score relatively high on the financial literacy quiz are more receptive to financial educational offerings. Our results suggest that highly customized guidance and education programs may be needed to significantly increase participation in programs designed to improve the overall financial acumen of early career workers. In the absence of these customized services, financial products that rely heavily on passive auto-features may provide the best chance of helping post-graduate school workers start on the path of achieving financial well-being. An open question is whether these default features can provide an adequate framework throughout working life or should programs to adapt that incentivize workers' engagement in their financial well-being.

Our investigation of post-graduate student financial capability is part of a larger research protocol designed to understand the importance of deepening financial acumen among this group. In a series of follow-up papers, we will present evidence on participant experience with our educational offerings and gauge further receptivity from a second wave of graduate students enrolled in the Indiana University system. Within seminar sessions, our questions of participants include repeat items from the initial survey to make it possible to measure improvement in scores across repeated items.¹³ Because all students initially contacted for the first survey are invited to a final survey, in future work, our two measures are designed to be matched to see whether treatments are effective, and whether (in lieu of, or in addition to treatments) students engage information to learn about the concepts studied over the observation period.

13. The protocol design allows for the measurement of our seminar's effects because seminars were not offered to all those who said they were willing to engage them. Thus our research design will measure marginal treatment effects among those willing to be treated once final survey results are processed. Because we also randomize across more ambivalent survey responses, marginal effects can be distinguished across the more and less willing.

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