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Original Paper

Financial and insurance mathematics in practice from students' point of view

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ABSTRACT

The general theoretical knowledge is provided to students in the bachelor's study programs and courses in educational system at the Slovak universities. Basic knowledge of higher mathematics students obtain by passing the compulsory subjects "Mathematics IA" and "Mathematics IB" in the 1st year of bachelor's degree. Practical and applied knowledge students obtain by passing the optional subject "Financial and Insurance Mathematics" in the 3rd year of bachelor's degree.

The paper deals with questionnaire survey which was conducted in subject "Financial and Insurance Mathematics" taught at the Faculty of Economics and Management of the Slovak University of Agriculture in Nitra. The aim of statistical analysis is Financial and Insurance Mathematics in practice from full-time and part-time students' point of view. The subject of the analysis was the answers of students in the academic years 2016/17 and 2017/18. Responses were obtained by completing a short questionnaire aimed at identifying a general overview of students in this field.

The basic methods of the descriptive statistics and hypotheses testing were utilized in the assessment of the survey results. The existence of the statistically significant relations among the acquired assessments was verified by means of the χ^2 -test. In case of dependence confirmation the intensity of assessed dependence was determined. The conducted questionnaire survey confirmed the existence of statistically significant differences between the answers of the students of the full-time and part-time study.

KEYWORDS: teaching of mathematics, financial and insurance mathematics, questionnaire survey, statistics

JEL CLASSIFICATION: I 21, C12

INTRODUCTION

In the contemporary society the university education is the important factor for employment opportunities on the labor market [5]. University study programs reflect the requirements of the labor market that requires creative, flexible and quick minded people [6].

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Graduates of the 1st education level at the Faculty of Economics and Management of the Slovak University of Agriculture (FEM SAU) in Nitra are prepared for various economic areas of economy and agriculture. For the graduates of FEM knowledge obtained in particular study programs and language competences create wide opportunities of application at different levels of business management in agro-food resort, companies of biological and technical services, businesses of foreign trade as well as business departments of companies in agro resort and in financial institutions. Students are educated also for the requirements of institutions of public administration and self-administration, consultancy companies, research departments and education [4].

“Financial and Insurance Mathematics” is subject taught in the 3rd year of Bachelor's study at FEM SUA in Nitra for Quantitative Methods in Economics as a compulsory subject and for Accounting as a compulsory optional subject.

Financial mathematics provides appropriate applications of mathematics in the financial area and analogically the insurance mathematics provides applications of mathematics in the insurance practice. Knowledge of financial mathematics enables more effective and rational manner of its use in borrowing or investing of financial means. Knowledge and methods shall be applied within job decisions but as well as in private decisions on finance assessment. Insurance mathematics provides better orientation in insurance products, possibilities and types of insurance and insurance practice in general [2].

Methods of financial mathematics can be applied in a lot of economic branches. Accounting, financial planning and decision making is the part of many professional courses and specialized subjects [1]. According to Papcunová and Geciková [9] the quality of human decision making is largely contingent on their qualifications and experience.

Presentation and solving application tasks demonstrate the need to introduce new mathematical methods at faculties with economic and technical focus [3].

Knowledge obtained by the study at the FEM SUA in Nitra is utilized by graduates in trading with various commodities at foreign markets not only in the Slovak Republic but as well as within other countries of the European Union [10].

MATERIAL AND METHODS

The analysis was targeted at the responses of students of bachelor study programs at the FEM SAU in Nitra who, in school years 2016/17 and 2017/18, elected the optional subject Financial and Insurance Mathematics. Responses were obtained by means of a short questionnaire, aimed at finding out a general overview of students in this area, where they had to choose one of the Yes / No / I don't know answer. Respondents' answers were the subject of analysis from the study form point of view, since we assume that part-time students will have more practical experience. This assumption should be manifested as a statistically significant difference in the number of responses between full time and part time students (H1). In order to verify the existence of a difference in responses, a hybrid approach to statistical hypothesis validation was chosen, which takes into account both Fischer and Neyman-Pearson approaches [8]. The value of the test characteristic was determined as follows:

$$z = \frac{P_1 - P_2}{\sqrt{\frac{P_1 \cdot (1 - P_1)}{n_1} + \frac{P_2 \cdot (1 - P_2)}{n_2}}}$$

where P_1 and P_2 represent the ratio of one of the responses and the indices 1, 2 identify the form of the respondents' study [7]. The computed z characteristic has a normal distribution. To apply Fischer's approach, p -value was determined, which was compared with the level of significance α . In general, there is no reason to reject the basic hypothesis if $\alpha < p$ -value [8].

RESULTS AND DISCUSSION

The questionnaire was filled out by 129 students, namely 102 (79.07%) were full-time and 27 (20.93%) were part time FEM students (Table 1). The structure of the group of students according to the type of secondary school can be considered to be the same for graduates of grammar schools (GS) and business schools (BS) or hotel academies (HA) (Table 2). There is a statistically significant difference in case of a secondary school of another type, which means that such respondents have higher ratio in the group of part time students than in the group of full-time students.

Table 1 Structure of students according to the type of secondary school and form of study

Type of secondary school	Form of study		Total
	full time	part time	
Grammar school	23.26 %	3.88 %	27.13 %
Business schools or hotel academies	50.39 %	13.18 %	63.57 %
Other	5.43 %	3.88 %	9.30 %
Total	79.07 %	20.93 %	100.00 %

Source: authors' calculations

By analyzing the respondents' answers, whether they had to deal with problems of financial or insurance mathematics in real life we found that, in case of the positive answer, there is no difference between full time and part time students. However, the response No was more frequent in case of part time students than in case of full time students (Table 2). Comparison of question answers regarding professional guidance of respondents lead to similar results. There is no statistically significant difference between the analyzed groups of students in their perspectives to work in financial or insurance practice but there is a statistically significant difference in negative answers to these questions. Also in this case (No answer) the ratio of part time students is higher than that of full time students.

As mentioned above, the questionnaire survey was conducted at the first meeting with students in both forms of study before they were introduced to the content of the subject. For this reason we assume that in case of answers to questions: "Did you use something from financial (insurance) math in practical life?" there will be differences in respondents' answers. Differences exist in answers to a question regarding financial mathematics, where surprisingly, full time students responded Yes (55.88%) more frequently than part time students of the Accounting study program (37.04%), who on the contrary opted more often the answer No (51.85% vs. 30.39%).

There is no statistically significant difference in responses between comparative groups of respondents in terms of their perception of applications of insurance math in practical life (Table 2).

Table 2 Results of mutual interactions determined in the survey

		Value of testing statistics	Critical value	Acquired assessment	
		z		p -value	
Type of secondary school Grammar school (GS), Business schools or hotel academy (BS/HA), other	G	1.13	CV _{0.05} = 1.64	0.870	
	BS/HA	0.07		0.530	
	other	-1.85		0.032	
Did you meet with problems of financial mathematics in practical life?	yes	1.37		0.085	
	no	-1.76		0.039	
Did you meet with problems of insurance mathematics in practical life?	yes	0.67		0.251	
	no	-1.81		0.035	
Did you use something from financial math in practical life?	yes	1.79		CV _{0.01} = 2.32	0.037
	no	-2.02			0.022
Did you use something from insurance math in practical life?	yes	0.76			0.223
	no	-1.61	0.054		
Would you like to work after graduating in financial practice?	yes	0.26	0.397		
	no	-1.83	0.034		
Would you like to work after graduating in insurance practice?	yes	1.32	0.093		
	no	-1.99	0.023		

Source: authors' calculations

Table 2 shows the value of a test criterion for comparison of answers of both full time and part time students. Positive values were obtained if responses of a given type were prevalent at full time students, while a negative z -value indicates the prevalence in responses of part time students. Thus, the verified differences in answers of full time and part time students can be considered statistically significant (p -value < 0.05), but not highly demonstrable (p -value > 0.01).

CONCLUSIONS

The aim of the survey was to find out if there is a difference in answers to questions about experience with financial and insurance mathematics in practice. It can be assumed that the difference in responses is due to the fact that part time students have more practical work experience, and in their work they might have met financial and insurance mathematics more often than full-time students. The conducted survey confirmed the existence of statistically significant differences between the answers of full time and part time students. These differences were confirmed primarily in case of negative answers.

Many students of FEM SUA in Nitra, regardless of their form of study, are encountering a lot of financial and insurance products offered by different banks and insurance companies or agencies that offer these bank and insurance products to their clients. Therefore, before the survey was conducted, it was not clear whether the difference in responses would be explicit.

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