Assessment of individual Financial Literacy level depending on respondent profile

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ABSTRACT

Financial literacy plays an important role in ensuring individual's welfare; hence, it is essential to evaluate individual financial knowledge and skills.

In 2015, academic personnel of the Department of Finance, Faculty of Engineering Economics and Management of Riga Technical University conducted research within the project "Enhancing Latvian Citizens' Securitability through Development of the Financial Literacy" to analyze knowledge as one of the dimensions of financial literacy. A questionnaire was designed taking into consideration aspects of Latvian economic environment so that it could be used to assess the level of financial literacy of respondents from different age groups, of various educational background and employment status. In total 506 respondents took part in the survey.

The goals of the current paper are to determine the average level of financial literacy of the Latvian population and to test several hypotheses put forward. Using a multiple regression model, respondent profile data were used as independent variables, and overall 10 models were developed.

Keywords: Financial literacy; Survey; Latvia, Multiple regression analysis.

1. INTRODUCTION

Financial literacy (FL) is very important as it provides benefits to an individual as a consumer, state economy and financial system overall. Informed decisions concerning personal finance management can contribute to economy resulting in efficient allocation of financial resources and financial stability [17]. In turn, financial illiteracy denotes lack of knowledge of basic financial concepts when an individual makes financial decision. Pervasiveness of this phenomenon has been attested by numerous studies [12][15], and in the long term it leads to losses [6], particularly with respect to retirement planning decisions [1] [14] [16].

In many countries, the level of financial literacy of the population is regularly evaluated by cooperative effort of state and research institutions [1] [13][18]. International research allows ranging countries according to FL level of the population, adopting best practices of the countries most advances in this field, and selecting the most efficient approach to implementing national strategies for financial literacy [20].

In the recent years, various aspects of financial literacy have become focus of academic research in different countries. Experts recognize that financial knowledge of consumers is insufficient, it is manifested as problems in using credits cards [19], problems in meeting financial obligations [17], lack of participation in the stock market [25], inability to accumulate wealth or manage it efficiently [23], portfolio diversification [2] [9] [11], and inadequate retirement planning [1] [7] [15] [22].

The level of financial literacy as a variable parameter is used in household wealth accumulation forecasting model to determine the impact of population FL level on changes in wealth [4]. Financial literacy as an indicator demonstrates to what extent individuals understand key financial concepts and whether they are capable and confident enough to successfully manage their personal finance [21] [26], as it requires making both short-term decisions and long-term financial planning taking into account life cycle events and changing economic conditions.

Joining Organization for Economic Co-operation and Development (OECD) is one of the strategic aims of Latvia, and the preconditions the country should meet are to adapt core competencies on financial literacy developed by the OECD and to ensure implementation of the tasks formulated in the National Strategy for Financial Literacy in Latvia 2014–2020. The advantages of the development of a National Strategy include «promoting a sustainable co-operation between stakeholders, avoiding duplication of resources and allowing the development of clearly determined roadmaps with measurable and realistic objectives based on national assessments» [10]. Information on the problems related to the level of financial knowledge of particular demographic groups provides the basis for

improvement of education system and allows evaluating changes after implementing various programs.

2. DATA AND METHODS

The present research has been conducted by the authors within the framework of the project «Enhancing Latvian Citizens' Securitability through Development of the Financial Literacy» implemented by the academic staff of the Department of Finance, Faculty of Engineering Economics and Management of Riga Technical University. 506 respondents took part in the survey. The questionnaire was designed to account for the aspects of Latvian economic environment to assess the level of financial literacy of respondents from different age groups, of various educational background and employment status. The questionnaire addressed the components of financial literacy [5]. It comprised 24 questions covering the following areas: 1) savings, 2) debt obligations, 3) personal budget, 4) economic issues and financial concepts, 5) financial services, 6) investments, financial instruments and financial markets. The questionnaire included multiple choice questions formulated as tasks. Survey results were processed using Excel and SPSS 20.0, applying analysis of means, Kolmogorov-Smirnov test; multiple regression analysis was used to forecast the level of financial literacy of an individual. In order to evaluate the level of financial literacy of respondents, the authors calculated the mean points score in the sample. Estimating the score in case a respondent gave a correct answer, rank w_i ascribed to the respective question was taken into account. The score that a respondent could get for a correct answer n_i was calculated by Formula (1):

$$n_i = 1 \text{ point} * w_i \qquad (1)$$

Rank w_i was estimated as arithmetic mean of evaluations provided by experts, as questions differed with respect to level of complexity. Answering correctly to all questions, the respondent could get the maximum of 54.2 points. The points gained were proportionally allocated to grades in a 10-grade scale, which is used to assess educational performance in Latvia (Table 1).

Table 1.

Correspondence of financial literacy scores to the criteria for assessment of educational performance

Financial literacy points score	Criteria for assessing educational performance	Financial literacy points score	Criteria for assessing educational performance
0 – 5.5 points	1 (very, very weak)	27.5 – 33 points	6 (almost good)
5.5 – 11 points	2 (very weak)	33 – 38.5 points	7 (good)
11 – 16.5 points	3 (weak)	38.5 – 44 points	8 (very good)
16.5 – 22 points	4 (almost satisfactory)	44 – 49.5 points	9 (excellent)
22 – 27.5 points	5 (satisfactory)	49.5 – 54.2 points	10 (with distinction)

The score that falls into two grades is allocated to the lower grade, e.g. 5.5 points correspond to grade «1» (very, very weak), grade «2» (very weak) is ascribes starting with 5.6 points.

Determining financial literacy score of each respondent in the sample, it was possible to estimate the average level of financial literacy of the Latvian population. Based on the data on 506 respondents, their average level of financial literacy is 28.29 points, which corresponds to grade «6» (almost good). It points at «lack of in-depth understanding of some basic concepts and significant difficulties in practical application of the knowledge gained». Respondent scores by groups are presented in Fig.1.
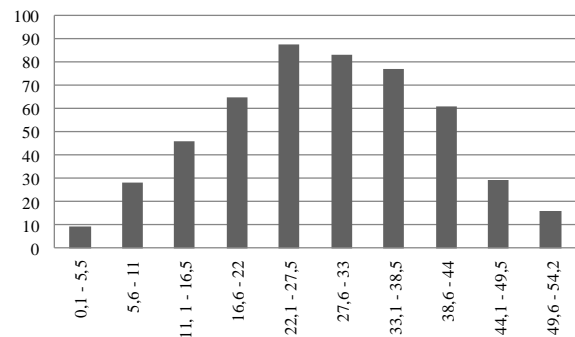

Figure 1. Respondent points scores

Fig.1 demonstrates that the majority of respondents obtained the score in the range from 16.6 to 44. It corresponds to grades from «4» (almost satisfactory) to «8» (very good).

A hypothesis was put forward: *distribution of the data characterizing the level of financial literacy of respondents corresponds to normal distribution* (see Fig. 2). The hypothesis is based on the assumption that the majority of processes occurring in nature and society are characterized by data distributed according to normal distribution law [8]. Kolmogorov-Smirnov test was carried out to test the hypothesis; it is preferable when the number of cases exceeds 50.
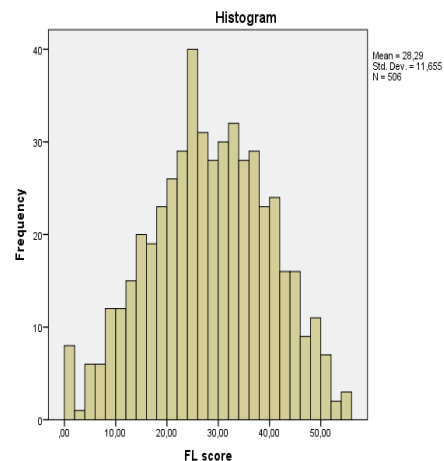

Figure 2. Sample data distribution

The results of Kolmogorov-Smirnov test are shown in Figure 3. According to the results, the analyzed data distribution follows the normal distribution because Sig. = 0.200 > 0.05. Thus, the null hypothesis on the normal distribution cannot be rejected.

	Kolmogorov-Smirnov test		
	Statistic	df	Sig.
FL score	.028	506	.200

Figure 3. Results of Kolmogorov-Smirnov test

International research attests that respondents with definite socio-demographic characteristics demonstrate higher level of financial literacy. For example, within the pilot research carried out by the OECD in 2012 involving respondents from 14 countries, men demonstrated better financial knowledge compared to women [3]. In addition, in the majority of countries, the respondents that demonstrated the highest results were in the age group 30-60 years old, and a positive correlation between education level and the level of financial literacy was observed in all countries. Based on research results, the following hypothesis was advanced: *respondents with the highest level of financial literacy are men in the age group 31-45 with higher education in economics or finance*. Respondent profile data were used to test the hypotheses applying a multiple regression model.

3. FORECASTING THE LEVEL OF FINANCIAL LITERACY

Multiple regression analysis is used to forecast individual's level of financial literacy. In this case, dependent variable (Y) is the level of financial literacy of a respective respondent (points score), but independent variables will be represented by respondent profile data X_i (see Formula (2)).

$$Y_i = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + ... + \alpha_8 X_{8i} + \varepsilon_i \ (i = 1, ..., 506), \quad (2)$$

where
Y_i – i-th respondent points score giving answers to survey questions;
$X_{1i}, X_{2i}, ..., X_{8i}$ – dummy variables describing the i-th respondent profile;
N – number of respondents.

To conduct regression analysis, respondent profile data were encoded into binary dummy variables. The number of dummy variables is k-1, where k – the number of qualitative characteristics. For example, a respondent profile question «age» has 5 answer options ($k = 5$). In this case, the number of dummy variables is equal to 5-1=4. Regression model is developed evaluating a respondent with a basic demographic profile. For example, it is possible to forecast the level of financial literacy (points score) of an individual of 18–25 years of age living in a definite region, with a specific employment status. The obtained result can be adjusted to account for respondent profile data change in accordance with the calculated regression coefficients. Considering

all eight indicators that characterize respondent profile, for the majority regression coefficients are not statistically significant. Therefore, several models were designed, and all respondent profile elements were analyzed separately. Conclusion on including or excluding the constant was made based on the data on statistical significance of the model and regression coefficients.

Model I. Independent variable – respondent gender
Replacing variable "gender" with dummy variable X_{1i}, a man is ascribed code «1», but a woman – code «0». By default, a respondent is female. In this case the forecasted FL level is 27.146 points (see Table 2), which corresponds to grade «5» (satisfactory).

Table 2.
Model I. Coefficients in the model (extract from SPSS)

Model 1	Coefficients		t	Sig.
	B	Std. Error		
(Constant)	27.146	.607	44.752	.000
Gender	4.004	1.133	3.534	.000

If a respondent is male, then the forecasted FL level increases by 4.004 points and equals 31.15 points, which corresponds to grade «6» (almost good).

Model II. Independent variable – respondent age
By default, respondent's FL level equals 0. Depending on the respondent age, FL level is forecasted to depart from 0 (see Table 3).

Table 3.
Model II. Coefficients in the model (extract from SPSS)

Model 2	Coefficients		t	Sig.
	B	Std. Error		
Age 18–25	25.459	.724	35.163	.000
Age 26–30	31.017	1.705	18.188	.000
Age 31–45	34.342	1.022	33.610	.000
Age 46–62	28.301	1.192	23.747	.000
Age above 62	22.489	2.089	10.767	.000

It is forecasted that the highest level of financial literacy will be demonstrated in the age group from 31 to 45 years old; it is 34.342 points, which corresponds to grade «7» (good).

Model III. Independent variable – respondent location
By default, respondent's FL level equals 0. Depending on respondent location, FL level is forecasted to depart from 0 (see Table 4).

Table 4.
Model III. Coefficients in the model (extract from SPSS)

Model 3	Coefficients		t	Sig.
	B	Std. Error		
Riga	29.146	.691	42.158	.000
Large Latvian cities	27.286	1.537	17.748	.000
Riga District	33.378	1.597	20.906	.000
Vidzeme	22.895	1.759	13.013	.000
Kurzeme	24.554	1.646	14.920	.000
Zemgale	30.319	2.765	10.964	.000
Latgale	25.245	2.488	10.146	.000

It is forecasted that a respondent who lives in Riga District will demonstrate the highest level of financial literacy; it is 33.378 points, which corresponds to grade «7» (good).

Model IV. Independent variable – respondent education level
By default, respondent's FL level equals 0. Depending on respondent education level, FL level is forecasted to depart from 0 (see Table 5).

Table 5.
Model IV. Coefficients in the model (extract from SPSS)

Model 4	Coefficients		t	Sig.
	B	Std. Error		
Primary education	13.772	4.898	2.812	.005
Secondary education	24.785	.717	34.543	.000
Undergraduate education	29.187	.957	30.501	.000
Postgraduate education	33.935	.936	36.267	.000

It is forecasted that a respondent with postgraduate education will demonstrate the highest level of financial literacy; it is 33.935 points, which corresponds to grade «7» (good). In turn, if a respondent has secondary education, this level will decrease to 24.785, which corresponds to grade «5» (satisfactory).

Model V. Independent variable – respondent education field
Replacing the variable «thematic field of education» with a dummy variable, «the economist» is ascribed code «1», but «non-economist» - code «0». By default, a respondent has not received any education in economics or finance. In this case the forecasted FL level is 24.873 points (see Table 6), which corresponds to grade «5» (satisfactory).

Table 6.
Model V. Coefficients in the model (extract from SPSS)

Model 5	Coefficients		t	Sig.
	B	Std. Error		
(Constant)	24.873	.656	37.920	.000
Education field	7.726	.986	7.837	.000

If a respondent has received education in economics or finance, FL level increases by 7.726 points and equals 32.6, which corresponds to grade «6» (almost good).

Model VI. Independent variable – respondent social/employment status
By default, respondent's FL level is equal to 0. Depending on respondent social/employment status, FL level is forecasted to depart from 0 (see Table 7).

The authors stress that each model analyzes only one respondent profile element. A respondent with the status of unemployed has a higher forecasted level of financial literacy than a student. However, it is possible that the

unemployed has received education in economics and that influences his/her result.

Table 7.
Model VI. Coefficients in the model (extract from SPSS)

Model 6	Coefficients		t	Sig.
	B	Std. Error		
Student	24.959	.802	31.119	.000
Employed in the financial sector	34.872	1.271	27.428	.000
Employed in the non-financial sector	29.864	.798	37.424	.000
Retired	19.429	2.723	7.134	.000
Unemployed	28.668	4.584	6.254	.000
Other	23.958	3.551	6.747	.000

It is forecasted that a respondent employed in the financial sector will demonstrate the highest level of financial literacy; it is 34.872 points, which corresponds to grade «7» (good). In turn, for the retired person this level decreases to 19.429, which corresponds to grade «4» (almost satisfactory).

Model VII. Independent variable – household type
By default, respondent's FL level equals 0. Depending on the household type, FL level is forecasted to depart from 0 (see Table 8).

It is forecasted that a respondent with the household type «2 adults with dependent children (child)» will demonstrate the highest level of financial literacy; it is 30.043 points.

Table 8.
Model VII. Coefficients in the model (extract from SPSS)

Model 7	Coefficients		t	Sig.
	B	Std. Error		
One-person household, up to 64 years of age	26.741	1.188	22.515	.000
One-person household, 65 and older	16.300	3.879	4.202	.000
2 adults without dependent children	28.864	.885	32.623	.000
2 adults with dependent children (child)	30.043	.872	34.444	.000
2 adults, 3 and more dependent children	25.728	2.539	10.131	.000
Single-parent family (at least one dependent child)	25.463	2.327	10.940	.000

In turn, the lowest level is forecasted for one-person household aged 65 or older, i.e., a single retired person (16.3 points, which corresponds to grade «3» (weak)).

Model VIII. Independent variable – respondent income
By default, respondent's FL level equals 0. Depending on income level, FL level is forecasted to depart from 0 (see Table 9).

Table 9.
Model VIII. Coefficients in the model (extract from SPSS)

Model 8	Non-standardized coefficients		t	Sig.
	B	Std. Error		
Income 285 <<	22.703	1.112	20.410	.000
Income 286–700 euro	27.554	.629	43.772	.000
Income above 700 euro	36.033	1.101	32.723	.000

It is forecasted that a respondent with the highest income will demonstrate the highest level of financial literacy; it is 36.033 points, which corresponds to grade «7» (good).

Predictably, the authors are interested in plotting a profile of an «ideal respondent» (Model IX). It is not possible to include all respondent profile elements in the model due to low statistical significance of the coefficients. It is still possible to develop a good forecasting three-factor model covering gender, education level and education field. The model is statistically significant and all regression coefficients also are statistically significant (see Table 10). By default, a respondent is a woman with secondary education (=«non-economist»), whose FL level is 20.427. If a respondent is male, FL level increases by 4.112 points. If he has received postgraduate education in economics or finance, it increases by the total of 16.246 points (8.468 + 7.778).

Table 10.
Model IX. Coefficients in the model (extract from SPSS)

Model 9 (3 factors)	Non-standardized coefficients		t	Sig.
	B	Std. Error		
(Constant)	20.427	.830	24.616	.000
Gender	4.112	1.019	4.035	.000
Primary education	-6.655	4.632	-1.437	.151
Undergraduate education	3.931	1.119	3.512	.000
Postgraduate education	8.468	1.102	7.682	.000
Education field	7.778	.923	8.424	.000

Thus, it is forecasted that a man with tertiary education in economics will gain the maximum points score; it is 40.785, which corresponds to grade «8» (very good). To test the hypothesis, it is necessary to include four factors into the model: gender, age, education level and thematic field of education. Results of regression analysis attest that regression coefficients in some cases are not statistically significant (see Table 11) (Sig. > 0.05). By default, a respondent is a woman of 18-25 years of age, with secondary education, «non-economist». In this case, the forecasted respondent FL level equals 19.825, which corresponds to grade «4» (almost satisfactory).

If a respondent is a man, FL level increases by 3.928 points. Advancement of education level has a positive impact on the final result. Maximal FL level increase can be forecasted changing respondent's age to 31–45 years old. Thus, it is forecasted that a man in 31–45 age group with postgraduate education in economics or finance will gain the maximal score. In this case, the result is 42.481 (19.825+3.928+6.252+7.713+4.763), which corresponds to grade «8» (very good).

Table 11.
Model X. Coefficients in the model (extract from SPSS)

Model 10 (4 factors)	Non-standardized coefficients		t	Sig.
	B	Std. Error		
(Constant)	19.825	.909	21.814	.000
Gender	3.928	1.007	3.902	.000
Primary education	-4.361	4.705	-.927	.354
Undergraduate education	2.575	1.204	2.138	.033
Postgraduate education	6.252	1.345	4.648	.000
Education field	7.713	.966	7.988	.000
Age 26-30	2.441	1.819	1.342	.180
Age 31-45	4.763	1.367	3.485	.001
Age 46-62	2.726	1.439	1.894	.059
Age above 62	-2.820	2.202	-1.280	.201

It should be pointed out that regression coefficients for the variables «gender», «postgraduate education», «education field» and «age 31–45» are statistically significant, therefore, it can be concluded that the advanced hypothesis has been fully confirmed.

4. CONCLUSIONS

Assessing the answers given by 506 respondents, the mean level of financial literacy according to 10-grade scale has been estimated to correspond to grade «6», which is transcribed as «lack of in-depth understanding of some basic concepts and significant difficulties in practical application of the knowledge gained».

Using independent variable «respondent gender», the difference in the forecasted level of financial literacy has been attested. It is forecasted that the level of financial literacy of a man will be 1 grade higher than that of a woman.

The highest level of financial literacy is expected in 31-45 age group; it will be demonstrated by a respondent who lives in Riga District. It corresponds to grade «7», which is transcribed as «lack of understanding of some less important issues, there are minor difficulties in solving some practical tasks».

It is not possible to include all respondent profile elements into one model, but the authors have developed an «ideal respondent» profile model using three factors: gender, education level and education field. It is a man with tertiary education in economics; his FL level corresponds to grade «8», which implies that a respondent «lacks sufficiently detailed understanding of some issues to apply knowledge independently to solution of the most complex problems».

Research results can be used to determine population groups, which lack financial knowledge, and to set priorities to promote financial literacy. They can be used

as a basis for improving study modules or developing life-long learning courses.

The opportunity to forecast the level of financial literacy of respondents can help financial institutions recognize the risks that arise as a result of customer/individual decisions, if these decisions are not based on knowledge and awareness.

5. ACKNOWLEDGEMENTS

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