The Role of Sociability and Social Interactions for Financial Literacy*

Apostolos Drakos

University of Ioannina, Department of Economics†

Abstract

Financial literacy is an essential life skill in modern age and is increasingly encouraged to be cultivated at a younger age than it was a couple of decades ago by many individuals and worldwide organizations, such as the OECD. There are many channels that can affect a teenager's financial proficiency levels, among which the availability of a financial literacy course at school or social interactions at school or home. I use data from the 2012 PISA financial literacy assessment to find out if, and to what extent, sociability and social interactions affect performance in the financial literacy course. The demographic characteristics of the student impact significantly financial literacy performance, with girls, repeaters and students with an immigration background performing worse in the assessment. On the other hand, higher socioeconomic status is associated with better performance in financial literacy. Social interactions in the 2012 PISA assessment are captured by several statements to which students are requested to provide an answer regarding how often they perform certain tasks or whether they agree or disagree with said statements. Talking about or helping your friends with mathematics positively affects financial literacy performance while those who agree that their friends work hard on mathematics, perform worse in financial literacy. Furthermore, students who feel lonely or left out at school also perform worse in financial literacy. Interestingly, discussing money issues, whether it be with your parents or your friends, does not affect financial literacy performance. Overall, although not all variables are statistically significant for the financial literacy course, results from most of those variables that are significant, suggest that performance in the financial literacy course is affected much more than performance in the remaining two courses that were part of the assessment, namely mathematics and reading comprehension.

Keywords: financial literacy; PISA; social interactions; peers

JEL Classification: A21; I25

*The findings, interpretations, opinions and conclusions presented in this paper are entirely those of the author. All errors are my own.

†University of Ioannina, Department of Economics, Panepistimioupoli Ioanninon, 45110 Greece, contact e-mail: drakos.apostolos@gmail.com

1 Introduction

The economic and financial environment has changed dramatically over the past few decades. People now-days have access to a wider variety of financial products regarding several different aspects of the individual's economic life; from new ways and available markets to invest in or borrow money from, to more prosperous, individually-centered retirement plans than compared to twenty or thirty years ago. Despite the fact that the financial market continues to adapt and offer new alternatives as times demand, the amount of people that take advantage of such opportunities in various parts of the world remains pretty limited. The majority of the products are more sophisticated than their equivalents from years past or completely new, demanding more knowledge and higher expertise on the individual's behalf in order to be fully exploited.

Lack of (any or extensive) financial education and it's impact on financial decisions is highlighted by many researchers over the past, at least, half-a-century. From lower stock market participation (Van Rooij, Lusardi, and Alessie, 2011) or higher risk aversion groups (Almenberg and Dreber, 2015), to instances of money-borrowing at higher than normal interest rates (Stango and Zinman, 2009), these are just a few examples of how financial illiteracy can negatively affect financial decisions. Outcomes such as the previous are more likely to occur among women or less-educated individuals (Mitchell and Lusardi, 2015), raising the alarm for these groups which can potentially lack even more behind on financial awareness.

Understanding and emphasizing the importance of financial literacy is only the first part of the process to produce a more financially literate and active population. The argument that those foundations should be laid pretty early during the life cycle is supported by many individuals as well as global organizations such as the OECD and the International Network for Financial Education (INFE), one of its branches. Financial literacy programms at the school curriculum are becoming more common these days, with results being rather encouraging (Kalmi, 2018). In order to assess the current situation at the school level as well as the impact of such intervention, the OECD has opted to include financial literacy in its triennial PISA survey since 2012.

Besides education, however, another important factor that can help forge an individual's financial profile is his/her social cycle. As with many aspects of life, people tend to discuss financial issues with their families and/or their close social group. This interaction may provide some thoughtful insights which can have an impact, either directly or indirectly, on the financial decisions an individual makes. While at school, it is most commonly perceived that students discuss financial issues mainly with their parents. The PISA 2012 data set confirms this belief as students opt to discuss such issues mostly with their parents; after them follow their peer groups which include their friends and/or their school- and classmates. There are, therefore, several channels through which financial

information can reach the individual besides directly through education. Arguably, information exchanged through communication with said groups can have equally important results in shaping not only the financial profile of the individual, but also directly impact school performance as do financial literacy programms themselves. In recent years, there has been increased interest to exploit the vast information provided by the PISA programme regarding the financial literacy performance of students. The majority of those approaches center around the demographic characteristics of students. Despite the fact that the PISA data set provides substantial information on how social interactions at school affect school performance across several courses, including financial literacy, this perspective remain untouched. This research attempts to fill that gap. By using data from the PISA 2012 financial literacy assessment, the first large-scale international survey for financial literacy competences, I seek to uncover the effect of social interactions on student performance at the financial literacy course. Results from the remaining two courses that were also part of this survey, mathematics and reading comprehension, are used alongside those of the financial literacy course to compare the impact of sociability on general school performance. This is, to my knowledge, the first attempt on such an approach using the PISA 2012 data set.

As most, if not all, variables that capture social interactions are categorical, I opt to create dummy variables out of them by clustering similar answers into one category. Most of the statements involved around social interactions were offered to different samples of students, therefore estimating more than one of those variables at the same time would generate a substantially small sample compared to the original one which is not ideal. Therefore, with the exception of a group of variables which were offered to the same subsample, I estimate every other variable on its own. The estimation method I use is OLS and the model used for the estimations of the sociability variables controls for school fixed effects.

Since previous research concludes that the demographic characteristics of students are important predictors of school performance, I include several of those characteristics in my research. I find that my results align with those of the majority of the literacy as, with the exception of some dummies which denote the grade that a student attends, all demographic characteristics are statistically significant across all three assessed courses. Female students do not perform as well as males in financial literacy, same as the repeaters and immigrants while students from a household with higher socioeconomic status perform better. When it comes to the social interactions, results are mixed. Most of the variables used herein to capture social interactions seem to be significant for financial literacy performance. Helping your friends with mathematics increases performance in the financial literacy course while feeling lonely at school negatively impacts financial literacy performance. Participating in social networks outside of school affects only financial literacy performance whereas discussing money matters either with your parents or friends does

not impact financial literacy performance. Arguably though, the most important result is that, besides some variables which are directly related to mathematics, all other variables impact performance on the financial literacy course more than in any of the remaining two courses.

Some of the results are rather encouraging while others are alarming and should be treated accordingly by policymakers. Evidently, besides the direct effect of educational policies on school performance, some effects pass through the social channels at school which can affect students' academic career. Although it may not be easy to directly manipulate social interactions through educational policies, the benefits of more socially active individuals would be more than apparent in future cases of similar surveys. Further research upon this direction is mandatory in order to create and/or improve educational policies to achieve not only higher totals of financial literacy levels but also close the gaps between lower and higher performing groups as well as, and more importantly, provide students with the mandatory financial education that the current time period demands.

The remainder of this paper is organized as follows: Section 2 mentions aspects of the relevant strand of the literature; Section 3 describes the data and presents summary statistics. Section 4 describes the econometric model used for the estimations. Section 5 unfolds the empirical findings. Finally, Section 6 concludes.

2 Literature Review

The part of the literature that uses PISA as a means of analysis for financial literacy is still limited, since results from the first implementation of the programme (2012) came in 2014. Despite that, the vast information that is made available through the results to the researching community allows for many different approaches when questioning the results of 15-year-old students on financial literacy.

One of the very first papers that belongs in this part of the literacy comes from Lusardi (2015). In this paper the author provides an overview of the programme as well as some comments on the results of the first wave of financial literacy assessment. Development of the programme started by providing a definition of financial literacy which was characterized by four innovative aspects compared to other definitions up until that time. The next step involved the three dimensions (content, processes, context) that were considered for the design of the assessment along with the response formats adopted (constructed-response questions and selected-response questions) for its implementation. After providing this information the author opts to discuss three of the main findings that the first wave of PISA FL offered regarding the factors that explain financial literacy among 15-year-olds. Firstly, results suggest that FL performance does not seem to be affected by per capita GDP (as a variable, it explains below 20% per cent of the variation in financial literacy mean performance). Despite the fact that as per capita GDP increases

so does mean performance on PISA FL, there are examples of countries (Latvia, New Zealand) that are less rich than others (United States, Spain) but have higher mean performance than them. Secondly, there seems to be no gender differences across the countries when talking about mean performance in financial literacy with the exception of Italy, where girls are outperformed by boys on average. Results also show that boys outnumber girls on both ends of the proficiency levels (level 1 being the lower, level 5 being the higher). Lastly, PISA FL results confirm the importance of the socioeconomic status of an individual and it's impact on the student's FL results. The author concludes by stating the importance of the first wave of PISA results and their ability to serve as a benchmark for future findings and how they can be used by governments for educational reforms.

An early attempt to identify key determinants of financial literacy came by Lusardi and Lopez (2016) who utilized data from the 2012 PISA FL on 15-year-old high school students in the United States for that purpose. US students perform, on average, at the same level as the OECD average (492 and 500 respectively) but report a large variation in performance, with only one in ten students performing in the highest level of proficiency (level 5), and a bigger percentage (18 per cent) of students that perform below the baseline level (level 2) compared to the 15 per cent OECD average. Their analysis includes three groups of variables, demographic characteristics, socioeconomic status of the household and school characteristics, and is performed in three ways. A descriptive analysis suggests that, from the demographic characteristics, the level of familiarity with the language seems to affect the level of financial literacy of the student. Regarding the socioeconomic group of variables, the authors report a strong link between financial literacy and socioeconomic status with higher status leading to better performance on the financial literacy assessment as students that perform at or below the threshold (level 2) live, on average, in households characterized by worse socioeconomic status that the average household in the US. School characteristics do not seem to be important predictors of financial literacy performance. The multivariate analysis shows roughly the same results in terms of significance for the demographic and socioeconomic groups of variables while, regarding the school characteristics, a proportional increase of math teachers by 10 per cent in a school boosts financial literacy performance of students, although marginally (8 points). Finally, the ordered probit analysis highlights the importance of access to information for a student, as owning a computer and having more than 100 books at home increases the probability of the baseline student, as described by the authors, to reach a higher level of financial literacy proficiency.

Pesando (2018) conducted the first study, to my knowledge, regarding student's perceived value of schooling, using data from the PISA FL for Italian students combined with data from several other sources such as SIOTEC, ISTAT and ADS. For her analysis, she relied on proxies of this value provided by the data on PISA FL in order to examine

if financial literacy affects the tendency of school-skipping, the amount of time students allocate to homework when not at school and the student's attitudes towards school. To avoid problems such as reverse causality and omitted variables bias, she opts for OLS estimates with an instrumental variable (IV) approach providing 4 models, each adding a different set of explanatory variables. The model specifications provide evidence of a positive relation between financial literacy and the value that students place on schooling, with the IV approach providing results triple or quadruple in magnitude compared to the OLS specification. Students with higher proficiency levels in financial literacy tend to skip school far less, are punctual at school and devote on average 1 or 2 more hours per week on out-of-school study time. On the other hand, when controlling for endogeneity through regional or individual-level variables, relationship between financial literacy and attitude towards school tends to fade, a result that the author attributes to reasons such as a non-valid approximation of student's perceived value of schooling through questions concerning their attitude towards school, or the fact that an individual's behavior is more easily measurable than attitudes.

The implementation form of a financial literacy programme in school is a dimension that attracted the attention of the researching community, once the results from the first PISA FL wave were made available.

Molina Marfil, Marcenaro Gutierrez, and Martin Marcos (2015) are interested in identifying the variables that are related to better results on financial literacy along with their connection to those (variables) on previous assessments of different competences, and also how are the financial literacy results affected by the different types of financial education in the educational systems of the 13 OECD countries that participated in this assessment, in order to positively influence future educational policies. Control variables related to the student's characteristics include the socioeconomic level of families, sex, a dummy for students who reported to have repeated at least one school year and whether the student is an immigrant or not. Regarding the educational center, they divide the variables in two groups, one related to the availability and implementation type of financial education in the school while the second group comprises the types of schools depending on their ownership along with the peer effects of students. Their estimates are provided through the use of multilevel regression and a second estimation strategy which involved three progressive models for each country, each adding an extra set of control variables. Results from their estimations note that the worst performers, across nearly all countries, are students with a lower socioeconomic index, students that repeat grades and the immigrants, while eight of the thirteen countries show significant differences in gender in favor of the males. Peer effects show a positive and significant sign on financial literacy results while the type of school (public, private or private with public funding) is only partially relevant. Including financial education courses in math or social science classes seems to not affect the results in the same significant way as a separate economics course for the

majority of the countries. Results also suggest that even the most relevant implementations of inclusion policies regarding financial education at schools, despite their positive influence, still have very limited impact on improving performance (6.1 per cent being the best in the Flemish community of Belgium).

Cordero, Gil, and Pedraja Chaparro (2016) explored the effects of specialized courses, which provided basic financial concepts, on student achievement. Since their main focus depends on the availability of financial education courses, they rely on data from the PISA FL that depict such availability in all participating countries and also the form of implementation of such courses with the most common option reported being the cross-curricular approach. For their estimations, they rely on control variables that have significant explanatory power such as the index of socioeconomic background and gender. They base the construction of their main variable of interest, financial education availability, on information provided by the principals of schools that participated in the PISA programme and also create several dummies that indicate the form of implementation of such courses. They acknowledge the existence of problems such as omitted variables, reverse causality and selection bias and use as their estimation method a difference-in-differences (DiD) approach which allows for every student to be his/her own control group, while also applying a multiple mutation method to avoid problems related to missing values in some variables. Their results suggest a positive and significant effect of financial education courses on student results in financial literacy, something that is evident in every model implemented for their estimations. Regarding the implementation form of such courses, their results show that the best way is using a cross-curricular approach while the regulation of such courses as mandatory appears to be insignificant.

The two years following the first PISA FL wave (2013 and 2014), the Bank of Spain along with the Spanish Stock Exchange Commission offered a financial literacy program (BdE-CNMV) at Spanish schools that declared interest which consisted of a 10-hours course. Hospido, Villanueva, and Zamarro (2015) used this project to evaluate such an intervention on the student's financial knowledge. The program implemented a pre-test, post-test approach for its assessment and the main evaluation is provided by comparing results from the treatment group, students that received the class, with results from the control group. The control group consisted of students from two schools that did not offer the FL program but agreed to implement both the pre- and the post-tests. Students in the control group that had similar characteristics to those on the treated group were re-weighted before the estimation in order to provide more profound results. Estimation results show that the group receiving the treatment achieved a score of 5.24 compared to the 4.88 of the re-weighted control group with the difference between these two scores showing the impact of the program. Results also exhibit an increase in knowledge of non-arithmetic topics along with gains in topics such as banking relationships and of saving and financial planning, with sustainable consumption reporting a negative estimation

sign. Post-test results regarding private school students across the treated and the control groups show that the FE program had negligible effect on their scores, something that is mostly attributed to the type and level of implementation of the program in those schools. The authors challenge the selection bias that exists by using data from the 2012 PISA FL on schools that participated in both PISA and in the BdE-CNMV program and compare their results with the rest of the schools. Results suggest the existence of selection bias which affects inversely boys (positively) and girls (negatively). Re-weighting of the student sample though in order to achieve similar levels in a number of factors, such as admission criteria or grade repeaters among others, between schools that did not volunteer for the program and those that did (volunteer), results in the elimination of almost two thirds of the selection bias, thus providing more robust results regarding the influence of a financial education program and its impact on the student's financial knowledge.

Despite the fact that overall results suggest there exists no major differences in performance between boys and girls, the Italian schools showcase a significant gender gap on the financial literacy results.

The work from Bottazzi and Lusardi (2016) is one of the first that seeks to uncover the reasons for such a gender gap in financial literacy among Italian students. Italian schools had the second worse average performance in the first wave of PISA FL among the 18 participating countries while also reporting large regional differences, some of which exceed a whole proficiency level (more than 75 points). The PISA data set is used alongside data from other sources, such as the ISTAT, the Bank of Italy, the Excelsior Survey and other historical data to provide all the explanatory variables used in the estimations. Those variables are related to student and school characteristics, family background, peer effects (measured by the proportion of girls in the school), regional parameters and, finally, historical variables that are related to the gender gap in Italy in previous work. The OLS regressions show that boys perform better than girls even when macro regions are taken into consideration along with controls for student, school and family characteristics. Quantile regressions show that at the median (0.75) and the higher (0.95) end of the distribution, the gender coefficient is much larger which suggests that the difference in performance between boys and girls increases in the top of the distribution of financial literacy scores. The quantile regressions also provide information regarding the socioeconomic status which is insignificant but positive in the lower end but becomes large and significant in the upper end of the distribution. Girls are positively affected when their mother has a finance-related job, an effect that persists even when controlling for the girl's interest in math. The girl's results in financial literacy are negatively affected by a higher proportion of girls as peers but there is a positive, and significant (for girls only), peer effect connected to the frequency of discussion related to money issues between students and their friends. Students that are enrolled in the lyceum perform better than

the ones opting for other forms of schools while girls in particular benefit in their FL results when more time is devoted to math at school. Regarding the effect of the regional and local factors on the explanation of the differences in financial literacy between boys and girls, the authors report that political participation negatively affects girl's performance (boys are unaffected) while in regions where the cultural level is higher, the gender gap in FL decreases. Historical variables also support the gender gap in favor of the boys while when a Gender Equality Index is taken into account, regions that boast a high index report lower financial literacy for boys and higher for girls. Finally, regarding the student's experience with money, owning a credit card boosts FL performance for both genders while being more financially literate is associated with a higher tendency to save money although boys, despite being more financially literate than girls, do not report higher saving rates than girls.

The gender gap that exists among Italian students was the main motive of a research paper by Longobardi, Pagliuca, and Regoli (2018) as well. Their two main objectives were, firstly, to evaluate the effect of problem-solving attitudes on financial literacy performance for both genders and, secondly, to decompose the gender differential in financial literacy into contributions from measured and unmeasured factors. The control variables are taken from the PISA data and are formed into different groups. The most important group contains variables such as student's perseverance, their openness to problem solving and their familiarity with new technologies. For their first objective they employ OLS as their estimation method and, after that, an unconditional quantile approach. Results from the OLS regression show that males outperform females and that perseverance, openness to problem-solving and the type of school, among other variables, have a positive effect on FL performance. Results from the unconditional quantile regression suggest that the gender gap is bigger at the top of the distribution, with openness to problem-solving reaching its highest value at the median of the score distribution and perseverance severely affecting students at the bottom of the score distribution. They then approach their second objective firstly through an Oaxaca-Blinder and secondly through an FFL decomposition, a form of Recentered Influence Functions (RIF). The Oaxaca-Blinder decomposition regarding the explained components shows two main forces that work in the opposite way, one helping to widen the gap and the other helping to narrow it. The largest effect regarding the unexplained component derives from the difference in returns to both perseverance in problem-solving and the academic programme of the student with both gaps favoring the boys. Girls, on the other hand, have an advantage over boys, which is based on their observable characteristics, but is reported only at the lower-end of the score distribution, as evidenced by the FFL decomposition. Despite girls showing more favorable characteristics over boys, they tend to perform worse than them in FL due to lack of perseverance mainly. In that context, the authors suggest that educational reforms should opt to improve girl's approach towards problem solving but warn that

even equal endowment levels between the two genders cannot narrow the gender gap in financial literacy performance unless girls achieve the same yields as boys in terms of said performance.

As important as cognitive factors are, personality traits are also equally important when shaping an individuals financial background and behavior. One such personality trait is the individual's self-confidence. A (working) paper from Arellano, Cámara, Tuesta, et al. (2014) analyses the effects of self-confidence on young people's performance on financial literacy by using PISA data on students residing in Spain. Their key explanatory variables measure self-confidence on 4 different levels, perseverance and motivation of the student and are all used as dummies. They use data available from PISA, including questions answered as DK/DA ("I don't know", "I don't want to answer") because they provide important information regarding the student's self-confidence. 4 models are deployed for their estimations, all of them containing fixed effects of individual and family characteristics while the 4th also includes random effects of the school characteristics. Overall results suggest that students with higher levels of self-confidence perform better in financial literacy tests. Also, self-confidence in its broader sense is the variable with the biggest impact on the test results. However, there is a threshold of self-confidence, above which students run the risk of overconfidence which could lead to irrational behavior and negatively impact their FL performance, indicating the existence of diminishing returns to scale for this variable. Results also support other parts of the literature that indicate a significant effect on financial literacy results from socioeconomic and environmental characteristics as well as the importance of gender on said results. They conclude their work by acknowledging that individuals do not have perfect knowledge of their abilities, something that may result in better decisions from people with higher self-confidence but lower levels of knowledge compared to the opposite combination of those two factors.

The immigration status of students is also considered an important aspect that affects financial literacy performance because in most cases, immigrant parents originate from countries with lower FL levels, therefore penalizing their kid's results. Gramatki (2017) is the first, to my knowledge, who seeks to address the existence of a gap in financial literacy performance between immigrant students and natives and why this is the case by using data from the first wave of PISA FL. He uses one of the five plausible values for FL as the main dependent variable while the most important independent variable characterizes the student's immigration status. Other important explanatory variables include the generation of the immigrant (first-generation or second-generation) along with various student, family and school characteristics. Results of math and reading from PISA are also taken into account for comparison reasons. Acknowledging problems such as omitted variable bias and reverse causality, among others, the author proceeds with two distinct estimation methods, a simple OLS at first followed by a Propensity Score Matching (PSM) estimation method. OLS estimation results suggest that there is a 12-point-gap between natives and

immigrants in favor of the first group while the same gap increases when considering only first generation immigrants to 18 points but drops significantly, at a 7-point difference, for the second generation immigrants. With the inclusion of country and region-level fixed effects, the gap is no longer statistically significant though, suggesting that some countries have managed to integrate immigrants better than others. Partialing out the reading performance of the test does not affect the performance gap in FL but when the math results are partialed out, the gap between natives and immigrants evaporates, suggesting that numeracy is a key channel through which financial literacy performance is affected. The PSM estimation results indicate that the unexplained gap in financial literacy between the two groups is close to just 7 points while the gap corresponding to the first-generation immigrants becomes insignificant. The author concludes by noting the differences in performance gaps that arise through the migrant integration processes of countries as well as the importance of numeracy skills and its effects on the general educational ability of both native and immigrant groups of students.

3 Data

Financial literacy is most commonly perceived as the ability to process economic related information and make decisions regarding different financial aspects of an individuals life. A few examples of such decisions include stock market participation, wealth accumulation and pension planning. Yet financial literacy is a much broader concept than that, something that is evident in the definition used by the OECD in the PISA Financial Literacy Assessment Framework for 15-year-old students, which states: "Financial literacy is knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life" (OECD,2014).

It is evident therefore that financial literacy is an essential and indispensable life skill not only for the young, but across all age groups. It is also a key factor related to economic and financial stability at both individual and aggregate economy levels. An example that shows it's importance on both those levels is the 2008 financial crisis which associates poor financial decisions, partly due to individual's financial illiteracy, with the negative implications that derive from those on the aggregate level of the global economy. In order to avoid such circumstances from reoccurring in the future, governments and financial institutions require a form of measurement of an individual's financial literacy level in order to assess the current situation and move in the direction dictated by the currently fast-evolving financial market.

One such method is the PISA assessment, a triennial survey established by the OECD. The Programme for International Student Assessment (PISA) was implemented for the

first time in the year 2000 with more than 40 countries and economies taking part in it. Those included both OECD member countries and other partner economies, a trend which continues to date. PISA's main goal is to assess students near the end of compulsory education on the extent of skills and key knowledge they have acquired and that are deemed essential for the modern-day society across the fields of mathematics, reading comprehension and science. Another extension of the assessment is it's ability to examine how well students can extrapolate from what they have learned and how to apply that knowledge in unfamiliar settings, related to both in- and out-of-school activities.

In the year 2012, for the first time, PISA included an optional financial literacy assessment along with its core survey. The financial literacy assessment in PISA 2012 offered the first ever international assessment of the financial knowledge and skills of 15-year-old students. Due to its optional character, the financial literacy assessment was implemented in a much smaller scale than the core assessment fields of math, reading and science: approximately 29.000 students from 5.260 schools participated across 13 OECD countries and economies (Estonia, the Flemish community of Belgium, the Czech Republic, France, Italy, Israel, Australia, New Zealand, Slovenia, the Slovak Republic, Spain, Poland and the United States) and 5 partner countries and economies (Croatia, Latvia, Colombia, the Russian Federation and Shanghai-China). Students participating in the assessment are required to be between 15 years and 3 completed months to 16 years and 2 completed months of age, with an allowed variation of up to one month. The number of students from each school ranges from as low as 1 student per school up to as high as 20 students per school, with the average amount of students from each school that participated in the financial literacy assessment standing at 6 students.

In all countries, the sampling design implemented for the PISA assessment was a two-stage stratified sample design. The only exception to this design was reported in the Russian Federation. The first stage concerned the schools that would participate in the PISA assessment. Schools were sampled with probabilities that were proportional to a measure of size, which was a function of the estimated number of 15-year-old students enrolled in the school that were eligible to participate in the assessment. This is referred to as systematic Probability Proportional to size (PPS) sampling. The second stage sampling consisted of students within the sampled schools. Every country that participated had a Target Cluster Size (TCS) which was typically in the region of 35 students; if a country had less than that, all students on the list were selected. For countries that took part in the optional financial literacy (FL) assessment, the TCS was increased in every school that was sampled in order to achieve the required student sample size required for FL.

The test design that was adopted for the PISA 2012 assessment offered specifications concerning both the arrangement and the volume of material needed in each domain (math, reading, science, problem solving and financial literacy) that was to be tested as well as the test mode that was to be employed which could be one of two alternatives,

paper- or computer-based. Those specifications required the development of sets of items , referred as "item clusters", in every domain of the test, each of which would need to occupy a predetermined amount of test time. The specifications also determined how the item clusters would be arranged in test booklets (referring to the paper-based components) and in test forms (referring to the computer-based components). In total, 13 booklets were available for the core part of the assessment. Those were handed at random to students and required approximately two hours to be completed. In addition to those booklets, the committee also created a special one-hour booklet which was made available in schools caring for students with special needs. Countries that opted to take part in the optional financial literacy assessment were administered an additional four booklets, each consisting of two clusters of financial literacy items as well as one cluster of reading material and one cluster of mathematics material. As with the core domains, a special one-hour booklet was prepared for use in schools caring for students with special needs.

The final design of the PISA assessment was focused on covering three dimensions of financial literacy : i) the content, associated with the concepts of knowledge and understanding which are important for financial literacy. This dimension comprised of four areas, namely money and transactions, risk and reward, financial landscape and planning and managing finances. ii) the processes, a dimension that refers to the student's mental approach to the given material, related to analyzing information in a financial context, identifying financial information, evaluating financial issues and applying financial knowledge and understanding. iii) the contexts, referring to the situations in which financial knowledge, skills and understanding are applied. This dimension is divided in four groups: education and work, home and family, individual and societal.

The structure of PISA does not allow the use of a single value as a reference for the student's results by construction, since each student only replies to a certain number of questions (derived from the available pool) 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 per domain (math, reading, science, financial literacy) are obtained from the distribution for each student. These values are called plausible values (PV). The five plausible values of the domain of interest must be used in the estimation process in order to avoid problems associated with biases and inefficiency (OECD, 2009). The plausible values that are generated for each student are not test scores and should not, under any circumstances, be treated as such. They are random numbers drawn from the distribution of scores that could be reasonably assigned to each individual. As such, plausible values contain random error variance components and are not as optimal as scores for individuals. Plausible values as a set are better suited to describing the performance of the population. To control for problems such as inefficiency and biases, PISA's database provides 80 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 in order to complete the booklets.

Before moving on to the description of the variables used in this paper, it is of utmost importance to provide information regarding the data entry quality control and more specifically the treatment of Not Applicable (N/A) data as they represent a large amount of the observations in certain key variables. As reported in the PISA 2012 technical report : "[...]Code 7 (Not Applicable) was reserved for cases when a student was unable to provide a response through no fault of their own, such as when a poorly printed item presented to the student was illegible.[...]The data of an unresolved systematic error for a particular cognitive item was replaced by the <Not Applicable> code.[...] If the country deleted a variable in the questionnaire, it was replaced by the <Not Applicable> code. If the country changed a variable in the questionnaire in such a way that it could not be re-coded into the international format, the international variable was replaced by the <Not Applicable> code."

Table 3.1 provides summary statistics for some student characteristics that are important for educational purposes, the plausible values of the assessed courses (mathematics, reading comprehension, and financial literacy) as well as several variables that denote the sense of belonging at school or social interactions among peers. The Table reports the number of observations, the mean, the standard deviation as well as the minimum and maximum values of each variable.

The average age of the students that participated in the PISA 2012 FL assessment is well above 15 years old and creeps closer to 16 years old (about15 years and 9 months). The upper and lower age boundaries match the description provided earlier on in this Section. Female is a dummy which takes value of 1 when the student is a girl. The sample of students is equally divided between boys and girls (50.3% are girls) which is helpful when examining results regarding gender as there is no oversampling of a certain sex. There are very few students (about 0.5%) that reported attending the 7th grade during the assessment while 8th graders represent 3% of the sample. 9th grade students make up almost one third of the sample size (29.8%) while more than half of the sampled students (55.3%) attend 10th grade. 11th graders sum up to 11% of the sampled students. The rest of the students that attend either the 12th or the 13th grade add up to a total of about 50 students and serve as the omitted categories along with very few students that are reported as ungraded in the database. 15% of the students have some immigration background, either being a first or a second generation immigrant. ESCS denotes the socioeconomic and cultural index of the parents and has the same composition since PISA 2003, namely it consists of home possessions, the highest parental occupation and the highest parental education expressed as years of schooling. The Table shows that the average household has a marginally negative ESCS index.

The average of the plausible value in mathematics is 480 points with student per-

formance ranging from as low as 26 points to as high as 890 points. The corresponding average for reading comprehension stands at 492 points with student performance ranging from 8 points, the lowest minimum among the three assessed courses, to 844 points. The average plausible value for financial literacy is 485 which is not far off the OECD average of 500 points. As with the assessments of mathematics and reading comprehension, financial literacy also reports a substantial difference between the worst (22 points) and the best performing student (838 points) while it also has the lowest maximum plausible value among the three assessed courses.

Finally, the Table reports summary statistics for the sociability and social interactions variables which are divided into five groups, based on their nature. All social interactions variables are categorical. The original response categories include 4 or 5 available answers and are coded 1-4 or 1-5. I create dummies by clustering similar answers such as "strongly agree" and "agree" or "strongly disagree" and "disagree". For variables that refer to quantity of time, I assign the 0 category to answers denoted as "never or hardly ever" or "never or rarely", depending on the original response categories, while I cluster every other possible category, except from missing values, in the 1 category. An important thing to note is that all of the sociability and social interactions variables report different numbers of observations among them. This is observed because most of those statements were offered to different sub-samples of students, therefore the number of respondents in each statement varies depending on the sample.

Two of the statements ("Help friends with mathematics", "Talk about mathematics with friends") were associated with the student's mathematics behavior at- and out of-school. The original response categories, coded from 1 to 4 respectively, are "Always or almost always", "Often", Sometimes" and "Never or rarely". Through the aforementioned clustering, students who answered "Never or rarely" are assigned in the 0 category while students who gave any of the remaining available answers are assigned in the 1 category. From Table 3.1 we can see that 71% of students help their friends with mathematics at some level while the rest 29% never or rarely helps their friends with mathematics. Regarding the second statement of this group, almost 60% of students report that they are talking about mathematics with their friends compared to the rest 40% of students who never or rarely talk with their friends about mathematics.

Two statements ("Discuss money matters with parents/guardians", "Discuss money matters with friends/peers") captured the frequency with which students discuss money matters, such as saving, banking and investment or spending, with their parents/guardians or their friends/peers. The available response categories were "Never or hardly ever", "Once or twice a month", "Once or twice a week" and "Almost every day", coded 1-4 respectively. Students who discussed money matters at least once or twice a month with their parents or friends are assigned in the 1 category while students who never or hardly ever discuss money matters with their parents or friends are assigned in the 0

category. Table 3.1 shows that 83% of students discuss money matters with their parents or guardians at least once or twice a month while the equivalent percentage for students who discuss money matters with their friends is about 55%.

Three statements ("Friends enjoy mathematics tests", "Friends work hard on mathematics", "Friends do well in mathematics") were involved with subjective norms in mathematics and their response categories were "Strongly agree", "Agree", "Disagree" and "Strongly disagree", coded 1-4 respectively. Students who strongly agreed or agreed are assigned in the 1 category while those who (strongly) disagreed populate the 0 category. Only 13% of students agree that their friends enjoy mathematics tests while almost half of the sample (45.6%) agrees that their friends work hard on mathematics. Finally, almost 55% of the sampled students agree that their friends do well in mathematics.

Another set of statements ("Feel like an outsider", "Make friends easily at school", "Liked by other students", "Feel lonely at school") captured student's sense of belonging at school. Those statements provided the same response categories as the previous group, namely "Strongly agree", "Agree", "Disagree" or "Strongly disagree", with the same coding (1-4 respectively). Clustering of the answers follows the same pattern as in the above category. 11.4% of the sample feels like an outsider at school and 9.4% of the sample feels lonely at school. 88% of the sampled students find it easy to make friends at school while almost the same percentage of students (86.8%) agree that other students seem to like them.

The final set of statements ("Play one-player games", "Play collaborative games", "Chat on-line", "Social networks participation") involved students' out-of-school Information and Communication Technology (ICT) usage for entertainment. The response categories for this set of statements were centered around time spent on each activity. More specifically, the response categories were "Never or hardly ever", "Once or twice a month", "Once or twice a week", "Almost every day" and "Every day", coded 1-5 respectively. Students who reported an involvement level of "Never or hardly ever" are assigned in the 0 category while students who answered with any of the remaining available categories are assigned in the 1 category. Students that play single player games at least once or twice a month make up 60.9% of the sample while the equivalent percentage for collaborative games stands at almost half of the sample (48.6%). Students that never or hardly ever chat on-line are a small proportion of the sample (only 18.5%) while students who use social networks at least once or twice a month constitute 88.9% of the sample.

Table 3.1: Summary statistics

	No of obs	Mean	St. dev.	Min.	Max.
Plausible value in Mathematics[a]	28705	479.611	98.360	25.827	890.410
Plausible value in Reading comprehension[a]	28705	492.290	98.320	8.448	843.984
Plausible value in Financial Literacy[a]	28705	484.677	99.664	22.214	837.681
Age	28705	15.816	0.289	15.25	16.33
Female	28705	0.503	0.499	0	1
Immigration background	27937	0.151	0.358	0	1
ESCS[b]	28423	-0.047	1.000	-4.91	3.11
7th grade	28705	0.005	0.076	0	1
8th grade	28705	0.029	0.169	0	1
9th grade	28705	0.298	0.457	0	1
10th grade	28705	0.553	0.497	0	1
11th grade	28705	0.110	0.313	0	1
Help friends with math	18684	0.710	0.453	0	1
Talk about math with friends	18707	0.594	0.491	0	1
Discuss money (parents)	12654	0.830	0.375	0	1
Discuss money (friends)	12390	0.549	0.497	0	1
Friends enjoy math tests	18783	0.130	0.336	0	1
Friends work hard on math	18791	0.456	0.498	0	1
Friends do well in math	18818	0.548	0.497	0	1
Feel like an outsider	18593	0.114	0.318	0	1
Make friends easily at school	18624	0.880	0.324	0	1
Liked by other students	18554	0.868	0.338	0	1
Feel lonely at school	18573	0.094	0.292	0	1
Playing one player games	23336	0.609	0.487	0	1
Playing collaborative games	23298	0.486	0.499	0	1
Chat on-line (out of school)	23248	0.815	0.387	0	1
Social networks (out of school)	23285	0.889	0.314	0	1

Note: Summary statistics using final student weights.

[a]: Created using the average of five PISA plausible values

[b]: ESCS stands for PISA index of economic, social and cultural status.

4 Econometric Model

The linear baseline model for student $i = 1, ..., n$ in school $s = 1, ..., S$ and for course $c = mathematics,\ reading\,comprehension,\ financial\,literacy$ is the following:

$$y_{i_c s} = \beta_0 + \beta_1 age_{is} + \beta_2 fem_{is} + \beta_3 imback_{is} + \beta_4 ESCS_{is} +$$

$$+ \beta_5 grade7_{is} + \beta_6 grade8_{is} + \beta_7 grade9_{is} + \beta_8 grade10_{is} + \beta_9 grade11_{is} + \alpha_s + \varepsilon_{i_c s} \qquad (4.1)$$

where $y_{i_c s}$ is the student's performance, as measured by the 5 PISA plausible values, in the three available courses of mathematics, reading comprehension and financial literacy. Variable *age* measures students' age in years while fem is a dummy variable that takes value 1 if the person is female. Variable *imback* captures the immigration status of the student, taking value 1 if the student reported having an immigration background. $ESCS$ denotes the economic, social and cultural status of the students' parents. Variables $grade7 - grade11$ are dummies which take value 1 if the student reported attending grade 7 to 11 respectively. Available grades were every grade between 7th and 13th although grades 12th, 13th as well as a few students that did not report their grade and were marked as ungraded, serve as omitted categories for the estimations. The reason for choosing more than 1 category as "omitted" was due to the small amount of students that reported attending those grades and/or being ungraded. Term α_s captures school fixed effects. By including school fixed effects in the estimation, I control for unobservable characteristics at the school level such as the quality of the school or whether the school offers a course on financial literacy. Parameter β_0 serves as the constant term while $\varepsilon_{i_c s}$ is the independent and identically distributed (iid) error term. Parameters $\beta_1 - \beta_9$ are coefficient scalars which capture the magnitude of the variable's effect on the students' performance.

4.1 Identification and Estimation

This paper uses OLS as the estimation method. Below, I discuss the assumptions needed for the OLS estimator to be consistent and unbiased.

Firstly, the model is linear in the coefficient terms (no squared or higher power terms). Random sampling is guaranteed through the implementation process of the PISA survey (see OECD, 2014a). Inclusion of a constant term in the estimations guarantees that the mean of the error term is zero. Endogeneity-related issues in this here application appear in the form of simultaneity between the dependent variable and some explanatory variables, omitted variable bias and measurement error.

Variables that are exogenous or predetermined, such as the demographic characteristics of a student or their family background, do not generate simultaneity issues. There are variables though that have the potential to create simultaneity issues in this application. One such example is the variable that measures the frequency with which a student helps his/her friends with mathematics. Arguably, the better you perform in PISA, the more likely you are to help your friends since you become better in mathematics. The same can be said, respectively, for the variable that measures the frequency with which a student talks about mathematics with their friends. The better you perform at PISA, the more eager you are to share your experiences and knowledge on mathematics with your friends.

There are a couple of different factors responsible for producing omitted variable bias issues. The most important one is that the PISA plausible values for the assessed courses are only proxies of true student ability, derived from a continuous distribution of scores. This means that true student ability is unobserved in this survey. Also, since the data are cross-sectional, one cannot control for unobserved student characteristics, such as their school or academic related preferences, that might play an important role on PISA performance. The cross-sectional nature of the data only allows to control for school unobserved characteristics. Therefore, part of the issue generated by omitted variable bias is addressed by using school fixed effects. Elimination of this bias though is not possible due to unavailability of data from the conducted survey. Measurement error in the explanatory variables is an issue that affects every survey and there is no genuine way to account for it.

There are no high correlations reported among the explanatory variables which effectively suggests that there are no multicollinearity issues in the model. Finally, in order to account for possible heteroskedasticity because of employing student final weights in the estimations, I use robust to heteroscedasticity standard errors. Another important issue herein is the treatment of N/A (see Section 3) and invalid data entries. Not applicable (N/A) entries are excluded from estimations while invalid entries are treated as missing values.

Finally, in all estimations, I use student final weights provided by the PISA data set. The way that the student final weights are created ensures that the probability of selection in the survey does not vary among students and also that every student who is sampled represents an appropriate number of students from the total population. Weighting the sampled population also ensures that bigger/smaller countries do not bias upwards or downwards the results due to a larger/thinner amount of student participation in the sample. An important detail concerning the countries that opted to participate in the financial literacy study is that student weights were adjusted "depending on whether the student was sampled for financial literacy or not" (OECD, 2014a) because "the financial literacy sample was also designed to represent the full PISA student population" (OECD, 2014a).

Since the data set consists of more than 5000 schools, the usage of school dummies as a means to control for school fixed effects is not optimal. Instead, I opt for the removal of school fixed effects by subtracting the school mean from each variable (within transformation). First, I create the school mean for each variable and then I subtract it from the variable itself. The within transformed equation on the student level is:

$$\ddot{y}_{i_c s} = \beta_1 a\ddot{g}e_{is} + \beta_2 f\ddot{e}m_{is} + \beta_3 im\ddot{b}ack_{is} + \beta_4 E\ddot{S}CS_{is} +$$

$$+ \beta_5 \ddot{grade7}_{is} + \beta_6 \ddot{grade8}_{is} + \beta_7 \ddot{grade9}_{is} + \beta_8 \ddot{grade10}_{is} + \beta_9 \ddot{grade11}_{is} + \ddot{\varepsilon}_{i_c s} \quad (4.2)$$

where $\ddot{y}_{i_c s} = y_{i_c s} - \frac{\sum_{i=1}^{n_s} y_{i_c s}}{n_s}$ and similarly for every explanatory variable as well as the error term. Schools with a single student are kicked out when controlling for school fixed effects and therefore are excluded from estimations. The total number of excluded schools is 336.

The within-transformed equation 4.2 is estimated, as mentioned above, using OLS. PISA plausible values estimations are based on the demeaned multiple (5) imputed values of each course according to PISA. The same method (OLS) is used when estimating the effect of sociability and social interactions variables on student's performance.

5 Empirical Results

Table 5.1 presents the results from the OLS estimation and provides some insights regarding basic student characteristics as well as educational parameters and their effect on the three assessed courses. For each of the three courses (mathematics, reading comprehension, financial literacy) the Table reports two specifications of the model; the former is one that does not control for school fixed effects and the latter is one that does. As mentioned in Section 4, grades 12, 13 as well as ungraded students serve as the omitted categories.

Table 5.1: The effects of Basic Student Characteristics on PISA Plausible Values in Mathematics, Reading Comprehension and Financial Literacy

	Plausible Value in Mathematics		Plausible Value in Reading comprehension		Plausible Value in Financial Literacy	
Age	-2.884	-11.377***	-20.006***	-18.816***	-6.132	-11.069***
	(4.179)	(3.613)	(4.070)	(3.596)	(4.514)	(4.180)
Female	-19.715***	-22.372***	23.605***	20.870***	-6.739***	-9.834***
	(2.469)	(2.118)	(2.368)	(2.179)	(2.629)	(2.454)
Immigration background	-14.462***	-8.878**	-1.094	-12.115***	-10.183**	-12.730***
	(4.338)	(3.913)	(4.283)	(4.174)	(4.787)	(4.931)
ESCS[a]	34.845***	15.943***	36.335***	18.846***	37.166***	18.289***
	(1.250)	(1.354)	(1.261)	(1.392)	(1.413)	(1.581)
7th grade	-71.767**	-109.299***	-85.819***	-61.900**	-79.666***	-108.751***
	(28.963)	(28.951)	(25.856)	(28.196)	(21.821)	(23.226)
8th grade	1.534	-82.431***	-19.372	-32.989	-1.596	-70.264***
	(26.384)	(27.618)	(22.695)	(26.700)	(19.354)	(21.877)
9th grade	48.1923*	-44.986	24.170	-4.539	36.972**	-37.946*
	(25.834)	(27.396)	(22.261)	(26.457)	(18.701)	(21.540)
10th grade	71.493***	3.489	64.847***	39.119	64.428***	14.949
	(25.829)	(27.265)	(22.267)	(26.308)	(18.722)	(21.299)
11th grade	74.005***	31.591	77.863***	58.889**	78.520***	43.295**
	(26.214)	(27.100)	(22.677)	(26.240)	(19.391)	(21.443)
School fixed effects	NO	YES	NO	YES	NO	YES
No of observations	27,818	27,818	27,818	27,818	27,818	27,818

Note: Estimation with OLS including a constant term (not reported) and using five PISA plausible values as well as student final weights. Robust standard errors in parentheses. *** denotes significance at 1%, ** denotes significance at 5% and * denotes significance at 10%. Grades 12th and 13th as well as ungraded students are the omitted category. Schools with only one student are excluded from estimations.
[a]: ESCS stands for PISA index of economic, social and cultural status.

For the mathematics course, we can see that age has a negative sign on both columns although statistical significance for this variable exists, and is reported at the 1% level, only when controlling for school fixed effects. In that case, a one-year-older student performs worse by 11 points in the mathematics course. Being female is associated with lower performance as well and is a statistically significant variable at the 1% level across both columns. Female students performed worse by 22 points in the mathematics course compared to their male fellow-students when controlling for school fixed effects. Students with an immigration background perform worse than native students in the mathematics course. The effect of this variable is significant for both columns although, when controlling for school fixed effects, the significance level drops from 1% to 5%. Native students outperform immigrants by 9 points in the mathematics course in the latter specification of the model. The PISA index of economic, social and cultural status (ESCS) is a variable that positively affects student performance in mathematics and is statistically significant at the 1% level across both columns. When the ESCS index increases by 1 point, mathematics performance is boosted by 16 points when controlling for school fixed effects.

Students who report attending the 7th grade perform significantly worse in mathematics than the omitted categories. Estimated coefficients are statistically significant for both specifications of the model (at the 5% level for the former, at the 1% level for the latter). When controlling for school fixed effects, 7th graders are outperformed by the omitted categories by 109 points in the mathematics course. 8th graders have an insignificant positive difference to the omitted categories when there are no school fixed effects but they have a substantial, negative and statistically significant (at the 1% level) one when controlling for school fixed effects. In the latter case, 8th graders perform worse than the omitted categories in mathematics by 82 points. The estimated coefficient of students who attend 9th grade also reports a sign flip, from positive to negative when moving from an estimation that does not control for school fixed effects to one that does but the result is not statistically significant. Finally, both 10th graders and 11th graders perform better in mathematics than the omitted categories across both columns, albeit these results lose their high statistical significance (1% level) when moving from a model that does not control for school fixed effects to one that does.

I now report results concerning the reading comprehension course. As in the case of the mathematics course, age has a negative sign on both columns. For this course though, the effect is statistically significant across both columns at the 1% level. In the latter specification of the model, one year older students perform worse by 19 points in reading comprehension. In contrast to the mathematics course, being female has a positive effect on reading comprehension performance. This variable reports a 1% level of statistical significance for both columns and shows that female students outperform males by 21 points in reading comprehension when controlling for school fixed effects. Students with

an immigration background are outperformed by natives in reading comprehension, as in the mathematics course. This variable reports statistical significance (at the 1% level) only in the latter specification of the model and in this case has an estimated coefficient of -12 which means that immigrants' performance is worse than native students' by 12 points in reading comprehension. The PISA index of economic, social and cultural status (ESCS) has the same sign (positive) and statistical significance (1% level) on both columns, as in the mathematics course. When controlling for school fixed effects, results suggest that a 1 point increase in the index leads to a 19 points increase in reading comprehension performance.

7th grade students perform worse than the omitted categories in reading comprehension. Controlling for school fixed effects in the estimation drops the statistical significance from the 1% level to the 5% level and in that case, 7th graders have a negative difference of 62 points to the omitted categories. The estimated coefficient of students who attend 8th grade reports the same sign (negative) as the one of 7th graders for both specifications of the model although results are not statistically significant in either of them. The equivalent estimated coefficient for 9th grade students reports a sign flip, as in the mathematics course, between the two specifications of the model, from a positive on the former specification of the model to a negative for the latter, although results are not statistically significant for both specifications of the model. As in the mathematics course, 10th- and 11th-grade students perform better than the omitted categories in reading comprehension on both model specifications. However, the estimated coefficient for 10th grade loses its high (1% level) statistical significance completely compared to a one-level decrease (from 1% to 5%) for the 11th grade one when moving to a model which controls for school fixed effects. In the latter case, 11th graders outperform the omitted categories by 59 points.

Finally, I report results for the financial literacy course. As with both previous courses, age once again has a negative sign on both specifications of the model. Moving from the model that does not control for school fixed effects to the one that does, results in the effect of age becoming statistically significant at the 1% level. The negative coefficient reported in the latter specification denotes that one-year-older students' performance drops by 11 points in financial literacy. The effect of being female also has the same sign (negative) and statistical significance levels (1%) on both specifications of the model as in the mathematics course, although magnitudes are not as high, with female students' performance being 10 points lower than male students when controlling for school fixed effects. The effect of the variable that captures the immigration background of a student also moves in the same, negative, direction as it does in the other two courses. Statistical significance changes from the 5% level to the 1% level when moving from a model with no school fixed effects to one that controls for them. For the latter specification, we can see that native students outperform immigrants by 13 points in financial literacy. The PISA index of economic, social and cultural status (ESCS) has the same positive and highly

(1% level) statistical significant effect for both specifications of the model as in the other two courses. More specifically, a 1 point increase in the ESCS index, boosts financial literacy performance by 18 points.

Results for the estimated coefficient of 7th grade students yet again suggest a move in the same negative direction as in the rest of the assessed courses. The most notable difference is noted in the levels of statistical significance which stand at the 1% level for both specifications of the model. When controlling for school fixed effects, 7th grade students are outperformed by the omitted categories by 109 points. In the case of the financial literacy assessment, this result indicates a difference of more than one, whole, proficiency level between the two groups. 8th grade students are outperformed by the omitted categories on both specifications of the model. As in the mathematics course, results from the model which does not control for school fixed effects lack statistical significance while a move to the model that does control for them leads to a change in the statistical significance level which is then reported at the 1% level. In that case, 8th graders' performance drops by 70 points compared to the omitted categories in financial literacy, a result which is very close to determining a one-level difference in financial literacy proficiency. The estimated coefficient for 9th grade yet again reports a flip in the sign of its effect, having a positive sign in the model that does not control for school fixed effects while having a negative one on the model that controls for them. This move between specifications also results in a lower level of statistical significance, from 5% in the former to 10% in the latter. Therefore, the reported difference of 38 points between 9th graders and the omitted categories in favor of the latter group of students is not significant. Lastly, as in both of the other courses, 10th graders and 11th graders outperform the omitted categories in financial literacy. The problem with the loss of statistical significance when moving from one model specification (no control of school fixed effects) to the other (control of school fixed effects), reported in both mathematics and reading comprehension, persists for the 10th grade in financial literacy as well, while the estimated coefficient regarding 11th grade reports the same statistical significance level change as in reading comprehension (from 1% to 5%). The difference in performance between 11th graders and the omitted categories is 43 points in favor of the former students.

The most usual occasion for a student to be one year older than his/her classmates is to be a repeater. This category of students is generally associated with lower academic ability. A large portion of the literature supports this idea and, consequently, results of Table 5.1. Pierson and Connell (1992) compared results from grade repeaters with three other student categories and results suggested that retained students performed significantly worse than a random sample consisted of their classmates who were non-repeaters. McCoy and Reynolds (1999) also reported that students who repeated a grade had worse school performance than their same-age peers who got promoted to the next grade. Finally, much more recently, Ikeda and García (2014) used the PISA 2009 data

set and reported that non-repeaters outperform repeaters, whether they are primary- or secondary-school repeaters.

Another important outcome presented in Table 5.1 is the gender gap that seems to exist across the different courses, favoring girls in reading comprehension and boys in the remaining two courses. Niederle and Vesterlund (2010) provide evidence of a gender gap in favor of boys in competitive performance on mathematics, although they argue that this gap is not as significant when it comes to non-competitive instances. Another study which uses the same approach, that of mathematics competitions, and yields the same results is that of Ellison and Swanson (2010). They also provide evidence of a gender gap in mathematics performance among high achievers which favors the boys while also noting that the gender gap greatly widens at percentiles that conventional tests cannot measure properly. A different approach on the debate for the gender gap is provided by Turner and Bowen (1999). The authors report the superiority of females on reading related courses and speculate that this advantage is what leads more women to opt for theoretical studies instead of more skill-based ones, such as mathematics.

Results concerning the effect of immigration on a student's school performance are mixed in the existing literature. Gramatki (2017), as mentioned in Section 2, provides evidence of a gap in the financial literacy performance between native students and immigrants in favor of the former group, same as the results reported in Table 5.1, and relates this gap to the migrant integration processes of the host countries, among other factors. On the other hand, studies by Schwartz and Stiefel (2006) as well as Stiefel, Schwartz, and Conger (2010) show that immigrants are able to outperform native students at the school level, while also noting the impact of English language proficiency and language spoken at home on those results, suggesting that language barriers affects overall student performance. Despite the contradiction regarding the direction of the effect of immigration, the majority of the literature agrees that this characteristic plays an important role on the individual's academic career.

By taking another look at the immigration status results of Table 5.1, we can see that the smallest differential among the assessed courses is encountered in the mathematics course with 8 points, followed by reading comprehension with 12 points and finally financial literacy with 13 points. Although differences are small among the courses, it is clear that immigrants have a bigger problem performing well in courses that are based more on verbal skills, such as reading comprehension and financial literacy, than in the mathematics course which is not heavily based on said skills. This result may be connected to the language that immigrant students choose to use either at home or when talking with their friends or schoolmates. Potentially, opting at said instances to use their heritage language at the expense of the host country language (which is the language in which they take the financial literacy assessment), could hinder the learning progress of the host country language and therefore impact results on more verbal skill based courses.

Indeed, by exploiting the PISA data set, I uncover a high correlation (more than 0.85) between immigration status and preference of the heritage language over the host country language when (immigrants are) talking with their schoolmates. In the same sense, there is high correlation (more than 0.75) between immigration status and usage of heritage language when (immigrants are) talking with their best friends. This could explain why there is a higher difference between natives and immigrants at the more verbal-based courses of reading comprehension and financial literacy compared to the less verbal-skill-based mathematics course since immigrants may well have a disadvantage due to their decision of using more frequently their heritage language. The only downside is that these results are derived from only about a quarter (24%) of the total number of immigrant students as the rest of them were most likely not offered these questions, evidenced by the high number of N/A entries in questions regarding the usage of heritage language over the test language.

As divided as the literature is concerning the immigration status and its effect on school performance, it is much more unanimous when interpreting the effects of a higher socioeconomic index on student's school performance.White (1982) reports the positive influence of a higher socioeconomic status on school performance in his work but argues that the relation between academic achievement and higher socioeconomic status is not as strong as it seems. A review of part of the literature by Bradley and Corwyn (2002) further supports results of Table 5.1 regarding the positive effects of a higher socioeconomic index not only on school performance but also in other aspects of a kid's life.

Evidently, the positive effect of a higher socioeconomic status on academic attainment is directly related to social mobility. There exists a substantial number of researches that relate social mobility to educational success across several stages of the education pyramid. Haveman and Smeeding (2006), citing several sources, provide evidence that individuals from higher-income families outnumber those from lower-income families in post-secondary education and even more so when it comes to acceptance in the best colleges in United States. Existing literature suggests that education policies should be directed in an attempt to close this inequality gap by providing lower-income students with the resources they lack in order to compete with the top-end of students, leading to a higher probability of the former individuals to move onto higher socioeconomic status throughout their lives. It is also important to note that the interaction between education and social mobility goes both ways. This means that higher socioeconomic status can lead to higher educational attainment in the same sense as higher educational success may be the reason of a future move onto higher socioeconomic statuses.

Arguably, the most important outcome of Table 5.1 lies in the differences between the two specifications of the model regarding the statistical significance and coefficient magnitudes of the variables. Moving from a model that does not control for school fixed effects to one that does, leads to changes in the level of statistical significance of some

variables while, at the same time, most of the variables report substantial magnitude changes across all assessed courses which means that the former specification suffers from omitted variable bias. Controlling for school fixed effects leads to the aforementioned changes in magnitudes and statistical significance levels as well as, in some cases, a flip in the sign of the coefficient, providing evidence that control of school fixed-effects is essential because unobserved school characteristics seem to matter in this econometric model.

5.1 Sociability and Social Interactions

In this Section, I investigate the effect of sociability and social interactions on PISA performance. As mentioned in Section 3, students were asked to express their opinion by agreeing or disagreeing to statements and by denoting how often they perform certain activities. With the exception of the first group of five variables reported in Table 5.2, every other specification includes a single variable denoting sociability or social interactions. The reason for estimating the effects of these variables separately and not jointly relates to the different sub-samples of students who were offered these questions. All of the first five variables reported in Table 5.2 were offered to the same sub-sample of students, therefore they can be used together in one equation. Each of the last ten variables, however, was offered to a different sub-sample of students. Therefore, simultaneous inclusion of all variables in a single equation results in a small sample of observations (less than 1/3 of the original sample).

Table 5.2 presents the estimation results obtained with OLS as the baseline equation in Section 5. All specifications include school fixed effects.

Table 5.2: The Effect of Sociability and Social Interactions on PISA Performance

	Plausible Value in Mathematics	Plausible Value in Reading Comprehension	Plausible Value in Financial Literacy	N
Help friends with math	21.456***	10.708***	16.429***	18,052
	(3.008)	(3.035)	(3.535)	
Talk about math with friends	9.637***	5.725*	7.041**	18,052
	(3.011)	(3.170)	(3.572)	
Friends enjoy math tests	-8.242**	-16.517***	-16.702***	18,052
	(4.495)	(4.661)	(4.999)	
Friends work hard at math	-8.535***	-5.759*	-7.232**	18,052
	(3.041)	(3.072)	(3.520)	
Friends do well in math	3.350	1.234	0.744	18,052
	(3.022)	(2.982)	(3.482)	
Discuss money (parents)	7.152	8.651*	11.282*	12,293
	(5.222)	(4.915)	(6.036)	
Discuss money (friends)	1.337	-0.637	0.964	12,047
	(3.859)	(3.725)	(4.716)	
Feel like an outsider	-16.012***	-19.813***	-24.968***	18,085
	(4.173)	(4.522)	(4.787)	
Make friends easily	0.754	1.013	1.517	18,120
	(4.081)	(4.295)	(4.699)	
Liked by other students	15.442***	13.261***	17.088***	18,050
	(4.174)	(4.216)	(4.699)	
Feel lonely at school	-12.787***	-14.201***	-16.186***	18,070
	(4.416)	(5.073)	(5.384)	
Playing one player games	7.085***	4.703***	7.614***	22,757
	(1.896)	(1.775)	(1.809)	
Playing collaborative games	-1.190	-4.839***	1.994	22,725
	(1.895)	(1.848)	(1.791)	
Chat on-line (out of school)	-5.157**	-7.547***	-1.856	22,679
	(2.371)	(2.293)	(2.361)	
Social networks (out of school)	4.846	4.161	7.942***	22,713
	(3.096)	(2.971)	(2.828)	

Note: Estimation with OLS using student final weights. Robust standard errors in parentheses. *** denotes significance at 1%, ** denotes significance at 5% and * denotes significance at 10%. The following variables are included in the estimations but not reported in the table: Age, female, immigration background, ESCS[a], 7th grade, 8th grade, 9th grade, 10th grade, 11th grade. Grades 12th and 13th as well as ungraded students are the omitted category. Schools with only one student are excluded from estimations.
[a]: ESCS stands for PISA index of economic, social and cultural status.

Students who help their friends with mathematics (sometimes, often, always or almost always) perform better, across all courses, than students that rarely or never help their friends with mathematics; their performance advantage stands at 21 more points in the mathematics course, 11 more points in reading comprehension and 16 more points in financial literacy. Evidently, helping your friends with mathematics yields the best return on the helper's mathematics performance. In that sense we can say that helping someone with mathematics makes not only the person on the receiving end better in mathematics, but also the person offering the help. Talking about mathematics problems with their friends is another factor that positively affects students' performance. Students that rarely or never participate in such conversation perform worse in both mathematics (by 10 points) and financial literacy (by 7 points) courses compared to students who had more frequent talks about mathematics with their friends, while results concerning the reading comprehension course are statistically significant only at the 10% level. Being part of a social group, especially at younger ages, is highly associated with helping each other as well as exchanging opinions on several subjects. Patacchini, Rainone, and Zenou (2011), using a database on friendship networks from the AddHealth survey, prove that there are significant peer effects in education as the effect of friend's education is positive and highly significant on own education, a result which seems to carry over time even if the original friendship group exists no more. However, splitting the sample between 7-9th graders and 10-12th graders shows insignificant results for the former group but significant and larger in magnitude ones for the latter. There exists therefore a mixture of results concerning not only the significance of peer effects, as evidenced by the paper above, but also their direction, as evidenced by the literature review of Sacerdote (2011) where one can see that peer effects during primary or secondary school are not as consistent as in post-secondary school.

A set of statements concerning their friends' view on mathematics was also provided to the students in which they were asked to report whether they agree or disagree with those. Students who agree that their friends enjoy taking mathematics tests performed worse in all three courses than students who disagreed with this statement. In particular, they are outperformed by 8 points in mathematics and 17 points in reading comprehension as well as the financial literacy assessment by the second group of students. In the same context, students who agree that most of their friends work hard at mathematics perform worse by 9 points in the mathematics course and by 7 points in the financial literacy course than those who disagree with this statement, while results for the reading comprehension course are statistically significant only at the 10% level. This result might strike as peculiar but could be connected to the psychological condition of the individual and most notably to its anxiety levels. It is not unlikely that students take notice of their friends' hard work on mathematics and get anxious about themselves. Anxiety is commonly associated with worse school performance as mentioned in Wood (2006) who proves that when anxiety

levels drop, school performance increases. Finally, performance of students who agree that most of their friends do well in mathematics is not significantly different from those who disagree with this statement.

Clearly, the five statements discussed above are centered around the field of mathematics. It is not a surprise, therefore, that the effect of these statements is larger in the mathematics course than in any of the remaining two assessed courses of reading comprehension and financial literacy. Helping your friends with mathematics has double the positive effect on mathematics performance than in reading comprehension, a more verbal-based course, while the estimated coefficient for financial literacy, a course that combines skills from both of those fields, stands between those of the other two courses. Furthermore, the effect of talking about mathematics with friends is also greater for the performance on the mathematics course than for the financial literacy one (reading comprehension is not statistically significant). On the same note, students who agree that their friends work hard on mathematics perform marginally worse in the mathematics course compared to financial literacy. Evidently, it is reasonable to notice that questions relating to mathematics have the biggest effect on the mathematics course, followed by the financial literacy course, which depends both on quantitative and verbal skills, and then on reading comprehension, a mostly verbal skill based course which, for some statements, is not significantly affected at all. Weirdly though, there is a statement among those five that does not follow the same path as the rest of them. Specifically, students who agree that their friends enjoy mathematics tests perform way worse in reading comprehension and financial literacy than in the mathematics course.

Another set of statements was developed to acquire information regarding how often students discuss money matters with their close social circle. The first of the two statements involved around financial discussion between students and their parents or guardians while the other captured the same discussion between students and their friends or peers. Discussing money matters with parents/guardians does not have a significant impact on PISA performance as the estimated coefficient for mathematics completely lacks statistical significance while, for the remaining two courses (reading comprehension and financial literacy), the estimated coefficients are statistically significant only at the 10% level. Results concerning money matters discussion among students and their friends or peers also lack statistical significance across all three assessed courses.

Students were also asked to report their beliefs concerning their place as an individual at school, again by agreeing or disagreeing with certain statements. Those who feel like an outsider at school perform significantly worse than students who do not agree with this statement. More specifically, this group of students is outperformed by 16 points in mathematics, 20 points in reading comprehension and 25 points in the financial literacy assessment by students who did not report feeling like an outsider at school. Another statement deals with the feeling of loneliness at school. Students who agree with the

statement "I feel lonely at school" perform worse than students who disagree, across all courses. Their mathematics performance was worse by 13 points, their reading comprehension performance by 14 points while their financial literacy performance was lower by 16 points compared to students who did not report feeling lonely at school. The sense of belonging for people of this age is a significant factor connected to multiple aspects of their lives, whether being health and overall well-being or school performance. Osterman (2000) highlights the need of students to feel like they belong in the school community in his review of the literature. The key point is that there appears to be higher commitment, motivation and engagement in school and learning procedures when students feel that they belong in a group, something that is directly and closely linked to school performance. In addition, London and Ingram (2018) report results from two separate, yet similar, literatures that examine the effects of social isolation and connectedness on several youth aspects. The authors' literature review on the link between social isolation and school performance of young people suggests worse school performance for students reporting low sense of school belonging or connectedness. Finally, results regarding the feeling of loneliness at school are mixed, as evidenced in the review by Donte Newsom, Mallow, and Watson (2013) where, by providing a large number of studies, the authors show both the positive and the negative effects of loneliness in student's school performance.

Making friends easily at school does not affect performance on any of the three courses since results are not statistically significant. A final noteworthy statement provided to the students, relative to this group, was if "other students seem to like me". Those who agree with this statement perform better, on all three courses, than those who disagree. The first group's positive difference was 15 points for mathematics, 13 points for reading comprehension and 17 points for financial literacy. Feeling liked by other students, especially when adolescents start being more socially active and extrovert, can be a significant boost of confidence. A recent study of Arellano, Cámara, Tuesta, et al. (2014) highlights the importance of self-confidence and its effects on financial literacy performance of Spanish students. Their research provides evidence that students who feel more confident, perform better than students who do not feel as confident. There is, however, the problem of diminishing returns and the danger of a student becoming over-confident, which ultimately may drive scores and overall school performance downwards.

The final set of statements reported in Table 5.2 deals with out-of-school usage of information and communication technologies, where students were asked to report how often they use a computer for a number of activities. Students who use a computer to play single-player games, regardless of how often, perform better than those who hardly ever or never use a computer for the same cause; they outperform the latter group by 7 points in the mathematics course, 5 points in reading comprehension and 8 points in financial literacy. People, however, often relate more time spent playing video games with worse school performance. Van Schie and Wiegman (1997) use a sample of 346

children attending grades 7 and 8, equally distributed among boys and girls, and show that there is no significant effect from the amount of time students spent playing video games on children's school performance. However, the authors report that the amount of time spent playing video games is positively related with the child's IQ and they continue on with providing evidence that there exists "a significantly positive correlation between a child's IQ and arithmetic skills, language skills and general school performance"(Van Schie, Wiegman, 1997). Durkin and Barber (2002) use a sample of 16-year-old students to examine the relationship between playing video games and a number of measures related to the everyday life of a 16-year-old student. Their results suggest that there is not much evidence connecting computer video games with negative results on GPA. In fact, students who were categorized in the low or high (amount of) play groups scored better than students who never played video games, with the low play group reporting the highest GPA results among the three groups. They also report, among other results, higher family cohesion for low and high playing-time students and less risky friendship networks. Results from those studies provide evidence that either directly (higher GPA) or indirectly (higher IQ), there is a positive effect on student's scores from playing video games. Using a computer to play collaborative games has a significant effect (at the 1% level) only on reading comprehension, penalizing performance of students who play at least once or twice a month by 5 points on said course. By comparing between the two types of video games, we can see that results lose their statistical significance for two of the three courses, namely mathematics and financial literacy, when it comes to collaborative games. As for the reading comprehension, the only course that the results retain their statistical significance, Table 5.2 shows a sign flip, from positive when playing alone to negative when playing with others.

Chatting online using a computer has a significant and negative effect on mathematics and reading comprehension performance while the effect on financial literacy performance is insignificant. A more general participation in social networks, however, affects significantly (at the 1% level) and positively only financial literacy performance. More specifically, students that participate in social networks outperform students that never or hardly ever participate in social networks by 8 points in financial literacy. Some of the advantages related to social network participation include the ability to interact with people that you share interests with across the world as well as the convenience of having access to multiple news sources, all available in one place. However, it is important to point out that social networks can be addictive, especially for the younger population who may spend an excessive amount of time on social networks, neglecting their homework and therefore performing worse at school. In general, literature concerning the effect of social networks on school performance does not reach a unanimous verdict as evidenced by the work from Marker, Gnambs, and Appel (2017) which shows that proper usage (school-related) of social networks can have positive effects on student's school performance while

social network usage unrelated to school has indeed negative results on scores.

If we take a closer look at the results from the second half of the table we can see that estimated coefficients for the financial literacy course, where they report a high statistical significance, are larger than those of the mathematics or reading comprehension courses. Students who feel like an outsider or those who feel lonely at school perform worse in the financial literacy course than in any other course. On the opposite side, students who feel liked by other students, those who play single player games or those who participate in social networks at least once or twice a month, perform better at the financial literacy course than at mathematics or reading comprehension. Moreover, the fact that participation in social networks is associated with better performance only for the financial literacy course, should signify that students are more usually involved in financial related discussions with their peers than with mathematics or language related ones.

Overall, results from Table 5.2 suggest that measures of sociability and social interactions have a greater impact, either in a positive or in a negative way, on financial literacy competences than on quantitative and/or verbal skills, related to the mathematics and reading comprehension courses respectively.

6 Conclusion

There is no doubt that financial literacy has become an essential skill in modern society, more than it has ever been up until recent decades. The complexity and large variety of financial products requires more from the individual in terms of knowledge and involvement in order to yield the best possible returns. Younger generations are faced with more challenging financial decisions than previous generations starting from as early as their school years, having to make choices such as saving money for post-secondary education or opting for other forms of (time and/or money) investment. Some countries already offer financial literacy courses as part of their school curriculum while the number of countries that offer such courses increases as years go by, proving that policy-makers understand and respect the importance of offering financial education to younger populations. Despite the fact that there are much to be gained through said courses, we cannot neglect the importance of the social cycle and its effect not only on financial decisions but also on students' school performance.

In this paper, I study the effect of sociability and social interactions on the financial literacy course performance included in the PISA 2012 assessment. The reason for using data from the PISA 2012 financial literacy assessment is that it is the first large-scale international survey that offers an abundance of information on students aged 15-16 on several aspects of their academic and social life. The PISA survey offers students several statements that capture social interactions between them and their peer groups and re-

quires from respondents to denote how often they perform certain tasks or whether they agree or disagree with some of those statements. Since those statements are categorical, I create dummies by clustering similar responses in one category for estimation purposes. The majority of said statements were offered to a different sub-sample of students, with the exception of a group of five statements which were all offered to the same sub-sample. The econometric method used for the estimations is OLS while results from two different specifications of the model, one that does not control for school fixed effects and one that does, show that it is important to include school fixed effects in the process. Besides the variables that capture social interactions, I also estimate the effect of several demographic characteristics of students which previous literature establish as important predictors of financial literacy performance. The PISA 2012 assessment also includes two more courses, mathematics and reading comprehension, results from which I use to compare those of the financial literacy course performance with.

Results concerning the effect of demographic characteristics of students on school performance consort with those of the majority of the literature. Grade repeaters perform worse on all assessed courses and students with an immigration background also report the same trend. Female students are outperformed by males in the mathematics and financial literacy courses while results are reversed for the reading comprehension course. Regarding the socioeconomic index of the household, a one point increase in the index boosts performance on all three courses by at least 16 points.

The variables that denote social interactions provide some interesting results regarding both their significance and the direction of the effect on financial literacy performance. Interestingly, discussing money issues either with your parents or with your friends does not impact financial literacy performance, with results being statistically significant just for one of those categories (parents) and only at the 10% level. Feeling lonely or left out at school negatively impacts financial literacy performance while, on the other hand, students who feel that they are liked by other students perform better in the financial literacy assessment. Talking about mathematics with your friends or actively helping your friends with mathematics results in performing better in financial literacy while those who state that their friends work hard in mathematics perform worse (in financial literacy). Curiously, students who state that their friends enjoy mathematics tests perform worse in financial literacy than students who do not agree with this statement. As for the statements that involve around interaction with information and communication technologies, playing single-player games positively affect financial literacy performance while online multiplayer games do not affect performance on said course. Finally, chatting online when not at school does not impact performance in the financial literacy assessment but a more general participation in social networks has a positive effect on financial literacy performance.

Despite the fact that not all of the variables that capture social interactions produce

statistically significant results for the financial literacy performance, there is no doubt that sociability is important during the learning process. Further research on how social interactions affect school performance could result in important breakthroughs that may help diminish differences in school performance between less and more socially active groups of students. Education policy-makers have every incentive to encourage changes that can positively affect students' social life at school, at the point that such an intervention is possible, since individuals with higher financial literacy proficiency levels will be better prepared to confront a future full of increasingly challenging financial decisions.

References

Almenberg, J., and A. Dreber (2015): "Gender, stock market participation and financial literacy," *Economics Letters*, 137, 140–142.

Arellano, A., N. Cámara, D. Tuesta, et al. (2014): "The effect of self-confidence on financial literacy," Discussion paper.

Bottazzi, L., and A. Lusardi (2016): "Gender Differences in Financial Literacy: Evidence from PISA Data in Italy1," *Global Financial Literacy Excellence Center (GFLEC) Working Paper, Washington DC*.

Boucher, V., Y. Bramoullé, H. Djebbari, and B. Fortin (2014): "Do peers affect student achievement? Evidence from Canada using group size variation," *Journal of applied econometrics*, 29(1), 91–109.

Bradley, R. H., and R. F. Corwyn (2002): "Socioeconomic status and child development," *Annual review of psychology*, 53(1), 371–399.

Cordero, J. M., M. Gil, and F. Pedraja Chaparro (2016): "Exploring the effect of financial literacy courses on student achievement: a cross-country approach using PISA 2012 data," .

Donte Newsom, B., J. Mallow, and J. Watson (2013): "Loneliness in School Age Children: An Integrative Review of Quantitative Studies," *AN INTERDISCIPLINARY JOURNAL*, p. 32.

Durkin, K., and B. Barber (2002): "Not so doomed: Computer game play and positive adolescent development," *Journal of applied developmental psychology*, 23(4), 373–392.

Ellison, G., and A. Swanson (2010): "The gender gap in secondary school mathematics at high achievement levels: Evidence from the American Mathematics Competitions," *Journal of Economic Perspectives*, 24(2), 109–28.

Gramatki, I. (2017): "A comparison of financial literacy between native and immigrant school students," *Education Economics*, 25(3), 304–322.

Haveman, R., and T. Smeeding (2006): "The role of higher education in social mobility," *The Future of children*, pp. 125–150.

Hospido, L., E. Villanueva, and G. Zamarro (2015): "Finance for all: the impact of financial literacy training in compulsory secondary education in spain," .

Ikeda, M., and E. García (2014): "Grade repetition," *OECD Journal: Economic Studies*, 2013(1), 269–315.

Kalmi, P. (2018): "The Effects of Financial Education: Evidence from Finnish Lower Secondary Schools," *Economic Notes: Review of Banking, Finance and Monetary Economics*, 47(2-3), 353–386.

London, R., and D. Ingram (2018): "Social Isolation in Middle School," *School Community Journal*, 28(1), 107.

Longobardi, S., M. M. Pagliuca, and A. Regoli (2018): "Can problem-solving attitudes explain the gender gap in financial literacy? Evidence from Italian studentsâ data," *Quality & Quantity*, 52(4), 1677–1705.

Lusardi, A. (2015): "Financial literacy skills for the 21st century: Evidence from PISA," *Journal of consumer affairs*, 49(3), 639–659.

Lusardi, A., and A. Lopez (2016): "Financial Literacy among High School Students in the United States: Evidence from the 2012 Programme for International Student Assessment (PISA)," .

Marker, C., T. Gnambs, and M. Appel (2017): "Active on Facebook and failing at school? Meta-analytic findings on the relationship between online social networking activities and academic achievement," *Educational Psychology Review*, 30(3), 651–677.

Mazzone, L., F. Ducci, M. C. Scoto, E. Passaniti, V. G. D'Arrigo, and B. Vitiello (2007): "The role of anxiety symptoms in school performance in a community sample of children and adolescents," *BMC public health*, 7(1), 347.

McCoy, A. R., and A. J. Reynolds (1999): "Grade retention and school performance:: An extended investigation," *Journal of School Psychology*, 37(3), 273–298.

Mitchell, O. S., and A. Lusardi (2015): "Financial literacy and economic outcomes: Evidence and policy implications," *The journal of retirement*, 3(1), 107.

Molina Marfil, J. A., O. D. Marcenaro Gutierrez, and A. Martin Marcos (2015): "Financial literacy and educational systems in the OECD: a comparative analysis using PISA 2012 data," *REVISTA DE EDUCACION*, (369), 85–108.

Niederle, M., and L. Vesterlund (2010): "Explaining the gender gap in math test scores: The role of competition," *Journal of Economic Perspectives*, 24(2), 129–44.

OECD (2014a): "PISA 2012 technical report," .

——— (2014b): "Results: Students and Money (Volume VI) Financial Literacy Skills for the 21st Century," .

——— (2016): *PISA 2015 assessment and analytical framework: Science, reading, mathematic and financial literacy*. OECD publishing.

——— (2017): "PISA 2015 technical report," .

Osterman, K. F. (2000): "Students' need for belonging in the school community," *Review of educational research*, 70(3), 323–367.

Patacchini, E., E. Rainone, and Y. Zenou (2011): "Dynamic aspects of teenage friendships and educational attainment," .

Peña-López, I., et al. (2012): "PISA 2012 Assessment and Analytical Framework. Mathematics, Reading, Science, Problem Solving and Financial Literacy," .

Pesando, L. M. (2018): "Does financial literacy increase studentsâ perceived value of schooling?," *Education Economics*, pp. 1–28.

Pierson, L. H., and J. P. Connell (1992): "Effect of grade retention on self-system processes, school engagement, and academic performance.," *Journal of Educational psychology*, 84(3), 300.

Sacerdote, B. (2011): "Peer effects in education: How might they work, how big are they and how much do we know thus far?," in *Handbook of the Economics of Education*, vol. 3, pp. 249–277. Elsevier.

Schwartz, A. E., and L. Stiefel (2006): "Is there a nativity gap? New evidence on the academic performance of immigrant students," *Education Finance and Policy*, 1(1), 17–49.

Stango, V., and J. Zinman (2009): "Exponential growth bias and household finance," *The Journal of Finance*, 64(6), 2807–2849.

Stiefel, L., A. E. Schwartz, and D. Conger (2010): "Age of entry and the high school performance of immigrant youth," *Journal of Urban Economics*, 67(3), 303–314.

Turner, S. E., and W. G. Bowen (1999): "Choice of major: The changing (unchanging) gender gap," *ILR Review*, 52(2), 289–313.

Van Rooij, M., A. Lusardi, and R. Alessie (2011): "Financial literacy and stock market participation," *Journal of Financial Economics*, 101(2), 449–472.

Van Schie, E. G., and O. Wiegman (1997): "Children and Videogames: Leisure Activities, Aggression, Social Integration, and School Performance 1," *Journal of applied social psychology*, 27(13), 1175–1194.

White, K. R. (1982): "The relation between socioeconomic status and academic achievement.," *Psychological bulletin*, 91(3), 461.

Wood, J. (2006): "Effect of anxiety reduction on children's school performance and social adjustment.," *Developmental psychology*, 42(2), 345.