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The effect of financial education on college students' knowledge and behavior

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Abstract

There is a growing literature on the importance of adults' financial education, especially in developed countries. The literature is scarcer in regards to assessing the effect of financial education programs on the individuals' financial knowledge and behavior, particularly in developing countries. This article evaluates the conditional means effect of *Gestionando mis finanzas (GMF)* on the financial knowledge of college students in Peru. With a duration of one month, taking this virtual program of basic financial education is highly correlated with an increase in the students' financial test score, which raised by 0.42 standard deviations after the program. Women's gains in financial literacy are equally likely as men's, while the conditional means effect of the program is smaller for women, though the coefficients are not statistically significant. Further, I observe a greater financial learning in students from the highest socioeconomic levels. In terms of simple correlations, GMF is correlated with gains in self-perception of financial knowledge, as well as on savings behavior. The (positive) correlation with other aspects of healthy financial behavior, such as price comparison before purchasing and budgeting, is modest.

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1. Introduction

There is a mounting evidence about the importance of financial education on economic behavior, including daily financial management, and longer-term decisions, such as making precautionary savings, taking debts (together with the use of credit cards), and planning for retirement and for wealth accumulation (Lusardi and Mitchell, 2014; Hastings et al., 2013). From a more theoretical perspective, and considering more complex financial decisions, one could even consider financial education as a form of investment in human capital (Lusardi and Mitchell, 2014). Accordingly, several governments have implemented strategies promoting financial literacy (Kaiser et al., 2022).

The growing empirical evidence highlights a remarkable gap in financial knowledge, both within the adult population—50 years of age and older—and the youth, not only for the United States, but also for other countries around the world (Lusardi, 2011; Lusardi and Mitchell, 2011b). This evidence suggests that the relationship between financial knowledge and the life cycle has an inverted-U shape (Lusardi and Mitchell, 2014). These authors also report that the literature finds that, in general, men have greater financial knowledge than women (both in adulthood and youth[1]); and that the observed financial knowledge is greater for people with higher levels of education.

Another branch of the literature shows a growing interest in examining the correlates of financial learning in several regions of the world, though they largely focus on analyzing experiences in developed countries.[2] In fact, Xu Zia (2012), in their review of financial education programs around the world, find that few of them have been implemented in developing countries, which is particularly true in the case of programs aimed at young people: studies are mostly for the United States. For a review of studies that experimentally evaluate the effect of financial education programs in schools and colleges (implemented in the US, some European countries, Brazil, South Africa, and Ghana), during 2004-2015, see Amagir et al. (2018).

In terms of the causal effect of financial education, Kaiser et al.'s (2022) recent meta-analysis examined 76 published randomized experiments on financial education, conducted in (mostly) developed and (some) developing countries through January 2019, and concludes that financial education is effective, on average. As it is clear from that study and the literature, in general, programs of financial education implemented in developing countries are scarce. Consequently, studies examining the effects of financial education programs in those countries are even slimmer. Peru is not an exception, and not only do we not have much information about the general financial knowledge in the population as a whole, but also, we are not aware of any studies but one that rigorously examines the effect of financial education programs. Though the SBS (2018)'s report surveys 180 financial education initiatives carried out throughout the country in recent

[1] This is also the case for younger cohorts, including high school and college students (see Chen Volpe, 2002, and Mandell, 2008).

[2] At least partially, this bias is probably due to the larger number of financial education programs carried out in those countries, as well as to the greater availability of data, especially in terms of nationwide representative surveys.

years,[3] the only large-scale pilot financial education program we are aware of, offered to Peruvian schoolchildren, is Finanzas en mi colegio (Finances in my high school), a randomized experiment implemented in 2016 in 150 public schools nationwide (see Frisancho, 2018 for details).

In this context, in which a seemingly large number of initiatives on financial education were carried out in the country, though practically none of them included an evaluation component, the Peruvian Insurance Companies Association (APESEG, for its acronym in Spanish), in partnership with the Association of Pension Fund Administrators (AAFP), and the Peruvian Banks Association (ASBANC)'s Center for Financial Studies (CEFI), created the virtual course Gestionando mis finanzas (GMF) (Managing my Finances) in 2018, targeting young people at the age of starting post-secondary technical or college education.[4]

Based on the plausible premise that financial education can be a useful tool to promote healthier financial decisions, this article makes two contributions: it measures the baseline level of financial knowledge and skills from a sample of students from an elite private university in Peru (a rather unusual endeavor in the country), and it evaluates the results from a basic financial education program (the virtual course GMF) on their financial knowledge and skills, using a unique data set specifically collected for this study. Though I cannot claim a causal effect, but a conditional means effect of GMF, the results show a substantial improvement in financial learning (by 0.42 standard deviations, in our most conservative estimates). Further, students from the highest socioeconomic status exhibit larger gains than those from the poorest SES and, while women are as equally likely as men to benefit from the course, the conditional means effect of the course for women is smaller than that for men. Examining only the intervention group, I find an increase in the self-perception of financial knowledge (subjective learning) and on savings. However, the correlation with other aspects of healthy financial behavior, such as price comparison before purchasing and budgeting, is modest.

The remainder of this article is organized as follows. Section 2 reviews the literature on financial education and the impact of financial education programs. Section 3 presents the financial education program under scrutiny (GMF) and discusses the design of the study: course content and delivery, as well as the large set of tools used for the analysis. Section 4 presents the data and discusses the main results and Section 5 concludes.

2. Related Literature

Though there are multiple definitions of financial education, recent studies (e.g., Atkinson and Messy, 2012) emphasize three crucial components: knowledge, behavior, and attitude. In this

[3] 77% of which were conducted in-person and 15% had a virtual mode, with the remaining 8% having a mixed format. This report highlights the lack of a rigorous evaluation of their results as the main limitation affecting most of those programs.

[4] By the end of 2019, this course had been offered to college students from the University of Arts and Sciences in Latin America (UCAL), Continental University, the Peruvian University for Applied Sciences (UPC), the Pontifical Catholic University of Peru (PUCP), and Universidad del Pacífico. As of 2022, other universities, including the Peruvian Autonomous University, had also agreed to participate.

article, I will address the first two components—knowledge and skills.[5] Hence, the literature review will focus on financial education from the point of view of knowledge, taking as a definition an adapted version of Rai et al. (2019): financial education consists in having the necessary knowledge to make an adequate decision regarding the effective and efficient use of money.

The most widely used way to measure financial education is through objective tests on key topics. In a recent meta-analysis, Amagir et al. (2018) finds that those themes are repeated in various programs implemented in different regions around the world, with the main ones being the following: Planning and budgeting, banking services, income and employment, investments, savings, expenses and loans. All of these topics have been included, both in the GMF course and in the financial knowledge tests taken as part of this study, although there is less material on the subject of investments (see Subsection 3.1).

2.1 Impulsiveness and Financial Education

Impulsiveness is one of the many human traits that can have an effect on almost all areas of human life, including financial choices. In particular, impulsiveness is related to learning, even considering differences in the intellectual coefficient (Spinella and Miley, 2003). This characteristic is also related to a series of behaviors that have intertemporal effects, such as the use of credit cards (Henegar et al., 2013), job search (DellaVigna and Paserman, 2005), and participation in gambling (Blaszczynski et al., 1997), among others. Using the Barrat Impulsiveness Scale (BIS), Ottaviani and Vandone (2018) find that impulsiveness is negatively correlated with the level of financial education, and argue that both indicators are necessary to explain the individuals' financial behavior, in particular the one concerning indebtedness. In this article, following those authors' advice, I examine the role of impulsiveness in the empirical section (Section 4).

2.2 Effect of Financial Education Programs

Several financial education courses have been offered to both high school and college students, with mixed results, though both samples are not necessarily comparable. In particular, using five (biannual, nationally representative) Jump$tart surveys, conducted in the United States, Mandell (2008) argues that, college students tend to score higher on financial literacy tests, and even high school students aiming to pursue college education tend to score higher than their peers. This may be due to differences in cognitive ability or simply to the greater experience that college students have in making financial decisions, compared to younger age cohorts. Along the same lines, Peng et al. (2007) study the effect of personal finance education received both in high school and college in the US. While the former does not seem to affect investment knowledge, the latter is positively correlated with it.[6]

Keeping this in mind, I first review some landmark studies conducted in high schools. In the case of the United States, two studies examine the effect of the financial and economic education

[5] The focus groups, conducted as part of this research (but unreported in this paper), address briefly the attitudinal component, among other issues related to the design of the course and the potential room for improvements.

[6] The authors use an on-line survey to randomly-selected alumni from a midwestern university in the United States. The survey asked for formal classroom experience during college and high school.

curriculum called Financial Fitness For Life (FFL) which is accompanied by a standardized test. Harter and Harter (2009) find a modest increase in learning for Kentucky, while Butt et al. (2008) report an increase by 0.501-0.561 standard deviations for Milwaukee, Wisconsin. Both studies implemented the FFL curriculum in person, but with different intensities: the first had 8 lessons, while the second had 17. Similarly, in a 10-hour program in Spain, Hospido et al. (2015) found an increase of one third of a standard deviation. These findings suggest that longer courses may have a greater effect on learning.

Regarding studies conducted in Latin American countries, two stand out. In Brazil, a large-scale course lasting from 1 to 1.5 years, involving around 25,000 high school students, found a quarter standard deviation increase and spillover effects in their behaviors and attitudes, as well as in those of their relatives (Bruhn et al., 2016). A similar study, conducted in six Peruvian regions, reaching almost 20,000 students from 150 public high schools, found an increase by 0.14 standard deviations in financial knowledge (Frisancho, 2018). It is noteworthy that this last intervention had a more moderate intensity, since the financial education material used was incorporated into existing courses (History, Geography and Economics).[7]

In terms of the effect of financial education programs for college students, (Borden et al., 2008) find a positive impact of a short 1.5-hour seminar increased the score by 0.326 standard deviations, while a traditional full-semester course increased the grade by 0.309 standard deviations. Along the same lines, Maurer and Lee (2011) examine any differential learning gains introduced by traditional classroom instruction and peer financial counseling with college students; both methods yield similar gains. On the other hand, focusing on financial learning and risky credit behavior among first-year college students, Xiao et al. (2010) conducted an online survey to gather information to measure objective and subjective financial knowledge and credit behavior. Those courses and others, found in the literature have been developed in the United States. I have not found, however, financial education studies for Latin America, focusing on college students.

Summing up, from this quick review I find that educational interventions in colleges can generate a considerable increase in students' financial knowledge, a result that is confirmed by two recent meta-analyses: Fernandes et al. (2014) and Amagir et al. (2018). However, as mentioned earlier, financial literacy is a broader concept, and in this review, I skipped the impact of interventions on financial behavior or attitudes, an effect that, according to the two aforementioned studies, is not as clear-cut as in case of financial knowledge. Further, this review accounts for the large gap in knowledge about the evaluation of financial education programs among post-secondary education students in Latin America, a gap we aim to contribute to close for the case of Peru. Next section presents the financial education program under scrutiny and the tools designed for such purpose.

[7]Using another method (a randomized controlled trial) and with a different pool of subjects (beneficiaries from the largest social program in Peru, Juntos), Galiani et al. (2022) study the effect of a very short (3-hour) workshop intended to enhance trust in financial institutions among Juntos beneficiaries and to evaluate its impact on savings. The piece about financial literacy in this study was secondary and the authors did not find any effect of the workshop in this regard.

3. Evaluating the Financial Education Course

3.1 The Virtual Course *Gestionando mis Finanzas*

The virtual course *Gestionando mis finanzas (GMF)* aims at improving the financial knowledge of young people at an age to start studies at post-secondary technical institutions or universities. This is a basic financial education course, composed of seven modules, covering six topics: budget management, savings, credit, insurance, pensions, and consumer rights. The content of each module includes videos and selected readings, which are presented on a platform designed by APESEG-AAFP-ASBANC. Table 1 shows information about the contents of the course. Both the contents of each module and its end-of-module-evaluations, as well as the format of the videos and selected readings, are taken as given for the purpose of this study. I examine the effectiveness of those learning materials to improve the basic financial knowledge and skills.

As shown in the table, the coverage of each topic, in video time and length of the readings, varies. In particular, starting with Module 3, there is a greater course workload (with the exception of Module 6), which could increase the difficulty to complete the course.[8] A more recent version of the curriculum has fixed this problem.

3.2 Design of the Evaluation

The intervention evaluated in this study consisted of offering the virtual course *Gestionando mis finanzas* to students from an elite private university in Peru, the Universidad del Pacífico (UP). In particular, our sample under study is composed of all undergraduate students from the 2019 cohort (who entered either in March or August): a total of 674 first-year students. The course was offered through the Blackboard platform, which UP students use for their regular courses. *Gestionando mis finanzas* was offered as a free-of-charge elective course, with no academic credits. Initially, those 674 students were informed that GMF would be available on Blackboard from September 3 (two weeks after the beginning of the 2019 fall semester) to October 6, but the final date was later extended until October 15 (42 days), to gather information from a larger sample to analyze.

Given its nature—an elective course, with no academic credits and no pre-registration advertisement —to encourage students to take GMF, the publicity emphasized its nature (it is a virtual course, which students could complete at their own pace, and in a rather short period), in addition to highlighting the zero-tuition cost and the possibility to obtain a certificate upon completion (students could thus list GMF in their résumés). Likewise, from the beginning of the course, students knew that three iPads would be given to three randomly chosen students, among all those who completed the course. This information was disseminated on Blackboard, as well via emails sent to the 674 students by the Extracurricular Training Division, the UP's office in charge of this type of activities. While the course has an auspicious beginning, since a significant number of students completed Module 1, the pace of progress declined rapidly, so we decided to add an extra incentive: the first 50 students that complete Module 4 could collect

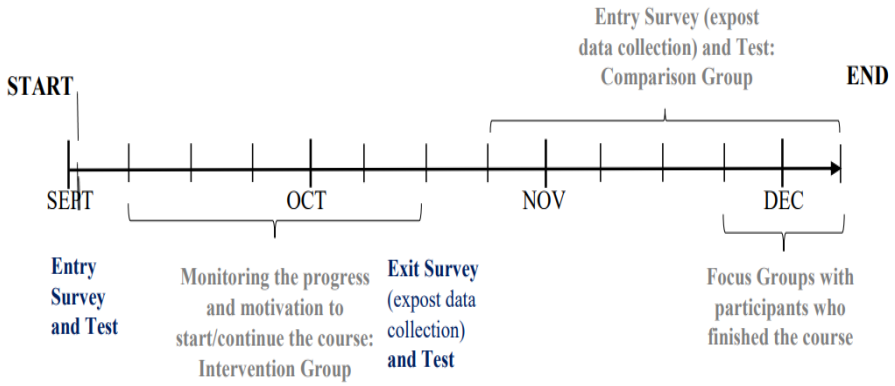
[8]The focus groups we conducted highlighted this as an obstacle in the original curriculum design, thus suggesting a change in the course design, which was implemented in the newest version of the curriculum.

movie tickets during the first week of October.[9] Table A.1 in the Appendix shows the number of students who completed each module, per week.

Thus, our intervention group is made up of all those students who voluntarily completed the course until October 15, 2019. The evaluation of the effect of GMF is carried out with this sample of 111 students. For the comparison group, I included those students who did not have any direct interaction with the course on Blackboard until such deadline: the 379 students in the 'No progress' group in Table A.1. Our research team sent emails to those students, asking to fill out a survey and the financial knowledge entry test, in exchange for a movie ticket. The period to complete that (this was also done on Blackboard) was between October 21 and December 6, 2019. This comparison group consists of 46 students.

Figure 1 shows the timeline of the intervention I am examining in this article and displays the tools used for the evaluation.[10] Moreover, as stated above, we applied a survey to the comparison group. Given that the participation to answer the entry survey was voluntary, I cannot guarantee the randomness of the sample. More details about the characteristics of both samples are reported in Section 4.1.

Figure 1. Timeline of the intervention: GMF 2019



3.2.1 Instruments Used

The survey as well as the entry and exit financial knowledge tests, were all administered via Blackboard. Appendix B presents the questionnaires used to collect the information, which also describes the way we constructed the indicators used in this article. As we will see below, we collected a considerable amount of information, which is not usually gathered by other types of studies, such as impact evaluations (specially, randomized-controlled trials). In essence, our data collection largely responds to our interest to test for the importance of several indicators on financial literacy.

[9] This extra incentive proved to be useful, since during that week we saw the greatest rate of progress thus far. In fact, the last week had 83 additional students completing the course (out of the total 111).

[10] As part of this project, we conducted four focus groups with a sample of students who completed the course, to find out their views on the content and delivery, as well as improvements in the design of the course (this part is not reported in this study).

3.2.1.1 Surveys

The entry survey (see Appendix B1) contains 56 questions to gather information on socioeconomic status–SES (district of residence); knowledge and use of financial instruments; purchasing habits and budgeting; self-perception of financial and mathematics knowledge;[11] risk preferences; time preferences (including hyperbolic discounting, taken from Ashraf et al., 2006); the Frederick's (2005) Cognitive Reflection Test–CRT (see Appendix B2 for more details on this test);[12] measurements of two personality traits that are part of the so-called Big Five Personality Traits: responsibility and emotional stability (see Appendix B3[13]) (Goldberg, 2013); as well as the Barrat Impulsiveness Scale (BIS-15), adapted by Orozco-Cabal et al. (2010), from which I constructed three indicators for the analysis: motor, attentional, and non-planning impulsiveness (see Appendix B4).

The information collected about demographics, CRT, risk and time preferences, impulsiveness, personality traits, will be used to examine the factors correlated with financial literacy. Some of the literature the reveals the connection between the aforementioned indicators and financial literacy include: Lusardi and Mitchell (2008) and Bernheim (2009) [sex]; Kiliyani et al. (2016), Lusardi (2012) and Mitchell and Lusardi (2011) [education]; Lusardi and Mitchell (2011a) [SES]; and Muñoz-Murillo et al. (2020) and Paraboni and da Costa, Jr. (2021) [cognitive abilities]. A study among French students finds that risk averse students also display lower financial literacy (Le Fur and Outreville, 2022), while other study for China reports that financial literacy had a negative impact on risky credit behavior (Liu and Zhang, 2021). Mudzingiri (2021) examines the link between financial literacy and patience, risk aversion in an experimental setting in South Africa. Furthermore, the link between financial literacy and personality traits has been explored by Shanmugam et al. (2023) (for India), Goulart et al. (2023) (for Brazil), and Pinjisakikool (2017) (for Thailand).[14]

3.2.1.2 The Financial Knowledge Test

The financial knowledge test used in this article contains 15 questions (see Appendix B5, for details); 4 of them were taken from the 2008 Jump$tart Financial Literacy Survey conducted in the United States (Mandell, 2008), 2 from Frisancho (2018); and the remaining 9 questions either come from entry exams designed by ASBANC's CEFI or were developed by the author. The design of the set of questions for the test responds to the goal of covering the six major topics studied along the seven modules of the GMF course; namely: budget management, savings, credit, insurance, pensions, and consumer rights.

[11] We are aware that it is plausible to find an overestimation of knowledge. For instance, Lusardi (2011) finds that, while 70% of respondents in the U.S. self-reported a 4 (in a 1-to-7 Likert scale) in financial knowledge, only 30% of them could answer correctly the questions of the test.

[12] The CRT score has shown to be highly correlated with standardized measures of cognitive skills for the U.S.

[13] Appendix B3 explains how the corresponding indicators were constructed for the analysis.

[14] Those studies focus on university students; a common feature is that most of them conducted a correlational analysis. Unlike those studies, we examine the link between financial literacy and several of the variables that they only examine separately.

This 15-question test is part of the redesign of the original GMF course's entry test. In its construction, I followed the four principles suggested by Lusardi and Mitchell (2014): simplicity (to assess fundamental knowledge), relevance (pertinence), brevity, and ability to differentiate (to measure individual differences). To measure the internal consistency of our financial score, I calculated the Cronbach's alpha (which takes values between 0 and 1, with those above 0.8 considered as ideal). I found a Cronbach's alpha greater than 0.82 in all the questions from the entry test (with an average of 0.853), and an alpha of at least 0.879 in all the questions from the exit test (with an average of 0.896).

It is worth to mention that, although GMF contains its own assessment questions after each module (which are part of the original course design), I did not use this information in the main analysis. Table 1, presented earlier, summarizes the content of each module, including the number of assessment questions.

3.2.2 Evaluating the Effect of *Gestionando mis Finanzas (GMF)*

Firstly, I examine the before-and-after results on financial knowledge and other outcomes of interest, such as the self-sufficiency in financial and math knowledge, financial practices (behavior: savings, price bargaining, budgeting), socioemotional skills, and personality traits, for the intervention sample.[15] This is similar to a conditional mean test. Obviously, this result does not control for any differences in unobservables between our intervention and comparison groups (e.g., ability or motivation).

Second, I examine the conditional means effect of the GMF course on the student i's financial literacy using the following base specification, estimated by ordinary least squares (OLS):

$$y_i = \alpha_0 + \alpha_1 Treated_i + \alpha_2 Women_i + \alpha_3 SES_i + X'A + \varepsilon_i \quad (1)$$

where y_i denotes our standardized financial learning,[16] $Treated_i$ is an indicator that equals 1 for the sample that received the course and equals 0, for the comparison sample; *Women* and *SES* are indicators for sex and socioeconomic status, respectively. Vector X includes a set of covariates that previous studies found relevant to examine, such as: financial autonomy, self- perception of financial knowledge, the Cognitive Reflection Test score, indicators of risk and time preferences (impatience), personality traits (responsibility and emotional stability) and the Barrat's impulsiveness indicators (motor impulsiveness, non-planning impulsiveness and attentional impulsiveness), in addition to the score in the financial knowledge entry test.[17] And ε_i is the error term of the regression.

[15] To be clear, I estimate $y_i = \gamma_0 + X'\Gamma + \varepsilon_i$, where y_i captures the standardized outcome variable,$(\frac{y_{exit\ test} - y_{entry\ test}}{\sigma_{y\,entry\ test}})$, and X includes sex, socioeconomic status (medium or high), and indicators for high financial autonomy, and for having been born in Lima, the capital city of Peru. Thus γ_0 is our coefficient of interest.

[16] That is, for each student, the entry test would be subtracted from the exit test, and the result will be divided by the entry test's standard deviation from the comparison group. Thus, we will examine the result in terms of the score's standard deviations of the comparison group. As a reference, any improvement of at least 0.25 standard deviations suggests a substantial effect.

[17] All covariates included in the regressions were measured by the entry survey.

In this equation, the coefficient estimate $\hat{\alpha}_1$ captures the conditional means effect of *Gestionando mis finanzas* on financial learning, controlling for a large set of individual variables. As long as vector X_i includes all the relevant variables that influence the improvement in financial literacy, $\hat{\alpha}$ could be a consistent estimate of the effect of GMF,[18] which controls for invariant unobservables, such as motivation and intrinsic ability.[19] Based on prior studies (e.g., Lusardi and Mitchell, 2014; and Chen and Volpe, 2002), I hold the following hypotheses: $\hat{\alpha}_2 \neq 0$ and $\hat{\alpha}_3 \neq 0$.

One challenge I face before I can estimate the previous equation is that the comparison group did not take the exit financial knowledge exam. To deal with this, I use a matching technique to find the score on that exam that an observation in the comparison group would have obtained had she taken the course. For the main results, I use the kernel method with the biweight kernel type, because this method reduced the bias to its largest extent, compared to four alternative methods.[20] This reduces our sample to 136: 94 from the intervention group (down from 111) and 42 from the comparison group (down from 46). The subsequent regression analysis is performed with this matched sample. Appendix C explains the matching procedure I followed, and reports the bias reduction from using all five marching methods used. It is important to mention that our main result, in terms of the effect of the GMF course, does not depend on the matching method used.

I then extend our main specification to capture any differential effect by sex, a topic that is typically not tackled by the existing literature, which generally only examines the coefficient on sex in a specification similar to equation (1). We thus estimate the following equation:

$$y_i = \beta_0 + \beta_1 Treated_i + \beta_2 Women + \beta_3 SES + \beta_4 Treated_i \cdot Women + Z'B + \varepsilon_i \quad (2)$$

with $\hat{\beta}_4$ being our coefficient of interest. Vector Z includes a similar set of variables as vector X in equation (1), except for sex.

It is worth to mention that the evaluation I am carrying out aims to measure only a short-term effect, because the course GMF lasted only five weeks. Only a follow-up study will tell whether the results will remain in a longer term. Furthermore, these students could be exposed to other (more advanced) financial education modules, so that the growth in the level of financial learning can be assessed. This may be a fruitful topic for future research, as will any study comparing results across the several universities whose students took the GMF course.

[18] With our research design, this conditional mean effect is the closest estimate to an average treatment effect or an intent-to-treat estimate we can get.

[19] An anonymous referee highlighted this comment.

[20] The other matching methods include: the nearest-neighbor (with 1-to-1 matching, 2 neighbors, and 4 neighbors) and the radius (with caliper = 0.03).

4. Data and Results

4.1 Data

In this section, we report the main results from the GMF course, using data from the tests and the entry and exit surveys. For the analysis, I divided the participants into two groups: the intervention group, composed of those who completed all the modules and evaluations of the course (111 students); and the comparison group, made up of those who did not start the course, but completed the entry survey and test (46 students). Table 2 shows the main descriptive statistics of interest for our sample. Our intervention group includes young students, 18.7 years old, on average 56.7% of whom are women. Members of the comparison group have a similar average age and a lower proportion of women (54.3%). Regarding other academic characteristics of the samples under study, we can appreciate a relatively high grade point average (13.59 in the intervention group; and 14.42, in the comparison group, according to self-reported figures), a relatively low performance in Basic Mathematics (around of 12.6 in both groups), and a better performance in the Economics and Business courses[21] (13.24 and 14.58, respectively).

It should be mentioned that, since neither the treatment group nor the comparison group were randomly chosen, it is not possible to infer that the effect detected is causal, at the same time that it is not possible to extend the results beyond our sample. Also, while we can think that the more financially knowledgeable or motivated students decided to complete de course (as we will see in next section, they are ex-ante more financially knowledgeable), while the least interested or motivated in the course did not bother to even start clicking on the link for the course, the previous figures about academic performance suggest that the latter group is not necessarily the least analytically skilled.

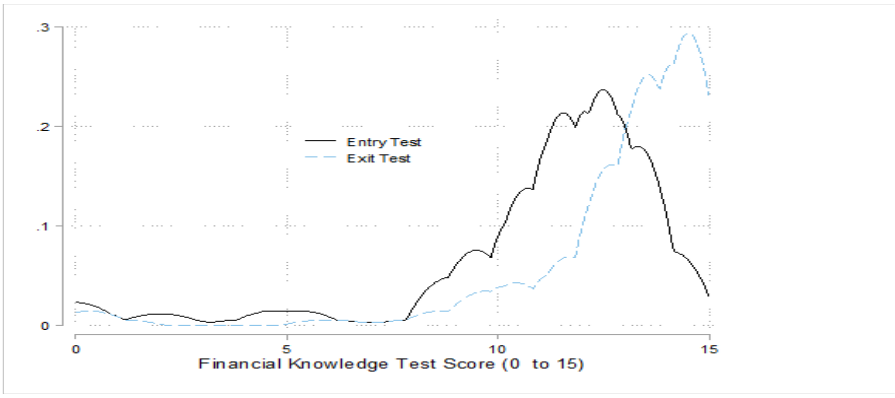
4.2 Results

A first important result of the GMF course is the relatively high level of baseline basic financial knowledge of our intervention group. As shown in Table 2, the average score on the 15 questions of the financial test for the 111 students who completed the GMF course is 11.05 on the entry test (with 12.61% of students answering 14 or all 15 questions correctly). This represents a 73.3% effectiveness. Furthermore, this group obtained on average 13.03 out of 15 on the exit test, an improvement that represents an increase by 1.97 points, or almost two additional questions answered correctly, compared to the entry test. Figure 2 shows the distribution of the entry and exit financial test for the intervention group. As shown in the figure, there is a general improvement in financial knowledge, presumably, as a result of the GMF course, given by the shift to the right of the distribution of financial scores, which is summarized by an increase in 0.662 standard deviations, compared to the entry test. Later, we will calculate the average effect

[21] In Peru, a 1-to-20 scale is used to record score academic performance, with 11 being the passing grade. Note the smaller number observations for these variables, which explains why I did not include them as controls, with the exception of the GPA.

of the course on financial learning, in a regression context, with the estimation of equation (1) described above.

Figure 2. Kernel Density of Financial Knowledge Tests: Intervention Group



The details of the performance in the financial knowledge entry test, for each question and by group, are shown in Appendix Table A.2 (intervention sample) and Appendix Table A.3 (comparison sample), while Table A.4 compares the individual characteristics of both samples, including the financial entry test score. Taken together, two important results stand out from this information. First, as seen in Table A.2, with the exception of questions 6 and 13, the percentage of students who answered each question correctly increased, which shows that the positive effect of the course is transversal to the topics evaluated. Likewise, the difference between the exit score and the entry score is statistically greater than 0 in 12 of the 15 questions of the financial test (and this difference is significant at 99% confidence in 7 questions). Second, as shown in Table A.4, panel B, the intervention group has a higher entry financial score than the comparison group; and this difference is significant at 5% (p-value = 0.013). This result suggests that there could be some self-selection bias, in terms of financial knowledge (i.e., those who decided to complete the course already knew something more about basic finances) or a predisposition to learn. However, we do not see that subjects in our intervention group have a higher performance in basic Economics and Mathematics courses or overall (measured by the grade point average—GPA) (Table A.4, panel B).

Appendix Table A.4 reports the results from comparing several characteristics between the intervention and comparison groups, measured by the entry survey (taken before the delivery of the GMF by the intervention group and ex-post by the comparison group). We measured individual characteristics (panel A), financial behavior and objective knowledge (panel B), personality traits and socioemotional skills (panel C), and self-perception (panel D). We see no statistically significant difference in individual characteristics (age, sex, parents' education, socioeconomic status, financial autonomy, likelihood of being born in Lima, the propensity to live with parents, risk aversion, and time preferences) (see last column). Further, we do observe some differences in financial behavior, responsibility and emotional stability, as well as two types of impulsiveness (attentional and motor), and a higher self-perception of financial knowledge and math skills. In sum, our intervention group is not different, on average, from the comparison group, at least in

terms of their individual characteristics.[22]

Let us now turn to the results from the GMF course. I proceed in two steps. First, I examine the before and after outcomes for the intervention group, in terms of financial knowledge and self-perception (Table 3), financial behavior (Table 4) and socioemotional skills and personality traits (Table 5), in a regression context. As mentioned earlier, this analysis is equivalent to a conditional (on some observables) means tests. We report the results for the entire sample (n = 111) and breaking the sample by the semesters attended, to examine a potential heterogeneity. As shown in Table 3, the financial knowledge increased considerably for the entire sample. The aggregate effect is 0.9608 standard deviations, which represents a substantial improvement in students' learning, which is greater than the effect reported by previous studies for high schools in Peru (e.g., Frisancho, 2018).[23] The largest improvement occurs for first-semester students, who register an increase by 1.1250 standard deviations in their financial knowledge score. Though these figures are capturing only the before-and-after outcomes, and do not have a proper comparison group, when we perform the regression analysis that do have a comparison group, I find smaller but significant effects from the GMF course.

On the other hand, although there is no increase in the self-perception of how saver a student is, we do see a considerable increase in the self-perception of financial knowledge (by 1.3685 standard deviations). The growth in the self-perception of mathematical abilities, however, is only marginally significant. In sum, taking the GMF course appears to be correlated with an increased objective and subject financial knowledge.

[22] A valid concern, raised by a referee, is about how representative is the comparison sample I use. As shown in Appendix Table A.1, 295 students answered the financial knowledge entry test but did not continue farther. Excluding the 111 students who completed the course, in principle, we could use the data on the remaining 184 students to examine that issue. From the information available (only 62 out of 184 students completed the information necessary for the analysis), comparing the same variables reported in Table A.4, between the comparison group and the subsample of students who started but did not complete the course, only in 3 out of 30 variables, is there a difference that is statistically significant (the results are available upon request), which gives us confidence about the representativeness of our comparison sample.

[23] Recall that the (unconditional) increase in financial knowledge was 0.662 standard deviations, comparing only the exit and entry test scores.

Table 1

Content of the virtual course *Gestionando mis finanzas (GMF)*

Module (Theme)	**Content**	**Allocated Time (minutes)**	**Readings (No. of pages)**
Entry Test & Survey	Financial knowledge test and survey	30	
Module 1 *Importance of finances*	• Income and expenditures • Overindebtedness • Resources • Needs, desires, and priorities Assesment Questions (15)	11	12
Module 2 *How to manage my finances*	• Types of expenses: fixed (e.g., housing rent, pension, insurance), variable, and discretional • Budgeting: weighting income and expenditures • Surplus and deficits Assesment Questions (10)	12	2
Module 3 *How can I attain my short-, medium-, and long-term goals?*	• Short-run goals • Savings (formal and informal), APY • Opportunity costs • Loans, APR Assesment Questions (5)	16	17
Module 4 *Which risks do we face and how to deal with them?*	• Risks • Impact evaluation • Damages and types of damages • Insurance and insurance cycle Assesment Questions (20)	22	10
Module 5 *The risks that young people do not see*	• Funding the expenditures after retirement • Pension savings (long run) • Types of pensions: public, private • Profitability Assesment Questions (8)	21	30
Module 6 *How can I take advantage of technology to manage my finances?*	• Banks, insurance, pension funds, and their Apps • Digital banking • Fintechs Assesment Questions (20)	23	3
Module 7 *The rights a consumer of a financial product has*	• Car insurance: coverage, deductible, cost • Information on loans, insurance, pensions, and how to choose a pension fund • Responsible consumption • How to be creditworthy in the financial system (video) • Bank statements, insurance policy, pension fund statements • Complaints before the consumer protection authority Assesment Questions (20)	21	18 + 63 (optional)
Exit test	Financial Knowledge Test	30	

Table 2
Descriptive statistics

	Intervention Group					
	Mean	Median	Std. Dev.	Min	Max	N
Age (years)	18.66	18.10	3.40	17.14	48.70	103
Women (=1)	0.57	1.00	0.50	0.00	1.00	111
Entry test score (0 to 20)	11.05	12.00	3.17	0.00	15.00	111
Exit test score (0 to 20)	13.03	14.00	2.73	0.00	15.00	111
Difference in test scores	1.97	2.00	3.69	-12.00	15.00	111
Past semester's GPA (0 to 20)	13.59	13.44	1.70	10.22	18.50	91
Score in Mathematics I (0 to 20)	12.56	12.00	2.74	6.00	19.00	87
Score in General Economics I (0 to 20)	13.24	13.00	2.24	8.00	17.00	54
	Comparison Group					
	Mean	Median	Std. Dev.	Min	Max	N
Age (years)	18.54	18.28	1.21	16.80	22.95	41
Women (=1)	0.54	1.00	0.50	0.00	1.00	46
Entry test score (0 to 20)	10.012	10.00	2.69	3.00	15.00	46
Past semester's GPA (0 to 20)	14.42	14.82	1.77	10.00	16.75	33
Score in Mathematics I (0 to 20)	12.74	14.00	3.22	2.00	16.00	31
Score in General Economics I (0 to 20)	14.58	15.00	1.50	12.00	17.00	19

Note: The variation in the number of observations is due to non-responses.

Table 3

Conditional means effect of GMF on financial knowledge and self-perception of savings, financial knowledge and math skills (*Standardized variables*)

	All	Semester 1[a/]	Semester 0 and 1[a/]	Semester 2[a/]
		(1)	(2)	(3)
Financial knowledge (Standardized score)	0.9608***	1.1250***	1.1016***	0.4183**
	(0.2022)	(0.3198)	(0.2691)	(0.1972)
N	104	48	59	38
R-squared	0.2387	0.2768	0.2976	0.3351
Self-perception of savings (1 to 10)	0.1170	-0.1164	0.0718	0.3348
	(0.2215)	(0.3366)	(0.2924)	(0.4935)
N	98	47	58	38
R-squared	0.0629	0.0863	0.0510	0.1377
Self-perception of financial knowledge (1 to 10)	1.3685***	1.1991***	1.2374***	1.8406***
	(0.2586)	(0.3792)	(0.3237)	(0.4258)
N	97	46	57	38
R-squared	0.4685	0.4726	0.4765	0.5447
Self-perception of math skills (1 to 10)	0.2112*	0.2246	0.2667	0.0338
	(0.1219)	(0.1918)	(0.1615)	(0.2022)
N	97	46	57	38
R-squared	0.1203	0.1445	0.1886	0.1481

Note: Estimates obtained using ordinary least squares. All specifications include the following controls: sex, socioeconomic status (medium or high), indicator for high financial autonomy, and an indicator for having been born in Lima, the capital city of Peru. [a/] Semester 0 is devoted to take refresher courses, before the actual start of college studies. Column 1 reports Semester 1, column 2 reports Semesters 0 and 1, and column 3 reports Semester 2 (Semester 0 is unreported due to so few observations for a regression). Robust standard errors in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Similarly, the students who finished the course show a positive effect on their financial behavior (Table 4), except in the case of haggling over prices. However, only in the case of holding savings, the increase is statistically significant (by 0.3767 standard deviations), with the students from the first semester being the ones that show the most noticeable improvements and, paradoxically, it is these same students who decreased their self-perception of savings. It is possible that these results show that this group of students noticed a deficiency in their level of savings, and they are starting to solve it, but they still do not feel comfortable with their current level. On the other hand, although increases are also reported in formal savings, in the practice of comparing prices before buying and in making monthly budgets, these improvements are not statistically significant. For such a short duration of the course (about one month), I believe that those changes are substantial.

Finally, I examine the conditional mean effect of the GMF course on socio-emotional skills and two personality traits of the students. As seen in Table 5, there is a mixed effect on impulsiveness and an improvement in responsibility and emotional stability. However, only in the case of emotional stability, the improvement is statistically significant in the case of the entire sample (by 0.4087 standard deviations). The small number of observations of the subsamples might affect the statistical power to detect any effects. To discard the existence of any effect, further study involving a larger sample may be required.

The second type of analysis I conduct is to run an ordinary least squares regression to estimate equation (1) from Section 3.2.2. This analysis will also allow to examine the role of variables potentially correlated with financial literacy. As mentioned in the previous section, I am using the biweight kernel type for the matching as the main method. The results are presented in Table 6, where we include the covariates sequentially. All specifications include the financial knowledge entry test. For the main analysis, we will examine columns (1) to (5) (results from column (6), which implies a reduced sample, are examined in Section 4.2.1). Column (1) includes only the *Treatment* variable and reports the unconditional effect of the GMF course. Columns (2) to (5) adds more variables of interest and thus report the conditional means effect of the *Treatment*, which is around 0.40 standard deviations (with respect to the control group). In addition to the coefficient being relatively steady, this effect is statistically significant in all specifications.

We mentioned earlier that two of our variables of interest include the student's sex and their socioeconomic status, approximated by the college tuition brackets. As shown in Table 6, the coefficient on Women is small and statistically insignificant. On the other hand, in regards to the NSE, though all the coefficients on the college tuition brackets examined (with the lowest bracket as the omitted category) are positive, meaning that students from the richer NSE get larger gains in financial knowledge than those from the poorest NSE, only the coefficients from the fourth and the first (richest) are statistically significant at 90% or 95%.

Furthermore, looking at the influence of the cognitive reflection test score (an indicator correlated with cognitive ability (Frederick, 2005), we see that the point estimates are monotonically increasing (a higher cognitive ability is correlated with larger gains in financial literacy), though only the coefficient estimate on the highest score (CRT score = 3) is significant in all specifications (see columns 2 to 5). In columns 3 to 5, we include indicators for risk aversion and

Table 4
Conditional means effect of GMF on financial behavior (*Standardized variables*)

	All	Semester 1[a/]	Semester 0 and 1[a/]	Semester 2[a/]
		(1)	(2)	(3)
Has savings	0.3767*	0.7185**	0.5403*	0.2591
	(0.2121)	(0.3118)	(0.2785)	(0.2473)
N	100	48	59	38
R-squared	0.0528	0.1695	0.1225	0.1401
Has formal savings	0.1648	0.2471	0.1935	0.0292
	(0.1311)	(0.2506)	(0.1867)	(0.1499)
N	99	48	59	38
R-squared	0.0433	0.0434	0.0342	0.1876
Compare prices before purchase	0.2531	0.4913	0.5367*	-0.3539
	(0.2421)	(0.3548)	(0.3004)	(0.2876)
N	99	48	59	38
R-squared	0.0943	0.1313	0.1928	0.1040
Bargain prices	-0.0205	-0.0341	-0.0551	-0.0406
	(0.1287)	(0.2160)	(0.1648)	(0.1620)
N	98	47	58	38
R-squared	0.0456	0.1050	0.0915	0.0515
Makes a monthly budget	0.1302	0.0337	-0.0077	-0.0428
	(0.1842)	(0.2732)	(0.2060)	(0.0989)
N	99	48	59	38
R-squared	0.0446	0.0626	0.0528	0.0718

Note: Estimates obtained using ordinary least squares. All specifications include the following controls: sex, socioeconomic status (medium or high), indicator for high financial autonomy, and an indicator for having been born in Lima, the capital city of Peru. [a/] Semester 0 is devoted to take refresher courses, before the actual start of college studies. Column 1 reports Semester 1, column 2 reports Semesters 0 and 1, and column 3 reports Semester 2 (Semester 0 is unreported due to so few observations for a regression). Robust standard errors in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5

Resultados de Barrat's Impulsiveness Indicator y Personality Traits

	All	Semester 1[a/]	Semester 0 and 1[a/]	Semester 2[a/]
	(1)		(2)	(3)
Barrat's Impulsiveness Indicator				
Motor Impulsiveness	-0.0426	-0.1136	0.0310	-0.2627
	(0.1811)	(0.2001)	(0.1987)	(0.3894)
N	85	42	51	34
R-squared	0.1113	0.1129	0.0670	0.2026
Non-Planning Impulsiveness	0.2739	0.2176	0.2032	0.4162
	(0.1932)	(0.2448)	(0.2137)	(0.4843)
N	84	42	50	34
R-squared	0.1872	0.2618	0.1889	0.2444
Attentional Impulsiveness	-0.0045	0.1162	0.1403	-0.3513
	(0.1648)	(0.2056)	(0.1849)	(0.3116)
N	83	40	49	34
R-squared	0.0087	0.1928	0.0535	0.0714
Impulsiveness (Total)	0.1495	0.1691	0.2502	-0.1202
	(0.1758)	(0.2205)	(0.2191)	(0.3305)
N	82	40	48	34
R-squared	0.0522	0.1809	0.1231	0.0537
Personality Traits				
Responsibility	0.0384	0.2790	0.0641	-0.1539
	(0.1856)	(0.2314)	(0.2349)	(0.2672)
N	87	43	53	34
R-squared	0.0723	0.1529	0.1189	0.1532
Emotional Stability	0.4087*	0.4461	0.3653	0.5352
	(0.2292)	(0.3570)	(0.2989)	(0.3337)
N	86	43	52	34
R-squared	0.0977	0.1219	0.0935	0.1703

Note: Estimates obtained using ordinary least squares. All specifications include the following controls: sex, socioeconomic status (medium or high), indicator for high financial autonomy, and an indicator for having been born in Lima, the capital city of Peru. [a/] Semester 0 is devoted to take refresher courses, before the actual start of college studies. Column 1 reports Semester 1, column 2 reports Semesters 0 and 1, and column 3 reports Semester 2 (Semester 0 is unreported due to so few observations for a regression). Robust standard errors in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6

OLS Regression on the Standardized Financial Knowledge Test Score: Conditional means effect

	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.2966**	0.4357***	0.4160***	0.4037**	0.4214***	0.4616***
	(0.1240)	(0.1496)	(0.1571)	(0.1689)	(0.1574)	(0.1631)
Women		0.0002	-0.0804	0.0058	0.0328	0.0234
		(0.1424)	(0.1334)	(0.1180)	(0.1233)	(0.1304)
College tuition		0.6018**	0.6103**	0.5231*	0.5271*	0.5975*
bracket 4[a/]		(0.3036)	(0.2897)	(0.3114)	(0.3050)	(0.3487)
College tuition		0.6336**	0.6404**	0.4400	0.4077	0.4175
bracket 3[a/]		(0.3163)	(0.2958)	(0.3130)	(0.2995)	(0.3531)
College tuition		0.4813	0.4672	0.3797	0.3509	0.3788
bracket 2[a/]		(0.3261)	(0.3172)	(0.3455)	(0.3331)	(0.3832)
College tuition		0.7029**	0.6871**	0.5644*	0.6133*	0.7968**
bracket 1 (highest)[a/]		(0.3143)	(0.2930)	(0.3265)	(0.3241)	(0.3494)
CRT Score = 1[b/]		0.4188*	0.3791*	0.1871	0.2074	0.1745
		(0.2158)	(0.2020)	(0.1865)	(0.1915)	(0.2158)
CRT Score = 2[b/]		0.4843**	0.4378**	0.3217	0.3265	0.3932*
		(0.2285)	(0.2144)	(0.2028)	(0.2060)	(0.2204)
CRT Score = 3[b/]		0.5103**	0.4978**	0.3897*	0.4366*	0.4312
		(0.2453)	(0.2311)	(0.2184)	(0.2314)	(0.2629)
Risk Averse[c/]			0.2360	0.3280	0.4247	0.4286
			(0.2430)	(0.2649)	(0.2842)	(0.2926)
Impatient[d/]			-0.2737*	-0.2351*	-0.2217	-0.2514
			(0.1579)	(0.1369)	(0.1432)	(0.1517)
Responsibility[e/]				-0.0028	0.0205	0.0192
				(0.0109)	(0.0169)	(0.0171)
Emotional Stability[e/]				0.0125	0.0189*	0.0196*
				(0.0084)	(0.0102)	(0.0112)
Attentional					-0.0338	-0.0276
Impulsiveness[f/]					(0.0212)	(0.0221)
Motor Impulsiveness[f/]					0.0410	0.0456
					(0.0267)	(0.0294)
Non-Planning					-0.0183	-0.0156
Impulsiveness[f/]					(0.0195)	(0.0216)
Past semester's GPA						0.0045
						(0.0348)
Constant	4.1122***	3.6041***	3.6458***	3.4736***	2.6063**	2.6404**
	(0.2414)	(0.3600)	(0.4196)	(0.6985)	(1.1642)	(1.2456)
N	136	136	136	127	122	109
R-squared	0.5399	0.6163	0.6300	0.7063	0.7246	0.7193

Note: All specifications include the score in the entry test (unreported), which is negatively correlated with financial learning. Its inclusion increases significantly the R-squared. Specifications in columns 2 to 6 include the following controls: financial autonomy (index constructed using three questions: (i) who will pay for the next vacations (0, if her parents will pay it in full; 1, if parents will pay part of it; 2, if the student will pay it with her credit card; and 3, if she will pay it with her savings); (ii) If the student lives with both parents (+0) or not (+1); and (iii) if she has a savings account on her name (+1) or not (+0). Thus, this index takes values from 0 to 5, with a mean of 2.086 and a standard deviation of 1.415) and self-perception of financial knowledge (indicator equal to 1, if such individual self-perception is above that of the sample's average). a/ The omitted categories are college tuition brackets 0 (with a scholarship) and 5 (the lowest category). b/ The omitted category is 'CRT Score = 0'. c/ Indicator variable for the student choosing the hypothetical PEN 100 for certain, instead of a lottery with a 50/50 chance to receive PEN 200 or 0. d/ Indicator variable for the student choosing 'To receive PEN 200 guaranteed today' instead of 'To receive PEN 300 guaranteed in a month' or choosing 'To receive PEN 200 guaranteed in 6 months' instead of 'To receive PEN 300 guaranteed in 7 months'. e/ See Appendix B.3 for details on its construction. f/ See Appendix B.4 for details on its construction. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

impatience, which show a positive and negative correlation, respectively, with financial learning, but were not significant in all specifications (columns 4 and 5). Finally, regarding personality traits and socio-emotional skills, an interesting result is that emotional stability does appear to be positively correlated with greater financial learning (see columns 5 and 6), unlike responsibility and impulsiveness, which do not have statistically significant coefficients.

4.2.1 Heterogeneity in the Effects

There are at least three potential sources of heterogeneity in our sample. First, as students advance their college education, they are exposed to a broader set of topics (including the ones related to financial matters), which could make them respond differently to the GMF course. I estimate equation (1) for the subsamples of students enrolled in their first semester or second semester. I further aggregate the sample of students in their first semester with those taking refresher courses (semester 0). I replicate the estimation from the two more complete specifications estimated in Table 6, for the aforementioned subsamples, and include the result for all sample, for reference. The results, presented in Table 7, show that most of the conditional means effects from the GMF course estimated for the entire sample are coming from the subsample of students enrolled in their first semester (see column 3). Adding the youngest cohort (semester 0) reduces the point estimate (see column 5), but it is still significant, despite the relatively small sample size.

Table 7

OLS Regression on the Standardized Financial Knowledge Test Score: Conditional means effect by progress in college

	All		Semester 1[a/]		Semester 0 and 1[a/]		Semester 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.4214***	0.4616***	0.5982*	0.5271*	0.4959*	0.5271*	0.2362	0.2664
	(0.1574)	(0.1631)	(0.3042)	(0.3066)	(0.2840)	(0.3066)	(0.2328)	(0.2404)
Women	0.0328	0.0234	0.0060	-0.0018	0.0631	-0.0018	-0.0658	-0.0894
	(0.1233)	(0.1304)	(0.1962)	(0.1957)	(0.1695)	(0.1957)	(0.1575)	(0.1580)
College tuition bracket 4b/	0.5271*	0.5975*	0.5499	0.5624	0.4385	0.5624	0.1346	0.1762
	(0.3050)	(0.3487)	(0.4418)	(0.4427)	(0.3803)	(0.4427)	(0.2420)	(0.2355)
College tuition bracket 3b/	0.4077	0.4175	0.3601	0.4329	0.3901	0.4329	-0.3994	-0.3573
	(0.2995)	(0.3531)	(0.4149)	(0.4293)	(0.3490)	(0.4293)	(0.2752)	(0.2803)
College tuition bracket 2b/	0.3509	0.3788	0.1060	0.1066	0.1756	0.1066	-0.1167	-0.0748
	(0.3331)	(0.3832)	(0.4216)	(0.4163)	(0.3711)	(0.4163)	(0.2726)	(0.2586)
College tuition bracket 1b/	0.6133*	0.7968**	0.8635**	0.8635**	0.6088	0.8635**	0.1444	0.1779
	(0.3241)	(0.3494)	(0.3894)	(0.4005)	(0.3688)	(0.4005)	(0.3061)	(0.3146)
Past semester's GPA		0.0045		-0.0468		-0.0468		0.0319
		(0.0348)		(0.0577)		(0.0577)		(0.0414)
N	122	109	65	65	78	65	44	44
R-Squared	0.7246	0.7193	0.7810	0.7835	0.7634	0.7835	0.7775	0.7837

Note: Specifications are the same as columns 5 and 6 in Table 6. All specifications include the score in the entry test (which is negatively correlated with financial learning; its inclusion increases significantly the R-squared) and the following controls: financial autonomy (index constructed using three questions: (i) who will pay for the next vacations (0, if her parents will pay it in full; 1, if parents will pay part of it; 2, if the student will pay it with her credit card; and 3, if she will pay it with her savings); (ii) If the student lives with both parents (+0) or not (+1); and (iii) if she has a savings account on her name (+1) or not (+0). Thus, this index takes values from 0 to 5, with a mean of 2.086 and a standard deviation of 1.415) and self-perception of financial knowledge (indicator equal to 1, if such individual self-perception is above that of the sample's average). [a/] Semester 0 in college is devoted to take refresher courses, before the actual start of college studies. Columns 3 and 4 reports results for students enrolled in their Semester 1; columns 4 and 5, include the sample of students enrolled both in their Semesters 0 and 1; and columns 7 and 8 includes students enrolled in their Semester 2 (Semester 0 alone is unreported due to few observations for a regression). [b/] The omitted categories are college tuition brackets 0 (with a scholarship) and 5 (the lowest category). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Secondly, a referee suggested a heterogeneity analysis considering the variation in the GMF course completion. From the matched sample of 94 students in the intervention group, grouping the subjects by quintiles of completion date, using descriptive statistics we observe higher scores on the financial knowledge exit exam, for those who completed the course more promptly. This does not necessarily mean that we should observe more program effects on early birds, especially considering that there is not much variability in the number of days taken to complete the course.[24] I run a regression with dummy variables for quartiles of course completion date (Q1: completed the course between 1 and 34 days of the start; Q2: between 35 and 38 days; Q3: between 39 and 40 days; Q4: 41 days), and report the results in Table A.5 in the Appendix. Even though students who completed the course in more than 34 days do have smaller gains in financial knowledge than those who did it in fewer days, the difference is not statistically significant. Only in the case of quartile 4, the coefficient of interest reaches significance though in only two specifications (see first three rows).

Lastly, we would also aim to explore whether there is a differential effect by sex from the GMF course, as explained in Section 3.2.2. Results from estimating equation (2) are reported in Table 8, where we see that women are less likely to display smaller gains in financial literacy than men, though the relatively large standard errors do not allow to reject the null of nil effects. Note that in this specification, emotional stability becomes significant (at 90%) and is positively correlated with larger gains in financial knowledge, while the point estimates of attentional and non-planning impulsiveness slightly increase, compared to those in Table 6. Without further analysis, which should preferably involve a larger sample, I cannot tell whether the null effects are true non-zeros or not.[25]

4.2.2 Robustness Analysis

In principle, the results presented earlier could be affected by the inclusion of some indicators of analytical skills or a different matching method used. Unfortunately, we do not have administrative data about the performance of students in their last years of high school or the college entry exam, though we do have information on the past semester's GPA (though we have a number of non-responses on this variable). Including GPA data in the regressions does not alter the results (see column 6 in Table 6). With the CRT score already included in the regressions, perhaps it should not be surprising that the further inclusion of the GPA does not yield a significant coefficient. Despite the reduction in the sample size due to non-responses, including the GPA does not affect the main results from the GMF course in any of the additional estimations I ran (from equations (1) and (2)).

Furthermore, there is a bigger concern about all the relevant variables that could influence

[24] As mentioned earlier, most of the 111 students who completed the course did it on the last few days. To be specific, 43 students completed the course exactly on the 41st day since it started.

[25] I further estimated a conditional means effects by SES, in addition to sex, using an expanded version of equation (2). Though the conditional effect by SES is negative (students in higher SES display smaller gains in financial knowledge than those in the lowest SES), the coefficient estimate is significant in only two out of six specifications considered (available upon request from the author).

Table 8

OLS Regression on the Standardized Financial Knowledge Test Score: Conditional Means Effect with Differential Effects by Sex

	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.4816***	0.5744**	0.5543**	0.5534**	0.6116***	0.6706***
	(0.1720)	(0.2488)	(0.2470)	(0.2498)	(0.2253)	(0.2424)
Woman	0.1690	0.1554	0.0729	0.1783	0.2568	0.2644
	(0.1238)	(0.1536)	(0.1687)	(0.1762)	(0.1741)	(0.2028)
Treatment x Woman	-0.3318	-0.2277	-0.2224	-0.2507	-0.3279	-0.3401
	(0.2393)	(0.2668)	(0.2545)	(0.2434)	(0.2446)	(0.2808)
College tuition bracket 4[a/]		0.5875*	0.5947**	0.5051	0.5034	0.5690
		(0.3165)	(0.3002)	(0.3226)	(0.3171)	(0.3606)
College tuition bracket 3[a/]		0.6315*	0.6337**	0.4339	0.4044	0.4183
		(0.3204)	(0.3000)	(0.3180)	(0.3044)	(0.3564)
College tuition bracket 2[a/]		0.4616	0.4495	0.3581	0.3233	0.3473
		(0.3402)	(0.3276)	(0.3584)	(0.3439)	(0.3938)
College tuition bracket 1 (highest)[a/]		0.6900**	0.6744**	0.5504	0.6038*	0.7556**
		(0.3254)	(0.3018)	(0.3357)	(0.3303)	(0.3617)
CRT Score = 1[b/]		0.4087*	0.3708*	0.1746	0.1880	0.1801
		(0.2206)	(0.2053)	(0.1896)	(0.1948)	(0.2148)
CRT Score = 2[b/]		0.4778**	0.4339**	0.3163	0.3131	0.3796*
		(0.2293)	(0.2145)	(0.2029)	(0.2040)	(0.2182)
CRT Score = 3[b/]		0.4895*	0.4779**	0.3712	0.4105*	0.4064
		(0.2539)	(0.2383)	(0.2292)	(0.2424)	(0.2746)
Risk Averse[c/]			0.2529	0.3494	0.4618	0.4652
			(0.2411)	(0.2644)	(0.2840)	(0.2945)
Impatient[d/]			-0.2624	-0.2263	-0.2110	-0.2460
			(0.1604)	(0.1410)	(0.1461)	(0.1536)
Responsibility[e/] /				-0.0034	0.0200	0.0184
				(0.0109)	(0.0171)	(0.0172)
Emotional Stability[e/]				0.0139*	0.0203**	0.0214*
				(0.0081)	(0.0101)	(0.0109)
Attentional Impulsiveness[f/]					-0.0369*	-0.0286
					(0.0208)	(0.0218)
Motor Impulsiveness[f/]					0.0364	0.0408
					(0.0282)	(0.0307)
Non-Planning Impulsiveness[f/]					-0.0200	-0.0184
					(0.0195)	(0.0224)
Past semester's GPA						0.0016
						(0.0351)
Constant	3.9933***	3.5055***	3.5313***	3.3436***	2.5306**	2.5655**
	(0.2676)	(0.3360)	(0.4076)	(0.6913)	(1.1853)	(1.2651)
N	136	136	136	127	122	109
R-Squared	0.5446	0.6182	0.6317	0.7087	0.7288	0.7231

Note: All specifications include the score in the entry test (unreported), which is negatively correlated with financial learning. Its inclusion increases significantly the R-squared. Specifications in columns 2 to 6 include the following controls: financial autonomy (index constructed using three questions: (i) who will pay for the next vacations (0, if her parents will pay it in full; 1, if parents will pay part of it; 2, if the student will pay it with her credit card; and 3, if she will pay it with her savings); (ii) If the student lives with both parents (+0) or not (+1); and (iii) if she has a savings account on her name (+1) or not (+0). Thus, this index takes values from 0 to 5, with a mean of 2.086 and a standard deviation of 1.415) and self-perception of financial knowledge (indicator equal to 1, if such individual self-perception is above that of the sample's average). [a/] The omitted categories are college tuition brackets 0 (with a scholarship) and 5 (the lowest category). [b/] The omitted category is 'CRT Score = 0'. [c/] Indicator variable for the student choosing the hypothetical PEN 100 for certain, instead of a lottery with a 50/50 chance to receive PEN 200 or 0. [d/] Indicator variable for the student choosing 'To receive PEN 200 guaranteed today' instead of 'To receive PEN 300 guaranteed in a month' or choosing 'To receive PEN 200 guaranteed in 6 months' instead of 'To receive PEN 300 guaranteed in 7 months'. [e/] See Appendix B.3 for details on its construction. [f/] See Appendix B.4 for details on its construction. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

the gains in students' financial knowledge.[26] Considering the literature I reviewed, the fullest specification I used (see column 6 in Table 6) has more covariates than the ones that appear in most if not all of them. Also, to my best knowledge, no theory-based arguments are used for studying the role of those covariates. For instance, Lusardi and Mitchell (2014) proposes to examine age, sex, education, race/ethnicity, income, and employment in regards to financial literacy or the lack thereof. I addressed all of the relevant ones, considering the age cohort I study (that has no income or employment data), and, given the state-of-the-art, I would not have a solid argument to claim any upward or downward bias caused by any omitted variable.

Second, I estimate equation (1), with the same specifications shown in Table 6, but now using four alternative matching methods (see page foot 20 on page 9). Table 6, panels A to D, in the Appendix, summarizes the results. For each subsample, the table only reports the results for the coefficients on *Treatment*, sex, college tuition brackets, and past semester's GPA (full results are available upon request). As shown in that table, with the exception of the use of the nearest-neighbor method with 4 neighbors, which yields similar coefficients on *Treatment* as those reported in Table 6 (see panel D in Table 6), the other three methods yield larger point estimates (see panels A to C in Table 6). These results provide some confidence that, if anything, I may not be overestimating the conditional means effect of the GMF course with the matching method chosen for the main analysis.

5. Concluding Remarks

The international literature on financial education shows two important results, which hold for both the adult and youth population: the level of financial knowledge is low and the improvements resulting from financial education programs are generally modest. In contrast to this evidence, in this work, I find that the virtual course *Gestionando mis Finanzas*, which seeks to help close the gap in basic financial knowledge among Peruvian young people, is associated with a sizeable increase in conditional means of college students' financial learning (by 0.42 standard deviations); an effect that is even larger for the students in their first semester (by 0.60 standard deviations). In addition, taking this virtual course is correlated with substantial improvements in the perception of financial knowledge (subjective learning), which is probably due to greater self-confidence it induced, and, to a lesser extent, in savings behavior.

A note on the external validity of these results and the difficulty to examine treatment effects without a proper design is in order. First, we study a particular set of students, who are on average more likely to be interested and to have more information about economic matters than students from most of other universities. Thus, though the results reported in this article may be representative of the earliest cohort of students from the university under study, this does not necessarily extend to older cohorts of students. Also, students from other universities may have different results from the same course. In regards to the evaluation of financial education programs, a difficulty I faced was the lack of students' persistence to complete an elective course

[26] A referee pointed out the necessity to discuss my selection of relevant variables that may influence students' knowledge and behavior, and the potential role played, and bias caused, by the omitted variables.

whose benefits are not readily seen. Without further incentives, we would not have enough observations to conduct the evaluation. Given the elective/voluntary nature of the course, this suggests that examining its effect in other universities may be complicated (unless they have a higher motivation to learn these topics).

The analysis of the influence of personality traits and socioemotional skills on financial knowledge is a topic that is not sufficiently studied. In my analysis, I find a role for emotional stability, a result which stresses the importance of strengthening that trait to achieve larger gains in financial learning. In a broader sense, an issue that would benefit from further research is testing whether the gains in financial learning would remain among other samples of college students. This article shows that *Gestionando mis Finanzas* holds the promise to contribute to expand financial learning in the young population; even more so in the context of the COVID- 19 pandemic, in which virtual education has become an important part of our learning tools.

Appendix

Appendix A: Tables

Table A.1
Weekly progress in the GMF course, 2019 (Number of participants)

Progress	Sept. 8	Sept. 15	Sept. 22	Sept. 29	Oct. 6	Oct. 13
None	525	491	466	444	417	379
Completed the Entry Survey	158	192	216	232	257	295
Completed Module 1	61	82	102	107	134	175
Completed Module 2	22	32	49	57	88	142
Completed Module 3	12	21	31	37	59	135
Completed Module 4	6	11	19	28	49	132
Completed Module 5	3	6	13	25	42	120
Completed Module 6	2	4	10	20	33	119
Completed Module 7	2	4	9	16	29	118
Completed the Course	2	4	8	16	28	111

Table A.2

Financial Knowledge Entry and Exit Test Results: Intervention Group

	Entry Test Score		Exit Test Score		Difference[1/]	p-value	N
	Mean (1)	Std. Dev.	Mean (2)	Std. Dev.	(2) - (1)	(Diff>0)	
Question 1	0.802	0.400	0.919	0.274	0.117***	0.006	111
Question 2	0.351	0.480	0.838	0.370	0.487***	0.000	111
Question 3	0.414	0.495	0.829	0.378	0.415***	0.000	111
Question 4	0.802	0.400	0.847	0.362	0.045	0.189	111
Question 5	0.757	0.431	0.874	0.333	0.117**	0.012	111
Question 6	0.901	0.300	0.901	0.300	0.000	0.500	111
Question 7	0.865	0.343	0.946	0.227	0.081**	0.020	111
Question 8	0.892	0.312	0.955	0.208	0.063**	0.039	111
Question 9	0.919	0.274	0.973	0.163	0.054**	0.038	111
Question 10	0.874	0.333	0.973	0.163	0.099***	0.003	111
Question 11	0.811	0.393	0.946	0.227	0.135***	0.001	111
Question 12	0.883	0.323	0.937	0.244	0.054*	0.080	111
Question 13	0.604	0.491	0.486	0.502	-0.118	0.960	111
Question 14	0.432	0.498	0.694	0.463	0.262***	0.000	111
Question 15	0.748	0.436	0.910	0.288	0.162***	0.001	111
Total Score	**11.054**	**3.170**	**13.027**	**3.691**	**1.973*** **	**0.000**	**111**

[1/] One-tail mean test. * p < 0.10, ** p < 0.05, *** p < 0.01

Table A.3

Financial Knowledge Entry Test: Comparison Group

	Mean	Standard Deviation	N
Question 1	0.761	0.431	46
Question 2	0.239	0.431	46
Question 3	0.217	0.417	46
Question 4	0.783	0.417	46
Question 5	0.674	0.474	46
Question 6	0.696	0.465	46
Question 7	0.870	0.341	46
Question 8	0.891	0.315	46
Question 9	0.826	0.383	46
Question 10	0.870	0.341	46
Question 11	0.696	0.465	46
Question 12	0.848	0.363	46
Question 13	0.522	0.505	46
Question 14	0.326	0.474	46
Question 15	0.804	0.401	46
Total Score	**10.022**	**2.687**	**46**

Table A.4

Descriptive Statistics for the Intervention and Comparison Groups (Averages)

	Intervention (1)	N	Comparison (2)	N	Difference (2) - (1)	p-value[a/]
A. Individual characteristics						
Age (years)	18.657	103	18.543	41	-0.114	0.835
Women (=1)	0.568	111	0.543	46	-0.024	0.784
Education level: Mother (1 to 11)	4.688	109	4.652	46	-0.036	0.911
Education level: Father (1 to 11)	5.064	109	5.174	46	0.110	0.713
Born in Lima (=1)	0.676	111	0.717	46	0.042	0.610
Lives with parents (=1)	0.591	110	0.587	46	-0.004	0.964
High socioeconomic status (=1)	0.358	109	0.333	46	-0.024	0.774
College tuition bracket (0 to 5)	2.713	101	2.333	42	-0.380	0.146
Financial autonomy (0 to 5)	2.086	105	2.065	46	-0.020	0.933
High financial autonomy (=1)	0.324	105	0.348	46	0.024	0.775
CRT Score (0 to 3)	1.369	111	1.065	46	-0.304	0.144
Risk averse (=1)	0.858	106	0.826	46	-0.032	0.611
Impatient (=1)	0.324	105	0.348	46	0.024	0.775
Impatient in the short run (=1)	0.238	105	0.196	46	-0.042	0.569
Impatient in the medium-run (=1)	0.143	105	0.174	46	0.031	0.628
Hyperbolic discounting (=1)	0.181	105	0.174	46	-0.007	0.918
B. Financial behavior and objective knowledge						
Has savings (=1)	0.717	106	0.652	46	-0.065	0.428
Has formal savings (=1)	0.340	106	0.457	46	0.117	0.174
Bargain prices (=1)	0.610	105	0.565	46	-0.044	0.612
Compare prices before purchase (=1)	0.925	106	0.804	46	-0.120	0.031
Makes a monthly budget (=1)	0.774	106	0.609	46	-0.165	0.037
Financial knowledge entry test (0 to 20)	**11.054**	**111**	**10.022**	**46**	**-1.032**	**0.054**
Score on general Mathematics I (0 to 20)	12.563	87	12.742	31	0.179	0.767
Score on general Economics I (0 to 20)	13.241	54	14.579	19	1.338	0.018
Past semester's GPA	13.59	91	14.42	33	0.827	0.019
C. Personality traits and socioemotional skills						
Responsibility	37.074	95	34.043	46	-3.030	0.001
Emotional Stability	33.000	94	28.378	46	-4.622	0.000
Attentional Impulsiveness	14.925	93	13.578	46	-1.347	0.015
Motor Impulsiveness	8.526	95	9.848	46	1.322	0.010
Non-Planning Impulsiveness	14.710	93	14.065	46	-0.644	0.220
Barrat Impulsiveness Total	38.087	92	37.400	46	-0.687	0.412
D. Self-perception						
Self-perception of being a saver (1 to 10)	4.638	105	4.696	46	0.058	0.863
Self-perception of financial knowledge (1 to 10)	5.865	104	4.913	46	-0.952	0.003
Self-perception of math skills (1 to 10)	7.087	104	6.565	46	-0.521	0.053

[a/] P-value for the mean difference being not equal to 0.

Table A.5

OLS Regression on the Standardized Financial Knowledge Test Score: Conditional means effect by quartile of course completion's date

	(1)	(2)	(3)	(4)	(5)	(6)
Course Completion Date: Q2[a/]	-0.0567	-0.2353	-0.2973	-0.2455	-0.2885	-0.2653
	(0.1572)	(0.2162)	(0.2130)	(0.1934)	(0.2582)	(0.3073)
Course Completion Date: Q3[a/]	-0.2962	-0.4988	-0.4735	-0.1077	-0.2880	-0.2500
	(0.3061)	(0.3287)	(0.3101)	(0.1994)	(0.2343)	(0.2978)
Course Completion Date: Q4[a/]	-0.3285	-0.3681*	-0.3965*	-0.2748	-0.2788	-0.3078
	(0.2320)	(0.2190)	(0.2127)	(0.1879)	(0.1999)	(0.2710)
Women		-0.1019	-0.2382	-0.2496	-0.2337	-0.2705
		(0.2058)	(0.1739)	(0.1571)	(0.1546)	(0.1672)
College Tuition Bracket 4[b/]		1.0192**	1.0356**	1.1473**	1.1018**	1.0957*
		(0.4721)	(0.4421)	(0.5625)	(0.5505)	(0.5764)
College Tuition Bracket 3[b/]		1.1819**	1.1705***	1.1287*	1.0554*	1.0304
		(0.4761)	(0.4423)	(0.5820)	(0.5597)	(0.6288)
College Tuition Bracket 2[b/]		1.0043*	0.9624**	0.9896	0.9619	0.9083
		(0.5242)	(0.4794)	(0.5977)	(0.5911)	(0.6520)
College Tuition Bracket 1		1.1683**	1.0524**	1.0341*	0.8997*	1.0250*
(Highest)[b/]		(0.5353)	(0.4496)	(0.5652)	(0.5049)	(0.5340)
CRT Score = 1[c/]		0.3735	0.2781	-0.1472	-0.0734	-0.0615
		(0.2938)	(0.2698)	(0.2142)	(0.2463)	(0.2589)
CRT Score = 2[c/]		0.4012	0.2852	-0.0367	0.0025	0.0722
		(0.3309)	(0.2945)	(0.2305)	(0.2701)	(0.2738)
CRT Score = 3[c/]		0.4353	0.3490	0.1002	0.1430	0.1390
		(0.3393)	(0.2966)	(0.2134)	(0.2259)	(0.2499)
Risk Averse[d/]			0.4574	0.5611*	0.7416*	0.7568*
			(0.3144)	(0.3068)	(0.3736)	(0.3894)
Impatient[e/]			-0.3181	-0.4044*	-0.3314	-0.3407
			(0.2166)	(0.2131)	(0.2116)	(0.2555)
Responsibility[f/]				-0.0127	0.0142	0.0175
				(0.0139)	(0.0225)	(0.0265)
Emotional Stability[f/]				0.0291**	0.0325*	0.0301
				(0.0120)	(0.0166)	(0.0196)
Attentional Impulsiveness[g/]					-0.0026	0.0010
					(0.0339)	(0.0391)
Motor Impulsiveness[g/]					0.1029*	0.1143*
					(0.0601)	(0.0659)
Non-Planning Impulsiveness[g/]					-0.0231	-0.0139
					(0.0414)	(0.0547)
Past Semester's GPA						-0.0083
						(0.0487)
Constant	4.6011***	4.0572***	4.0061***	3.4294***	1.6729	1.7122
	(0.4219)	(0.6065)	(0.6250)	(0.9230)	(1.8662)	(1.9097)
N	94	94	94	86	82	76
R-Squared	0.4776	0.5988	0.6212	0.7353	0.7611	0.7618

Note: All specifications include the score in the entry test (unreported), which is negatively correlated with financial learning. Its inclusion increases significantly the R-squared. Specifications in columns 2 to 6 include the following controls: financial autonomy (index constructed using three questions: (i) who will pay for the next vacations (0, if her parents will pay it in full; 1, if parents will pay part of it; 2, if the student will pay it with her credit card; and 3, if she will pay it with her savings); (ii) If the student lives with both parents (+0) or not (+1); and (iii) if she has a savings account on her name (+1) or not (+0). Thus, this index takes values from 0 to 5, with a mean of 2.086 and a standard deviation of 1.415) and self-perception of financial knowledge (indicator equal to 1, if such individual self-perception is above that of the sample's average). a/ The omitted quartile is the one that took the fewest number of days to complete de GMF course. b/ The omitted categories are college tuition brackets 0 (with a scholarship) and 5 (the lowest category). c/ The omitted category is 'CRT Score = 0'. d/ Indicator variable for the student choosing the hypothetical PEN 100 for certain, instead of a lottery with a 50/50 chance to receive PEN 200 or 0. e/Indicator variable for the student choosing 'To receive PEN 200 guaranteed today' instead of 'To receive PEN 300 guaranteed in a month' or choosing 'To receive PEN 200 guaranteed in 6 months' instead of 'To receive PEN 300 guaranteed in 7 months'. f/ See Appendix B.3 for details on its construction. g/ See Appendix B.4 for details on its construction. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table A.6

OLS Regression on the Standardized Financial Knowledge Test Score: Conditional means effect using alternative matching methods

	(1)	(2)	(3)	(4)	(5)	(6)
A. Nearest neighbor (1 neighbor)						
Treatment	0.6307**	0.8357**	0.7976**	0.8047**	0.9331**	0.7787**
	(0.2896)	(0.3314)	(0.3265)	(0.3578)	(0.3850)	(0.3782)
Women		-0.0001	-0.0685	0.0666	0.1150	0.2197
		(0.2355)	(0.2386)	(0.2387)	(0.2484)	(0.2657)
College tuition bracket 4[a/]		0.5361	0.5561	0.3286	0.3631	0.2579
		(0.4110)	(0.4081)	(0.4456)	(0.4372)	(0.4092)
College tuition bracket 3[a/]		0.5887	0.6371	0.2881	0.2783	0.1357
		(0.4370)	(0.4266)	(0.4713)	(0.4580)	(0.4590)
College tuition bracket 2[a/]		0.2471	0.2250	-0.0207	-0.0410	-0.2284
		(0.4713)	(0.4775)	(0.5386)	(0.5126)	(0.5144)
College tuition bracket 1 (Highest) [a/]		0.4963	0.4866	0.2115	0.3208	0.4438
		(0.4945)	(0.4890)	(0.5272)	(0.4922)	(0.4000)
Past semester's GPA						-0.0283
						(0.0477)
N	136	136	136	127	122	109
R-squared	0.2900	0.3349	0.3419	0.4040	0.4483	0.5286
B. Nearest neighbor (2 neighbors)						
Treatment	0.5826***	0.6815***	0.6477***	0.6173***	0.6622***	0.6691***
	(0.1907)	(0.2128)	(0.2086)	(0.2231)	(0.2257)	(0.2314)
Women		0.0828	0.0373	0.1439	0.1667	0.1563
		(0.1705)	(0.1680)	(0.1603)	(0.1706)	(0.1837)
College tuition bracket 4[a/]		0.7148**	0.7331**	0.6360*	0.6817*	0.7299*
		(0.3291)	(0.3269)	(0.3542)	(0.3473)	(0.3768)
College tuition bracket 3[a/]		0.8075**	0.8564**	0.6365*	0.6376*	0.6441
		(0.3450)	(0.3342)	(0.3654)	(0.3488)	(0.3944)
College tuition bracket 2[a/]		0.5192	0.5005	0.4073	0.4241	0.4490
		(0.3811)	(0.3868)	(0.4273)	(0.4175)	(0.4508)
College tuition bracket (Highest)[a/]		0.7952**	0.7903**	0.6506*	0.7299*	1.0288***
		(0.4945)	(0.4890)	(0.5272)	(0.4922)	(0.4000)
Past semester's GPA						0.0340
						(0.0413)
N	136	136	136	127	122	109
R-squared	0.4126	0.4939	0.4999	0.5634	0.5805	0.6061
C. Radius (caliper = 0.03)						
Treatment	0.3832***	0.5305***	0.5091***	0.5002***	0.5221***	0.5788***
	(0.1372)	(0.1612)	(0.1689)	(0.1815)	(0.1702)	(0.1777)
Women		-0.0009	-0.0771	0.0112	0.0357	0.0261

		(0.1454)	(0.1388)	(0.1252)	(0.1303)	(0.1350)
College tuition bracket		0.5824*	0.5872*	0.4893	0.5076	0.6358*
4[a/]		(0.3116)	(0.2982)	(0.3226)	(0.3130)	(0.3613)
College tuition bracket		0.6279*	0.6318**	0.4221	0.4043	0.4742
3[a/]		(0.3236)	(0.3032)	(0.3228)	(0.3077)	(0.3677)
College tuition bracket		0.4634	0.4448	0.3391	0.3245	0.4154
2[a/]		(0.3383)	(0.3272)	(0.3581)	(0.3418)	(0.3979)
College tuition bracket		0.7766**	0.7564**	0.6229*	0.6852**	0.9500**
(Highest)[a/]		(0.3221)	(0.3027)	(0.3401)	(0.3357)	(0.3702)
Past semester's GPA						-0.0009
						(0.0370)
N	135	135	135	126	121	108
R-squared	0.5180	0.6009	0.6132	0.6859	0.7080	0.7076
D. Nearest neighbor (4 neighbors)						
Treatment	0.3315**	0.4668***	0.4346***	0.4031**	0.4323**	0.4753***
	(0.1400)	(0.1605)	(0.1636)	(0.1745)	(0.1661)	(0.1685)
Women		-0.0434	-0.1358	-0.0411	-0.0155	-0.0236
		(0.1476)	(0.1359)	(0.1196)	(0.1246)	(0.1318)
College tuition bracket		0.6029*	0.6183**	0.5261	0.5465*	0.6302*
4[a/]		(0.3106)	(0.2972)	(0.3173)	(0.3083)	(0.3472)
College tuition bracket		0.6030*	0.6300**	0.4247	0.4075	0.4373
3[a/]		(0.3198)	(0.2995)	(0.3169)	(0.3031)	(0.3507)
College tuition bracket		0.3918	0.3712	0.2823	0.2721	0.3111
2[a/]		(0.3375)	(0.3300)	(0.3593)	(0.3455)	(0.3848)
College tuition bracket 1		0.6588**	0.6423**	0.5187	0.5819*	0.7873**
(Highest)[a/]		(0.3271)	(0.3079)	(0.3386)	(0.3325)	(0.3458)
Past semester's GPA						0.0141
						(0.0356)
N	136	136	136	127	122	109
R-squared	0.2900	0.3349	0.3419	0.4040	0.4483	0.5286

Note: I am using the same specifications as in Table 6, but the table only reports results for the treatment, sex, college tuition, and past semester's college GPA. [a/] The omitted categories are college tuition brackets 0 (with a scholarship) and 5 (the lowest category). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parenthesis.

Appendix B: Instruments Used in the Study

Appendix B1: Entry Survey

(Note: the Exit Survey is the same; except for questions 1–5 and 19–21)

Please answer the following questions:

Information

1. Where were you born?
   (a) In Lima
   (b) In another province in Peru (please, indicate which one)
   (c) In another country
2. In which district do you live? (multiple choices)
3. Do you currently live with your parents?
   (a) Yes
   (b) No
4. What is your Mother's education level?
   (a) Complete Primary
   (b) Some Secondary
   (c) Complete Secondary
   (d) Some post-secondary technical education
   (e) Some 5-year college studies
   (f) Complete post-secondary technical education
   (g) Complete 5-year college studies
   (h) Graduate studies
5. What is your Father's education level?
   (a) Complete Primary
   (b) Some Secondary
   (c) Complete Secondary
   (d) Some post-secondary technical education
   (e) Some 5-year college studies
   (f) Complete post-secondary technical education
   (g) Complete 5-year college studies
   (h) Graduate studies
6. Do you currently have any type of savings?
   (a) Yes
   (b) No

7. Do you have a savings account under your name in any financial institution (bank, financial enterprise, caja municipal, etc.)?

   (a) Yes

   (b) No

Next question is a proxy variable for risk aversion

(An individual deemed as "risk averse", if she chooses option A in question 8)

8. If you had to choose between PEN 100 with certainty or a 50% chance of receiving PEN 200 and a 50% chance of receiving nothing, which one would you choose?

   (a) To receive PEN 100 with certainty

   (b) To have a 50% chance to receive PEN 200 and a 50% de chance to receive PEN 0

9. How will you pay for your next vacation trip?

   (a) Exclusively with my own savings

   (b) I will pay with my credit card

   (c) My parents will pay it in part

   (d) My parents will pay it in full

10. Do you prepare a monthly budget, in which you make projections for your main personal income and expenditure items?

    (a) Yes, always

    (b) Yes, sometimes

    (c) No

11. When you buy something, you?:

    (a) Compare prices in different shops before making the purchasing decision

    (b) Buy what you are looking for in the first available store

12. When you pay for a good or service, you?:

    (a) Bargain the final price with the vendor

    (b) Pay the list price set by the vendor

The next two questions measure patience and hyperbolic discounting

(An individual is considered as "impatient", if she chooses option A in question 13 or option A in question 14. She is considered to have "hyperbolic discount rate" (i.e., she is patient in the short-run, but impatient in the long-run), if she chooses option B in question 13 and option A in question 14.

13. If you had to choose between receiving PEN 200 guaranteed today or PEN 300 guaranteed in a month, which one would you prefer?

    (a) To receive PEN 200 guaranteed today

    (b) To receive PEN 300 guaranteed in a month

14. If you had to choose between receiving PEN 200 guaranteed in 6 months or PEN 300 guaranteed in 7 months, which one would you prefer?

    (a) To receive PEN 200 guaranteed in 6 months

    (b) To receive PEN 300 guaranteed in 7 months

15. Some persons tend to be very thrifty and save all the money they can, while others tend to spend all they have, and even to take a loan to keep spending. In a 1-to-10 scale, where 1 represents a very thrifty person and 10 means a very spendthrift person, how would you rate yourself?

1	2	3	4	5	6	7	8	9	10

16. In a 1-to-10 scale, where 1 es the lowest level and 10 is the highest level, how would you rate your level of financial knowledge?

1	2	3	4	5	6	7	8	9	10

17. In a 1-to-10 scale, where 1 es the lowest level and 10 is the highest level, how would you rate your level of math skills?

1	2	3	4	5	6	7	8	9	10

18. Please indicate how you learned about the use and management of money:

In high school	1
From my parents/tutors	2
From my friends	3
From my relatives	4
Through the media (TV, Internet, and the like)	5
I have not received any financial education	6

The Frederick (2005)'s Cognitive Reflection Test. See Appendix B2 for its interpretation.
(Correct answers are marked in blue, with an asterisk)

19. If 5 machines take 5 minutes to produce 5 cell phones, How much time will 100 machines take to produce 100 cell phones?

    (a) 10 minutes

    (b) 5 minutes*

    (c) 100 minutes

20. A bat and a ball cost PEN 1.10 in total. The bat costs PEN 1 more than the ball. How much does the ball cost?

    (a) 10 cents

    (b) 50 cents

    (c) 5 cents*

21. There is an island on a lake. Every day, this island doubles in size. If it takes 48 days for the island to entirely cover the lake, how many days will it take for the island to cover half the lake?

(a)

(b) 47 days*

(c) 10 days

(d) 24 days

Please, indicate how much you agree or disagree with the following statements:

Capturing two personality traits: responsibility (questions 22–31) and emotional stability (questions 32–41). Appendix B3 explains how we constructed the indicators, based on that information.

22. I am always prepared

    (a) Completely agree

    (b) Agree

    (c) Neither agree nor disagree

    (d) Disagree

    (e) Completely disagree

23. I leave my belongings in any place

    (a) Completely agree

    (b) Agree

    (c) Neither agree nor disagree

    (d) Disagree

    (e) Completely disagree

24. I pay attention to details

    (a) Completely agree

    (b) Agree

    (c) Neither agree nor disagree

    (d) Disagree

    (e) Completely disagree

25. I am messy

    (a) Completely agree

    (b) Agree

    (c) Neither agree nor disagree

    (d) Disagree

    (e) Completely disagree

26. I complete my tasks promptly

    (a) Completely agree

    (b) Agree

    (c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

27. Often times, I forget to place items where they belong

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

28. I like order

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

29. I elude my duties

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

30. I make a schedule and follow through

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

31. I like perfection in my work

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

32. I get stressed out easily

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

33. I am relaxed most of the time

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

34. I worry about everything

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

35. I rarely feel blue

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

36. I am easily disturbed

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

37. I get upset easily

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

38. I change my mood a lot

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

39. I have frequent mood swings

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

40. I get irritated easily

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

41. I often feel blue

(a) Completely agree

(b) Agree

(c) Neither agree nor disagree

(d) Disagree

(e) Completely disagree

*What comes next is the Barratt Impulsiveness Scale (BIS-15) [Orozco-Cabal et al., 2010]. It contains three components: motor impulsiveness (questions 42-46); non-planning impulsiveness (questions 47–*51); *attentional impulsiveness (questions 52-56) http://www.impulsivity.org/measurement/bis11.* Appendix B4 explains how we use this information to construct the related indicators for the analysis.

Indicate how much you agree or disagree with the following statements. Please, answer quickly and honestly.

42. I act impulsively

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

43. I do things on the spur of the moment

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

44. I do things without thinking

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

45. I say things without thinking

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

46. I buy on impulse

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

47. I plan for job security

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

48. I plan for the future

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

49. I save on a regular basis

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

50. I plan tasks carefully

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

51. I am a careful thinker

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

52. I squirm at plays or lectures

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

53. It is hard for me to keep quiet for long periods

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

54. I can concentrate easily

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

55. I am a steady thinker

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

56. I get easily bored when solving thought problems

(a) Rarely or never

(b) Occasionally

(c) Often

(d) Almost always or always

Appendix B2: Frederick (2005)'s Cognitive Reflection Test

The Cognitive Reflection Test–CRT contains 3 questions:

1. If 5 machines take 5 minutes to produce 5 cell phones, How much time will 100 machines take to produce 100 cell phones?
   (a) 10 minutes
   (b) 5 minutes*
   (c) 100 minutes
2. A bate and a ball cost PEN 1.10 in total. A bate costs PEN 1 more than a ball. How much does the ball cost?
   (a) 10 cents
   (b) 50 cents
   (c) 5 cents*
3. There is an island in a lake. Every day, this island doubles in size. If it takes 48 days for the island to entirely cover the lake, How many days will it take for it to cover half the lake?
   (a) 47 days*
   (b) 10 days
   (c) 24 days

Note: Cognitive ability (*cognitiveness*) is reflected by the number of correct answers (b, c a, respectively), while the extent of intuition (*intuitiveness*) is given by the number of intuitive but incorrect answers (c, a, & c, respectively). We will use only the first indicator in our analysis.

Appendix B3: Personality Traits

(Likert scale)

Question: "Please indicate how much you agree or disagree with the following statements"

1. Completely Agree	2. Agree	3. Neither Agree nor Disagree	4. Disagree	5. Completely Disagree

Responsibility	
1. I am always ready	+
2. I leave my belongings in any place	-
3. I pay attention to details	+
4. I am messy	-
5. I do my tasks promptly	+
6. I often forget to place things where they belong	-
7. I like order	+
8. I elude my duties	-
9. I make a schedule and follow through	+
10. I like perfection in my work	+
Emotional Stability	
1. I am stressed out easily	-
2. I am relaxed most of the time	+
3. I worry about everything	-
4. I rarely feel blue	+
5. I get upset easily	-
6. I am easily disturbed	-
7. I change my mood a lot	-
8. I have frequent mood swings	-
9. I get irritated easily	-
10. I often feel blue	-

Note: To construct the aggregate indicator for *responsibility* and *emotional stability*, we use the following Table:

+ **Positive Items**	**Score**
Completely Disagree	1
Disagree	2
Neither Agree nor Disagree	3
Agree	4
Completely Agree	5
- Negative Items	
Completely Disagree	5
Disagree	4
Neither Agree nor Disagree	3
Agree	2
Completely Agree	1

Appendix B4: Barratt Impulsiveness Scale (*BIS-15*)

(Orozco-Cabal et al., 2010)

Please how much you agree or disagree with the following statements, using the following scale. Please, respond quickly and honestly. The scores go from 5 to 20 in each area (motor, planning and attention).

Read each statement and mark your answer with an "X"	1. Rarely or never	2. Occasionally	3. Often	4. Almost always or always
Motor Impulsiveness				
1. I act impulsively				
2. I make things on the spur of the moment				
3. I do things without thinking				
4. I say things without thinking				
5. I buy on impulse				
Non-Planning Impulsiveness				
6. I plan for job security				
7. I plan for the future				
8. I save regularly				
9. I plan my tasks carefully				
10. I am a careful thinker				
Attentional Impulsiveness				
11. I squirm at plays or lectures	-			
12. It is hard for me to keep quiet for long periods	-			
13. I can concentrate easily	+			
14. I am a steady thinker	+			
15. I get easily bored when solving thought problems	-			

Note: For questions 1-10, the scores for the selected choice are the ones indicated above (1: Rarely or never;...; 4: Almost always or always); for questions 11-15, if the item represents an affirmative assertion about attention (given by the "+" in the table above: questions 11, 12, 15), the scores are the ones indicated in the table heading. And, if the item represents a negative assertion about attention (given by the "-" in the table above: questions 13, 14), the scores are as follows: 1: Almost always or always, ..., 4: Rarely or never.
Motor impulsiveness related to acting before thinking; *non-planning impulsiveness* related to lack of orientation for the future; and *attentional impulsiveness* is related to the difficulty to focus the attention.

Appendix B5: Financial Knowledge and Abilities Test (15 Questions)

(Correct answers are in color blue, marked with an asterisk)

Your score will be used to assess you current level of knowledge and attitudes

1. Imagine that this month, you have a revenue of PEN 300, but you have spent PEN 375 purchasing a new cell phone. When our expenses exceed our revenue, we say we have a:
   (a) Deficit*
   (b) Superavit
   (c) Surplus
   (d) None of the above
2. Those expenses needed to secure our livelihoods but that can be reduced are known as:
   (a) Discretionary expenditures
   (b) Variable expenditures*
   (c) Fixed expenditures
   (d) None of the above
3. Should we take insurance against all negative events?
   (a) Yes, one must take insurance against all risks because we do not know what could happen to us, nor when
   (b) Yes, it is best to be insured always
   (c) No, one must only take insurance against a risk that cannot be avoided and whose consequences could make a great impact in life*
   (d) No, we should only insure against risk that may yield small losses
4. How is it prudent to face expenses from small unexpected events and house repairs?
   (a) Using savings*
   (b) Paying for an insurance
   (c) Requesting a loan from a bank
   (d) Requesting a loan from relatives
5. Juan works painting houses. He has a request to paint a house next Monday at 8:00 AM, but he was planning to help paint his brother's house at the same time next Monday. Juan decides to reject the job and help his brother. What is Juan's opportunity cost to help his brother?
   (a) The amount of money Juan should have earned had he accepted the job*
   (b) A little more than the amount of money he should have earned had he accepted the job
   (c) A little less than the amount of money he should have earned had he accepted the job
   (d) Juan does not incur in any opportunity cost for helping his brother since there is no such thing as payments or debts between siblings.

6. Alberto found a job that pays him PEN 2,000, excluding taxes and other discounts, every month. He spends PEN 1000 on rent and PEN 250 on foodstuff every month. In addition to that, he spends PEN 100 on transportation, 150 on books, and 200 going out to eat with friends every month. How many months will Alberto take to save PEN 600?

   (a) 1 month
   (b) 2 months*
   (c) 3 months
   (d) 4 months

7. Julia and Pamela work together at the Finance Department with the same company and earn the same salary. Pamela uses her free time to take computing classes that will help her improve her skills working with a PC in her workplace, while Julia uses her free time going to the gym to keep in good shape. After 5 years, which of the following statements is likely to be true?

   (a) Julia will earn more money because she is more outgoing
   (b) Julia will earn more money because Pamela is likely to get fired
   (c) Pamela will earn more money because she is worthier to her company*
   (d) Julia and Pamela will continue to earn the same salary

8. Estefany saved PEN 10,000 to pay for her college tuition. She plans to start college next year and will then need the money she saved. Which is the safest place to save the money?

   (a) Her closet
   (b) The house of her closest friend
   (c) A saving account in a bank*
   (d) To buy stocks in the Lima stock market

9. Under which of the following circumstances would it be financially profitable for you to ask for a loan to buy something today and repay the loan in the future?

   (a) When I need to buy my ticket to India on vacations
   (b) When I need to buy a cutting-edge laptop to play video games
   (c) When I need to buy a motorcycle that would help me work delivering pizza and chicken*
   (d) When I wanted to buy fancy clothes that will be sold out soon

10. Carlos owns a car he uses to work as a cab driver. He is afraid of suffering a serious accident that could damage his car or, even worse, cause his death and leave his family unprotected. What could be the best way of protection?

    (a) Saving to pay for the expenses in case of an accident
    (b) Buying an insurance against a car accident*
    (c) Saving to pay for the expenses in case of an accident
    (d) Just working during non-rush hours

11. How many years do I need to contribute to the public pension system to receive a retirement pension?

(a) Minimum, 20 years*

(b) There is no minimum number of years

(c) Maximum, 20 years

(d) None of the above

12. Marta is 20 years old, and has been working in a company for several months now. In general, she is happy with her job but she does not like to contribute to the Private Pension System every month. Marta does not see the need for such contributions, since she is young and would prefer to keep the money in her pocket. What would you say to Marta?

(a) Her monthly contribution is needed to guarantee her pension when she retires*

(b) Her monthly contribution is needed to guarantee the pension for all persons working at her workplace

(c) Her monthly contribution is not necessary, since she is younger than 30 years old, and can decide when to stop contributing

(d) Her monthly contribution is not necessary and she can ask to be reimbursed for all the amount contributed

13. Fidel has decided to save in a financial entity. He has requested information about the annual interest rate paid by banks and the annual percentage yield. The following table shows the information he gathered:

Bank	**Savings annual interest rate**	**Annual Percentage Yield (APY)**
Banco Cooperativo	1.3%	1.1%
Banco El Buen Vecino	1.9%	1.8%
Banco El Rendidor	1.5%	1.3%
Tu Banco Amigo	2.0%	1.6%

Which bank should Fidel choose to save in?

(a) Banco Cooperativo

(b) Banco El Buen Vecino*

(c) Banco El Rendidor

(d) Tu Banco Amigo

(e) It does not matter, since all banks offer the same return

14. Claudia needs a loan to buy a knitting machine and open a business to sell sweaters. She visited 4 banks and gathered information about the interest rate and the annual percentage rate. The following table shows the results from her inquiries:

Bank	**Annual Interest Rate**	**Annual Percentage Rate (APR)**
Banco Contigo	38.0%	41.0%
Banco Sí Podemos	40.1%	41.8%
Banco Empresa	39.2%	40.3%
Banco Solidario	41.3%	42.0%

Which bank should Claudia request the loan from?

(a) Banco Contigo

(b) Banco Sí Podemos

(c) Banco Empresa*

(d) Banco Solidario

(e) It does not matter, since all banks involve the same costs

15. Which of the following steps should not be taken by a responsible consumer?

(a) To define her needs and search information

(b) To get information, review and compare in detail before purchasing a good or service

(c) To know the customer service lines, private and public

(d) To define her needs and file a complaint whenever the service received from a company is more expensive than the one obtained from another company*

Appendix C: Matching procedure used to find the exit exam score for the comparison group

Our original samples have 111 observations (intervention group) and 46 observations(comparison group). I use the propensity score matching (PSM) technique to find the comparable student in the intervention group to use that score on the financial knowledge exit exam for the comparison group. The marching used 94 observations from the intervention group, with the 46 observations from the comparison group. This sample size (n=136) es used for the conditional effects analysis in the article.

For the PSM, I matched using the following variables: sex, college tuition, CRT Score, father's education, and indicators for financial autonomy, being born in Lima, self-perception of financial knowledge, risk aversion, and impatience. For the main analysis, I used the kernel method, with the biweight kernel type, and a Probit regression. The 136 observations mentioned above were on the common support and this method reduced completely the difference in scores between the control and the treated samples. Next table summarizes the results: while the initial, unmatched sample had an exit score of 13.2447, after the matching the comparable intervention sample had an average score of 12-2644.

Variable	Sample	Treated	Control	Difference	S.E.	T-stat
Financial knowledge	Unmatched	13.2447	12.2644	0.9804	0.4124	-2.38
exit test	ATT	11.3928	12.2644	-0.0000	0.4614	-0.00

Note: S.E. does not take into account that the propensity score is estimated.

Table C1 below shows the bias between both groups, in the unmatched and matched cases. As shown in the table, while we can find a significant difference (in some variables) between the treatment and the control, this is not the case in the matched sample (see last column). On average, the unmatched sample bias was 16 and it went down to 2.8 in the matched sample.

Table C1: Bias and bias reduction between the intervention (treatment) and comparison (control) groups, for the unmatched and matched samples.

	Unmatched	Mean			%reduct	t-test		V(T)
Variable	Matched	Treated	Control	%bias	Bias	t	p>t	/V(C)
Women	U	0.5714	0.5638	1.5		0.08	0.935	
	M	0.5714	0.5658	1.1	26.1	0.05	0.959	
College tuition	U	2.333	2.713	-25.1		-1.43	0.154	1.82
bracket	M	2.333	2.305	1.9	92.67	0.08	0.934	1.64
CRT score	U	1	1.521	-46.1		-2.43	0.017	0.78
	M	1	1.035	-3.1	93.3	-0.15	0.883	0.95
Born in Lima	U	0.6904	0.67021	4.3		0.23	0.817	
	M	0.6904	0.69462	-0.9	79.5	-0.04	0.968	
Father's education	U	5.071	5.1383	-2.8		-0.15	0.885	0.59
level	M	5.071	5.0224	2.1	26.6	0.10	0.923	0.63
Self-evaluation of	U	4.881	5.8617	-53.9		-2.97	0.004	1.24
financial knowledge	M	4.881	4.8971	-0.9	98.4	-0.04	0.967	1.34
Risk aversion	U	0.8333	0.8511	-4.8		-0.26	0.793	
	M	0.8333	0.8167	4.5	6.1	0.20	0.843	
Impatience	U	0.3571	0.3298	5.7		0.31	0.758	
	M	0.3571	0.3266	6.4	-11.5	0.29	0.772	
Financial	U	2.119	2.117	0.1		0.01	0.994	0.90
autonomy	M	2.119	2.060	4.3	-2818.6	0.20	0.841	1.01

*if variance ratio outside [0.54; 1.86] for U and [0.54; 1.86] for M.

In order to ensure that our results from the conditional means estimation does not depend on the matching method used, I conducted the same matching analysis with four other methods: nearest-neighbor (with 1 neighbor, 2 neighbors, and 4 neighbors), and radius (with caliper 0.03). Next table summarizes the bias reduction using those alternative matching methods. Full results are available from the author.

Variable	Sample	Treated	Control	Difference	S.E.	T-stat
		Nearest neighbor (1 neighbor)				
Financial knowledge exit test	Unmatched	13.2447	12.2644	0.9804	0.4124	-2.38
	ATT	11.2619	12.2644	1.0025	0.9480	1.06
		Nearest neighbor (2 neighbors)				
Financial knowledge exit test	Unmatched	13.2447	12.2644	0.9804	0.4124	-2.38
	ATT	11.3928	12.2644	0.8715	0.6492	1.34
		Radius (caliper = 0.03)				
Financial knowledge exit test	Unmatched	13.2447	12.2644	0.9804	0.4124	-2.38
	ATT	12.0267	12.2644	0.2197	0.4580	0.48
		Nearest neighbor (4 neighbors)				
Financial knowledge exit test	Unmatched	13.2447	12.2644	0.9804	0.4124	-2.38
	ATT	12.1548	12.2644	0.1096	0.4831	0.23

Note: S.E. does not take into account that the propensity score is estimated

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