# Linking Italians' financial literacy and their need for financial services

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## Abstract

Financial literacy is an important topic that offers a picture of people's knowledge about basic financial concepts. In this project we want to investigate on financial literacy and other struggles with other financial instruments across the general public. To do so, we are going to use the data coming from the OECD International Network on Financial Education enriched with the ones obtained by a research conducted by Banca d'Italia. This questionnaire has a very similar structure to the surveys that banks submit to their clients when opening an account, this makes it very suitable for this kind of research. We want to provide useful insights for banks and other financial businesses that want to investigate the socio-demographic aspects associated with the different financial attitude and knowledge of Italian people. In particular, our focus is set on financial literacy and the impact that it has on the way the client manages his money.

## 1 Introduction - Business Idea

Several studies show that an individual's ability to understand and use basic financial and economic concepts plays an important role in achieving an appropriate level of economic well-being[1]. The OECD defines financial education as "the process by which individuals improve their understanding of financial products and concepts; and through information, instruction and/or objective advice develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being and protection" (OECD, 2005). However, the very same research conducted by Banca d'Italia, shows the "existence of a substantial financial literacy gap between Italy and the other G20 countries, which is most evident among less educated respondents, among the elderly and among women"[1]. One of the most straightforward consequences of limited financial literacy may be limited financial market participation. Households that are not familiar with the workings of a bank, for example, are unlikely to open a bank account, and may instead choose to store cash at home or invest in other stores of value (such as gold), which may offer unattractive returns [2]. In section 3 we are going to take the perspective of a bank and investigate how different socio-demographic components affect the clients knowledge about finance. Understanding which classes of individuals lack financial knowledge is fundamental to tackle the problem, and will likely result in greater market participation, as the other models will point out.
In section 4, we want to search for the classes of individuals that have not yet thought of a secure plan for retirement, and investigate the impact that financial literacy has on this

separation. In this way a financial business could reach this cluster of people and offer their services for retirement plans. To do so, we are going to evaluate both people confidence in their plan and the tools used by people to build their fund.
In section 5, we want to understand if and how financial literacy is associated with the struggle of people with the management of their savings. Furthermore, we are going to study which other socio-demographic variable is linked with this problem. Once again, a bank could utilize this information to find clients that struggle with saving their money, and that therefore could not overcome an improvise expense or an interruption of their income. These individuals could be interested in the support of a personal-finance consultants.

## 2 The Dataset

The data is composed by two different components: the socio-demographic variables and the questionnaire on financial literacy. Together, they account for a total of 105 variables.
For what regards the socio-demographic variables that will be used as explanatory variables in all of the models, we have:

- Gender (0 Female; 1 Male)
- Geographical area:
    1. North-West
    2. North-East
    3. Centre
    4. South
    5. Islands
- Number of household members (from 0 to "6 or more")
- Age
- Educational qualification
    1. Primary school or lower
    2. Some secondary school
    3. Completed secondary school
    4. University-level education
- Employment status
    1. Self-employed
    2. In paid employment
    4. Looking after the home
    5. Looking for work
    6. Retired
    9. Student
    10. Other

Before our analysis, we decided to build a new variable, called "knowledge score", resulting from the sum of all the correct answers that the individual gave in the question related to financial knowledge (QK3 - QK7). The score therefore ranges between 0 (minimum) and 7 (maximum). This new variable will be used both as dependent variable and as explanatory variable in the following models.
Since there are questions for which some individuals did not respond, we decided to remove these observations. In order not to remove all observations that did not respond in any of the questionnaire's questions, we created a subset for each model, containing all the individuals that answered to the specific question we used as dependent variable.

## 3 Financial Literacy

In this subsection we want to understand which are the socio-economic factors that help to explain financial literacy among people. In other words, we are going to build a model that tries to explain the "Knowledge Score" that we built in the preprocessing phase, utilizing as explanatory variables all of the socio-economic covariates we described in the dataset section.
To model this relationship we are going to use a Proportional Odds Logistic Regression model, which has shown to be one of the most useful models when dealing with regression models for ordinal data [3]. This model helps us to overcome the assumption of equidistant levels that should be assumed in the case of a Linear Regression Model.
After applying the Akaike Information Criterion we found the explanatory variables that result in a better model: sex, age and instruction. The estimates of this model are represented in Table 1.
It is important to remind that we have applied the exponential transformation to the coefficients in order to interpret the values as the ratio between the odds. Therefore, an estimate lower than one indicates a negative association with the dependent variables, while an estimate greater than one indicates a positive association.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| sex | 1.264 | 0.001 | ** |
| age | 1.009 | 0.000 | *** |
| instruc.L | 3.105 | 0.000 | *** |
| instruc.Q | 0.888 | 0.175 | |
| instruc.C | 0.931 | 0.288 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 1: Result of proportional odds logistic model 1
Financial Literacy explained by sex, age and instruction

As we can see from the estimated results, the variables sex, age, and instruction, all result statistically significant at least at the 0.01 level. Furthermore, all of the resulting estimates are greater than one highlighting that:

- a male individual, as opposed to a female individual, is associated with a higher likelihood of having an high knowledge score;
- a unit increase in the age of the individual implies on average an improvement in the knowledge score;
- increasing the individual's education qualification to the next higher class, implies an improvement in the literacy score.

A financial institution that might want to address this problem and improve individual's financial literacy should therefore aim their target more to females, young people, or people with lower education qualifications.

## 4 Retirement Plan

In this second subsection we instead aim to understand which types of people have not yet thought of a secure plan for retirement. To do so, we utilize the answers of questions "QF8" and "QF9".

### 4.1 Confidence for Retirement

With question QF8 we want to understand which class of people do not think to have a good retirement plan. The question in fact asks the following: "how confident are you that you have done a good job of making financial plans for your retirement?". It is therefore important to notice that this question tackles the problem of "being confident" of having a good retirement plan, and does not search for people that actually have it. The possible answers are "Very confident", "Confident", "Somehow confident", "Not very confident", "Not at all confident", "I am not planning for retirement" and "Don't know".
With the exception of "Don't know" all the possible answers to the question can be considered ordinal levels of the response variable. For this reason, we are going once again to use the Proportional Odds Logistic Regression Model.
From now on, we are going to insert inside the explanatory variables also the knowledge score. The resulting model, estimated with the ordinal logistic regression model and utilizing only the variables selected through the AIC method, is presented in Table 2.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| area2 | 0.725 | 0.032 | * |
| area3 | 0.590 | 0.000 | *** |
| area4 | 0.552 | 0.000 | *** |
| area5 | 0.483 | 0.000 | *** |
| age | 1.026 | 0.000 | *** |
| instruc.L | 1.516 | 0.027 | * |
| instruc.Q | 1.508 | 0.005 | ** |
| instruc.C | 0.815 | 0.059 | . |
| employment2 | 0.939 | 0.676 | |
| employment4 | 0.291 | 0.000 | *** |
| employment5 | 0.306 | 0.000 | *** |
| employment6 | 0.116 | 0.000 | *** |
| employment9 | 0.079 | 0.000 | *** |
| employment10 | 0.0385 | 0.100 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 2: Result of proportional odds logistic model 2
Confidence in a good retirement plan explained by area, age, instruction and employment status

The results of the model reflect that the confidence of having done a good retirement plan increases with age, decreases in the southern areas of the country and between people that are looking after the home, looking for work, studying, or for people that are already retired.
We now want to have a closer look into the effects that our main research variable, knowledge score, has on the confidence for retirement. To do so we build a new Proportional Odds Logistic Model with knowledge score as the only explanatory variable. We discover that the knowledge score is positively associated with an higher confidence for retirement: to a unit

increase in the knowledge score corresponds an increase of 0.616 in the log odds of our dependent variable, with a p-value of $1.02 \cdot 10^{-3}$.

### 4.2 Tools for Retirement

From question QF9, instead, we are going to individuate the classes of individuals that use precarious tools to build their retirement plan. The question in consideration, in fact, recites: "how will you fund your retirement?". Answers relative to government, occupational, workplace, survivors' and private pension plans are considered secure, as well as answers related to selling or relying on income generated by financial or non financial assets. The remaining people, instead, rely on their partners or family members for sustaining their expenses after the retirement. This last group of people, together with the ones that responded with "Other", are going to be considered our target. We added "Other" to the category of people that use precarious tools because all of the solid way to fund one's retirement are present between the answers. Therefore, if someone chose the "Other" option, it probably means that they are using a loose tool. This time, since the response variable is binary, we are going to utilize a logistic model, whose results are presented in Table 3.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| (Intercept) | 0.358 | 0.985 | |
| sex | 1.613 | 3.98e-4 | *** |
| area2 | 1.001 | 0.994 | |
| area3 | 1.052 | 0.792 | |
| area4 | 0.772 | 0.141 | |
| area5 | 0.584 | 0.008 | ** |
| household.L | 0.923 | 0.774 | |
| household.Q | 0.860 | 0.532 | |
| household.C | 0.823 | 0.365 | |
| household$^4$ | 1.165 | 0.405 | |
| household$^5$ | 0.715 | 0.019 | * |
| age | 1.019 | 4.787e-3 | ** |
| instruction.L | 2161.057 | 0.968 | |
| instruction.Q | 1.873-03 | 0.972 | |
| instruction.C | 115.661 | 0.969 | |
| instruction$^4$ | 8.491e-02 | 0.968 | |
| instruction$^5$ | 1.9250 | 0.974 | |
| employment2 | 1.789 | 0.030 | * |
| employment4 | 0.118 | 3.97e-14 | *** |
| employment5 | 0.297 | 2.19e-05 | *** |
| employment6 | 0.237 | 4.78e-07 | *** |
| employment9 | 0.450 | 0.026 | * |
| employment10 | 1.1370 | 0.871 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 3: Result of logistic model 3
Usage of safe retirement tools explained by sex, area, number of household members, age, instruction and employment status

The statistically significant estimates are related to sex, area5, age and most of the levels of the variable related to employment. Once again, an increase in age indicates better financial experience, and therefore the usage of more secure tools to build one's retirement fund. The estimates also highlight that both the female sex and people that live in Italy's islands could tend to use riskier tools. Finally, being a paid employee seems to be associated with secure retirement plans, unlike looking after the home, studying, searching for work, or being already retired. This of course make sense, since most of the categories just cited do not have a stable source of income, and therefore struggle to build a solid retirement plan.
An in depth look at the differences that being employed makes to the probability of using secure tools to plan one's retirement can be had in Figure 1. In this stacked bar plot we aggregated people that are "Looking after the home", "Looking for work", "Retired", "Students" and "Other" into the "unemployed" category, while all the others ("self employed" and "in paid employed") in the "employed" category.
From the graph in figure 1 is evident a difference in the distribution of people that use secure tools for planning their retirement between those who are employed and those who are not. The stacked barplot in fact confirms what we have found through the model: the "employed" category tends to use smarter tools for their retirement fund. This is probably simply explained: people with a more secure source of income can, more easily, plan a saving strategy than those who rely on unsteady sources of income, or no income at all.

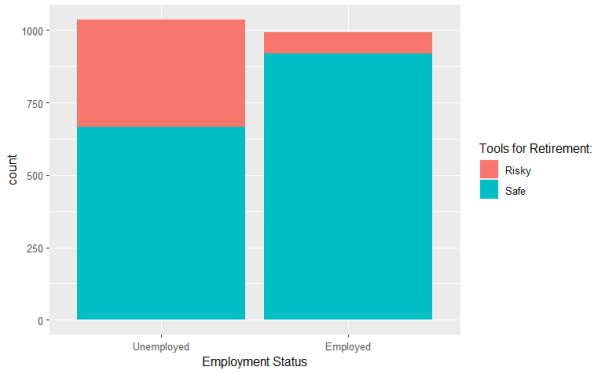


Figure 1: Distribution of safe and risky tools for retirement between employed and unemployed individuals

## 5 Personal Finance

In this third section we want to investigate topics related to services of personal finance. Many financial businesses, in fact, put in place personal-finance related consultants to help their clients with the management of their savings and the creation of an emergency fund. This last tool is put in place to help them sustain their lifestyle in case of an improvise expense or a sudden interruption of their income. To carry this investigation we are going to analyse the responses to questions: "QF3", "QF4" and "QF13".

### 5.1 Savings

With the question QF3 we want to understand which are the people that use non-smart ways to save money. The question in fact recites: "In the past 12 months have you been personally saving money in any of the following ways?". We therefore categorized all the answer in smart (1) and non-smart (0) ways to save money:

- "Saving cash at home or in your wallet" has been classified as "non smart".
- "Paying money into a saving account" has been classified as "smart"
- "Giving money to family to save on behalf" has been classified as "non smart"
- "Buying financial investment products, other than pension funds" has been classified as "smart"
- "Some other way (including remittances, buying livestock, gold or property)" has been classified as "smart"
- "Has not been actively saving" has been classified as "non smart"

With these two categories we differentiate those who use specialized bank services and those who don't. The model therefore tries to explain whether a person utilizes smart or non smart ways to save money based on their socio-demographic variables and their financial literacy (knowledge score). The result of the estimated logistic model, after having performed variables selection with AIC, are presented in table 4.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| (Intercept) | 1.213607e-01 | 0.969 | |
| area2 | 0.984 | 0.905 | |
| area3 | 9.422 | 0.657 | |
| area4 | 0.648 | 0.001 | ** |
| area5 | 0.415 | 3.16e-07 | *** |
| household.L | 0.848 | 0.463 | |
| household.Q | 0.869 | 0.477 | |
| household.C | 1.446 | 0.0322 | * |
| household$^4$ | 1.026 | 0.856 | |
| household$^5$ | 1.145 | 0.1978 | |
| instruc.L | 906.857 | 0.973 | |
| instruc.Q | 4.753e-03 | 0.976 | |
| instruc.C | 57.795 | 0.973 | |
| instruc$^4$ | 0.139 | 0.974 | |
| instruc$^5$ | 1.831 | 0.976 | |
| employment2 | 1.595 | 0.002 | ** |
| employment4 | 0.727 | 0.112 | |
| employment5 | 0.534 | 0.003 | ** |
| employment6 | 1.512 | 0.017 | * |
| employment9 | 0.407 | 1.74e-4 | *** |
| employment10 | 0.509 | 0.189 | |
| knowScore.L | 2.394 | 1.52e-07 | *** |
| knowScore.Q | 1.037 | 0.818 | |
| knowScore.C | 1.071 | 0.645 | |
| knowScore$^4$ | 1.081 | 0.579 | |
| knowScore$^5$ | 0.870 | 0.292 | |
| knowScore$^6$ | 1.156 | 0.240 | |
| knowScore$^7$ | 1.044 | 0.703 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 4: Result of logistic model 4
Usage of smart ways to save money explained by area, number of household members, instruction, employment status and financial literacy

From the resulting estimates is evident that South-Italy and the island tend to not rely on financial instruments to save their money. For what regards the employment status, instead, we can see that people who are in paid employment and those who are retired tend to use safer

tools to save money compared to individuals that are searching for work or students. Lastly, perhaps the most interesting insight, we note that the our research variable, knowledge score, has a deep impact in utilizing smarter methods to save money. A financial business could therefore be interested in campaigns designed to boost financial literacy: an increase in people's knowledge, in fact, could result in a greater interest to the business' savings-related services.

### 5.2 Improvise Expenses

An important tool that the personal financial advisor should help the client to put in place is an emergency fund. This reserve of savings is made to protect the client himself in case of an improvise substantial expense, or a sudden interruption of their income. In this section we are going to evaluate which class of individuals could not face a major (equivalent to their monthly income) expense today without having the need to borrow money or ask for help, utilizing the data coming from question QF4 of the questionnaire. For this model, We removed not only the observation that have not given an answer for the question, but also those who have not a personal income, since this type of tool would not be necessary for them. Moreover, we categorized the answer "yes" as positive (1), and both the answer "No" and "I don't know" as negative (0). The results are presented in Table 5.

The variables most associated with a positive response are age, employment and financial literacy. An increase in age result in an increase of the probability of being able to cover an improvise substantial expense. The same probability, instead, decreases for people looking after the home or looking for work, if compared with the baseline (self-employed). Lastly, once again, the variable related to the knowledge score seems to be deeply positive associated with an affirmative response. This indicates that people with better financial knowledge tend to have greater probability of having enough savings to face an improvise expense.

In figure 2 we wanted to get a more in depth look on the differences in the distributions of the knowledge score between people that can face an improvise expense and those who cannot.

As we expected, the distribution of the financial knowledge's score is asymmetric to the left for people that cannot face an improvise expense without borrowing money, while it is asymmetric to the right for those who can. This reflects what has been found in the model, and further highlights the association between a greater financial knowledge and the possibility of face the problem of a sudden expense.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| (Intercept) | 2.981e-02 | 0.948 | |
| age | 1.029 | 9.44e-09 | *** |
| instruc.L | 1522.126 | 0.970 | |
| instruc.Q | 1.070-02 | 0.980 | |
| instruc.C | 9.907 | 0.985 | |
| instruc$^4$ | 0.413 | 0.988 | |
| instruc$^5$ | 1.355 | 0.988 | |
| employment2 | 1.185 | 0.294 | |
| employment4 | 0.485 | 4.79e-4 | *** |
| employment5 | 0.286 | 4.21e-08 | *** |
| employment6 | 1.157 | 0.496 | |
| employment9 | 0.170 | 5.49e-08 | *** |
| employment10 | 0.375 | 0.074 | . |
| knowScore.L | 4.809 | $< 2e-16$ | *** |
| knowScore.Q | 1.180 | 0.338 | |
| knowScore.C | 1.215 | 0.236 | |
| knowScore$^4$ | 1.180 | 0.274 | |
| knowScore$^5$ | 1.102 | 0.496 | |
| knowScore$^6$ | 1.013 | 0.925 | |
| knowScore$^7$ | 1.124 | 0.329 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 5: Result of logistic model 5 Capability of facing an improvise major expense explained by age, instruction, employment status and financial literacy

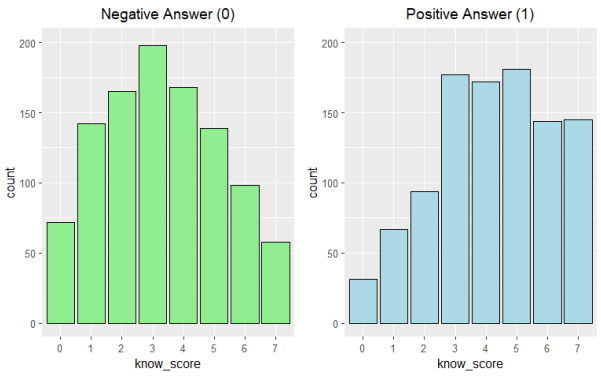


Figure 2: Differences in the distributions of the score obtained in Financial literacy between people who can face an improvise expense and people who can not

### 5.3 Interruption of Income

As previously stated, an emergency fund should also permit the individual to cover their expenses in the case of a sudden interruption of their income. In this section, therefore, we are going to analyze data from question QF13 in order to evaluate which are the variables that are associated with the possibility of facing this problem without borrowing money. More precisely, the question asks: "If you lost your main source of household income, how long could your household continue to cover living expenses, without borrowing any money?". According to the popular opinion [4], an emergency fund should cover at least from 3 to 6 months of living expenses. For this reason, even if we could utilize once again a Proportional Odds Logistic Model, we decide to categorize people that answered "Less than a week", "at least a week, but not one month", "at least one month, but not three months" and "don't know" as "in need of an emergency fund" (0), while, for all the others, this type of consultancy is not needed (1). The resulting logistic model, built with the variables selected through the Akaike Information Criterion, is reported in Table 6.

The resulting estimates reflect what we have seen until now. People that live in southern Italy or in the islands have more trouble facing this sudden interruption of income, and are therefore more in need of a financial tool like the emergency fund. Once again, an increase in the person age is associated with better financial stability, while the opposite can be said for people looking after the home or those looking for work. The importance of the knowledge score in this section related to savings is also present in the capability to face a sudden interruption of one's income.

| | Estimate | $Pr(>\|t\|)$ | Sig.cod |
|---|---|---|---|
| (Intercept) | 0.519 | 0.017 | * |
| area2 | 0.795 | 0.088 | . |
| area3 | 0.888 | 0.385 | |
| area4 | 0.734 | 0.021 | * |
| area5 | 0.524 | 1.55e-4 | *** |
| age | 1.010 | 0.028 | * |
| employment2 | 0.914 | 0.565 | |
| employment4 | 0.685 | 0.058 | . |
| employment5 | 0.436 | 1.49e-4 | *** |
| employment6 | 0.769 | 0.179 | |
| employment9 | 0.632 | 0.076 | . |
| employment10 | 0.423 | 0.117 | |
| knowScore.L | 7.591 | $< 2e-16$ | *** |
| knowScore.Q | 0.821 | 0.275 | |
| knowScore.C | 1.066 | 0.703 | |
| knowScore$^4$ | 0.923 | 0.604 | |
| knowScore$^5$ | 0.970 | 0.829 | |
| knowScore$^6$ | 1.052 | 0.691 | |
| knowScore$^7$ | 1.094 | 0.431 | |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$

Table 6: Result of logistic model 6
Capability to cover one's expenses after a sudden interruption of one's income explained by area, age, employment status and financial literacy

## 6 Conclusions

The aim of our work was to derive, from a questionnaire with the same structure of a real bank's survey, useful insights on the relationships that socio-demografic variables and a financial literacy score have with the usage of financial instruments that the banks themselves propose. The survey in question came from the OECD International Network for Financial Education's questionnaire from which we derived a knowledge score based on the number of correct answers to the seven questions related to financial knowledge.

First of all, we developed a model to understand which factors are more associated with financial literacy. The results highlighted a positive association with both age and instruction, and better results for the male sex. This insights could help financial businesses in campaigns focused on an improvement of general financial knowledge to target people most in need. A better financial knowledge, as highlighted in the next models, will result in a major interest for the businesses' services.

In the second section we took an in depth look to Retirement Plans. We thought that, for a bank selling this type of services, it could be interesting to understand which socio-demographic variables better explain the confidence of people of having done a good job for planning their retirement and which explain the usage of safer tools for building their fund. We found that southern Italy and islands' people tend to be both less confident of their plan and use precarious tools. Also, age and being employed are fundamental variables to explain both confidence and tools used. Lastly, sex seems to be relevant only for the choice of the tools used, not for the individual's

confidence. Of course, our research variable knowledge score proved to have a deep impact on the matter. For a business that wants to market this retirement services, it is useful to know that these are the categories of people that most struggle with the problem, and are therefore in need of help.
In the third section, we focused on services related to personal finance. This type of services consist in helping the individual to manage his savings and expenses. We found that a bad management of one's savings is related to: living in southern areas or islands, being unemployed or having a low financial knowledge. Furthermore, we found that people that are younger, unemployed and with a low financial knowledge are the most in need of this services, since they would struggle to face an improvise expense. Instead, the need for services like the put in place of an emergency fund would be more necessary for people of southern areas and islands, young people and those with a low financial knowledge, since they do not have any tool to protect them from a sudden interruption of their income.

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