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Abstract

Using data from the 2012 Programme for International Students 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. We 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. We complement OLS estimates with an instrumental variable (IV) approach to recover a plausibly causal effect of financial literacy on the school outcomes of interest, namely (a) truancy and time spent on homework outside of school (*time commitment to education*), and (b) attitudes towards school (*attitudes*). Results 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. We see this finding as consistent with the idea that adolescents' behavior is easier to measure objectively and reliably than attitudes.

JEL Classification: A21, D10, I22, I23

Keywords: Financial literacy, schooling, truancy, attitudes, youth, Italy

I. Introduction

Financial illiteracy among the youth is widespread (Chen and Volpe 1998; Mandell 2008; Johnson and Sherraden 2007; Lusardi, Mitchell, and Curto 2010; Lusardi 2015a), 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 (Xiao et al. 2014; Lusardi and Tufano 2015; Brown et al. 2016). 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 (Xu and Zia 2012; Fernandes, Lynch Jr., and Netemeyer 2014). In this study we 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; Lusardi, Mitchell, and Curto 2010; Mahdavi and Horton 2014; Grohmann, Kouwenberg, and Menkhoff 2015) 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 we 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? We posit that students with higher financial literacy might be more aware of the financial and non-financial (psychological and opportunity) costs that education entails,¹ as well as the monetary and non-monetary (e.g. occupational prestige) returns that it yields. As no variable perfectly captures the value that students attribute to schooling, in this analysis we rely 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, we examine whether financial literacy affects: i) the chance that students skip school days or classes; ii) the amount of time students devote to homework outside of school; and iii) students’ attitudes towards school.

The goal of evaluating 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 financial literacy module has been administered to students in 18 OECD

¹ As public high school education in Italy is mostly free, the opportunity cost argument is likely to prevail in this specific context. Yet we suspect individuals with higher financial literacy will be more forward-looking, hence more likely to anticipate the financial costs that college will entail.

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.³ 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.⁴

This paper makes three important contributions. First, we 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, we provide a systematic description of regional differences in financial literacy which offers a quite novel focus within the Italian context. Second, we 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 (OECD 2012a; Lusardi 2015a). Despite its cross-sectional nature, this database has great potential and is still largely unexplored in financial literacy research.⁵ Third, drawing on different data sources, we propose a set of novel and plausibly exogenous instrumental variables to control for omitted variable bias, reverse causation, 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, we observe 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 in one proficiency level⁶ is associated with one to two more hours per week spent on out-of-school study time. Conversely, there is no robust

² Thirteen are members of the OECD: 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).

³ Refer to the data section for an accurate description of the sampling procedure.

⁴ The sample is representative at the national and regional level.

⁵ Bottazzi and Lusardi (2016) and Christelis, Georgarakos, and Lusardi (2016) stand out as notable exceptions.

⁶ An increase of one proficiency level corresponds to a 75-unit increase on a 0-1000 score scale. See section 3 for further details.

evidence that financial literacy shapes attitudes towards school, suggesting that young adolescents' behavior might be easier to measure objectively than attitudes.

Our findings have wide ranging implications for educational policy. Demonstrating that financial literacy increases 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 including financial literacy in school curricula.

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.

II. 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 society as a whole (Lusardi and Mitchell 2014; Lusardi 2015b). 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 the field.

a. 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 (Jappelli and Padula 2013; Behrman et al. 2012; Fort, Manaresi, and Trucchi 2016; van Rooij, Lusardi, and Alessie 2012), debt load (Huston 2012; Lusardi and Tufano 2015), retirement planning (Lusardi and Mitchell 2007; Alessie, van Rooij, and Lusardi 2011; Almenberg and Söderbergh 2011; Fornero and Monticone 2011; Lusardi and Mitchell 2011; Sekita 2011; van Rooij, Lusardi, and Alessie 2012; Agnew, Bateman, and Thorp 2013), and stock market participation (van Rooij, Lusardi, and Alessie 2011; Arrondel, Debbich, and Savignac 2012; Xia, Wang, and Li 2014; Arrondel, Debbich, and Savignac 2015). In this study we explore the importance of focusing on financial literacy research for earlier-life outcomes, endorsing the idea that financial literacy originates early in life in the context of the family (Hastings, Madrian, and Skimmyhorn 2013; Grohmann, Kouwenberg, and Menkhoff 2015) 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).⁷ 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

⁷ 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).

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 (Shim et al. 2010; Jorgensen and Savla 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.

b. Financial literacy in schools

Research on financial literacy in schools has taken two main directions. The first is mainly descriptive, focusing on assessing 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 2008; 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 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 school 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 therefore provides a unique opportunity to expand scholarly knowledge on the interplay between financial literacy skills and school-related outcomes such as student performance, effort, and motivation. No studies have yet drawn on these data to address questions of this kind.

c. Dealing with endogeneity in financial literacy research

In recent years, an increasing number of scholars has started to address the potential endogeneity of financial literacy by means of instrumental variables (IV) or generalized method of moments (GMM) techniques more broadly. To provide a background for what follows, we briefly review some of the studies

that were most successful in handling these methodological concerns. We 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 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, 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 tended 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 Urzi 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 some disagreement among scholars on the effect size of IV estimates as compared to simple Ordinary Least Squares (OLS). 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 Urzi 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 Jr., 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.

III. Data and Methodology

a. Sample

In what follows we 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.⁸ 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.⁹ In the second stage, students were sampled within schools.¹⁰ 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

⁸ Findings about these data were officially released on July 9, 2014.

⁹ A minimum response rate of 85 per cent is required for the schools initially selected.

¹⁰ PISA 2012 also requires a minimum participation rate of 80 per cent of students within participating schools, to be met at the national level.

module.¹¹ 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 age 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.¹² 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, Appendix A), 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 (1,158) and the highest number of students within schools (7,068), providing a substantial sample size for analysis. Third, and related to the above, the dataset

¹¹ For additional details please refer to: OECD (2014b), *PISA 2012 Technical Report*, OECD Publishing, Paris.

¹² Although these might be 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 is in the process of developing higher-quality financial education questions.

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.

b. Measures

Table 1 summarizes the school outcomes chosen for 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, time spent on out-of-school study time, and attitudes towards school. We presume that students who skip classes or school days frequently, think school is a waste of time, and devote little time to homework, would be more likely to perceive schooling as a worthless investment.¹³ Our analysis investigates the relationship between financial literacy and each outcome separately. We attempted to combine truancy measures and attitudes into factors, yet any factor analysis suggests a degree of reliability (Cronbach's alpha) less than 0.7 - the conventionally accepted threshold for factors. We take this evidence as suggestive that each selected variable captures a different underlying construct.¹⁴

[Table 1 about here]

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).

¹³ Holding other factors constant, such as parental influences.

¹⁴ Simple correlations (Table A2 in Appendix A) align with this idea.

The PISA test design permits to construct a single scale of proficiency, drawing on all the questions in the financial literacy assessment.¹⁵ 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, 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.¹⁶ Each proficiency level represents 75 score points, i.e. there are 75 points between the top of one level and the top of the next.¹⁷ A difference in performance of one proficiency level therefore represents a significant gap in financial literacy performance (OECD 2014a). Proficiency levels allow researchers to investigate differences in financial literacy not only across countries but also within countries (Lusardi 2015a).

[Table 2 about here]

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.¹⁸ The five plausible values need to be accounted for in the estimation process in order to avoid problems associated with biases and inefficiency (OECD 2014b). To account for these properties, the PISA database provides 80 replicates of individual weightings, which allow for efficient

¹⁵ The OECD makes the single item responses publicly available but not the text of the questions.

¹⁶ Students at each level are expected to be proficient at the preceding level, and to reach a particular proficiency level a student must correctly answer a majority of items at that level.

¹⁷ In the analysis that follows I divide the financial literacy score by 75 to interpret a one-unit increase in financial literacy as an increase in one proficiency level.

¹⁸ 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.

estimators. The use of replicates is necessary because of the way in which individuals are selected for the PISA sample.¹⁹

c. Methodological approach

As the PISA study is cross-sectional, the relationship between financial literacy and the outcomes of interest may suffer from reverse causation. In addition, these variables might be jointly determined by a third omitted factor such as unobserved ability, personality trait, 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. In order to deal with these concerns, this analysis complements ordinary least squares (OLS) estimates with an instrumental variable approach (IV). We first estimate the following OLS specification:

$$Y = X_1\beta_1 + FL\beta_2 + u_1$$

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 is our coefficient of interest.

For each outcome we 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. In Model 3 we add household-level controls such as family socio-economic status and a dummy for whether the student lives in a household with both parents. Socio-economic status 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 enrolment,

¹⁹ 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.

class size, and student-teacher ratio. All specifications account for regional dummies to control for region-specific heterogeneity.²⁰ Standard errors are clustered at the school level.

Building on the previous specification, we then attempt to account for the potential endogeneity of financial literacy by estimating the following model:

$$Y = X_1\beta_1 + FL\beta_2 + u_1$$

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

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 they 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).

We propose a series of regional and individual-level instruments separately, and evaluate whether a combination of them further improves the precision of the estimates. We construct regional-level instruments by complementing the PISA file with additional data sources. From the statistical database of the Bank of Italy and the Census of Banks (SIOTEC), we obtain data on the number of Italian banks, branches, and ATMs (per 1,000 inhabitants) per region in the years 2010, 2011 and 2012. From the Chamber of Commerce and the Italian Ministry of Justice, we obtain data on Italian youth enterprises and bankruptcies in 2012. From the Italian National Institute of Statistics (ISTAT), we gather information on the demographic composition of high schools in each region. From Accertamenti Diffusione Stampa (ADS), we obtain provincial-level data on newspaper circulation by region.²¹ Lastly, we merge historic data constructed by Bertocchi and Bozzano (2015) on the percentage of provinces per region whose main cities lay on medieval commercial routes or hosted a fair or a bank in the 13th and 14th centuries. This latter variable is included to test for the role of historical persistence. i.e. to explore the hypothesis that financial

²⁰ Regional dummies are omitted – by construction – whenever we use regional-level instruments.

²¹ PISA does not include province identifiers nor it is representative at the provincial level. Therefore any provincial-level data is aggregated at the regional level.

literacy today is higher in regions where more provinces were involved in commercial exchanges in the past (Bottazzi and Lusardi 2016).

Individual-level instruments are devised using PISA data aggregated at the school level, excluding the information pertaining to the student him/herself.²² We construct the percentage of a student's schoolmates who have at least one parent working in direct contact with money flows, the average educational expenditure among a student's schoolmates, the percentage of schoolmates who have a bank account or a prepaid debit-card, and the percentage of schoolmates who discuss money matters with their parents at least once per week.

We acknowledge that some of these variables could still affect the dependent variable directly, so we use Hansen's J test of over-identifying restrictions to determine which instruments appear truly independent of the second-stage disturbance term. We conclude that the Hansen J statistic does have power in identifying problematic candidate instruments and use only the variables that survive tests for both instrument strength (i.e. relevance) and exogeneity (i.e. validity). Specifically, we carry out the empirical analysis relying on a combination of three regional-level instruments (Table 3) – the share of circulating newspapers with finance-related content in 2012,²³ the growth of ATM branches between 2010 and 2012, and the number of bankruptcies in 2012 – and one individual-level instrument – the percentage of a student's schoolmates with at least one parent working in direct contact with money flows.²⁴

[Table 3 about here]

The validity of the regional-level instruments rests on the assumption that these variables should correlate well with students' financial literacy without affecting the school outcomes directly or indirectly through unobserved factors. Our 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 we view this

²² No class-level identifier is included in PISA.

²³ This is constructed as the volume of released newspapers with finance-related content (namely *ilSole24ore* newspaper) over the volume of all newspapers released in 2012.

²⁴ 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/>

variable as less driven by demand-side factors that correlate with household-level socio-economic considerations and more likely to exogenously capture exposure to financial information and/or to peers (either other family members, schoolmates, or neighbors) with higher financial knowledge. Several other studies have shown that individuals learn about financial matters from peers (Duflo and Saez 2003; Hong, Kubik, and Stein 2004; Brown et al. 2008). By similar reasoning, we 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.²⁵

As for the validity of the individual-level instrument, we draw on prior literature (van Rooij, Lusardi, and Alessie 2011; Klapper, Lusardi, and Panos 2013) 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. We hence posit that a higher share of schoolmates with parents working in direct contact with money 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 we account for all types of occupations that require recurrent money exchanges, i.e. from bank managers to grocery store cashiers.²⁶

IV. Descriptive statistics

a. Dependent variables

²⁵ F-tests for first stage are reported in Table A3 (Appendix).

²⁶ The percentage of the respondent's schoolmates who have a bank account and the percentage of the respondent's schoolmates who discuss with parents about money matters at least once per week do satisfy the relevance requirement (F=35.59 and F=13.16, respectively). Yet the first question was asked only to half of the students, and the second to the other half. When combined with the fact that some of the outcomes were also not asked to some groups of students, the sample size loss is significant. Anyway, findings using these variables as instruments are unchanged - and available upon request.

Table 4 reports descriptive statistics on the school outcomes of interest. Despite their inherent nature as categorical variables, we take truancy and attitudes towards school as continuous variables, with values ranging from 0 to 3, defined as in Table 1. Questions pertaining to time spent on activities and attitudes towards school were only asked to two-thirds of the students, so the table has fewer observations for some of the outcomes.²⁷ Variables on attitudes have been renamed and recoded consistently to ensure that higher ordinal values are associated with more positive attitudes towards school. Descriptive statistics reveal that Italian high school students skip a whole school day on average one day every two weeks, and they get to school late or skip classes at a similar – yet somewhat lower – frequency.²⁸ Moreover, students spend a little less than nine hours per week on homework and, despite considerable variability, the majority of them agree with the proposition that schooling is a worthwhile investment.

[Table 4 about here]

b. School characteristics

Table 5 describes the nature and characteristics of the 1,158 schools sampled for the PISA financial literacy assessment, by geographic region. Around 50 schools per region were sampled, with an average of 350 students.²⁹ Although the OECD planned to administer eight financial literacy questionnaires per sampled school, our table shows that on average six to seven students were actually interviewed. The percentage of private schools is below 10 per cent in almost every region, 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 level or location, as it does in some

²⁷ 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, while questions on attitudes towards school were not asked in questionnaire A. Even though these are not technically missing data (they are coded as N/A, i.e. not available), in the Appendix (Table A4) we verify that these “missing” students do not systematically differ in terms of socio-demographic characteristics. We find no systematic differences in terms of age, gender, grade, and socio-economic status. Yet we document statistically significant differences in the financial literacy score. Students missing on the dependent variable tend to have on average a lower financial literacy score, a finding to keep in mind when interpreting results.

²⁸ Due to the way the variable is coded, this is an approximate assessment.

²⁹ 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).

countries such as the United States (Bottazzi and Lusardi 2016). Public schools are not considered to be 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 about here]

c. Financial literacy

Italy's performance in financial literacy is second to last when considering all countries and economies participating in the 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 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 proficiency level. 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 far behind. Results show a clear regional patterning of financial knowledge whereby students in the North-East and North-West score above the country-level average (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 of 466 points. 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).

[Figures 1 and 2 about here]

Figure 2 provides a breakdown of the share of Italian students who fall within each financial literacy proficiency level, by region. Two findings are particularly striking. First, more than 20 per cent 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 per cent in Calabria. This high share of low-performers is alarming since some of these students cannot even complete some of the simplest 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).

V. Multivariate results

Table 6 provides results from an OLS specification of the school outcomes of interest on financial literacy, accounting for individual (model 2), household (model 3), and school-level (model 4) controls progressively. Panel (a) focuses on pupil *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 school attitudes. Coefficients are strongly statistically significant and robust to the inclusion of individual, household, and school-level controls. Accounting for controls marginally affects the significance of the estimates, though it does reduce the magnitude of the financial literacy coefficients by a fifth to half.

[Table 6 about here]

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 agree that schooling is a beneficial investment that will help them be more prepared for college and adult life more broadly. 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. 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, there is no evidence of a clear SES-gradient in students' perceived value of schooling, while family stability and parental involvement – as proxied by an indicator for whether the student lives in a family with two parents – emerge as clearer drivers of students' time commitment to education. In terms of school characteristics, students in private schools are less likely to 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 associated with higher truancy and more negative attitudes towards school, in line with the idea that students who sort into vocational education value working more than schooling and report a higher discount rate.

The positive association between financial literacy and students' perceived value of schooling is consistent across outcomes. The only exception to this trend is in the “get a job” question, which suggests that more financially literate students tend to disagree with the idea that trying hard at school will help them get a good job.³⁰ We suspect students might have interpreted the idea of getting a job as a short-term substitute for college education, instead of a life stage that can occur after college and build upon prior human capital investments. This hypothesis is consistent with both the positive financial literacy coefficient observed in the “prepare for college” question, and the positive association between vocational education and “get a job”, which departs from the overall trends discussed above. By suggesting that students in vocational education agree with the claim that trying hard at school will help them get a good job – though not get into a good college – we have yet another indication that students may not have understood the meaning of the question. We remain confident that this exception does not invalidate our main conclusions.

[Table 7 about here]

³⁰ In the full specification (model 4), the financial literacy coefficient is only significant at the 10 per cent level.

Table 7 assesses the robustness of the findings reported in Table 6 by addressing potential endogeneity concerns. We report the financial literacy coefficient from a full specification accounting for individual, household, and school-level controls.³¹ Column (1) reports the financial literacy coefficient from an OLS specification, as per model 4 in Table 6. Columns (2), (3) and (4) report the same coefficient from an IV specification where financial literacy is instrumented through regional-level, individual-level, and a combination of both regional and individual-level variables. Results 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 aligned in terms of sign, magnitude, and statistical significance, regardless of the type of instrumental variable used. Third, even the most conservative IV estimate is three to four times larger in magnitude as compared to its OLS counterpart, suggesting that OLS results underestimate the magnitude and significance of financial literacy as a determinant of school-related outcomes.³²

Estimates of the relationship between financial literacy and students' time commitment to education indicate that an increase of one proficiency level in financial literacy reduces the number of times students are late for school and skip school days by 0.18 and 0.16, respectively (column 3), a close-to-fourfold reduction as compared to the OLS estimates.³³ As students get to school late and skip a whole school day roughly one day every two weeks, this effect size implies a reduction in truancy by 18 and 16.4 per cent per two-week period, respectively. Moreover, an increase in one proficiency level is associated with one to two more hours per week spent on out-of-school study time, a small yet non-negligible gain. Scholars have shown that time spent on homework has positive impacts on the educational trajectories of children as they

³¹ According to Table 6, this is the most conservative specification. The full output with four specifications per outcome can be found in Table A5 (Appendix A).

³² The attenuation bias due to measurement error in financial literacy also drives estimates towards zero. Measurement error in financial literacy may be substantial because respondents may guess the answer at random or they may misunderstand the question.

³³ We are aware of the complexity of interpreting changes on a 0 to 3 continuous scale where each level does not correspond to an exact number of times a student skipped school or classes (Table 1), yet this parameterization makes the estimation strategy and the application of the sampling design through in-built Stata commands more straightforward. Substituting with dichotomous variables measuring the probability of being late for school or skipping one whole day at least once over the previous two weeks, the interpretation of these effects suggest that an increase in one FL proficiency level is associated with a reduction in the probability of being late for school by 11.4 per cent and a reduction in the probability of skipping one whole day by 12 per cent.

grow older (Eren and Henderson 2008; 2011). Specifically, 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).³⁴ Drawing in turn on the large body of research relating academic achievement and subsequent wages (Currie and Thomas 1999; French et al. 2015), we suspect high school financial literacy might have powerful indirect effects on individual wages later in life.

By contrast, the relationship between financial literacy and attitudes towards school fades once we control for endogeneity, providing no evidence of a direct causal effect of the former. The effect size does not statistically differ from zero across all outcomes and all specifications, hence increasing confidence in the validity of the chosen instruments.

VI. Discussion

In this study we 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 on schooling. Our analysis posits that financial literacy may play 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, we use measures of time commitment to education and attitudes towards school. Our results suggest that higher financial literacy increases students' perceived value of schooling by boosting their time commitment to education. Yet we 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

³⁴ 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 2 and 2 and a half hours a night.

(Ajzen 1991; Armitage and Conner 2001). We 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, as somewhat evidenced by the "get a job" question discussed above. Second, even if these measures are reliable, we 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, we document a larger effect size using IV versus OLS. Our most conservative IV specifications indicate that an increase in one financial literacy proficiency level implies a reduction in school delays and school absences by 18 and 16.4 per cent, respectively, over a two-week period. Also, an increase in one proficiency level is associated with one to two additional hours per week spent on out-of-school study time. When converted to annual terms,³⁵ a one to two hour per week increase in time devoted to homework translates into 34 to 68 more hours per year, a substantial human capital advantage. This study further adds to the debate over the relative size of OLS vs IV estimates in financial literacy studies. In this respect, our finding that OLS coefficients on financial literacy are biased downward due to omitted variable bias and measurement error in financial literacy aligns with Behrman et al. (2012) and Lusardi and Mitchell (2014).

More broadly, this research highlights the role of financial literacy as a driver of human capital accumulation. By departing from math and reading skills in its deeper focus on decision-making, the value of time, the role of incentives and rewards, and the importance of savings,³⁶ we show that financial literacy

³⁵ A school year has approximately 34 weeks.

³⁶ Math and reading skills are indeed correlated with financial literacy, yet it is important to highlight that financial literacy retains a different character, to the extent that a high level of competence in the former two disciplines does not necessarily translate into a high level of financial literacy. Also, Italy is one of the countries in which variation in financial literacy is least explained by variation in math skills (OECD 2014a). 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.

affects the extent to which students view schooling as a worthwhile investment by curtailing wasted human capital. Although the data do not allow us to further investigate the precise mechanisms whereby this effect is produced, we 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. This finding is of particular relevance to academics and policy-makers concerned with boosting human capital accumulation during the teenage years. Additionally, one might expect positive spillover effects on other 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 can 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.

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Tables and Figures

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

Variable	Wording	Coding
<i>a. Time commitment to education</i>		
Truancy		
Late for school	In the last two full weeks of school, how many times did you arrive late for school?	0: None
Skip whole day	In the last two full weeks of school, how many times did you skip a whole school day?	1: One or twice
Skip classes	In the last two full weeks of school, how many times did you skip some classes?	2: Three or four times
		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
<i>b. Attitudes*</i>		
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	2: Disagree
Get a job	Trying hard at school will help me get a good job	3: Agree
Prepare for college	Trying hard at school will help me get into a good	4: Strongly agree

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

* Variables have been recoded such that higher ordinal values are associated with more positive attitudes towards school.

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

Proficiency level 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.

Note: 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 1,000.

Source: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table 3: Regional-level instruments 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
Abruzzo	0.0119	-0.020	281
Basilicata	0.015	0.008	55
Calabria	0.0162	-0.025	285
Campania	0.0117	-0.005	950
Emilia-Romagna	0.0139	-0.021	950
Friuli	0.0118	-0.015	253
Lazio	0.0163	-0.009	1,252
Liguria	0.0328	-0.013	257
Lombardia	0.0215	-0.015	2,613
Marche	0.0142	-0.033	417
Molise	0.0115	0.000	42
Piemonte	0.0128	-0.006	881
Puglia	0.0116	-0.008	497
Sardegna	0.0438	0.001	242
Sicilia	0.0106	-0.037	610
Toscana	0.0121	-0.002	786
Trentino-Alto Adige	0.0171	-0.003	137
Umbria	0.0149	0.019	210
Valle d'Aosta	0.0166	0.021	17
Veneto	0.0130	-0.010	1,021
Average	0.0164	-0.009	589

Note : Author's calculations from raw data, available upon request

Sources: Accertamenti diffusione stampa (ADS); Bank of Italy; Italian Ministry of Justice

Table 4: Descriptive statistics for dependent variables of interest

Outcomes	N	Mean	(SD)	Min	Max
<i>a. Time commitment to education</i>					
Truancy					
Late for school	7,029	0.50	(0.77)	0	3
Skip whole day	7,026	0.59	(0.69)	0	3
Skip classes	7,019	0.43	(0.66)	0	3
Time spent on activities*					
Homework out of school	4,547	8.75	(7.09)	0	30
<i>b. Attitudes</i>					
Attitudes towards school*					
Prepare for life	4,612	2.76	(0.81)	1	4
Valuable time	4,620	3.17	(0.75)	1	4
Get a job	4,607	3.32	(0.69)	1	4
Prepare for college	4,596	3.24	(0.73)	1	4

Note : Stratified two-stage sample design and replicate weights accounted for

* Time spent on activities not asked in questionnaire B; attitudes not asked in questionnaire A

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

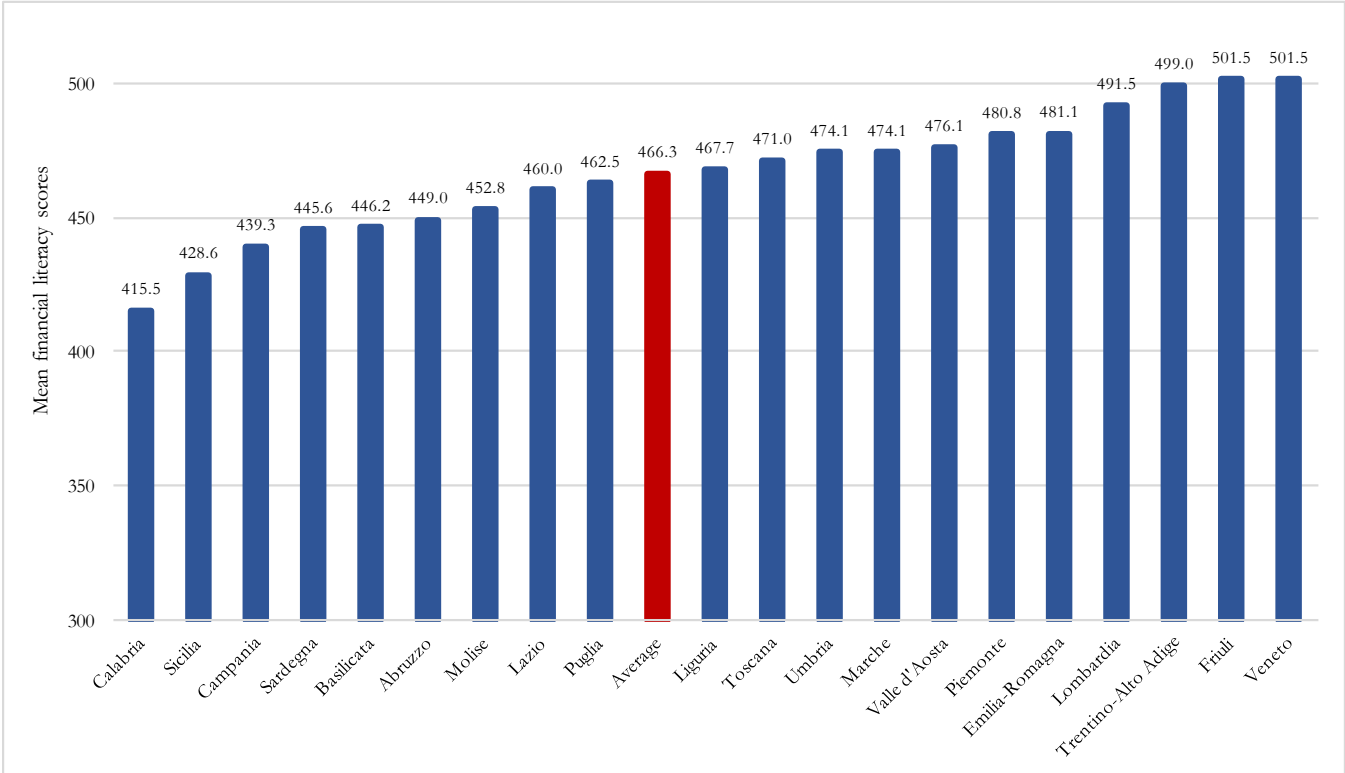
Table 5: Descriptive statistics on sample of schools and students, by region

Region	# of schools	# of students	Vocational orientation (%)	Private (%)	# students per school interviewed	Average school size	Average class size	Student-teacher ratio
<i>North-West</i>								
Liguria	58	331	43.2%	7.8%	6.5 (1.85)	654.0 (344.57)	23.1 (3.68)	10.0 (3.50)
Lombardia	54	347	49.6%	8.5%	6.9 (1.67)	879.9 (441.78)	28.3 (11.84)	10.7 (3.51)
Piemonte	51	339	57.0%	9.9%	7.1 (1.29)	664.4 (382.53)	26.6 (10.91)	9.7 (2.42)
Valle d'Aosta	30	178	46.0%	13.0%	9.1 (4.35)	360.4 (302.61)	22.4 (10.39)	7.7 (3.04)
<i>North-East</i>								
Emilia-Romagna	54	331	59.4%	4.8%	6.8 (1.67)	741.5 (404.48)	26.2 (9.46)	10.0 (3.39)
Friuli	53	330	49.6%	8.0%	6.8 (1.63)	786.1 (555.99)	22.8 (7.59)	10.2 (3.36)
Trentino-Alto Adige	136	794	59.9%	13.1%	6.9 (1.47)	577.0 (376.76)	24.9 (10.83)	8.2 (3.85)
Veneto	70	455	55.0%	12.9%	7.1 (1.61)	786.2 (442.38)	25.1 (7.57)	11.6 (3.91)
<i>Center</i>								
Lazio	54	340	41.6%	4.2%	6.7 (1.54)	764.5 (390.31)	24.4 (7.18)	10.5 (3.26)
Marche	53	336	52.6%	0.0%	7.0 (1.76)	738.0 (309.82)	24.6 (5.88)	10.0 (2.45)
Toscana	54	320	55.4%	2.8%	6.5 (1.54)	708.0 (425.96)	23.4 (3.49)	9.5 (2.93)
Umbria	53	325	45.1%	0.7%	6.7 (1.69)	654.5 (315.55)	24.3 (6.64)	10.0 (2.81)
<i>South</i>								
Abruzzo	53	336	42.0%	2.6%	6.8 (1.47)	718.8 (406.91)	24.8 (7.24)	9.3 (3.26)
Basilicata	56	351	52.7%	0.4%	6.7 (1.59)	496.9 (328.85)	22.6 (5.19)	9.7 (3.34)
Calabria	58	354	46.1%	0.7%	6.6 (1.92)	673.1 (367.04)	24.0 (8.53)	8.9 (3.54)
Campania	53	347	44.3%	4.0%	7.0 (1.51)	852.5 (362.69)	26.1 (8.36)	10.8 (3.20)
Molise	48	254	46.6%	0.0%	6.8 (1.57)	495.3 (251.86)	27.6 (11.72)	8.83 (2.7)
Puglia	56	365	47.4%	0.2%	7.1 (1.34)	761.7 (363.18)	28.8 (10.87)	11.4 (3.96)
<i>Islands</i>								
Sardegna	58	307	45.7%	1.1%	6.0 (1.88)	560.1 (333.59)	23.1 (7.48)	9.7 (2.76)
Sicilia	56	328	42.5%	0.5%	6.4 (1.6)	793.6 (472.22)	25.1 (9.22)	9.9 (2.56)
Total	1,158	7,068	49.1%	5.2%	6.8 (1.62)	762.6 (413.64)	25.8 (9.23)	10.4 (3.38)

Note : Stratified two-stage sample design and replicate weights accounted for. Standard deviation in parentheses.

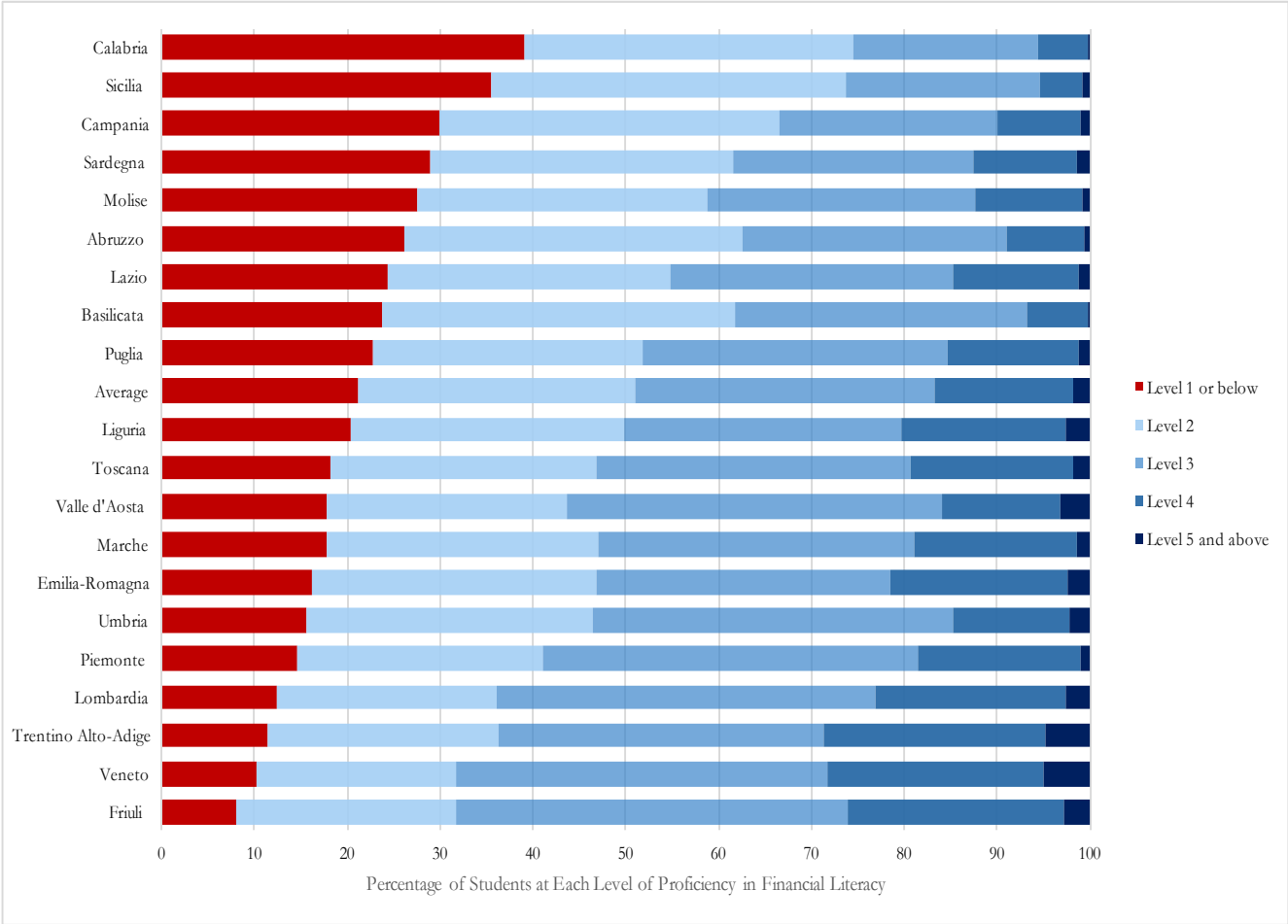
Source : Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

Figure 1: Descriptive statistics on financial literacy competence, by region



Source: Author’s computations from the OECD PISA 2012 Financial Literacy (FL) database

Figure 2: Share of students at each proficiency level on the financial literacy scale, by region



Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

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

<i>a. Time commitment to education</i>	Truancy												Time spent on activities			
	Late for school				Skip whole day				Skip classes				Homework out of school			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial literacy	-0.074*** (0.013)	-0.064*** (0.014)	-0.066*** (0.015)	-0.047*** (0.016)	-0.081*** (0.010)	-0.062*** (0.011)	-0.055*** (0.012)	-0.044*** (0.014)	-0.048*** (0.009)	-0.044*** (0.010)	-0.048*** (0.010)	-0.036*** (0.011)	2.141*** (0.128)	2.109*** (0.137)	1.862*** (0.147)	1.304*** (0.168)
<i>Child characteristics</i>																
Female (Ref. Male)		-0.067** (0.027)	-0.073** (0.029)	-0.052* (0.030)		-0.037* (0.022)	-0.052** (0.021)	-0.027 (0.023)		-0.103*** (0.025)	-0.107*** (0.025)	-0.091*** (0.028)		3.075*** (0.268)	3.256*** (0.274)	2.591*** (0.294)
Age		-0.015 (0.051)	-0.004 (0.049)	-0.013 (0.047)		0.049 (0.037)	0.038 (0.038)	0.040 (0.036)		-0.004 (0.031)	-0.003 (0.030)	-0.015 (0.032)		-0.499 (0.535)	-0.276 (0.514)	-0.413 (0.533)
Grade		-0.067** (0.030)	-0.055* (0.031)	-0.067** (0.033)		-0.117*** (0.032)	-0.089*** (0.032)	-0.092*** (0.035)		-0.034 (0.030)	-0.032 (0.031)	-0.038 (0.034)		0.650** (0.254)	0.318 (0.259)	0.535** (0.266)
<i>Household characteristics</i>																
ESCS Index			0.008 (0.014)	0.018 (0.016)			-0.033*** (0.012)	-0.007 (0.015)			0.025* (0.013)	0.029** (0.014)			1.209*** (0.155)	0.757*** (0.181)
Two-parent family (Ref. Other)			-0.151*** (0.056)	-0.141** (0.061)			-0.146*** (0.041)	-0.162*** (0.044)			-0.058* (0.035)	-0.066 (0.042)			0.866** (0.418)	0.365 (0.406)
<i>School characteristics</i>																
Private school (Ref. Public)				-0.120* (0.066)				-0.180*** (0.061)				-0.056 (0.061)				-0.477 (0.783)
Vocational (Ref. General)				0.066** (0.032)				0.112*** (0.032)				0.056* (0.030)				-3.144*** (0.306)
Class size				-0.001 (0.002)				-0.002* (0.001)				0.000 (0.001)				-0.003 (0.012)
Total school enrolment				-0.000** (0.000)				-0.000* (0.000)				-0.000 (0.000)				0.000 (0.000)
Student-Teacher ratio				-0.000 (0.005)				-0.001 (0.004)				0.005 (0.004)				0.181*** (0.046)
Constant	0.869*** (0.092)	1.067 (0.821)	1.068 (0.798)	1.089 (0.753)	1.072*** (0.078)	0.203 (0.615)	0.469 (0.634)	0.404 (0.587)	0.665*** (0.072)	0.757 (0.489)	0.827* (0.484)	0.892* (0.527)	-2.749*** (0.923)	3.745 (8.520)	0.955 (8.174)	7.105 (8.542)
Observations	7,029	7,029	6,756	5,957	7,026	7,026	6,754	5,956	7,019	7,019	6,750	5,952	4,547	4,547	4,374	3,854
R-squared	0.031	0.036	0.039	0.042	0.041	0.049	0.054	0.071	0.011	0.018	0.02	0.021	0.13	0.18	0.208	0.27

Note : Stratified two-stage sample design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). Regional dummies included. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database.

<i>b. Attitudes</i>	Attitudes towards school															
	Prepare for life				Valuable time				Get a job				Prepare for college			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial literacy	0.102*** (0.018)	0.114*** (0.021)	0.112*** (0.021)	0.105*** (0.022)	0.144*** (0.015)	0.146*** (0.016)	0.133*** (0.018)	0.119*** (0.019)	-0.038*** (0.012)	-0.039*** (0.014)	-0.039*** (0.015)	-0.027* (0.016)	0.100*** (0.015)	0.081*** (0.016)	0.071*** (0.015)	0.040** (0.017)
<i>Child characteristics</i>																
Female (Ref. Male)		0.208*** (0.039)	0.193*** (0.040)	0.176*** (0.042)		0.324*** (0.031)	0.313*** (0.031)	0.286*** (0.034)		0.069** (0.031)	0.074** (0.032)	0.104*** (0.035)		0.194*** (0.029)	0.194*** (0.029)	0.142*** (0.030)
Age		-0.057 (0.058)	-0.056 (0.055)	-0.080 (0.058)		-0.099** (0.046)	-0.083* (0.044)	-0.102** (0.048)		0.082* (0.049)	0.079 (0.048)	0.080 (0.054)		0.071 (0.053)	0.088* (0.051)	0.091 (0.058)
Grade		-0.040 (0.040)	-0.037 (0.040)	-0.017 (0.040)		0.035 (0.039)	0.038 (0.041)	0.071* (0.040)		0.009 (0.044)	-0.004 (0.044)	-0.057 (0.035)		0.121*** (0.045)	0.096** (0.044)	0.082* (0.044)
<i>Household characteristics</i>																
ESCS Index			-0.022 (0.020)	-0.040** (0.020)		0.042** (0.017)	0.014 (0.019)			0.009 (0.015)	0.009 (0.016)			0.057*** (0.017)	0.018 (0.017)	
Two-parent family (Ref. Other)			0.042 (0.065)	0.045 (0.065)		0.026 (0.055)	0.045 (0.054)			0.084 (0.052)	0.029 (0.057)			0.098* (0.058)	0.048 (0.060)	
<i>School characteristics</i>																
Private school (Ref. Public)				0.240** (0.105)				-0.136 (0.114)				0.080 (0.079)				-0.076 (0.071)
Vocational (Ref. General)				-0.026 (0.043)				-0.069* (0.038)				0.095*** (0.034)				-0.215*** (0.033)
Class size				-0.001 (0.002)				-0.001 (0.002)				-0.003 (0.002)				-0.000 (0.002)
Total school enrolment				0.000 (0.000)				0.000 (0.000)				0.000 (0.000)				0.000 (0.000)
Student-Teacher ratio				-0.000 (0.005)				0.006 (0.004)				0.001 (0.005)				0.004 (0.005)
Constant	2.251*** (0.133)	2.971*** (0.908)	2.927*** (0.859)	3.346*** (0.901)	2.316*** (0.124)	3.720*** (0.709)	3.537*** (0.684)	3.865*** (0.749)	3.593*** (0.077)	2.278*** (0.768)	2.239*** (0.769)	2.164** (0.877)	2.698*** (0.094)	1.615* (0.826)	1.318 (0.815)	1.593* (0.949)
Observations	4,612	4,612	4,443	3,928	4,620	4,620	4,450	3,932	4,607	4,607	4,438	3,923	4,596	4,596	4,427	3,915
R-squared	0.024	0.041	0.037	0.041	0.052	0.1	0.098	0.108	0.016	0.02	0.02	0.026	0.036	0.063	0.069	0.083

Note : Stratified two-stage sample design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). Regional dummies included. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database.

Table 7: OLS and IV estimates of financial literacy on students' perceived value of schooling (full specification)

Dependent variable	Financial Literacy			
	(1)	(2)	(3)	(4)
	OLS	Regional IVs	Individual IV	Combined IVs
<i>a. Time commitment to education</i>				
Truancy				
Late for school	-0.047*** (0.016)	-0.264** (0.103)	-0.181** (0.091)	-0.220*** (0.074)
Skip whole day	-0.044*** (0.014)	-0.314*** (0.088)	-0.164** (0.081)	-0.245*** (0.060)
Skip classes	-0.036*** (0.011)	-0.128* (0.074)	0.013 (0.076)	-0.067 (0.050)
Time spent on activities				
Homework out of school	1.304*** (0.168)	-0.340 (0.882)	2.201** (1.081)	1.325** (0.589)
<i>b. Attitudes</i>				
Attitudes towards school				
Prepare for life	0.105*** (0.022)	0.041 (0.131)	-0.014 (0.132)	0.006 (0.097)
Valuable time	0.119*** (0.019)	-0.109 (0.119)	-0.040 (0.110)	-0.079 (0.089)
Get a job	-0.027* (0.016)	-0.035 (0.103)	-0.174 (0.113)	-0.097 (0.076)
Prepare for college	0.040** (0.017)	-0.141 (0.104)	-0.017 (0.115)	-0.081 (0.082)

Note : Stratified two-stage sample design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses).

*** p<0.01, ** p<0.05, * p<0.1

Sources: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database, combined with data from Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.

Appendix A

Table A1: Students' performance in financial literacy across 18 economies

Country	Financial Literacy	
	Mean	(SD)
Australia	526.05	(101.24)
Belgium	541.10	(97.46)
Colombia	378.66	(105.64)
Czech Republic	513.19	(88.32)
Spain	484.25	(85.18)
Estonia	529.06	(79.01)
France	486.26	(105.55)
Croatia	480.30	(85.18)
Israel	476.46	(115.41)
<i>Italy</i>	<i>466.33</i>	<i>(87.19)</i>
Latvia	500.60	(77.96)
New Zealand	519.98	(118.04)
Poland	510.13	(81.91)
Shanghai-China	603.38	(83.49)
Russian Federation	486.27	(87.82)
Slovak Republic	470.45	(104.98)
Slovenia	484.10	(89.13)
United States	491.60	(99.36)
OECD average	500	(100)

Note : Stratified two-stage sample design and replicates accounted for

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

Table A2: Correlation matrices for continuous variables

Truancy	(1)	(2)	(3)	
(1) Late for school	1			
(2) Skip whole day	0.2296	1		
(3) Skip classes	0.2559	0.2607	1	
Attitudes towards school	(1)	(2)	(3)	(4)
(1) Prepare for life	1			
(2) Valuable time	0.4443	1		
(3) Get a job	0.1235	0.2248	1	
(4) Prepare for college	0.1592	0.2796	0.479	1
Regional-level instruments	(1)	(2)	(3)	
(1) Newspapers	1			
(2) Growth of ATM	-0.0668	1		
(3) Bankruptcies	0.2304	-0.2482	1	

Sources: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database, combined with data from Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.

Table A3: F-tests for first-stage IV regression specifications

	First stage (F-test)
<i>Regional-level</i>	
Share of newspapers with finance-related content	3.79
Growth of ATM branches 2010-2012	8.14
Number of bankruptcies in 2012	9.39
Combined	12.73
<i>Individual-level</i>	
Share of schoolmates with parents working in money-related occupation	13.05
<i>Regional and individual-level combined</i>	
	25.52

Sources: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database, combined with data from Accertamenti diffusione stampa (ADS), Bank of Italy, and Italian Ministry of Justice

Table A4: Missing data analysis

	a. Time commitment to education				b. Attitudes			
	Truancy			Time spent on activities	Attitudes towards school			
	Late for school	Skip whole day	Skip classes	Homework out of school	Prepare for life	Valuable time	Get a job	Prepare for college
Age	0.049 (0.074)	-0.028 (0.068)	0.034 (0.058)	-0.001 (0.010)	0.000 (0.012)	0.004 (0.012)	0.004 (0.012)	0.001 (0.012)
Female	-0.015 (0.095)	0.009 (0.101)	0.077 (0.086)	-0.027 (0.017)	0.023 (0.016)	0.023 (0.016)	0.019 (0.016)	0.019 (0.016)
Grade	0.006 (0.125)	-0.186 (0.174)	-0.063 (0.142)	0.005 (0.018)	0.002 (0.017)	0.003 (0.017)	0.002 (0.017)	0.001 (0.017)
ESCS Index	-0.043 (0.223)	-0.190 (0.223)	-0.230 (0.174)	-0.013 (0.036)	0.029 (0.035)	0.031 (0.036)	0.027 (0.035)	0.023 (0.035)
Financial Literacy	-61.368*** (13.522)	-34.602** (17.321)	-56.626*** (17.585)	-1.334 (3.376)	-5.398* (3.173)	-4.854 (3.160)	-5.496* (3.099)	-6.047* (3.087)
% missing	0.61%	0.79%	0.85%	35.57%	34.80%	34.66%	34.82%	35.05%

Note: Robust standard errors clustered at the school level (in parentheses); *** p<0.01, ** p<0.05, * p<0.1

This table reports coefficients from a regression of the variables listed on the left on a dummy for whether the dependent variable is missing. This is analogous to a ttest accounting for the sampling design.

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database

Table A5: OLS and IV estimates of financial literacy on students' perceived value of schooling, all specifications

Dependent variable	Financial Literacy															
	OLS				Regional-level IVs				Individual-level IV				Combined IV			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>a. Time commitment to education</i>																
Truancy																
Late for school	-0.074*** (0.013)	-0.064*** (0.014)	-0.066*** (0.015)	-0.047*** (0.016)	-0.276*** (0.085)	-0.268*** (0.076)	-0.292*** (0.086)	-0.264** (0.103)	-0.148** (0.059)	-0.136** (0.067)	-0.175** (0.076)	-0.181** (0.091)	-0.184*** (0.049)	-0.188*** (0.051)	-0.222*** (0.057)	-0.220*** (0.074)
Skip whole day	-0.081*** (0.010)	-0.062*** (0.011)	-0.055*** (0.012)	-0.044*** (0.014)	-0.286*** (0.081)	-0.276*** (0.073)	-0.297*** (0.080)	-0.314*** (0.088)	-0.184*** (0.044)	-0.170*** (0.049)	-0.159*** (0.059)	-0.164** (0.081)	-0.215*** (0.039)	-0.214*** (0.042)	-0.218*** (0.048)	-0.245*** (0.060)
Skip classes	-0.048*** (0.009)	-0.044*** (0.010)	-0.048*** (0.010)	-0.036*** (0.011)	-0.048 (0.067)	-0.064 (0.059)	-0.081 (0.066)	-0.128* (0.074)	-0.036 (0.042)	-0.008 (0.047)	-0.007 (0.056)	0.013 (0.076)	-0.039 (0.035)	-0.030 (0.036)	-0.040 (0.041)	-0.067 (0.050)
Time spent on activities																
Homework out of school	2.141*** (0.128)	2.109*** (0.137)	1.862*** (0.147)	1.304*** (0.168)	0.365 (0.924)	0.544 (0.800)	0.083 (0.831)	-0.340 (0.882)	3.630*** (0.679)	3.121*** (0.706)	2.644*** (0.810)	2.201** (1.081)	2.621*** (0.521)	2.019*** (0.512)	1.487*** (0.565)	1.325** (0.589)
<i>b. Attitudes</i>																
Attitudes towards school																
Prepare for life	0.102*** (0.018)	0.114*** (0.021)	0.112*** (0.021)	0.105*** (0.022)	0.060 (0.125)	0.057 (0.109)	0.092 (0.118)	0.041 (0.131)	0.050 (0.069)	0.015 (0.081)	0.010 (0.094)	-0.014 (0.132)	0.050 (0.063)	0.026 (0.068)	0.036 (0.077)	0.006 (0.097)
Waste of time	0.144*** (0.015)	0.146*** (0.016)	0.133*** (0.018)	0.119*** (0.019)	-0.152 (0.126)	-0.121 (0.102)	-0.141 (0.111)	-0.109 (0.119)	0.148** (0.065)	0.077 (0.069)	0.026 (0.079)	-0.040 (0.110)	0.068 (0.058)	0.002 (0.061)	-0.042 (0.069)	-0.079 (0.089)
Get a job	-0.038*** (0.012)	-0.039*** (0.014)	-0.039*** (0.015)	-0.027* (0.016)	-0.060 (0.101)	-0.068 (0.093)	-0.057 (0.099)	-0.035 (0.103)	-0.094 (0.063)	-0.123* (0.069)	-0.167** (0.081)	-0.174 (0.113)	-0.080 (0.052)	-0.096* (0.054)	-0.119* (0.061)	-0.097 (0.076)
Prepare for college	0.100*** (0.015)	0.081*** (0.016)	0.071*** (0.015)	0.040** (0.017)	-0.132 (0.118)	-0.094 (0.099)	-0.131 (0.106)	-0.141 (0.104)	0.155** (0.066)	0.091 (0.072)	0.053 (0.081)	-0.017 (0.115)	0.073 (0.058)	0.018 (0.061)	-0.022 (0.068)	-0.081 (0.082)

Note : Stratified two-stage sample design and replicate weights accounted for. Robust standard errors clustered at the school level (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

Source: Author's computations from the OECD PISA 2012 Financial Literacy (FL) database, combined with data from Accertamenti Diffusione Stampa (ADS), Bank of Italy, and Italian Ministry of Justice.