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# The effect of self-confidence on financial literacy

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## Abstract

This study analyses whether self-confidence affects financial abilities of young people in Spain, through financial literacy. We use data from the Programme for International Student Assessment (PISA) Financial Literacy (2012) report, conducted by the OECD. Our hypothesis is that non-cognitive factors are important to establish young people's financial literacy. Financial knowledge, together with other personal attitudes, determines people's financial behaviour. We focus on the role of self-confidence in four dimensions. First, the student's self-confidence in the environment of their college; second, self-confidence referring to the utility found at school; third, self-confidence in relation to the results obtained; and finally, self-confidence in a broader sense. Our multi-level estimates show that students with higher levels of self-confidence score higher in financial literacy tests, whatever the dimension considered. Beyond the individual's inherent characteristics, there are other factors such as maturity, gender, socio-economic characteristics and the surroundings, which also influence financial literacy.

Keywords: Financial literacy, financial capabilities, self-confidence.

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# INTRODUCTION

The lack of financial abilities is considered to be one of the most important problems in modern societies. These societies have increasing levels of indebtedness and saving needs, with individuals who do not have a comprehensive understanding of basic financial issues.

Global trends anticipate that the relationship between individuals and financial systems is going to intensify. Factors such as increased life expectancy and the changes in the welfare state's coverage mean that, increasingly, individuals have to be involved in financial decisions. Decisions such as saving for retirement, expenditure on education and health, or buying a home, are taken in a scenario in which financial markets are more accessible to consumers, due to major technological progress (reducing transaction costs between supply and demand) and the appearance of new financial services. In order to meet the demand for these types of services, financial markets have added a wide range of more sophisticated services to those already on the market, which individuals select depending on their circumstances. Although this progress is positive, it increases the responsibility for saving, debt, investment and asset decumulation through tailored financial contracts.

Financial education is an essential element for developing financial capabilities, for the purpose of guiding individual decision-making. The combination of knowledge and practice in the area of finance defines the cognitive part of individual financial capabilities. Young people are especially interesting since they need preparing themselves to deal with increasingly complex financial decisions in the future. Research conducted in the United States shows that most students in secondary and university education fail their financial literacy exams (Chen & Volpe, 1998; Shim et al., 2010; Mandell, 2008; Markow & Bagnaschi, 2005). They also show that financial literacy is lower among younger students than among older ones, and that there are diminishing returns with age (Lusardi & Mitchell, 2011a, 2011b, 2013).

Beyond the importance of the socio-economic and family characteristics influencing young people's financial capabilities, there are personality characteristics which also influence financial behaviour. Economic literature analyses how self-motivation drives human beings to achieve a goal. Several studies (Gagné & Deci, 2005; Bénabou & Tirole, 2002; Bénabou & Tirole, 2003) show that personal attitudes can be conditioned by extrinsic and intrinsic motivation. The first defines the reaction which a human being may have in response to the external offer of a specific recompense (not necessarily monetary). The second refers to the satisfaction or enjoyment of carrying out the action. This type of stimulus can generate higher self-confidence, leading individuals to decide about more ambitious goals or to persist in striving to reach their goals. On the other hand, self-confidence can also increase motivation, converting it into a valuable asset for individuals with insufficient willpower (Bénabou & Tirole, 2002).

Our paper analyses whether self-confidence (as a non-cognitive factor) affects the financial capability of young people in Spain, via their knowledge of financial matters. We have used data from the Programme for International Student Assessment (PISA) Financial Literacy (2012) report, conducted by the OECD. It is the first large-scale, international study evaluating the financial competence of young people<sup>1</sup>. Our hypothesis is that non-cognitive factors are important to determine the financial behaviour of young people, as much as these influence cognitive factors. Specifically, those individuals with higher levels of self-confidence are expected to score higher in financial literacy tests than the remaining individuals with similar characteristics.

Young people have to operate in an increasingly complex financial world, particularly those living in developed countries. Given their notable spending capacity, young people are an attractive target, particularly for retail banking and credit card institutions. However, they have limited abilities in taking correct financial decisions. Financial education among young people and their preparation for decision-making in adult life has aroused increasing concern among governments and other international bodies. It is crucial that young people can cope before they get involved in significant contracts and financial transactions.

This study works on the assumption that financial capacities, responsible to a large degree for financial behaviour, are determined by different elements which can be separated into two groups: cognitive factors (knowledge, understanding or acumen, among others) and non-cognitive (personal attitudes). The cognitive aspects are considered to be part of the acquired financial literacy that can improve using different practices relating to financial education and learning by experience. There is evidence to support the premise that the use of formal financial services contributes positively to improved financial capabilities (Chen & Volpe, 1998; Furnham, 1999; Johnson & Sherraden, 2007; Whitebread & Bingham, 2013; and Otto, 2013). As several authors show, non-cognitive aspects or personal attitudes also appear to be an important element in determining financial behaviour (Noon & Fogarty, 2007; Segal, 2008; Borghans et al., 2008; Johnson & Staten, 2010). Issues such as risk aversion, making important decisions, being more aware of one's own actions, or the curiosity to look for and compare between financial services are to a large degree conditioning financial behaviour. Among these non-cognitive factors, the role of self-confidence can be a relevant factor, affecting the way in which young people deal with financial issues (Bénabou & Tirole, 2002; Bénabou & Tirole, 2003).

The rest of the paper is organised as follows. Section 2 presents the data and the methodology used. Section 3 reports the empirical results. Section 4 discusses the main findings and, finally, section 5 presents conclusions.

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<sup>1</sup> The technical documents in the PISA programme on financial education, in their references to Spain in 2012, indicate that in 2008 a Financial Education Plan was designed, developed and subsequently applied. This plan consisted of a joint initiative between Banco de España (Bank of Spain), the CNMV (National Securities Market Commission) and the Ministry of Finance. The plan considered students as a specific target and a first round of funding for the plan was approved for 2008-13. Building on this experience, a second round of funding was agreed between the central bank and the CNMV for 2013-17. A very small number of schools in which some kind of financial teaching exists were taken in the framework of this analysis.

# MEASURING FINANCIAL LITERACY

## DATA

Financial literacy is defined as people's ability to process economic information and make informed decisions about financial plans, wealth accumulation, indebtedness and pensions. A more complete definition of financial literacy is given by the OECD: financial literacy is understood as "the process by which financial consumers/investors improve their understanding of products, concepts and financial risks and, via information, instruction and objective advice, develop the skills and confidence to be more aware of financial risks and opportunities, take well-founded decisions, know where to go for help and carry out other effective interventions to improve their financial position" (OECD, 2005).

Financial literacy includes the ability to discriminate between different financial alternatives, speak clearly on financial matters and save for the future. According to these and other definitions, financial literacy is an important ingredient in increasing financial capability and thus affecting behaviour (Lyons et al., 2006; Mandell, 2006; and Hilgert et al., 2003).

A good approach to measure cognitive factors behind financial ability could be provided by the scores in a test of financial literacy. On the other hand, the non-cognitive issues reflect intrinsic attributes of the individual, such as motivation and self-confidence. These attributes could be determined by their own perception of themselves. Financial PISA contains questions which allow us to measure both types of factors, cognitive and non-cognitive. Table A1 in the Appendix shows the questions from which the necessary information is extracted to measure the self-confidence of students; as a non-cognitive element in this analysis that contributes to improving financial capabilities.

The PISA programme conducted in 2012 has the aim of assessing competences in reading comprehension, in mathematics and, for the first time, it also looks at financial literacy. These questions are included in response to the last major economic crisis, where one of the causes appears to indicate individuals' lack of financial wherewithal. Financial PISA begins with the specific purpose of assessing the literacy and financial abilities of 15 year-old students, covering 18 OECD and non-OECD countries<sup>2</sup>. Our study focuses on young people living in Spain.

Individuals in the Financial PISA data base are 15 year-old students selected using a stratified process. Before the random choice of students, there is a random choice of schools. Therefore, students belong to a higher level of aggregation: the schools. In the first level, students provide personal details about themselves and their family. In the second level, head teachers provide information about the centre. This nested system prevents conventional linear regression

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<sup>2</sup> See the technical notes on the OECD's PISA Financial Education programme for a more detailed description of the issues relating to the Financial Literacy PISA project.

analysis from being used, since the students at the same school share characteristics with their peers. In this context, the classic assumption in regression models - independence of the observations - disappears. We carry out estimations based on a multilevel analysis, in which a hierarchy structure is considered. We distinguish between the first level (students) and the second (schools). The database includes 1,108 students, all 15 years old, distributed around 179 educational centres. Table 1 presents the descriptive statistics for the variables analysed in the study. Table A1 in the Appendix provides a detailed description about these variables, and Appendix B presents some of the questions answered in the questionnaire.

Our dependent variable is defined by the results obtained by the student in financial competence tests. The structure of PISA prevents the use of a single value as a reference for the student's results, since the latter only replies to a certain number of questions in the entire questionnaire. The 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*, are obtained from this distribution for each student. The five plausible values must be used in the estimation process in order to avoid problems associated with biases and inefficiency (OECD, 2009). To control for these properties, PISA's data base provides eighty replicates of individual weightings, which allow efficient estimators. The use of replicates is necessary because of the way in which individuals are selected from the PISA sample.

Regarding the explanatory variables, the students fill in a questionnaire about their social and family environment, their personal characteristics, their study habits and their attitudes. The PISA database also provides comprehensive information about the type of school in which they study. We divide the explanatory variables into similar groups to those described above.

The individual characteristics focus not only on the conventional questions about the student, such as gender and date of birth, but also on subjective factors associated with the individual's personality or psychology, such as self-confidence, perseverance and motivation. Almlund et al. (2011) point out the importance of personal psychological factors in obtaining good results in general, both in matters to do with money, as well as academic, work-related and social areas. Other authors (Bénabou & Tirole, 2002) also highlight the role of self-confidence and motivation in the decisions of individuals.

The variables measuring self-confidence (*selfconf*), perseverance (*persever*) and motivation (*motivaf*) are dummies that take the value 1 if the individual signals that they feel identified with high self-confidence, motivation and perseverance, and 0 otherwise<sup>3</sup>. Each of the variables can be composed of one or several items. The distinction between the final letters *a*

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<sup>3</sup> Depending on whether the item corresponding to each of the questions is formulated in positive/negative form, we adapt the way we construct the dummies.

and  $b$  for some of the variables reflects positive versions (high) and negative (low) of these variables respectively<sup>4</sup>. The range of values which all these variables take is listed in Table 1.

Our sample shows that the number of men and women is similar (around 53% of individuals are men and 47% are women). Birth dates are evenly distributed across the year. In terms of academic performance, only 20% claim to have had to repeat a year in the middle years of primary school, and 36% say that they had good grades in mathematics. The level of perseverance is close to a third of the maximum value possible in its positive format (*persever1a*) and above 15% in its negative version (*persever1b*). The motivation indicator is above 50% of its corresponding maximum. In terms of our variables of interest, the level of self-confidence is above 50% of the maximum, except for *selfconf3b* and *selfconf4*.

Including family variables is justified in the results shown by Villar (2013) and García-Montalvo (2013). According to these authors, the distribution of students with poorer results is uneven between social groups and they experience significant difficulties in social progress. As a result, the family environment is confirmed as a factor that needs to be taken into account in the estimation process (Lusardi et al., 2010; Lusardi & Mitchell, 2013). Family characteristics reveal that around 27% of parents have university-level education, while around 36% left school at 15 or 16. Nearly seven out of ten students have a mother working outside the home, and the figure rises to eight in the case of the father. The variable for the number of books in the household tries to measure the household's sociocultural status. Table 1 illustrates that only 36% of students claim to have more than 25 books in their homes<sup>5</sup>.

In terms of the issues of the educational centre, 64% of the students in the database go to state schools. The ratio of computers with internet access per student is around 0.6. Only a very small proportion of students are at a centre where access is based on academic merit (less than 8%). Finally, it is interesting to note that only 15% of schools offer some kind of specific financial education programme.

## METHODOLOGY

Our estimation process aims to control for the two levels of information mentioned above, students and schools, by including the weights associated with each level. When creating the explanatory variables, we avoid eliminating the observations, for two reasons. First, to avoid skewing the influence of the weightings in the estimates. Interpreting the variables where the information about all the individuals is not complete is different from the conventional interpretation. The dummy variable associated with a discrete variable with incomplete information takes a value of 1 when the individual answers explicitly that they identify themselves fully with the option in the original

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<sup>4</sup> On occasion the statements in the questions contain negative messages, so if the student responds that they identify with the statement, they are displaying a low level of the quality under consideration.

<sup>5</sup> "The number of books" variable endeavours to pin down structural sociocultural variations rather than trends. For this reason this variable is included in our regressions instead of the number of electronic books.

variable, and 0 otherwise. As such, 0 includes both those people who are excluded under the value of 1, as well as those about whom the information is not known. Second, the “I don’t know” (DK) or “I don’t want to answer” (DA) contain, in and of themselves, relevant information. This information is particularly interesting for our set of variables about self-confidence. When answering questions about one’s view of oneself, there is no one correct, expected, answer and as such the choice of either of the two options could be a sign of low self-confidence. This procedure helps to identify more clearly the idea of self-confidence, taking the respondents who feel identified with this concept, without hesitation, and clearly dividing this group off from the rest. In our sample, the DK/DA weighting in the variables is relatively low.

In a multilevel analysis, students’ results depend on their personal and family characteristics, as well as on the characteristics of school centres. Bearing in mind that the observations are nested, this type of model allows us to include fixed effects and random effects.

The overall model is expressed as follows (Laird & Ware, 1982):

$$Y_j = X_{1j}\beta_1 + X_{2j}\beta_2 + Z_j\gamma_j + \varepsilon_j$$

$$\varepsilon = [\varepsilon_j]_{j=1,\dots,179}, \quad \varepsilon \sim N(0, \sigma_\varepsilon^2 \Sigma_\varepsilon)$$

where  $\gamma = [\gamma_j]_{j=1,\dots,179}$  has a matrix of variances and covariances  $\Sigma_\gamma$  and is orthogonal to  $\square$ .

Let the dependent variable  $Y_{ij}$  be the (expected) educational result of the student  $i$  in the school  $j$  ( $j = 1, \dots, 179$ , where each school includes  $n_j$  students in the sample). These results are aggregated in a column vector,  $Y_j$ , which includes all the results of the finance exam ( $Y_j = [Y_{ij}]_{i=1,\dots,n_j, j=1,\dots,179}$ ).

Vector  $X$  represents the characteristics associated with the student and is divided into two subgroups ( $X_1, X_2$ ).  $X_1$  represents the characteristics related with the individual’s self-confidence. This vector contains the following variables: *selfconf1a* and *selfconf1b*, which establish the student’s level of self-confidence at school. The variable *selfconf2* aims to measure the student’s self-confidence in terms of the utility the student obtains at school. The measurement of the level of self-confidence in relation to the results obtained is represented in the variables *selfconf3a* and *selfconf3b*. Finally, the variable *selfconf4* refers to self-confidence in its more general sense. As mentioned in the previous section, versions *a* and *b* of the variables *selfconf1* and *selfconf3* denote questions in a positive direction and questions in a negative direction, respectively. The person who feels identified to a large extent with any of the concepts in version *a*, is an individual with a high degree of confidence. By contrast, the person who identifies to a large extent with the concepts in version *b* is associated with an individual with low self-confidence.

The student’s remaining characteristics are represented in  $X_2$ . It includes personal characteristics, such as gender, month of birth, the possibility of having repeated a year in the first two years of secondary school, or in the middle of primary education, whether the student gets good grades for mathematics and some variables relating to personality (perseverance and motivation). The variable *perserver1*, in its *a* and *b*

versions, is treated in the same way as the variables *selfconf1* and *selfconf3*. Family characteristics are also included, such as the educational level of the mother and father, and whether they work outside the home or not. Finally, it contains information about the number of books in the home.

Vector  $Z$  contains characteristics relating to school (identical for all the students in each educational centre), in order to control for the composition effects or group effects stemming from the school itself. The effects of these variables are estimated with random effects.

Vectors  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  contain the coefficients associated with the independent variables. The fixed effects are represented in  $\alpha$  and  $\beta$  and the random effects, at school level, are represented by  $\gamma$ . Given the specific conditions of the sample, we carry out our estimates following the indications in the OECD report (2009) to obtain accurate estimates and standard deviations.

## EMPIRICAL RESULTS

Table 2 shows the results of the estimated models. We have four different models. Models 1 to 3 are estimated with fixed effects. For Model 4, which controls for the school characteristics, we consider the estimate for fixed effects of individual and family characteristics, as well as the estimate for random effects of the characteristics of the school. Statistics of individual significance are in brackets and the asterisks denote conventional significance levels.

We start from a base model (Model 1) where the dependent variable is built with the scores in the financial literacy test and the explanatory variables are our variables of interest. We refer to those variables relating to self-confidence as our variable of interest. The *selfconf* variables refer to different variables which try to measure the student's level of self-confidence (see Table A1 for more detail). The variables *selfconf1a* and *selfconf1b* are statistically significant and with the expected sign. The variables *selfconf2* and *selfconf3a* are non-significant in this first regression, although both have the expected sign. However, measuring the level of self-confidence in relation to the results obtained in their negative form, *selfconf3b*, is a relevant variable when explaining financial literacy. Finally, the *selfconf4* variable is also significant in accounting for the behaviour of our dependent variable.

The second regression (Model 2) aims to control also for the possible synergies between mathematical abilities and financial literacy. We introduce *goodgrma* as a control. This variable includes information as to whether the individual says that he/she receives good grades in mathematics or not. This variable is significant and it does not generate an important variation in the estimations for the base model (Model 1).

Model 3 includes Model 2 variables, together with additional controls for the individual, such as gender, month of birth, whether the individual has repeated a year or not and personality questions which might also affect performance in the financial literacy test, such as perseverance and motivation. Also, we control for the family surroundings by including information about parents' educational level, parents working outside the

home and the number of books at home. All the variables have the expected sign although not all are statistically significant.

In terms of the variables of interest, the influence of self-confidence in Model 3 generates partial changes over previous models. With the exception of *selfconf1b*, *selfconf2* and *selfconf4*, which maintain or slightly increase their magnitude in absolute terms, the rest of the variables reduce their effect by around 50% in absolute terms after controlling for the variables described. In terms of statistical significance, all the variables remain the same except in *selfconf1a*, which becomes non-significant, and *selfconf2*, which becomes statistically significant.

The remaining individual characteristics show that women obtain eleven points less than men.<sup>6</sup> Students born in January achieve nearly twenty points more than the ones in the reference group (those born in December). The fact of not indicating that they repeated a year at the end of primary school or in the first two years of secondary school gives students a positive difference of 55 points in the test over those students who admit that they had repeated. This variable tries to control, together with the good grade in maths, for those cognitive aspects relative to mathematical numeracy which may have a relationship with financial literacy. In Model 3, *goodgrma* is statistically non-significant.

The variable which measures perseverance in its negative sense has the expected sign and its effect on the test grade is important (over thirteen points). However, perseverance in its positive form (*persever1a*) results in a direction which in principle appears unexpected, but can be justified by the psychology theory. This variable, *persever1a*, may be reflecting issues such as the perverse effects of perfectionism, which could lead to irrational behaviour patterns (Bénabou & Tirole, 2002; and Bénabou & Tirole, 2003). We believe that this may be due to the fact that the percentage of individuals who claim to identify to a large extent with statements denoting this quality is comparatively higher than for the *persever1b* variable. They represent between 25% and 35% of the total sample for *persever1a*, compared to 11% for *persever1b*. An alternative explanation is given by the overestimation of his/her own abilities on the part of the individual (Ackerlof & Dickens, 1982; Bénabou & Tirole, 2002). The positive self-qualification of individual work capacity and perfection may hide an intention to give positive messages about him/herself (despite the anonymity of the test) or the person's own overestimation of their successful experiences as against the negative ones (cognitive dissonance). In addition, more *perseverant* individuals seem to score better, but this is not always true. Our hypothesis is that there may be some kind of decreasing returns to scale in this variable, which means that high levels of persistence lead to worse results. Persistence taken to extremes can generate irrational behaviour, giving rise to poorer results. To control for this hypothesis, we include non-linear specifications in our models. However, we are not able to capture this feature.

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<sup>6</sup> Fonseca et al. (2012) suggest that men and women may acquire their financial knowhow differently. This idea is supported by the work of Mahdavi & Horton (2012), who find that even women with higher levels of qualification have a very low level of financial education. Finally, the work of Bucher-Koenen et al. (2012) attributes gender differences to a problem of self-confidence, which also differs by sex. Nevertheless, our estimates show that the differences by gender remain after controlling for self-confidence and other attitude-based questions.

Among the variables controlling for the family environment, only the number of books in the home is significant, and sufficiently important to affect financial literacy. Those students claiming to have more than 25 books in the home score nearly 40 points more in the exam than the rest.

In terms of the lack of significance in the family variables which control for parents' educational level and working status, more research is needed to capture this effect, found in other papers in the literature. Studies such as Lusardi et al. (2010) show how those students in families with more education and those which consume more financial services are more competent from a financial point of view. Financial education as an obligatory part of education could be a tool to minimise inequality between individuals from different family backgrounds. Along these lines, the use of variables which approximate the level of household wealth would be helpful in capturing these effects.

The last model (Model 4) includes the variables considered in Model 3, together with the variables referring to the school, which enter in the model via random effects. Neither the magnitude of the fixed effects coefficients nor their significance show major changes from the results in Model 3. The students who do not indicate high self-confidence in their school environment, both in terms of feeling they belong to a group and the sensation of utility, may score between 15 and 31 ( $10,180 \times 3 \approx 31$ ) points less, respectively. If we take an individual with low self-confidence in all the areas covered in the previous questions, he/she scores 5% lower than the average of the results in the exam, compared to other classmates with high self-confidence levels. The level of self-confidence in relation to school results (*selfconf3b*) penalises those individuals who have low self-confidence by 29 points (this means nearly 6% lower than the average). Finally, it is interesting to observe that self-confidence in its widest meaning is the variable with the greatest effect on the test results. Those individuals who signal that they have high self-confidence in the five areas associated with this characteristic score an average of 55 points more than schoolmates with identical characteristics. Our results are robust to alternative specifications.

## CONCLUSIONS

How individuals and families conduct their financial dealings is an essential component of economic well-being. However, financial literacy on the part of the general population is still wanting. Investment in financial education is understood as a way of investment in human capital. Theoretical models show that integrating financial literacy into the system and developing policies designed to encourage financial literacy have positive implications in terms of wellbeing. This study offers an initial approach to the impact of non-cognitive factors on financial literacy. Specifically, we show how self-confidence, measured in different spheres of life, affects financial literacy, impacting on the way individuals process information and on decision-making.

The results show that individuals with higher levels of self-confidence score higher in financial literacy tests. These skills, together with personal attitudes, determine the financial behaviour patterns of the economic agents involved. However, very high levels of self-confidence run the risk of over-confidence. Although self-confidence

improves wellbeing, we argue that the likely existence of diminishing returns for this variable could lead to a loss of wellbeing. This idea is also reflected in the results obtained when perseverance is included in the model.

Individuals have imperfect information about their own abilities, so that high levels of self-confidence associated with not so high levels of knowledge could give rise to decisions that are more beneficial than combinations associated with greater knowledge but low levels of self-confidence. This question opens the debate for a more general issue, which is how someone's attitude towards an exam can partly explain the result of that exam. The link between motivation and self-confidence is also important; ability and effort work together to determine results. High levels of self-confidence reinforce motivation at times of action. In terms of our estimates, the relationship between self-confidence and motivation could account for the lack of significance found in the variable measuring motivation. One question for further research lies in the study of theoretical mechanisms which determine this relationship, with the aim of improving the information about the isolated effects of each one of these personal characteristics.

As well as the inherent characteristics of the person, there are other factors which also condition results. On the one hand, we find evidence that factors of a personal nature, such as maturity or gender, are revealed as important elements when explaining financial abilities. Students born at the beginning of the year score more highly than those born at the end. The same thing happens with men by contrast with women. On the other hand, socio-economic and environmental characteristics also affect capacities. In our study, parents' education and whether they work does not have significant influence in the results achieved by young people. However, the number of books in the home, interpreted as a way of gauging socio-economic status, comes out as a relevant variable, and it is important in terms of magnitude. Detailed information enabling us to measure wealth-related aspects would be useful, for the purpose of improving our results. Our hypothesis is that household wealth constitutes an important factor when determining financial capacities. The incidence of family wealth on financial literacy is expected to be higher than the impact it could have on the results in other subjects, such as mathematics and reading comprehension. This is an interesting area for further research.

Although the PISA database provides information about students' savings habits, the significant lack of response in these variables has caused us to discount them from this analysis. Learning by experience may be a tool for improving financial literacy. Better information about these issues will mean that this kind of effect can be estimated; this will allow us to obtain information to help design policies that are focused on improving financial literacy. A subject which deserves to be debated is the extent to which the differences generated by socio-economic characteristics and habitat may be offset by the reinforcement of characteristics relating to personality. The constant change in these characteristics throughout life could lead them to become a good instrument for policy design. Introducing activities to reinforce personal attitudes, financial education programmes and learning by experience in the early years of school, will enable us to maximise the effects of interventions designed to improve financial abilities.

## APPENDIX A. Table A1: Description of the variables

Student: St Questionnaire PISA 2012			
selfconf1a	ST87Q01, Q04, Q06	Q37-Form B	Discrete quantitative variable – Self-esteem
selfconf1b	ST87Q02, Q03, Q05	Q37-Form B	Discrete quantitative variable – Self-esteem
selfconf2	ST88Q03	Q38-Form B	Dummy Self-esteem
selfconf3a	ST91Q01, Q02, Q05, Q06	Q40-Form B	Discrete quantitative variable – Self-esteem
selfconf3b	ST91Q06	Q40-Form B	Dummy Self-esteem
selfconf4	ST94Q05, Q06, Q09, Q10, Q14	Q51-Form B	Discrete quantitative variable – Self-esteem
woman	ST04	Q4-Form A, B y C	Takes the value 1 if the individual is a woman and 0 otherwise
January	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in January and 0 otherwise
February	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in February and 0 otherwise
March	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in March and 0 otherwise
April	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in April and 0 otherwise
May	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in May and 0 otherwise
June	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in June and 0 otherwise
July	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in July and 0 otherwise
August	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in August and 0 otherwise
September	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in September and 0 otherwise
October	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in October and 0 otherwise
November	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in November and 0 otherwise
December	ST03Q01	Q3-Form A, B y C	Takes the value 1 if the individual was born in December and 0 otherwise
repeat2	ST07Q02	Q7-Form A, B y C	Takes the value 1 if the individual repeated a year in the first phase of secondary education and 0 otherwise
goodgrma	ST42Q04	Q44-Form B	Takes the value 1 if the individual claims to have good grades in mathematics and 0 otherwise
persever1a	S93Q04, 06, 07	Q28-Form A	Discrete quantitative variable- Motivation
persever1b	S93Q01, 03	Q28-Form A	Discrete quantitative variable- Motivation
motivat	S89Q04	Q39-Form B	Dummy Motivation
Family: St Questionnaire PISA 2012			
himoted	ST14Q01, Q02, Q03	Q15-Form A, B y C	Takes the value 1 if the mother has tertiary education and 0 otherwise
hifated	ST18Q01, Q02, Q03	Q20-Form A, B y C	Takes the value 1 if the father has tertiary education and 0 otherwise
lomoted	ST13Q01	Q15-Form A, B y C	Takes the value 1 if the mother completed first phase of secondary education or less and 0 otherwise
lofated	ST19Q01	Q20-Form A, B y C	Takes the value 1 if the father completed first phase of secondary education or less and 0 otherwise
motwork	ST15	Q16-Form A, B y C	Takes the value 1 if the mother works outside the home and 0 otherwise
book25	ST28Q01	Q27-Form A, B y C	Takes the value 1 if there are more than 25 books in the individual's home and 0 otherwise
fatwork	ST19	Q21-Form A, B y C	Takes the value 1 if the father works and 0 otherwise

Source: PISA database (2012)

Table A1: Description of the variables (*Cont*)

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School: Sc Questionnaire PISA 2012		
finaninf	SC47	Takes the value 1 if the school offers financial education courses and 0 otherwise
admcomp	SC32Q01	Takes the value 1 if the school has an academic admission policy and 0 otherwise
ratio0	SC11Q03/SC11Q01	Ratio of computers with internet access per child
state	SC01	Takes the value 1 if the school is state-sector and 0 otherwise

---

Source: PISA database (2012)

## APPENDIX B: QUESTIONS ABOUT THE VARIABLES OF INTEREST.

Source: PISA database (2012)

### ABOUT YOUR SCHOOL

#### **Q37 Thinking about your school: to what extent do you agree with the following statements?**

*Please tick only one box in each row: strongly agree, agree, disagree, strongly disagree*

- a) I feel like an outsider (or left out of things) at school.
- b) I make friends easily at school.
- c) I feel like I belong at school.
- d) I feel awkward and out of place in my school.
- e) Other students seem to like me.
- f) I feel lonely at school.
- g) I feel happy at school.
- h) Things are ideal in my school.
- i) I am satisfied with my school.

#### **Q38 Thinking about what you have learned at school: to what extent do you agree with the following statements?**

- a) School has done little to prepare me for adult life when I leave school.
- b) School has been a waste of time.

- c) School has helped give me confidence to make decisions.
- d) School has taught me things which could be useful in a job.

**Q40 Thinking about your school: to what extent do you agree with the following statements?**

- a) If I put in enough effort, I can succeed in school.
- b) It is completely my choice whether or not I do well at school.
- c) Family demands or other problems prevent me from putting a lot of time into my school work.
- d) If I had different teachers, I would try harder at school.
- e) If I wanted to, I could perform well at school.
- f) I perform poorly at school whether or not I study for my exams.

**ABOUT YOUR PROBLEM SOLVING EXPERIENCES**

**Q51 How well does each of the following statements below describe you?**

*Please tick only one box in each row: Very much like me, mostly like me, somewhat like me, not much like me, not at all like me.*

- a) I can handle a lot of information.
- b) I am quick to understand things.
- c) I seek explanations for things.
- d) I can easily link facts together.
- e) I like to solve complex problems.

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# TABLES

Table 1: Descriptive statistics of the variables

Variable	Average	Standard Dev.	Min	Max	Num. Obs.
<b>Student: St Questionnaire PISA 2012</b>					
selfconf1a	1,773	1,399	0	3	1108
selfconf1b	0,176	0.576	0	3	1108
selfconf2	0.553	0.497	0	1	1108
selfconf3a	1,719	1,361	0	3	1108
selfconf3b	0.107	0.31	0	1	1108
selfconf4	1,736	1,859	0	5	1108
Woman	0.472	0.499	0	1	1108
January	0.064	0.245	0	1	1108
February	0.073	0.26	0	1	1108
March	0.088	0.283	0	1	1108
April	0.084	0.277	0	1	1108
May	0.099	0.299	0	1	1108
June	0.077	0.266	0	1	1108
July	0.088	0.283	0	1	1108
August	0.072	0.259	0	1	1108
September	0.097	0.297	0	1	1108
October	0.079	0.271	0	1	1108
November	0.095	0.293	0	1	1108
December	0.084	0.277	0	1	1108
repeat2	0.232	0.422	0	1	1108
goodgrma	0.363	0.481	0	1	1108
persever1a	0.992	1,176	0	3	1108
persever1b	0.315	0.618	0	2	1108
motivatt	0.613	0.487	0	1	1108
<b>Family: St Questionnaire PISA 2012</b>					
himoted	0.284	0.451	0	1	1108
hifated	0.263	0.44	0	1	1108
lomoted	0.347	0.476	0	1	1108
lofated	0.376	0.485	0	1	1108
motwork	0.653	0.476	0	1	1108
book25	0.356	0.479	0	1	1108
fatwork	0.804	0.397	0	1	1108
<b>School: Sc Questionnaire PISA 2012</b>					
finaninf	0.149	0.356	0	1	1108
admcomp	0.076	0.265	0	1	1108
ratio0	0.587	0.372	0	2,857	1108
state	0.638	0.481	0	1	1108

Source: PISA database (2012)

Table 2: Financial Education among the Young: the Case of Spain

Variables	Model 1	Model 2	Model 3	Model 4
selfconf1a	9,318** (2,360)	7,763* (1,872)	4,518 (1,064)	4,571 (1,080)
selfconf1b	-9,547* (-1,738)	-10,776* (-1,914)	-10,568** (-2,068)	-10,180** (-1,986)
selfconf2	-11,274 (-1,250)	-12,454 (-1,409)	-15,630* (-1,803)	-14,950* (-1,722)
selfconf3a	4,454 (1,088)	3,404 (0,804)	1,623 (0,385)	1,642 (0,389)
selfconf3b	-48,447*** (-5,079)	-45,104*** (-4,668)	-29,389*** (-3,061)	-28,886*** (-3,014)
selfconf4	11,198*** (7,658)	11,037*** (7,466)	10,717*** (6,159)	10,859*** (6,208)
Woman			-11,069** (-2,067)	-10,973** (-2,039)
January			19,741* (1,673)	20,282* (1,725)
...			...	...
November			1,325 (0,120)	2,049 (0,187)
repeat2			-54,962*** (-8,857)	-54,916*** (-8,894)
goodgrma		14,316** (2,252)	7,106 (1,210)	6,673 (1,139)
persever1a			-4,624** (-2,040)	-4,97** (-2,160)
persever1b			-13,027*** (-3,340)	-12,913*** (-3,326)
Motivat			11,707 (0,904)	11,218 (0,874)
Himoted			1,582 (0,232)	1,335 (0,196)
Lomoted			2,005 (0,367)	1,913 (0,350)
Hifated			10,764 (1,638)	10,500 (1,596)
Lofated			-6,842 (-1,178)	-6,837 (-1,177)
motwork			5,214 (0,928)	4,999 (0,893)
Fatwork			4,605 (0,730)	4,644 (0,736)
book25			39,528*** (5,593)	39,332*** (5,536)
constant	455,598*** (66,897)	455,676*** (66,529)	447,604*** (32,035)	448,929*** (32,072)
Random effects	No	No	No	Si
Students	1108	1108	1108	1108
Schools	179	179	179	179

Notes: \*\*\*, \*\*, \* denote ratios significant to 1%, 5% and 10% respectively. The values in brackets are statistics with individual significance. Source: PISA (2012) database

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