# Are there urban-rural gaps in Spaniards financial knowledge?

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**Abstract:** Our objective is to analyze whether there are urban-rural gaps in financial knowledge of Spanish people. For this purpose, we use data from the Survey of Financial Competences conducted by the Bank of Spain and the Spanish National Securities Market Commission on a representative sample of the Spanish population aged between 18 and 79 during the last quarter of 2016 and the first half of 2017. From this microdata base, we estimate qualitative response models in which each of the dimensions of financial knowledge (inflation, compound interest and risk diversification) acts as dependent variable on a set of explanatory variables. Among the latter is one that measures whether the respondent lives in an urban or rural area. Our results reveal that there are urban-rural gaps in the financial knowledge of Spaniards over 39 years old. We also find conclusive results about the effect of other socioeconomic factors on the financial knowledge of Spaniards. Thus, the probability of being financially illiterate is higher for those who are women and have low income and low educational attainment. Meanwhile, being born in another country, self-confidence, and contracting financial products are all of them factors that have positive implications for financial knowledge of Spanish population.

**Keywords:** Financial Knowledge, Urban-Rural Gaps, Age, Gender, Birthplace.

**JEL Codes:** R00, J24, D80.

## 1. INTRODUCTION

Over the past half century, the world economic order has undergone profound transformations that have triggered increasing and exponential financial liberalization. This liberalization has led to the proliferation of a multitude of increasingly complex financial products and services. Moreover, more and more people with different individual characteristics (in terms of gender, income, educational attainment, place of birth, etc.) can contract these types of products and services.

This abundant, complex, and varied supply of financial products and services has been accompanied by a growing demand for them. This fact, at least in Western countries, is driven by the need to supplement certain contingencies that public social security systems are no longer fully able to cover due to their unsustainability (especially, pensions). Specifically, in these countries, the old-dependency ratio is higher than in previous decades, as the number of births has fallen and life expectancy at birth has increased. This, along with other factors, such as high public debt, threatens the sustainability of such systems (OECD, 2005, 2016a, 2019; Peters et al., 2019), especially if they are *pay-as-you-go*. In fact, in Spain, where in addition the unemployment rate is usually high, this threat is notorious (Blanco and Ruiz 2017; Moreno-Herrero et al. 2017).

Increasingly, therefore, individuals need to plan financially to supplement certain contingencies, such as their pension. However, they do not always possess the financial knowledge required to successfully manage financial assets (OECD, 2016b, 2017). In Spain, this is reflected in the Financial Competences Report by Bover et al. (2018), which comments on the main results of the Survey of Financial Competences (SFC) prepared by the Bank of Spain and the National Securities Market Commission (BdE and CNMV, 2018a).

Precisely, both organizations propose to jointly design financial education plans that, instead of being general for the entire Spanish population, are adapted to the particularities of each of the different groups that make up this population. In addition, those groups that reflect a lower level of financial knowledge than others are of special interest. In other words, a greater need for financial literacy. However, to achieve this purpose, a "process of identifying groups" is necessary (BdE and CNMV, 2018b, p.42).

To contribute to this identification process, our main objective is to analyze whether living in rural or urban areas influences the financial knowledge of Spaniards; a question

that is still not fully resolved in economic research. In our analysis, together with the place of urban or rural residence of the Spaniards, other socio-economic factors are considered concerning their gender, income, educational attainment, household structure, financial portfolio, occupational status, etc. Considering these variables contributes to the robustness and reliability of the results. But, at the same time, they shed light on the set of factors that determine the financial knowledge of Spanish population; a subject not yet widely explored in economic research.

For our purpose, this introduction is followed by a review of previous works that have dealt with urban-rural differences in the financial knowledge of individuals. This is followed by an empirical analysis in which we address what data and methodologies are used, as well as the results obtained and their discussion. Finally, the conclusions are presented.

## 2. PRIOR LITERATURE

Those first papers that analyzed the existence of financial knowledge gaps due to residing in urban or rural areas date back to the 1970s in the American context. Thus, Larson (1971) pointed out that American high school students living in urban areas denoted greater financial knowledge than their rural counterparts. However, Armstrong and Uhl (1971) and Bibb (1973) pointed out exactly the opposite. Later, Carter et al. (1986) showed that living in rural areas is associated with low levels of financial knowledge in Quebec.

Most recent empirical evidence has been covering this initial lack of consensus, finding that those living in rural areas are generally less likely to be financially literate than those living in urban areas. This fact was demonstrated by Lusardi and Mitchell (2011), Klapper and Panos (2011) and Klapper et al. (2012) based on representative samples of the Russian population. Similar conclusions were reached by Beckman (2013) in the Romanian context, as well as by Bhusban and Medury (2013) with respect to Indian workers; by Santoso et al. (2016) in Indonesia; or by Cui et al. (2017) and Yuan and Jin (2017) in China.

Also, Huchin-Flores and Simon (2011) revealed that, in Mexico, primary school students enrolled in rural schools are more financially illiterate than their urban school counterparts. Ali et al. (2016) reached the same conclusion using a representative sample

of Australian secondary school students. Nkomazana et al. (2015) found that Zimbabwean secondary school students in urban areas scored better on tests of financial knowledge than their rural counterparts. Subsequently, Murendo and Mutsonziwa (2017) managed to extend this finding to the whole population of Zimbabwe.

More recently, Faulkner et al. (2019) have concluded that, in Ireland, proximity to urban areas is a key determinant of financial knowledge, which is one of the reasons why recovery from the 2008 crisis has lagged behind in rural areas compared to urban areas. Likewise, Mandanna and Mahesh (2020), in analyzing the investment paths of rural households in Kodagu, have warned that those living in rural areas show more financial illiteracy than those in urban areas.

Regarding Spain, country analyzed in this paper, there are a few papers that have analyzed the existence of urban-rural gaps in financial knowledge. Moreover, they only concern a very specific group of the population (adolescent secondary school students) and, even using the same database (OECD, 2014), have reached different conclusions. Thus, Moreno-Herrero et al. (2018) noted that students enrolled in schools located in rural areas or small municipalities denote worse levels of financial knowledge than those enrolled in schools in urban areas and/or large cities. Previously, Cordero et al. (2016) found that "there is a positive and significant relationship for rural location" (p. 21), in disagreement with Moreno-Herrero et al. (2018), as well as with most of the related literature.

The methodology employed in these previous works, in general, is strongly conditioned by the nature of the database used and, especially, of the variable dependent on the models that are estimated in them. For example, Moreno-Herrero et al. (2018) have to employ a hierarchical linear model because they use as a dependent variable the financial literacy scores reported in the framework of the PISA 2012 Report, which are structured by levels (OECD, 2014, p. 59). Although Cordero et al. (2016) use those same data, they do so by considering a treatment group (students in whose schools financial literacy courses are offered) and a control group (students in whose schools such courses are not offered). This forces them to employ a difference-in-differences approach.

In addition to the nature of the database, the main objectives of each work sometimes also influence the way in which the financial knowledge has been analyzed. For example, Klapper and Panos (2011) and Klapper et al. (2012) analyze the financial knowledge of

the Russian population as a preliminary step to analyze the effect of this knowledge on issues such as retirement planning, the level of disposable income in a crisis scenario or the use of formal versus informal banking. Therefore, since in these works financial knowledge is analyzed preliminarily for further analysis, the way in which urban/rural differences in financial knowledge are found is through a descriptive analysis. This type of preliminary analysis is also used by Beckmann (2013) and Cui et al. (2017) before evaluating the effect of financial knowledge on savings and access to credit, respectively.

Other authors directly review, at a descriptive level, financial knowledge surveys previously carried out in certain contexts and present, for information purposes, the distribution of responses according to the characteristics of the interviewees (among which is rurality). In broad terms, they observe what profile of individuals fail (or get it right) most frequently. This is the example of Lusardi and Mitchell (2011), as well as Yuan and Jin (2017), who observe that people living in urban areas get questions on financial issues right more often than their rural counterparts. Therefore, as Bover et al. (2018) do in their Financial Competences Report, they comment on the main results of the surveys, but do not analyze causal relationships (e.g., whether rurality is a determinant of financial knowledge).

Those works that have analyzed rurality as an explanatory variable of financial knowledge, measuring the latter through a quantitative variable, have been able to estimate regressions by Ordinary Least Squares, i.e. OLS (Carter et al., 1986; Ali et al., 2016; Murendo and Mutsonziwa, 2017). However, other authors who have used quantitative variables of financial knowledge have employed other methodologies, such as ANOVA (Hunchin-Flores and Simon, 2011; Bhusban and Medury, 2013; Faulkner et al., 2019), or even factor analysis (Mandanna and Maesh, 2020).

In general, the use of ANOVA is more appropriate when most of the explanatory variables are qualitative, with the dependent variable being quantitative. It can also be used as a previous step to a difference-in-differences approach. Meanwhile, when most of the explanatory variables are quantitative (even if there is some qualitative variable), it is usual to estimates by OLS (being a necessary condition that the dependent variable is quantitative, as in ANOVA). On the other hand, factorial analysis is usually appropriate for reducing a set of variables that explain a phenomenon into a single variable (in this case, being financially literate) and then using the resulting variable in subsequent analyses. This is precisely what Ali et al. (2016) do.

However, when the dependent variable is qualitative, the researcher has no other option than to employ qualitative response models (QRM). QRM par excellence are logit and probit models, since they correct all the drawbacks of the pioneering linear probability model or LPM (Gujarati and Porter, 2009, p. 552). Thus, Nkomazana et al. (2015) rely on a logistic (logit) regression to obtain their conclusions because they use a binary qualitative variable to measure financial knowledge. Precisely because each of the three dimensions of financial knowledge that we use in our empirical analysis are binary qualitative variables, we estimate QRM models. Specifically, although we could estimate only logit models or only probit models (which is what researchers usually do) we estimate both models to further guarantee the reliability and robustness of our results (see section 3).

Be that as it may, papers that have analyzed urban-rural gaps in Spaniards' financial knowledge are scarce and contradictory. Moreover, given the availability of data at the time, they did not address the whole of the Spanish population, but rather a very specific segment. To cover all these gaps, we use the SFC (BdE and CNMV, 2018a) which comprises a representative sample of the Spanish population between 18 and 79 years old. As an additional novelty, our analysis is carried out according to three different age groups (18-39, 40-64, 65-79). Thus, it will be possible to know whether the urban-rural gaps in financial knowledge have widened or narrowed over the generations.

## 3. EMPIRICAL ANALYSIS

We use the SFC database (BdE and CNMV, 2018a) based on interviews conducted during the fourth quarter of 2016 and the first half of 2017 with a representative sample of the Spanish population aged 18 to 79. Precisely because it is a survey, most of the variables that comprise this database are of a qualitative nature. Among these variables are the three dimensions of financial knowledge (inflation, compound interest and risk diversification), which act respectively as variables dependent on the different models estimated in this section to achieve the proposed objectives.

Therefore, the estimators we use in this section are qualitative response, and more specifically, logit and probit. As will be seen throughout this same section, although the results are quantitatively different according to the estimator used (because they use different cumulative distribution functions), they are qualitatively similar. In other words,

the sign and significance of the estimated coefficients are coinciding in both estimators. Finally, special attention is paid to the odd-ratios generated by the logistic regression, due to their high interpretative value and how easily they are to understand the results and, consequently, conclusions can be drawn.

### 3.1. Data

SFC is composed of a total of 8,554 valid observations and follows the methodological guidelines recommended by the OECD (2015). Likewise, the latter is inspired by the modus operandi of Lusardi and Mitchell (2005, 2014); a method that stands out for measuring financial knowledge according to the following three dimensions: (i) inflation, (ii) compound interest and (iii) risk diversification. SFC also collects a great deal of information intrinsic to individuals and their households (e.g., gender, employment status, income, educational level, health, etc.), as well as their financial portfolio, real estate assets and financial attitudes, among other issues.

All variables we use in our estimations are extracted from this SFC. However, to meet the proposed objective, the sample has been segmented into three age groups (18-39, 40-64, 65-79). In this way, it will be possible to know whether the urban-rural gaps have narrowed or widened over the course of generations. Therefore, there is an estimate for each age group, as well as for each of the dependent variables. In other words, there is a dependent variable for each dimension of financial knowledge that exists (inflation, compound interest and risk diversification).

Table 3.1.1. below shows the definition and statistical-descriptive summary of each one of the variables that we use in our analysis.

**Table 3.1.1.** Definition and Statistical-Descriptive Summary of Used Variables

| Variable | Definition | Mean | | | Standard Deviation | | | Percentage | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 18-39 | 40-64 | 65-79 | 18-39 | 40-64 | 65-79 | 18-39 | 40-64 | 65-79 |
| **Financial Knowledge (Inflation)** | Binary variable that acquires value 1 when the interviewee identifies that inflation implies a decrease in purchasing power. It acts as a dependent variable in some of the estimated models. | 0.528 | 0.637 | 0.566 | 0.499 | 0.481 | 0.496 | 52.8 | 63.7 | 56.6 |
| **Financial Knowledge (Compound Interest)** | Binary variable that takes the value 1 when the respondent correctly calculates a compound capitalization operation. It acts as a dependent variable in some of the estimated models. | 0.475 | 0.486 | 0.372 | 0.499 | 0.500 | 0.483 | 47.5 | 48.6 | 37.2 |
| **Financial Knowledge (Risk Diversification)** | Binary variable that records the value 1 when the interviewee agrees that it is possible to reduce the risk by diversifying. It acts as a dependent variable in some of the estimated models. | 0.450 | 0.534 | 0.432 | 0.497 | 0.499 | 0.495 | 45.0 | 53.4 | 43.2 |
| ***Explanatory variables*** | | | | | | | | | | |
| **Rural** | Binary qualitative variable that acquires the value 1 when the person interviewed resides in a municipality with less than 15,000 inhabitants. This variable registers the value 0 otherwise. | 0.332 | 0.330 | 0.348 | 0.471 | 0.470 | 0.476 | 33.2 | 33.0 | 34.8 |
| **Gender** | Binary variable that takes the value 1 when the person interviewed is a woman. | 0.500 | 0.502 | 0.505 | 0.500 | 0.500 | 0.500 | 49.9 | 50.2 | 50.3 |
| **One-person household** | Binary variable that acquires the value 1 when the respondent habitually lives alone in his/her household, and 0 when the household structure is different. | 0.054 | 0.060 | 0.030 | 0.226 | 1.538 | 3.733 | 2.7 | 9.0 | 17.3 |
| **Educational Attainment** | Binary variable that registers the value 1 when the maximum level of studies reached by the interviewee is the basic and compulsory level to be undertaken by law in Spain or lower (ISCED classification 2 and lower). This variable takes the value 0 otherwise (ISCED classification 3 and higher). | 0.297 | 0.444 | 0.742 | 0.457 | 0.497 | 0.437 | 29.7 | 44.4 | 74.2 |
| **Income** | Binary variable that records value 1 when the total annual gross income in the household of the interviewee is less than 26,001 euros. Consider that, according to the Spanish National Statistics Institute, the average income per household in Spain was 26,730 | 0.594 | 0.539 | 0.676 | 0.491 | 0.498 | 0.468 | 59.3 | 53.9 | 67.6 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | euros at the time of the interview. This variable acquires the value 0 otherwise (more than 26,000 euros). | | | | | | | | | |
| ***Occupational Status*** | | | | | | | | | | |
| **Self-employed** | Binary variable that records the value 1 when the interviewee is self-employed, and 0 in any other employment situation. | 0.096 | 0.159 | 0.017 | 0.295 | 0.361 | 0.129 | 9.6 | 15.4 | 1.7 |
| **Salaried employee** | Binary variable that acquires the value 1 when the interviewee is employed, and 0 in any other employment situation. | 0.507 | 0.064 | 0.008 | 0.500 | 0.500 | 0.087 | 50.7 | 49.8 | 0.8 |
| **Unemployed** | Binary variable that takes the value 1 when the respondent is unemployed, and 0 in any other employment situation. | 0.174 | 0.077 | 0.049 | 0.379 | 0.366 | 0.070 | 17.4 | 15.9 | 0.5 |
| **Retired** | Binary variable that records the value 1 when the interviewee is retired, and 0 in any other work situation. | 0.001 | 0.040 | 0.772 | 0.032 | 0.244 | 0.419 | 0.1 | 6.4 | 77.2 |
| ***Financial Products*** | | | | | | | | | | |
| **Shares** | Binary variable that is 1 when, "during the two years prior to the interview", the interviewee has personally or jointly acquired shares in a company. | 0.047 | 0.077 | 0.069 | 0.211 | 0.267 | 0.253 | 4.7 | 7.7 | 6.7 |
| **Pension plans** | Binary variable that is 1 when, "during the two years prior to the interview", the interviewee has personally or jointly acquired pension plans. | 0.021 | 0.040 | 0.006 | 0.144 | 0.196 | 0.079 | 2.1 | 4.0 | 0.6 |
| **Investment funds** | Binary variable that is 1 when "during the two years prior to the interview", the interviewee has personally or jointly acquired investment funds. | 0.026 | 0.067 | 0.060 | 0.158 | 0.250 | 0.238 | 2.6 | 6.7 | 6.0 |
| **Mortgages** | Binary variable that is 1 when, "during the two years prior to the interview", the interviewee has personally or jointly taken out a mortgage. | 0.040 | 0.038 | 0.007 | 0.195 | 0.196 | 0.087 | 4.0 | 3.8 | 0.8 |
| **Personal loans** | Binary variable that is 1, "when during the two years prior to the interview", the respondent has personally or jointly taken out a personal loan. | 0.131 | 0.157 | 0.065 | 0.337 | 0.364 | 0.247 | 13.1 | 15.7 | 6.5 |
| | | | | | | | | | | |
| **Native** | Binary variable that is equal to 1 when the respondent is a native, and 0 when he/she is a foreigner. | 0.819 | 0.899 | 0.974 | 0.385 | 0.302 | 0.159 | 81.9 | 89.9 | 97.4 |
| **Subjective Financial** | Ordinal polytomous variable that follows the Likert scale. This variable is 1 when the interviewee qualifies his/her general | 2.544 | 2.453 | 2.126 | 0.838 | 0.890 | 0.940 | 49.7 (=3) | 46.7 (=3) | 34.6 (=3) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Knowledge** | knowledge of financial matters as very low. Meanwhile, it is equal to 5 when the interviewee considers that he/she has a very high level of such knowledge. | | | | | | | | | |
| **Tenure** | Binary variable that is 1 when the household of the interviewee possesses real estate assets in addition to the main dwelling (e.g., land, farms, warehouses, garages not included in the main dwelling, etc.). This variable is 0 otherwise. This variable is important in the Spanish context, where real estate wealth predominates over financial wealth (BdE, 2019). | 0.309 | 0.412 | 0.491 | 0.462 | 0.492 | 0.500 | 30.9 | 41.2 | 49.1 |
| **Health** | Binary variable that is 1 when the interviewee confesses that, "during the year prior to carrying out the survey", a member of his/her family or he/she has had an accident or health problem that has prevented him/her from carrying out a normal life. | 0.110 | 0.114 | 0.123 | 0.313 | 0.318 | 0.329 | 11.0 | 11.4 | 12.3 |
| **Financial Fragility** | Binary variable that is 1 when the interviewee acknowledges that, "during the year prior to the interview", he/she has faced situations in which his/her income was not sufficient to cover his/her current expenses (food, electricity, water, mobile phone, school, etc.). It acquires the value 0 if this is not the case. | 0.280 | 0.286 | 0.199 | 0.449 | 0.452 | 0.400 | 28.0 | 28.6 | 19.9 |
| | **Obs.** | 2,842 | 4,287 | 1,425 | | | | | | |

### 3.2. Estimations

Conclusions we provide here are supported by the results we obtain in the estimations of the logit and probit models that take place in this section. However, for these results to be valid and reliable, a series of analyses should be carried out before and after the estimation. Among all the previous assumptions required by the classical linear regression model, the absence of multicollinearity becomes important in the estimation of binary qualitative response models. However, the remaining assumptions are also addressed. In the meantime, post-estimation analysis revolves around the goodness of fit.

Beginning with the pre-estimate analysis, the database we use is constructed from interviews with "a large sample of randomly selected individuals" (Bover et al. 2018 p.7). Therefore, the assumption of randomness is confirmed. However, the assumption of normality for random disturbances is not given precisely because they can only take two values, as is the case for the dependent variable. Therefore, they follow the Bernoulli distribution. This is not a problem even in the classical linear regression model, where "if the objective is point estimation, the assumption of normality is not necessary" (Gujarati and Porter, 2009, p. 544). Even less so when estimating logit and probit models.

Since the presence of outliers is only a problem when it is due to human error (Draper and Smith, 1998) and the database is reliable in this regard, this paper does not address this issue. Also, since the database used is cross-sectional, the presence of autocorrelation is highly unlikely, especially if the data have been collected randomly. Heterocedasticity is also not an important issue when estimating binary qualitative response models using the maximum likelihood method, as recently tested by Ginker and Lieberman (2017).

However, it is important that there is not a high degree of correlation between two or more explanatory variables (i.e. no multicollinearity). One of the most common methods of detecting multicollinearity is the Variance Inflation Factor (VIF), the inverse of which is known as the Tolerance Index (Tol.). Both methods show how the variance of an estimator is inflated by the presence of collinearity. High values of VIF (or low values of Tol.) indicate that there is multicollinearity.

VIF and Tolerance Index values we provide in table 3.2.1. reveal VIF values well below 10 and Tolerance Index values well above 0.1. According to the related literature (Gujarati and Porter, 2009, p.340; Greene, 2018, p.95) we can say that there are not multicollinearity problems.

**Table 3.2.1. Multicollinearity Analysis**

| | 18-39 | | 40-64 | | 65-79 | |
|---|---|---|---|---|---|---|
| | **VIF** | **Tol.** | **VIF** | **Tol.** | **VIF** | **Tol.** |
| **Rural** | 1.02 | 0.98 | 1.03 | 0.97 | 1.06 | 0.94 |
| **Gender** | 1.03 | 0.97 | 1.11 | 0.90 | 1.32 | 0.76 |
| **One-Person Household** | 1.04 | 0.97 | 1.00 | 0.99 | 1.01 | 0.99 |
| **Educational Attainment** | 1.23 | 0.81 | 1.28 | 0.78 | 1.32 | 0.76 |
| **Income** | 1.18 | 0.85 | 1.26 | 0.79 | 1.23 | 0.81 |
| **Self-Employed** | 1.34 | 0.74 | 2.14 | 0.47 | 1.19 | 0.84 |
| **Salaried Employee** | 1.68 | 0.59 | 2.86 | 0.35 | 1.08 | 0.93 |
| **Unemployed** | 1.54 | 0.65 | 2.01 | 0.50 | 1.04 | 0.96 |
| **Retired** | 1.01 | 0.99 | 1.51 | 0.66 | 1.51 | 0.66 |
| **Shares** | 1.61 | 0.62 | 1.90 | 0.52 | 1.80 | 0.55 |
| **Pension Plans** | 1.44 | 0.69 | 1.64 | 0.61 | 1.65 | 0.61 |
| **Investment Funds** | 1.58 | 0.63 | 1.82 | 0.55 | 1.69 | 0.59 |
| **Mortgages** | 1.15 | 0.87 | 1.18 | 0.84 | 1.21 | 0.83 |
| **Personal Loans** | 1.16 | 0.86 | 1.28 | 0.78 | 1.28 | 0.78 |
| **Native** | 1.12 | 0.89 | 1.14 | 0.88 | 1.04 | 0.96 |
| **Subjective Financial Knowledge** | 1.03 | 0.97 | 1.02 | 0.98 | 1.05 | 0.95 |
| **Tenure** | 1.04 | 0.96 | 1.02 | 0.98 | 1.07 | 0.94 |
| **Health** | 1.06 | 0.94 | 1.04 | 0.96 | 1.05 | 0.95 |
| **Financial Fragility** | 1.04 | 0.96 | 1.03 | 0.97 | 1.05 | 0.95 |
| **Mean VIF** | **1.23** | | **1.44** | | **1.24** | |

Below are the specifications of the estimated models:

- Logit models:

$$P(Y = 1) = F(\beta_0 + \beta_1 rur + \beta_2 gnd + \beta_3 sng + \beta_4 bsc + \beta_5 low + \beta_6 lab + \beta_7 fp + \beta_8 nat + \beta_9 sub + \beta_{10} ten + \beta_{11} health + \beta_{12} frag + u_i) \quad [3.2.1]$$

  Where:

  - $P(Y = 1)$ is the probability that the dependent variable acquires the value 1. That is to say, the probability that the interviewee answers correctly to the question that measures his/her financial knowledge. Therefore, this model is estimated for each of the dimensions of said knowledge (inflation, compound interest and risk diversification), as well as for each age group.
  - $F$: cumulative logistic distribution function.
  - $rur$: rural.
  - $gnd$: gender.
  - $sng$: one-person household.
  - $bsc$: educational attainment.
  - $low$: income.

- $lab$: occupational status (self-employed, salaried employee, unemployed or retired).
- $fp$: financial products (shares, pension plans, investment funds, mortgages, personal loans).
- $nat$: native.
- $sub$: subjective financial knowledge.
- $ten$: tenure.
- $health$: health.
- $frag$: financial fragility.
- $u_i$: random disturbances.

Expression (3.2.1.) can also be expressed as:

$$L_i = ln(p_i/q_i) = \beta_0 + \beta_1 rur + \beta_2 gnd + \beta_3 sng + \beta_4 bsc + \beta_5 low + \beta_6 lab + \beta_7 fp + \beta_8 nat + \beta_9 sub + \beta_{10} ten + \beta_{11} health + \beta_{12} frag + u_i \quad [3.2.2.]$$

Where $ln(p_i/q_i)$ is important because $p_i/q_i$ is the probability of success over the probability of failure. In other words, it is the odds ratios, which have a high interpretative value and at the same time are easy to understand.

- Probit models:

$$P(Y = 1) = \theta(\beta_0 + \beta_1 rur + \beta_2 gnd + \beta_3 sng + \beta_4 bsc + \beta_5 low + \beta_6 lab + \beta_7 fp + \beta_8 nat + \beta_9 sub + \beta_{10} ten + \beta_{11} health + \beta_{12} frag + u_i) \quad [3.2.3.]$$

Where:

- θ: cumulative normal distribution function.
- The rest of the notations coincide with the specifications of the logit models.

Meanwhile, the post-estimation analyses that exist for binary qualitative response models are generally aimed at verifying the goodness of fit. However, such goodness "is of secondary importance. What matters is the expected signs of the regression coefficients and their statistical and/or practical significance" (Gujarati and Porter 2009 p.563).

In all our estimations, *count* $R^2$ is greater than 0.5. This indicates that there is a correct fit of the data to the model. Also, in almost all estimates, the p-value of Pearson's test

does not allow rejecting the null hypothesis that there is conformity in the predicted and observed frequencies through the patterns. Otherwise, the p-value of the Hosmer-Lemeshow test does, which, in turn, also verify a good part of the results obtained in the Pearson test. In any case, all these tests are reinforced by sufficiently large areas of the ROC curve (>0.5) in all estimations.

Therefore, there is more evidence to support the goodness of the fit of the data to the models than to suggest otherwise. Finally, Akaike and Schwartz's information criteria determine which estimator (logit or probit) is the most appropriate and, therefore, the most reliable to support the conclusions obtained in this paper. As a rule, the estimator whose information criteria show the least value should be chosen. However, since the qualitative results (i.e. the sign and significance of the coefficients) are the same for both estimators, there is no compelling reason to choose one estimator or the other, both being equally valid and reliable. All values of the post-estimation statistics are shown in the results tables in Appendix.

### 3.3. Results and Discussion

In this section, we show and discuss the results obtained from the different estimations, made according to the previously described specifications. In appendix, we provide tables 3.3.2. to 3.3.4. First of them, contains the results of logit and probit estimations for each of the three age groups we consider, where financial knowledge about inflation is the dependent variable. Following two tables differ from the first one in that dependent variable is financial knowledge about compound interest and risk diversification, respectively. All these tables also contain the value of the post-estimation tests, which contribute to guaranteeing the reliability and validity of our results.

Meanwhile, in this section we provide table 3.3.1. (just below), which contains the odd-ratios values of all estimations we made. These odd-ratios are generated by logistic regression and are important because they facilitate the interpretation of the results while having great informational value. Specifically, odd-ratios are defined as the probability of an event occurring over the probability of the same event not occurring. In this case, the event is the right question that measures financial knowledge. A value above 1 denotes a positive relationship between the explanatory and dependent variables, while values below 1 indicate a negative relationship between those variables. However, they are only conclusive when there is significance, which is indicated in the tables by asterisks.

**Table 3.3.1.** ***Odd-Ratios***

| | Inflation | | | Compound Interest | | | Risk Diversification | | |
|---|---|---|---|---|---|---|---|---|---|
| | **18-39** | **40-64** | **65-79** | **18-39** | **40-64** | **65-79** | **18-39** | **40-64** | **65-79** |
| **Rural** | 0.929 | 0.989 | 0.897 | 1.034 | 0.891* | 1.164 | 0.909 | 0.851** | 0.762** |
| **Gender** | 0.710*** | 0.627*** | 0.988 | 0.895 | 0.705*** | 0.661*** | 0.781*** | 0.589*** | 0.602*** |
| **One-Person Household** | 1.414** | 0.978 | 1.032 | 1.076 | 0.975 | 1.116 | 1.332 | 1.052 | 1.080 |
| **Educational Attainment** | 0.587*** | 0.507*** | 0.472*** | 0.887 | 0.734*** | 0.525*** | 0.870 | 0.529*** | 0.290*** |
| **Income** | 0.668*** | 0.659*** | 0.891 | 0.851** | 0.947 | 0.855 | 0.683*** | 0.799*** | 0.823 |
| **Self-Employed** | 1.040 | 1.118 | 3.125** | 0.966 | 1.252* | 1.695 | 1.237 | 1.199 | 1.383 |
| **Salaried Employee** | 0.880 | 1.129 | 6.745** | 0.998 | 1.111 | 24.090** | 1.005 | 1.139 | 0.738 |
| **Unemployed** | 0.822 | 1.024 | 0.309 | 0.829 | 0.935 | 0.539 | 0.975 | 1.069 | 1.228 |
| **Retired** | 1.565 | 1.117 | 1.292 | 0.519 | 0.898 | 0.969 | 0.553 | 1.068 | 1.040 |
| **Shares** | 1.004** | 1.003*** | 1.003 | 1.003* | 1.002 | 1.004 | 1.002 | 1.003** | 1.000 |
| **Pension Plans** | 1.000 | 1.000 | 1.008*** | 1.004*** | 1.003** | 1.007*** | 1.001 | 1.000 | 1.005** |
| **Investment Funds** | 1.003** | 1.002** | 1.005** | 1.000 | 1.001 | 1.004** | 1.001 | 1.005*** | 1.008*** |
| **Mortgages** | 0.998 | 0.999 | 1.004 | 0.997 | 1.000 | 1.002 | 1.001 | 0.993** | 1.002 |
| **Personal Loans** | 0.999 | 1.004** | 0.997 | 0.999 | 1.003 | 1.007** | 1.003** | 1.001 | 1.004 |
| **Native** | 1.087 | 1.004 | 1.317 | 0.725*** | 0.947 | 1.001 | 0.798** | 0.846 | 0.446** |
| **Subjective Financial Knowledge** | 1.151*** | 1.004 | 0.997 | 1.000 | 1.028** | 1.027 | 1.376*** | 1.011 | 1.022 |
| **Tenure** | 1.006 | 1.009 | 1.003 | 1.008 | 1.006 | 1.003 | 1.015 | 0.999 | 1.001 |
| **Health** | 1.013 | 0.998 | 1.096 | 0.997 | 1.002 | 0.903 | 0.982 | 0.999 | 1.226 |
| **Financial Fragility** | 0.987** | 1.011* | 0.991 | 1.006 | 1.008 | 1.035 | 0.998 | 1.003 | 1.009 |
| **Intercept** | 1.558** | 3.825*** | 1.987 | 1.558*** | 1.339** | 1.429 | 0.687* | 2.618*** | 7.461*** |

***$p < 0.01$ **$p < 0.05$ *$p < 0.10$

Results for rural variable are negative and significant for the population aged 40 and over in the risk diversification dimension and for the population aged 40-64 in the compound interest dimension (see Table 3.3.1., Table 3.3.3, and Table 3.3.4.). This means that, for Spaniards over 39 years old, the probability of being financially literate in matters related to risk diversification is lower if they are residents of rural areas compared to their counterparts living in urban areas. The same is true for Spaniards aged 40-64 in terms of being financially literate in matters related to compound interest.

Comparing both age groups, the negative association between residing in rural areas and possessing financial knowledge is stronger for the older age group (65-79) than for the intermediate age group (40-64). Furthermore, for the latter group, the association is stronger when it comes to financial knowledge of risk diversification compared to that of compound interest (see Table 3.3.3. and Table 3.3.4. in appendix). Be that as it may, these results are consistent with those of most previous literature. Furthermore, they help to

clarify the lack of consensus around urban-rural gaps in the financial knowledge of Spaniards (Cordero et al., 2016; Moreno-Herrero et al., 2018).

The fact that the negative association between rurality and financial knowledge is stronger in the older groups reveals information in at least two senses. First, at least for the Spanish context, the belief that financial knowledge improves with age is questioned (Lusardi et al., 2010; van Rooij et al., 2011; Bucher-Koenen et al., 2016; West and Worthington, 2018, among others). Second, if the urban-rural gaps in financial knowledge are more pronounced for the older groups, it is understandable that in Spain these gaps, although they still exist, have been decreasing over the generations. This highlights that the inclusion of economic-financial content in school curricula has led to the convergence of financial knowledge in urban and rural populations.

Regarding gender, our results are negative for all age groups in all dimensions of financial knowledge. This reveals that the probability of being financially literate is lower when the person interviewed is female, compared to being male. In other words, being female has negative implications for financial knowledge. However, these results are significant for all but two cases: (i) the elderly (65-79) in the inflation dimension and (ii) the young in the compound interest dimension. In these cases, although the results describe a negative association, they are not significant. Except for these two cases, the remaining results are significant and, therefore, conclusive.

Also, the strength of the negative relationship between being a woman and being financially literate varies by age group. Specifically, in the dimensions of inflation and risk diversification, being a woman under 40 is associated negatively with financial knowledge less strongly than being a woman over 40 (see Table 3.3.2. and Table 3.3.4.). Likewise, being a woman of 40-64 years of age is negatively associated with financial knowledge about compound interest with less force than in the case of being a woman of 65-79 years of age (see Table 3.3.3.). Therefore, in these cases there are gender gaps in financial knowledge unfavorable to women, but these gaps are less deep the younger the woman is.

In other words, in these cases, the gender-based financial knowledge gaps have narrowed over the generations. However, there is an exception: in the dimension of risk diversification, the results reveal that gender gaps in financial knowledge are deeper for the middle age group (40-64 years) compared to their predecessors (65-79 years).

However, in this dimension, this is not the case, as stated in the previous paragraph, with the younger group (18-39 years) where the gap is narrower compared to women aged 40 and over, although to a different degree. This mean that in the dimension of risk diversification the trend of closing the gap has skipped a generation.

Our findings on gender gaps in financial knowledge (unfavorable to women) are consistent with previous papers (e.g., Lusardi et al., 2010; Lusardi, 2012; Lusardi and Tufano, 2015; Lusardi and De Bassa Scheresberg, 2017; Lürhman et al., 2018; West and Worthington, 2018; Yakoboski et al., 2019; Xue et al., 2019; etc.). However, in the Spanish context, those papers that analyzed these gaps are scarce. Moreover, they refer only to adolescent high school students and, above all, are contradictory. Thus, Molina-Marfil et al. (2015), Arellano et al. (2018) and Moreno-Herrero et al. (2018) found that being a woman is negatively associated with financial knowledge. But Mancebón et al. (2019) used the same database to conclude just the opposite. Therefore, our results allow us to create consensus on this issue and, in addition, we do it for the whole of the Spanish population.

In relation to educational attainment, all significant results we obtain are negative (see Table 3.3.1.). Given that this variable is 1 when the maximum educational attainment is basic or lower (ISCED 2 or lower), these results indicate that low educational levels imply low financial knowledge. In other words, the probability that a person is financially literate increases as his or her educational attainment increases. These results are consistent with most previous paper that has analyzed the relationship between education and financial knowledge both in the international context (e.g., Lusardi et al., 2010; Bucher-Koenen and Lamla-Dietrich, 2018; West and Worthington, 2018; Xue et al., 2019) and in Spain (Molina-Marfil et al., 2015; Moreno-Herrero et al., 2018; Mancebón et al., 2019).

As with educational attainment, all significant results we obtain for income level are negative (see Table 3.3.1.). This variable is 1 when the total annual gross income of the household where the interviewee lives is lower than the average income of Spanish households. Therefore, our results suggest that lower income levels are associated with low financial knowledge. These findings complement those of Molina-Marfil et al. (2015) and Mancebón et al. (2019) in the Spanish context. They also coincide with most of the findings found by other authors in the context of other countries (e.g., Lusardi et al., 2010;

Bucher-Koenen and Lamla-Dietrich, 2018; West and Worthington, 2018; Xue et al., 2019).

With respect to occupational status, our results are inconclusive in most cases. Significant and positive results for self-employed and salaried employees are only given for the dimensions of inflation and compound interest (see Table 3.3.1.). On the one hand, the probability of being financially literate in matters related to inflation is higher when one is self-employed or a salaried employee over 64 years of age compared to the rest of the occupations and age groups (see Table 3.3.2. in appendix). In addition, this probability is higher for salaried employees compared to those who are self-employed. On the other hand, being self-employed is also positively associated with financial knowledge about compound interest for the 40-64-year-old population. The same association is true for salaried employees aged 65-79, and it is even stronger.

Our findings on occupational status are unprecedented in the Spanish context. However, they are consistent with previous findings by other authors in the context of other countries. For example, West and Worthington (2018) and Cumurovic and Hyll (2019) noted a positive relationship between self-employment and financial knowledge. Similarly, Loke (2017) and Cude et al. (2019) pointed to the positive implications of individuals' job stability on their financial knowledge. Furthermore, given that our results obtained concern the population over 39 years of age, these findings could be justified by the age (Lusardi et al., 2010; van Rooij et al., 2011; Bucher-Koenen et al., 2016; West and Worthington, 2018) that can inform the time an individual has been interacting with the labor market.

About contracting financial products, we include a series of explanatory variables that measure the hiring of different financial products. Most of the results for these variables that are significant are also positive (see Table 3.3.1.). This suggests that participating in financial markets increases the probability of being financially literate, compared to not participating in such markets. Exceptionally, a negative and significant result is obtained for Spaniards aged 40-64 who have taken out a mortgage. However, both in this case and in the other significant cases, the value of the estimated coefficients is very low (odd-ratios very close to 1). These results are not surprising given that the financial profile of Spaniards is quite conservative (BdE, 2019).

So far, empirical evidence about the relationship between using financial products and having financial knowledge has been very scarce in the Spanish context. Moreover, such evidence has referred to the use of very basic financial products by adolescents (Moreno-Herrero et al., 2018). Regardless, our results contribute to complementing this lack in the Spanish context. But they are also consistent with the broad body of previous papers that in the context of other countries has proven that contracting financial products has positive implications for agents' financial knowledge (e.g., van Rooij et al., 2011; Klapper et al., 2012; Lusardi and Mitchell, 2014; West and Worthington, 2018).

There is consensus about the negative association between belonging a racial or ethnic minority and being financially literate (e.g., Boisclair et al., 2017; Nam et al., 2018; Yakoboski et al., 2019). In Spain, the empirical evidence in this regard is contradictory. Thus, Molina-Marfil et al. (2015) suggested that being an immigrant is negatively associated with financial knowledge. In contrast, using the same data, Mancebón et al. (2019) found significant results for those born in Spain, although these were not significant. Our results are significant in the sense of Mancebón et al. (2019). Specifically, young people (18-39 years old) born in Spain are less likely to have financial knowledge (compound interest and risk diversification) compared to their foreign counterparts. The same is true for the elderly (65-79) with respect to risk diversification (see Table 3.3.1.). These findings may be justified in the management of remittances (Gibson et al., 2014).

Regarding subjective financial knowledge, the significant results of this research reveal that the greater self-confidence young people on their financial knowledge, the greater the likelihood of being financially literate about inflation, as well as risk diversification. In the compound interest dimension, this phenomenon occurs only for the intermediate age group (40-64 years). After all, subjective financial knowledge is an indicator of the individual self-confidence level. Therefore, these findings complement the paper of Arellano et al. (2018) in the context of Spanish adolescents and, in turn, are consistent with those previous works that related certain psycho-emotional factors to financial knowledge (e.g., Graham et al., 2009; Mudzingiri et al., 2018).

Financial fragility is the last of our variables whose estimated coefficients show significant values. This variable defines that situation in which the individual income is insufficient to cover current expenses (electricity, water, food, etc.). Results we obtain here suggest that young Spaniards in a financial fragility situation are less likely to be

financially literate in inflation matters. This finding, unpublished in the Spanish context, is consistent with most of the previous related literature (Lusardi and Tufano, 2015; Lusardi and De Bassa Scheresberg, 2017). However, the relationship between financial fragility and financial knowledge about inflation is weakly positive and significant for the 40-64-year-old group. In this regard, some suggest that having to manage a bad financial situation can lead to the development of financial knowledge (Buckland, 2010; Yong and Tang, 2017).

### 3.4. Limitations and Future Research

Our analysis contributes to the previous literature for several reasons. First, because we are analyzing an issue (urban-rural gaps in financial knowledge) that, in the Spanish context, is not fully explored and clarified. Second, for making such an analysis for the whole of the Spanish adult population, and not only for a very specific segment of the population. Third, because it considers different age groups, allowing us to know whether there have been advances or setbacks over the generations. Fourth, because it focuses on each of the different dimensions that make up financial knowledge, rather than on a general variable of that knowledge. In addition, we shed light on other determining factors of financial knowledge that have not been sufficiently explored in Spanish and even international literature.

However, our work also has some limitations. Thus, since we are using a cross-sectional database, we cannot analyze how urban-rural gaps have varied from one period to the next. Precisely, we are considering three generations in order to achieve some longitudinality. But even assuming that SFC is repeated periodically, it is likely that the same individuals will not be interviewed. Even assuming that they were, it is very likely that some of them would drop out (attrition problem). Therefore, a longitudinal and aggregated financial knowledge index (LAFKI) like that recently created by Oliver-Márquez et al. (2020) could be used in future research for the Spanish case.

Another drawback of SFC is the way it measures some variables, such as income or tenure. Thus, interviewees are not able to answer their exact income level, but must choose, in a multiple-choice question, which income range they fall into. For example, a person with an income of 15,000 euros per year is statistically in the same range as a person with an income of 25,000 euros per year. This is because both would choose the

"14,501-26,000 euros" option. Therefore, we decided to create a variable that would indicate whether a person has an income higher (0) or lower (1) than 26,000 euros, which is around where the average annual income in Spain is at the time of the survey. Similarly, in the case of tenure we can only know if individuals have additional properties to their usual residence, but not the exact amount (in euros) of their tenure.

In this sense, it would be desirable that, in view of future editions of SFC, individuals could answer what are their exact levels (in euros) of income and tenure. The same applies to any other socio-economic variable that can be measured in exact quantitative terms. This would make it possible to use this micro-database to create measures of inequality of income or wealth and to analyze how these relate to the financial knowledge of the interviewees. In the meantime, if researchers wish to analyze this type of issues (both in a general way and in an urban-rural way), and also from a longitudinal perspective, an alternative could be to use indices such as the aforementioned LAFKI, to determine how financial knowledge relates to macroeconomic variables of income or wealth inequality (such as the Gini coefficient, the S80/S20 ratio, wealth-income ratio, etc.).

## 4. CONCLUSIONS

Those previous papers that have analyzed urban-rural gaps in financial knowledge of Spanish population are scarce. Moreover, they do not address the whole of the Spanish population, but are limited to samples of adolescent secondary school students. Likewise, even using the same databases, they come to different conclusions. Therefore, our main objective is to analyze whether there are urban-rural gaps in Spaniards financial knowledge.

As an additional novelty, this objective is solved by addressing three different age groups (18-39, 40-64, 65-79). In this way, it is possible to know whether urban-rural gaps in financial knowledge have widened or narrowed from one generation to the next. For that, we use a micro-database that is representative of the entire Spanish population, aged 18-79, interviewed between the last quarter of 2016 and the first half of 2017.

Empirical analysis we develop in this paper allows us to conclude that there are urban-rural gaps in financial knowledge in Spain, although these gaps do not appear for all age groups or for all dimensions of financial knowledge. Exactly, these gaps are to the detriment of the rural population aged 40-64 in the dimension of compound interest and

of the rural population aged over 39 in the dimension of risk diversification. With respect to the latter, the gaps are deeper for the rural population over 64 compared to their 40-64 counterparts. This reports a decrease in this gap in the intermediate age group compared to their predecessors.

This find also indicates that the insertion of economic-financial content in school curricula during recent years has helped urban and rural populations to converge with respect to their financial knowledge. Therefore, this type of content should continue to be maintained and intensified in educational plans. Specially, knowing that basic education is compulsory and free in Spain, which would contribute to improving the financial literacy of both urban and rural populations, as well as to reducing the financial knowledge gaps between both populations.

With our paper we also contribute to the literature on determinants of financial knowledge other than rurality, which has not been widely explored within Spanish borders. Thus, there are gender gaps in the financial knowledge of Spaniards, especially to the detriment of women over 39. Similarly, Spaniards with low levels of education and low income, who are also financially fragile, are more likely to be financially illiterate. Meanwhile, being born in another country, self-confidence, and contracting financial products are all of them factors that have positive implications for financial knowledge of Spanish population.

Even so, there are still issues to be explored around the issue of financial knowledge within Spanish borders (and even beyond). In this sense, future research could aim to analyze whether these urban-rural gaps in Spaniards' financial knowledge have implications for their distribution of income and wealth. This type of analysis could also be carried out from an aggregated and longitudinal perspective, given the limitations sometimes involved in cross-sectional and microeconomic analysis.

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## APPENDIX

**Table 3.3.2. Empirical Results (Dependent Variable: Financial Knowledge – Inflation)**

| | 18-39 | | 40-64 | | 65-79 | |
|---|---|---|---|---|---|---|
| **Variables** | **Logit** | **Probit** | **Logit** | **Probit** | **Logit** | **Probit** |
| **Rural** | -0.073 | -0.046 | -0.011 | -0.006 | -0.108 | -0.068 |
| **Gender** | -0.342*** | -0.212*** | -0.467*** | -0.285*** | -0.012 | -0.005 |
| **One-Person Household** | 0.346** | 0.214** | -0.022 | -0.013 | 0.032 | 0.020 |
| **Educational Attainment** | -0.532*** | -0.331*** | -0.678*** | -0.416*** | -0.751*** | -0.456*** |
| **Income** | -0.403*** | -0.251*** | -0.417*** | -0.252*** | -0.116 | -0.073 |
| **Self-Employed** | 0.039 | 0.024 | 0.112 | 0.068 | 1.139** | 0.657** |
| **Salaried Employee** | -0.128 | -0.078 | 0.121 | 0.077 | 1.908** | 1.109** |
| **Unemployed** | -0.196 | -0.122 | 0.023 | 0.016 | -1.173 | -0.729 |
| **Retired** | 0.448 | 0.302 | 0.111 | 0.072 | 0.256 | 0.159 |
| **Shares** | 0.004** | 0.002** | 0.004*** | 0.002*** | 0.003 | 0.002 |
| **Pension Plans** | 0.000 | 0.000 | 0.001 | 0.000 | 0.008*** | 0.005*** |
| **Investment Funds** | 0.003** | 0.002** | 0.002*** | 0.001 | 0.005*** | 0.003*** |
| **Mortgages** | -0.002 | -0.001 | -0.001 | -0.000 | 0.004 | 0.002 |
| **Personal Loans** | -0.001 | -0.000 | 0.004*** | 0.002*** | -0.003 | -0.002 |
| **Native** | 0.084 | 0.055 | 0.004 | 0.001 | 0.276 | 0.184 |
| **Subjective Financial Knowledge** | 0.141*** | 0.088*** | 0.004 | 0.003 | -0.002 | -0.001 |
| **Tenure** | 0.006 | 0.004 | 0.009 | 0.005 | 0.004 | 0.002 |
| **Health** | 0.013 | 0.008 | -0.002 | -0.002 | 0.092 | 0.054 |
| **Financial Fragility** | -0.013*** | -0.008*** | 0.011*** | 0.007*** | -0.009 | -0.005 |
| **Intercept** | 0.443*** | 0.271*** | 1.341*** | 0.820*** | 0.686 | 0.405 |
| **Count $R^2$** | 0.600 | 0.598 | 0.659 | 0.659 | 0.657 | 0.655 |
| **Pearson Test (p-value)** | 0.382>0.05 | 0.382>0.05 | 0.132>0.05 | 0.130>0.05 | 0.178>0.05 | 0.182>0.05 |
| **Hosmer-Lemeshow Test (p-value)** | 0.103>0.05 | 0.193>0.05 | 0.094>0.05 | 0.065>0.05 | 0.386>0.05 | 0.209>0.05 |
| **Roc Curve** | 0.650 | 0.650 | 0.672 | 0.672 | 0.679 | 0.679 |
| **Akaike I.C.** | 3766.69 | 3766.34 | 5299.12 | 5297.89 | 1827.47 | 1827.31 |
| **Schwartz I.C.** | 3885.73 | 3885.39 | 5426.38 | 5425.15 | 1932.71 | 1932.55 |

***$p < 0.01$ **$p < 0.05$ *$p < 0.10$

**Table 3.3.3. Empirical Results (Dependent Variable: Financial Knowledge – Compound Interest)**

| | 18-39 | | 40-64 | | 65-79 | |
|---|---|---|---|---|---|---|
| **Variables** | **Logit** | **Probit** | **Logit** | **Probit** | **Logit** | **Probit** |
| **Rural** | 0.033 | 0.021 | -0.115* | -0.072* | 0.152 | 0.090 |
| **Gender** | -0.111 | -0.069 | -0.349*** | -0.218*** | -0.414*** | -0.254*** |
| **One-Person Household** | 0.074 | 0.046 | -0.023 | -0.015 | 0.109 | 0.062 |
| **Educational Attainment** | -0.120 | -0.074 | -0.309*** | -0.195*** | -0.644*** | -0.404*** |
| **Income** | -0.161** | -0.100** | -0.054 | -0.034 | -0.156 | -0.090 |
| **Self-Employed** | -0.035 | -0.023 | 0.225* | 0.142* | 0.528 | 0.316 |
| **Salaried Employee** | -0.002 | -0.002 | 0.106 | 0.068 | 3.182** | 1.688** |
| **Unemployed** | -0.187 | -0.118 | -0.066 | -0.039 | -0.617 | -0.369 |
| **Retired** | -0.656 | -0.413 | -0.107 | -0.065 | -0.031 | -0.023 |
| **Shares** | 0.003* | 0.002* | 0.002 | 0.001 | 0.004 | 0.002 |
| **Pension Plans** | 0.004*** | 0.003*** | 0.003** | 0.002** | 0.007*** | 0.004*** |
| **Investment Funds** | -0.000 | -0.000 | 0.001 | 0.001 | 0.004** | 0.002** |
| **Mortgages** | -0.003 | -0.002 | 0.000 | 0.000 | 0.002 | 0.001 |
| **Personal Loans** | -0.000 | -0.000 | 0.003 | 0.002 | 0.007** | 0.004** |
| **Native** | -0.321*** | -0.200*** | -0.054 | -0.034 | 0.001** | -0.012** |
| **Subjective Financial Knowledge** | 0.000 | 0.000 | 0.027** | 0.013** | 0.027*** | 0.015*** |
| **Tenure** | 0.008 | 0.003 | 0.006 | 0.004 | 0.003 | 0.002 |
| **Health** | -0.003 | -0.002 | 0.002 | 0.001 | -0.102 | -0.068 |
| **Financial Fragility** | 0.006 | 0.004 | 0.008 | 0.005 | 0.035 | 0.020 |
| **Intercept** | 0.443*** | 0.276*** | 0.292** | 0.192** | 0.357* | 0.239* |
| **Count $R^2$** | 0.554 | 0.553 | 0.568 | 0.568 | 0.672 | 0.672 |
| **Pearson Test (p-value)** | 0.254>0.05 | 0.253>0.05 | 0.444>0.05 | 0.468>0.05 | 0.239>0.05 | 0.251>0.05 |
| **Hosmer-Lemeshow Test (p-value)** | 0.464>0.05 | 0.420>0.05 | 0.263>0.05 | 0.443>0.05 | 0.727>0.05 | 0.698>0.05 |
| **Roc Curve** | 0.571 | 0.571 | 0.601 | 0.601 | 0.689 | 0.688 |
| **Akaike I.C.** | 3922.57 | 3922.54 | 5831.56 | 5831.55 | 1750.91 | 1751.59 |
| **Schwartz I.C.** | 4041.61 | 4041.59 | 5958.82 | 5958.82 | 1856.15 | 1856.83 |

***$p < 0.01$ **$p < 0.05$ *$p < 0.10$

**Table 3.3.4. Empirical Results (Dependent Variable: Financial Knowledge – Risk Diversification)**

| | 18-39 | | 40-64 | | 65-79 | |
|---|---|---|---|---|---|---|
| **Variables** | **Logit** | **Probit** | **Logit** | **Probit** | **Logit** | **Probit** |
| **Rural** | -0.095 | -0.060 | -0.161** | -0.099** | -0.272** | -0.162** |
| **Gender** | -0.247*** | -0.153*** | -0.529*** | -0.327*** | -0.508*** | -0.310*** |
| **One-Person Household** | 0.286 | 0.179 | 0.051 | 0.029 | 0.077 | 0.045 |
| **Educational Attainment** | -0.140 | -0.084 | -0.636*** | -0.396*** | -1.238*** | -0.766*** |
| **Income** | -0.382*** | -0.237*** | -0.225*** | -0.139*** | -0.194 | -0.118 |
| **Self-Employed** | 0.213 | 0.131 | 0.182 | 0.115 | 0.324 | 0.168 |
| **Salaried Employee** | 0.005 | 0.004 | 0.130 | 0.081 | -0.304 | -0.189 |
| **Unemployed** | -0.025 | -0.014 | 0.066 | 0.042 | 0.205 | 0.155 |
| **Retired** | -0.592 | -0.373 | 0.066 | 0.043 | 0.040 | 0.027 |
| **Shares** | 0.002 | 0.001 | 0.003** | 0.002** | -0.000 | -0.000 |
| **Pension Plans** | 0.001 | 0.000 | 0.001 | 0.000 | 0.005** | 0.003** |
| **Investment Funds** | 0.002 | 0.001 | 0.005*** | 0.003*** | 0.008*** | 0.004*** |
| **Mortgages** | 0.001 | 0.001 | -0.007** | -0.004** | 0.002 | 0.001 |
| **Personal Loans** | 0.003** | 0.002** | 0.001 | 0.001 | 0.004 | 0.002 |
| **Native** | -0.226** | -0.137** | -0.168 | -0.100 | -0.808** | -0.454** |
| **Subjective Financial Knowledge** | 0.320*** | 0.197*** | 0.011 | 0.006 | 0.022 | 0.010 |
| **Tenure** | 0.015 | 0.009 | -0.000 | -0.000 | 0.001 | 0.001 |
| **Health** | -0.018 | -0.011 | -0.001 | -0.001 | 0.204 | 0.123 |
| **Financial Fragility** | -0.002 | -0.001 | 0.003 | 0.002 | 0.009 | 0.005 |
| **Intercept** | -0.375* | -0.232* | 0.962*** | 0.594*** | 2.010*** | 1.200*** |
| **Count $R^2$** | 0.596 | 0.596 | 0.613 | 0.613 | 0.686 | 0.687 |
| **Pearson Test (p-value)** | 0.337>0.05 | 0.335>0.05 | 0.533>0.05 | 0.531>0.05 | 0.219>0.05 | 0.221>0.05 |
| **Hosmer-Lemeshow Test (p-value)** | 0.001<0.05 | 0.000<0.05 | 0.006<0.05 | 0.006<0.05 | 0.893>0.05 | 0.845>0.05 |
| **Roc Curve** | 0.629 | 0.628 | 0.660 | 0.660 | 0.739 | 0.737 |
| **Akaike I.C.** | 3795.36 | 3795.45 | 5620.33 | 5619.93 | 1722.27 | 1722.91 |
| **Schwartz I.C.** | 3914.40 | 3914.50 | 5747.60 | 5747.20 | 1827.51 | 1828.15 |

***$p < 0.01$ **$p < 0.05$ *$p < 0.10$