Excellence comes from distance: the case of a Croatian higher education institution

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Abstract

In this paper, we empirically test the impact of motivation on educational outcomes by using distance to home region as a proxy variable. The data come from the Faculty of Economics and Business, University of Rijeka. We develop two econometric models with GPA and number of courses passed as dependent variables, while controlling for physical distance from the home region to Rijeka and students' educational abilities. Our results show that distance negatively affects the number of courses passed, but has no effect on GPA. We argue that these results show that distance from the home region is a strong motivating factor for earlier rather than later graduation and that educational policies at the faculty level are needed to increase the motivation of local students to stay level with their "foreign" peers. This would help to minimize opportunity costs for local students and lower the student to academic staff ratio.

Keywords: cost of education, educational outcomes, student motivation, student cost of living

1 INTRODUCTION

For students, attending university usually means a higher future income, but it also incurs opportunity costs. Opportunity costs include living costs, tuition fees and the most important variable – the income that could have been earned during the period of study. As in other countries that have adopted the "Bologna Process", the average duration of studies in Croatia has increased from four to five years, as the first cycle leading to a bachelor's degree was and still is not properly recognised by employers and as a result earns less on the labour market than the second cycle graduates (Crosier, Purser and Smidt, 2007; Kroher et al., 2021). As a result, most students opt for a five-year programme to obtain a Master's degree. In view of this exogenous increase in the opportunity costs of studying, endogenous factors that influence the duration of studies come to the fore. In a country like Croatia, with households that are on average relatively poor as compared with western EU member states, the endogenous factors correlate very strongly with the exogenous factors such as the cost of living and the duration of studies, as tuition fees are paid by the state.

In addition to extending the duration of studies, the introduction of the Bologna system also had a positive effect on university participation, as, among other things, information restrictions were reduced (Di Pietro, 2012). Higher participation means in practice that students from poorer households are the main beneficiaries of the reform, as information restrictions are hardly an obstacle for students from richer households. This in turn means that these students are likely to be more motivated to complete their studies on time, especially if their chosen university is not in their home region.

Since students' motivation is the most important factor in educational success, in this paper we analyse the effects of distance from home on students' academic performance. Distance from home is a proxy variable for cost of living and an

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indirect variable for student motivation. For academic performance, we use grade point average (hereafter: GPA) and the number of courses passed after three years of study. We observe the generation of full-time students who enrolled in the 2019/2020 academic year. Our hypothesis is that students studying in their home region are less motivated to pass all first-cycle exams in time (three years) than students coming from other regions. On the other hand, GPA should not differ between these two groups of students because GPA depends mainly on students' ability and motivational factors that are the same for all students, especially institutional factors such as the quality of the curriculum and the quality of teaching. In addition, we control for students' ability by including school grades and type of school programme, distinguishing between academic high school ("gymnasium") and vocational high schools.

The remainder of the paper is organized as follows. Section 2 contains an overview of the literature. In section 3, we present the methodology used as well as the descriptive statistics of the dataset, while section 4 contains the results of the estimations. Finally, in section 5 we discuss the implications of the results and draw a conclusion.

2 LITERATURE REVIEW

In this section we give a brief overview of two strands of the literature, one regarding students' abilities and one regarding the impact of the student environment on academic performance.

Student ability can be measured in a variety of ways and in the past, it has been tested using standardized admission tests (SAT). The results of these tests have been shown to reflect test preparation rather than a student's actual ability (Geiser and Santelices, 2007). The results of a 2002 study by Geiser and Studley show that high-school grades are the best predictors of academic performance because they reflect students' cumulative performance over time. Therefore, they are proofed against different "test-wise" strategies that students can employ to obtain better SAT results. In our paper we use high school points that reflect the knowledge that students acquired over the four years of high school education. Moreover, using theoretical models and the empirical results of the research done by Brunello and Checchi (2007) we differentiate between students who completed academic and those who completed vocational high school.

There is well-established research on the relationship between student residence and academic performance. Back in 1989, Blimling found that after controlling for academic ability, there are no differences in GPA between students living on campus, off campus in the city in which they are studying or at home. Since the influence of residence on academic performance is multifaceted, subsequent research focused on different aspects of living and learning conditions (Bektas-Cetinkaya and Oruc, 2011). Findings show that academic success is highly influenced by several environmental elements, including living conditions in student residences.

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The availability of private, quiet work areas, general noise levels, and accessibility of academic resources are important variables. A quiet and distraction-free environment is critical to promoting concentration and allowing students to engage effectively with the subject matter. Housing factors that directly impact academic performance include comfort, cleanliness and room layout. These factors can also affect students' ability to concentrate and their mental health. Peer engagement and intellectual collaboration within the residence hall provide social support that increases motivation and decreases feelings of isolation, which further enhances academic performance. Physical aspects that impact students' ability to learn well and stay healthy include lighting, ventilation and room layout. Living close to campus facilities such as the library and study centres encourages regular participation in academic activities, which improves academic performance. Finally, the overall residence hall environment has a significant impact on academic progress, whether it fosters a culture of academic excellence or social distraction. It is important that students live in an ideal environment that promotes their academic and personal development. In our paper, we control for whether student lives on campus (variable *sd*) and expect that the estimated coefficient will be positive and significant in the model [2] that explains the outcome variable number of courses passed after three years of studying.

Over the past decade, research on associated variables such as well-being, environmental impact, and student involvement has widely examined the relationship between academic achievement and student housing. An analysis of student engagement found that behavioural engagement, which can be influenced by living arrangements, has a significant impact on academic achievement (Çali, Lazimi and Luna, 2024). In addition, a study on distance education conducted during the epidemic revealed that there is no significant correlation between students' academic achievement and their ability to engage in distance education. This implies that the environment, including place of residence, may have a subtle influence on academic outcomes (Olvido, Sanchez and Alejandro, 2024). Another relevant study emphasises the critical importance of mental health to academic success, showing that stress and anxiety, possibly exacerbated by inappropriate living conditions, are negatively related to academic success (Hou, Hou and Peng, 2024). In addition, a study on sleep quality, which is strongly influenced by the living environment, found a modest negative relationship with academic achievement, highlighting the need for a favourable living environment for academic success (Lalwani and Sushmitha, 2024). The research findings highlight the complex and multifaceted relationship between students' living situations and their academic achievement and indicate that living circumstances can indirectly affect academic outcomes through various behavioural and psychological processes.

Contemporary research has repeatedly investigated the significant influence of motivation on educational outcomes. One prominent study examined the influence of learning motivation, work ethic, and environmental variables on students' academic performance and emphasised that external support and engagement in

activities are critical for improving students' motivation and academic achievement (Syukur et al., 2025). Another study conducted with nursing students participating in involuntary distance learning found that the use of digital concept mapping techniques can reduce learning anxiety and increase motivation, leading to better academic performance (Tang and Tang, 2024). In addition, studies conducted with architecture students have shown the importance of learning motivation in mediating the relationship between professional development efforts and employment capacities. This means that intrinsic motivation plays a crucial role in improving employability (Fan and Yeh, 2024). In the field of engineering, project-based learning (PBL) has been shown to significantly improve both conceptual understanding and motivation, especially in technical disciplines such as electricity (Rendón and Martínez, 2024). Research conducted in Malaysia has shown that leadership styles and motivation play a crucial role in shaping students' entrepreneurial inclinations. Motivation has been identified as an important factor contributing to differences in entrepreneurial tendencies (Abiddin and Ro'is, 2024). The combined findings underscore the complex influence of motivation on educational outcomes and highlight the critical importance of both internal and external elements in promoting academic achievement and future career prospects.

Kadio (2025) examines the impact of peer effects, school quality and socioeconomic background on educational outcomes in sub-Saharan Africa. The results show significant differences influenced by school characteristics and socioeconomic status, which in turn affect student performance and parents' school choice. Kaye (2023) confirmed that the cumulative effects of socioeconomic disadvantage on educational achievement are significant, highlighting the increasing inequality in educational achievement at secondary level and the relative importance of specific risk factors. A study by Daniele and Geys (2016), based on European data, examines the impact of strong family ties on socioeconomic outcomes, including education. It concludes that family support can mitigate the negative consequences of low socioeconomic status in low-income European countries; however, it can also limit upward mobility. The overarching theme of these studies is that socioeconomic status has a significant impact on educational outcomes, with school quality, family support and systemic disadvantage playing a crucial role. Although support systems can mitigate some of the negative effects, they often exacerbate existing inequalities and limit upward mobility.

3 METHODOLOGY AND DATA

For the empirical part of our research, we developed following econometric models:

$$GPA_i = \beta_0 + \beta_1 hs_i + \beta_2 home_i + \beta_3 sd_i + \beta_4 gym_i + u_i \quad (1)$$

and

$$courses_i = \beta_0 + \beta_1 hs_i + \beta_2 home_i + \beta_3 sd_i + \beta_4 gym_i + u_i \quad (2)$$

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where *GPA* stands for grade point average, *hs* are high school obtained points that serve for ranking students' applications for a faculty and here serve as a proxy for students' abilities, *home* is a dummy variable with value 1 if students are domestic, where we define being domestic if a student primary residence is in Primorje-Gorski Kotar County. Variable *sd* is a dummy variable with value 1 if students use campus facility (dormitory), while *gym* is a dummy variable with value 1 if students completed academic high school. The final term, *u,* presents an idiosyncratic error term that varies across students. In model (2) *courses* stands for the number of courses passed after three years of studying. For both models we calculate and present robust and clustered error terms. For the clustering unit we use the track that students choose; there are six of them: Economics, Finance and Accounting, Marketing, Management, International Business and Entrepreneurship. We do so to allow for correlation of error terms among students within a particular track, which is expected as there are differences among tracks in the courses and lecturers, which can have an impact on GPA as well as the number of courses passed but are the same within a track.

We estimate both models using ordinary least squares (OLS) estimator, while as robustness check we estimate model (2) using Poisson estimator as well as negative binomial estimator, since the dependent variable is a count variable. Residuals calculated after estimating model (1) are normally distributed, which confirms the suitability of the estimator chosen. Poisson regression diagnostics indicated the issue of overdispersion since the conditional variance is higher than the conditional mean (likelihood-ratio test resulted in the value of chi2 statistics of 304.13 and rejection of H_0 that overdispersion constant is zero), therefore we also estimated the model using a negative binomial estimator. Here we show results from OLS estimation only since the results from negative binomial regression models are quantitatively similar. Moreover, since the starting academic year of our analysis is the year that was hampered by the Covid-19 pandemic, we estimated models (1) and (2) for each academic year separately. The results are not significantly different from those presented in table 2, which shows that Covid-19 didn't affect our results.

Table 1 shows the values of the descriptive statistics of the data. The 2019/2020 generation of students enrolled in the first cycle of the Bologna degree programme in economics and business at EFRI with 249 students was observed over three academic years. The dataset was created from three sources: https://admin.postanistudent.hr/ was the source of the variables HS points, Home students and academic high schools; ISVU.hr was the source of the variables GPA and total number of exams passed; Student Center Rijeka was the source of the variables Student dormitory. The maximum number of courses a student could complete during the observation period was thirty-five. In the sample 11% of students used the services of student dormitories (living on campus) during the entire period, while 59% of students came from other counties in Croatia.

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Table 1
Descriptive statistics

Variable	Mean	SD	Min	Median	Max
GPA	3.33	0.40	2.00	3.30	4.59
Total no. of exams passed	26.65	9.51	1.00	31.00	35.00
HS points	309.22	40.78	220.00	309.60	398.40
Home students	0.41	0.49	0.00	0.00	1.00
Student dormitory	0.11	0.31	0.00	0.00	1.00
Gymnasium	0.39	0.49	0.00	0.00	1.00

Note: Observations = 249.

Source: Authors' calculations.

Apart from the data shown in table 1, we conducted Jarque-Berra tests for normality of GPA and HS points. The results showed that HS points are normally distributed at 5% significance level (p-value 7.09%), while GPA points are not, indicating that there is potentially one or more variables that influence the GPA, apart from students' abilities proxied by HS points.

4 EMPIRICAL RESULTS

We present the results of the estimates of models (1) and (2) in table 2. The results of model (1) are in line with our expectations and show that students' ability (high school scores) and better general knowledge (completed gymnasium) positively influence grade point average, while other variables are not significant. These results are qualitatively comparable with previous studies. On the other hand, the second columns in table 2 show the estimation results for model (2), in which the number of courses passed is the dependent variable. In this case, the coefficients of all independent variables are significantly different from zero, and while the signs for the coefficients of the HS scores and Gymnasium are the same, the magnitudes are much larger, confirming that ability is an important determinant of academic performance when using different proxies to measure it. However, in the context of our study, these two variables are control variables, while we focus on the estimated coefficients of the home region and dormitory variables. The coefficients of the Home region and the Students dormitory variables contribute to the understanding of the specific part of academic performance that directly influences the opportunity costs of studying. Their signs are consistent with our expectations, negative for the Home region variable and positive for the Students' dormitory variable. Students who use the services of the student dormitories have, after three years of study, passed, on average, more than four courses more than other students. In addition, students from the home region passed more than two courses fewer than students from other regions during the same period. Consequently, these students will prolong their studies into a fourth year (at least), therefore increasing the opportunity costs of studying and increasing the student/academic staff ratio.

Table 2
Estimation results of models (1) and (2)

	(1)	(2)
	GPA	**No. of courses passed**
High school points	0.006*	0.080*
	(0.000)	(0.015)
Home region	0.015	-2.425*
	(0.035)	(0.535)
Student dormitory	0.176**	4.184*
	(0.073)	(0.959)
Gymnasium	0.250*	3.723*
	(0.039)	(1.075)
_cons	1.478*	0.909
	(0.097)	(5.387)
N	249	249
R^2	0.428	0.190

*Note: Standard errors in parentheses. ** $p < 0.10$, * $p < 0.05$.*
Source: Authors' calculations.

We can also observe significant difference in the coefficients of determination (R^2) between two models, which indicates that the number of courses passed (R^2 two times lower than for model with GPA as dependent variable) is a more complex measure of academic performance that has more (at least one more) variables that affect it. As stated, institutional variables, which are time fixed (like professors), certainly have an impact on academic performance.

In table 3 we show standardized beta coefficients of independent variables of the models (1) and (2) to observe the relative importance of independent variables on the outcome variable. In both models, academic performance is dominantly influences by students' abilities but in the case of model (2) the importance of distance clearly rises, which corroborates our research hypothesis.

Table 3
Standardized beta coefficients of independent variables presented in table 2

	(1)	(2)
	GPA	**No. of courses passed**
High school points	0.567	0.344
Home region	0.018	-0.126
Student dormitory	0.136	0.137
Gymnasium	0.302	0.191

Source: Authors' calculations.

In table 4 we show the results of estimation of the model (2) for each year of study separately to check for the effects of attrition on the results, as well as of the possible influence of Covid-19 on the results.

Table 4

Estimation of model 2 for each year separately

	2019/2020 cohort (I year of study)	2019/2020 cohort (II year of study)	2019/2020 cohort (III year of study)
	no_courses	no_courses	no_courses
High school points	0.082*	0.080*	0.065*
	(0.015)	(0.010)	(0.008)
Home region	-2.659*	-1.260*	-0.572
	(0.403)	(0.427)	(0.599)
Student dormitory	4.257*	1.835*	1.426**
	(1.053)	(0.402)	(0.658)
Gymnasium	4.047*	1.633	2.089*
	(1.025)	(0.923)	(0.772)
_cons	0.676	4.111	8.833*
	(5.274)	(3.477)	(3.260)
N	243	224	209
R^2	0.205	0.280	0.287

Note: Standard errors in parentheses. ** *p < 0.10,* * *p < 0.05.*

Source: Authors' calculations.

Results in table 4 indicate that although Covid-19 did influence results in the first year of study, the signs remain the same, while the coefficient is not significant only in third year of study (academic year 2021/22).

5 DISCUSSION AND CONCLUSION

This paper addresses the effects of motivation on academic performance, with distance from home region as the key variable influencing motivation. We argue that as the opportunity costs of studying have increased due to the Bologna system and the unsuccessful integration of first cycle graduates into the labour market, an examination of the determinants of study duration is needed. Although there are many factors that influence study duration and overall academic performance, we focus on the most important ones – students' abilities, educational background, economic status and motivation. We measured study duration with the variable "number of courses passed after three years of study" and academic performance with the variable "GPA". Our results clearly indicate that distance from home is one of the key determinants of study duration and thus students' motivation to finish the programme on time. Results also confirm the importance of students' ability and the type of high school attended on both study duration and academic performance. Our findings on the impact of students' ability on the GPA are in line with the influential study of Geiser and Santelices (2007), which uses high school GPA as a predictor of university GPA. Student residence on campus was also shown to be a contributing factor to academic performance, thus confirming research results that go back as far as 1970 and the paper from Hountras and Brandt.

The results of our research suggest that faculty-level policies are needed and should be implemented to increase the motivation of local students to finish study programmes in time, so that they can catch up with their peers coming from other regions of the country. This would have positive effects on the student to academic staff ratio as well as on the labour market in general. For future research, it would be beneficial to examine other variables that might influence the relationship between academic achievement, motivation, and distance from home. In particular, there should be research into how various social, economic and psychological factors – such as homesickness, social integration and financial support – mitigate or attenuate the effects of distance on student motivation and duration of study. In addition, analysing the function of hybrid or online learning models that can mitigate the negative effects of physical distance can provide insightful information. To understand how motivation changes over time and at different stages of study, longitudinal studies that follow students throughout their academic careers would also be helpful. It would also be beneficial to examine how institutional elements, such as the campus environment and support services offered by the university, influence students' ability to overcome the difficulties associated with distance from home and achieve better academic outcomes.

Disclosure statement

The authors have no conflict of interest to declare.

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