RECENT TRENDS AND NEW EVIDENCE IN ECONOMICS LITERACY AMONG ADULTS

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ABSTRACT

Economics literacy has received growing attention in the academic literature and even more in the context of the present economic and financial crisis. In this work we develop a sound and novel empirical work, analysing the level and determinants of economic literacy of a sample of adults in Portugal, being unique in this respect. The purpose of this paper is to obtain new evidence about a fundamental question of empirical studies on economic literacy: the determinants of the level of economic literacy. Besides, we investigate the level of economic literacy of adults and interest on the matter. A good evaluation of economic literacy allows one to distinguish the existing deficiencies and thus define education according to these deficiencies. It is expected that this work will contribute to an increased interest in "education in economics" on the part of researchers and that their results will allow for the expansion of knowledge about the Portuguese reality, being possible to compare the results to others obtained internationally. The developed questionnaire can also be applied by other researchers in the future.

INTRODUCTION

It is essential for citizens to have a reasonable level of knowledge about the functioning of the economy lato sensu, or relative to markets of goods and services, work, and capital, in a society that intends more active citizen participation. An understanding of market functioning will make it possible for citizens to evaluate political decisions and their consequences in a more fundamental manner, as well as make better decisions that maximise their well being (Koshal, Gupta, Goyal, & Choudhary, 2008). Huston (2010) and Remund (2010) concludes that it is extremely important to increase the general level of the population's economic knowledge so that people can better understand and settle the decisions with which they are currently confronted. Economics literacy has received growing attention in the academic literature and even more in the context of the present economic and financial crisis.

Not surprisingly, economics literacy, which encompasses both real and financial aspects, has received growing attention in the academic literature (Clark, Shung & Harrison, 2009), and

even more in the context of the present economic and financial crisis. In this context, it becomes relevant to further investigate the citizens' level of economic knowledge, as well as to explore variables that permit explanations of differentiation between individuals' economic knowledge.

In this work we develop a sound and novel empirical work, analysing the level and determinants of economic literacy of a sample of adults in Portugal, being unique in this respect. A good evaluation of economic literacy allows one to distinguish the existing deficiencies and thus define education according to these deficiencies. It also permits identification of the more critical groups (Huston, 2010). The vast majority of this theoretical and empirical literature focuses on the USA case and emphasises financial aspects, but interest in this subject continues to gain interest and attention from researchers, teachers, institutions and political decision-makers in other parts of the world. This study analysis new data for an European economy, Portugal. It is expected that this work will contribute to an increased interest in "education in economics" on the part of researchers and that their results will allow for the expansion of knowledge about the Portuguese reality, being possible to compare the results to others obtained internationally. The developed questionnaire can also be applied by other researchers in the future.

BACKGROUND

Economic literacy consists of the set of knowledge and competencies that permit the improvement of personal and social decisions about various economic problems encountered in daily life, whether as consumers, vendors, producers, investors, workers or voters. An important component of economic literacy involves knowledge of financial aspects or financial literacy. Financial literacy is understood as the comprehension of a set of economic concepts that can be used to evaluate financial situations and make good financial decisions (Pang, 2010).

It becomes relevant to investigate the citizens' level of economic knowledge, as well as to explore variables that permit explanations of differentiation between individuals' economic knowledge. On this regard, studies in the literature reveal the importance of the education level. Gleason & Scyoc (1995), Wood & Doyle (2002) and Walstad & Rebeck (2002) verified that the education level of individuals had a statistically significant positive effect on their economic literacy, such that the greater the level of education, the greater the level of correct responses on a test on economics. More recently, Monticone (2010) verified that the highest education levels are generally associated with higher levels of financial knowledge. Individuals with more education experience fewer difficulties when acquiring financial knowledge and therefore incur fewer learning costs. In an international comparison, Jappelli (2010) verified that, at country level, the general level of education is positively related to the level of economic literacy.

The literature also indicates that having training or a degree in economic sciences is also important to possessing economic knowledge. Wood & Doyle (2002) and Koshal, Gupta, Goyal

& Choudhary (2008) verified that possession of a degree in economic sciences has a positive effect on economic literacy. Soper & Brenneke (1981), Gleason & Scyoc (1995) and Walstad & Rebeck (2002), and Walstad and Rebeck (1999), also concluded that adults with degrees and/or training in economics know more about economics than those that do not have training in economics. From a complementary perspective, Walstad, Rebeck & MacDonald (2010) investigated whether training in personal finances during secondary education increased the level of financial knowledge. The authors verified that the levels of financial knowledge increased significantly in the students who participated in a personal finance training. In this line, Pang (2010) published a study in which a specialised course was applied to increase financial literacy to students in secondary education and thus enable them to make informed and independent financial decisions. The results showed that the students who attended the course performed better than those who did not attend the course and that this advantage was maintained over time. Income level is another factor that is highlighted in the literature. In a study by Monticone (2010), the connection between financial behaviour and financial knowledge was studied with a focus on the accumulation of wealth. The results indicated that families with greater wealth had a greater probability of investing in financial knowledge. Wood & Doyle (2002), Walstad & Rebeck (2002) and Grimes, Millea & Thomas (2010) also verified that economic knowledge is consistently affected by the income level, thus confirming that individuals with higher salaries possess more economic knowledge. In a study by Jappelli (2010), in which an international comparison is made between different countries, it was verified that economic literacy tends to be associated with higher incomes. However, Mandell & Klein (2007) concluded that family income is not a determinant of financial literacy.

Some studies explore the effect of gender on economic literacy. A significant part of this literature indicates that, on average, males have consistently higher levels of economic knowledge than females (for example, Soper & Brenneke, 1981; Gleason & Scyoc, 1995; Walstad & Rebeck, 2002; Wood & Doyle, 2002; Tabesh & Schultz, 2007;, Millea & Thomas, 2010; Monticone, 2010).

Nonetheless, a few have concluded that gender does not influence literacy levels (see Mandell & Klein, 2007; Koshal, Gupta, Goyal & Choudhary, 2008).

In the literature, it is reported that individuals learn economics throughout their lifetimes (Grimes, Millea & Thomas, 2010). Thus, naturally, age has been indeed considered to be a determining factor in economic literacy in several studies, such as Gleason & Scyoc (1995) and Walstad & Rebeck (2002). However, age may not have a linear relationship with learning. For this reason the authors often test the effect of age squared (Walstad & Rebeck, 2002; Koshal, Gupta, Goyal & Choudhary, 2008; Monticone, 2010). Indeed, Koshal, Gupta, Goyal & Choudhary (2008) verified that the economic literacy of MBA students increased with age, although at a decreasing rate. Walstad & Rebeck (2002) and Monticone (2010) reported that the

relation between age and financial knowledge is an inverted U (concave), which means that middle-aged adults have higher levels of literacy than those who are younger and older. Both studies verified that literacy increases until 40-60 years of age and then declines because knowledge only accumulates until a certain age and later depreciates. This phenomenon might also occur because older generations were not exposed to the current complex financial services during their youth.

The effect of an individual's professional situation on financial literacy as also been analysed. Monticone (2010) confirmed that employed individuals responded correctly to more questions than did those who were unemployed or out of the work force.

Another factor analysed in the literature is ethnicity. Both studies by Mandell & Klein (2007) and Grimes, Millea & Thomas (2010) concluded that ethnicity was a determinant in literacy by verifying that Africans had lower literacy levels. Experience in the job market was analysed in a study by Koshal, Gupta, Goyal & Choudhary (2008). Because experience generally does not have a linear relationship with learning, the authors included the squared number of years of experience in the job market. They verified that the marginal rate of economic literacy on the order of experience increased at a greater rate, which suggested that gains in economic literacy are accelerated by experience in the job market.

Finally, one more factor was analysed in the literature, mathematics knowledge. Mathematics knowledge was confirmed to have a statistically significant positive effect on economic literacy (Jappelli, 2010; Schuhmann, McGoldrick, & Burrus (2005).

In the next section we address the following issues. What is the general knowledge of economics in the adult community? Are adults capable of understanding economic and financial concepts? Which factors explain the differences in levels of economic literacy among the community in general?

METHODOLOGY AND DATA

The questionnaire designed draws predominantly on the Economy Literacy Test (ELT) developed by the NCEE because there was no standardised tool with which to evaluate the economic literacy of Portuguese adults. The ELT was chosen because its reliability, validity and consistency have been proven over a 13-year period by thousands of respondents.

The possibility of evaluating the financial knowledge of adults in the same questionnaire also emerged since, given the international financial crisis, financial concepts are extremely important to the population. A questionnaire that was applied by the Bank of Portugal to the Portuguese population in 2010, known as the "Inquiry of Financial Literacy of the Portuguese Population" ["Inquérito à Literacia Financeira da População Portuguesa" (ILFPP)], was used. This questionnaire was chosen because it was already adapted to the economic and financial realities of the Portuguese population and thus did not require either translation or adaptation of

international terms. Thus, the questionnaire used in this study to measure the economic literacy and financial comprehension of adults in the general population combined questions from the Economic Literacy Test and from the ILFPP of the Bank of Portugal. In total, the study questionnaire has 29 questions, of which 22 address economic questions and 7 address financial questions that allowed us to assess the financial comprehension of adults as shown in Table 8. Sociodemographic, economic and motivational variables relative to the degree of interest, attitudes, ambition and importance of economics to each individual were also collected.

The questionnaire is subdivided into four parts. The first part comprises a set of questions regarding the sociodemographic characteristics of the respondents. Part two includes multiple-choice questions that evaluate the economic literacy of the respondents. The questionnaire used in this study includes questions that were included in the 1999 and 2005 versions of the ELT as well as financial questions that were included in the ILFPP, which was applied to the Portuguese population by the Bank of Portugal in 2010. It was considered relevant to add two more questions about International Economics because the original questionnaire (ELT) only included two questions related to this subject. It comprises 22 questions that address the following economic areas: consumer economics, producer economics, financial economics, the economic role of the government and international economics.

The part 3 includes seven multiple-choice questions that evaluate the respondent's financial comprehension of basic financial concepts, which are encountered by a significant portion of the population in daily life. In this group, the respondent is also asked about the income class in which their household monthly income is located.

Finally, part 4 attempts to analyse the respondents' interest in economics and the degree of importance that it has on economic subjects. Thus, the respondents are questioned about whether they follow economic subjects or news through various means of communication and whether economic knowledge is important to the perception of electoral promises, to being a more responsible citizen, to making better investment decisions and to improving well-being. Respondents are also asked if they are able to save and what their main motives for saving are. Finally, the respondents reveal their degree of interest in economic subjects and whether they consider it relevant to insert economic subjects into basic education programs for students. This last group will be relevant when explaining that, in addition to the economic and demographic characteristics influencing the levels of economic and financial literacy, motivation and an interest in economics also significantly influence the levels of economic and financial literacy.

The degree of internal consistency in the questionnaire was assessed with the Cronbach alpha coefficient. This coefficient varies from 0 to 1, and the greater the value of this coefficient, the greater the consistency and reliability of the questionnaire. According to various authors (e.g., Belbute & Sousa (2004)) in inquiries with elevated numbers of questions, an alpha value greater than 0.7 shows a good level of internal consistency and reliability (Nunnaly, 1978). In

this study, the value achieved by this coefficient was 0.902, which permits the conclusion that the questionnaire is reliable; this was expected because the questionnaire was developed from an existing and tested questionnaire.

The data used were collected with a questionnaire that was applied in April 2012 to the parents/guardians and teachers of students who were attending the 1st Cycle of Basic Education in the Aveiro Schools (5 schools). The questionnaire performance implies the choice of a sample that reflects, in an unbiased manner, the characteristics of the universal population such that it is possible to use answers from the respondents to estimate, through statistical inference, the degree of economic and financial literacy of adults in general. A total of 1061 questionnaires (1016 parents and 45 teachers) were distributed. Out of the 1061 delivered questionnaires, only 618 properly filled-out questionnaires were returned, of which 598 were from parents/guardians and 20 were from teachers. Thirty-seven blank questionnaires and 2 incomplete questionnaires were excluded. The largest percentage of the collected questionnaires are from school C (35.8%) followed by A (29.9%) and B (22.2%). Overall, 96.6% of the respondents were parents/guardians. The responses from the teachers corresponded to only 3.4% of the total (Table 12).

Table 1. Stratification of the collected sample relative to the demographics of the respondents (%)

Individual characteristics		**(%)**
Gender	Female	70,9
	Male	28,4
	N.reply	0,6
Nacionality	Portuguese	93,2
	Other	6,6
	N.reply	0,2
Age	26-35	14,9
	36-45	67,7
	46-55	15,5
	56-67	1,5
	Não responde	0,5
Civil status	Married	68,2
	Union	9,5
	Single	6,5
	Divorced	13,4
	Widow	1,1
	Not reply	1,3

As shown in Table 1, the sample was found to be mostly composed of females (70.9%). Additionally, the majority of the respondents were found to be Portuguese (93.2%). It was

observed that the respondents' ages varied between 26 and 67 years. The majority of the respondents were married (68.2%).

Table 2. Stratification of the collected sample relative to the qualifications and capacities of the respondents (%)

		%
Education level	No primary school	0,3
	4 years	4,0
	9 years	11,5
	12 years	24,4
	University degree	43,3
	Post graduation	15,3
	No reply	1,1
Holds degree in Economics/ finance	Yes	13,9
	No	64,5
	No reply	21,6
Holds training in economic related subjects	Yes	26,3
	No	62,4
	No reply	11,3
Professional activity (1: professions associated to higher qualifications; 9-professions associated to less qualifications)	Group 1	4,4
	Group 2	37,8
	Group 3	11,8
	Group 4	12,1
	Group 5	10,2
	Group 6	0,5
	Group 7	3,2
	Group 8	0,2
	Group 9	4,5
	No reply	15,3
Years of labour experience	1-20	73,3
	21-41	22,1
	No reply	4,5
Math capacity	Very good	10,3
	Good	36,2
	Sufice	44,1
	Weak	8,2
	No reply	1,1

Regarding the education levels of the respondents (Table 2), those with bachelor's degrees (43.3%) and secondary education (24.4%) predominated. It was further observed that 15.3% of the respondents had education beyond a bachelor's degree. Only 11.5% completed

education through the 9th year and 4.0% through the 4th year, while 0.3% had no primary instruction.

The majority of the respondents (58.6%) had higher degrees, and of the respondents with degrees, only 13.9% reported that their degrees were in economics or the business sciences. With regard to the training of the respondents, the majority (62.4%) reported that they did not receive any training in the areas of economics or business sciences. In an analysis of the respondents' professions and a classification of the same, according to the National Classification of Professions [Classificação Nacional de Profissões (CNP)], it was found that the majority (37.8%) belonged to group 2, which corresponds to specialists in intellectual and scientific professions. Finally, the number of years of experience in the job market varied from 1 to 41 years, with 73.3% having between 1 and 20 years of experience. The questionnaire also asked how the respondents considered themselves as mathematics students, on a scale of very good/good/sufficient/weak. The majority responded sufficient (44.1%) and good (36.2%). These variables indicate the qualifications and capacities of the respondents. The information is shown in Table 14.

With regard to the work situation, the majority of the respondents were employees (72.1%) and only 11.0% were self-employed. Additionally, 10.2% of the respondents were unemployed, as shown in Table 3.

Table 3. Stratification of the collected sample relative to the professional situation (%)

Working situation	%
Work for other	72,1
Self-employed	11,0
Study and works	0,5
Unemployed	10,2
Retired	0,5
Study	1,0
Housekeeper	4,0
Other	0,3
No reply	0,5

With regard to the economic situation (Table 4), the income distribution was analysed, and 37.3% of the respondents were found to be in the 2001€ to 6000€ range, while 30.5% were in the 1001€ to 2000€ range. Overall, 19.4% of the respondents had a net household monthly income below 1000€. Only 1.1% of the respondents had a monthly income that exceeded 6001€. When asked about their household monthly financial situations, the majority of the respondents revealed that the situation was satisfactory (59.6%), while 19.7% reported that the situation was good/very good and 19.7% that the situation was bad/very bad.

Table 4. Stratification of the collected sample relative to the economic situation of the respondents (%)		
Variable		%
Income	<1.000€	19,4
	1.001€-2.000€	30,5
	2.001€-6.000€	37,3
	6.001€-10.000€	0,8
	>10.001€	0,3
	No replay	11,6
Financial situation	Very good	0,5
	Good	19,2
	Average	59,6
	Bad	17,6
	Very bad	2,1
	No reply	1,0

RESULTS

Level of economic literacy

The level of economic literacy is evaluated according to the percentage of correct responses. A summary of the statistics related to lato sensu economic literacy is shown in Table 5, with consideration of those that are more financially oriented. The questionnaire includes 29 questions, of which 22 concern economics and 7 concern finances.

Table 5. Percentage of correct responses (%)				
	Descriptive statistics			
	Average	S.d.	Min	Max
Overall	73,1	19,9	0,0	100,0

From a total of 29 questions that evaluate economic literacy and financial comprehension, the average number of correct responses was approximately 73.1%. On a scale of 0 to 20 (Scale of Portugal) the average score was approximately 14.5. This result demonstrates that the respondents had a good understanding of economic and financial subjects. The standard deviation was 19.9%, the minimum value was 0.0% and the maximum value is 100%.

Table 6. Percentage of correct responses to the 22 economic questions (%)				
	Statistics			
	Average	S.d.	Min	Max
22 'economic' questions	75,6	20,4	0,0	100,0
7 'financial' questions	63,8	23,6	0,0	100,0

Regarding economics only, the average result was 75.6% (Table 6), which is equivalent to approximately 17 correct answers out of 22. On the Scale of Portugal (0-20), the individuals had an average economic literacy level of 15.12. Ferreira (2010) assessed the economic knowledge of the same target population, and the average score obtained was 68.5%. Two years later the respondents improved their performance from an average result of 68.5% to 75.6%. Partial financial literacy is evaluated by the number of correct responses to the seven multiple-choice questions in group 3 of the questionnaire.

The average number of correct responses was 63.8%; thus, on average, all of the interviewees responded correctly to more than half of the seven questions about financial knowledge (4.47 questions). On the Scale of Portugal (0-20), the individuals showed an average financial comprehension level of 12.8.

Hence, overall, the average number of correct responses to economics questions (75.6%) was greater than the average number of correct responses to financial questions (63.8%). With the objective of analysing whether partial economic literacy is greater than partial financial literacy, the SPSS was used, as well as the non-parametric Wilcoxon Signed Ranks test (paired samples), because the data do not validate the assumption of normality. It was concluded that the partial economic literacy is significantly higher than the partial financial literacy at the usual levels of significance.

Table 7. Percentage of individuals with correct responses to the economic questions by subject (%)

	Statistics			
	Average	S.d.	Min	Max
Economics of consumer	90,1	17,9	0,0	100,0
Economis of producer	74,2	24,5	0,0	100,0
Economics finance	70,0	27,1	0,0	100,0
Role of government	65,9	31,0	0,0	100,0
International Economics	76,8	29,0	0,0	100,0

As explained above, the economic questions addressed the following areas: consumer economics, producer economics, financial economics, the economic role of the government and international economics. It can be observed that the respondents performed better in the area of "Consumer Economics", the question with the largest percentage of correct responses is also found in this area (question 6), as shown in Table 7. However, the economics area in which the respondents performed the worst was that related to "the economic role of the government", with an average of 65.9% correct responses, and the question in which the respondents performed the worst was also in this area (question 8). It is notable that, in the five addressed areas, a large disparity was confirmed between the individuals' knowledge within each area. Ferreira (2010)

also concluded that the area with the best respondent performances was consumer economics, and the area with the worst performances was government-related.

The existence of differences in the percentages of correct responses between economic areas was tested. Given the non-parametric nature of the data, the Friedman test was performed for repeated measurements at the usual significance levels (1%, 5% and 10%). Significant differences were verified between the economic areas.

The questionnaire included a set of questions related to the interest and importance attributed to the economy. During the inquiry, the individuals expressed their opinions relative to their interests in economic subjects in two of the questions. The first question evaluated whether the individuals followed economic-related subjects and news through the various means of communication. Overall, 44.9% reported that they frequently followed news about the economy. However, a considerable percentage of respondents (31.7%) mentioned that they rarely followed economic subjects and announcements.

The majority of the respondents demonstrated that they were reasonably interested in economic subjects, and a few respondents said that economic subjects were very interesting. This result was expected, given that individuals still do not recognise the importance that the economy has in their lives and in the world around them. This information is summarised in Table 8.

Table 8. Distribution of the obtained responses to questions related to the respondents' interests in economic subjects (%)

Question	**Answer**	**%**
How frequently you follow economic news? (magazines, newspapers, TV, radio or internet)?	Follow very frequently	18,4
	Follow frequently	**44,9**
	Follow rarely	31,7
	Do not follow	4,4
	Not reply	0,6
How would you rank your interest abou economic matters?	Very interested	19,5
	Reasonable interested	**64,6**
	Little interested	13,1
	Not interested	1,9
	Not reply	0,8

In addition to evaluating the respondents' interests in economics, it is also essential to perceive the importance of economic knowledge in financial and political situations and wealth. Thus, the respondents were questioned about the importance of economic knowledge in various situations. Table 9 indicates the degree of importance that the respondents placed on each one of the situations.

Table 9. Distribution of the obtained responses relative to the importance of economic knowledge in various situations (%)		
Question	Answer	**%**
How importante is economic knowledge for these following situations?		
To understand bettwe polititians promisses and actions	Very important	22,5
	Important	**46,0**
	Not much important	17,6
	Not important at all	11,1
To get a better job and better wage	Very important	20,7
	Important	**48,5**
	Not much important	21,8
	Not important at all	6,5
To be a better and more active citizen in society	Very important	28,4
	Important	**53,0**
	Not much important	11,8
	Not important at all	4,4
To take better decisions and manage better my investments and savings	Very important	**66,2**
	Important	26,7
	Not much important	2,4
	Not important at all	2,1
To take better decisions regarding present and future consumption	Very important	44,7
	Important	**45,2**
	Not much important	5,5
	Not importante at all	1,9
To manage better my debts	Very important	**59,9**
	Important	32,0
	Not much important	3,2
	Not important at all	2,4
To improve my wealth and wellbeing	Very important	31,3
	Important	**52,0**
	Not much important	10,7
	Not important at all	3,4

It was confirmed that the respondents thought that having economic knowledge was very important when making better decisions about investments and savings (66.2%) and also for the better management of decisions about loans and credit (59.9%). Thus, the respondents gave greater importance to the economy in financial situations. The majority of the respondents indicated that was is important to understand the economy in the remaining situations.

Because the respondents were parents/guardians and teachers of students in elementary education, it was considered pertinent to understand whether the respondents thought that the application of economic disciplines was relevant in basic education, as shown in Table 10.

When questioned about the importance of inserting economic subjects into basic education programs for students, the majority of the respondents (57.5%) considered it to be relevant. Only 25.5% considered it very relevant to include economic subjects in basic education programs, and 4.2% considered it irrelevant to educate the youngest students about economic science.

Table 10. Distribution of the respondents' responses to the question of the relevance of the insertion of economic subjects into Basic Education (%)

Question	Option	%
How importante you think it is to include economics into basic education?	Very relevant	25,5
	Relevant	**57,5**
	Not much relevant	11,5
	Not relevant at all	4,2
	Not answer	1,3

Determinants of economic and financial knowledge: Econometric Model and variables

A central aim of this paper is to explore factors that contribute to explain the performances of adults in terms of economic and financial literacy. To this end, a model was developed to consider a set of factors as explicative variables, which, according to the literature, may contribute to explanations of the differences in economic literacy between adults.

The multiple linear regression model was adopted as the econometric methodology; because this model only includes cross-sectional data (a sectional sample in which individual observations are obtained at the same moment in time), it establishes a relationship of dependence and has many exogenous variables (Wooldrige, 2006).

The model takes the following form:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + ... + \beta_k x_{ki} + \mu_i \quad (1)$$

The majority of the articles in the literature review used an ordinary least squares (OLS) estimate, and this was the option for the estimation in this study.

The dependent variable, y_i, EFTOTAL_PERC, corresponds to the percentage of the number of correct responses to the 29 questions, which varied from 0% to 100%. (following Walstad & Rebeck, 2002). We explore a number of explanatory variables (x_{ji}). AGE and AGE2 correspond, respectively, to the age of the respondent in years and the age of the respondent in

years squared. It is expected that economic literacy will increase with age, although at a decreasing rate.

GEN indicates the gender of the respondent. It is a dummy variable equal to 1 if the respondent is male and 0 if the respondent is female.

NAT corresponds to the nationality of the respondent and can be considered a proxy for ethnicity, which was significant in the study by Mandell & Klein (2007). It is a dummy variable that is equal to 1 if the respondent is Portuguese and 0 if they are of another nationality.

EDU1, EDU2 and EDU3 are variables related to the education level of the respondent. Thus, education level is aggregated into three main groups. EDU1 corresponds to the respondents that completed the mandatory education and is equal to 1 if they belong to this level and 0 if they do not. To avoid exclusion, the minority that responded that they did not have primary instruction or only completed up to the 4th year of education was also included in this group. EDU2 corresponds to the respondents that confirmed having secondary education and is equal to 1 if they belong to this level and 0 if they do not belong to this level. EDU3 indicates that the respondents had a degree (bachelors, masters or doctorate), and the value is equal to 1 if they belong to this level and 0 if they do not belong to this level. The category excluded for this set of dummy variables was EDU1, and its effect was captured in the constant term. It is expected that people with more education will perform better, as observed in the studies by Wood & Doyle (2002) and Walstad & Rebeck (2002).

ECON is a dummy variable that represents individuals with some type of degree in the areas of economics or finance. It is expected to assume positive values because the possession of this type of degree indicates that the individual will have more knowledge about the subject and consequently, better results.

NCP is an ordinal variable and comprises an evaluation of the respondents' professions according to the National Classification of Professions. Thus, this variable varies from 1 to 9, with 1 corresponding to the professions with the highest qualifications and 9 to the professions with the lowest qualifications. It is expected that the greater the qualifications of the profession, the better the obtained results will be. Thus, the value of this variable is expected to be negative because 1 is the highest qualification and 9 is the lowest qualification.

MAT is a dummy variable equal to 1 for individuals who consider themselves to be Very Good at mathematics, and 0 for the others. It is expected that the individuals with more mathematics knowledge will have better results.

ACTIVE is a dummy variable and takes the value of 1 in cases of employed respondents (encompasses both employees and self employed respondents) and 0 for non-employed respondents (e.g., unemployed, retired, home maker, student, other). It is expected that the active respondents will have better results than those that are not active.

NMI corresponds to the household net monthly income of the respondent. This variable is continuous and varies from 1 to 5. A value of 1 corresponds to lower income levels, and 5

corresponds to the highest income levels. It is expected that this variable will positively affect the respondents' performance.

Table 11. Main variables of the study		
Variable		**Decription**
Dependent variable		
Percentage of correct answers (EFTOTAL_PERC) Percentage of correct answers, varies 0 to 100%		
Explanatory		
Age (AGE and AGE2)		Age in years and Age in years squared
Gender (GEN)		1=male; 0=female
Nacionality (NAC)		1=portuguese; 0= other
Education level	ESC1	Up to 9 years Education : 1= Yes; 0= no
	ESC2	Secundary: : 1= Yes; 0= no
	ESC3	University degree : 1= Yes; 0= no
Add training in economics / finance (ECON)		1= Yes; 0= no
Professional qualification level	CNP	1 to 9
Math capacity (MAT)		Good in maths: : 1= Yes; 0= no
Working (ACTIVE)		Is working: : 1= Yes; 0= no
Net monthly income (NMI)		1 to 5

The list of variables is summarised in Table 11.

Econometric results

The estimates for the number of correct responses are shown in Table 9. In the OLS regression, the 43.03% variation in global literacy was explained by the variables of the model. The coefficient obtained from AGE and AGE2 reflectes an inverted U relationship. The gender variable (GEN) was significant and positive. Thus, males have global literacy levels that are higher relative to the females, if the other explicative variables are constant. This result goes is in line with the studies by Walstad & Rebeck (2002) and Wood & Doyle (2002) for other economies.

Nationality (NAT) is a significant variable, as it was in the study by Mandell & Klein (2007), and Portuguese individuals were found to perform better than individuals of other nationalities, ceteris paribus. This result can be explained by differences in native language because non-Portuguese people might not be familiar with the economic terms or the Portuguese economic realities.

Relative to education, those who had a secondary education (EDU2) had more percentage of correct responses than those who had a basic education, ceteris paribus. When the respondents with higher education (EDU3) were analysed, the average score was even higher relative to those with only a basic education, ceteris paribus. Thus, it is confirmed that the effects of the education level are more evident and positive for those respondents with degrees, although both were significant. This result agrees with those obtained by Wood & Doyle (2002) and Monticone (2010).

Previous training in business sciences (ECON) also influenced the global literacy of the respondents because respondents with training had better results than those who did not have training in economics, ceteris paribus. Walstad & Rebeck (1999) also concluded that training in economics had a positive effect on the level of economic literacy. This result, despite being positive, was very small and could be explained by the fact that the test was short and did not precisely measure what people learned during economic training, the dissipation over time of the economic knowledge gained in the training, variability in the quality of economics teachers and the materials used to teach economics, which could reduce teaching effectiveness, and finally the effects of guessing on a multiple-choice test, which could influence the scores of those who lacked economic knowledge.

Not surprisingly, the national classification of professions (NCP) was found to have a negative and significant impact on global literacy. This indicates that the respondents with weaker professional qualifications answered fewer questions correctly (3%) than did those with better professional qualifications, ceteris paribus. This can be explained by the fact that professions with better qualifications require that the respondents have a higher level of education and are more informed about societal problems while professions such as those in group 9 do not require a high level of education and consequently the respondents have less knowledge about economics and finances.

Another variables positive related to the economic literacy level is the level of maths of the individual. Individuals who considered themselves better at maths had higher scores than those who considered themselves worst in maths.

Individuals who were active had higher scores than those who were were not currently working, ceteris paribus. This variable indicates, not surprisingly, that working respondents had better economic knowledge. This result indicates that adults obtain economic information through various sources, such as friends, relatives and work colleagues.

In turn, the estimated coefficient for income is also statistically significant, indicating that, on average individuals from households with higher levels of net monthly income also have a higher economic knowledge, with everything else constant.

Table 12. Determinants of economic literacy		
	Estimated coefficients (t statistics)	
C	-7.766	(-0.334)
AGE	2.269**	(2.104)
AGE2	-0.025**	(-2.003)
GEN	4.656*	(3.443)
NAC	14.239*	(4.400)
ESC2	7.508*	(2.715)
ESC3	8.344*	(2.702)
ECON	5.494*	(4.076)
CNP	-1.941*	(-4.178)
MAT	4.515**	(2.395)
ACTIVE	7.404*	(2.781)
NMI	4.320*	(4.245)
N	422	
R2	0.43025	
R2-ajustado	0.41496	
LR statistic	28.1464	
Prob(LR statistic)	0.00000	

DISCUSSION

This study fills an empirical investigation gap and calls attention to a question of extreme interest, namely the economic literacy of a general population. This paper is part of an investigation project of the Department of Economics, Engineering and Industrial Management of the University of Aveiro, Economicando, which is financed by the Foundation for Science and Technology (Fundação para a Ciência e a Tecnologia - FCT).

The consensus seems to be that economic literacy is increasingly important, given the growing complexity and variety of financial products and services available on the market, as well as the perceptions of the conditions and realities in which this set of economic activities have developed. Despite the growing attention paid to the dissemination of economic science, empirical studies show that individuals have little knowledge of economics and finances, and thus it is necessary to define policies that will increase individual interest in the knowledge of economic subjects. Based on the literature review, factors were identified that permit an explanation for the levels of economic and financial literacy in the general population, as well as why the levels differ. Out of a total of 29 questions that evaluated economic literacy and financial comprehension, the average number of correct responses was 21 (73.1%), which translates to a good level of economic knowledge on the part of the respondents. However, when comparing the results from the economic and financial questions, it was found that individuals

performed better on the economics questions. The respondents were in general interested in the subject and considered it important to have economic knowledge in various situations, mainly financial situations.

Various international studies have explored ways to improve the economic literacy levels. Monticone (2010) and Huston (2010) reported that active measures were needed to create a financially responsible work force. More education, dissemination of information, transparency of financial institutions and greater access to financial counselling are necessary, especially for the most vulnerable individuals. In a more comprehensive manner, the government could contribute to improved economic literacy in the general public by promoting the integration of economic subjects in all schools and means of communication (Federal Reserve Bank of Minneapolis, 1999). To this end, it will be necessary to train teachers to increase their economic knowledge and develop their manners of thinking about economic subjects.

With the OLS model we tested the importance of a number of explanatory variables.

For future research it would be interesting to implement the same evaluation tool to a representative sample of all Portuguese population at another period of time and confirm the evolution of respondent knowledge. Another suggestion for further investigation involves a study of the effects of economic literacy on the attitudes and well being of the individual. In this study, factors that affect economic literacy were studied, but economic literacy is thought to affect other variables, thus making it an explicative variable.

It is expected that this work will contribute to an increased interest in "education in economics" on the part of researchers and that their results will allow for the expansion of knowledge about the Portuguese reality, being possible to compare the results to others obtained internationally. The developed questionnaire can also be applied by other researchers in the future.

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