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Does financial literacy increase students' perceived value of schooling?

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ABSTRACT

Using data from the 2012 Programme for International Student Assessment (PISA) for Italy, this paper investigates whether financial literacy skills play a role in shaping the value that high school students place on schooling. I hypothesize that higher financial literacy may foster students' awareness of the financial and non-financial benefits of gaining additional education, together with the costs associated with poor school outcomes. Results from OLS and IV estimates suggest that higher financial literacy increases students' perceived value of schooling by boosting their time commitment to education. Conversely, there is no evidence that financial literacy shapes students' attitudes towards school.

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1. Introduction

Financial illiteracy among the youth is widespread (Chen and Volpe 1998; Erner, Goedde-Menke, and Oberste 2016; Lusardi 2015a; Lusardi, Mitchell, and Curto 2010; Mandell 2008), and a solid body of research has shown that poor financial decisions on the part of students might have serious consequences for later-life outcomes (Brown et al. 2016; Lusardi and Tufano 2015; Xiao et al. 2014). Nevertheless, very little is known about how financial literacy at young ages interacts with school-related outcomes. In particular, no research has focused on financial literacy as a skill shaping students' perception of the intrinsic value of education. This paper seeks to fill this gap.

Financial literacy is an important component of sound financial decision-making. Lusardi and Mitchell (2014) define it as 'people's ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions.' Yet what financial literacy is, what it measures, and when it develops are still the subject of scholarly debate (Fernandes, Lynch, and Netemeyer 2014; Xu and Zia 2012). In this study I welcome the idea that financial literacy embodies a multi-dimensional set of skills that originate early in life in the context of the family (Chiteji and Stafford 1999; Grohmann, Kouwenberg, and Menkhoff 2015; Lusardi, Mitchell, and Curto 2010; Mahdavi and Horton 2014) and is shaped throughout the life course by means of interactions with the external context, including the school environment.

Schooling is the most traditional form of human capital investment. As financial literacy skills entail the ability to assess whether an investment is worthwhile or not, in this paper I explore whether more financially literate students place a higher value on schooling as compared to less literate ones. Specifically, do financially literate students 'care' more about schooling due to their ability to discern the nature of education as an investment which entails short-term costs and long-term benefits? I posit that students with higher financial literacy might be more aware of the financial

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and non-financial (psychological and opportunity) costs that education entails, as well as the monetary and non-monetary (e.g. occupational prestige) returns that it yields.[1] As no variable perfectly captures the value that students attribute to schooling, this analysis relies on proxies such as measures of truancy and time spent doing homework (henceforth, *time commitment to education*), and attitudes towards school (henceforth, *attitudes*). With these, I examine whether financial literacy affects: (1a) the chance that students skip school days or classes; (1b) the amount of time students devote to homework outside of school; and (2) students' attitudes and views towards school.

The goal of assessing the financial knowledge of high school students around the world has recently been taken up by the OECD's Programme for International Student Assessment (PISA), which in 2012 added a module on financial literacy to its review of high school students' proficiency in mathematics, reading, and science. The PISA 2012 financial literacy module has been administered to students in 18 OECD and non-OECD economies that voluntarily opted to be part of the assessment.[2] Around 29,000 students completed the module, representing about nine million 15-year-olds in the schools of the 18 participating countries and economies. This analysis is based on the financial literacy module in the PISA data for Italy, one of the few participating countries that permits a regional-level analysis thanks to the inclusion of a regional identifier and an adequate sample size.[3]

This paper makes three important contributions. First, I shed light on whether financial literacy shapes individual perceptions of the inherent value of schooling among high school students, which no prior research has heretofore addressed. In doing so, I provide a systematic description of regional differences in financial literacy which offers a quite novel focus within the Italian context. Second, I draw on the OECD PISA database for Italy, one of the countries with the lowest levels of financial literacy among those that took part in the 2012 international assessment (Lusardi 2015a; OECD 2014a). Despite its cross-sectional nature, this database has great potential and is still largely unexplored in financial literacy research.[4] Third, drawing on different data sources, I propose a set of novel and plausibly exogenous instrumental variables (IVs) to control for reverse causation, omitted variable bias, and random measurement error in financial literacy.

Results show that higher financial literacy increases students' perceived value of schooling by boosting their time commitment to education. Specifically, the study documents lower levels of unjustified absences and class delays, together with more time devoted to homework in response to higher financial literacy. Different model specifications suggest, for instance, that an increase of one financial literacy proficiency level (PL) – corresponding to a 75-unit increase on a 0–1000 financial literacy scale – is associated with one to three more hours per week spent on out-of-school study time. Conversely, there is no robust evidence that financial literacy shapes students' attitudes towards school, suggesting that young adolescents' behavior might be easier to measure objectively than attitudes.

Findings from this study have wide ranging implications for educational policy. Demonstrating that financial literacy positively shapes students' awareness of the importance of education is useful in informing governments and their policy advisers as they consider new initiatives for financial education and evaluate the possibility of promoting financial literacy in schools. Differently from countries such as Australia and Singapore, in Italy a specific focus on financial literacy is still largely absent from school curricula, hence new policies and initiatives in the area have the potential to importantly shape youth financial knowledge and capabilities (Montanaro and Romagnoli 2016).[5]

The rest of the paper is organized as follows. Section 2 discusses the available literature and identifies the gaps the present study seeks to address. Section 3 describes the PISA financial literacy assessment, the sample of study, and the variables chosen. Section 4 provides descriptive statistics on the sample of schools and financial literacy skills by region. Section 5 provides empirical evidence on the relationship between financial literacy and students' perceived value of schooling. Section 6 summarizes the results, discusses policy recommendations, and outlines implications for future research.

2. Literature review

Financial literacy research has grown rapidly over the past two decades. Scholars have extensively documented that financial literacy impacts individual decision making in several domains, with wide-ranging implications that apply to individuals, communities, countries, and societies as a whole (Lusardi 2015b; Lusardi and Mitchell 2014). Yet little is known about how financial literacy skills relate to outcomes in the teenage years. Despite the increasing availability of data on students' financial literacy, scant academic research has focused on the interplay between financial literacy and school-related environments and processes. Moreover, despite scholarly recognition that endogeneity in financial literacy is a serious concern, assessing the validity of novel instruments exploiting regional-level variation may further contribute to enriching scholarship in the field.

2.1. Financial literacy as predictor of later-life behavior

Scholars have devoted a great deal of attention to the role of financial literacy in affecting later-life behavior such as wealth accumulation (Behrman et al. 2012; Fort, Manaresi, and Trucchi 2016; Jappelli and Padula 2013; van Rooij, Lusardi, and Alessie 2012), debt load (Huston 2012; Lusardi and Tufano 2015), retirement planning (Agnew, Bateman, and Thorp 2013; Alessie, van Rooij, and Lusardi 2011; Almenberg and Säve-Söderbergh 2011; Fornero and Monticone 2011; Lusardi and Mitchell 2007, 2011; Sekita 2011; van Rooij, Lusardi, and Alessie 2012), and stock market participation (Arrondel, Debbich, and Savignac 2012, 2015; van Rooij, Lusardi, and Alessie 2011; Xia, Wang, and Li 2014). In this study I explore the importance of financial literacy for earlier-life outcomes, endorsing the idea that financial literacy originates early in life in the context of the family (Grohmann, Kouwenberg, and Menkhoff 2015; Hastings, Madrian, and Skimmyhorn 2013) and develops jointly with other cognitive and non-cognitive skills, exhibiting properties such as self-productivity and dynamic complementarity (Cunha and Heckman 2007; Cunha, Heckman, and Schennach 2010; Hastings, Madrian, and Skimmyhorn 2013).[6] If financial literacy evolves throughout the life course by means of interactions with the external context including the school environment, this study will show whether it can determine life outcomes well before individuals enter the labor market.

Grohmann, Kouwenberg, and Menkhoff (2015) conducted one of the first studies to systematically assess the role of childhood experiences as root drivers of financial literacy. Using 12 childhood-related variables, the authors explored the two main channels through which early-life experiences affect financial literacy, namely family and schooling. They documented stronger direct influences of the former, suggesting that the importance of childhood experiences may partially explain why it is so difficult to train and improve young adults' financial literacy through *ad hoc* courses. Their study concluded that financial literacy – and possibly even more financial behavior – may be deeply rooted in personality traits, hence the family and educational background of the target group should be more carefully considered when designing training courses.

A growing body of related literature revolves around the concept of financial socialization, i.e. the idea that children learn about finances through deliberate instruction, participation, and practice, as well as through direct observation and involuntary interaction (Jorgensen and Savla 2010; Shim et al. 2010; Van Campenhout 2015). Shim et al. (2010) highlighted the prominent role of the family in young adults' financial socialization, claiming that parents can be both direct teachers and useful role models in the financial development of their children. Their findings suggest that seeing one's parents as financial role models is linked to both students' complying in positive ways with parental expectations and to displaying favorable attitudes towards performing healthy financial behaviors. What is more, when parents are actively involved and serve as role models, young adults feel they can control their financial behaviors better.

2.2. Financial literacy in schools

Research on financial literacy in schools has taken two directions. The first is mainly descriptive, focusing on the assessment of how well-informed people are before entering the labor market. Measuring youth's competence in financial literacy is crucial, as in many countries young people face one of the most important financial decisions in their lives, i.e. whether to invest in college or higher education. In the US context, several authors have measured high school students' financial literacy using data from the Jump$tart Coalition for Personal Financial Literacy and the National Council on Economic Education, providing a rather nuanced evaluation of what young people know when they enter the workforce (Mandell 2008). Studies on college student financial literacy (Chen and Volpe 1998; Cull and Whitton 2011) echoed the findings for high school students: students are not knowledgeable about personal finance, and their low levels of knowledge will limit their ability to make informed decisions.

A second research stream builds on experimental evidence and is concerned with quantifying the impacts of financial education programs aimed at improving financial knowledge and awareness among students. As one example, several U.S. states mandated financial education in high school at different points in time, generating 'natural experiments' utilized by Bernheim, Garrett, and Maki (2001), one of the pioneer studies in this field. Evidence of the effectiveness of these programs in improving literacy is mixed. For instance, while Mandell (2008) documented that Chicago students in ten classes slightly improved their financial literacy after a financial literacy course, Mandell (2005) found no evidence of an increase in knowledge, though a higher propensity to save in 17 to 19-year-old students who were taught financial education in high schools. More recently, Lührmann, Serra-Garcia, and Winter (2015) examined the impact of a short financial education program on teenagers in German high schools, which they found to have significantly improved students' interest in financial matters, their financial knowledge, and their ability to properly assess the riskiness of assets. In a similar spirit, Becchetti, Caiazza, and Coviello (2013) used a difference-in-difference estimation strategy to study the effect of a financial education course on financial literacy and investment attitudes in a large sample of high school students in Italy. The course in finance reduced the virtual demand for cash and increased the level of financial literacy and the propensity to read economic articles in both treated and control classes, compared to pre-treatment baseline levels. Similar programs have been implemented in the US, Brazil, and Spain, and their mixed effectiveness discussed by Walstad, Rebeck, and MacDonald (2010), Bruhn et al. (2013), and Hospido, Villanueva, and Zamarro (2015), respectively.

Research on financial literacy in schools is, hence, quite narrow in scope. The dataset on the financial literacy of high school students collected by the OECD as part of the 2012 Programme for International Students Assessment provides a unique opportunity to expand scholarly knowledge on the interplay between financial literacy skills and school-related outcomes such as student performance, effort, motivation, and aspirations. No studies have yet drawn on these data to address questions of this kind.

2.3. Dealing with endogeneity in financial literacy research

In recent years, an increasing number of scholars have started to address the potential endogeneity of financial literacy by means of instrumental variable (IV) or generalized method of moments (GMM) techniques more broadly. To provide a background for what follows, I briefly review some of the studies that were most successful in handling these methodological concerns. I group them according to three broad categories of instrumental variables chosen, namely (i) family background and financial knowledge of the peer or reference group, (ii) information on past education and previous financial or math knowledge, and (iii) instruments that exploit natural experiments or geographical variation in specified outcomes.

van Rooij, Lusardi, and Alessie (2011) evaluated the relationship between financial literacy and stock market participation instrumenting financial literacy with the financial experiences of siblings

and parents, claiming that these were not under the control of the respondent and were hence exogenous with respect to his or her actions. Arrondel, Debbich, and Savignac (2012) attempted to answer the same question in the French context, focusing on whether parents planned for retirement, owned a life insurance policy, or read the economic and financial press as proxies for parental financial knowledge. Alessie, van Rooij, and Lusardi (2011) were instead concerned with estimating the causal effect of financial knowledge on retirement planning in the Netherlands, and they chose as IV information on whether the financial situation of the oldest sibling was 'better,' 'the same,' or 'worse' than the financial situation of the respondent. The same methodology was employed by Agnew, Bateman, and Thorp (2013) to address this same question in the Australian context. Lastly, together with age-dependent variables and respondent personality traits, Behrman et al. (2012) selected measures of family background as IVs to investigate how financial literacy affected household wealth accumulation in Chile.

van Rooij, Lusardi, and Alessie (2012) relied on information on exposure to financial education acquired in school as an instrument for financial sophistication, in order to study the relationship between financial literacy and household net worth in the Netherlands. In particular, they focused on how much of the respondents' education was devoted to economics. Another example of a study relying on prior financial knowledge is Jappelli and Padula (2013), who investigated the effect of financial literacy on wealth accumulation and national saving throughout Europe, choosing the math literacy endowment before entering the labor market as a potentially valid instrument for the current level of financial literacy.

As for the third group of instruments, Lusardi and Mitchell (2009) provided one of the most compelling studies tackling the endogeneity of financial literacy by exploiting temporal and geographical variation in U.S. state mandates for high school financial education. Bucher-Koenen and Lusardi (2011) instead used political attitudes at the regional level in Germany as an instrument, arguing that free-market oriented supporters tend to be more likely to be financially literate. Finally, Klapper, Lusardi, and Panos (2013) used the number of public and private universities in the Russian regions and the total number of newspapers in circulation as instruments for financial literacy, finding that financial literacy affected indicators such as having bank accounts, using bank credit, and having spending capacity.

To the best of my knowledge, only three studies have used IVs to deal with the endogeneity of financial literacy in the Italian context. Fornero and Monticone (2011) instrumented financial sophistication by using cost of learning and acquiring financial knowledge and information. Specifically, they used information on whether a household member had a degree in economics or used a computer (either at home, at work, or elsewhere). Fort, Manaresi, and Trucchi (2016) instead investigated the causal effect of financial literacy on financial assets exploiting confidential bank information policies as instrumental variables. Lastly, Calcagno and Urzì-Brancati (2014) selected as IV the amount of credit/debit/cashline cards held by different households to show that financially sophisticated households hold a more balanced portfolio, with a lower share of wealth locked up in housing assets.

There is still scholarly disagreement on the effect size of IV estimates as compared to simple Ordinary Least Squares (OLS) ones. Lusardi and Mitchell (2014) reported that out of 11 studies using instrumental variables for financial literacy across different countries, all of them documented larger IV estimates. Behrman et al. (2012), Fort, Manaresi, and Trucchi (2016), and Calcagno and Urzì-Brancati (2014) aligned with Lusardi and Mitchell's findings (2014). Conversely, in a meta-analysis of the relationship between financial literacy and financial behavior, Fernandes, Lynch, and Netemeyer (2014) reached the opposite conclusion. According to their study, analyses using instrumental variables produced smaller effects than those using simple cross-sectional designs and OLS.

Despite the existence of papers using instrumental variable techniques to account for the endogeneity of financial literacy, all of them have been concerned with predicting forms of financial behavior such as stock market participation, retirement planning, or household wealth accumulation. By contrast, this paper contributes to the literature by providing a new strategy to identify the causal effect of financial literacy on yet unexplored school outcomes such as measures of time commitment

to education and attitudes towards school. The analysis below also sheds additional light on the IV-OLS effect size controversy outlined above.

3. Data and methodology

3.1. Sample

In what follows I use data collected by the OECD Programme for International Student Assessment (PISA) for high school students in Italy in 2012. The goal of the PISA financial literacy module was to assess the literacy and financial capabilities of 15 year-old students across 18 OECD and non-OECD countries.[7] This survey evaluated high school students' competencies in reading comprehension, mathematics, science and, for the first time in 2012, financial literacy. The latter questions were included in response to the last major economic crisis, which evidenced a widespread lack of financial sophistication that contributed to ill-informed financial decisions.

PISA samples were designed in a two-stage stratified fashion. First, individual schools in which 15-year-old students could be enrolled were sampled, with probabilities proportional to their size. In the second stage, students were sampled within schools.[8] In the 18 countries that also implemented the optional financial literacy assessment, sampled schools selected with equal probability 43 students, 35 of whom completed the core assessment, and the remaining eight were administered the financial literacy module.[9] PISA has an age-based definition for its target population, i.e. one not tied to the institutional structures of national education systems (OECD 2014a). PISA assesses students who are aged between 15 years and three months and 16 years and two months at the beginning of the assessment period (plus or minus a one-month allowable variation), and who are enrolled in an educational institution in grade seven or higher, regardless of the grade levels or type of institution in which they are enrolled, and regardless of whether they are in full-time or part-time education. Hence, PISA tests the knowledge of a group of individuals born within a comparable reference period who may have followed different educational trajectories both in and out of schools.

The 2012 PISA assessment consisted of 40 math and reading questions, as well as questions about students' experiences with money matters. Additional questions were asked to students to gather information about themselves, their home and school environment, their learning experiences, and their attitudes. School principals also answered questionnaires on school policies, the learning environment, and the school's provision of financial education in prior and the current year.[10] In three of the 18 countries – namely Belgium, Croatia, and Italy – parents filled a questionnaire too.

Of the 18 countries surveyed, Italy provides an interesting case study for several reasons. First, results from the 2012 PISA financial literacy assessment show that Italy occupies the second-lowest rank out of the 18 OECD and non-OECD countries that participated in the module (Table A1 in the Appendix), with a mean financial literacy score of 466, well below the OECD average of 500 (OECD 2014a). Second, Italy is the country with the highest number of schools sampled (1158) and the highest number of students within schools (7068), providing a substantial sample size for the analysis. Third, and related to the above, the dataset for Italy includes a regional identifier that makes it possible to conduct the analysis at the sub-national level with a satisfactory sample size per region.

3.2. Measures

Table 1 summarizes the type of school outcomes examined in this analysis. No variable perfectly captures the extent to which students value schooling. Nevertheless, the PISA database gives the opportunity to examine proxy indicators such as measures of truancy and time spent on out-of-school study time (*time commitment to education*), and attitudes towards school (*attitudes*). Implicit in this choice is the presumption that students who skip classes or school days frequently, devote little time to homework, and think school is a waste of time are more likely to perceive schooling as a

Table 1. School outcomes as proxies for students' perceived value of schooling.

Variable	Wording	Coding
a. Time commitment to education		
Truancy		
Late for school	In the last two full weeks of school, how many times did you arrive late for school?	0: None 1: Once or twice
Skip whole day	In the last two full weeks of school, how many times did you skip a whole school day?	2: Three or four times
Skip classes	In the last two full weeks of school, how many times did you skip some classes?	3: Five or more times
Time spent on activities		
Homework out of school	Thinking about all school subjects: on average, how many hours do you spend each week on homework or other study set by your teachers?	Hours per week
*b. Attitudes**		
Attitudes towards school		
Prepare for life	School has contributed to prepare me for adult life	1: Strongly disagree
Valuable time	School has not been a waste of time	
Confidence	School has helped give me confidence to make decisions	2: Disagree
Prepare for college (acad.)	Trying hard at school will help me get into a good college	3: Agree
Get a job (vocat.)	Trying hard at school will help me get a good job	4: Strongly agree

Source: OECD PISA 2012 Financial Literacy (FL) database.
*Variables on attitudes have been recoded such that higher ordinal values are associated with more positive attitudes towards school, and then combined in an index.

worthless investment – holding other factors constant, such as parental influences. This study investigates the relationship between financial literacy and each *time commitment to education* outcome separately (panel a). The rationale behind the choice of these outcomes relies on previous research showing that time commitment to education affects subsequent educational outcomes, such as school dropout, end-of-high-school test scores, and academic achievement more broadly, both in Italy and elsewhere (Attwood and Croll 2006; Checchi and Zollino 2001; Cooper, Robinson, and Patall 2006; Eren and Henderson 2008; Kalenkoski and Pabilonia 2017). This may be particularly relevant for Italy, where 15-year-old students report school truancy levels that are substantially higher than the OECD average, yet also spend more than eight hours per week on homework – relative to an OECD average of 4.9 (OECD 2014c; OECD 2017).

As for *attitudes*, I combine the variables listed in Table 1 (panel b) – all measured on a 1 to 4 scale – into an index constructed as the row mean of the elements.[11] These items suggest a degree of reliability/internal consistency of 0.66 (Cronbach's alpha). This value is slightly below the conventionally accepted threshold for factors of $\alpha = 0.7$, yet it is deemed acceptable due to the small number of items combined (Lance, Butts, and Michels 2006), as also witnessed by previous studies on PISA (Lee 2016). Differently from Lee (2016), I take a step forward and match the attitudes indices to the type of school attended. Specifically, as the majority of students in academic high schools in Italy ('licei') seek some form of university education, while students in vocational education see schooling as a vehicle for immediate employment (Ballarino and Checchi 2006), the variable 'prepare for college' is a meaningful proxy for students' perceived value of schooling for the former group of students, while the variable 'get a job' better fits the latter.[12] The remaining three attitude variables are more generic and capture aspects of confidence-building and the use of time that are equally relevant to both groups of students. I thus combine the variables 'prepare for life', 'valuable time', 'confidence', and 'prepare for college' into an attitudes index for students in academic schools, and the variables 'prepare for life', 'valuable time', 'confidence', and 'get a job' into an attitudes index for students in vocational schools.

Financial literacy was measured in PISA using a mixture of multiple-choice and constructed-response questions. These items assessed familiarity with financial products, understanding and

use of financial terms, conceptual understanding of numeracy, application of numeracy skills, and capacity to make effective financial decisions. PISA assessed not only whether students can reproduce knowledge, but also whether they can extrapolate from what they have learned and apply their knowledge in new contexts. Three dimensions were considered when designing the financial literacy questions, namely *content*, i.e. the areas of knowledge that are essential for financial literacy; *processes*, i.e. the approaches and mental strategies called upon to negotiate the material; and *contexts*, i.e. the situations in which the financial knowledge, skills, and understanding are applied (OECD 2014a).

The PISA test design permits to construct a single scale of proficiency, drawing on all the questions in the financial literacy assessment.[13] Each question is associated with a particular point on the scale indicating its difficulty, and each student's performance is associated with a particular point on the same scale that indicates his or her estimated financial literacy proficiency (OECD 2014a). The single continuous scale is divided into five levels (Table 2). Level 1 indicates low proficiency, level 2 is the international baseline proficiency level (PL), and level 5 indicates high proficiency. Students at level 1 are considered to be financially illiterate, while students at level 2 are only starting to apply their knowledge to make financial decisions in contexts that are immediately relevant to them.

Table 2. Description of PISA 2012 proficiency levels on financial literacy scale.

Proficiency level (PL) and lower cut score	Task descriptions
Level 5 625	Students can apply their understanding of a wide range of financial terms and concepts to contexts that may only become relevant to their lives in the long term. They can analyze complex financial products and can take into account features of financial documents that are significant but unstated or not immediately evident, such as transaction costs. They can work with a high level of accuracy and solve non-routine financial problems, and they can describe the potential outcomes of financial decisions, showing an understanding of the wider financial landscape, such as income tax.
Level 4 550	Students can apply their understanding of less common financial concepts and terms to contexts that will be relevant to them as they move towards adulthood, such as bank account management and compound interest in saving products. They can interpret and evaluate a range of detailed financial documents, such as bank statements, and explain the functions of less commonly used financial products. They can make financial decisions taking into account longer-term consequences, such as understanding the overall cost implication of paying back a loan over a longer period, and they can solve routine problems in less common financial contexts.
Level 3 475	Students can apply their understanding of commonly used financial concepts, terms and products to situations that are relevant to them. They begin to consider the consequences of financial decisions and they can make simple financial plans in familiar contexts. They can make straightforward interpretations of a range of financial documents and can apply a range of basic numerical operations, including calculating percentages. They can choose the numerical operations needed to solve routine problems in relatively common financial literacy contexts, such as budget calculations.
Level 2 400	Students begin to apply their knowledge of common financial products and commonly used financial terms and concepts. They can use given information to make financial decisions in contexts that are immediately relevant to them. They can recognize the value of a simple budget and can interpret prominent features of everyday financial documents. They can apply single basic numerical operations, including division, to answer financial questions. They show an understanding of the relationships between different financial elements, such as the amount of use and the costs incurred.
Level 1 326	Students can identify common financial products and terms and interpret information relating to basic financial concepts. They can recognize the difference between needs and wants and can make simple decisions on everyday spending. They can recognize the purpose of everyday financial documents such as an invoice and apply single and basic numerical operations (addition, subtraction or multiplication) in financial contexts that they are likely to have experienced personally.

Source: OECD PISA 2012 Financial Literacy (FL) Database.

Notes: To reach a particular proficiency level, a student must correctly answer a majority of items at that level. Students were classified into financial literacy levels according to their scores. Cut scores in the exhibit are rounded. Scores are reported on a scale from 0 to 1000.

Students at each level are expected to be proficient at the preceding level, and to reach a particular PL a student must correctly answer the majority of items at that level. Each PL represents 75 score points, i.e. there are 75 points between the top of one level and the top of the next. A difference in performance of one PL therefore represents a significant gap in financial literacy performance (OECD 2014a). PL allow researchers to investigate differences in financial literacy not only across countries but also within countries (Lusardi 2015a). Note that in the descriptive analysis that follows I focus on the raw financial literacy score, while in the regression section I divide the raw score by 75 to interpret a one-unit increase in financial literacy as an increase in one PL.[14]

The structure of PISA prevents the use of a single value as a proxy for the student's results, since each student only replies to a certain number of questions in the entire questionnaire. These replies, together with information on several variables in the questionnaire, yield a distribution of values to be created *a posteriori* for each individual. In total, five random values called *plausible values* (PVs) are obtained from this distribution for each student.[15] The five plausible values need to be accounted for in the estimation process in order to avoid problems associated with biases and inefficiency. Specifically, PISA technical reports recommend to first estimate the coefficients of interest for each plausible value, then to take the average of these five coefficients, and finally to compute the standard errors using a replication method that takes into account the stratified two-stage sample design of PISA and permits to draw inferences at the population level (OECD 2014b). The PISA database provides 80 replicates of individual weightings, which allow for efficient estimators. In sum, the use of replicates is necessary because of the way in which individuals are selected for PISA.[16]

3.3. Methodological approach

As the PISA study is cross-sectional, the relationship between financial literacy and the outcomes of interest may suffer from reverse causation. Specifically, the correlation between financial literacy and students' time commitment to education and attitudes towards school might be driven by the fact that higher motivation to study makes schoolchildren more financially literate, rather than vice versa. This is in line with interdisciplinary scholarship on science and math skills (Arnold and Straten 2012; Singh, Granville, and Dika 2002), and with a study on the relationship between motivation and financial literacy among young adults in the US (Mandell and Klein 2007). It is worth mentioning, though, that in the Italian context causality running from motivation to performance is more likely to hold for outcomes such as math and reading, and less so for financial literacy itself. Students in Italy have very low experience with money-related issues (OECD 2014a), mostly due to the fact that financial education is seldom offered in schools, and financial matters rarely discussed in class as part of conventional school curricula – at least in high schools with academic orientation ('licei'). Therefore, financial knowledge and the ability to make financial decisions are very much stimulated by financial socialization within the family and out-of-school settings – such as discussions with parents and exposure to news, opinions, and information through social media – and one's own experiences (Montanaro and Romagnoli 2016). Consistent with this idea is also the finding that, despite the positive correlation of financial literacy with math and reading skills, Italy is among the countries in which variation in financial literacy is least explained by variation in math and reading skills (OECD 2014a; Montanaro and Romagnoli 2016).[17] The implication of the above observations is that student's motivation may affect financial literacy differently (likely, to a lesser extent) than math and/or reading skills. Nonetheless, in the analyses that follow I seriously take into account the possibility of reverse causation.

In addition, financial literacy and the school outcomes of interest might be jointly determined by a third omitted factor such as unobserved ability, personality traits, or family upbringing. Empirical measures of financial literacy are also likely to suffer from measurement error that, *ceteris paribus*, can bias standard estimates of the impacts of financial literacy towards zero. To deal with all these concerns, this analysis complements ordinary least squares (OLS) estimates

with a Two-Stage Least Squares (2SLS) Instrumental Variable (IV) approach. I first estimate the following OLS specification:

$$Y = X_1\beta_1 + FL\beta_2 + u_1 \quad (1)$$

where Y is any school outcome proxying for students' perceived value of schooling, X_1 is a vector of individual, household, and school-level covariates, and β_2 captures the association between financial literacy and the outcome of interest.

For each outcome I estimate four specifications to explore how additional controls affect the relationship between financial literacy and the dependent variable. Model 1 provides the bivariate correlation between financial literacy and the outcome. Model 2 adds individual-level characteristics such as gender, age, and grade attended, where grade is measured relative to the modal grade in the country. In Model 3 I add household-level controls such as family socio-economic status (SES) and a dummy for whether the student lives in a household with both parents (versus a household with a single parent or other configurations). SES is estimated by the PISA index of economic, social, and cultural status (ESCS), built to be internationally comparable and based on indicators such as parents' education and occupation, the number and type of home possessions – which are used to indicate levels of household wealth – and the educational resources available at home. Lastly, model 4 accounts for school-level characteristics such as the type of school attended (public vs private), school orientation (generic vs vocational), school size as measured by total school enrollment, class size, and student-teacher ratio. Table A2 in the Appendix provides details of all the variables used in the analysis, together with their coding. Note that all OLS specifications account for regional dummies to control for region-specific heterogeneity. Standard errors are clustered at the school level.

Building on specification (1), I then attempt to account for the potential endogeneity of financial literacy by estimating the following two-stage system:

$$Y = X_1\beta_1 + FL\beta_2 + u_1 \quad (2)$$

$$FL = X_1\gamma_1 + X_2\gamma_2 + v_2$$

where X_1 is a vector of controls – as before – and X_2. is a vector of financial literacy instruments. The candidate instrumental variables should predict *FL* well but should not affect *Y* directly or indirectly through other unobserved factors. Arguably, properly chosen instruments are similar to quasi-experiments when the instrument for financial literacy is not plausibly caused by the dependent variable (Angrist and Krueger 2001).

I propose a series of individual and regional-level instruments, and evaluate whether their combination improves the precision of the estimates. As no class-level identifier is included in PISA, individual-level instruments are devised using PISA data aggregated at the school level, excluding the information pertaining to the student him/herself. I construct two individual-level IVs, namely the share of a student's schoolmates whose *mothers* work in direct contact with money flows (or money-related occupations), and the share of a student's schoolmates whose *fathers* work in direct contact with money flows. Two points are worth mentioning with regard to these two individual-level IVs. First, as only about eight students per school were administered the financial literacy assessment (while the remaining 35 completed the core assessment, as outlined in subsection 3.1), these IVs are constructed using information on parental occupation from all 43 students (35 + 8), i.e. drawing information from both the OECD PISA 2012 FL database and the OECD PISA 2012 general database.[18] This is possible because questions on mothers (ocod1) and fathers' occupation (ocod2) are asked equally in both datasets. From an analytical standpoint, relying on a bigger share of schoolmates is likely to deliver a less selected picture, together with more sample variability. Second, the correlation between these two IVs – correlations between variables used in the analysis are reported in Table A3 in the Appendix – is 0.32, thus suggesting the variables are sufficiently distinct.

For the validity of these instruments, I draw on prior literature – also discussed in subsection 2.3 above – to argue that variables related to family background, financial knowledge, and financial experiences of other individuals in one's reference group are not under the direct control of the respondent, and hence are likely to be exogenous with respect to pupil behavior (van Rooij, Lusardi, and Alessie 2011; Klapper, Lusardi, and Panos 2013). I posit that a higher share of schoolmates with parents working in direct contact with money flows may correlate well with respondents' acquisition of financial literacy by way of peer influence, and affect students' perception of schooling only through better financial literacy. To minimize the concern that this instrument retains a strong SES component (e.g. parents working in finance concentrate in high-SES groups), the variable is built such that all types of occupations that require recurrent money exchanges are accounted for, i.e. from bank managers to grocery store cashiers.

As for regional-level IVs, I construct variables complementing the PISA database with external data sources. From Accertamenti Diffusione Stampa (ADS), I obtain provincial-level data on newspaper circulation by region. As the PISA survey does not include province identifiers nor it is representative at the provincial level, I aggregate any provincial-level data at the regional level and construct the share of circulating newspapers with finance-related content in 2012, i.e. the volume of released newspapers with finance-related content (namely, *ilSole24ore* newspaper) over the volume of all newspapers released in 2012. From the statistical database of the Bank of Italy and the Census of Banks (SIOTEC), I obtain data on the number of Italian banks, branches, and ATMs (per 1000 inhabitants) per region in the years 2010–2012, and build a regional-level variable measuring the growth of ATM branches between 2010 and 2012. Lastly, combining information from the Bank of Italy together with the Italian Ministry of Justice, I obtain data on the number of bankruptcies by region in 2012. Correlations between these variables are in the range of −0.25 and 0.23 and reported in Table A3 (Appendix).

To be valid instruments, these regional-level variables should predict well students' financial literacy without affecting the school outcomes directly or indirectly through unobserved factors. The variable on the share of finance-related newspapers builds on the volume of released newspapers – instead of the frequency or number of newspapers actually read – so I view this variable as less driven by demand-side factors that correlate with household-level SES-considerations, and more likely to exogenously capture exposure to financial information and/or to peers with higher financial knowledge (be them other family members, schoolmates, or neighbors). Several other studies have shown that individuals learn about financial matters from peers (Brown et al. 2008; Duflo and Saez 2003; Hong, Kubik, and Stein 2004). By similar reasoning, I expect the number of bankruptcies in 2012 to raise students' financial awareness by means of heightened media coverage, and the growth of ATM branches to increase the chances that students use prepaid debit cards and check on their bank accounts and savings regularly.

Notwithstanding their theoretical plausibility, I acknowledge that some of these variables could still affect the dependent variable directly. Although Hansen-J tests of over-identifying restrictions do not permit to determine whether the instruments are truly independent of the second-stage disturbance term, they can provide evidence against instrument exogeneity.[19] Hence, in my analysis I provide Hansen-J tests of over-identifying restrictions, alongside first-stage F-tests for instrument relevance. While tests for exogeneity and relevance are detailed in the results section below each IV estimation, Table A4 in the Appendix shows extended first-stage estimates from two specifications, one that relies on the two individual-level IVs only, and one that combines the two individual-level IVs with the three regional-level IVs. In both cases the instruments (jointly) turn out as strongly predictive of financial literacy. For instance, a 0.1 increase in the share of schoolmates whose mothers work in money-related occupations is associated with a 0.45–0.52 increase in the financial literacy proficiency level. Note that in the analysis that follows, regional-level variables are never used as instruments on their own, as doing so would imply that student-level heterogeneity would be collapsed into 20 fitted values only (i.e. the number of regions in Italy), thus severely reducing the amount of meaningful variation and resulting in high standard errors. Regional-level IVs are used in tandem with individual-level

IVs to test for the robustness of the findings. Also, regional-level dummies are excluded whenever regional-level IVs are used.

4. Descriptive statistics

4.1. Dependent variables, controls, and individual-level IVs

Table 3 reports descriptive statistics on the dependent variables chosen (panel a), along with child, household, and school-level controls (panel b), and individual-level IVs (panel c). Descriptive statistics on regional-level IVs and financial literacy are provided in subsections 4.2 and 4.3, respectively. Despite their inherent nature as categorical, in this study I use truancy outcomes as continuous variables, with values ranging from 0 to 3. Although the categories are slightly nonlinear (0 corresponds to 'None', yet 1 corresponds to 'Once or twice', 2 corresponds to 'Three or four times', and 3 corresponds to 'Five or more times'), I treat these variables as cardinal. In other words, I assume that 0 corresponds to 'None', 1 to 'Once', 2 to 'Twice' and 3 to 'Three times'. This choice makes the interpretation of the coefficients more straightforward and, if anything, underestimates the means of the truancy variables (as I am imposing, for instance, all values of 'once or more' to be coded as 1, while in reality some would correspond to 1, and some would correspond to 2), thus making my results conservative. For the sake of comparison, I also create dummy variables that take the value of 1 if the student was late for school, skipped the whole day, and/or skipped classes at least once over the past two weeks (OLS and IV estimates using these dichotomous counterparts are reported in Table A5 in the Appendix). Questions pertaining to time spent on activities and

Table 3. Descriptive statistics on school outcomes, controls, and individual-level IVs.

	N	Mean	(SD)	Min	Max
a. Outcomes					
Late for school	7029	0.50	(0.77)	0	3
Late for school (dummy)	7029	0.37	(0.48)	0	1
Skip whole day	7026	0.59	(0.69)	0	3
Skip whole day (dummy)	7026	0.49	(0.50)	0	1
Skip classes	7019	0.43	(0.66)	0	3
Skip classes (dummy)	7019	0.35	(0.48)	0	1
Homework out of school*	4547	8.75	(7.09)	0	30
Attitudes towards school (index) – acad.*	2397	3.13	(0.46)	1	4
Attitudes towards school (index) – vocat.*	2166	3.00	(0.51)	1	4
b. Controls					
Child characteristics					
Female (Ref. Male)	7068	0.49	(0.50)	0	1
Age	7068	15.8	(0.28)	15.2	16.3
Grade	7068	−0.19	(0.52)	−3	1
Household characteristics					
ESCS Index	7045	−0.03	(0.97)	−2.55	3.11
Two-parent family (Ref. Other)	6797	0.90	(0.30)	0	1
School characteristics					
Private school (Ref. Public)	6651	0.05	(0.23)	0	1
Vocational (Ref. General)	7068	0.49	(0.50)	0	1
Class size	6581	25.8	(9.23)	13	53
Total school enrollment	6496	762.6	(413.6)	16	2974
Student-teacher ratio	6244	10.4	(3.38)	0.63	72.5
c. Individual-level IVs					
Share of schoolmates whose *mothers* work in money-related occupations	6826	0.05	(0.04)	0	0.33
Share of schoolmates whose *fathers* work in money-related occupations	6810	0.05	(0.05)	0	0.33

Sources: OECD PISA 2012 Financial Literacy (FL) and OECD PISA 2012 General database.

Notes: Stratified two-stage sampling design and replicate weights accounted for. The attitude index for students in schools with academic orientation is a row mean of the four variables 'prepare for life', 'valuable time', 'confidence', and 'prepare for college'. The attitude index for students in schools with vocational orientation is a row mean of the four variables 'prepare for life', 'valuable time', 'confidence', and 'get a job'.

*Time spent on activities not asked in Questionnaire B (Questionnaires A and C, i.e. ∼67% of students); attitudes not asked in Questionnaire A (Questionnaires B and C, i.e. ∼67% of students).

attitudes towards school were only asked to two-thirds of the students, hence the fewer observations for some of the outcomes (see subsection 4.4). Time spent on homework is continuous by construction and measured in hours per week, while the attitude indices are continuous variables created from categorical variables listed in Table 1. To summarize, all outcomes in the study are modeled as continuous.

Descriptive statistics reveal that Italian high school students skip on average half a school day every two weeks, and they get to school late or skip classes at a similar – yet somewhat lower – pace. Moreover, students spend a little less than nine hours per week on homework and show more positive attitudes towards school if they attend high schools with academic orientation (3.13 vs 3.00). The sample is balanced in terms of sex, and the average student is aged 15.8 years old and is in the correct grade for his/her age. Also, 90% of students live in households with both parents present. In terms of school-level controls, only 5% of students are enrolled in private schools, and about half attend high schools with vocational orientation. The average class size is 26 students per class, and the mean student body is 763 students per school. As for individual-level IVs, the share of schoolmates whose mothers and fathers work in money-related occupations averages five per cent.

4.2. School characteristics by region and regional-level IVs

Table 4 provides additional details on the nature and characteristics of the 1158 schools sampled for the PISA financial literacy assessment, by geographic region. Around 50 schools per region were sampled, with an average of 350 students. Trentino-Alto Adige has a far higher number of schools and students as I combined the autonomous provinces of Trento and Bolzano – separate in the PISA data – to reflect the reality that Italy has actually 20 regions (instead of 21). Although the OECD planned to administer eight financial literacy questionnaires per sampled school, the table shows that on average six to seven students were interviewed. The percentage of private schools is below 10% in every region except for Valle d'Aosta, Trentino-Alto Adige, and Veneto, reflecting the reality that high-school education in Italy is predominantly provided by the public system. This holds even more strongly in the South of Italy and the Islands, where the percentage of private schools drops below five per cent. In Italy, school quality does not vary dramatically by family income or location, as it does in some countries such as the United States (Bottazzi and Lusardi 2016). Public schools are not considered to be of lower quality than private schools, and the difference between students attending the two types of schools rests mainly on the socioeconomic status of the family, a variable we are able to control for. Lastly, there is little cross-regional variability in terms of class size and student-teacher ratio, which average 25–26 students per class and 10 students per teacher, respectively.

Table 5 shows descriptive statistics for the three regional-level IVs used in the analysis, namely the share of newspapers with finance-related content over the total volume in 2012, the growth of ATM branches between 2010 and 2012, and the number of bankruptcies in 2012. The share of newspapers ranges from a minimum of 1.1% in Molise and Sicilia to a maximum of 4.4% in Sardegna, averaging around 1.6% for the country as a whole. The number of ATM branches experienced a negative growth rate across all regions, except for Valle d'Aosta, Umbria, Basilicata, Molise, and Sardegna. Lastly, the number of bankruptcies ranges from a minimum of 17 in Valle d'Aosta to a maximum of 2613 in Lombardia. Overall, this table suggests widespread cross-regional heterogeneity, increasing confidence in the potentially explanatory role of the chosen variables.

4.3. Financial literacy

Italy's performance in financial literacy is second to last when considering all countries and economies participating in the 2012 global financial literacy assessment (Table A1, Appendix A). More than one in five students does not reach the baseline level of proficiency in financial literacy, and only

Table 4. Descriptive statistics on sample of schools and students, by region.

Region	# of schools	# of students	Vocational orientation (%)	Private (%)	# students per school interviewed	Average school size	Average class size	Student-teacher ratio
North-West								
Liguria	58	331	43.2%	8.1%	6.5	654.0	23.1	10.0
					(1.85)	(344.57)	(3.68)	(3.50)
Lombardia	54	347	49.6%	9.1%	6.9	879.9	28.3	10.7
					(1.67)	(441.78)	(11.84)	(3.51)
Piemonte	51	339	57.0%	9.9%	7.1	664.4	26.6	9.7
					(1.29)	(382.53)	(10.91)	(2.42)
Valle d'Aosta	30	178	46.0%	17.0%	9.1	360.4	22.4	7.7
					(4.35)	(302.61)	(10.39)	(3.04)
North-East								
Emilia-Romagna	54	331	59.4%	5.1%	6.8	741.5	26.2	10.0
					(1.67)	(404.48)	(9.46)	(3.39)
Friuli-Venezia Giulia	330	49.6%	8.9%	6.8	786.1	22.8	10.2	(3.36)
					(1.63)	(555.99)	(7.59)	
Trentino-Alto Adige	794	59.9%	13.9%	6.9	577.0	24.9	8.2	(3.85)
					(1.47)	(376.76)	(10.83)	
Veneto	70	455	55.0%	12.9%	7.1	786.2	25.1	11.6
					(1.61)	(442.38)	(7.57)	(3.91)
Center								
Lazio	54	340	41.6%	4.7%	6.7	764.5	24.4	10.5
					(1.54)	(390.31)	(7.18)	(3.26)
Marche	53	336	52.6%	0.0%	7.0	738.0	24.6	10.0
					(1.76)	(309.82)	(5.88)	(2.45)
Toscana	54	320	55.4%	3.0%	6.5	708.0	23.4	9.5
					(1.54)	(425.96)	(3.49)	(2.93)
Umbria	53	325	45.1%	0.8%	6.7	654.5	24.3	10.0
					(1.69)	(315.55)	(6.64)	(2.81)
South								
Abruzzo	53	336	42.0%	2.7%	6.8	718.8	24.8	9.3
					(1.47)	(406.91)	(7.24)	(3.26)
Basilicata	56	351	52.7%	0.4%	6.7	496.9	22.6	9.7
					(1.59)	(328.85)	(5.19)	(3.34)
Calabria	58	354	46.1%	0.8%	6.6	673.1	24.0	8.9
					(1.92)	(367.04)	(8.53)	(3.54)
Campania	53	347	44.3%	4.2%	7.0	852.5	26.1	10.8
					(1.51)	(362.69)	(8.36)	(3.20)
Molise	48	254	46.6%	0.0%	6.8	495.3	27.6	8.83
					(1.57)	(251.86)	(11.72)	(2.7)
Puglia	56	365	47.4%	0.2%	7.1	761.7	28.8	11.4
					(1.34)	(363.18)	(10.87)	(3.96)
Islands								
Sardegna	58	307	45.7%	1.2%	6.0	560.1	23.1	9.7
					(1.88)	(333.59)	(7.48)	(2.76)
Sicilia	56	328	42.5%	0.5%	6.4	793.6	25.1	9.9
					(1.6)	(472.22)	(9.22)	(2.56)
Total	1158	7068	49.1%	5.5%	6.8	762.6	25.8	10.4
					(1.62)	(413.64)	(9.23)	(3.38)

Source: OECD PISA 2012 Financial Literacy (FL) database.
Notes: Stratified two-stage sampling design and replicate weights accounted for. Standard deviations in parentheses.

two per cent of students are top performers (level 5). Regional differences are large (Figure 1), as the difference between the best-performing region (Veneto) and the worst-performing one (Calabria) is around 86 score points, i.e. larger than one PL. To locate these findings in a comparative perspective, only two regions report financial literacy scores that are above the average of the OECD countries (500), namely Veneto and Friuli-Venezia Giulia, in the North-East part of Italy. Students in Trentino-Alto Adige and Lombardia are close to the OECD average, yet students in the remaining regions fall behind. Results show a clear regional patterning of financial knowledge whereby students in

Table 5. Regional-level IVs for financial literacy.

Region	Share of newspapers with finance content over total volume in 2012	Growth of ATM branches between 2010 and 2012	Number of bankruptcies in 2012
North-West			
Liguria	0.033	−0.013	257
Lombardia	0.022	−0.015	2613
Piemonte	0.013	−0.006	881
Valle d'Aosta	0.017	0.021	17
North-East			
Emilia-Romagna	0.014	−0.021	950
Friuli-Venezia Giulia	0.012	−0.015	253
Trentino-Alto Adige	0.017	−0.003	137
Veneto	0.013	−0.010	1021
Center			
Lazio	0.016	−0.009	1252
Marche	0.014	−0.033	417
Toscana	0.012	−0.002	786
Umbria	0.015	0.019	210
South			
Abruzzo	0.012	−0.020	281
Basilicata	0.015	0.008	55
Calabria	0.016	−0.025	285
Campania	0.012	−0.005	950
Molise	0.011	0.000	42
Puglia	0.012	−0.008	497
Islands			
Sardegna	0.044	0.001	242
Sicilia	0.011	−0.037	610
Average	0.016	−0.009	589

Sources: Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.

the North-East and North-West score above the country-level average of 466 (494 and 486, respectively), while students in the South and the Islands score considerably below (443 and 432, respectively). Students attending schools in the Center of Italy score around the average. The data hence provide evidence of widespread financial illiteracy throughout the country, with marked regional differences that place students in some regions of the South, such as Calabria, 200 points – almost three proficiency levels – below their 15-year-old Chinese peers (OECD 2014a).

Figure 2 provides a breakdown of the share of Italian students who fall within each financial literacy PL, by region. Two findings are particularly striking. First, more than 20% of students perform below the baseline level of proficiency (level 2) on average, with proportions ranging from eight per cent in Friuli-Venezia Giulia to around 39% in Calabria. This high share of low-performers is alarming since some of these students cannot even complete simple financial tasks such as recognizing the difference between needs and wants, or comparing the value of goods based on a comparison of their price per unit (OECD 2014a). On the other side of the spectrum, the share of students reaching level 5 or above averages below two per cent, and it surpasses four per cent in only two North-Eastern regions, namely Trentino Alto-Adige (4.8) and Veneto (4.9).

4.4. Missing data

As anticipated in subsection 4.1 and shown in Table 3, questions on time spent on activities and attitudes towards school were not asked to all students. The OECD devised three types of questionnaires, i.e. A, B, and C. Questions on time spent on activities were not asked in questionnaire B (∼ 67% of students filled questionnaires A and C), while questions on attitudes towards school were not asked in questionnaire A (∼ 67% of students filled questionnaires B and C). Students who did not

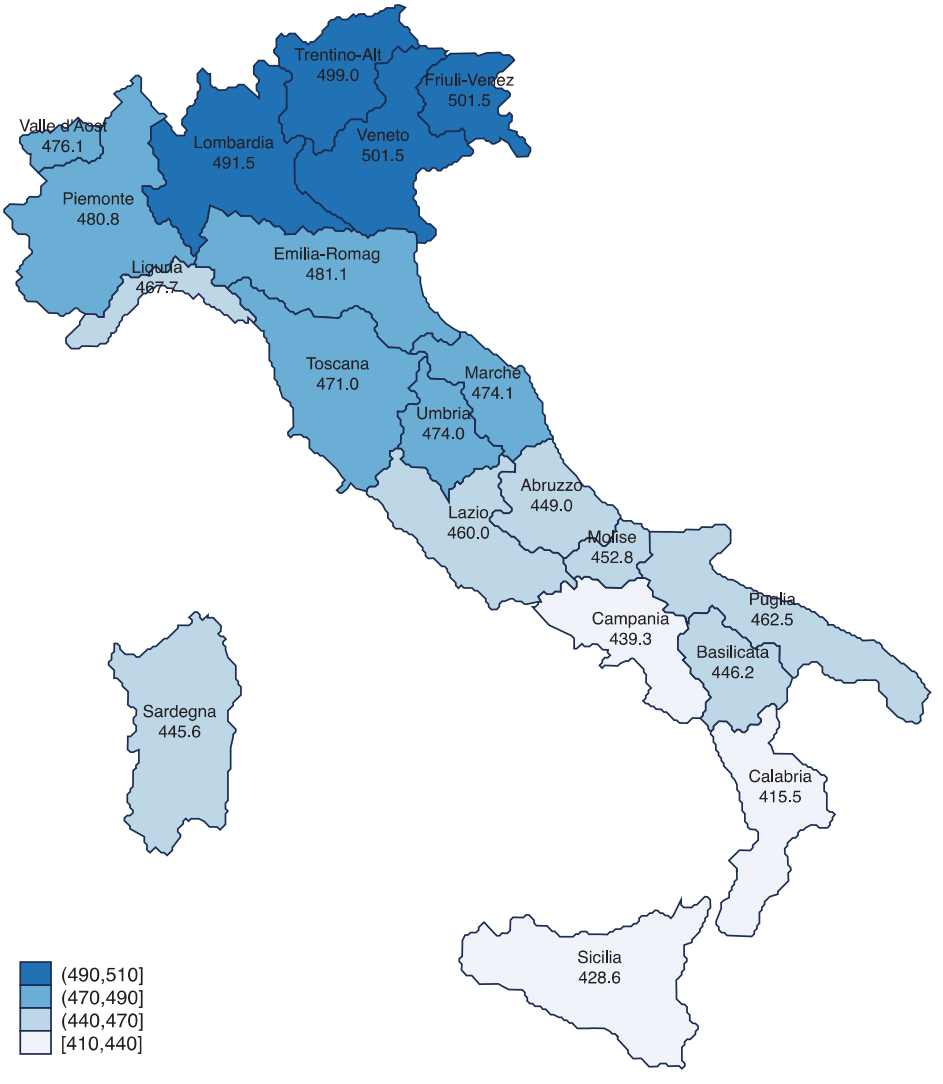

Figure 1. Descriptive statistics on financial literacy competence, by region. Source: OECD PISA 2012 Financial Literacy (FL) database.

fill a questionnaire are coded as not available (N.A.) – instead of missing – and are likely less problematic in terms of sample validity. On top of the N.A. cases, some variables also report missing values (see Table A2 in the Appendix for further details). In the regression analyses that follow (section 5), missing and N.A. cases are coded as missing and listwise deleted. Yet in Appendix Table A6 I assess whether students who are N.A. (top panel) or missing (bottom panel) on each outcome are statistically different in terms of child, household, and school-level predictors from students who are not. In more technical terms, the table reports coefficients from a regression of each predictor on a dummy for whether the dependent variable is N.A. or missing. The top panel shows that N.A. students are not statistically different from non-N.A. students across most variables considered. The bottom panel poses instead more concerns, as students missing on three of the six outcomes are more likely to come from public schools. More importantly, students missing on all dependent variables tend to have a lower financial literacy score (33 to 85 raw points less). Although the percentage of missing cases is low (at most 4.4% for the homework outcome), this finding needs to be kept in mind.

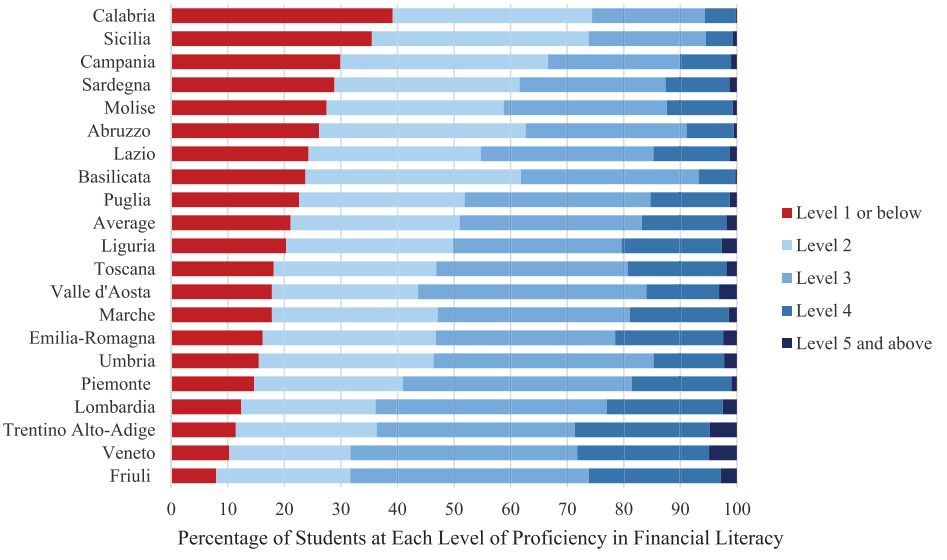

Figure 2. Share of students at each proficiency level on the financial literacy scale, by region. Source: OECD PISA 2012 Financial Literacy (FL) database.

5. Multivariate results

5.1. OLS estimates

Table 6 provides results from an OLS specification of the school outcomes of interest on financial literacy in PL, accounting for individual (model 2), household (model 3), and school-level controls (model 4) progressively. Panel (a) focuses on *time commitment to education* outcomes, while panel (b) focuses on *attitudes*. Our model specifications suggest that financial literacy is positively associated with the value students place on schooling, regardless of whether the latter is proxied by measures of time commitment to education or attitudes towards school. Financial literacy coefficients are statistically significant and robust to the inclusion of individual, household, and school-level controls. For instance, an increase of one financial literacy PL is associated with 1.3 (model 4) to 2.1 (model 1) more hours per week spent on homework, and a 0.07 increase in the attitude index for students in vocational schools ($p < 0.01$). Accounting for controls marginally affects the significance of the estimates – except when predicting the attitude index for students in academic schools, as the FL coefficient turns insignificant after introducing school-level controls – though it does reduce the magnitude of the financial literacy coefficients up to a half ('skip whole day').

Among individual-level controls, gender plays a relevant role, suggesting that girls place on average a higher value on schooling as compared to boys. Girls tend to be late for school less frequently, skip fewer school days or classes, spend almost three additional hours per week on homework, and show more positive attitudes towards school in general, regardless of the type of school attended. Age turns out to be a weak predictor of all school outcomes, which is not surprising given the little variability in the age of the students sampled in PISA. We also see that students in higher grades are less likely to engage in truancy and more likely to spend time on homework, though their attitudes differ only slightly from those of lower-grade students.

Evidence on the role of household-level characteristics is more mixed. Except for a few outcomes ('skip whole day' and 'homework out of school'), there is no evidence of a clear SES-gradient in students' perceived value of schooling, while family stability and parental involvement – as proxied by whether the student lives in a family with two parents – emerge as clearer drivers of all students' time commitment to education and vocational students' attitudes towards school. In terms of school

Table 6. OLS estimates of financial literacy on students' perceived value of schooling (panels a and b).

	Truancy												Time spent on activities			
	Late for school				Skip whole day				Skip classes				Homework out of school			
a. Time commitment to education	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial literacy (PL)	−0.074***	−0.064***	−0.066***	−0.047***	−0.081***	−0.062***	−0.055***	−0.044***	−0.048***	−0.044***	−0.048***	−0.036***	2.141***	2.109***	1.862***	1.304***
	(0.013)	(0.014)	(0.015)	(0.016)	(0.010)	(0.011)	(0.012)	(0.014)	(0.009)	(0.010)	(0.010)	(0.011)	(0.128)	(0.137)	(0.147)	(0.168)
Child characteristics																
Female (Ref. Male)		−0.067**	−0.073**	−0.052*		−0.037*	−0.052**	−0.027		−0.103***	−0.107***	−0.091***		3.075***	3.256***	2.591***
		(0.027)	(0.029)	(0.030)		(0.022)	(0.021)	(0.023)		(0.025)	(0.025)	(0.028)		(0.268)	(0.274)	(0.294)
Age		−0.015	−0.004	−0.013		0.049	0.038	0.040		−0.004	−0.003	−0.015		−0.499	−0.276	−0.413
		(0.051)	(0.049)	(0.047)		(0.037)	(0.038)	(0.036)		(0.031)	(0.030)	(0.032)		(0.535)	(0.514)	(0.533)
Grade		−0.067**	−0.055*	−0.067**		−0.117***	−0.089***	−0.092***		−0.034	−0.032	−0.038		0.650**	0.318	0.535**
		(0.030)	(0.031)	(0.033)		(0.032)	(0.032)	(0.035)		(0.030)	(0.031)	(0.034)		(0.254)	(0.259)	(0.266)
Household characteristics																
ESCS Index			0.008	0.018			−0.033***	−0.007			0.025*	0.029**			1.209***	0.757***
			(0.014)	(0.016)			(0.012)	(0.015)			(0.013)	(0.014)			(0.155)	(0.181)
Two-parent family (Ref. Other)			−0.151***	−0.141**			−0.146***	−0.162***			−0.058*	−0.066			0.866**	0.365
			(0.056)	(0.061)			(0.041)	(0.044)			(0.035)	(0.042)			(0.418)	(0.406)
School characteristics																
Private school (Ref. Public)				−0.120*				−0.180***				−0.056				−0.477
				(0.066)				(0.061)				(0.061)				(0.783)
Vocational (Ref. General)				0.066**				0.112***				0.056*				−3.144***
				(0.032)				(0.032)				(0.030)				(0.306)
Class size				−0.001				−0.002*				0.000				−0.003
				(0.002)				(0.001)				(0.001)				(0.012)
Total school enrollment				−0.000**				−0.000*				−0.000				0.000
				(0.000)				(0.000)				(0.000)				(0.000)
Student-Teacher ratio				−0.000				−0.001				0.005				0.181***
				(0.005)				(0.004)				(0.004)				(0.046)
Constant	0.869***	1.067	1.068	1.089	1.072***	0.203	0.469	0.404	0.665***	0.757	0.827*	0.892*	−2.749***	3.745	0.955	7.105
	(0.092)	(0.821)	(0.798)	(0.753)	(0.078)	(0.615)	(0.634)	(0.587)	(0.072)	(0.489)	(0.484)	(0.527)	(0.923)	(8.520)	(8.174)	(8.542)
Observations	7029	7029	6756	5957	7026	7026	6754	5956	7019	7019	6750	5952	4547	4547	4374	3854
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.031	0.036	0.039	0.042	0.041	0.049	0.054	0.071	0.011	0.018	0.020	0.021	0.130	0.180	0.208	0.270

Table 6. Continued.

	Attitudes towards school							
	Academic				Vocational			
b. Attitudes	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial literacy (PL)	0.027**	0.027*	0.026*	0.025	0.072***	0.075***	0.074***	0.073***
	(0.012)	(0.014)	(0.015)	(0.017)	(0.015)	(0.016)	(0.017)	(0.018)
Child characteristics								
Female (Ref. Male)		0.116***	0.114***	0.124***		0.193***	0.194***	0.195***
		(0.026)	(0.025)	(0.026)		(0.033)	(0.033)	(0.036)
Age		−0.031	−0.028	−0.036		0.005	0.005	0.005
		(0.043)	(0.043)	(0.045)		(0.057)	(0.051)	(0.053)
Grade		0.061*	0.062*	0.041		0.007	−0.005	0.005
		(0.031)	(0.035)	(0.037)		(0.040)	(0.040)	(0.044)
Household characteristics								
ESCS Index			−0.000	−0.013			0.021	0.015
			(0.015)	(0.016)			(0.016)	(0.017)
Two-parent family (Ref. Other)			0.040	0.014			0.101**	0.094*
			(0.047)	(0.052)			(0.045)	(0.050)
School characteristics								
Private school (Ref. Public)				0.100				0.112*
				(0.073)				(0.064)
Class size				−0.000				−0.002
				(0.001)				(0.002)
Total school enrollment				0.000				0.000
				(0.000)				(0.000)
Student-Teacher ratio				0.009**				−0.003
				(0.005)				(0.006)
Constant	2.933***	3.364***	3.266***	3.297***	2.717***	2.555***	2.465***	2.512***
	(0.086)	(0.662)	(0.659)	(0.721)	(0.120)	(0.902)	(0.819)	(0.865)
Observations	2397	2397	2324	2059	2166	2166	2075	1828
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.020	0.042	0.044	0.047	0.033	0.065	0.067	0.079

Note: Stratified two-stage sample design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). Regional dummies included.
Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

characteristics, students in private schools are less likely to be late for school and skip school days, consistent with the nature of the private school system which tends to devote more resources to monitoring student absences and interacting with parents. Lastly, vocational education is significantly associated with higher truancy and less time spent on homework, in line with the idea that students who sort into vocational education value working more than schooling and report a higher discount rate (De Witte and Csillag 2014).

For the attitude outcomes, the financial literacy coefficient for students in vocational schools is larger (0.07–0.08 versus 0.02–0.03 for students in academic schools) and more robust to the inclusion of additional controls. As students in vocational education have on average a lower financial literacy score (442.4 versus 489.4 for students in academic schools) and hold more negative attitudes towards school (Table 3), these estimates provide suggestive – yet purely associational – evidence that better financial literacy might benefit more students in vocational education.

5.2. IV estimates

Table 7 assesses the robustness of the findings presented in Table 6 by addressing endogeneity concerns outlined in subsection 3.3. The table reports the financial literacy coefficient from a full specification accounting for individual, household, and school-level controls.[20] To ease comparisons, column (1) reports the financial literacy coefficient from the OLS specification, as per model 4 in Table 6. Columns (2) and (3) report the financial literacy coefficient from IV 2SLS specifications where financial literacy is instrumented through individual-level variables, and a combination of individual and regional-level variables, respectively. Below each IV estimate I report the F-test for relevance of the instrument and the *p*-value from a Hansen-J test for over-identifying restrictions. With few exceptions – partly due to smaller sample sizes for attitudes – these tests indicate that there is no evidence to reject the null hypothesis that the instruments are orthogonal to the second-stage disturbance term. Similarly, F-tests for IV relevance are larger than 10 – the commonly adopted rule of thumb suggesting the absence of weak instruments – and even larger in the specification that relies on both individual and regional-level IVs combined. Although not conclusive, the value of these statistics seem to alleviate concerns of weak instruments.

Results from Table 7 point to three main findings. First, there is evidence that financial literacy plays a role in shaping students' perceived value of schooling, yet this effect persists only when relying on measures of time commitment to education. Second, IV estimates are quite aligned in terms of sign, magnitude, and statistical significance, regardless of the combination of IVs used. Third, IV estimates are larger in magnitude compared to their OLS counterpart, suggesting that OLS results underestimate the magnitude of financial literacy as a determinant of school-related outcomes. With regard to this latter point, it is important to remind that attenuation bias due to measurement error in financial literacy also drives estimates towards zero. Measurement error in financial literacy may be substantial if respondents guess answers at random or misunderstand the question.

Estimates of the relationship between financial literacy and students' time commitment to education indicate that an increase of one PL in financial literacy reduces the number of times students are late for school and skip school days by 0.23 and 0.27, respectively (column 3), a close-to-sixfold reduction as compared to the OLS estimates.[21] As students get to school late and skip a whole school day roughly half a day every two weeks (i.e. assuming the outcomes are at their mean values reported in Table 3, namely 0.50 and 0.59), this effect size implies a reduction in truancy by 46 ('late for school') and 45.8% ('skip whole day') per two-week period, respectively. Moreover, an increase of one PL is associated with 1.4 (column 3) to 3.3 (column 2) more hours per week spent on out-of-school study time, a non-negligible gain given the average of 8.7 hours per week. Scholars have documented that time spent on homework has positive impacts on the educational trajectories of children as they grow older (Eren and Henderson 2008, 2011). Specifically, previous research has shown that while the association between time on homework and achievement gains – as measured by grades or standardized test scores – tends to be weak for children in elementary school, it is

strong and significant for high school students (Cooper, Robinson, and Patall 2006; Kalenkoski and Pabilonia 2017).[22] Drawing in turn on the large body of research relating academic achievement and subsequent wages (Currie and Thomas 1999; French et al. 2015), there is reason to believe that financial literacy in teenage years might have powerful indirect effects on individual wages later in life.

By contrast, the relationship between financial literacy and attitudes towards school fades once controlling for endogeneity, providing no evidence of a direct causal effect of the former. The relevance and exogeneity tests for the attitudes index for students in vocational schools in column (2) fail to satisfy the requirements, yet the effect size does not statistically differ from zero across both IV specifications, thus increasing confidence in the validity of the instruments and in the conclusion that that there is no causal effect of financial literacy on attitudes towards school.

5.3. Robustness checks

This subsection provides some robustness checks (RC) to the findings documented above. Table 8 is structured similarly to Table 7, yet it includes two vertical panels labeled, respectively, RC1 and RC2. RC1 tests the relationship between financial literacy (PL) and the school outcomes using alternative individual-level IVs more closely related to money management, namely the share of schoolmates who learned how to manage money in a specific course in school, the share of schoolmates who learned how to manage money in an activity outside of school, and the share of schoolmates who discuss about money matters with their parents at least once a week – the latter constructed from information included in the parent's questionnaire (see Appendix Table A2 for further details). These variables were not used in the main specifications presented in Table 7 as they are built from questions that were answered by 50% of students only, hence the sample size loss would have been substantial – especially if combined with the fact that some outcomes are only available for some students. Column (1) of RC1 reports the financial literacy coefficient from an IV specification using these three individual-level IVs; column (2) combines the three individual-level IVs with the three regional-level IVs used previously. As usual, F-tests and *p*-values from Hansen-J tests are reported below each coefficient. Although these tests perform less well for some outcomes (mainly the attitude indices) due to smaller sample sizes, the sign and magnitude of the estimated coefficients are quite in line with those presented in Table 7. For instance, column (3) suggests that an increase of one financial literacy PL reduces the number of times students are late for school and skip school days by 0.20 and 0.30, respectively. These estimates are reassuring as they provide further support to the evidence documented in Table 7, yet they also present limitations. Besides the smaller sample size, the individual-level IVs are constructed using only information on schoolmates who completed the FL assessment, i.e. 6–8 students. This may imply that the variability captured does not reflect the variability that would result if information from more schoolmates were available.

RC2 tests the relationship between math skills (PL) and the school outcomes in an OLS framework (column 1), and using a set of individual-level IVs (column 2) that are more plausibly related – at least in a theoretical sense – to math skills (rather than financial literacy). With RC2 the underlying idea is to verify that the effects reported for FL are not – or at least not fully – driven by other skills that correlate highly with FL. In this respect, math is an obvious candidate due to its predominant 'numeracy' component, which also features in FL. Also, the 2012 OECD PISA FL database provides some questions that directly relate to parental involvement and math skills which can be used as IVs in a spirit similar to the IVs constructed for FL (see Appendix Table A2 for further details). Specifically, individual-level IVs for RC2 (column 2) include the share of schoolmates whose parents help them on math homework at least once per month, and the share of schoolmates whose parents discuss about their child's performance in math class at least once per month. OLS coefficients for math (column 1) deliver slightly larger estimates for truancy outcomes compared to OLS estimates for FL (column 1 in Table 7), yet smaller for time spent on homework. More importantly, when controlling for

Table 7. OLS and IV estimates of financial literacy on students' perceived value of schooling, full specification (financial literacy coefficient reported).

	Financial Literacy (PL)		
	(1)	(2)	(3)
Dependent variable	OLS	Individual-level IVs	Individual and Regional-level IVs
a. Time commitment to education			
Truancy			
Late for school	−0.047***	−0.225***	−0.234***
(SE)	(0.016)	(0.075)	(0.063)
Regional dummies	Yes	Yes	No
F-test (first stage)		13.40	19.73
Hansen J. (*p*-value)		0.110	0.506
Skip whole day	−0.044***	−0.248***	−0.270***
(SE)	(0.014)	(0.065)	(0.054)
Regional dummies	Yes	Yes	No
F-test (first stage)		14.01	20.24
Hansen J. (*p*-value)		0.174	0.554
Skip classes	−0.036***	0.007	−0.056
(SE)	(0.011)	(0.059)	(0.049)
Regional dummies	Yes	Yes	No
F-test (first stage)	.	13.38	20.13
Hansen J. (*p*-value)	.	0.550	0.045
Time spent on activities			
Homework out of school	1.304***	3.329***	1.380**
(SE)	(0.168)	(1.275)	(0.596)
Regional dummies	Yes	Yes	No
F-test (first stage)	.	10.52	14.92
Hansen J. (*p*-value)	.	0.231	0.101
b. Attitudes			
Attitudes towards school – acad.	0.025	−0.021	−0.073
(SE)	(0.017)	(0.092)	(0.065)
Regional dummies	Yes	Yes	No
F-test (first stage)	.	11.54	14.04
Hansen J. (*p*-value)	.	0.234	0.410
Attitudes towards school – vocat.	0.072***	−0.068	−0.039
(SE)	(0.015)	(0.061)	(0.056)
Regional dummies	Yes	Yes	No
F-test (first stage)	.	8.11	11.57
Hansen J. (*p*-value)	.	0.012	0.206

Sources: OECD PISA 2012 Financial Literacy (FL) database, OECD PISA 2012 General Database, Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.

Notes: Stratified two-stage sampling design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). Individual-level IVs include the share of schoolmates whose mothers work in money-related occupations and the share of schoolmates whose fathers work in money-related occupations. Regional-level IVs include the share of newspapers with finance content over the total volume in 2012, the growth of ATM branches between 2010 and 2012, and the number of bankruptcies in 2012.

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

endogeneity of math, results indicate that the coefficient on 'late for school' is not statistically significant, while coefficients on 'skip whole day' and 'homework out of school' are significant at the 10% level yet lower in magnitude. As for FL, there is no evidence of a causal effect of math skills on attitudes towards school. Taken together, these findings suggest that math skills potentially mediate the relationship between FL and the school outcomes, yet there is also evidence of an independent role of financial literacy in shaping students' perceived value of schooling. These preliminary findings set the stage for further research on the relationship between FL and related skills.

6. Conclusions

In this study I have used Italian data from the 2012 OECD PISA financial literacy assessment to investigate whether financial literacy skills play a role in shaping the value that high school students place

Table 8. Robustness checks – RC (financial literacy coefficient reported for RC1 and math coefficient reported for RC2).

	RC1 – Financial Literacy (PL)		RC2 – Math (PL)	
	(1)	(2)	(1)	(2)
Dependent variable	Individual-level IVs	Individual and Regional-level IVs	OLS	Individual-level IVs
a. Time commitment to education				
Truancy				
Late for school	−0.244*	−0.196**	−0.041**	−0.161
(SE)	(0.144)	(0.095)	(0.016)	(0.111)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	10.60	10.21	.	10.15
Hansen J. (*p*-value)	0.172	0.169	.	0.071
Skip whole day	−0.255**	−0.296***	−0.059***	−0.192*
(SE)	(0.128)	(0.099)	(0.011)	(0.105)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	9.94	10.20	.	10.88
Hansen J. (*p*-value)	0.167	0.428	.	0.098
Skip classes	−0.127	−0.137	−0.029***	−0.041
(SE)	(0.117)	(0.087)	(0.010)	(0.097)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	10.59	10.76	.	11.14
Hansen J. (*p*-value)	0.205	0.303	.	0.054
Time spent on activities				
Homework out of school	2.718**	2.164**	0.834***	1.560*
(SE)	(1.279)	(0.857)	(0.119)	(0.890)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	10.06	10.18	.	10.64
Hansen J. (*p*-value)	0.495	0.081	.	0.606
b. Attitudes				
Attitudes towards school – acad.	−0.422	−0.354	0.018	0.093
(SE)	(0.349)	(0.234)	(0.014)	(0.173)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	7.54	8.21	.	9.88
Hansen J. (*p*-value)	0.887	0.854	.	0.472
Attitudes towards school – vocat.	0.176	0.209	0.038**	−0.016
(SE)	(0.156)	(0.129)	(0.016)	(0.103)
Regional dummies	Yes	No	Yes	Yes
F-test (first stage)	8.11	9.12	.	9.94
Hansen J. (*p*-value)	0.115	0.484	.	0.556

Sources: OECD PISA 2012 Financial Literacy (FL) database, Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.

Notes: Stratified two-stage sampling design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). Individual-level IVs for RC1 include the share of schoolmates who learned how to manage money in a specific course in school, the share of schoolmates who learned how to manage money in an activity outside school, and the share of schoolmates who discuss about money matters with their parents at least once a week. Regional-level IVs for RC1 are the same as of Table 7. Individual-level IVs for RC2 include the share of schoolmates whose parents help them on math homework at least once per month, and the share of schoolmates whose parents discuss performance in math class at least once per month.

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

on schooling. My analysis posits that financial literacy plays a role within the school context by raising students' awareness of the financial and non-financial benefits of gaining additional education, together with the lifetime costs associated with poor school outcomes. To measure the extent to which students value schooling, I have used measures of time commitment to education and attitudes towards school. My results suggest that higher financial literacy increases students' perceived value of schooling by boosting their time commitment to education. Yet I find no robust evidence that financial literacy shapes students' attitudes towards school.

The finding that financial literacy shapes students' time commitment to education but not attitudes towards school is at odds with the belief that changes in attitudes are a precondition for changes in behavior (Ajzen 1991; Armitage and Conner 2001). I advance three hypotheses that can help reconcile this puzzle. First, attitude-related questions might not be a valid proxy for students' perceived value of schooling. Second, even if these measures are reliable, I suspect adolescents' behavior could be easier

to measure objectively than attitudes, especially during ages in which attitudes are quite unstable and the value of a higher education is not clear yet. Third, the nature of financial literacy as a skill that stresses the practical side of decision-making may be more conducive to immediate behavioral changes, such as reduced delays or absences, as compared to shifts in attitudes.

In terms of time commitment to education, I document a larger effect size using IV versus OLS. Specifications relying on individual and regional-level IVs indicate that an increase of one financial literacy PL implies a reduction in school delays and school absences by 0.23 and 0.27 of a day per two-week period. Focusing on the latter variable – and considering that a school year has approximately 34 weeks – a coefficient of 0.27 converted in annual terms implies that an increase of one financial literacy PL leads to a decrease of 4.59 days lost per year.[23] Also, an increase of one PL is associated with about one to three additional hours per week spent on out-of-school study time, which translates into 34 to 102 additional hours per year, a substantial human capital gain. This study further adds to the debate over the relative size of OLS vs IV estimates in financial literacy studies. In this respect, my finding that OLS coefficients on financial literacy are biased downward aligns with Behrman et al. (2012) and Lusardi and Mitchell (2014). Previous research has shown that measurement error in financial literacy is substantial, which would explain the far higher IV estimates. Another explanation may be related to instrument validity. Further research should pick up on these important points.

More broadly, this research highlights the role of financial literacy as a driver of human capital accumulation. By departing from other skills in its deeper focus on decision-making, the value of time, the role of incentives and rewards, and the importance of savings, I show that financial literacy affects the extent to which students view schooling as a worthwhile investment by curtailing wasted human capital. Although the data do not permit to further investigate the precise mechanisms whereby this effect is produced, I suspect that financial literacy shapes students' perception of the intrinsic value of education by raising their awareness of the short-term financial and non-financial costs that education entails, as well as the long-term monetary and non-monetary returns that it yields. Being successful in education – regardless of how success is measured (performing well in the end-of-high-school exam, getting into a good college, getting a job, etc.) – requires putting in effort. Individuals' choice of effort in turn involves an intertemporal trade-off, as effort costs of studying an additional hour are incurred immediately, while the benefits materialize in the future (Non and Tempelaar 2016). This study suggests that students with lower financial literacy might be less able to understand this trade-off, thereby exerting less effort and showing less motivation. This finding is of particular relevance to academics and policy-makers concerned with boosting human capital accumulation during the teenage years. Additionally, drawing on the wealth of research on financial literacy and adult outcomes documented above, one might expect positive spillover effects on later-life outcomes such as the choice of occupation, wealth, earnings, savings, stock-market participation, and retirement preparedness.

Policy implications are clear. In the case of Italian youth, the highest priority is in the Southern regions. Devising effective strategies to boost financial knowledge of students in the South would allow the national average to get closer to the OECD one. On a broader scale, governments could strengthen financial education interventions by complementing students' academic training. Including a course with economic or finance-related content in school curricula could be an effective strategy, exposing students to structured sequences providing them with the tools needed to make better financial decisions.

Notes

1. As high school education in Italy is mostly public (hence, free) the opportunity cost argument is likely to prevail in this context. Yet, there is reason to believe that individuals with higher financial literacy are more forward-looking, hence also more likely to anticipate the financial costs that college entails.

2. Thirteen are OECD members: Australia, the Flemish Community of Belgium, the Czech Republic, Estonia, France, Israel, Italy, New Zealand, Poland, the Slovak Republic, Slovenia, Spain, and the United States; five are partner countries and economies: Colombia, Croatia, Latvia, the Russian Federation, and Shanghai-China (Table A1 in Appendix A). Also, note that the OECD recently released the PISA 2015 assessment, which again includes a financial literacy module. The 2015 assessment covers 15 countries and economies: Australia, the Flemish Community of Belgium, seven provinces in Canada, Chile, Italy, the Netherlands, Poland, the Slovak Republic, Spain and the United States, Brazil, four provinces in China, Lithuania, Peru and the Russian Federation. As PISA is a cross-sectional snapshot of the 15-year-old student population, students surveyed in PISA 2015 differ from those surveyed in PISA 2012, hence there is little benefit in using both waves together. Yet a similar analysis as the one conducted in this paper could be replicated on the 2015 PISA round.
3. The sample is representative at the national and regional level. Refer to the data section for an accurate description of the sampling procedure.
4. Bottazzi and Lusardi (2016), Christelis, Georgarakos, and Lusardi (2016), and Gramatki (2017) stand out as notable exceptions.
5. There has been, however, an increasing number of 'external' initiatives promoted by institutions such as the Bank of Italy or consortia such as Patti Chiari.
6. Self-productivity refers to the property whereby the skills produced at one stage augment the skills attained at later stages. Dynamic complementarity entails that skills produced at one stage raise the productivity of investment at subsequent stages. Together, self-productivity and dynamic complementarity produce skill multiplier effects, which are the mechanisms through which skills beget skills and abilities beget abilities (Cunha and Heckman 2007).
7. Findings from these data were officially released on July 9, 2014.
8. A minimum response rate of 85% is required for the schools initially selected. PISA 2012 also requires a minimum participation rate of 80% of students within participating schools, to be met at the national level.
9. For additional details please refer to: OECD (2014b). *PISA 2012 Technical Report*, Paris, OECD Publishing.
10. Although these are potentially good sources of exogenous variation in financial literacy, they suffer from several limitations. First, even if the school took part in a financial education program, there is no way to assess whether the single student benefited from it. Second, questions on the availability of financial education and questions on financial literacy use different 'reference points' (students in the school vs students in the national modal grade for 15 year olds), making it tricky to relate them. Third, there are serious inconsistencies in the answers, likely reflecting a poor understanding of the questions. To address these shortcomings, the OECD team developed higher-quality financial education questions to be included in the 2015 PISA round.
11. I also constructed the index using principal component analysis (pca) and extracting the first principal component. The correlation between the index constructed as a row mean and the index constructed through pca is 0.99, hence in the analysis I rely on the former for ease of interpretation. Results using the latter are available upon request.
12. This analytical choice builds on a deeper discussion on the returns to education in Italy. For instance, Checchi (2000) estimated the returns to different types of high schools, showing that completing a generalist/academic secondary school without going on with university enrolment yields a lower return (5%) than that arising from attending a professional or vocational school (6%). However, if a student decides to proceed to university, the yearly rate of return rises significantly, from 7.3% to 13.9% according to the chosen field.
13. The OECD makes the single item responses publicly available but not the text of the questions.
14. Studies relying on PISA data usually divide the raw score by 100 – the OECD standard deviation. As this study is country-specific, I choose to interpret the associations in terms of PL, i.e., dividing the financial literacy score by 75.
15. As it is common with item response scaling models, student proficiencies are not observed; they are missing data that must be inferred from the observed item responses. PISA uses the imputation methodology usually referred to as plausible values (PVs) to make this inference and produce consistent estimators of population parameters. PVs are imputed values that resemble individual test scores and have approximately the same distribution as the latent trait being measured. PVs represent random draws from an empirically derived distribution of proficiency values that are conditional on the observed values of the assessment items, plus the background variables.
16. Stata packages have been developed to handle the PISA two-stage stratified sample design, the use of replicates, and the plausible values for the test scores. Repest and pisatools are some examples. Replication weights based on the variables w_fstr1-w_fstr80 provided in PISA 2012.
17. In Italy about 62% (compared to the OECD average of 75%) of the financial literacy score reflects some skills also measured in math or reading assessments, while 38% (compared to the OECD average of 25%) of the score indicates factors measured only from the financial literacy assessment.
18. This variable is built by the author using the International Standard Classification of Occupations 2008 (ISCO-08) developed by the International Labour Organization (ILO). http://www.ilo.org/public/english/bureau/stat/isco/.
19. Note that these tests are conditional on one instrument being exogenous, which cannot be directly tested.
20. The full output with four specifications per outcome can be found in Table A7 (Appendix).

21. Substituting with dichotomous variables measuring the probability of being late for school or skipping at least one whole day over the previous two weeks (Table A5 in the Appendix), the interpretation of these effects suggests that an increase in one FL PL is associated with a reduction in the probability of being late for school and skipping one whole day by 15.5 and 21 percentage points, respectively (column 3).
22. This correlation holds up to a certain hour threshold. Cooper, Robinson, and Patall (2006) claimed that for high school students, achievement continued to improve with more homework until assignments lasted around two and two and a half hours per afternoon.
23. Remember that this is likely an underestimate due to the way the variable is used as cardinal.

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