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Financial education for youth: A randomized evaluation in Uruguay[☆]

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Resumen

Este documento realiza una evaluación de impacto basada en un experimento aleatorio de un programa de educación económica y financiera dirigido a estudiantes de segundo ciclo de secundaria de Uruguay. El programa se basa en talleres interactivos de política monetaria y supervisión financiera. Encontramos que dichos talleres tienen un impacto positivo y significativo en el conocimiento de los estudiantes. Nuestros resultados arrojan luz sobre la importancia de la educación económica y financiera para los jóvenes en los países en desarrollo.

Abstract

Using data from a randomized control trial in Uruguay, we evaluate the impact of an economic and financial education program targeted to senior high-school students. The program is based on an innovative playful approach workshop about monetary policy and financial supervision. We find that the workshop has a positive and significant impact on student knowledge. Our results shed light on the importance of economic and financial education for the youth in developing countries.

JEL: A21, D12, I22, J24

Keywords: BCUEduca, economic education, youth, treatment effects

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1. Introduction

Financial literacy has captured the interest of different international players, as well as global and regional forums. Financial literacy describes ‘Peoples’ ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions’ (Lusardi & Mitchell (2014)). During the last decades, several governments, central banks and superintendencies, financial institutions, and international organizations and foundations, among others, have created a wide variety of programs to provide financial education. These programs are commonly motivated by the belief that individuals often make poor financial decisions or are excluded from the formal financial sector because of a lack of financial knowledge in the current world of increasingly complex financial markets. They assume that financial literacy produces better informed, empowered, and trustier in financial institutions individuals, who then make better financial decisions.

Although the programs’ objectives in the different countries are similar and seek to improve the level of population’s financial instruction level, there are essential differences in their implementation, methodologies, and main target population. For example, there are differences in the teaching process, emphasizing specific courses on money management, texts, support materials, or the use of software or applications for tablets or mobile phones. Besides, certain programs focus on elementary and middle school students while others also emphasize adults’ financial education.

Education for primary and secondary school children, and courses for teachers, is a fundamental element of financial education programs around the world. The OECD International Network for Financial Education (INFE) – the leading organization promoting policy making in financial education– state that “Financial education should start as early as possible, ideally from the beginning of formal schooling, and carry on until the end of the students’ time at school.” (OECD (2014)). Based on this premise an increasing number of countries are promoting financial literacy in the school curriculum. This is because these programs are not so much aimed at generating more financial knowledge, but at eventually achieving healthy financial behavior. Thus, if this financial behavior is taught from an early age it allows the foundations to be laid for developing behavior that results in well managed personal finances. The review of academic literature has also shown that the effectiveness is highest at elementary and primary schools. Nevertheless, it does not imply that financial education should be limited to these early ages but emphasizes the need to start as early as possible. In the case of adults financial literacy programs imply changing their financial behavior, which, as several works on economic behavior have shown, is not impossible but not so simple (Roa et al. (2019); Arnold & Rhyne (2016)).

Since 2012, the International Programme for International Student Assessment ¹ (PISA) developed by the Organization for Economic Co-operation and Development (OECD) includes a financial literacy module that assesses the knowledge and financial competence applied in financial resolution issues. The module explores if students can solve basic financial problems, make informed decisions about daily expenses, use a credit card, or take credit.

In the first edition of the financial module in 2012 there were 18 countries (most of the OECD), but only one from Latin America and the Caribbean (LAC) participated, occupying the last position. The 2015 edition involves 21 countries with 3 (LAC) countries that occupied the financial test's last positions (Brazil, Chile, and Peru). LAC countries occupy the last positions in terms of average results, but the differences to the countries that precede them are important (for example, the difference is 22% compared to the country with an immediate superior result in 2012).

In Latin America, the main target groups of financial education programs are primary and secondary school students, followed by the general public. Central banks and superintendencies are among the most important institutions leading financial education and inclusion programs, as well as and national strategies on that matters. The last decade central banks of LAC have implemented a set of programs to improve the level of instruction in the population's financial and money management issues. To name some, the following countries stand out with their respective programs in financial education in LAC: Bank of Bolivia (BCB educa), Chile (Econoclases), Mexico (Banxico educa), Peru (BCRP educa), and Uruguay (BCUEduca) (Roa et al. (2014); OECD/CAF (2020)).

To assess the effectiveness of financial education intervention and implement changes if necessary, it is important to incorporate monitoring and evaluation components from the start of the program. The program evaluation should aim to include the long-term effects of these interventions, especially on financial behaviors. Since the beginning it is crucial: to define realistic, specific and measurable goals; including initial evidence on the level of financial literacy and skills (baseline surveys, such as PISA); and define concrete and rigorous quantitative and qualitative indicators/measures of short-term and long-term impacts.

Building on the above discussion, this study's objective is to evaluate one of the Banco Central del Uruguay (BCU) education program components, called BCUEduca. Specifically, we evaluate the workshop in Economics and Finance (WEF) designed for senior

¹PISA measures for a growing number of countries every three years the academic performance of 15-year-old students in various areas of knowledge such as mathematics, science, and reading.

high school students. This subprogram started (as a pilot) in 2012 to train teenage students in inflation, monetary policy, and the financial system regulation and supervision, two main activities conducted by the Central Bank of Uruguay. The workshop has two parts: the first explains the concepts of money and inflation and the second analyses the financial system. The learning technique is based on simulation, exploratory activities, and cooperative learning in groups. The WEF tries to ensure the students' appropriation of these economics and finance concepts through a thoughtful and innovative playful approach. The WEF has a total duration of three hours to selected high school groups by staff members of the Bank through a simulation and experimentation methodology that allows them to approach the issues pleasantly and unusually.

The WEF has two different activities: the first one, "Living in Bancania", an hour and a half long, aims at students knowing the financial activity and its importance, the agents that integrate the financial system and its links, as well as the role of the Central Bank in the supervision and regulation of that financial system. The second one, "Auction and Balloons", also an hour and a half long, aims at students understanding the concepts of inflation, the importance of price stability and the role of the BCU in the exercise of monetary policy.

In this paper we use the random selection of participants into the program to evaluate its impact. We compare the knowledge on inflation and the groups' financial system issues randomly selected to participate with those randomly selected as a control group. We find that the program has a positive, and significant impact on student knowledge. When we analyze the result at a disaggregated level, we find that the positive impact is only observed on financial sector knowledge. We do not find a significant positive impact on inflation and money knowledge.

This article is organized as follows. In the second section, we review relevant studies on the impact of financial education and financial literacy programs for children and young adults. In the third section, we describe in detail the economics and finance workshops. The fourth section is devoted to explaining our empirical methodology. The fifth section presents our unit of analysis and the descriptive statistics analysis of our sample. In the sixth section, we present our empirical model and our econometric results, and finally in the seventh section we discuss our main results and outline our conclusions.

2. Literature review

Numerous empirical studies have conducted surveys to measure the world population's financial literacy levels and have analyzed the effects of adult financial literacy

programs. They conclude that there are significant benefits to having greater financial expertise, manifested in healthy financial behaviors such as saving for retirement, avoiding excessive debt, or repaying credit on time, among others (Lusardi & Mitchell (2014); Alsemgeest (2015); Kaiser & Menkhoff (2020); Bover et al. (2018); Lührmann et al. (2015); Frisancho (2018); Frisancho (2019); Bruhn et al. (2016)). Besides, financial literacy has been shown to have a significant impact on financial well-being² (Brüggen et al. (2017); Ladha et al. (2017); Xiao & O’Neill (2018)).

Despite the increasing number of school programs around the world, and that financial education interventions are often associated with youth and programs taught in schools, rigorous and solid empirical evidence in academic studies on the impact of financial education interventions aiming children and youth is relatively scarce and recent. This section reviews the most relevant academic studies on the impact of financial education and financial literacy programs for children and young adults. We present the extent to which the academic literature gives solid evidence on the financial education programs’ effectiveness. Moreover, we present key characteristics found within the most successful financial education designs.

Firstly, some of the studies are comprehensive reviews or meta-analysis of this literature³. Such is the case of Amagir et al. (2018), who covers the research published between 2004 and 2015 peer-reviewed quasi and experimental studies testing the effects of educational programs or interventions. This systematic review documents that school-based financial education programs may improve children’s and adolescents’ financial knowledge and attitudes, at least in the short-term. Therefore, longitudinal experimental research is still needed to assess long-term effects. Their review also suggests that financial education programs in secondary schools and colleges may reduce the gender gap. Furthermore, the few financial education programs that involve parents in their children’s education seem to be effective in increasing children and adolescent’s financial literacy. They conclude that a promising method to teach financial literacy seems to be “Experiential Learning”; that is, “financial-literacy education” should not only be concerned with acquiring new skills, and knowing how to apply these skills, and based on this, help students gain experiences that make them stronger.

Similarly, Kaiser & Menkhoff (2020) study the literature on school financial education

²Unlike the previous studies, another group of works have not found a positive relationship between financial literacy and financial decisions, or they found mixed results McArdle et al. (2009); Gerardi et al. (2013); Fernandes et al. (2014)). Some authors point out that such contradictory results are the product of both inherent conceptual differences in financial literacy definitions and the diversity in the design, delivery and content of the education programs (Roa (2013)).

³There are comprehensive meta-analyses studies of the relationship of financial literacy and of financial education to adult and financial behaviors (Miller et al. (2014); Fernandes et al. (2014)).

programs for children and youth via a quantitative meta-analysis of 37 (quasi-) experiments. They find that financial education treatments have, on average, sizeable impacts on financial knowledge, like educational interventions in other domains. Nevertheless, they evidence smaller effects on financial behaviors among students. Effectiveness is highest at elementary schools, which does not imply that financial education should be limited to these early ages.

Another review of this literature is carried out by [McCormick \(2009\)](#), who explores the current state of youth financial education interventions. He found that youth financial education must permeate the entire primary and secondary setting rather than wait until the introduction of middle or high school years. In addition, financial education programs must demonstrate relevance to students to engage their motivation and be designed to forge understandings of the relationships among money, work, investments, credit, bill payment, retirement planning, taxes, and so forth. Moreover, the evaluation must be planned into the design and delivery of programs.

Similarly, [Totenhagen et al. \(2015\)](#) conducted a comprehensive review of the current literature on youth financial literacy education to identify characteristics of financial education programs that may influence positive changes. The best practices and current methods of promising delivery methods proposed in this study are: (a) interactive learning experiences, (b) use of real money, (c) integration of curriculum, (d) involving the community, and (e) other unique delivery methods. Involving credit unions or other members of the local community may help to solidify these experiences for youth.

In Latin America and other countries, [Frisancho \(2019\)](#) reviews the main experimental evidence on the impact of financial education programs for children and youth. The author presents studies in Brazil, Italy, Peru, Spain, and United States that identify large and comparable knowledge gains among high school students who received financial education lessons introduced during the regular school day. In turn, the author finds that the voluntary programs with similar contents (after or outside the school) had a limited impact on financial knowledge. One limitation highlighted by the author, and common to the previous reviews, is that financial education programs lack evidence supporting their long-run effectiveness, especially once the youth and children become active economic and financial agents. Despite that, the reviewed short-term experimental evidence on behavior in this article is encouraging; the limited range of transactions at young ages, financial education programs seem able to change behavior among youth. Notably, a few recent but encouraging studies suggest that youth's financial education programs affect personality traits and preferences that may promote healthy financial behaviors.

We end our review of the academic findings by summarizing four relevant studies on

this literature that use field experiments methodologies. [Karlan et al. \(2014\)](#) randomly assign 250 youth clubs to receive different savings promoting interventions in Uganda. The treatment effect estimates suggest that financial education plus account treatment increases bank savings relative to account-only. But survey-measured total savings and income show equal increases in all treatments. They find some evidence that education and account access are substitutes. Their results also show that, relative to the control group, financial education increases financial literacy and decision power, and decreases risk tolerance and altruism.

In Brazil, [Bruhn et al. \(2016\)](#) assess the impact of a comprehensive financial education program on public high school students' on financial knowledge and behaviors. The program spanned 17 months and was integrated in classroom curricula. The study covers 868 public high schools in six Brazilian states and approximately 20,000 students. Their results show that financial education can be an effective tool in improving students' financial outcomes when delivered in a comprehensive manner and over a significant period. Also, key complimentary benefits can be derived by involving the entire household, students and parents, as indicated by the trickle-up and parents' workshop impacts. Further the results on mechanisms show that student preferences on saving intentions and financial autonomy are important pathways for improved financial behavior.

[Sherraden et al. \(2007\)](#) and [Sherraden et al. \(2011\)](#) examine an innovative four-year school-based financial education and savings program, called "I Can Save" (ICS). The program took place in a Midwestern urban elementary school that serves a predominantly African American (90%) student body of mixed incomes. Children in ICS received financial education and incentives for saving. ICS Club met for one hour after school most weeks throughout the four years. Club activities included games, refreshments, and, beginning in Year 2, monthly field trips to deposit savings in the bank. Using a quasi-experimental design, the study shows that children who participated in ICS scored significantly higher on a financial literacy test than comparison group students in the same school, regardless of parent education and income. The qualitative evidence suggests that the children may have been especially motivated to learn because of the savings account and visits to the bank, they had access to real financial services.

Finally, [Hospido et al. \(2015\)](#) evaluate the financial education program "Finanzas para todos" launched by the National Securities Market Commission (CNMV) and the Bank of Spain (Banco de España, BdE). The program is aimed at secondary schools in Spain that voluntarily and freely choose to participate. It consists of 10 modules of a financial education course supported by a website with guides and training materials. Using data from twenty-two schools in the Madrid region, BdE researchers evaluated the program with randomized controlled trial (RCT) methodology. The program had a positive

impact on students' financial competencies and their performance in banking relationships and budgeting and the number of students who talk to their parents or caregivers about economic issues, do household chores for money, and have preferences for future consumption vs. the present.

Based on the above review of academic studies, we conclude by underlining that the evidence from them shows that financial-education programs can improve children's and adolescents' financial knowledge and attitudes. The status of literature on the subject for developing countries and LAC countries is still incipient and more evidence is required to identify the best practices and the most effective educational strategies (Roa et al. (2019)).

3. Description of the Workshops in Economics and Finance

In 2012 the Banco Central del Uruguay (BCU) started the education program called BCUEduca to promote and develop the Uruguayan population's economic and financial education and culture. The BCUEduca program consists of a set of subprograms in economics and finance that target school-age children, junior and senior high school students⁴ and also adults as teachers and professors (PROCAD⁵), union workers, economic reporters, and family members⁶. The program can serve citizens to understand economic thinking and incorporate financial skills for the proper development and behavior of their household finances or successfully to manage the household budget.

International experience (OECD (2014), OECD (2019)) and the academic studies reviewed above show that the effectiveness of financial education for children and young people depends not only on the content and topics, but also on when it is offered and how it is designed. The use of active learning methodologies is especially emphasized as the way to increase not only learners' knowledge, but also attitudes and behavior. The importance of digital and innovative tools is also highly mentioned, such as e-learning

⁴In this regard, one of its main products is the "Interactive Economic and Financial Fair" (FIEF), a colorful fair that like a circus builds its tents inside different municipal spaces specially qualified for the event, in different cities of the country.

⁵PROCAD: A program designed for training teachers from Primary, Middle and High School years primarily aimed at strengthening the population's financial inclusion strategy through the incorporation of knowledge in economics and finance concepts by their replicating in classrooms the playful methodology of learning as the carried out in the fairs, FIEF, and sharing the experience with other colleagues. The main core of the PROCAD is its serving as a multiplier among other teachers at the national level. See Caño Guiral (2019) for a complete description of the PROCAD program.

⁶For a complete description of the BCUEduca program see www.bcueduca.gub.uy.

platforms, visual media, and interactive delivery channels like games, simulations, interactive museums, competitions, etc. Based on this premise, the multiple products of BCUEduca have been developed in the framework of strategic educational techniques such as group learning, simulation, and experimentation.

One of the main components of the program is the workshop in Economics and Finance. These workshops expect to hold 15 seminars per year. Every year the BCU sends invitations to high schools explaining the program and encouraging them to participate in it. The workshops are held within the BCU facilities and the schedule is sent at the beginning of the year by email to a database of high school teachers in the country. The BCU built this database based on all activities carried out within the BCUEduca program and the education authorities. The interested teachers have the possibility of registering by online on the dates of their interest with only one condition to be met to be chosen: their students must answer a online knowledge questionnaire on the topics to be addressed in the course. They know that the results in this questionnaire do not affect the chances of participating in the program. The only condition to participate is to complete the questionnaire. When more than one group is registered on the same date, the group that will be invited to participate is randomly drawn and the others will remain as substitutes on that same date (in case the first selected teacher and group warns that for some reason they cannot effectively come on the date set for the workshop).

The workshop has two parts: the first explains the concepts of money and inflation and the second analyses the financial system. The learning technique is based on simulation and role-playing activities in groups. The simulation techniques and role-playing activities have been chosen to elaborate the workshops as they are a good option for achieving the group participation (involvement) and their cooperation for the learning activity success. The simulation technique of a certain case to be developed during the workshop and role-playing (i.e. the financial system supervision and regulation workshop where some have to be bank officials, others warehouse officials, etc., or even the Monetary Policy auction where it is simulated to be in an obvious "simplified" auction) are ideal simulation tools for the acquisition of a competency as relevant as teamwork. The role-playing technique used in these workshops allows its participants to experience a situation or action before the precise and detailed description of the situation that is going to develop (action, setting, time, circumstances, nuances, etc.). At the beginning, the technique to be used is explained and roles are assigned, including the facilitators. The facilitator introduces the situation and explains to all the people the instructions, sufficiently precise and at the same time vague to allow the students to develop freely to solve the instructions. Once the facilitator concludes the action, he makes them think about what has happened in the "laboratory" of that experience and clarifies difficult concepts and definitions from

the explanation of the game played. To evaluate the impact of the workshops the initial online questionnaire was conducted again immediately after the intervention.

The teachers of the workshops receive training and a manual, which is the same for both workshops. Besides the teachers the monetary policy workshop is conducted by economists and the Financial System Supervision and Regulation workshop is conducted by BCU accountants.

3.1 Money and inflation workshop

This session takes place in an hour a half. The first session of the workshop comprises two activities. In the first one, a real auction of certain products in two rounds is simulated with the participants: in the first round they have a certain amount of money and in the second round they are given more money so that they can bid. The price that a product reaches in the second round (with the same characteristics as the one that was auctioned in the first) allows us to show the relationship between the amount of money and the price level of an economy.

In the second part, the students are divided into two groups and must inflate balloons (representing products) for a few seconds and see how many balloons go into certain bags that represent the income of each of the two families. Then, they receive more time than before to inflate the balloons and count again how many balloons fit into the same revenue pools. With this simple activity it is possible to show the non-proportional increase in prices and the consequences this has on the purchasing power of people in the face of inflation.

At the end of these activities the teachers explain that the BCU uses the relationship between the amount of money and prices to control inflation. The instrument used to achieve price stability is controlling the amount of money in circulation (monetary aggregates, M1).

The students also receive infographics on how the monetary policy is applied in an economy with inflation above the target range. This reinforces the idea of monetary aggregates as an instrument of the monetary policy, and the issuance of Monetary Regulation Bills (MRB) as the main tool currently used by the BCU in this context.

Lastly, the three main concepts introduced in the workshop are mentioned again: i) the direct relationship between the amount of money and prices, ii) the purchasing power of all households is reduced by inflation and affects the regressive distribution of income and

iii) the BCU uses the Monetary Policy to ensure price stability in order to contribute to the general objectives of growth and employment.

It is expected that by the end of the workshop students will understand the following concepts:

- There is a direct relationship between the quantity of money in an economy and the level of prices of goods and services sold
- Inflation is the continuous and general increase in prices
- Inflation causes households with a stable income to lose their purchasing power
- Inflation affects the regressive distribution of income
- A contractive monetary policy can be useful to control the rise in price levels
- The BCU is currently using an indicative evolution of payment methods to have contractive effects that will result in achieving the inflation target.

3.2 Financial system workshop

This session takes place in an hour a half. The first part of the workshop discusses the interaction between the Central Bank, the commercial banks, and the individuals. The students make deposits, request loans, withdraw money from the ATM and buy at a general store. They assume different roles and interact with each other as entrepreneurs, bank managers, consumers, or bank supervisors.

In the second part of the workshop the students in groups receive information and discussed different types of financial institutions and the regulatory and supervisory role of the Central Bank.

At the end of the workshop there is a review of the topics discussed during the session:

- The financial system acts as an intermediary
- Receives deposits and makes loans (for different purposes and at different interest rates)
- The financial system is not only comprised of commercial banks, other agents have different functions
- The Central Bank regulates and supervises the activities of the agents.

It is expected that by the end of the workshop students will understand the following concepts:

- Financial activity and its importance (savings, expenses, among others)
- Agents that make up the financial system and its operation

- How deficit and surplus agents are connected through the financial intermediation system
- Give value to the importance of regulation and supervision by the Central Bank of Uruguay
- Give value to the importance of stability in the financial system

4. Methodology

In this paper, we use the randomized controlled trial (RCT) implementation of the program in 2019 to assess how effective this program of workshop is to improve senior high school students' economic and financial competence. The RCT nature of the evaluation ensures that the programs' impact is not confounding with unobserved variables that can impact the outcome and the selection. The control group was randomly chosen from students that only responded to the online register questionnaire before the workshops (April 2019). The treatment group was randomly selected from students that responded to the questionnaire applied immediately after the workshops to evaluate their impact (between September and October of 2019). The initial questionnaire and the evaluation questionnaire are the same. The first one is used to get the counterfactual of the treatment group.⁷ Both groups were told that they would be selected to participate in the treatment but were not told when they would be selected. Due to program economic restrictions, finally, only four groups were randomly chosen to participate in the program.

Even though there were more than four months between the application of the two questionnaires, we believe that there are no significant shocks that can impact the response of the second questionnaire beyond the workshop treatment for these reasons: i) the questionnaire (that is the same one for the control group as for the treated) could not have any feedback from the program organizers in April 2019 (at the moment of the registration of the groups), ii) none of the high school students learn the subjects of the workshops in their regular classes – these topics are not incorporated in the curricula and iii) the selected group to participate as treated did not know prior to the workshop that they were going to be asked once again the same questionnaire that they had answered as a requisite to their enrollment (they did not prepare to answer any test at all). However, it could be that the questionnaire has aroused the interest of the students in the subject and they have investigated on their own given the delay between the questionnaire and the intervention, which would be overestimating the effects of the intervention.

⁷See the questionnaire in annex B.

As we have an experimental design we can evaluate the impact of the workshops through the following equation:

$$Y_{is} = \beta_0 + \alpha T_{is} + \beta_1 Priv_{is} + \beta_2 Non - capital_{is} + \beta_3 Med_{is} + \varepsilon_{is}$$

where i is individual, s is school, Y is our outcome variable (the count of correct answers), T_i is an indicator variable for treatment, $Priv$ is a binary indicator if the individual attends a private high school, $Non - capital$ is an indicator variable for residence out of the capital of the country (Montevideo), Med is an indicator variable for medicine students⁸ and ε is an individual error term. Because there can be a correlation in students' error term across schools, we clustered the standard error at the school level.

Our parameter of interest is α that measures the workshop's causal impact on monetary policy and the financial system in student knowledge.

5. Unit of analysis and descriptive statistics

In Table 1 we present the summary statistics for the data. For the whole sample (12 questions) the mean of the total correct answer is 8.41. The percentage of correct answers for the inflation questions is 87 (3.48 divided by 4) and it is higher than the percentage of correct answers for the financial system questions that are 62 (4.93 divided by 8). Therefore, before the treatment of the workshop, the students have a higher level of knowledge on the subject of inflation than about the financial system.

The proportion of students participating in the program is a quarter of the sample of 295 students. One in fifth participants attends private high schools. Seventy percent of the students attend high schools in the capital of the country Montevideo and the remaining 30% are from outside the capital. Concerning the study area, 87% of the students are enrolled in social sciences and the rest is in medicine. We do not see significant differences in the count of correct answers of students from private schools, from outside the capital, and medicine before seminars.

Because a significant concern is the internal validity of the random assignment the Table 2 shows the baseline comparisons between the treatment and the control groups. We

⁸It is controlled by medicine because a priori, we could expect that they have less knowledge of economics. We have students only in the areas of social sciences and medicine. Unfortunately, we do not have other characteristics of the students as grades in high school, sex, etc.

	Mean	Median	St Dev	Min	Max	N
# of correct answers (12 questions)	8.41	8	1.79	4	12	295
# of correct answers -inflation (4 questions)	3.48	4	0.77	1	4	295
# of correct answers -financial (8 questions)	4.93	5	1.52	2	8	295
Treatment	0.25	0	0.50	0	1	295
Private school	0.20	0	0.43	0	1	295
Non-country capital	0.30	0	0.46	0	1	295
Social sciences	0.87	1	0.33	0	1	295
Medicine	0.13	0	0.33	0	1	295

run an ordinary least squared regression where the dependent variable is an indicator of treatment and as control variables, we include private schools, non-country capital, and medicine. This regression's data is based on the questionnaire conducted in April 2019 (before the treatment). Table 2 indicates that none of the controls is significantly correlated with participation in the program before the treatment.

Regression before the treatment	
Variables	
Private school	-0.242 [0.298]
Non-country capital	-0.086 [0.250]
Medicine	-0.149 [0.300]
Wald test of joint significance	1. 17. p-value=0.76
N	295
Standard error clustered at the school level in parentheses.	
* p<0.1, ** p<0.05, *** p<0.01.	

6. Empirical results

Table 3 shows the results of the workshop's impact on the count of correct answers based on the linear estimation. To allow for correlation of the error term at the school level we cluster the standard errors at the school level. In each case, the dependent variable is the count of correct answers. The independent variables include participation in the workshops and binary indicators for private school, non-country capital, and medicine students.

The results indicate a positive and significant effect of the workshop on the number of correct answers at the 1% level. Attending a private school and being a medical student has a non-significant impact on the total number of correct answers. However, students who are not from the capital of the country are worse than those of the capital. This could be due to the students' influence on the best qualified and experienced teachers in the capital than in the non-country capital. In this regard, it is commonly known that teachers in the countryside are less prepared than in the country capital where competition to teach at education institutions is quite fierce and at the end of the day they are chosen by their experience and qualifications. Meanwhile in the countryside as fewer people want to live there getting jobs within the education system is relatively easy and teachers probably are less qualified than those in the capital.

Table 3. Impact of workshops on test performance
OLS regression on the count of correct answers

Variables	Test		
	All	Inflation	Financial
Treatment	2.366*** [0.296]	0.255 [0.156]	2.111*** [0.169]
Private school	-0.111 [0.248]	-0.141 [0.133]	-0.031 [0.181]
Non-country capital	-0.461** [0.228]	-0.146 [0.135]	-0.316 [0.179]
Medicine	-0.302 [0.267]	-0.157 [0.118]	0.145 [0.233]
N	295	295	295

Standard error clustered at the school level in parentheses.
* p<0.1, ** p<0.05, *** p<0.01.

When we analyze the result at a disaggregated level, we find that the positive impact is only observed for the section on questions about the financial sector. We do not find a significant positive impact on the inflation questions. Although the questionnaire topics are not into the high school curricula the fact that inflation is a topic highly discussed in the media can lead to students being better informed about inflation than the financial system. Therefore, the workshop's impact and the dynamics of inflation and monetary policy would be almost not significant.

As a robustness check with the most recent literature, we also consider a more sophisticated financial literacy indicator known as pridit. This is based on [Behrman et al. \(2012\)](#). Pridit is indicated to deal with easy or difficult outcomes when the dependent variable is binary or categorical. Pridit weighs in two stages. In the first stage, scores are given weighted by the questions' relative difficulty, and apply a higher penalty if much of the

sample answered the question correctly. The penalty is lower if the question was answered incorrectly by most of the sample. Second, prdit applies a major component analysis to consider the correlation between questions and thereby measure how informative each of them is. The results in Table 4 show that prdit estimates are qualitatively similar to ordinary least squares. There is a positive effect only for the workshop on the financial system.

Variables	Test		
	All	Inflation	Financial
Treatment	0.621*** [0.089]	0.145 [0.0916]	0.546*** [0.0734]
N	295	295	295

Controls: Private school, non-country capital, and medicine.
Standard error clustered at the school level in parentheses.
* p<0.1, ** p<0.05, *** p<0.01.

We also estimate a Poisson model to consider the dependent variable's count nature (see Table 5). The results are aligned with those obtained in the main specification: the workshop has a positive and significant impact on the total correct questions. The treatment increases the correct response in two. Again, the positive and significant impact of the program is basically driven by the training in the financial system. We also find that the performance of non-country capital students is lower relative to those in the capital.

Finally, to ensure the causal interpretation of the results we run a placebo exercise to compare the outcome of those selected into the treatment with those not selected based on information previous to the treatment. As the placebo test is based on the information before treatment, we should expect to find non-significant results. Because we did not find coefficients statistically different from zero, our strategy was working properly (see Table 6). The placebo test worked correctly for both the linear and the Poisson regression models.

Table 5. Impact of workshops on test performance			
Poisson regression on the count of correct answers			
Marginal effects			
Variables	Test		
	All	Inflation	Financial
Treatment	2.228*** [0.270]	0.253* [0.153]	1.931*** [0.145]
Private school	-0.116 [0.248]	-0.143 [0.136]	0.026 [0.177]
Non-country capital	-0.766** [0.229]	-0.146 [0.132]	-0.330** [0.185]
Medicine	-0.299 [0.264]	-0.159 [0.121]	-0.137 [0.226]
N	295	295	295

Standard error clustered at the school level in parentheses.
* p<0.1, ** p<0.05, *** p<0.01.

Table 6. Placebo test: regression pretreatment		
Variable	Model	
	Linear	Poisson
Treatment	-0.322 [0.230]	-0.284 [0.287]
N	295	

Controls: private, non-country capital and medicine.
Marginal effects reported.
Standard error clustered at the school level in parentheses. * p<0.1, ** p<0.05, *** p<0.01

5. Discussion and conclusions

This paper uses an experimental design to evaluate the impact of the workshops in Economics and Finance designed for high school students in Uruguay. The estimated models shed new light on the impact of school training on economics and finances. We present evidence that a workshop in financial supervision significantly increases student financial knowledge. On the contrary, the monetary policy workshop does not impact the students' financial knowledge. This result suggests that students' (or their families) experiences with past inflation episodes have understood this economic concept.

This last result is consistent with [Borraz & Zacheo \(2018\)](#) that compare the level of attention to inflation of Uruguayan and New Zealand firms, as surveyed by [Coibion et al. \(2018\)](#). They found that while the firms that made errors lower than 2 percentage points of the actual inflation rate are approximately half of firms in New Zealand (49%), in Uruguay they are the majority (91–95%). [Coibion et al. \(2018\)](#) suggest that in countries with low and stable inflation, such as New Zealand, firms' incentive to monitor inflation closely may have diminished. On the contrary, in Uruguay with a high internationally level of inflation the agents are better informed about inflation. Similarly, [Roa et al. \(2019\)](#) found that individuals in Bolivia, Colombia, Ecuador, and Peru respond relatively knowledgeably to questions on inflation and risk diversification. This result contrasts with studies in developed economies, where the questions related inflation obtained the lowest proportion of correct answers. The authors point out that this result could be due to the economic and financial experiences of people in the countries of our study, such as inflation episodes ('80-'90s) and economic crises.

On the other hand, the worse performance of students who are not from the capital found in our empirical exercise highlight the inequalities within the Uruguayan education system. These inequalities between the capital and non-capital schools affect the student's learning and cognitive abilities, and they should consider when designing and delivering financial education interventions.

Our findings have direct policy implications by highlighting the importance of economic and financial education for the youth. Firstly, the interventions should consider that financial knowledge is promoted or produced by both past financial and economic experiences, and formal financial education programs. Secondly, the inequalities found between capital and non-capital students enhance the development of financial education programs which segment the students according to their socioeconomic background.

Our study has some specific limitations which will define future research and empirical methodology. Firstly, although we use a rich date base, it does not contain data regarding

the students' socio-demographic information (age, gender, education, and occupation of the parent, etc) due to protection data laws for minors. Furthermore, information regarding personality traits, cognitive characteristics and economic preferences of the student should be valuable to collect, since an expanding body of work has shown the importance of these variables on explaining financial knowledge and behaviors (Delavande et al. (2008); Kausel et al. (2016); Frisancho (2019); Giannatale & Roa (2019)). Future research should be orientated towards collating other variables to obtain a complete view on the determinants of students' financial knowledge.

Secondly, measurements of some of our variable of interest – financial knowledge – can be improved. Albeit we used several questions to develop financial education indicators, more complete empirical instruments should be developed to elaborate comprehensive indicators of financial literacy beyond the knowledge of basic economic and financial concepts. Based on the more recent financial literacy studies and PISA financial knowledge section, we plan to extend our analysis and questionnaire to measure financial literacy outcomes in a broad sense: financial attitudes, knowledge, and behaviors. These comprehensive and holistic approaches seem to be key to getting a better and deeper understanding of how to promote healthy financial behaviors since childhood and youth, and then transform individuals' financial behavior over the long term. In this regard, we should be cautious when generalizing our results due to themselves' short-term effects and the size of our sample. For future research we plan to define quantitative and qualitative measures of both short-term and long-term impacts and extend the size of our sample.

References

- Alsemgeest, L. (2015). Arguments for and against financial literacy education: where to go from here? *International Journal of Consumer Studies*, 39(2), 155–161.
- Amagir, A., Groot, W., Maassen van den Brink, H., & Wilschut, A. (2018). A review of financial literacy education programs for children and adolescents. *Citizenship, Social and Economics Education*, 17(1), 56–80.
- Arnold, J. & Rhyne, E. (2016). A change in behavior: Innovations in financial capability. Working paper, Washington, DC: Center for Financial Inclusion and Accion.
- Behrman, J. R., Mitchell, O. S., Soo, C. K., & Bravo, D. (2012). How financial literacy affects household wealth accumulation. *American Economic Review*, 102(3), 300–304.
- Borraz, F. & Zacheo, L. (2018). Inattention, disagreement and internal (in)consistency of inflation forecasts. Working paper, Banco Central del Uruguay.
- Bover, O., Hospido, L., & Villanueva, E. (2018). The impact of high school financial education on financial knowledge and choices: Evidence from a randomized trial in Spain. *Institute for the Study of Labor (IZA) DP No. 11265*.
- Bruhn, M., de Souza Leão, L., Legovini, A., Marchetti, R., & Zia, B. (2016). The impact of high school financial education: evidence from a large-scale evaluation in Brazil. *American Economic Journal: Applied Economics*, 8(4), 256–295.
- Brüggen, E. C., Hogreve, J., Holmlund, M., Kabadayi, S., & Löfgren, M. (2017). Financial well-being: A conceptualization and research agenda. *Journal of Business Research*, 79, 228–237.
- Caño Guiral, M. (2019). Assessing the effectiveness of a public teacher training program in economic and financial education in Uruguay - measurement of learning in procad in its pilot phase. *SSRN*.
- Coibion, O., Gorodnichenko, Y., & Kumar, S. (2018). How do firms form their expectations? new survey evidence. *American Economic Review*, 108(9), 2671–2713.
- Delavande, A., Rohwedder, S., & Willis, R. (2008). Preparation for Retirement, Financial Literacy and Cognitive Resources. Working Papers wp190, University of Michigan, Michigan Retirement Research Center.
- Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, 60(8), 1861–1883.
- Frisancho, V. (2018). The impact of school-based financial education on high school students and their teachers: Experimental evidence from Peru. *IDB Working Paper No. IDB-WP-871*, 1(1), 1–56.
- Frisancho, V. (2019). The impact of financial education for youth. *Economics of Education Review*, 1(1), 1–44.
- Gerardi, K., Goette, L., & Meier, S. (2013). Numerical ability predicts mortgage default. *PNAS*, 110(28), 11267–11271.
- Giannatale, S. D. & Roa, M. J. (2019). Barriers To Formal Saving: Micro- And Macroeconomic Effects. *Journal of Economic Surveys*, 33(2), 541–566.
- Hospido, L., Villanueva, E., & Zamarro, G. (2015). Finance For All: The Impact Of Financial Literacy Training In Compulsory Secondary Education In Spain. Working Papers 1502, Banco de España.

- Kaiser, T. & Menkhoff, L. (2020). Financial education in schools: A meta-analysis of experimental studies. *Economics of Education Review*, 78, 101930.
- Karlan, D. S., Jamison, J., & Zinman, J. (2014). Financial education and access to savings accounts: Complements or substitutes? evidence from ugandan youth clubs. Center Discussion Papers 169412, Yale University, Economic Growth Center.
- Kausel, E. E., Culbertson, S. S., & Madrid, H. P. (2016). Overconfidence in personnel selection: When and why unstructured interview information can hurt hiring decisions. *Organizational Behavior and Human Decision Processes*, 137(C), 27–44.
- Ladha, T., Asrow, K., Parker, S., & Rhyne, B. (2017). Beyond financial inclusion: Financial health as a global framework. Working paper, Center for Financial Services Innovation (CFSI).
- Lusardi, A. & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 4–44.
- Lührmann, M., Serra-Garcia, M., & Winter, J. (2015). Teaching teenagers in finance: Does it work? *Journal of Banking & Finance*, 54(C), 160–174.
- McArdle, J. J., Smith, J. P., & Willis, R. (2009). Cognition and economic outcomes in the health and retirement survey. Nber working papers, National Bureau of Economic Research, Inc.
- McCormick, M. (2009). The effectiveness of youth financial education: A review of the literature. *Journal of Financial Counseling and Planning*, 20(1), 70–83.
- Miller, M., Reichelstein, J., Salas, C., & Zia, B. (2014). Can you help someone become financially capable ? a meta-analysis of the literature. Policy Research Working Paper Series 6745, The World Bank.
- OECD (2014). Financial education for youth: The role of schools. Technical report, OECD Publishing, Paris.
- OECD (2019). Smarter financial education key lessons from behavioural insights for financial literacy initiatives. Technical report, OECD Publishing, Paris.
- OECD/CAF (2020). *Estrategias nacionales de inclusión y educación financiera en América Latina y el Caribe: retos de implementación*. Books. OECD/CAF.
- Roa, M. J. (2013). Financial education and behavioral finance: New insights into the role of information in financial decisions. *Journal of Economic Surveys*, 27(2), 297–315.
- Roa, M. J., Garrón, I., & Barboza, J. (2019). Financial Decisions and Financial Capabilities in the Andean Region. *Journal of Consumer Affairs*, 53(2), 296–323.
- Roa, M. J., Másmela, G. A. A., Bohórquez, N. G., & Pinilla, D. A. R. (2014). *Financial Education and Inclusion in Latin America and the Caribbean: Programs of Central Banks and Financial Superintendencies*. Number 1e in Books. Centro de Estudios Monetarios Latinoamericanos, CEMLA.
- Sherraden, M., Johnson, L., & Elliott, W. (2007). School-based children’s saving accounts for college: The i can save program. *Children and Youth Services Review*, 29(3), 294–312.
- Sherraden, M., Johnson, L., & Guo, B. (2011). Financial capability in children: Effects of participation in a school-based financial education and savings program. *Journal of Family and Economic Issues*, 32(3), 385–399.

- Totenhagen, C., Casper, D., & Faber, K. (2015). Youth financial literacy: A review of key considerations and promising delivery methods. *Journal of Family and Economic Issues*, *36*(2), 167–191.
- Xiao, J. J. & O'Neill, B. (2018). Propensity to plan, financial capability, and financial satisfaction. *International Journal of Consumer Studies*, *42*(5), 501–512.

Annex A: Call for teachers based on the dataset of high school teachers

Dear teachers:

We get in touch with you to invite your high school groups (accompanied by their teacher), to participate in the workshops offered by the Central Bank of Uruguay in the framework of the BCUEduca program on two of its main functions: regulation and supervision of the financial system and monetary policy and price stability.

We expect to hold workshops with recreational-educational activities that are offered throughout the year with a duration of 3 hours. The first objective of the workshop is to learn about the financial activity and its importance, the agents that make up the financial system and their links, as well as the role of the Central Bank in the supervision and regulation of the financial system. A second objective is to understand the concepts of inflation, the importance of price stability and the role of the BCU in the exercise of monetary policy.

The workshops are provided by BCU staff and they have a simulation and experimentation methodology. Therefore, the group must have a minimum of 15 students and a maximum of 30.

Requirements and information for registration:

1. To evaluate the impact of these workshops it is required the registration of teachers and a diagnostic test of their students with the questionnaire that appears in the link to continuation. The entire class must carry out the questionnaire without prior notice and prior preparation, since the selection of the group does not depend on those results, but they do have completed the questionnaire.
2. Below you will find a link to register your groups and leave your details. They can only register on ONE of the proposed dates.
3. For each date there will be a starting group and a waiting list.
4. The workshops are held at the Central Bank's facilities: Diagonal Fabini 777 (which can be accessed by Florida almost Uruguay).

Thank you.

Annex B: Questionnaire

Inflation questions: true and false.

1. Money fulfills the following functions: unit of account, means of exchange and a store of value. (True)
2. Inflation is caused solely and exclusively by the excess amount of money in the economy. (False)
3. Inflation is the continuous and generalized increase in prices and decreases the purchasing power of money. (True)
4. The Central Bank of Uruguay uses the Monetary Policy to ensure price stability to contribute to the general objectives of growth and employment. (True)

Financial supervision questions: true and false

Which institutions are part of the Financial System?

5. Central Bank of Uruguay. (True)
6. Insurance companies, stock exchange, and pension funds (AFAPs). (True)
7. Planning and Budget Office (OPP), Central Administration. (False)
8. Financial intermediation Banks and Cooperatives. (True)

¿Which institution has the "Regulation and Supervision of the Financial System" function?

9. Planning and Budget Office (OPP), Central Administration. (False)
10. Banco de la Republica Oriental del Uruguay (BROU). (False)
11. Inter-American Development Bank (IDB). (False)
12. Central Bank of Uruguay. (True)