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The Wage Premium to Higher Education: Evidence from the Polish Graduate Tracking System

Abstract: The paper justifies the possibility of estimating wage premiums that higher study education graduates may receive based on the administrative data from the Polish Graduate Tracking System. The data on wages in the year preceding the admission to a given study cycle were used, along with the data from the year after graduation. For the first-cycle full-time study programme, the average growth in wages in relation to every each subsequent year of education ranged from 20% to 40% depending on the area of study under which a given field of study was classified. For full-time second-cycle studies, the rate of return was 50%–60%. In the case of part-time studies, these growth rates were considerably lower.

Keywords: field of study, graduate tracking, rate of return to education, wage premium

JEL Classification Codes: I21, I26, J24

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Korzyści płacowe z wykształcenia wyższego według danych z ogólnopolskiego systemu monitorowania ekonomicznych losów absolwentów

Streszczenie: W artykule uzasadniono możliwość oszacowania korzyści płacowych, jakie uzyskują absolwenci studiów wyższych, na podstawie danych administracyjnych z systemu monitorowania ekonomicznych losów absolwentów. Wykorzystano dane o wynagrodzeniach z roku poprzedzającego rekrutację na dany stopień studiów oraz z roku po uzyskaniu dyplomu. Dla studiów stacjonarnych I stopnia przeciętny przyrost wynagrodzeń w związku z każdym rokiem edukacji wyniósł od 20 do 40% w zależności od dziedzin nauki, do której przyporządkowano kierunek studiów. Dla studiów stacjonarnych II stopnia jest to 50–60%. W przypadku studiów niestacjonarnych wzrosty są znacząco mniejsze.

Słowa kluczowe: kierunki kształcenia, ekonomiczne losy absolwentów, stopa zwrotu z wykształcenia, premia płacowa

Kody klasyfikacji JEL: I21, I26, J24

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Introduction

The primary aim of this study is to estimate the growth of wages for higher education graduates and who worked in the year preceding their admission to university. Data from the Polish Graduate Tracking System was used for this purpose. The analysis was conducted on the basis of the most recent available data pertaining to those who graduated in 2018.

The Polish Graduate Tracking System (ELA[1]) provides data on three groups of graduates: those who worked in the year preceding their admission to a given course of study; those who worked while studying; and those who at the time of being awarded a higher education degree, did not have any job experience. These definitions mean that graduates of first-cycle studies who worked during their studies probably form a large portion of the population of persons who had job experience before being admitted to second-cycle studies.

This analysis focuses on the first of these groups. Data from two moments in time will be compared: from the year preceding admission to university and the year after graduation. The difference in average wages before admission and after graduation may be interpreted as profit from an investment in higher education [Kaszubowski, 2013], a wage premium [Roszkowska, Majchrowska, 2014], a rate of return to education [Grotkowska, Pastuszka, 2019; Wincenciak, 2017] or private gains from higher education [Bugaj, Rybkowski, 2015].

It is assumed here that the growth of wages among people who worked before taking up university studies and who subsequently took up and com-

[1] https://ela.nauka.gov.pl

pleted a given field of study results from an increase in their competence thanks to their studies. However, it must be remembered that every cohort of graduates in practice comprises six groups of people. There are persons with degrees from various levels of university education (first-cycle studies, second-cycle studies, and long-cycle master's studies) and various modes of study (full-time or part-time studies). The diverse cycles and modes of study are related to varied preparation for studies and different motivation for taking up studies and admission criteria.

The research studies discussed below overlook features of universities such as type of ownership, location and prestige. Because of the nature of the data used in the analysis, the profession practised was not taken into account, either. The features distinguishing graduates are areas of science in which they graduated and the levels and modes of study.

Wage premium, rate of return, profit from investment in education

The research results presented below apply to various groups of graduates, and in this sense, their interpretation is different than in the case of studies making use of various types of modifications of the Mincer wage equation [Mincer, 1958][2]. Moreover, the findings of this study are not directly comparable with other studies because of the assumptions adopted in the Mincer model.

First of all, such studies make use of individual-level data. In the case of Poland, typical data sources include the Household Budget Survey [Myck, Nicinska, Morawski, 2009; Majchrowska, Roszkowska, 2013; Wincenciak, 2017], the Structure of Wages According to Occupations survey carried out by Statistics Poland [Roszkowska, Majchrowska, 2014], and questionnaire surveys [Kaszubowski, 2013]. Second, in the Mincer type equation, simplifying assumptions are adopted, such as uniform skills and uniform quality of education. Nattali [2016: 38] points out that, apart from the degree (level) of higher education, the field of completed studies is also important. In studies presenting the results of the estimation of the Mincer equation, differences in pay are highlighted that result from the profession practised and job seniority [Majchrowska, Roszkowska, 2013: 237] as well as the field of study chosen by graduates [Szreder et al., 2012: 568, Strawiński, 2006]. There is also one study [Grotkowska, Gaik, 2019] that focuses on differences in pay for graduates from several fields of study at selected universities.

Studies making use of the standard or extended Mincer wage equation (including correction on account of non-random sampling for the working persons sample) offered results ranging from several to several dozen percent. In a paper by J. Rutkowski [1996], attention is drawn to the "return to an additional year of tertiary level education" at 7% – 8%. On the other

[2] From a formal point of view, these are regression equations (econometric models) built on cross-sectional data, where the response variable is the wage and the basic independent variable is the number of years of education.

hand, Newell and Reilly [1999] put the rate of return at 10.9% – 11.1% for the early 1990 s, while Strawiński [2006] estimated the rate of return at 5.9% – 9.3% for data from the 1998–2005 period. In a study using cross-sectional data from 13 countries, Hanushek, Zhang [2006] obtained a rate of 8% for Poland. With the application of a micro-simulation model of the labour market, Myck, Nicińska, Morawski [2009] obtained an estimate of 9.7% for men and 13.4% for women. Meanwhile, Roszkowska, Majchrowska [2014] note that the "transition to the higher level of education" resulted in a 16% – 17% increase of wages for men and 18% – 19% for women. In a summary of his studies, Walenciak [2017] reports that the rate of return for the general population was 9.2% – 10.4%. In terms of individual fields of study, meanwhile, the "technology, industry and construction" and "health and social care" groups stood out in a positive sense, according to the report (p. 12).

Profit from the completion of university studies is defined in a more general way by Strawiński, Majchrowska, Broniatowska [2018]: "Wages of prime-aged workers with tertiary education are approximately 50% higher than median wages…" (p. 43). An interesting discussion on problems related to measuring the rate of return to education in Poland is contained in the work of Grotkowska, Pastuszka [2019]. This study indicates the necessity of distinguishing the rate of return to education from an education premium based on the Mincer equation.

The authors of the aforementioned studies make use of statistical samples and use various estimation methods to offer what are in fact estimates of the "actual" rates of return for graduates. However, thanks to the national system of graduate tracking, data on practically all those who have obtained university degrees have been available since 2015. The data derive from the Social Insurance Company (Zakład Ubezpieczeń Społecznych) system and cover almost 96% of the population with university degrees. These data are not individual-level data[3], and thus they do not offer the basis for using the Mincer wage equation, as they refer to people who graduated from a given university at a specific field (a more detailed description of the data is presented in a further part of this study). But they also contain information about work before admission and in the course of university studies. This makes it possible to calculate[4] the average growth of wages between the year preceding admission to university and the period after graduation (in particular after the first year from earning a degree) for such groups. Studies in this area, showing a significant diversification of careers among graduates from various types of universities, various fields of study and both modes of study, provide an insight into the broader issue of transition, i.e. moving from education to the labour market.

It must be emphasised here that the source of data used in this paper (and discussed in a further part of the text) is the most innovative system of its kind

3 They do not contain information about sex, age, secondary school, work performed, etc.

4 By means of aggregation of data for universities, faculties, areas of science, etc.

in Europe, which results in the fact that there are no publications about similar studies in international literature.

The purpose of this study is to present and estimate the wage premiums related to graduation for those who worked before their admission to university, divided into cycles of studies and areas of science into which fields of study were classified.[5] Data on the wages of graduates from the year preceding admission to a given cycle of studies and in the year after graduation were used for this purpose. It was assumed that, due to the average age of people taking up studies, job seniority before admission to university is not significant. Because of the causes explained above, this estimation has a different nature than those resulting from studies making use of individual-level data, and therefore it is not an alternative to the Mincer equation. For the entire population of graduates, data on their job experience before admission and during their university studies offers a basis for broader analyses, for example in terms of the impact of work experience on the time of job seeking. However, this issue is not the object of this study.

Source of Data

The data for the analysis below come from the national system of graduate tracking. These are administrative data from the registers of the Social Insurance Company (ZUS) and the POL-on higher education information system used by the Ministry of Science and Higher Education. The basic unit in the ELA system is a group of graduates[6], for which a specific identification number was determined in the POL-on system. This means that full-time and part-time studies offered by a given faculty (unit) of a university in a specific field of study constitute two units for analysis. Graduates from two different faculties in a given field, cycle and mode of study at a specific university are registered separately. There are also cases when the same field of study (available as part of a specific mode and cycle) is completed at a given faculty by two groups of graduates in a given year. This means that there are groups that started university studies at two different moments in time or, in other words, that one of these groups are graduates who earned their degrees after more semesters of study than they originally planned.[7]

The ELA system also provides aggregated data on graduates from individual fields of study within a specific mode and cycle. This makes it possible to

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5 Therefore, this is not a comparison of wages of persons with higher education and those without such an education.

6 In the ELA system, such groups are called *kierunek* (English: direction, field of study) which is misleading, as the term *kierunek* in Polish refers to the programme of studies determined by learning outcomes and the description of the process leading to their accomplishment [Rocki 2020: 841].

7 The ELA System only provides the planned number of semesters, which does not allow for concluding which of the aforementioned groups will earn their degrees later. It may only be assumed that this will be the case with the less numerous groups.

obtain information on graduates from a given university, while also allowing for different aggregation of the data available in the system[8] in the form of data files. A number of studies have made use of this possibility for selected types of universities [Pietrzak, Khovrak, 2019; Rocki, 2017a; Wysocka, Wierzejski, 2018].

In this paper, a field of study is understood as a comprehensive, consistent description of learning outcomes and the process leading to their accomplishment, formulated by the university and describing the knowledge, skills and stances characterising the graduate. Knowledge and skills indicated in the learning outcomes obviously must (should) refer to specific areas of scientific studies (areas and disciplines).[9] At the same time, it should be emphasised that the names of fields of study assigned to the analysed groups of graduates are not uniform, as the universities may assign different names to similar learning outcomes and simultaneously, a uniform name of a field of study may, at different universities, denote diversified learning outcomes. Obviously, this may affect the careers of graduates from a given "field of study" offered at various universities. Such a state of affairs is indicated by earlier studies [Rocki, 2018a; Rocki, 2020]. Additionally, for the 2018 cohort of graduates, 610 different names of fields of study were recorded in the ELA system. Furthermore, one field of study bearing the same name may be offered as either a general academic course ("general academic profile") or a training programme focusing on developing practical skills ("practical academic profile"). Due to this, groups of fields of studies assigned to various areas of science will be analysed.

For the analyses discussed further, a significant feature of the information contained in the ELA system and resulting from its administrative nature is that specific employment contracts, contracts of mandate and contracts concluded outside of Poland, as well as work without a contractual basis, are not registered in the ZUS sets. The data may also exclude persons insured under the Agricultural Social Insurance Fund (KRUS) system.

Secondly, the ZUS data do not contain information about the profession practised and type of work performed after graduation, before admission and during university studies. As a result, it is not known whether work performed by a graduate is consistent with his or her field of study (specialisation).

Thirdly, to ensure anonymity, reports and source data presented in the ELA system refer to groups of at least 10 graduates. What's more, the results for sub-groups with fewer than three persons are not presented. The same applies to groups that feature persons who did not commence work after graduation and those who looked for a job for more than 12 months.

Despite these limitations, because of the scope of the collected information, the ELA data make it possible to analyse various economic aspects of graduate careers – for example compare the careers of a selected cohort in subsequent years or compare subsequent cohorts in a given field of study at a given

8 https://ela.nauka.gov.pl/pl/experts/source-data

9 The definition is an updated version of that formulated in Rocki [2018e] with adjustment to the provisions of the 2018 Polish Law on Higher Education and Science.

university, including in juxtaposition with graduates from other universities. The selected possibilities of analysis are outlined in Rocki [2017b; 2018b].

The ELA data may also be analysed in combination with information from the Polish Accreditation Committee [Rocki, 2018c and 2018d], the National Centre of Science [Rocki, 2019], and the Ministry of Science and Higher Education [Rocki, 2018e]. In these cases, the compiled and shared data applies to universities and their research units creating and organising specific study programmes.

General Information About the Analysed Cohort of Graduates

The data on the 2018 cohort cover a total of 315,561 graduates from 6,869 groups ("directions"). Intuition suggests that a potential relationship between work and experience (not necessarily related to a specific field of study) should be exhibited by students of part-time studies, because this mode of study is chiefly dedicated to working persons and its organisation allows for the combination of higher education studies and gainful employment.[10] This is confirmed by the data in Table 1, which shows significant variations in work experience. Of the total studied cohort, 54.08% of graduates had no work experience. This was true of 82% of graduates from full-time long-cycle master's programmes and only 13% of graduates from part-time second-cycle study programmes. For the first- and second-cycle studies, the proportions of persons with job experience acquired prior to admission were 50% and almost 70% respectively. It is interesting to note that the percentage of persons with job experience gained during a long-cycle master's programme is higher than that of persons with experience gained prior to admission.

Table 1. The 2018 cohort of graduates by study mode, cycle and job experience (% of total).

Study cycle	Study mode	Job experience		Lack of job experience
		before admission	during university studies	
First cycle	full-time	9.04	13.76	77.20
First cycle	part-time	50.00	32.82	17.18
Second cycle	full-time	19.99	15.30	64.71
Second cycle	part-time	69.58	17.75	12.67
Long-cycle study programme	full-time	3.32	14.93	81.75
Long-cycle study programme	part-time	25.62	38.94	35.44
Total		27.72	18.19	54.08

Source: own calculations based on data from the ELA system.

[10] The definition of full-time studies comes from the Polish Law on Higher Education (Art. 63): a form of tertiary studies in which at least half of the ECTS credits covered by the study programme is attained as part of classes with direct participation of academic teachers or other persons conducting classes and mentoring the students.

Information About Analysed Graduate Groups

The analyses presented further pertain to those groups of graduates which include persons who had some job experience in the year preceding admission to a selected university study cycle. In the 2018 cohort, there are 5,044 groups which in total are made up of 264,061 persons, where at least three persons had job experience before admission. However, the analyses omit groups with a share of persons registered in the ZUS system lower than 60% (mostly groups of graduates from full-time first-cycle studies). Eventually, 2,950 groups were selected for analysis with a total number of 193,765 persons for whom data are published about average wages from all sources in the year preceding admission to university and in the year after graduation. Among these persons, 60,858 had job experience prior to admission.

Table 2. Groups of graduates by mode and cycle of study as well as job experience (% of total)

Study cycle	Study mode	Job experience		Lack of job experience
		before admission	during university studies	
First cycle	full-time	11.77	15.49	72.74
First cycle	part-time	47.99	34.11	17.90
First cycle	full-time	21.84	16.36	61.80
Second cycle	part-time	68.45	18.45	13.09
Long-cycle study programme	full-time	6.79	18.52	74.70
Long-cycle study programme	part-time	33.61	41.59	24.80
Total		33.12	20.34	46.54

Source: own calculations based on data from the ELA system.

Table 3. The studied groups of persons with and without job experience broken down by study mode and cycle (in %)

Study cycle	Study mode	Job experience		Lack of job experience
		before admission	during university studies	
First cycle	full-time	9.99	21.40	43.94
First cycle	part-time	26.75	30.95	7.10
Second cycle	full-time	18.82	22.96	37.91
Second cycle	part-time	42.00	18.43	5.72
Long-cycle study programme	full-time	0.55	2.46	4.33
Long-cycle study programme	part-time	1.89	3.80	0.99
Total		100.00	100.00	100.00

Source: own calculations based on data from the ELA system.

The breakdown of the analysed groups by mode and cycle of studies is presented in Tables 2 and 3. It confirms the conclusions from Table 1 to the

effect that, according to the ELA data, about 20% of the graduates covered by the research[11] worked during their studies and 30% had job experience before entering university.

Notably, 68.45% of those who were awarded degrees at part-time second-cycle study programmes had work experience before entering university. Meanwhile, 41.59% of graduates from part-time long-cycle study programmes gained job experience during their studies. Naturally, graduates from full-time first-cycle study programmes and full-time long-cycle study programmes represent the smallest proportions of those with job experience prior to enrolment, at 11.77% and 6.79% respectively.

Table 4. Graduates with prior work experience in each cycle and mode of study as well as area of science, as a percentage of the total number of graduates who had work experience before admission (in the 2018 cohort) (in %)

Area of science	First cycle		Second cycle		Long cycle	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Humanities	12.5	48.5	19.5	66.1	3.2	17.8
Theology	-	-	27.3	-	17.5	41.3
Social	11.7	47.8	25.4	72.1	12.8	45.6
Economics	9.5	47.7	19.8	68.4	-	-
Law	16.9	46.9	18.4	67.1	4.5	25.8
Mathematics	10.0	57.8	23.4	66.4	-	-
Physics	9.3	-	28.2	-	-	-
Chemistry	-	64.5	14.1	100.0	-	-
Biology	9.3	-	19.8	17.6	-	-
Earth sciences	10.3	32.0	19.4	55.6	-	-
Technology	9.9	50.8	21.9	73.3	-	-
Agriculture	8.7	25.4	16.1	52.6	-	-
Forestry	5.1	39.7	14.5	79.4	-	-
Veterinary medicine	-	-	-	-	3.3	-
Medical	17.1	43.1	39.2	60.5	2.2	-
Pharmaceutical	-	22.7	13.7	43.3	-	-
Health	19.8	42.4	25.2	55.6	-	-
Physical education	12.3	49.7	19.2	53.8	-	-
Art	11.4	31.3	22.3	39.5	-	-
Total	11.2	46.8	21.6	68.0	6.7	32.7

Note: "-" denotes lack of data

Source: own calculations based on data from the ELA system.

11 Some research findings in this area have been presented by scholars including Jarecki [2010: 23]. His study focused on 5th-year students of economics at the University of Szczecin in north-western Poland. According to Jarecki, "the majority (64%) of management and marketing students and IT and econometrics students [earn income] from [their] own work."

In the context of further analysis, the share of persons with job experience in their "area of science" reflecting a specific field of study is significant. This is shown in Table 4.

Among the 60,803 persons with job experience prior to admission, the largest group are graduates from part-time second-cycle study programmes (25,458). Sixty-eight percent of graduates of part-time second-cycle study programmes had job experience before entering university. Graduates from part-time first-cycle study programmes add up to a similar proportion: persons with job experience make up almost half (46.8%) of the 14,965 graduates of such studies. Full-time study graduates were less likely to have job experience before enrolment.

Wage Premiums to Higher Education for the 2018 Cohort

Calculations for the 2018 cohort, which included persons with job experience in the year preceding admission to a given study cycle, indicate that, in the case of first-cycle study programmes, the average growth in wages was 116.1% for full-time studies and 64.02% for part-time studies as compared to wages in the year before entering university. For the second-cycle study programme, the growth was smaller, at 95.25% for full-time studies and 55.31% for part-time studies. Yet it must be noted that these studies are shorter than the first-cycle study programme. In the case of the long -cycle study programme, the growth of wages was the smallest, at 48.56% and 34.79% respectively.

While calculating the annual wage premium to an additional year of education (rates of return from an additional year of education), it is necessary to account for the time of study, and this time is diversified depending on the field and mode of study as well as the curriculum adopted at a given university. In line with regulations[12], studies with a different number of semesters[13] can be offered.

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12 Art. 65 of the Polish Law on Higher Education and Science of 20 July 2018 stipulates that full-time first-cycle studies last at least six semesters, and if the curriculum encompasses learning outcomes allowing for the attainment of an engineering degree, at least seven semesters are required. Meanwhile, full-time second-cycle studies last from three to five semesters, whereas a full-time long-cycle master's programme lasts from nine to 12 semesters. In line with these regulations, part-time studies may last longer than the relevant full-time studies programme. In practice, some universities used the phrase "at least" and, for example, a full-time first-cycle study programme in construction lasts eight semesters at the Silesian University of Technology in southern Poland. The same applies to information technology and telecommunications at the Warsaw University of Technology. On the other hand, for example a part-time first-cycle study programme in construction and electrical technology at the Poznań University of Technology in western Poland lasts nine semesters.

13 Calculations of the average duration of studies, weighted by the number of students, indicate that the minimum duration of first-cycle studies is six semesters, while the maximum duration is 7.92. In the case of second-cycle studies, it is three and 4.22 semesters respectively, and for long-cycle studies the figures are 10 and 12.

In order to determine the wage premiums, the average study duration (weighted by the number of students) was calculated based on the ELA data for individual areas of science, levels and modes of study. This provided the basis for the calculation of wage premiums associated with one year of education. The calculation results are presented in Table 5[14].

Table 5. Wage premiums per year of higher education by cycle and mode of study and area of science (in %)

Area of science	First cycle		Second cycle		Long cycle	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Humanities	30.17	19.06	39.25	24.13	25.71	5.85
Theology			183.85		7.93	4.83
Social	32.70	19.39	29.55	25.39	7.20	5.24
Economics	44.61	22.21	59.38	29.21		
Law	27.56	20.81	60.67	23.09	10.13	8.87
Mathematics	35.07	38.43	47.45	62.08		
Physics	22.17		54.14			
Chemistry		8.57	63.95	46.71		
Biology	26.42		48.75	10.28		
Earth sciences	39.46	29.08	50.11	38.84		
Technology	33.67	17.42	59.58	36.80		
Agriculture	31.84	19.73	79.38	32.85		
Forestry	99.60	13.62	67.21	14.46		
Veterinary medicine					29.32	
Medicine	41.52	21.28	54.23	26,28	23.55	
Pharmaceutical		18.01	59.45	35.85		
Health	39.80	15.88	54.47	23.06		
Physical education	31.97	16.54	57.09	25.07		
Art	20.03	28.60	47.49	31.29		
Total	36.05	20.29	51.69	27.93	9.24	6.95

Note: "-" denotes lack of data

Source: own calculations based on data from the ELA system.

Table 5 shows that graduates of full-time studies attain higher wage premiums than graduates of part-time studies. At the same time, graduates of second-cycle studies have higher wage premiums, while those graduating from

14 It may be assumed that, because of low inflation in the period when the researched group of persons was studying, the breakdown of wages from the year preceding admission to university and the year after graduation reflects the wage premiums to education.

long-cycle study programmes have the lowest premiums. Because data on wages in the year before admission to university was used in the calculations, the impact of work during one's studies is omitted. Obviously, such work was different in nature in the case of full-time and part-time studies.

For full-time first-cycle studies, the rates of return range from 20% to 40%, with almost 45% for fields of study within economics and almost 100% for forest sciences (for several-member groups of graduates. In the last case, it may be assumed that persons who previously held lower wage positions in forestry decided to take up first-cycle studies in the field of forestry.

In the case of full-time second-cycle studies, the wage premiums range from 50% to 60%. The wage premium for humanities is 39.25%, while that for social sciences is 29.55%, with agricultural fields of study boasting almost 80% and forestry exhibiting over 67%.

For part-time first-cycle studies, wage premiums range from around 15% to 20%. The lowest figure (8.57%) is for a small group of graduates from fields of studies within chemical sciences, whereas the highest (38.43%) is for fields of study in the area of mathematics. Earth sciences have the second-highest wage premium, at 29.08%. This covers two fields of study at the Adam Mickiewicz University in the western Polish city of Poznań: land surveying and cartography (19 of 56 graduates with prior job experience); and tourism and recreation (five of 19 graduates).

On the other hand, part-time second-cycle study programmes offered their graduates a rate of return of 25% to 40% on average, though in the case of mathematics-related fields of study, it was at 62.08%, and for biology-related fields of study the figure was 10.28%, and for forestry it was 14.46%.

In the case of long-cycle master's programmes, approximately 30% of the annual rate of return was contributed by graduates of humanities (10-semester studies), veterinary medicine (11-semester studies) and medical studies (12 semesters).

Divergence from the Rule

To present the full picture of the wage premium in the 2018 cohort, it is necessary to note that in 28 cases (i.e. 0.09% of the examined groups comprising 196 people in total), groups of persons who had job experience before admission earn wages after graduation that are from several percent to almost 60% lower than before. For example:

- among 21 graduates of the "organisation of senior care" field of study offered as full-time first-cycle studies at the Nicolaus Copernicus University in Toruń, north-central Poland, there were nine persons with job experience in the year before admission who after graduation took a pay cut of PLN 2,499 on average (a 54.76% drop in wages: PLN 4,563.72 before admission vs. PLN 2,064.72 after graduation),
- fourteen persons with prior job experience who studied cosmetology in the form of part-time second-cycle studies at the Academy of Cosmetics

and Health Care in Warsaw (out of 51 graduates from this field of study in total) lost 15.52% of their wages on average (a drop from PLN 3,543.22 to PLN 2,993.38),

- fourteen of 18 persons who have earned a degree in psychology as a result of part-time first-cycle studies at the Tischner European University in the southern Polish city of Kraków earn 10.41% less after graduation than they did before entering university.

This may be due to a variety of causes, including a change of place of residence after graduation and finding new employment to better match one's training. The data from the ELA system do not allow for validating the hypotheses in this area.

Conclusion

Wage premiums to higher education calculated on the basis of data from the graduate tracking system are higher than previously indicated in the literature. The different source of data and different mode of designating such premiums obviously affect the results and their interpretation.

It will be worth checking the results of the analyses on the basis of data for subsequent cohorts of graduates.

The applied method makes use of a comparison of the actual wages of specific persons in the period before admission to university and after graduation, but it may be concluded that the obtained results indicating an increase in wages due to graduation (higher qualifications) may be extrapolated to people who did not work before taking up their university studies.

Due to the fact that most students do not take up second-cycle studies at the same university and the same field of study, the recorded higher wage premiums of graduates of second-cycle studies may mean that employers tend to offer higher wages to persons with broader horizons and greater experience. This may also mean that first-cycle study programme degrees are still not seen as being equivalent to having a higher education.

There are significant differences among graduates from fields of study in various areas of science. While the average wage premium from full-time second-cycle studies is 51.69% for every year of education, groups of graduates from agriculture-related studies attain wage premiums of 79.38%, and those graduating from chemical studies report 63.95%. The figure for law graduates is 60.67%[15], and that for technical graduates is 59.58%. Simultaneously, graduates of social studies obtain premiums that are 29.55% on average, whereas humanities graduates report 39.25%. This may mean that fields of study with higher wage premiums are the ones that are the most valued on the labour market.

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15 This does not apply to "law" as the field of study which, in principle, is offered as a long-cycle (10 semesters) study programme.

These differences may also result from the type of work undertaken by students before taking up their studies. On the other hand, the differences between full-time and part-time studies may mean that employers value part-time graduates less, or that graduates of extramural programmes, who usually work during their studies, do not receive higher salaries after graduation.

Obviously, the data available in the graduate tracking system make it possible to conduct further work to provide a more detailed insight into the wage premium for graduates from different types of universities (especially as some economic fields of study are offered by both economic universities and those specialising in natural sciences and technology). Further research could also be directed at examining changes in incomes among graduates in subsequent years after leaving university.

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