STOCKHOLDING AND FINANCIAL LITERACY IN THE FRENCH POPULATION

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─Abstract ─

This paper investigates the link between financial literacy and stock market participation. We provide an assessment of the level of financial literacy in the French population using standard and original measures. Based on eight questions asked to individuals to assess their level of financial literacy, we construct two indices: basic financial requirements and financial culture. Regression results reveal strong impact of financial culture on the probability to hold stocks and weaker impact of basic financial requirements. Thereby, we contribute to the extensive literature intending to account for the stock market participation puzzle.

Key Words: *Stock Market Participation, Financial Literacy, Household Finance*

JEL Classification: *G11, D12, C25, C26*

1. INTRODUCTION

Financial literacy has emerged lately in the literature on portfolio choices (Remund, 2010). The standard theory (Arrow, 1965; Merton, 1969; Samuelson, 1969) states that portfolios should be complete. Empirically, only a small share of households holds stocks: 49.9% in the United-States and 19% in France[1]. Extensions to the standard model have been brought to answer this puzzle such as first-order risk aversion (Epstein and Zin, 1990), earnings-return correlation (Heaton and Lucas, 2000a,b; Haliassos and Michaelides, 2003) or borrowing constraints (Haliassos and Michaelides, 2001). Entry costs understood in the broad sense have appeared as the most relevant extension to account for no stockholding (Haliassos, 2003). Our paper is in line with the literature questioning the participation puzzle (Haliassos and Bertaut, 1995) and investigating the link between financial literacy and financial behaviors. More precisely, we intend to pierce whether financial literacy can explain why so few households hold stocks, as a complement to traditional factors. Several papers provide evidence of a link between financial literacy and financial behaviors. Lusardi and Mitchell (2007) show that financially unsophisticated people are less likely to plan for retirement. Also, households tend to shy away from financial markets because they have little knowledge of stocks and the working of stock markets (Alessie *et al.*, 2011). Using cognitive abilities as a proxy for financial literacy, Christelis *et al.* (2010) find a causal impact of cognitive abilities on the probability to hold stocks.

The originality of our paper lies in the variety of questions on financial literacy we use. We decompose a synthetic measure of financial literacy obtained with a principal component factoring method, into two indices reflecting basic financial requirements and financial culture. We find that both our measures of financial literacy have large and significant impacts on the probability to hold stocks, in addition to standard explanatory variables (income, wealth, risk aversion, age, education, etc.). Financial culture appears as the main driver and its effect is even stronger when we control for endogeneity. Our findings contribute to the extensive literature on the participation puzzle: heterogeneous levels of financial literacy account in part for low stockholding rates.

The paper is organized as follows: In section 2, we present the data and provide descriptive statistics. In section 3, we introduce our methodology. In section 4, we report our results. In section 5, we conclude and suggest further area of research.

[1] Sources: Survey of Consumer Finances, 2010; *Enquête Patrimoine (INSEE)*, 2009.

2. DATA AND DESCRIPTIVE STATISTICS

We rely on an original household survey: PATER (2011)[2]. The dataset contains very detailed information on financial literacy, preferences (risk aversion, time preferences, altruism), and expectations (income, stock prices, job insecurity), in addition to wealth, income, socio-economic, and demographic characteristics for a representative sample of French households. The dataset contains both standard measures of financial literacy present in other surveys (assessment of the understanding of simple and compound interests, risk diversification, inflation, and expected value computation), and original measures such as self-assessment of financial culture and frequency of economic and financial press reading. In the literature several measures of financial literacy have been proposed; one has nevertheless emerged as a benchmark. In 2004, Lusardi and Mitchell designed a questionnaire for the 2004 US Health and Retirement Study. Their aim was to *identify three economic concepts that individuals should have some understanding of, if they are to use them when making financial decisions*. These concepts were the understanding of interest compounding, inflation, and risk diversification. Simple questions were designed to assess the understanding of these three concepts. Other assessments of financial literacy were later suggested in the literature: Alessie *et al.* (2011) add to the benchmark a more complex set of questions so as to capture awareness of financial markets and financial products; Christelis *et al.* (2010) rely on measures of cognitive abilities.

Table 1 - Answers for standard measures - Weighted percentages

	Simple interest	Compound interest (1)	Compound interest (2)	Inflation	Expected value	Diversification
Correct	72.84	47.98	18.97	61.18	33.34	66.85
Incorrect	13.15	34.80	57.98	11.45	20.81	18.53
DK/Refuse	14.01	17.22	23.05	27.37	45.85	14.62

[2] This survey was designed by Luc Arrondel and André Masson, researchers at the Paris School of Economics, and administered by Taylor-Nelson Sofres, a professional agency. The survey contains a panel component but we only make use of the 2011 wave. A paper-based questionnaire was sent in November 2011 to a representative sample of 4,000 individuals, corresponding to an equivalent number of households. 3,616 respondents sent their questionnaires back. The age of the respondents varies from 18 to 100 (with mean 49.2); 47.6% of our sample are male; 35.7% have a college education and 25.7% are retired. The final sample we use for regressions contains 2,047 observations. This final sample size comes from non responses to the question on equity return expectations. Robustness checks show that our results are not dramatically impacted by sample selection.

Based on our survey, Table 1 reports results from standard measures of financial literacy. The proportion of respondents correctly answering depends on the complexity of the question. For example, about three quarters of the sample answer correctly the question on simple interest computation while this share drops to less than a half for interest compounding. Less than two thirds of the sample understand the impact of inflation on purchasing power and only one third is able to compute expected values. The fact that holding one single share is riskier than holding a share of a mutual fund is rather correctly understood by more than two thirds of the sample. The wording of the question has also an impact on individual responses[3]. To control for this effect, the question on interest compounding is asked using a more complex framing appealing to Monopoly board game: less than a fifth of respondents is able to answer correctly this question. These figures tend to show that even if households exhibit some understanding of basic financial concepts, financial literacy cannot be taken for granted in the population. Results are in line with other countries' figures: percentages of correct answers for compound interests range from 35% in Sweden to 85% in Netherlands and from 59% in Japan to 75% in Germany for inflation (Lusardi, 2011).

Table 2 - Answers for original measures – Weighted percentages

Panel A: Reading of economic and financial press				
Never	Rarely	Sometimes	Often	N/a
63.13	18.89	10.97	3.73	3.28

Panel B: Financial culture					
None	Very low	Low	Average	High	N/a
20.75	27.75	26.67	19.4	1.76	3.67

Regarding original measures of financial literacy provided in PATER 2011 (Table 2), nearly two thirds of the sample never read the economic and financial press while only less than a third reads it rarely or sometimes (Panel A). More than 50% of respondents declare to have a very low or low level of financial culture and about a fifth states not to have any financial culture (Panel B). Those results suggest that people have indeed a low level of financial literacy and that they are aware of their shortcomings. It also shows that measuring financial literacy is not an easy task. Researchers have to bear in mind that measurement errors are inherent to assessing such complex concepts. To analyze the impact of financial literacy on stockholding, we take into account various dimensions of financial

[3] See Appendix for the exact wording of questions.

literacy by constructing a meaningful synthetic variable with a factor analysis. We apply the principal component factoring method to our height variables of financial literacy. The analysis brings out two factors dividing our set of variables in two groups: those that involve cognitive abilities and basic understanding of economic and financial concepts; those that are linked to financial culture and information. To account for both dimensions of financial literacy, we construct two distinct indices using rotated factor loadings that we respectively label *basic financial requirements* and *financial culture*[4].

3. METHODOLOGY

In order to evaluate the key determinants of stocks market participation, we consider a simple model in which households compare the utility gain from owning stocks with the costs, thus the net utility gain can be written as:

$$Y_h^* = X_h^{'}\beta + \varepsilon_h$$

The term X_h contains variables influencing stockholding such as age, education, wealth, income, occupation, risk aversion, expectations, background risks (on health, income, and unemployment), bequest, and financial literacy. To account for unobserved heterogeneity we include the term ε_h and assume it is normally distributed. Coefficients of relative risk aversion (CRRA) are computed using lottery choices following Barsky *et al.* (1997). Then, a household h holds stocks provided the latent variable Y^* is greater or equal to zero. Given that we only observe whether the household holds or not stocks ($Y_h = 1$ or $Y_h = 0$) we can estimate this model using either a linear probability model (LPM) or a probit model. We strongly suspect the financial culture index to be an endogenous variable and therefore its coefficient to be biased. Indeed, stockholding can foster financial literacy through learning effects. Reverse causality leads the coefficient on financial culture to be upward biased. Moreover, measurement errors can bias the coefficient towards zero. The overall effect then depends on the intensity of each bias. Regarding the basic financial requirements index, this refers to numeracy and basic understanding of economic and financial concepts; it is then unlikely to be affected by stockownership that requires more advanced knowledge of financial markets. We can therefore treat this variable as exogenous (Christelis *et al.*, 2010). The instruments chosen to treat the endogeneity should be valid and relevant. Given these conditions, financial literacy of parents appears as an

[4] Details about factor analysis and factor loadings are available upon request.

appropriate instrument provided we control for potential inheritance of financial portfolios as we do with the variable bequest in our regressions. There are three variables appearing as relevant proxies for parents' financial literacy in the survey. These variables regard whether parents planned for retirement, owned a life insurance policy or read the economic and financial press. We use these variables so as to instrument the financial culture index.

4. RESULTS

Table 3 - Probit model

Dep. Var. Stockholding	No financial literacy		Including financial literacy	
Financial culture			0.10***	(0.01)
Basic Fin. Req.			0.05***	(0.01)
Wealth <75k (ref.)	-	-	-	-
Wealth [75k,225k[	0.11***	(0.03)	0.10***	(0.03)
Wealth [225k,450k[	0.19***	(0.03)	0.16***	(0.03)
Wealth ≥450k	0.42***	(0.04)	0.33***	(0.05)
CRRA[5] ≥3.76 (ref.)	-	-	-	-
CRRA [2;3.76[	0.04	(0.03)	0.02	(0.03)
CRRA [1;2[	0.07**	(0.03)	0.06*	(0.03)
CRRA [0;1[	0.13**	(0.05)	0.09*	(0.05)
CRRA no answer	0.06	(0.06)	0.04	(0.05)
Expectations/100[6]	0.13***	(0.03)	0.07***	(0.03)
Pseudo-R^2	0.17		0.23	
Observations	2,047		2,047	

Other controls: age, education, income, background risks and bequest. Marginal effects reported and standard errors in parenthesis.

Table 3 reports results from the probit regression without controlling for endogeneity. In the first column, we display results for the standard determinants of stockholding without financial literacy. We find that wealth has a strong and significant impact on the probability to hold stocks; the marginal effect is increasing with wealth. Risk aversion is negatively associated to stockholding; respondents with high coefficients of relative risk aversion (CRRA) are less likely to participate in the stock market. Finally, respondents expecting an increase in stock market prices over the next five years are more likely to hold stocks. These

[5] We follow the methodology of Barsky *et al.* (1997) to account for risk aversion.
[6] Respondents are asked to give a probability distribution of equity returns over the next five years.

results are in line with standard theory's predictions. In the second part of the table, the coefficients of financial literacy indices are positive and highly significant. The introduction of these two variables captures some of the impacts of wealth and risk aversion, stressing the positive correlation between being financially literate and being wealthy or low risk averse. Those first results therefore suggest that financial literacy plays its own part in the process of deciding whether to hold or not stocks as a complement to standard determinants of stockholding.

Table 4 - Simple and IV regressions of stockholding on financial literacy

	Simple regressions		**IV regressions**	
Dep. Var. Stockholding	**LPM**	**Probit**	**GMM**	**Probit**
Financial culture	0.11***	0.10***	0.28***	0.26***
	(0.01)	(0.01)	(0.06)	(0.04)
Basic Fin. Req.	0.04***	0.05***	0.02*	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)
R^2 / Pseudo R^2	0.24	0.23	0.31	-
Observations	2,047	2,047	2,047	2,047
Controls	Yes	Yes	Yes	Yes

Marginal effects reported for probit models and standard errors in parenthesis.

Table 4 reports simple and instrumental variable regressions. In both cases, we performed linear regressions in addition to the probit regressions for robustness. The estimated coefficients are very close for the two methods. We find that instrumenting our endogenous variable leads to a significant increase in the coefficient thereby correcting for the global downward bias. The results suggest that a one-unit increase in the financial culture index leads the predicted probability of stock market participation to increase by 26 to 28 percentage points.

4. CONCLUSION

Using data from an original survey, we assessed the level of financial literacy for a representative sample of the French population. We distinguished between two dimensions of financial literacy: basic financial requirements and financial culture. We found a strong link between financial literacy and stock market participation. The link was even stronger when we instrumented to control for the endogeneity of financial culture. These results help filling the gap between standard portfolio theory predictions and empirical facts. Heterogeneity in the

levels of financial literacy explains part of portfolios incompleteness apart from education and standard determinants of portfolio choice. As the literature does not provide a coherent theoretical framework to explain the role played by financial literacy, further research should investigate the channel through which financial literacy impacts stockholding so as to identify implications for public policies.

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5. APPENDIX

Financial literacy questions in PATER 2011

	Wording of questions	**Proposed answers**
Simple interests	"Suppose you had 1000€ in a savings account and the interest rate was 2% per year. After 1 year, how much do you think you would have in the account?"	1) Less than 1020€ 2) 1020€ 3) More than 1020€ 4) Don't know
Coumpound interests (1)	"And after 5 years, how much do you think you would have if you left the money to grow?"	1) Less than 1100€ 2) 1100€ 3) More than 1100€ 4) Don't know
Compound interests (2)	"You play Monopoly. You have earned 1000€ and the bank offers to pay 20% every time you go through the corner square GO. You need 2000€ to buy a hotel. How often do you need to pass through the first corner square to buy the hotel?"	1) 2 times 2) 3 times 3) 4 times 4) 5 times 5) More than 5 times 6) Don't know
Inflation	"Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?"	1) More than today 2) Same as today 3) Less than today 4) Don't know
Expected value	"You toss a coin and earn 1€ each time you get "heads". How much do you think you would earn after 100 flips?"	*Free answer*
Diversification[7]	"Rank these financial products from the less risky to the riskiest, 1 being the less risky."	○ Savings account ○ Stocks ○ Bonds ○ Mutual Fund
Financial culture	"Would you say your financial culture is…?"	1) High 2) Average 3) Low 4) Very low 5) None
Reading of economic and financial press	"How often do you read the economic and financial press?"	1) Often 2) Sometimes 3) Rarely 4) Never

[7] We only make use of the relative ranking of stocks and mutual fund to construct this variable.