

COMPARISON OF THE GRADUATION RATE OF THE MASTER'S DEGREE IN THE FIS PUEB COMPUTER SCIENCE AND QUANTITATIVE STUDY PROGRAMMES

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Abstract A very serious problem at PUEB is the graduation rate for graduate studies. The failure rate for undergraduate studies is as high as 60% in some years for some degree programs. For the purpose of this paper, we analyze data on the study results between 2015 and 2020 for FIS master's degree programs. Our aim is to compare the "Completion rate" between different groups of degree programs - one of them is computer science degree programs and the other is quantitatively oriented programs ("Econometrics and Statistics"). We will use data for the analysis from the university information system. We will analyze those using MS Excel tools. The paper provides answers to the two research questions. The results obtained so far indicate that the main common feature, regardless of "Informatics" or "Quantitative Methods", is the method of funding. Graduation rate is higher for almost eight per cent points in Quantitative oriented study programs than in Informatics studies. If the student pays for his/her own tuition, the study period is shorter for both groups of study programs students than if he/she uses public funds to finance it.

Keywords:

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1 Introduction

The dropout rate, especially at state universities, is one of the most problematic features of Czech higher education. The dropout rate in some bachelor's study programs represents 60% to 70%. In this respect, the Czech Republic is one of the worst countries in the OECD and the European Union (Mačí, 2023). And this is not just a statistical issue. The high dropout rate means that a lot of state funds were purposelessly spent. It is also demotivating for the students who are disappointed and drop out.

The graduation rate significantly affects the achievement of strategic and quantitative objectives in higher education, both at national and European level. The attainability of the set benchmarks and objectives is quite negatively affected by the declining graduation rate of students in different types of studies. In response to this obstacle to achieving the objectives of the development of the higher education system and the population's education, a number of strategic documents also focus on increasing the graduation rate (MSMT, 2016). The data from 2018 suggest that the long-term increase in undergraduates' dropout rate in the Czech Republic stopped after the year 2014. It is currently stagnating and may be even slightly declining, which can be seen as a positive outcome of a number of measures taken at universities and their faculties, which are aimed at better informing applicants, expanding the offer of compensatory courses, providing greater study flexibility, strengthening social and academic integration, etc. (Dekker, 2009). A more accurate assessment of the change in this trend will require more time. On the other hand, there has been an increase in the dropout rate in follow-up master's study programs, especially after the year 2014 (Sagenmuller, 2018). While the overall dropout rate is less than one third and thus significantly lower than that in bachelor's study programs, this trend should be taken seriously.

This is also the case at the Prague University of Economics and Business (Prague University of Economics and Business - PUEB). The Faculty of Informatics and Statistics is one of the faculties with the highest dropout rate at the PUEB. The dropout rate is significantly higher in bachelor's study programs (Berka, Marek, 2022). This article, which is part of deeper study result analyses performed at the FIS, shows the dropout rate in master's study programs.

2 Problem Formulation

The main goal of the article is to analyze and compare the “Graduation Rate” in the informatics study programs and the quantitative methods programs (econometrics, statistics, demography) of the Faculty of Informatics and Statistics of the Prague University of Economics and Business during the years 2015-2020.

The secondary goal is to find out and compare the time-to-degree of the students in these study programs. For the purposes of our research, we formulated the following two research questions.

- **RQ1: What is the “Graduation Rate” of students in Informatics and Quantitative methods – comparison – graduate study programs at FIS?**
- **RQ2: How long does it take to reach the grade students in Informatics and Quantitative methods – comparison – graduate study programs at FIS?**

3 Material and Methods (Data Collection)

We used the database of PUEB students and applicants and their study results as the primary source of data for our research. This database is part of the university's study system and includes all data about applicants and admitted students and their study results from the year 2009 to the present.

3.1 Methodology

For the purposes of our analyses, we used data from 2015 – 2020 stored in the PUEB information system. We divided the study programs at the FIS into two main groups based on study accreditation – Economic study programs, which at the FIS includes “Quantitative Methods” such as Econometrics, Statistics and Demography, and Informatics study programs, which are accredited under “Informatics”. All Informatics study programs are accredited under the umbrella area of "Applied Informatics" – AI, which includes six study programs taught at the FIS. Four study programs are taught in the Czech language in the form of full-time studies (IM – Information Management, IST – Information Systems and Technology, Cognitive

Informatics, KT – Knowledge Technology). The Business Informatics study program (BI) is taught in the form of distance learning and the Information System Management study program (ISM) is taught in the English language and paid for by the students.

“Quantitative Methods” – QM – include four study programs taught in the Czech language (ED – Economic Demography, EO – Econometry and Operation Research a ST - Statistics) and one study program taught in the English language (QEA – Quantitative Economic Analysis) – the students pay their own tuition.

The data for individual study programs were analyzed using Microsoft Analysis Services, Microsoft Excel and, where appropriate, the SPSS statistical system.

All data used in our research are anonymized as required by Act No. 110/2019 of Coll. on the processing of personal data (*Regulation (EU) No. 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC*).

3.2 General Data Characteristics

We used SQL queries to obtain a total of 1,929 study records as of December 2022. These records concern the students of all master’s study programs at the Faculty of Informatics and Statistics – 1,513 records about “Applied Informatics” students and 416 records about “Quantitative Methods” students.

Table 1: The number of analyzed records by study program – “Applied Informatics”

AI	IM	IST	CI	KT	BI	ISM
1.513	259	736	61	138	246	73

Table 2: The number of analyzed records by study program – “Quantitative Methods”

QM	ED	EO	ST	QEA
416	75	156	143	42

4 Results and Discussion

We primarily focused on the answers to our two research questions. The first research question is about the trend of the “Graduation Rate” in master's study programs at the FIS.

RQ1: What is the “Graduation Rate” of students in Informatics and Quantitative methods – comparison – graduate study programs at FIS?

Figure 1 shows the trend of the “Graduation Rate” during 2015-2020 in the groups of study programs “Applied Informatics” and “Quantitative Methods”.

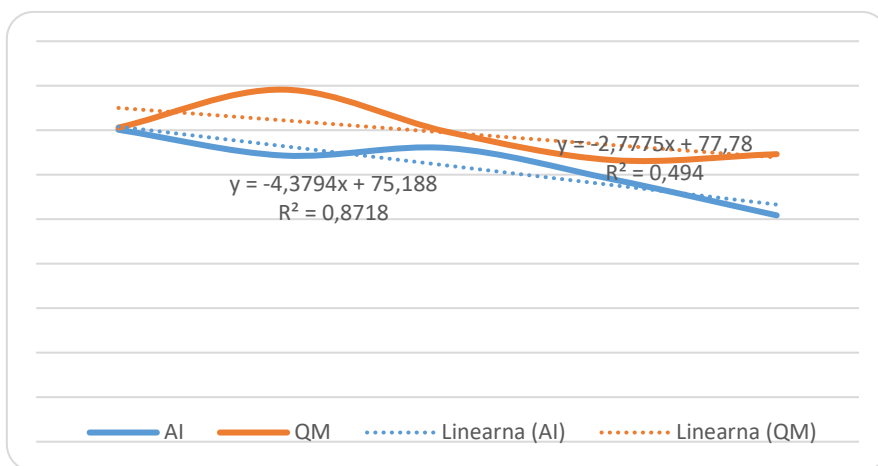


Figure 1: Trend of the “Graduation Rate” during 2015-2020

Figure 1 shows a **downward trend for both groups of study programs**. The trend of Applied Informatics is more pronounced, as the drop has the 0.8717 confidence level. Quantitative Methods have a lower confidence level (about 0.49), and the drop in the graduation rate stagnated during the last two years.

The situation for individual study programs is as follows – Table 3.

Table 3: Applied Informatics – graduation rate – average for 2015 – 2020

AI	IM	IST	CI	KT	BI	ISM
62.13	64.86	71.20	50.82	47.83	37.80	79.45

The graduation rate in Czech-taught study programs Information Management (IM) and Information Systems and Technology (IST) is 64.86% and 71.20% respectively. This is lower than the averages at other universities in the Czech Republic and significantly lower than the averages at universities or similar study programs abroad (Vossenstyen et al., 2015). The “Cognitive Informatics” and “Knowledge Technology” study programs significantly lag behind the projected graduation rates. The reason for the low graduation rate in the case of “Knowledge Technology” is surprising. It is because the study program was not clearly presented to applicants and they believed that it was about something else. This is why they dropped out.

The BI study program is taught in a combined form. Given the “Graduation Rate”, the question is whether to continue this form of studies at all (Kotsiantis et al., 2003).

The “Graduation Rate” in the ISM study program taught in English is nearly 80%. We would like to achieve this percentage at the entire FIS. The reason for this high graduation rate is that ISM is taught in English and the students pay their own tuition, potentially have a state scholarship.

The situation in the group of “Quantitative Methods” study programs is shown in Table 4.

Table 4: “Quantitative Methods” – graduation rate – average for 2015–2020

KM	ED	EO	ST	QEA
69.95	73.33	80.77	61.54	53.33

The average “Graduation Rate” in “Quantitative Methods” study programs for the analyzed time period is almost 70%, which is credited to the Czech study programs “Economic Demography” (ED) and especially “Econometrics and Operation Research” (EO). The Statistics study program has a significantly lower graduation rate, and our next research will focus on the weaknesses of this study program.

The QEA study program is taught in English and the students pay their own tuition. However, the graduation rate is unexpectedly very low, and we will research why this is the case.

Overall, we can say that the “Graduation Rate” is better in QM study programs than in Informatics study programs.

The second research question was about the time-to-degree of successful students in the FIS’s master's study programs.

RQ2: How long does it take to reach the grade students in Informatics and Quantitative methods – comparison – graduate study programs at FIS?

Figure 2 compares the average time-to-degree of successful studies.

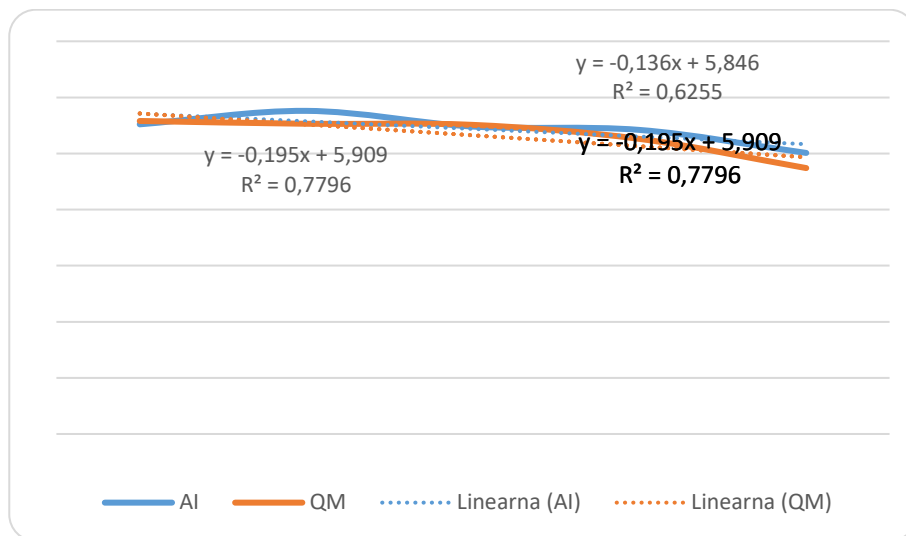


Figure 2: Trend of the average time-to-degree of successful studies during 2015-2020

The downward trend in this case is a good thing. The confidence level is relatively good (0,6255 AI and 0,7796 QM), but the Covid-19 pandemic, during which the students were not able to go on Erasmus+ or Erasmus Mundus exchanges abroad, had a significant impact on the time-to-degree. The average time-to-degree does not

show any significant and dramatic fluctuations – AI- 5.46 semesters and QM – 5.38 semesters. Table 5 shows the details of individual Informatics study programs.

Table 5: Applied Informatics – time-to-degree in semesters – average for 2015–2020

AI	IM	IST	CI	KT	BI	ISM
5,46	5,68	5,47	5,39	5,70	5,40	4,64

The ISM study program, which is taught in English and paid for by the students, is clearly apart. It shows the motivation of students to successfully complete their studies as early as possible in order not to have to pay tuition fees.

Other study programs have a very similar time-to-degree. Interestingly, the BI study program has a low graduation rate, but once the students decide to complete their studies, they rush to do so because they are also employed. Table 6 provides a more detailed look at the time-to-degree for the group of “Quantitative Methods” study programs.

Table 6: “Quantitative Methods” – time-to-degree in semesters – average for 2015–2020

QM	ED	EO	ST	QEA
5,38	4,98	5,61	5,59	4,31

In this group of study programs, the QEA study program taught in English and paid for by the students is again significantly different.

The “Statistics and Econometrics” and “Operation Research” study programs have a very similar time-to-degree, but the graduation rate is very different.

Overall, we can say that the average time-to-degree at the FIS shortened, although not very significantly, in both groups of study programs during the analyzed time period.

5 Conclusions

To answer our two research questions, we analyzed the data from the FIS's study programs and reached the following conclusions:

- The overall “Graduation Rate” at the Faculty of Informatics and Statistics is decreasing and lags far behind developed EU Member States.
- The time-to-degree can be significantly shortened if students are motivated to do so – e. g. financially. This fact has been proven by our findings from both study programs (ISM and QEA), where the students either pay their own tuition fees or are sent to study by their state that also pays their tuition.
- The time-to-degree in the “Business Informatics” study program (students studying while employed) provides another proof of the significant impact of this factor. The “Graduation Rate” is low – the students are admitted and discover during the first semester that it is difficult to reconcile their work responsibilities with their school duties; however, once they decide to complete their studies, they try to do so quickly – 5.4 semesters.

We actually expect the time-to-degree to be longer, as the analyzed sample includes data from the Covid-19 pandemic, when students had limited opportunities to participate in various exchange programs abroad.

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