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# An Empirical Study of Financial Literacy versus Risk Tolerance Among Higher Education Students

SUMMARY: The survey conducted in 2012–2013 by the State Audit Office of Hungary and its non-governmental partners examined the financial literacy, financial knowledge and risk appetite among higher education students (n=1,743), as well as the factors influencing the same. Our results show that starting a business only appears among the students' plans and goals to a lesser extent, and some three-quarters of the students are risk averse. It is surprising, at the same time, that their risk appetite does not depend on either the level of their knowledge of finance and economics or on their perception of their own financial knowledge and competence. Excessive risk aversion may prevent the leveraging of financial opportunities and may act as an obstacle to the development of the national economy if it becomes a mass phenomenon. This creates a need for young people with realistic self-perceptions, appropriate attitudes towards risks, and the capability of enterprise.

KEYWORDS: young adults, financial behaviour, financial attitude, financial literacy, risk aversion, self-perception
JEL CODES: A13, A14, A 23, D03, D14, D31, D81, G11, G32, I22, J11

## INTRODUCTION

While a growing number of individuals are taking responsibility for their own financial security, they are faced with increasingly more complex financial instruments, and there are still many who are ill-prepared for making sound savings decisions. In cooperation with the Budapest University of Applied Sciences, the Econventio Roundtable Nonprofit Association, the Nonprofit Association of Hungarian Financial and Economic Auditors, and the University of Szeged, the State Audit Office of Hungary conducted research on the financial literacy of higher education students. In our study, we use the database of the 2013 financial literacy research to profile the financial literacy of higher education students and their associated risk taking behaviours. The first part of the article provides an overview of literature describing the relationship of financial literacy and risk taking. The second part describes the background to our research, the characteristics of the sample collected by means of a questionnaire survey, our own financial literacy indicators that were used during research, and also investigates the factors influencing the risk aversion level of young Hungarians.

The financial crisis that started in 2008 has had numerous negative effects on the economy and society alike. The 2008 recession stemmed from the financial sector rather than the real economy. The need for financial

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literacy and efforts at its development have been present throughout the past decades, but became a focal point only in the context of the worldwide economic crisis that emerged from 2008 (Botos et al., 2012).

A letter issued by the OECD in 2006 also emphasises that as increasingly more complex options appear, consumers on the ever more sophisticated financial markets are unable to choose between two different bank loans or savings schemes based purely on interest rates. This is corroborated by the 2009 report on the research study conducted by four international institutions coordinated by the World Bank (IBRD–OECD–DFID–CGAP, 2009), according to which various financial products have reached such a degree of complexity that not even financial experts are able to estimate the inherent risks accurately. Consequently, developing financial literacy is of essential importance not only at the level of the individual, but also at that of society.

The hazard is manifested when individuals fail to improve their previously acquired financial knowledge, whereby a gap develops between their own level of knowledge and that required for the safe use of the financial products offered, and when they fail to align their knowledge to their own risk taking level (Botos et al., 2012). According to *Hung et al.* (2009), therefore, it is only possible to make responsible financial decisions with appropriate outcomes if satisfactory financial knowledge is available to make such decisions. The OECD also considers financial education to be of prime importance, and not just for investors. It emphasises that the ability to make decisions on the balance of the family budget, buying a home, financing children's education or income for the retirement years is indispensable even for an average family.

In 2008, the National Bank of Hungary defined financial literacy as "*a level of financial knowledge and skills that enables individuals to identify the fundamental financial information required to make their conscious and prudent decisions, and after the acquisition of such information, to construe it and use it to make decisions, assessing potential future financial and other consequences of their decisions.*" In other words, the financially literate are able to assess risk, and any uncertainty in their decision.

There are multiple approaches to the concept of risk, depending on the discipline addressing it: economics, psychology, sociology, etc. Nonetheless, an element common to all of these is that risk is understood as the probability of some sort of undesirable event occurring (Faragó–Vári, 2002). Many also treat the notions of risk and uncertainty as identical (Rowe, 1977); a distinction, however, must be made between them. The difference between risk and uncertainty was first articulated by *Knight* (1921). He proposes that risk occurs when the probability of an event's outcome is calculable or discoverable, while uncertainty is involved in cases where the probability of the outcome cannot be specified or discovered.

Individual attitude, past experiences, and emotions (Kunreuther, 2002) all shape individuals' risk taking behaviour, which varies by person. As a result, individual people frequently judge the same risk completely differently (Williams–Schroders, 2000), and even the same person may view a particular risk differently when in different decision-making situations.

According to *Fenton-O'Creevy–Soane* (2001), individual risk taking is equally influenced by the way individuals interpret risks, their attitudes towards gain and loss, as well as their prejudices and personalities. That is why it is important for individual self-perceptions to be appropriate so that risk is identifiable and can be undertaken.

At the same time, people may be classified into three types based on their risk appetite: they can be risk averse, risk seekers, and

indifferent to risks. That classification is based on the individual utility function (Kopányi, 1993), which interprets individual risk preferences on the basis of financial gain and the utility associated with it (Vlahos, 2001).

## LITERATURE REVIEW

In her study, *Lusardi* (2008) explains that financial illiteracy is increasingly widespread among the American population, particularly in special demographic groups. Typically, financial literacy is especially low in the case of those with a lower education, women, Hispanics, and Afro-Americans. At the same time, financial literacy has an effect on financial decisions, so if, for instance, an individual fails to plan for their passive age, does not save for retirement, does not partake of the broad range of stock-exchange products, or engages in bad loan taking behaviour, then ultimately this can be traced to their inadequate knowledge of even the most basic financial concepts. Financial education programs can help a lot in improving financial knowledge, as they boost the development of a willingness to save, and facilitate individuals' prudent financial decision-making.

Confirming the findings of *Danes–Hira* (1987), *Xiao et al.* (2010) explain in their study that college students usually have limited financial knowledge. Examining students' financial knowledge in five areas, they found college students to have general rather than specialised knowledge about financial matters. In a survey of financial literacy conducted among the students of 14 universities, *Chen–Volpe* (1998) found that 53 per cent of students gave correct answers to questions testing their knowledge. Students achieved good results on general questions about finance and insurance, while they showed less competence in savings, investments and loans. Overall, these studies

suggest that college students require additional financial education. This is also corroborated by the *Sallie Mae* (2009) survey, according to which 84 per cent of the students indicated their need for education on financial topics, primarily in the fields of money and debt management. Two-thirds of respondents specifically mentioned the importance of teaching student loan repayment and debt reduction strategies. In the field of general financial knowledge, they indicated the need to improve their budgeting and saving capabilities (46 and 45 per cent, respectively). At the same time, less than one-third of the students considered early saving for retirement and financial planning for the future to be important, and a mere quarter showed any interest in understanding the pros and cons of loans. On the question of where they should acquire such knowledge, 64 per cent would already have liked to receive information of this sort during their secondary school years, while 40 per cent highlighted freshman year at college. Responding students picture financial education primarily as one-on-one sessions that use guided or passive methods. Instructors participating in financial education assume that secondary school and college courses on personal finances and related matters improve the level of financial knowledge, and that students will demonstrate appropriate financial behaviour in making less risky financial decisions with better financial knowledge. Research findings, however, are mixed. Conducted at regular intervals over the past years among high school seniors in the US, the *Jump$tart* (2008) survey does not show a correlation between taking high school finance courses and the level of financial knowledge (Mandell, 2008). This is also corroborated by our own research results (Luksander et al., 2014), which show that while university education influences the level of financial knowledge significantly, secondary school education does not. The study conducted

by *Peng et al.* (2007) shows mixed results in terms of financial knowledge acquired at secondary school and financial education at universities. The alumni survey result (1039 people) of that research found that financial education provided as part of one-on-one sessions at secondary schools had no impact on investment knowledge (insignificant), while higher education finance courses had a positive influence on the willingness to save. At the same time, multiple studies have underscored the positive effects of financial training programs, namely that individuals' knowledge, own efficiency and savings rates increase after training. Involving 4,107 teenagers nationwide, the study found that three months after completing the programme, nearly a half of them claimed to have acquired adequate knowledge, one-third that their behaviour had been positively influenced, and 40 per cent had become more self-confident in their finances (Danes et al., 1999).

Studies also examined whether there was any correlation between financial education and college students' credit card usage behaviour. Research generated mixed results. Looking at credit card usage behaviour, *Lyons* (2008) reports that among participants of financial training courses, the number of those with a credit card debt of USD 1,000 or greater decreases, as does that of late payers, the ratio of those who reached their credit limits, and of those who fail to pay the full balance. *Hayhoe et al.* (2005) demonstrated a negative correlation between participation in financial education and students with 4 or more credit cards. By contrast, in their previous research Hayhoe et al. (1999) discuss a positive correlation between the behaviour of those using multiple credit cards and that of training participants.

Results from previous research studies can be summarised as follows:

❶ Short financial training may affect students' knowledge and behaviour.

❷ The effectiveness (or necessity) of full-semester formal courses may depend on the teaching context.

❸ Long-term financial training is what drives a positive impact on financial behaviour and proper risk management.

Upon examining college freshmen's credit card habits, *Jones* (2006) found that even though 62 per cent had credit cards, only a little more than a half (50.9 per cent) carried some kind of debt. The ratio of those who have credit cards and debt increases as college years progress, at the same time the debt of singles is lower than that of married students or those in a relationship. Most students acquired little knowledge about loans during their studies, but there is no significant correlation between the acquisition of knowledge and debt rate.

Both at the individual or group level, there are multiple methods to examine attitudes towards debt, and through that, to measure risk taking.

Optimally, a study focuses on risky behaviour itself. Most research studies (Johnson–Wilke–Weber, 2004) examine experiment subjects in a laboratory setting, and look at actual probabilities of winning and losing small amounts in the context of betting situations. Those studies, however, examine risky behaviour from the financial aspect, and not all of their observations are valid for actual, everyday decision-making situations (Radnóti, 2010).

*Faragó's* (2005) research in Hungary examined risk taking by students from an aspect where risk taking had a known outcome with a stake. In an examination test, the result of which counted towards the semester mark, choosing the problem that was more difficult but not known in detail was worth more points than the easier one, but the problem that got a lower score was also unknown when the choice had to be made, and at the same time,

an incorrect answer was worth zero points in every case. The drawback of this experiment is that it is only partially controlled and the effect of individual variables is difficult to determine. To eliminate this, *Radnóti–Faragó* (2005) measured risk taking by having the previously occurring risky event recalled, but the results that were thus obtained are still subjective, as they may be altered by the subject's memories.

Taking appropriate financial decisions and increasing individual well-being is not only conditional to identifying risk-taking levels correctly, but according to *Timmons* (2003), being an entrepreneur also has the essential criteria of tolerating risk and uncertainty.

When making financial decisions, individuals mostly rely on their existing knowledge and previous experiences, but may also be influenced by other factors. The assumed experience and knowledge of individuals, however, does not necessarily coincide with their actual level of knowledge.

### Hypotheses

H1: Our first hypothesis was that there would be a significant difference between the actual and assumed financial knowledge of young people in higher education.

H2: According to our second hypothesis, the degree of risk taking would not be influenced by actual financial knowledge, but the subjective perception thereof, i.e. self-perception.

## MATERIAL AND METHOD

For the research, a questionnaire was designed, and risk taking was examined by means of three indices. When analysing young people's risk appetite, we first examined the level of knowledge of finance and economics among the students participating in the survey. This was followed by an examination of the degree to which young people's risk taking was influenced by actual and assumed knowledge, and by the difference thereof.

To confirm the hypotheses formulated on the basis of our literature review, a questionnaire containing 79 questions in six blocks, including open-ended and closed questions as well as Likert scales, was circulated online (www.penzugyikultura.hu) between 1 December 2012 and 14 February 2013.

### Sample

The target group of the research was young adults, i.e. the 18–25 age group, studying various disciplines in higher education. The Budapest University of Applied Sciences and the University of Szeged were the two higher education institutions that participated in the financial literacy research. The combined student pool at these two institutions exceeds 38,000 students, thus providing a sound research basis. Furthermore, education at the two institutions covers a significant part of the disciplines, making the sample suitable for the comparisons set out in the hypotheses.

Out of the 2,070 questionnaires, the research included responses from a total of 1,743 young adults in higher education aged 18–25. Database cleaning was required because students majoring in economics were over-represented, and the adjustment produced a sample that was already suitable for drawing conclusions of general validity.

### Measuring Financial Literacy

To determine the level of financial literacy, we developed our own measurement system in the interest of taking a more complex approach

to the literacy of young Hungarians in higher education instead of focusing on various special financial areas, and to test our hypotheses properly. Three indicators were created to this end. Furthermore, relying on the definition provided by the National Bank of Hungary, i.e. (1) financial knowledge, (2) financial competence and experience, (3) financial skills, and (4) financial awareness (Béres–Huzdik, 2012), we added (5) financial attitude (Nagy–Zsótér, 2012) to the concept of financial literacy.

### Financial Knowledge Index (FKI)

The Financial Knowledge Index (FKI) measures the students' level of financial knowledge based on an equal ratio of theoretical and practical questions. Although the latter also examined the students' calculation skills (which, according to the OECD's survey, are showing a deteriorating trend), the questions were designed to ensure that any student with an appropriate sense of reality (financial experience) would be able to provide the correct answer. The FKI value was calculated as the ratio of correct answers to 21 questions. Its value is between 0 and 1. The closer it is to 1, the greater the student's financial knowledge.

### Self-perception Index (SPI)

The Self-perception Index (SPI) was used to measure the extent to which students are aware of their own financial knowledge. This index is based on the relative difference between students' self-assessments and measured levels of knowledge.

$$Self\text{-}perception\ Index = FKI_{self\text{-}assessment} - FKI_{measured}$$

Where the value of the Self-perception Index is zero or close to zero, financial knowledge is viewed realistically, otherwise it is either under- or overrated.

### Risk Taking Index (RTI)

The Risk Taking Index (RTI) is the ratio of students' expressed risk appetite to their levels of financial knowledge.

Students' risk taking index was measured in two ways. On one hand, it was assessed based on self-assessment, this being the resultant of assessed knowledge level and assessed risk taking level. On the other hand, it was also evaluated based on actual knowledge level and assessed risk appetite.

The calculation of risk taking indicators:

$$RTI_{self\text{-}assessment}\ \frac{Risk\ taking\ level\ based\ on\ self\text{-}assessment}{Knowledge\ of\ finance\ and\ economics\ based\ on\ self\text{-}assessment}$$

$$RTI_{actuals}\ \frac{Risk\ taking\ level\ based\ on\ self\text{-}assessment}{Actual\ knowledge\ of\ finance\ and\ economics}$$

These indicators may take values between zero and infinity. Where the value is below one, the given respondent is risk averse, and if it is above one, they are a risk taker. If the value of the indicator is one, then the individual assumes an appropriate degree of risk, which makes them a risk manager.

### Statistical Analysis

In addition to the methods of descriptive statistics, cross tabulation and variance analyses were used for processing the questionnaire *(see Table 1)*. SPSS and MS Excel were the applications used to process the data, and to generate the charts.

Cross tabulation analysis was performed as both the independent and the dependent variable is categorical. Variance analysis was used to test the coincidence of the expected

*Table 1*

**TYPES OF EXAMINATION FOR RELATIONSHIPS AMONG VARIABLES**

|  | Metric independent | Non-metric independent |
|---|---|---|
| Metric dependent | Correlation calculation<br>Regression calculation | Variance analysis<br>(ANOVA) |
| Non-metric dependent | Discriminant analysis | Cross tabulation analysis |

*Source:* authors' own editing

values of multiple populations. Considered as the generalisation of two-sample *t*-tests, variance analysis is a statistical method that can be used to compare the expected value of multiple normally distributed populations with equal standard deviations, allowing an examination of the relationship between a certain criterion–measured on at least an interval scale–of a population split into parts based on a grouping criterion, and the grouping variables. We sought to determine whether the groups showed a statistically significant difference in the metric variable. According to the null hypothesis of the test, the expected values of the groups would coincide, i.e. the grouping criterion would influence the metric variable. The alternative hypothesis, on the other hand, is the denial of the above. Therefore, the alternative hypothesis does not mean that the expected value of every group would differ, only that not all of them may be considered identical.

## RESULTS

### Sample attributes

The representativeness of the database was examined against several definitive criteria (gender, age, department, level of training, training area).

The questionnaire was completed by the 18–51 age group, but the purpose of this research was to examine the financial literacy and entrepreneurial activity of the 18–25 age group. Thus only 1,743 records out of a sample of 2,070 were used to confirm the hypotheses, but the older age group was not excluded to ensure comparison *(see Chart 1)*.

A majority (59.6 per cent) of questionnaire respondents are women, a fair reflection of the general claim that women in higher education represent a high ratio, which, according to the OECD report published in 2008, will likely continue to increase until 2030 (to 60 per cent).

Examining the composition of young people included in the research by level of training, an overall dominance of undergraduate students is observed, which is consistent with the national average in 2012, together with a prominent presence of students on master's, higher vocational training, and undivided courses. In terms of the field of training, the vast majority of questionnaire respondents were from the domain of economics, but social sciences, humanities, art, law, medicine and natural sciences were also represented.

### Assumed and actual levels of financial knowledge and risk taking based on the Self-perception Index

The Self-perception Index was examined to determine if there was a significant difference between the actual and assumed financial knowledge of young people in higher education. To prove the assertion, students' responses on their perceived levels of financial

*Chart 1*

## SAMPLE DISTRIBUTION BASED ON GENDER AND AGE COMPOSITION*
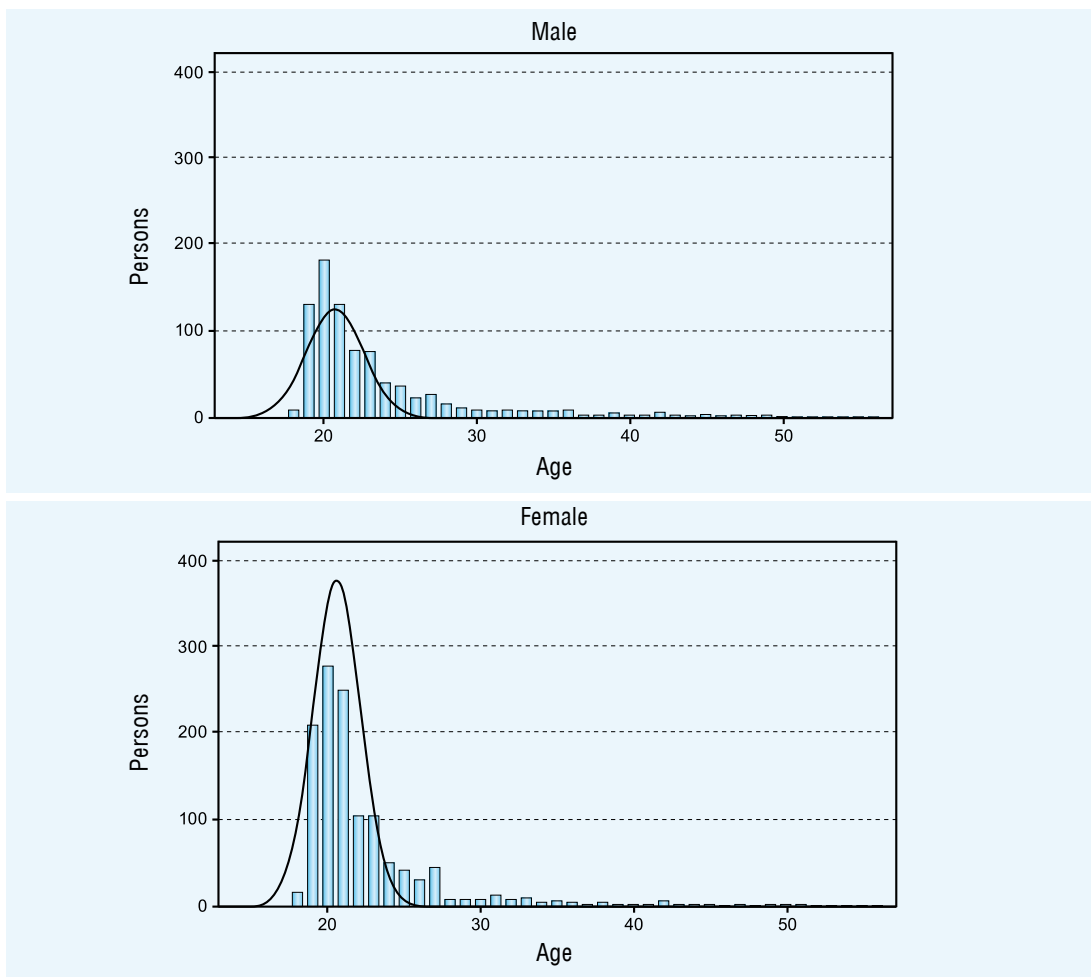


*Note:* n = 2,070
*Source:* authors' own editing

knowledge were compared with their FKI values, which was named the Self-perception Index (SPI).

The SPI could take values between –7 and 7 and was normally distributed, i.e. the sample included respondents underrating their own knowledge as well as respondents overrating it. The vast majority of SPI values, however, are in the positive range, indicating that the given student's self-assessment rates their financial knowledge higher than it is in reality. Values in the negative range, on the other hand, mean just the opposite, i.e. students underrating their knowledge *(see Table 2)*.

A 15 per cent threshold was chosen for evaluating students, because the average value of the difference between actual and assumed knowledge is 1.05, meaning that the ±1.05 deviation between self-assessment and actual knowledge is considered acceptable.

Based on the above, three-fifths of the respondents (59 per cent) perceive their own knowledge of finance and economics realistically, while 11 per cent underrate it,

**THE SELF-PERCEPTION INDEX OF STUDENTS AGED 18–25**

| % | Value | Underrates (persons) | Realistic perception (persons) | Overrates (persons) |
|---|---|---|---|---|
| 5 | 0 ± 0.35 | 466 | 368 | 909 |
| 10 | 0 ± 0.70 | 305 | 717 | 721 |
| 15 | 0 ± 1.05 | 191 | 1,027 | 525 |
| 20 | 0 ± 1.40 | 111 | 1,247 | 385 |
| 25 | 0 ± 1.75 | 68 | 1,418 | 257 |
| 30 | 0 ± 2.10 | 40 | 1,551 | 152 |

*Source:* authors' own editing

**STUDENT PERCEPTIONS BASED ON THE SELF-PERCEPTION INDEX**
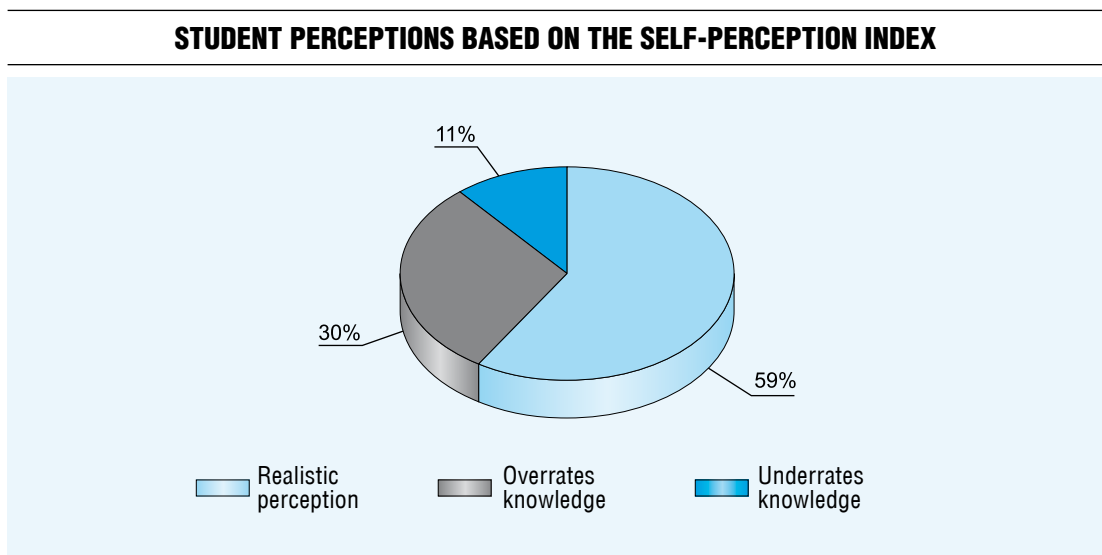


*Source:* authors' own editing

and 30 per cent overrate it *(see Chart 2)*. With women aged 18–25 included in the study, average deviation between self-assessment and actual knowledge is greater, if minimally, than in the case of men. Examining the difference between actual and assumed knowledge in terms of gender, no difference was found. We found that the young women and men included in the study had equal degrees of deviation between their self-assessment and actual knowledge of finance and economics.

Concerning risk taking, another question we tried to answer was whether students' risk taking level was in any way influenced by their self-perceptions, or it was determined by actual financial knowledge. This problem was addressed using the Risk Taking Indices described in the Material and Method section. An impression of how students perceive their own risk taking is obtained by comparing the levels of risk appetite and financial knowledge based on self-assessment. If, however, the way they relate to risk based on self-assessment

### RISK TAKING CLASSIFICATION OF THE 18–25 AGE GROUP

| Category | Risk taking | | | |
|---|---|---|---|---|
| | based on self-assessment | | based on actual knowledge level | |
| | persons | % | persons | % |
| Risk averse | 1.345 | 77.17 | 1.254 | 71.94 |
| Risk manager | 209 | 11.99 | 240 | 13.77 |
| Risk taker | 189 | 10.84 | 249 | 14.29 |

*Source*: authors' own editing

is compared to their actual knowledge, the degree of latent risk taking also becomes measurable, allowing inferences to be made on entrepreneurial activity as well.

The values of this indicator were used to define three categories: risk takers, risk managers, and the risk averse. Classification was again based on a ±15% threshold, except that—having regard to the particulars of this indicator—the band was aligned to the specific values *(see Table 3)*.

Young people's risk taking behaviour suggests that they are characterised by risk averse behaviour that is unaligned with the level of their knowledge of finance and economics.

We also examined the influence of self-perception on the way young people relate to risk. *Chart 3* shows the relationship between the two indicators, with the vertical line marking the ±1.05 value, which was used as the basis for classifying the students.

Regarding risk appetite and self-perception, we found that a relationship exists between the variables (Chi² = 33; df = 12; sig = 0.001), the strength of this relationship, however, is not significant (Cramér's V = 0.097).

A separate examination by gender provided a less unequivocal impression, because a relationship was found between the Self-perception Index and attitude towards risks in

the case of men (Chi² = 26.76; df = 12; sig = 0.008; Cramér's V = 0.14), while for women, the presence of this relationship could not be confirmed (Chi² = 18.597; df = 12; sig = 0.099).

In other words, the students' risk averse behaviour means that their risk appetite does not follow the level of their financial knowledge, so not only are they averse to financial instruments that could increase their well-being, but entrepreneurial activity is also lower among them.

## CONCLUSIONS

Under the first hypothesis formulated during the examination of risk taking among young people in higher education, there is a substantial difference between their actual and assumed financial knowledge. The analysis of the Self-perception Index–created in order to confirm this hypothesis–revealed that there is a significant difference between the actual and assumed knowledge of higher education students, and the majority (59 per cent) perceive it realistically.

Under our second hypothesis, the level of risk taking is determined by the way individuals perceive their own knowledge, i.e. by self-perception, rather than actual financial

*Chart 3*

## RELATIONSHIP OF RISK APPETITE AND THE SELF-PERCEPTION INDEX
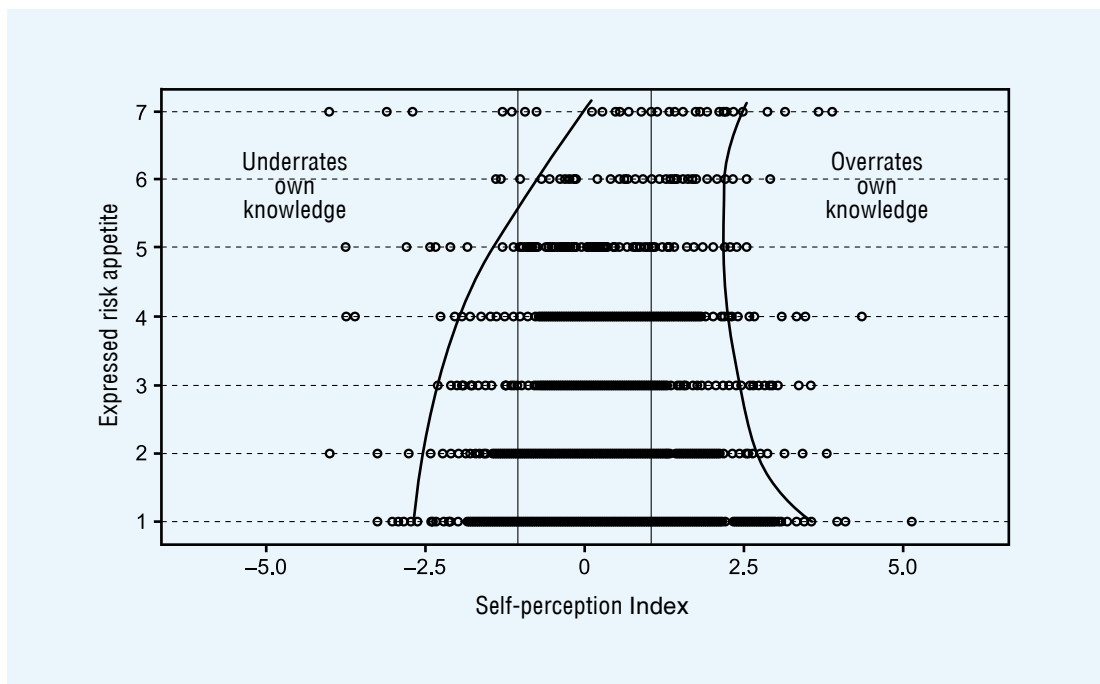


*Source:* authors' own editing

knowledge. In terms of risk appetite, our research showed that risk averse behaviour is characteristic of young people, with three-quarters of the 18–25 age group (76.9 per cent) avoiding risks. Respondents' extremely low risk appetite is not aligned with either their actual or their assumed level of knowledge of finance and economics. In other words, regardless of the level of their knowledge of finance and economics, students are strongly risk averse. The relationship between self-perception and risk taking, as articulated in the hypothesis, could not be demonstrated due to the students' highly risk averse attitude, so the second hypothesis remained unconfirmed. This precludes the assertion that overrating one's own knowledge would result in greater risk appetite, since even those who were quite self-confident regarding their financial knowledge proved risk averse.

The conclusion to be drawn from our research is that risk appetite is primarily determined by other factors such as current social attitudes, concerns, desires and experiences. Because the questionnaires were completed in 2012 and 2013, the known effects of the financial and economic crisis and debt problems presumably influenced the measured level of risk taking significantly.

Our research further highlights the phenomenon that even young people whose actual knowledge of finance and economics makes realistic risk assessment and risk taking possible are risk averse. This excessive risk aversion may also have social costs. Namely, avoiding risks at any price and under any circumstance might prevent people from leveraging financial opportunities and from becoming entrepreneurs, and could substantially hinder the development of the national economy should it become a mass phenomenon.

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