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Financial education on secondary school students: the randomized experiment revisited

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We analyze the effects of financial education on a large sample of secondary school students with a randomized experiment performed in the Center (Rome) and North (Milan and Genova) of Italy. Our main findings document that the course increases significantly financial literacy at both student and class level but the effect is different in different urban environments. More specifically, we document that the overall (questionnaire plus course) learning effect is significantly higher in the North than in Rome. We finally observe that high grades at final middle school exams, willingness to attend Economics at University and household borrowing status are three factors which significantly and positively affect financial education.

Keywords: financial education, financial literacy, demand for money balances, randomized experiment.

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1. Introduction

The interest toward financial education[1] has significantly grown among economists as far as the reduction of social protection and the development of individual complementary pension plans - together with the increasing financial instability and the recurrence of financial crises - have made managing skills of one's own financial resources a capability of paramount importance. The problem has been exacerbated in the recent global financial crisis by the weakening of the arm length's relationship between banks and borrowers generated by the passage from the originate-to-hold to the originate-to-distribute model. In this new scenario the consequent reduction of lender's monitoring activity on borrower's creditworthiness is another factor augmenting the importance of financial literacy under the form, in this specific case, of self-evaluation of one's own borrowing capacity.

In this economic environment of increasing complexity financial education has been progressively acknowledged as a crucial component by which human capital can contribute to individual wellbeing. In this respect it can be remarked that, while standard human capital investment increases the worker's earning potential due to the well known observed phenomenon of returns to schooling,[2] financial education has to do with the complementary capacity of managing earned financial resources and dealing with their volatility. Due to its public good features the reflection on policies aimed at producing it is becoming more and more important.

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[1]According to a standard definition *"financial education is the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being*" (OECD, 2005). This definition implies that financial education consists of two main elements: the first concerning *financial literacy* (learning and understanding) the second *financial empowerment* (application of the knowledge to improve decisions).

[2] For a survey on the vast literature on returns to schooling see, among others, Psacharopoulos and Patrinos (2004) and Card (1999).

As all other forms of education there is widespread consensus that "*Financial education should start at school, for people to be educated as early as possible"*[3] (OECD, 2006) and this is why evaluations of the impact of programs of financial education at school are urgently needed.

Financial education is a relatively new field of inquiry in economics. However several empirical contributions have investigated the role of financial literacy among adults (see, among others, Lusardi and Mitchell, 2009; Lusardi, 2004; Clancy et al., 2001; Bernheim et al., 1997; FIlotto and Nicolini, 2010) and children (Boyce and Danes, 1998; Mandell, 2005 and 2008; Carlin and Robinson, 2010).

Within this literature many authors (see, among others, O'Connel, 2008) claim that, in spite of the increased need to evaluate the proliferation of financial education programs, not much evaluation is in place and we still lack of rigorous studies measuring unambiguously the impact of financial education and the role of the main factors affecting it.

In an attempt to bridge this gap our paper is the first, to our knowledge, which proposes a randomized experiment on financial education on a large sample of high-school students where the treatment is a short (16-hour) extra-curricular course of financial education. As it is well known, the kind of experiment we propose has the advantage of randomizing ex ante participation to the treatment (the financial education course) of which we want to measure the effects. As a consequence averaged target variables differenced by treatment status yield clear cut results in

3 The importance of financial education is confirmed by institutional initiatives booming in most high income countries in the last decades. Among them it is worth mentioning: i) the effort of the US Congress (*Fair and Accurate Transactions Act, 2003*) and the Treasury Dpt. (*Taking ownership of the future: The National Strategy for Financial Literacy*, 2006) in the US; ii) the work of the Financial Service Authority coordinating the *National Strategy for Financial Capability* in the UK; iii) the two main programs of financial education at school in Germany (*SchülerBanking* and *Personal Economics*); iv) the endeavor of the the *Institut National de la Consommation* in France and v) the activity *Australian Securities and Investments Commission* (ASIC) in Australia with its *MoneySmart* and *Teaching financial literacy* plans.

which causality is much easier to establish and endogeneity problems (third factors affecting both the likelihood of participation to the treatment and its outcome) more likely to be overcome.

Our research extends the previous work of Becchetti et al. (2010) to an enlarged sample. In that empirical analysis most of the survey was conducted on schools in Rome and various issues (virtual propensity to invest, readership of economic journals, etc.) were investigated. In this new research many schools from the North of Italy (Milan and Genova) have been added and the focus concentrated on financial learning. The interest for comparing results from different urban environments comes from the fact that Italy is characterized by a high degree of cultural heterogeneity among its regions. Milan is the business and financial center of the country, Rome the political center (with a much stronger weight of the public sector and a much lower presence of the industrial sector and financial institutions) and Genova is the main country's harbor with an old established industrial tradition. We therefore wonder whether the same experiment run in the three different cultural and urban environments has different results on financial literacy.

Our findings document a significant difference in differences of financial learning between treatment and control sample at student and class level. Sample results at class level are our most important findings since they meet all balancing properties and overcome the externality problem which may affect results at student level. However, when we decompose our findings at city level we observe that significance disappears in one of the three cities (Rome) due to a large increase in learning of the local control sample. We further test whether the different impact of the experiment in different urban environments is significant and find that it is.

We are the first to acknowledge the limits of our analysis. Our results are unable to verify directly whether the increased financial literacy does decay in the long run or, on the contrary, it does not and leads to superior financial empowerment when young or adult. However, literature reviews conclude that "*People scoring highly on financial knowledge are probably more likely to be those doing the 'right' things to manage their finances*" (O'Connel, 2008), and most of our knowledge is

developed when at school. Furthermore, it must be remembered that our interviewed students are already active on financial markets since a large number of them has purchased online and has a personal current account (even though the latter is likely to be managed in some cases mainly by their parents). We are therefore encouraged to assume that an improvement in financial literacy at school may have important effects on financial management as other forms of investment in human capital have been proven to have in terms of people's skills and earning capacity.

The paper is divided into five sections (introduction and conclusions included). In the second section, we present our experiment design. In the third section we illustrate some descriptive statistics. In the fourth section we present results from our hypothesis testing. The fifth section concludes.

2.The experiment design

The sample is composed by 3,820 secondary school students enrolled in the final year before graduation in 118 classes of three Italian cities (Rome, Milan and Genova) and extends upon a previous smaller sample of 944 students enrolled in 36 classes mainly in Rome and for a smaller share in Milan. Students come from classical studies (*liceo classico*), scientific studies (liceo scientifico) and vocational training (*istituto professionale*). [4] Classes are divided into two (treatment and control) groups. In the first (treatment) group we i) administer a questionnaire; ii) take a 16-hour course[5] on finance which lasts three months and iii) administer again the same survey four

4 *Liceo Classico* has historically been considered the most prestigious type of high school in Italy. Its curriculum is mainly in the humanities (Latin, Greek, Italian, and Philosophy), but also includes Mathematics, Physics, Chemistry and Biology. *Liceo Scientifico* is mainly oriented toward scientific disciplines (eliminating Greek with respect to *Classico* but maintaining Latin). *Istituto Professionale* is a technical school in which the curriculum includes accounting and basic economic principles together with Italian, Mathematics, and Principles of Law.

5 The details of the structure of the course are omitted for reasons of space, but are available upon request.

months after the end of the course (Table 1). We conventionally define time period of these three steps as T_0, T_1 and T_2. In the second group we perform only steps i) and iii) using the same time interval of the first group. Even though for simplicity we will call the two groups treatment and control from here on we may as well consider both of them as treatment groups if we assume that the true control benchmark is the situation in which nothings happen and survey answers are unchanged between step i) and step iii), given the small time interval occurred between the two surveys. Due to these reasons the first group may be also conceived as the treatment with course and the second as the treatment without course group. More formally, we define

i) the *questionnaire effect* as the difference between first and second survey in the treatment without course (control) group $E_C[Y_{i2}-Y_{i0}]$ (under the conventional assumption that the counterfactual change in the interval between the two surveys is zero).

ii) the *course plus questionnaire effect* as the difference between the first and second survey in the treatment with course group $E_T[Y_{i2}-Y_{i0}]$

iii) the *course effect* as the difference between differences in survey performance between these two groups $\Delta = E_T[Y_{i2}-Y_{i0}] - E_C[Y_{i2}-Y_{i0}]$

where Y_i is our financial literacy performance variable for the i-th student, while $E_T[..]$and $E_C[..]$ are the average differences in performance between the two periods in the treatment and control group respectively.

In order to standardize the treatment we uniformed the material used by teachers in all classes. The material included three components: i) a set of slides covering the different topics of the course; ii) a synthetic teacher's guide providing guidelines to follow during the course and iii) an extended and

detailed guide with supplementary material for the students in the course.[6] Since it was impossible to have the same teacher in all class courses the ensuing heterogeneity on student level data will be controlled for in the econometric estimates which follow by introducing group (class/treatment and class/control) fixed effects and by clustering standard errors at class level. The questionnaires administered before and after the course at the same time interval to the treatment and control samples were identical and answers were given in presence of teachers and experimenters.

The test on financial literacy consists of 27 multiple choice questions with four possible answers (one of them being the "don't know" (DK) option). These include five questions about knowledge of bank instruments (current account, mortgage, cash card, credit card, interest rate), five about financial market elements (government securities, bonds, shares, stock exchange, value of shares), five about different factors related to risk and twelve related to monetary and financial policies and institutions (inflation, central banking, value of money, exchange rates). Based on this part of the survey we build our financial literacy performance variable (Y) as the number of correct answers in the 27 multiple choice questions on financial literacy (see section 4 in the questionnaire in the Appendix B).

The questionnaire also included: i) measures of trust toward banks and financial intermediaries; ii) control questions on the capacity of understanding and reading financial graphs and simple and compounded interest calculations and iii) information on socio-demographic characteristics. Such information includes relationships of the household with the financial system (i.e. students' experiences with online purchases, household mortgages, and loans or ownership of a current account), measures of students' skills (grades at the final middle school exam and final grade in Maths and Italian of the previous secondary school year), willingness to attend University and, if so, intention to choose Economics. These variables will be used as controls in the analysis which follows. Note as well that around 30 percent of sample students already purchased online and have

[6] For additional details on the course see Appendix A.

a bank account. Hence the problem of financial literacy does not apply only to their future but also to their present lives.

3. Descriptive statistics

Our sample includes 3,820 questionnaires of which 35 percent from Rome, while the rest from Genova and Milan. The number of observations unfortunately falls (due to non responses) once we consider our control variables and when we move from the first to the second questionnaire. In this last case non survivorship is highly likely to be casual since it mainly depends on accidental reasons for not being at school that day which we assume as not being related to financial ability skills (ie. only a small part of the school day – less than a hour - is dedicated to the questionnaire). Furthermore, there is no reason to imagine that significant differences exist in non random factors affecting non participation to the second survey between treatment and control group. In Table 1 we summarize characteristics of the main variables used in the empirical analysis. Male gender accounts for around 47 percent of the sample. The average final grade at intermediate school is around 8 (on a 1-10 scale). The majority of students (61 percent) is willing to go to University but only 14 percent of them intends to attend Economics. While around 22 percent have brothers or sisters attending University, only 10 percent have a graduated mother or father. A minority of students' households have experience of borrowing relationship due to a mortgage (35 percent) or a loan (26 percent). Table 1 also evidences that questionnaire have many missing variables when students are asked about their school grades or household experience with bank.

4 . The Effect of financial education: hypothesis testing

The null hypothesis we aim to test with our experiment is the short run effectiveness of financial education courses taught at secondary schools. More formally, we want to test the following null hypothesis

$$H_0 : \Delta = E_T[Y_{i2} - Y_{i0}] - E_C[Y_{i2} - Y_{i0}] = 0 \qquad (1)$$

assuming that the average difference at (the i-th) student level in the performance variable Y measuring financial literacy (the number of correct answers in the financial literacy questionnaire) between treatment and control group is not significantly different from zero.

A related issue to be investigated concerns the concurring factors which affect effectiveness of the treatment. This investigation allows us to understand in which contexts the impact of the course may be stronger.

As explained in section 2, if we take into account that the time interval between the two questionnaires is small, and that the change in financial knowledge may be close to zero for students not participating to our experiment, we may consider the change in the control group - $E_C[Y_{i2} - Y_{i0}]$- as the *questionnaire effect*, the change in the treatment group - $E_T[Y_{i2} - Y_{i0}]$ - as the *questionnaire plus course effect* and the diff-in-diff change Δ in (1) as the *course effect* net of the impact of the questionnaire (see Figure 1).

In order to test our null hypothesis we perform a first diff-in-diff test on the overall sample at student level (Table 2). Baseline data document a slight difference ex ante between treatment and control group (13.96 against 12.11 correct questions). The difference between treated and untreated students widens after the course (18.36 against 14.88) with a progress for both. The diff-in-diff value tells us that the gap between treatment and control group after the course gets larger (Δ=1.7 answers) and is significant in the parametric test at 1 percent level.

Overall, these findings seem to indicate that we have both a questionnaire learning effect (the control group progresses between the first and second survey since $E_C[Y_{i2} - Y_{i0}]>0$), together with a significant course effect (the treated learn significantly more than the untreated students in the control group, or, in (1), Δ>0). When looking at magnitudes, the change in the treatment (course plus questionnaire) effect (around 4.4 additional correct answers) is much higher than the control

(questionnaire) effect (around 2.6 additional correct answers) and both are significant at 1 percent level.

Asymptotic properties suggest that normality and parametric tests can be performed over our large sample, however we report in parallel in this case, and in those which follows, also standard between-group non parametric tests and find that they are never contradicting parametric tests. In doing so we consider that what may be puzzling in this first evidence is the significant (even though slight) difference between treatment and control group ex ante. This is why we perform a pairwise randomization in which initial units allocated to the treatment and control groups are matched in pairs as suggested by Imbens and Wooldridge (2009).[7] After this manipulation the difference in (pre and post treatment) differences between treatment and control sample remains strongly significant (1.65), even though the ex ante significant differences in exact answers do not disappear (Table 1).

Our first results on the overall sample at student level therefore clearly reveal three distinct phenomena: significant treatment (financial course) effect, questionnaire learning effect and imperfect random selection of students. This last finding is a problem since it reveals that a difference in observables (which may in turn depend on a difference in unobservables such as higher ability ex ante of students in the treatment group) determines a slightly better performance of the treated in the ex ante questionnaire. This difference may be suspected to drive the diff-in-diff result. The question is therefore what would be the effect of the treatment and its significance in absence of such difference.

This is one of the reasons why we further decompose our main findings at city level and, in section 3.2, at class level.

As already explained in the introduction, there is strong cultural heterogeneity in the three urban environments with Rome having a much stronger public sector presence, Milan being the business

[7] Variables used for matching are described in Table 1. We perform a robustness check and find that the use of a subset of those variables does not affect the significance of our main findings.

center and Genova having an old industrial tradition. Such differences are reflected also in significant differences in our socio-demographic controls (Table 3). Roman students have a significantly higher willingness to attend University (72 against 60 percent), however combined with a relatively lower propensity to attend Economics (10 against 14 percent), while a higher share of them perform voluntary activities (17 against 12 percent).[8] Another relevant difference is that a significantly larger share of students from the North declare that their families borrowed from a bank (25 against 18 percent). Finally, in terms of school performance, Roman students report higher grades at the final middle school exam and in Italian in the current year, while not significantly different grades in Math in the same current year.[9]

The geographical breakdown of our diff-in-diff test documents that students attending the course increase significantly more their number of exact answers than students in the control group in Milan and Genova (the Δ is very large and around 7-8 questions), while not in Rome (where the Δ is not significantly different from zero). Note that in both cities of the North we have very slight differences in terms of ex ante number of exact questions (around 1). The ex ante difference in correct answers between treated and untreated is not significant at 5 percent level in Genova. This finding is paralleled also by a lack of significant difference in observables between treatment and control sample in the same town, thereby overcoming the problem we have in the overall sample.

If we look at what factor drives this difference among urban environments we find that it is a strong questionnaire effect in the control group in Rome (from 13.4 to 18.17 correct questions in the control group), while such effect is negligible in Genova and Milan.[10] Hence, the significance of the questionnaire effect (significant and positive difference in correct answers in the control group) in

[8] See Table C1 in Appendix C.

[9] Note that school performance in different regional contexts may be hardly comparable due to differences in the quality and severity of school and teachers. However it is interesting to observe that the difference in Italian and middle school final exam between students of the two areas disappears once we come to Math.

[10] Such insignificant questionnaire effect in two out of three cities suggest that our hypothesis of a counterfactual with non significant change in financial learning in the interval between the two questionnaires is not unreasonable.

the overall sample is entirely driven by the Roman sample. Note as well that the simple inspection of the diff-in-diff values in the three different cities and their standard errors tells us that the diff-in-diff performance in the North is significantly different from that in Rome (ie. around 6-7 more correct answers in the North with a s.e. below 1 against 0.4 more correct answers in Rome with a s.e. below 1 as well). To go deeper in our comparison, we explicitly test the overall questionnaire and course effect by comparing the overall change in financial learning in the North and in Rome or, more formally, if we test

$$H_0 : E_{T+C}\left[Y_{i2} - Y_{i0}\right]_{NORTH} = E_{T+C}\left[Y_{i2} - Y_{i0}\right]_{ROME}$$

where T+C is the overall (treatment plus control) sample. We find that the null is rejected since the left hand side term is significantly higher (the difference being of 0.92 additional correct questions with significance at 1 percent level with parametric tests and 0.95 with non parametric test and propensity score matching). This result implies that the overall experiment and, more specifically, the combination of the questionnaire effect for the control group and the questionnaire plus course effect for the treatment group had stronger impact on financial literacy in the North vis-à-vis Rome.[11]

4.1 Econometric analysis at student level

In order to control our *diff-in-diff* results for the effect of covariates we perform econometric estimates following the classic specification of Inbens and Wooldridge (2009)

$$Y = \alpha_0 + \alpha_1 TREAT + \alpha_2 POST + \alpha_3 POST * TREAT + \sum_j \beta_j X_j + \varepsilon \qquad (2)$$

[11] To control for the robustness of our test findings we create two subsets of students using the median intermediate school performance as a delimiter. In this way we have two smaller samples which are more homogeneous in terms of school performance. Results are substantially unchanged. They are omitted for reasons of space and available upon request.

where Y is the number of correct answers from the 27 multiple choice questions on financial literacy, *TREAT* is a dummy for students in the treatment sample, *POST* is a dummy which takes value one for observations from the second questionnaire, and *POST*TREAT* is the interaction between the two previous dummies. With regard to the X covariates, *Male* is a dummy for male gender, *WouldBeUniversity* is a dummy taking value of one if the student intends to go to University, *MathGrade*, *ItalianGrade* and *IntermediateGrade* are final grades in Math in the previous school year, in Italian in the previous school year and at final middle school exam respectively. Controls also include the following (0/1) dummies: *MathDebt* if the student had a "debito" ("insufficient" grade to be recovered with extra courses during summer) in Math in the previous year, *WouldBeEconomics* if the student intends to study Economics at university; *FatherClerk*, *FatherWorker* or *FatherPublicSector* if the father is an employee in the private sector, a manual worker or an employee in the public sector, respectively; *MotherHousewife*, *MotherClerk* if the mother is a housewife or an employee respectively, *FatherDegree* (*MotherDegree*) if the father (mother) has a university degree. Finally, *BrothSistUniversity* is the number of brothers and/or sisters attending University, *HouseholdSize* the number of people living in the household, *Mortgage* (*Loan*) a (0/1) dummy if student's family has a mortgage (loan) and *Volunteering* a dummy taking value of one if the student takes part in volunteering activities. All estimates are performed in a first step with standard errors clustered at group[12] level without fixed effects (Table 4) and, in a second step, with group fixed effects and standard errors clustered at group level (Table 5).[13] Fixed effects are meant to capture unobservable factors such as: i) the impact of the specific financial education teacher holding the standardized course in a given class; ii) the skills and teaching abilities of the ordinary professors in that class; iii) local average socio-demographic

[12] The group is defined as the interaction of a specific class with the treatment/control condition.

[13] With the introduction of fixed effects an additional term (η_i) has to be introduced in specification (1) while all time invariant regressors are dropped since their effects are absorbed by the same fixed effects.

factors of the area in which the school is located which may affect class performance; iv) relational dynamics of the specific class; v) different types of school curricula.

The null of absence of the effect of the treatment can be tested as H_0: $\alpha_3=0$.

Results from the overall sample reveal a slight difference between treatment and control groups (α_1) corresponding to a difference of around 1.37 additional correct questions, together with a significant and positive difference between ex ante and ex post answers of 2.43 correct questions (α_2).

The null of no effect of the treatment can be rejected only at 10 percent level. The interaction coefficient (α_3) is significant and positive with treated students registering a positive difference of around two correct questions in terms of financial learning vis-à-vis control students.[14]

We repeat the estimate separately in the three cities (Rome, Milan and Genova) in which the experiment took place and find again important differences between Rome and the other two cities. The null hypothesis is rejected at 1 percent level in Milan and Genova, while not in Rome where α_3 is not significantly different from zero. In Genova the interaction effect is almost twice as much as in Milan (around 8 against 4 additional correct questions). Note that in all of the three cities we also have a non significant difference between treatment and control group, net of the *POST* and *POST*TREAT* effects. As explained in section 4, lack of significant ex ante differences between treatment and control sample is crucial to avoid that a difference in observables (i.e. higher ability ex ante of students in the treatment group) may drive the diff-in-diff results.[15] When looking at the impact of covariates without fixed effects we find that the variable which is significant in all estimates (even though weakly so in Rome) is the school grade at the final middle school exam whose impact on the number of correct answers is positive (Table 4). In the estimates in which we

[14] Note that the number of observations in the overall sample estimate is significantly smaller than that of the diff-in-diff test due to a large number of missing observations on covariates. By repeating the diff-in-diff tests presented in Table 3 with the restricted number of observations used for econometric estimates in Table 4 we find that our main results are unchanged. Details are omitted for reason of space and available upon request.

[15] It must be however considered that this ex ante difference is very small also in the two cities in which it is significant (around one correct answer).

control for class fixed effects the significance of the treatment is confirmed with similar magnitudes (Table 5).

We want to test now whether the observed difference in experiment results between Rome and the two cities in the North is significant. We therefore propose a *diff-in-diff-in-diff* estimate of the kind

$$Y = \alpha_0 + \alpha_1 TREAT + \alpha_2 POST + \alpha_3 NORTH + \alpha_4 POST * TREAT + \alpha_5 NORTH * TREAT + \\ + \alpha_6 NORTH * TREAT * POST + \sum_j \beta_j X_j + \varepsilon \qquad (3)$$

where regressors are defined as in (2), *NORTH* is a dummy with value one for students in Milan and Genova and *NORTH*TREAT*POST* is a triple interaction dummy. The null for the specific diff-in-diff-in-diff test here is H_0: $\alpha_6=0$.

Regression findings document that the triple interaction variable is significant (4.83 answers), thereby rejecting the hypothesis that the diff-in-diff result in Rome is equal to that in the other two cities combined (Table 4, column 6). Consistently with what found before we also register a positive and significant effect of the *POST* dummy and two negative effects for the *NORTH* and *NORTH*POST* dummies (students in the North perform slightly worse ex ante and strongly worse ex post when not considering the effect of those who participated to the course and therefore when limiting the analysis to control group observations).

Again, we find that some covariates have a strong positive impact on financial knowledge: they are the school performance at the final middle school exam, the willingness to attend Economics at university, the existence of household bank loans. These last two variables are also factors which are present in higher proportion in Northern vis-à-vis Roman students.

4.2 Class level results

The ex ante differences in observables and in the performance variable between treatment and control groups at student level for the overall sample lead us to test our hypothesis at class level where balancing properties are more likely to hold.

Furthermore, one of the problems that experiments are assumed to avoid is that treated or control units can influence each other while this is obviously the case (and also the desired goal) for a course of financial education in a given class. It is therefore important to repeat our test by collapsing our observations at group (class/control or class/treatment units) level, thereby eliminating the within class externality effect. By doing so we end up with 118 observations corresponding to an equal number of classes participating to the experiment either in the treatment or control group. Note that at class level we have the nice property of absence of significant differences in covariates between treatment and control classes (Table 6).

Our empirical findings document that the null of no impact of the treatment is rejected when we perform diff-in-diff parametric and non parametric propensity score matching tests[16] (Table 7) in Milan and weakly rejected in Genova but not in the overall sample. These findings at city level produce a significant result in the North sample of 5.92 additional exact questions.

Results of the diff-in-diff specification in (1) at class level are reported in Table 8. Treated classes have an average higher change of around 2.4 correct answers between the first and the second survey (Table 8, column 1) and of around 5 if we restrict the sample to classes of Milan and Genova (Table 8, column 2). The significance of school performance at the final middle school exam is confirmed also in the class level estimate.

We finally perform at class level the diff-in-diff-in-diff specification in (3) to see whether the difference between the impact of the treatment in the North and in Rome is significant. We find that it is strongly so since the *NORTH*TREAT*POST* dummy takes value 4.95 and is significant at 1 percent level (Table 8, column 3). Again, the positive and significant impact on financial education

[16] Matching is still based on the same regressors but is now at class level.

of school performance at the final middle school exam, willingness to attend Economics at university and the existence of household bank loans are confirmed in this estimate.

Overall, we may conclude that, while some of our diff-in-diff results (overall sample, Rome and Milan at student level) cannot lead us to conclude unequivocally in favor of a significant impact of the course because of the significant ex ante difference in observables, the problem disappears in class level estimates in which the significance of the diff-in-diff results definitely supports the relevance of the course.

5. Conclusions

Financial education is an increasingly important and investigated dimension of human capital. Financial institutions and policymakers are becoming more and more aware that promoting financial literacy at school is crucial to empower individuals and to provide them with those skills which are more and more urgently needed in a turbulent economic and financial environment in which the responsibility of managing one's own financial resources is always less delegated to external institutions.

In parallel, with the growth of financial education programs a strong demand for evaluating the impact of such programs has risen. This paper aims to answer to this demand with the first (to our knowledge) randomized experiment on a large sample of secondary school students in three different Italian urban environments. Our findings document a significant progress in financial literacy in two out of three cities and a significantly different impact of the overall (treatment plus questionnaire) effect in the North. From a quantitative point of view we note that the effect is very strong where it is significant (around 7-8 more correct questions) and that the difference across urban environments is extremely relevant. Note that the result is produced in presence of a short 16-hour course of financial education which is not in the regular syllabus of students and for which

students do not have to take exams. The effect of more structured course in the regular course may therefore presumably be larger. Considering the importance of financial education our results may be interpreted as evidence in favor of the introduction of financial literacy as a secondary school discipline.

A clear limit of our investigation is that we cannot evaluate whether our effects will be permanent or just temporary and how financial literacy may affect financial empowerment. However, many students in our sample already have to do with money and finance having their own current account, savings and purchasing online. Furthermore, exactly as we expect that an increase in school years and learned student skills will produce significant effects in terms of future earning capacity with standard human capital investment, we may expect that an increase in financial literacy may generate higher capabilities of managing one's own savings and wealth. In this perspective we hope that future developments of the financial education literature will be able to detect more clearly returns to financial literacy allowing us to understand the medium-long run effects of financial education on individual wellbeing.

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Figure 1. The experiment design

	Treatment with course	**Treatment without course**	**Control**
T_0	Questionnaire	Questionnaire	
T_1	16-hour course of financial education		
T_2	Questionnaire	Questionnaire	
Null hyp.	$E_T[Y_{i2}-Y_{i0}] = 0$	$E_C[Y_{i2}-Y_{i0}] = 0$	$E_{\neq T,C}[Y_{i2}-Y_{i0}] = 0$ *by assumption, due to the short time interval between first and second questionnaire*
Alternative hyp.	$E_T[Y_{i2}-Y_{i0}] > 0$ *Treatment+questionnaire effect significant*	$E_C[Y_{i2}-Y_{i0}] > 0$ *questionnaire effect significant*	
Test on the impact of the course			
Null hyp.	$H_0 : \Delta = E_T[Y_{i2}-Y_{i0}] - E_C[Y_{i2}-Y_{i0}] = 0$		
Alternative hypothesis	$H_0 : \Delta = E_T[Y_{i2}-Y_{i0}] - E_C[Y_{i2}-Y_{i0}] > 0$ *Course effect significant*		

Table 1. Summary statistics of the variables used

Variables	N. obs	Mean	Std. Dev.	Min.	Max.
Number of correct answers*	2124	13.42467	4.75935	0	26
Male	1983	0.469995	0.4992248	0	1
WouldBeUniversity	1997	0.6114171	0.4875503	0	1
MathGrade	1881	6.633174	1.153369	2	10
ItalianGrade	1889	6.7009	0.8793802	2	10
IntermediateGrade	1855	8.087332	1.317841	5	10
MathDebt	1688	0.2310427	0.4216245	0	1
WouldBeEconomics	2124	0.1412429	0.348354	0	1
FatherClerk	2124	0.1596045	0.3663251	0	1
FatherWorker	2124	0.2010358	0.4008691	0	1
FatherPublicSector	2124	0.0536723	0.225423	0	1
MotherHousewife	2124	0.2678908	0.4429647	0	1
MotherClerk	2124	0.2109228	0.4080598	0	1
FatherDegree	2124	0.096516	0.2953671	0	1
MotherDegree	2124	0.1016949	0.3023179	0	1
BrothSistUniversity	1974	0.2198582	0.6346082	0	1
HouseholdSize	2041	2.911318	0.7608524	1	4
Mortgage	1739	0.346751	0.4760726	0	1
Loan	1495	0.2548495	0.4359224	0	1
Volunteering	1946	0.1120247	0.3154779	0	1

Number of correct answers: in the 27 multiple choice questions on financial literacy (see section 4 of the questionnaire in the Appendix B); *Male* is a dummy for male gender. *MathGrade*, *ItalianGrade* and *IntermediateGrade* are Final grades in Math in the previous school year, in Italian in the previous school year and at final middle school exam respectively. *WouldBeUniversity* is a dummy taking value of one if the student intends to go to University. Controls also include the following (0/1) dummies: *MathDebt* if the student had a "debito" ("insufficient" grade to be recovered with extra courses during summer) in Maths in the previous year, *WouldBeEconomics* if the student intends to study Economics at university; *FatherClerk*, *FatherWorker* or *FatherPublicSector* if the father is an employee in the private sector, a manual worker or a an employee in the public sector, respectively; *MotherHousewife*, *MotherClerk* if the mother is a housewife or an employee respectively, *FatherDegree* (*MotherDegree*) if the father (mother) has a university degree. *BrothSistUniversity* is the number of brothers and/or sisters attending University, *HouseholdSize* the number of people living in the household, *Mortgage* (*Loan*) a (0/1) dummy if student's family has a mortgage (loan) and *Volunteering* a dummy taking value of one if the student takes part in volunteering activities.

Table 2. Difference in difference tests at student level (with or without propensity score matching (PSM))

	First (before course) test			Second (after course) test			Diff. in diff
	Control	Treatment	Diff.	Control	Treatment	Diff.	
			All sample				
Plain	12.211	13.956	1.745***	14.880	18.358	3.479***	1.734***
	(0.187)	(0.123)	(0.224)	(0.305)	(0.125)	(0.330)	(0.399)
PSM	12.719	13.956	1.237***	15.471	18.358	2.887***	1.650***
	(0.210)	(0.126)	(0.245)	(0.290)	0.128)	(0.317)	(0.400)
			Milan				
Plain	13.041	13.988	0.947***	10.723	17.690	6.967***	6.020***
	(0.308)	(0.171)	(0.352)	(0.599)	(0.169)	(0.623)	(0.715)
PSM	12.309	13.988	1.679***	11.968	17.690	5.722***	4.043***
	(0.407)	(0.170)	(0.441)	(0.651)	(0.169)	(0.672)	(0.804)
			Genova				
Plain	10.436	11.455	1.018*	10.256	18.358	8.101***	7.083***
	(0.338)	(0.396)	(0.521)	(0.815)	(0.396)	(0.906)	(1.045)
PSM	12.367	11.455	-0.912	11.167	18.358	7.191***	8.103***
	(0.466)	(0.391)	(0.608)	(1.023)	(0.391)	(1.095)	(1.252)
			Rome				
Plain	13.410	14.706	1.296***	18.168	19.558	1.391***	0.094
	(0.293)	(0.166)	(0.336)	(0.322)	(0.177)	(0.368)	(0.498)
PSM	13.992	14.706	0.714*	18.055	19.558	1.503***	0.789
	(0.320)	(0.175)	(0.364)	(0.332)	(0.187)	(0.381)	(0.527)
			North				
Plain	11.791	13.555	1.765***	10.548	17.803	7.255***	5.490***
	(0.228)	(0.159)	(0.278)	(0.486)	(0.159)	(0.511)	(0.582)
PSM	12.141	13.555	1.414***	11.672	17.803	6.131***	4.717***
	(0.292)	(0.159)	(0.333)	(0.499)	(0.158)	(0.523)	(0.620)

Number of observations: All sample (3795), Milan (1925), Genova (596), Rome(1273), North(Milan+Genova) (2521).
Standard errors in round brackets. *** p<0.01; ** p<0.05; * p<0.1
Plain: simple randomized assignment of students to treatment or control group; PSM: pairwise randomization in which initial units allocated to the treatment and control groups are matched in pairs (between group non parametric test).
Variables used for matching. *Male* is a dummy for male gender. *MathGrade*, *ItalianGrade* and *IntermediateGrade* are Final grades in Math in the previous school year, in Italian in the previous school year and at final middle school exam respectively. *WouldBeUniversity* is a dummy taking value of one if the student intends to go to University. Controls also include the following (0/1) dummies: *MathDebt* if the student had a "debito" ("insufficient" grade to be recovered with extra courses during summer) in Maths in the previous year, *WouldBeEconomics* if the student intends to study Economics at university; *FatherClerk*, *FatherWorker* or *FatherPublicSector* if the father is an employee in the private sector, a manual worker or a an employee in the public sector, respectively; *MotherHousewife*, *MotherClerk* if the mother is a housewife or an employee respectively, *FatherDegree* (*MotherDegree*) if the father (mother) has a university degree. *BrothSistUniversity* is the number of brothers and/or sisters attending University, *HouseholdSize* the number of people living in the household, *Mortgage* (*Loan*) a (0/1) dummy if student's family has a mortgage (loan) and *Volunteering* a dummy taking value of one if the student takes part in volunteering activities.

Table 3 Descriptive statistics at city level

Variables	Rome	Milan	Genova
Male	0.435	0.530	0.486
	(0.496)	(0.500)	(0.500)
WouldBeUniversity	0.599	0.779	0.534
	(0.490)	(0.415)	(0.499)
MathGrade	6.613	6.745	6.593
	(1.143)	(1.194)	(1.140)
ItalianGrade	6.658	6.884	6.652
	(0.830)	(0.952)	(0.894)
IntermediateGrade	8.007	8.620	7.875
	(1.278)	(1.319)	(1.292)
MathDebt	0.244	0.238	0.207
	(0.430)	(0.426)	(0.405)
WouldBeEconomics	0.142	0.089	0.170
	(0.349)	(0.286)	(0.376)
FatherClerk	0.128	0.163	0.206
	(0.334)	(0.370)	(0.405)
FatherWorker	0.229	0.171	0.176
	(0.420)	(0.377)	(0.380)
FatherPublicSector	0.032	0.069	0.078
	(0.177)	(0.254)	(0.268)
MotherHousewife	0.245	0.194	0.346
	(0.430)	(0.396)	(0.476)
MotherClerk	0.209	0.227	0.205
	(0.407)	(0.419)	(0.404)
FatherDegree	0.092	0.148	0.075
	(0.288)	(0.356)	(0.263)
MotherDegree	0.089	0.156	0.091
	(0.284)	(0.363)	(0.287)
BrothSistUniversity	0.211	0.317	0.179
	(0.564)	(1.039)	(0.384)
HouseholdSize	2.928	2.853	2.920
	(0.767)	(0.724)	(0.771)
Mortgage	0.364	0.344	0.323
	(0.482)	(0.476)	(0.468)
Loan	0.243	0.181	0.310
	(0.429)	(0.386)	(0.463)
Volunteering	0.119	0.174	0.067
	(0.324)	(0.380)	(0.250)

Variable legend: see Table A1.

Table 4. Multivariate diff in diff results at student level - with standard errors clustered at group level

VARIABLES	All sample	North	Rome	Milan	Genova	All sample
Treat	1.368**	1.729*	1.006	1.934	-0.0360	0.750
	(0.660)	(0.900)	(0.760)	(1.185)	(1.099)	(0.734)
Post	2.437**	-0.378	4.598***	0.00278	-1.462	4.634***
	(0.972)	(1.421)	(1.054)	(1.672)	(1.730)	(1.012)
Interaction	2.133*	4.914***	0.189	4.126**	7.907***	0.124
	(1.116)	(1.620)	(1.151)	(1.854)	(2.228)	(1.116)
North						-1.870***
						(0.666)
North*post						-5.035***
						(1.742)
North*treat						0.974
						(1.161)
North*treat*post						4.827**
						(1.971)
Male	0.568*	0.764**	0.00233	1.394***	-0.687	0.536*
	(0.315)	(0.361)	(0.513)	(0.371)	(0.833)	(0.295)
WouldBeUniversity	0.0141	-0.0983	0.738	-0.121	-0.191	0.184
	(0.327)	(0.340)	(0.478)	(0.352)	(0.926)	(0.317)
MathGrade	0.202	0.220	0.273*	0.234	0.245	0.226
	(0.138)	(0.192)	(0.159)	(0.204)	(0.344)	(0.143)
ItalianGrade	0.168	0.217	0.223	0.294	0.177	0.229
	(0.192)	(0.262)	(0.175)	(0.300)	(0.475)	(0.183)
IntermediateGrade	0.564***	0.746***	0.271*	0.790***	0.679***	0.606***
	(0.132)	(0.164)	(0.152)	(0.193)	(0.205)	(0.127)
MathDebt	-0.354	-0.303	0.207	-0.522	0.304	-0.163
	(0.368)	(0.446)	(0.518)	(0.468)	(0.908)	(0.342)
WouldBeEconomics	1.024***	0.900*	0.616*	0.706	1.608***	0.838**
	(0.357)	(0.469)	(0.327)	(0.542)	(0.537)	(0.351)
FatherClerk	0.162	-0.0697	0.0808	-0.133	0.289	-0.0716
	(0.332)	(0.381)	(0.454)	(0.502)	(0.343)	(0.299)
FatherWorker	0.00475	-0.0482	0.313	0.296	-1.158	0.0772
	(0.377)	(0.479)	(0.508)	(0.564)	(0.751)	(0.355)
FatherPublicSector	0.787*	0.603	0.334	1.308*	0.0667	0.505
	(0.474)	(0.594)	(0.639)	(0.675)	(0.946)	(0.394)
MotherHousewife	0.0105	-0.199	0.104	0.0486	-1.217***	-0.0873
	(0.282)	(0.307)	(0.431)	(0.303)	(0.452)	(0.256)
MotherClerk	0.497**	0.189	1.251***	-0.0942	1.086***	0.506**
	(0.239)	(0.258)	(0.343)	(0.355)	(0.361)	(0.235)
FatherDegree	-0.696	-0.780	0.0967	-0.969	-0.283	-0.548
	(0.493)	(0.591)	(0.594)	(0.677)	(0.880)	(0.461)
MotherDegree	0.204	0.498	-0.407	0.479	0.506	0.184
	(0.409)	(0.415)	(0.703)	(0.531)	(0.529)	(0.398)
BrothSistUniversity	0.346	0.748***	-0.551	1.057***	0.0752	0.396
	(0.282)	(0.269)	(0.607)	(0.336)	(0.569)	(0.276)
HouseholdSize	0.164	0.224	0.0381	0.135	0.566**	0.150
	(0.137)	(0.148)	(0.280)	(0.164)	(0.287)	(0.138)
Mortgage	-0.117	-0.0479	0.148	0.140	-0.291	-0.0117
	(0.299)	(0.360)	(0.430)	(0.388)	(0.563)	(0.267)
Loan	0.593**	0.648**	0.0590	0.465	1.252***	0.481**
	(0.232)	(0.266)	(0.373)	(0.291)	(0.407)	(0.204)
Volunteer	-0.241	0.138	-0.510	-0.366	1.433*	0.0520
	(0.353)	(0.371)	(0.514)	(0.456)	(0.805)	(0.314)
Constant	4.586***	1.862	7.339***	1.078	2.154	4.872***
	(1.360)	(1.515)	(1.858)	(1.750)	(3.907)	(1.237)
Observations	1836	1232	604	930	302	1836
R-squared	0.28	0.33	0.36	0.34	0.40	0.34

Variable legend: see Table A1.

Table 5. Multivariate diff in diff results at student level - group fixed effects with standard errors clustered at group level

VARIABLES	All sample	North	Rome	Milan	Genova	All sample
Post	2.565***	0.816	-1.747	4.847***	0.0955	4.829***
	(0.955)	(1.340)	(1.616)	(0.528)	(1.209)	(0.997)
Interaction	2.275**	3.682**	8.481***	-0.0434	4.813***	-0.00549
	(1.091)	(1.579)	(1.903)	(0.606)	(1.426)	(1.088)
North*post						-4.706***
						(1.603)
North*treat*post						4.715**
						(1.833)
Constant	13.91	30.31**	11.90	8.203	33.59**	15.33
	(16.02)	(13.80)	(8.677)	(15.74)	(14.58)	(15.68)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1836	930	302	604	1232	1836
R-squared	0.498	0.463	0.621	0.634	0.486	0.519

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Group: student class interacted with treatment/control status. Variable legend: see Table A1.

Table 6. Balancing properties at class level

Variable(s)	Mean	Control	Diff.	|t|	Pr(|T|>|t|)
Number of correct answers	12.543	13.984	1.442	1.87	0.0666*
Male	0.447	0.471	0.024	0.41	0.6828
WouldBeUniversity	0.613	0.525	-0.088	1.64	0.1063
MathGrade	6.635	6.641	0.006	0.05	0.9594
ItalianGrade	6.784	6.689	-0.094	1.01	0.3142
IntermediateGrade	7.967	7.839	-0.128	0.72	0.4719
MathDebt	0.245	0.181	-0.064	1.66	0.1025
WouldBeEconomics	0.148	0.169	0.022	0.59	0.5591
FatherClerk	0.131	0.165	0.034	1.32	0.1934
FatherWorker	0.190	0.202	0.012	0.39	0.7012
FatherPublicSector	0.060	0.062	0.002	0.12	0.9086
MotherHousewife	0.288	0.293	0.005	0.14	0.8881
MotherClerk	0.188	0.206	0.018	0.69	0.4937
FatherDegree	0.115	0.074	-0.041	2.13	0.0368**
MotherDegree	0.094	0.087	-0.007	0.39	0.6967
BrothSistUniversity	0.225	0.175	-0.050	1.23	0.2224
HouseholdSize	2.895	2.903	0.008	0.17	0.8670
Mortgage	0.343	0.384	0.041	0.99	0.3252
Loan	0.247	0.289	0.042	1.13	0.2615
Volunteering	0.118	0.092	-0.027	1.11	0.2731

Variable legend: see Table A1.

Table 7. Difference in difference tests – class averages (with or without propensity score matching (PSM))

	First (before course) test			Second (after course) test			Diff. in diff
	Control	Treatment	Diff.	Control	Treatment	Diff.	
			All sample				
Plain	12.543	13.984	1.442*	14.889	18.266	3.378***	1.936
	(0.662)	(0.537)	(0.852)	(0.827)	(0.537)	(0.986)	(1.303)
PSM	13.384	13.984	0.600	15.034	18.266	3.232***	2.632*
	(0.659)	(0.509)	(0.832)	(0.964)	(0.509)	(1.090)	(1.371)
			Milan				
Plain	12.625	13.833	1.208	9.974	17.574	7.600***	6.392***
	(1.119)	(0.840)	(1.399)	(1.679)	(0.840)	(1.877)	(2.341)
PSM	12.625	13.833	1.208	7.375	17.574	10.199***	8.991***
	(1.303)	(0.714)	(1.485)	(2.763)	(0.714)	(2.854)	(3.217)
			Genova				
Plain	10.646	11.857	1.211	10.429	17.419	6.990***	5.779*
	(1.337)	(1.337)	(1.891)	(1.727)	(1.337)	(2.184)	(2.889)
PSM	10.646	11.857	1.211	10.429	17.419	6.990***	5.779*
	(1.551)	(1.161)	(1.937)	(2.002)	(1.161)	(2.314)	(3.017)
			Rome				
Plain	13.337	14.753	1.415	18.559	19.167	0.608	-0.807
	(0.724)	(0.583)	(0.930)	(0.801)	(0.583)	(0.991)	(1.359)
PSM	13.189	14.753	1.564	18.697	19.167	0.470	-1.094
	(0.966)	(0.546)	(1.110)	(1.247)	(0.546)	(1.361)	(1.756)
			North				
Plain	11.919	13.363	1.444	10.169	17.537	7.368***	5.924***
	(0.863)	(0.705)	(1.114)	(1.221)	(0.705)	(1.410)	(1.797)
PSM	11.919	13.363	1.444	9.208	17.537	8.329***	6.885***
	(0.963)	(0.620)	(1.146)	(1.612)	(0.620)	(1.727)	(2.073)

Standard errors in square brackets. *** p<0.01; ** p<0.05; * p<0.1

Plain: simple randomized assignment of students to treatment or control group (parametric test); PSM: pairwise randomization in which initial units allocated to the treatment and control groups are matched in pairs (non parametric sign test).

Variables used for matching. *Male* is a dummy for male gender. *MathGrade*, *ItalianGrade* and *IntermediateGrade* are Final grades in Math in the previous school year, in Italian in the previous school year and at final middle school exam respectively. *WouldBeUniversity* is a dummy taking value of one if the student intends to go to University. Controls also include the following (0/1) dummies: *MathDebt* if the student had "debito" ("insufficient" grade) in mathematics in the previous year, *WouldBeEconomics* if the student intends to study economics at university; *FatherClerk*, *FatherWorker* or *FatherPublicSector* if the father is an employee in the private sector, a manual worker or a an employee in the public sector, respectively; *MotherHousewife*, *MotherClerk* if the mother is a housewife or an employee respectively, *FatherDegree* (*MotherDegree*) if the father (mother) has a university degree. *BrothSistUniversity* is the number of brothers or sisters attending University, *HouseholdSize* the number of people living in the household, *Mortgage* (*Loan*) a (0/1) dummy if student's family has a mortgage (loan) and *Volunteering* a dummy taking value of one if the student takes part in volunteering activities

Table 8. Multivariate diff in diff results at class level

VARIABLES	Diff-in-diff (All)	Diff-in-diff (North)	Diff-in-diff-in-diff (All)
Treat	0.0811	0.135	1.468*
	(0.668)	(0.997)	(0.863)
Post	2.354***	-0.871	5.041***
	(0.855)	(1.170)	(0.751)
Interaction	2.092**	4.991***	-0.174
	(0.962)	(1.347)	(0.935)
North			0.299
			(1.040)
North*post			-5.782***
			(1.257)
North*treat			-2.025
			(1.270)
North*treat*post			4.954***
			(1.457)
Male	-0.646	-0.398	-0.450
	(1.411)	(1.766)	(1.229)
WouldBeUniversity	-2.213	0.520	-2.344
	(2.093)	(3.015)	(1.683)
MathGrade	-1.275	-2.371*	-0.881
	(0.849)	(1.358)	(0.921)
ItalianGrade	-2.633***	-0.444	-2.050***
	(0.759)	(1.011)	(0.687)
IntermediateGrade	3.571***	2.648***	3.301***
	(0.614)	(0.729)	(0.638)
MathDebt	-4.825*	-6.629**	-4.898
	(2.742)	(3.252)	(3.060)
WouldBeEconomics	7.179***	11.65***	7.186***
	(1.888)	(2.907)	(1.629)
FatherClerk	3.066	-2.689	0.0756
	(2.930)	(6.985)	(2.624)
FatherWorker	1.164	6.824**	3.969*
	(2.813)	(3.125)	(2.394)
FatherPublicSector	-0.974	-5.612	-0.563
	(4.795)	(10.41)	(4.380)
MotherHousewife	-2.136	-3.164	-4.265**
	(2.257)	(4.163)	(2.065)
MotherClerk	1.616	1.264	3.107
	(3.964)	(4.132)	(3.148)
FatherDegree	-9.106**	2.190	-4.211
	(4.365)	(5.084)	(3.389)
MotherDegree	1.029	-10.29	-2.435
	(4.577)	(6.504)	(4.055)
BrothSistUniversity	0.543	2.807	0.169
	(2.207)	(3.497)	(2.621)
HouseholdSize	2.044	4.717	2.945*
	(1.920)	(3.027)	(1.776)
Mortgage	-0.135	-5.980*	0.418
	(2.336)	(3.191)	(2.105)
Loan	3.703	3.465	4.308*
	(2.485)	(3.816)	(2.231)
Volunteer	-8.300**	-8.301	-3.568
	(3.262)	(6.240)	(4.035)
Constant	6.911	-1.362	-1.161
	(10.12)	(15.49)	(8.655)
Observations	113	61	113

R-squared	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix A Contents of the teaching modules

There are six teaching modules which when taken all together form the cycle of lectures. The following topics are addressed by each module:

1. Basic Concepts of Economics

2. Economic Operators: Households, Companies and Banks

3. Debt, Indebtedness, and Financing

4. Monetary Policy and the Monetary Institutions

5. Financial Markets

6. Finance and Ethics

1. Basic Concepts of Economics

This teaching unit deals with economic definitions. It introduces the basic concepts of microeconomics, macroeconomics, and political economy. It then presents concepts concerning macroeconomic magnitudes, such as: gross domestic product and its composition, aggregate demand, growth rates of the economy, inflation and its effects, employment and unemployment, money and its functions, interest rates, and the links of these magnitudes with everyday life and the financial market.

2. Economic Operators: Households, Companies and Banks

This teaching unit considers concepts relative to flows among economic operators (households, firms and banks) and the social functions performed by these three actors, with the focus on the role, activities, and functions of banks. Explanations are given of the concepts underlying financial intermediation, the traditional functions of banks, and forms of deposits, savings and loans, as well as management of the risks attendant on traditional banking activities.

3. Debt, Indebtedness, and Financing

This teaching unit considers concepts concerning firms and households, with the focus on consumption, saving, indebtedness, and financing. It then discusses the motives for the postponement of consumption to the future (saving) and those for the anticipation of future consumption (indebtedness), and how financial resources are procured, with particular regard to risks. This unit considers both private operators and the public operator *par excellence*, the State. The unit finishes with a treatment of the links between national debt and the single currency.

4. Monetary Policy and the Monetary Institutions

This teaching unit deals with the most important monetary institutions, such the European Central Bank and the American Federal Reserve, and their monetary policies. It begins with the concepts of the value of money and interest rates, and continues with the mechanisms which transmit decisions by the monetary authorities to the financial markets. The focus then shifts to the main objectives of the central banks, the European Central Bank in particular, whose principal operating bodies are described. The second part considers the American Central Bank, the Federal Reserve, and concludes with a comparison between the two systems.

5. Financial Markets

This teaching unit examines the financial markets. It begins by explaining the decision-making process of operators in conditions of uncertainty. It continues with a treatment of the financial markets, with particular regard to securities, bonds, stocks, and derivatives. It describes the institutions that operate in the financial markets and then considers types of instruments and transactions in the financial markets. The unit closes with a treatment of the risks of investment in the financial markets.

6. Finance and Ethics

This teaching unit presents all the intermediaries which operate in the banking and financial system, with particular regard to the social and environmental effects of their actions. It starts with the traditional bank foundations, describing their nature and activities. Then analysed are examples of socially responsible financing, such as microcredit institutes, ethically-oriented funds, and other financial institutions created for mainly social purposes.

Appendix B

QUESTIONAIRE FOR ASSESSMENT OF ECONOMIC-FINANCIAL KNOWLEDGE

OSSERVATORIO
SUL
CREDITO

Organisers

ANSPC | Associazione Nazionale per lo Studio dei Problemi del Credito

UNIVERSITA' degli STUDI di ROMA
TOR VERGATA

With support of

FINANCIAL EVALUATION QUESTIONNAIRE

SECTION 1: PERSONAL INFORMATION

School …… City ……

Name …… Surname ……

Age …….. Sex F M Nationality ……

Place of birth …… email ……

Grade last year in:

- Mathematics ___/10
- Italian ___/10

Final grade at lower-secondary school: ___

Deficit in mathematics: YES NO

Student:

a) Classical high school
b) Scientific high school
c) Art high school
d) Accountancy technical school
e) Business technical school
f) Land survey technical school
g) Survey technical school
h) Nautical technical school
i) Aereonautic technical school
j) Tourism technical school
k) Social work school
l) Vocational school

Do you intend to enrol at university: YES NO

If yes, at a faculty of:

a) Medicine
b) Law
c) Engineering
d) Arts
e) Economics
f) Mathematics/Physics
g) Biology
h) Political Science
i) Other

Religious belief:

a) Christian
b) Jewish
c) Muslim
d) Atheist
e) Agnostic
f) Other

Including you, your family consists of:

a) 2 persons b) 3 persons c) 4 persons d) more than 4 persons

Father's nationality: …… Mother's nationality: ……

Father's educational qualification:

a) Master, PhD
b) Degree
c) Upper-secondary diploma
d) Lower-secondary certificate
e) Elementary certificate

Mother's educational qualification:

a) Master, PhD
b) Degree
c) Upper-secondary diploma
d) Lower-secondary certificate
e) Elementary certificate

Your father's profession is (was):

a) Artisan
b) Barman/Waiter
c) House husband
d) Shopkeeper
e) Shop assistant
f) Civil servant
g) Manager
h) Journalist
i) Office worker
j) Businessman
k) Teacher
l) Free professional
m) Factory worker
n) Bank worker
o) Pensioner
p) Medical practitioner
q) Sales representative
r) Unemployed
s) Other

Your mother's profession is (was):

a) Artisan
b) Barwoman/Waitress
c) Housewife
d) Shopkeeper
e) Shop assistant
f) Civil servant
g) Manager
h) Journalist
i) Office worker
j) Businesswoman
k) Teacher
l) Free professional
m) Factory worker
n) Bank worker
o) Pensioner
p) Medical practitioner
q) Sales representative
r) Unemployed
s) Other

Do you have brothers or sisters who are graduates or who are attending university? YES NO

Your family's annual gross income is:

a) < 15 000
b) 15 000 – 28 000
c) 28 000 – 55 000
d) 55 000 – 75 000
e) 75 000 – 100 000
f) 100 000 – 150 000
g) more than 150 000
h) Don't know

SECTION 2: FAMILY SITUATION

Does your family own its home? YES NO DON'T KNOW

Does your family have a mortgage? YES NO DON'T KNOW

If yes, in order to:

a) Buy the first home
b) Renovate the home
c) Buy a second home
d) Start a business
e) Other …

Has a member of your family taken out a loan? YES NO DON'T KNOW

If yes, in order to:

a) Buy a car
b) Buy consumer durables (domestic appliances)
c) Buy luxury goods (television, holidays, etc.)

Do members of your family have current accounts?: YES NO DON'T KNOW

If yes:

a) Yes, 1 b) Yes, 2 c) Yes, 3 or more d) Don't know

SECTION 3: INTEREST IN ECONOMICS

Do you talk about the economy at home? YES NO

The economy:

a) Bores me
b) I think it's important

Do you read the newspapers apart from the sports pages? YES NO

If yes, do you read articles about the economy?

a) No
b) I try but I don't understand very much
c) I try but I don't understand anything

SECTION 4: FINANCIAL KNOWLEDGE

A) BANKS

1) What is a current account?
   a) A kind of high-yield investment
   b) An instrument to make and receive payments and savings
   c) A bank product for family savings
   d) Don’t know

2) What is a mortgage?
   a) A loan issued by a bank to purchase goods (e.g. a car)
   b) A loan issued by a bank to purchase or renovate a property (e.g. a house)
   c) Credit owed to a bank
   d) Don’t know

3) The owner of a cash card can:
   a) Make payments up to the balance in his/her current account
   b) Spend sums of money above the balance in his/her current account
   c) Make payments up to the balance in his/her current account and make cash withdrawals
   d) Don’t know

4) What is a credit card?
   a) A card which allows use of a loan granted by the bank
   b) A card which allows postponement of debits on your credit account
   c) A card pre-loaded with a certain sum of money
   d) Don’t know

5) What is the passive interest rate?
   a) The price paid to a bank for a loan
   b) A tax paid by the bank
   c) The price paid by banks to clients for the sums of money deposited with them
   d) Don’t know

B) FINANCIAL MARKET

1) What are government securities?
   a) Loans made by the state to citizens
   b) Investments by the state
   c) Debts contracted by the state to raise funds
   d) Don’t know

2) What is a bond?
   a) A security issued by a firm to acquire capital on the market
   b) A security issued by a firm to pay its suppliers
   c) A particular type of bank deposit
   d) Don’t know

3) What is a share?
   a) A security issued by a firm to acquire capital
   b) A security issued by the state or a firm to acquire capital
   c) A security issued by the state to acquire capital
   d) Don’t know

4) The value of shares can:
   a) Only increase
   b) Only decrease
   c) Increase and decrease
   d) Don’t know

5) What is a stock exchange?
   a) A market where securities can be traded
   b) A market where goods can be traded
   c) A publicly-owned bank

d) Don’t know

C) RISK

1) In financial markets, risk is:
   a) The possibility of losing the capital invested and the interest on it
   b) The possibility of receiving higher capital on maturity
   c) The possibility of losing only the interest on the capital invested
   d) Don’t know

2) What does a rating company do?
   a) Evaluate the returns on bonds
   b) Evaluate the ability of borrowers to repay their debts
   c) Evaluate the returns on shares
   d) Don’t know

3) The risk of a high-yield bond, compared with a low-yield bond, is usually:
   a) Higher
   b) Lower
   c) There is no link between risk and yield
   d) Don’t know

4) Bank deposits up to a certain amount are guaranteed by:
   a) The state
   b) An insurnace fund
   c) The Central Bank
   d) Don’t know

5) There is less risk of losing your savings if you invest in:
   a) Government securities

b) Shares
c) Bonds
d) Don’t know

D) ECONOMIC POLICY AND INSTITUTIONS

1) What is inflation?
   a) The variation of the quantity of goods and services produced in a country
   b) The rate of variation of the prices of a representative basket of goods and services produced in a country
   c) The sum of the prices of all the goods and services produced in a country
   d) Don’t know

2) The real value of money:
   a) Does not exist
   b) Is the quantity of goods and services purchasable with a given amount of nominal money
   c) Is the value of the banknotes and coins in a person’s possession
   d) Don’t know

3) What is the European Central Bank?
   a) A body which decides monetary and fiscal policies in Europe
   b) A body which decides monetary policy in Europe
   c) A body which decides monetary policy in the Eurozone
   d) Don’t know

4) The purpose of monetary policy is:
   a) To keep the unemployment rate low
   b) To keep the inflation rate low
   c) Manage public spending
   d) Don’t know

5) The exchange rate is:
   a) The price paid to purchase foreign goods
   b) The price paid for exchanging national currency with foreign currency
   c) The price of petrol
   d) Don’t know

6) What is the public deficit?
   a) The sum of annual public debts
   b) The excess of public spending with respect to tax revenues
   c) The total interest on goernment securities
   d) Don’t know

7) What is the public debt?
   a) A country’s debt to other countries
   b) The debt accumulated by the state over time
   c) The difference between the state’s revenues and expenditure
   d) Don’t know

8) What is the Banca d’Italia?
   a) A body which decides fiscal policy in Italy
   b) A body which decides fiscal policy in the Eurozone
   c) A body which supervises banking in Italy and pays on behalf of the government
   d) Don’t know

9) What is Consob?
   a) The supervisory authority for pension and social security funds
   b) The supervisory authority for the property market
   c) The supervisory authority for the insurance industry
   d) Don’t know

10) What is the Federal Reserve System (FED)?
    a) The most important American commercial bank
    b) The body which decides monetary policy in the USA
    c) A group of American banks
    d) Don’t know

11) Bank foundations:
    a) Coillect savings
    b) Issue mortgages
    c) Work in the public interest
    d) Don’t know

12) Microcredit is:
    a) A small loan with guarantees
    b) A small loan without guarantees
    c) A small loan without guarantees intended for normal bank customers
    d) Don’t know

E) CALCULUS AND UNDERSTANDING GRAPHS

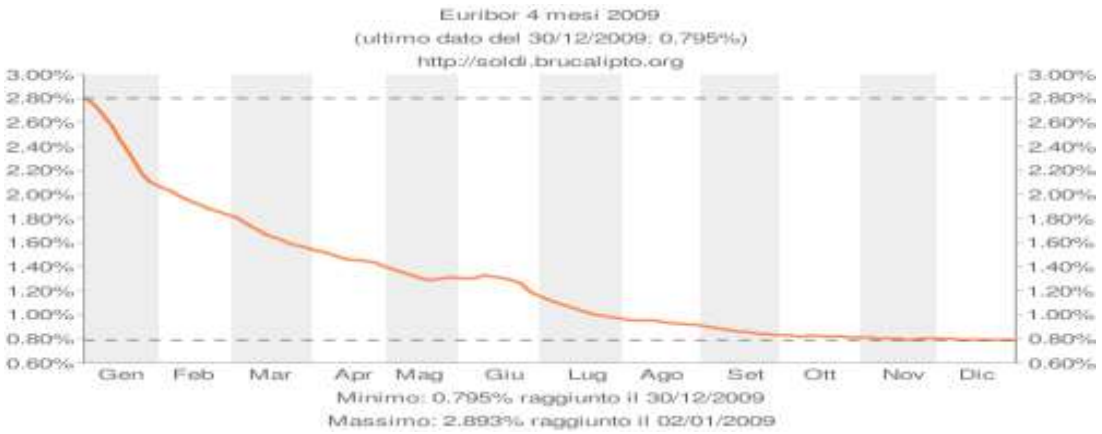
1) A saver has deposited €1000 at a bank with a 2% annual interest rate. How much is his capital after one year?
    a) 1020
    b) 980
    c) 1200
    d) Don’t know

2) And how much will it be after two years, considering that at the end of the year the interest matured will be added to the capital initially invested?

a) 1020
b) 1040.4
c) 990.84
d) Don't know

3) Look at the graph below.

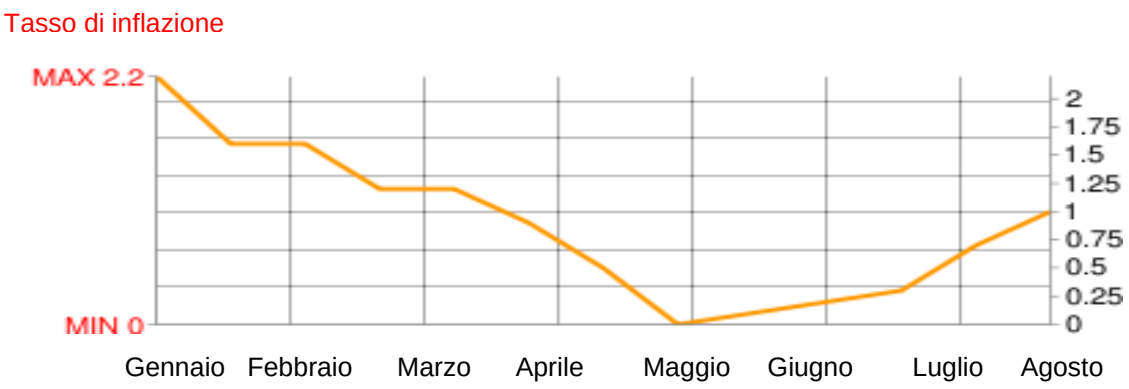
How did the Euribor interest rate vary between January and September?



a) It decreased by around two percentage points
b) It increased by around two percentage points
c) It decreased by around three percentage points
d) Don't know

4) Look at the overall trend of the inflation rate in the following graph.

How do you think your purchasing power changed?



a) It decreased

b) It increased

c) It remained unchanged

d) Don't know

SECTION 5: PERCEPTION OF THE ECONOMIC-FINANCIAL SYSTEM

Please answer the following questions using the following scale:

0 = Not at all; 1 = A little; 2 = Quite; 3 = Very;

1) To what extent do you think that the following are reliable?:

	Not at all	**A little**	**Quite**	**Very**
Government	0	1	2	3
Family	0	1	2	3
Information media	0	1	2	3
School	0	1	2	3
Police force	0	1	2	3
Banks	0	1	2	3
Cultural associations	0	1	2	3
Firms	0	1	2	3
Voluntary organizations	0	1	2	3
Universities	0	1	2	3

2) When you think about the future:

	Not at all	**At all**	**Quite**	**Very**
Do you feel reassured by the friendships on which you can count?	0	1	2	3

Would you invest in development of the local community?	0	1	2	3
Are you waiting to see what the future holds in store?	0	1	2	3
Do you see your future as lying elsewhere?	0	1	2	3
Are you already thinking about the future	0	1	2	3

3) Do you think that banks should:

	Not at all	**A little**	**Quite**	**Very**
Support and promote the country's economic and financial development?	0	1	2	3
Generate profits for their shareholders?	0	1	2	3
Increase the wealth of their customers	0	1	2	3

4) Choose one of the three alternatives. Today, the banking system:

a) Is growing b) Is stable c) Is in crisis

5) A bank:

	Not at all	**A little**	**Quite**	**Very**
Is a place to deposit money	0	1	2	3
Makes profits from managing its customers' money	0	1	2	3
Supports the economic and social development of its customers	0	1	2	3
Decides interest rates	0	1	2	3
Grants loans only to firms	0	1	2	3

Enables investments to be made	0	1	2	3

6) Is it right to earn ‘money with money’ by applying an interest rate on loans?

Not at all	A little	Quite	Very
0	1	2	3

7) If you thought about using a bank, would your priority be:

	Not at all	A little	Quite	Very
Investments to finance future projects?	0	1	2	3
Obtain general information about banking products?	0	1	2	3
Purchase financial products (shares, bonds, etc.)?	0	1	2	3
Obtain advice about services to meet your financial needs?	0	1	2	3
Disbelief in finding services useful for your needs	0	1	2	3

8) To what extent do you think the following are important for the effective use of financial instruments?:

	Not at all	A little	Quite	Very
Being informed about financial instruments	0	1	2	3
Relying on well-informed people	0	1	2	3
Following the advice of friends/relatives	0	1	2	3

9) What form should be taken by financial education for students attending the final years of upper-secondary school?:

	Not at all	A little	Quite	Very
A course of civic interest	0	1	2	3
A course to increase knowledge	0	1	2	3
Completion of the curriculum	0	1	2	3
Support for better management of one's economic resources	0	1	2	3
Guidance for future economic choices	0	1	2	3

SECTION 6: YOU AND YOUR FINANCES

1) At present, how do you manage your money (savings and/or spending)?:

	Not at all	A little	Quite	Very
Budget your spending according to the earnings or savings available				
Follow the advice of your family				
What is important is not managing money but obtaining what you want				

2) Do you have a current account? YES NO

3) Have you ever used a credit card? YES NO

4) Have you ever made purchases on the Internet using a credit card or a pre-paid card (e.g. postepay)? YES NO

5) Do you receive a fixed amount of pocket money from your parents? YES NO

   5.1) How do you manage it?

   Percentage on purchases: ___

   Percentage on savings: ___

6) Imagine you have inherited € 100,000, which you will use in 4 years' time to purchase a studio apartment, what would you do today?
   a) Use part of it to buy shares ___%
   b) Deposit some of it in a current account ___%
   c) Use part of it to buy bonds ___%
   d) Use part of it to buy government securities ___%

7) Imagine taking part a lottery where you have a 50% chance of winning € 200 (and a 50% chance of not winning anything). Above what price would you be willing sell your lottery ticket (i.e. at what price would you be indifferent between participating in the lottery or selling the ticket)?
   _____%

8) Do you belong to a voluntary association? YES NO

9) If yes, when is the scope of the association?
   a) Environment
   b) Assistance to the poor
   c) Assistance to the elderly or disabled
   d) Culture
   e) Other _____*(specify)*

10) All things considered, to what extent are you satisfied with your life on a scale from 0 to 10? ____

Within the meaning of art. 13 del D.lgs. 196/2003 do you authorize treatment of your personal information?: YES NO

Appendix C. Tab. C1 Variable definitions

Variable	
TotRight	Total number of correct answers
FatherClerk	Dummy taking value of one if the father is an employee in the private sector
FatherWorker	Dummy taking value of one if the father is a manual worker
FatherPublicSector	Dummy taking value of one if the father is an employee in the public sector
MotherHousewife	Dummy taking value of one if the mother is a housewife
MotherClerk	Dummy taking value of one if the mother is an employee
FatherDegree	Dummy taking value of one if the father has a university degree
MotherDegree	Dummy taking value of one if the mother has a university degree
Foreign	Dummy taking value of one if the student does not have Italian citizenship
BrothSistUniversity	Number of brothers or sisters attending University
HouseholdSize	Number of people living in the household
Mortgage	Dummy taking value of one if the student's family has a mortgage
Loan	Dummy taking value of one if the student's family is a borrower
MathGrade	Final grade in mathematics in the previous school year
ItalianGrade	Final grade in Italian in the previous school year
IntermediateGrade	Final grade at middle school
Male	Dummy taking value of one if the student is male.
MathDebt	Dummy taking value of one if the student had "debito" ("insufficient" grade) in mathematics in the previous year
Volunteering	Dummy taking value of one if the student takes part in volunteering activities
Humanities	Dummy taking value of one if the student is at *liceo classico** high school
WouldBeUniversity	Dummy taking value of one if the student intends to go to University
WouldBeEconomics	Dummy taking value of one if the student intends to study economics at university
TotRightPost	Total number of correct answers after the treatment
Milan	Dummy taking value of one if the student attends school in Milan