Studying and Working: Your Student Job Affects Your Future Labor Market Outcomes[1]

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Does student employment pay off in the labor market after college? Does the type of student job matter? We use administrative data to describe the amount and type of student work for twenty cohorts of students in higher education in Denmark. We find large differences in the amount, and especially the type of student jobs, by education level and field of study. We show that both the skill content and the study-relevance of the student job matter for earnings after college. Having an additional year of student work experience in a job requiring a high skill level or a study-relevant job is associated with an earnings premium of around 20-25% one year after exit from higher education. This premium fades out during the first years and stabilizes around 5% after 6-14 years for professional degrees, but remains relatively high and stable over time since exit from higher education for more theoretically oriented university degrees and for dropouts. This suggests a strong and persistent complementarity between the skills students learn in theoretical university courses and high-skill student jobs.

JUANNA SCHRØTER JOENSEN[2]
University of Chicago, TrygFonden's Centre for Child Research, Aarhus University (AU)
jjoensen@uchicago.edu

ELENA MATTANA[3]
Department of Economics and Business Economics and TrygFonden's Centre for Child Research, Aarhus University (AU)
emattana@econ.au.dk

1. Introduction

Student employment is increasingly common and hotly debated because of the social gains and losses it generates. It is a source of income for students, and may have counteracting effects on human capital: It may lead to valuable work experience, but too much work could be detrimental to academic performance. How strong these trade-offs are may depend on the type of student job. In this paper, we describe student employment – both in terms of how much students work, who works, and which types of jobs students do. Is working while studying worth it? If so, which types of student jobs are the most lucrative stepping stones? There are several reasons why individuals choose to enter the labor market prior to graduation. Students may be credit constrained and depend on the extra income.[4] However, student employment may also be an investment in enhancing labor market skills through different channels. First, students might improve their interpersonal skills, get familiarized with the labor market, develop better work habits, and gain a sense of responsibility – all of which are valuable skills in their later career. Second, potential employers might view student employment as a signal of other favorable attributes, such as high motivation or ability. Third, student employment might also enhance job search to the extent that labor market contacts improve employment opportunities after graduation. In most fields of study, university education does not prepare students for one specific job and there-

fore relevant work experience may be essential for finding the first job after graduation. This view that part-time jobs can provide students with valuable income, work experience, and a potential stepping stone to better jobs after graduation stems primarily from the search-matching literature. For example, Topel and Ward (1992) view jobs during the school-to-work transition as part of early career "climbing up the ladder" and beneficial to labor market search leading young workers to better and more stable employment. Finally, work experience in the field of study may complement the formal education or improve study motivation through recreation.[5]

Student employment could, however, also lower academic achievement by increasing the probability of dropping out and time-to-graduation (Ehrenberg and Sherman, 1987; Stinebrickner and Stinebrickner, 2003; Callender, 2008; Kalenkoski and Pabilonia, 2010) or by slowing down the production of course credits and academic achievement, even if non-linearly and heterogeneously (Wenz and Yu, 2010; Darolia, 2014; Avdic and Gartell, 2015; Scott-Clayton and Minaya, 2016; Holford, 2020; Joensen and Mattana, 2021, 2022).[6] In this paper, we abstract from the trade-offs embedded in the study-work relationship during higher education as well as the trade-offs embedded in the study aid-work relationship. Instead, we directly quantify the relationship between student job types and labor market outcomes later in life within narrowly defined categories of students with the same level and field of degree.

We describe the types of student jobs in more detail than previous literature, and analyze the association between type of student work experience at exit from higher education and labor market outcomes in the first fourteen years after exit. First, we describe the amount of work and the types of student jobs by education level and field of study. Conditional on level and field of study, however, we do not find strong sorting on student background into types of student jobs – neither in terms of high school grades and course choices nor on parental education and income. Second, we show that both the skill content and the study-relevance of the student job matter for earnings after exiting higher education. Having an additional year of student work experience in a job requiring a high skill level or a study-relevant job is associated with an earnings premium of around 20-25% one year after exit from higher education. This premium fades out during the first years and stabilizes around 5% after 6-14 years for professional degrees, but remains relatively high and stable over time since exit from higher education for more theoretically oriented university degrees and for dropouts. This suggests a strong and persistent complementarity between the skills students learn in theoretical university courses and high-skill student jobs. We also document a strong and persistent positive association between experience in a student job requiring a high skill level and future employment in high-skill jobs. Our results are in line with papers finding that student employment can reduce the cost of the education-to-work transition by increasing earnings and the probability of stable employment in the early career (Light, 2001; Hotz et al., 2002; Häkkinen,

2006; Van Belle et al., 2020; Joensen and Mattana, 2022) and still remains valuable more than a decade after higher education exit.

2. Education in Denmark

Education in Denmark is comprehensive and compulsory through ninth grade ("folkeskole") which is completed at age 16 for most students. After ninth grade, students can choose to continue in upper secondary schooling, where they either follow a vocational track with a combination of schooling and apprenticeships to prepare them for the skilled trade labor market, or an academic track. The academic track comprises the traditional academic high school (STX), the technical high school (HTX), and the business high school track (HHX). Access to higher education is conditional on satisfactory completion of an academic high school track or a high school equivalent diploma. Admission is centralized and students are screened on high school grade point average (GPA); some programs also have specific course prerequisites. Most education in Denmark is tax-financed and tuition-free for students. Students in higher education also receive universal financial aid to cover living costs. All study activities at higher education institutions in Denmark are measured in European Credit Transfer and Accumulation System (ECTS) credits. 60 ECTS correspond to one year of full-time study.

Four types of degree programs are offered at higher education institutions in Denmark: First, business academies ("erhvervsakademi") offer professionally-oriented short cycle degree programs (KVU). Short professional programs are standardized to 90-150 ECTS. Most last two years of full-time study (120 ECTS) and combine theoretical and practical education. Second, university colleges ("professionshøjskole") offer professionally oriented bachelor's degree programs (MVU).[7] These programs are standardized to 180-270 ECTS and on average stipulated to last 3.5 years or 210 ECTS. These programs are aimed at a particular professional profile. They combine theoretical studies with a practical approach, and include a 30 ECTS internship. The most common professional bachelor's degrees are pedagogues, primary and lower secondary school teachers, nurses, and practically oriented engineers. Finally, general and specialized research universities ("universitet") offer bachelor's (180 ECTS) and master's (120 ECTS) degree programs (i.e. 3+2 years, LVU) in academic disciplines.[8]

3. Data

We use Danish data from administrative registers hosted by Statistics Denmark (DST). The education register contains detailed information on education spells. We observe the month and year of enrollment and exit, a (UDD) code for the enrolled program, and a (AUDD) code for whether the student dropped out or graduated, and in case of graduation, details

on the level and field of the degree. We classify all higher education programs into four levels (short professional, professionally-oriented bachelor's, bachelor's, and master's degrees) and six fields (Humanities, Arts, Education; Life Sciences; Social Sciences; Business; Natural Sciences and Engineering; Health Sciences).

The education register also provides us with detailed information on the student's high school track. To measure academic preparedness, we supplement this data with the high school register containing information on high school GPA and course choices.

Finally, the unique individual identifier allows us to merge these administrative education registers to family background information (parental education and income) and employment histories (earnings, employment, hours, job description, occupation, and industry).

We focus on the 585,385 individuals who enrolled in higher education in Denmark between 1996 and 2015. We restrict the sample to individuals who started higher education at age 25 or younger. We consider only the first semi-continuous enrollment period; i.e. spells of enrollment in higher education interrupted by non-enrollment spells shorter than 24 months.[9]

3.1. Measuring Skill Content and Study-Relevance of Student Jobs

We construct two measures of the *skill content* of student jobs and the *study-relevance* of the occupation. The first measure is an indicator for whether the primary position requires competencies at the highest or second highest level (based on PSTILL2). The second measure is based on the DISCO08 code, which is the Danish version of the International Standard Classification of Occupations (ISCO-08). We measure study-relevance of each (4-digit) occupation code by the fraction of 35-53 year old individuals with the same higher education code who are employed in the occupation. We recognize that graduates from some programs are more concentrated in a few occupations, while others are more dispersed across many occupations. This means that it is not meaningful to compare the *level* of study-relevance between degree programs. Therefore, in the main empirical analysis, we focus on an indicator for whether the student works in an occupation with above median study-relevance *within* the student's degree program. Measurement error is an important consideration, since it is impossible to measure the exact skill content and study-relevance of each student job. In this setting, however, measurement error is presumably mostly related to the particular degree program rather than unobservable characteristics that determine individuals' student job assignment within a program.

Note that these two measures capture different dimensions of student jobs. The first measure focuses on jobs that require the worker to have a certain level of skill. This measure will, for example, capture if a bachelor student works as a teaching or research assistant at the university, as opposed to a

job in the cafeteria. Similarly, it will capture if a student has a job in a coffee shop with personnel responsibilities as opposed to working as a waiter. The second measure focuses on jobs in the most common occupations for prime-age graduates within the narrowly defined level and field of study. The idea is to measure if the job is directly relevant for the particular job market that each degree typically leads to. For example, a law student working as a legal secretary in a law-firm or in public administration may get valuable on-the-job experience by working closely with lawyers and assisting with the tasks that lawyers typically do. This is an example of a job that is study-relevant, but does not have a high skill content as it requires vocational training and not higher education. In Appendix* Table A.1 we report the ten most common occupations by field of higher education and the corresponding measure of study-relevance. The higher the measure of study-relevance, the more likely that a prime-age individual with a specific degree (classified by its field and level) will work in the corresponding occupation. It is perhaps not surprising that medical and educational professions at various levels, as well as social counselling, have the highest degree of study-relevance, as there are programs uniquely dedicated to forming those professional skills. In fact, 66% of all graduates with a professional bachelor's degree in health sciences work in nursing. Individuals with scientific degrees (both in natural and life sciences) are more dispersed across occupations: The most common occupation for graduates with a life science degree is diet and nutritional work (12.7% of all graduates from a short program and 5.4% of all graduates with a professional bachelor's degree). The most common occupation for graduates with a natural science degree is software development (16.9% of all graduates from a bachelor's program and 9.2% of all graduates from a master's program).

4. Student Work

In this section, we describe the amount and type of student work by student background.

First, we describe student characteristics before, during, and after higher education enrollment by highest completed degree (Table 1) and by the primary field of enrollment (Table 2).[10] Student characteristics at entry reveal substantial selection into level and field by high school GPA and track (top panel of Tables 1 and 2). Students in humanities, arts and education have the lowest high school GPA; only 10% of them have taken advanced math. We group dropouts from all education levels: Their academic preparedness, measured by high school track and GPA, is on average similar to that of a graduate from a professional bachelor's program. Students who graduate from professional programs enroll with more work experience than students who graduate from academic programs. They do not take a longer sabbatical between high school and higher education, but are slightly older at enrollment, indicating that they worked more during their sabbatical or during their high school years (Table 1). Women are over-represented in professional bachelor's programs such as

Table 1: Individual background by highest completed degree.

	Highest completed degree				
Individual variables	**Dropout**	**KVU**	**MVU**	**Bachelor**	**Master**
At Higher Education Entry:					
Both parents have higher education	0.51	0.35	0.44	0.57	0.65
Parental disposable income in top quartile	0.40	0.33	0.35	0.45	0.53
Parental disposable income in bottom quartile	0.14	0.14	0.12	0.13	0.09
High school, STX	0.54	0.31	0.53	0.64	0.74
High school, HTX	0.08	0.09	0.06	0.07	0.06
High school, HHX	0.16	0.29	0.11	0.18	0.12
High school, other	0.12	0.10	0.18	0.06	0.05
High school, advanced math	0.07	0.10	0.13	0.17	0.27
High school GPA	7.33	6.90	7.26	8.04	8.55
	(2.02)	(1.67)	(1.57)	(1.52)	(1.28)
Had sabbatical after high school	0.67	0.59	0.75	0.74	0.78
Duration of sabbatical (months)	15.60	14.94	19.46	18.54	18.31
	(0.47)	(0.49)	(0.44)	(0.44)	(0.42)
Work experience	0.51	1.21	1.10	0.62	0.63
	(15.37)	(16.75)	(16.38)	(16.14)	(14.60)
Age	21.09	21.46	21.63	21.03	20.87
	(0.92)	(1.45)	(1.16)	(0.80)	(0.75)
Female	0.53	0.47	0.71	0.49	0.54
During Higher Education Enrollment:					
Target duration from entry until exit (months)	0	22	42	34	58
Duration from entry until exit (months)	56.86	35.22	50.68	72.61	75.29
	(29.56)	(20.31)	(18.25)	(36.75)	(20.55)
Number of different programs	1.96	1.59	1.46	2.07	2.24
	(0.88)	(0.82)	(0.72)	(0.92)	(0.69)
Work experience per year (years)	0.14	0.27	0.25	0.22	0.19
	(0.26)	(0.33)	(0.30)	(0.31)	(0.26)
Study-relevance of student job (SR)	0.04	0.06	0.09	0.02	0.02
	(0.10)	(0.14)	(0.18)	(0.03)	(0.07)
Study-relevant student job (above median in degree program)	0.13	0.26	0.35	0.12	0.25
High-skill student job	0.08	0.14	0.26	0.14	0.19
At Higher Education Exit:					
Work experience (years)	0.67	1.03	1.36	1.48	1.44
	(1.17)	(1.19)	(1.17)	(1.81)	(1.34)
Study-relevant work experience (SR*years)	0.02	0.08	0.12	0.01	0.03
	(0.13)	(0.34)	(0.22)	(0.02)	(0.09)
Work experience, study-relevant student job (years)	0.22	0.45	0.69	0.24	0.60
	(0.64)	(0.80)	(0.72)	(0.60)	(0.85)
Work experience, high-medium-skill jobs (years)	0.17	0.34	0.68	0.50	0.58
	(0.62)	(0.80)	(0.76)	(1.11)	(0.89)
After Higher Education Exit:					
High-skill job	0.28	0.50	0.79	0.48	0.76
Hourly wages (real 2010 DKK)	206.63	220.23	207.03	226.23	251.53
	(511.02)	(595.58)	(503.93)	(1040.98)	(407.60)
Yearly earnings (real 2010 DKK)	208,416	292,513	286,101	269,607	364,110
	(200,545)	(193,870)	(145,336)	(257,018)	(241,191)
Number of Individuals	179,260	45,710	166,466	24,508	169,441
Fraction of total sample	0.31	0.08	0.28	0.04	0.29
Number of Observations	1,637,923	704,858	2,587,822	366,235	2,685,621
Total number of Individuals			585,38		
Total number of Observations			7,982,459		

Mean (standard deviation) of individual background variables by highest completed degree. Details on variable definitions and sources in Appendix* Table A.2. Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark.

Table 2: Individual background by primary field of higher education.

Individual variables	Field of Higher Education					
	Humanities Arts Education	Life Sciences	Social Science	Business	Natural Science Engineering	Health Sciences
At Higher Education Entry:						
High school, advanced math	0.10	0.20	0.14	0.18	0.23	0.18
High school GPA	7.50	7.92	7.78	7.86	7.85	7.83
	(1.71)	(1.67)	(1.88)	(1.59)	(1.72)	(1.71)
Work experience	0.78	0.87	0.69	0.67	0.92	0.78
	(0.90)	(0.93)	(1.24)	(1.36)	(0.89)	(0.92)
Female	0.68	0.53	0.55	0.45	0.29	0.83
During Higher Education Enrollment:						
Work experience per year (years)	0.21	0.17	0.20	0.24	0.17	0.20
	(0.28)	(0.26)	(0.28)	(0.30)	(0.27)	(0.28)
Study-relevance of student job (SR)	0.05	0.01	0.02	0.01	0.01	0.13
	(0.11)	(0.03)	(0.06)	(0.03)	(0.03)	(0.25)
Study-relevant student job (above median in degree programs)	0.28	0.20	0.23	0.22	0.20	0.31
High-skill student job	0.22	0.13	0.14	0.15	0.16	0.25
Type of student employment (sector of industry):						
Wholesale and retail trade; repair of motor vehicles	0.19	0.19	0.22	0.28	0.20	0.18
Accommodation and food service activities	0.12	0.11	0.13	0.14	0.10	0.10
Human health and social work activities	0.18	0.08	0.08	0.03	0.04	0.29
Education	0.14	0.12	0.06	0.03	0.09	0.07
Manufacturing	0.05	0.10	0.06	0.09	0.14	0.05
Professional, scientific and technical activities	0.04	0.08	0.09	0.11	0.09	0.02
Administrative and support service activities	0.05	0.05	0.05	0.05	0.04	0.15
Information and communication	0.06	0.02	0.05	0.06	0.08	0.01
Transportation and storage	0.03	0.07	0.04	0.04	0.04	0.02
Financial and insurance activities	0.02	0.02	0.05	0.08	0.03	0.02
Public administration and defence compulsory social security	0.03	0.03	0.08	0.02	0.02	0.02
Other service activities	0.05	0.03	0.03	0.02	0.02	0.04
Construction	0.01	0.02	0.01	0.01	0.07	0.01
At Higher Education Exit:						
Work experience (years)	1.29	1.01	1.18	1.42	0.98	1.13
	(1.32)	(1.23)	(1.30)	(1.54)	(1.19)	(1.13)
Study-relevant work experience (SR*years)	0.05	0.01	0.03	0.02	0.01	0.20
	(0.14)	(0.05)	(0.08)	(0.05)	(0.04)	(0.37)
Work experience, study-relevant student job (years)	0.57	0.35	0.47	0.53	0.37	0.63
	(0.80)	(0.63)	(0.74)	(0.96)	(0.62)	(0.79)
Work experience, high-medium-skill jobs (years)	0.57	0.29	0.37	0.50	0.39	0.63
	(0.86)	(0.63)	(0.71)	(1.01)	(0.71)	(0.86)
Highest acquired degree:						
Dropout	0.28	0.36	0.28	0.35	0.32	0.24
Short professional program	0.03	0.08	0.21	0.02	0.12	0.03
Professional bachelor	0.41	0.15	0.13	0.03	0.19	0.52
Bachelor	0.05	0.03	0.03	0.10	0.03	0.00
Master	0.23	0.36	0.35	0.50	0.33	0.20
Excess time-to-graduation (months)	11.86	11.11	10.59	9.38	8.31	11.99
	(19.23)	(17.56)	(19.95)	(17.62)	(15.36)	(21.76)
After Higher Education Exit:						
High-skill job	0.48	0.50	0.50	0.50	0.48	0.43
Hourly wages (real 2000 DKK)	204.24	222.39	233.01	252.63	239.26	218.23
	(531.12)	(690.42)	(518.09)	(479.16)	(587.86)	(391.88)
Yearly earnings (real 2000 DKK)	154.783	230.566	304.556	210.795	170.224	198.517
	(154,783)	(198,517)	(230,556)	(304,556)	(210,795)	(170,224)
Number of Individuals	191,036	39,744	103,724	57,353	84,603	87,225
Fraction of total sample	0.34	0.07	0.18	0.10	0.15	0.15
Number of Observations	2,735,692	513,164	1,402,088	794,030	1,182,482	1,191,340

Mean (standard deviation) by primary field of enrollment in higher education. Details on variable definitions and sources in Appendix* Table A.2. All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark.

nursing and teaching and are under-represented in natural sciences and engineering, where only 29% of students are female (Table 2).

Table 1 also reveals an average excess-time-to-graduation of one year. This is partly because students switch programs. For example, graduates with a bachelor's degree on average enrolled in two programs but completed one – e.g., some enrolled in a master's program, which would be the target progression, but later dropped out. Students work on average between 14% (dropouts) and 27% (graduates from short professional programs) of each enrollment year. At exit, professional bachelor's and master's graduates have accumulated around one and a half year of work experience, of which more than half a year is high-skill and study-relevant experience. Students who exit university with an academic bachelor's – but not a master's – degree have accumulated one and a half years of work experience, half a year of high-skill experience, but only around three months of study-relevant experience. Thus they work in jobs less related to their field of study than those who continue to a master's degree, perhaps suggesting negative selection on unobservables.

In Table 3, we describe the ten most common student occupations and the share of enrolled individuals who are employed in each of these occupations, by field of enrollment. In the second part of Table 3, we report the study-relevance of the occupations as related to each field. The most common student occupation across all fields is waiter jobs, in particular for life sciences students, and it is not study-relevant for any field. The second most common occupation is ordinary office work, which is study-relevant for students in social sciences and business. The study-relevance of the most common student occupation is not very high overall: Table 2 shows that students accumulate little study-relevance, with the exception of the health sciences. Students in health programs are very likely to work in health-related occupations: 24.4% work as nurses and 18.7% do social and health work in private homes.

This translates into a cumulated study-relevant experience of 0.20, much higher than for the other fields. Table 3 shows that students enrolled in professional bachelor's degrees are more likely to work in a study-relevant occupation (35%) and in a high-skill job (26%). Students enrolled in health sciences and in humanities, arts, or education are more likely to work in a study-relevant occupation (28% and 31%, respectively) and in a high-skill job (22% and 25%, respectively).

After higher education, we document a degree premium of any degree over dropouts, and a substantial premium to completing a master's degree on top of a bachelor's degree. Only 28% of dropouts and 48% of bachelor's graduates work in a high-skill job after education, compared to 50% of all KVU graduates, 79% of MVU graduates, and 76% of master's graduates. Posteducation earnings in the first 14 years after exit are highest for students in social sciences and lowest for students in humanities, arts, and education.

Table 3: Top-10 most common student employment types: Share of student employment by field and study-relevance.

	Field of Higher Education					
During Higher Education Enrollment:	**Humanities Arts Education**	**Life Sciences**	**Social Science**	**Business**	**Natural Science Engineering**	**Health Sciences**
Type of student employment (job description):						
Waiter jobs	0.081	0.183	0.095	0.065	0.107	0.075
Ordinary office work	0.175	0.087	0.141	0.117	0.188	0.040
Teaching at primary school level (incl. 10th grade)	0.020	0.180	0.035	0.020	0.025	0.009
Social and health work in private homes (incl. nursing homes)	0.024	0.056	0.060	0.028	0.050	0.187
Cleaning work (except private homes)	0.047	0.054	0.070	0.056	0.049	0.049
Sales work in stores	0.061	0.044	0.053	0.050	0.061	0.028
Nursing	-	-	-	-	-	0.244
Child care	0.014	0.058	0.031	0.015	0.033	0.022
Teaching and research at universities and colleges	0.026	0.017	0.068	0.090	0.031	0.022
Postal work (incl. mail sorting and delivery)	0.035	0.025	0.044	0.051	0.030	0.012
Study-relevance of occupation (average across levels):						
Waiter jobs	0.001	0.001	0.001	0.000	0.000	0.000
Ordinary office work	0.022	0.018	0.048	0.056	0.015	0.008
Teaching at primary school level (incl. 10th grade)	0.265	0.018	0.007	0.009	0.006	0.002
Social and health work in private homes (incl. nursing homes)	0.006	0.005	0.004	0.002	0.004	0.003
Cleaning work (except private homes)	0.006	0.011	0.006	0.002	0.005	0.003
Sales work in stores	0.003	0.004	0.007	0.004	0.004	0.002
Nursing	0.003	0.003	0.004	0.004	0.004	0.503
Child care	0.011	0.009	0.005	0.003	0.006	0.005
Teaching and research at universities and colleges	0.015	0.021	0.017	0.012	0.013	0.010
Postal work (incl. mail sorting and delivery)	0.002	0.003	0.003	0.002	0.003	0.000

Type of student employment: Share of employment in the top-10 most common student employment types during enrollment. Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Study-relevance of occupation: All primary jobs for adults with a higher education degree age 35-53 in Denmark in the years 1996-2020. Our measure of study-relevance is the employment share in the occupation among higher education graduates age 35-53 with the same level and field during the years 1996-2020. Occupations are defined using the 4-digit DISCO-08 code. Source: Administrative registers, Statistics Denmark.

Tables 1-3 document selection into student jobs by level and field. Figure 1 shows the probability of working in a study-relevant job or in a high-skill job by high school preparedness (GPA, track, and math level) and by socio-economic status (parental income and education). The probabilities are very similar across all measures, suggesting little selection on prior skills and parental background. Only students with advanced high school math have a higher propensity to work in study-relevant jobs, while technical track graduates have a lower propensity of working.

Overall, we document that there is a lot of sorting into levels and fields of higher education, but not into student jobs conditional on level and field of education. Therefore, in the next section, we focus directly on the association between types of student jobs and labor market outcomes after exit from higher education.

5. Does the Type of Student Work Matter?

In this section, we analyze the relationship between different types of student work experience and labor market outcomes after dropping out or graduating. We estimate the following multiple linear regression model:

$$Y_{ist} = \sum_{t=1}^{14} \delta_t^s 1[\mathrm{T} = \mathrm{t}]\, H_i^0 + \sum_{t=1}^{14} \alpha_t^s 1[T = t] H_i^1 + X_{is} + v_t + \gamma_y + \varepsilon_{ist} \qquad (1)$$

where Y_{ist} denotes the labor market outcome t years after exit from higher education for individual i with education level s. The explanatory variable of primary interest is H_i^j denoting cumulated student work experience of individual i in student-job type j. We estimate (1) for two measures: First, $j \in \{0, 1\}$ indicates low ($j = 0$) or high ($j = 1$) skill requirements for the measure of skill content. Second, $j \in \{0, 1\}$ indicates below ($j = 0$) or above ($j = 1$) median study-relevance of occupation within the student's education level and field of study for the measure of study-relevance. The last terms denote controls that vary at the individual and education level, X_{is}, time since exit from higher education ν_t, year effects γ_y, and an idiosyncratic error term ε_{ist}.

Figures 2-5 display OLS estimates $\hat{\delta}_t^s$ of the impact of an additional year of student work experience in low-skill jobs (Figures 2 and 4) and non-study-relevant jobs (Figures 3 and 5) as well as $\hat{\alpha}_t^s$ the impact of an additional year of student work experience in high-skill jobs (Figures 2 and 4) and study-relevant jobs (Figures 3 and 5) and corresponding 95% confidence intervals plotted by years since higher education exit. We estimate (1) using two outcome variables, Y_{ist}: log(earnings) in Figures 2 and 3 and an indicator for having a job requiring high-skill in Figures 4 and 5. We estimate (1) separately by level of highest completed education, s.[11]

To quantify the importance of selection on observables, we estimate four specifications of (1) that differ in which control variables are included in X_{is}. The baseline specification only includes field of last enrollment, the second specification adds controls for high school preparedness, the third specification adds controls for parental background, and the fourth also controls for gender and location of residence before enrollment (at age 18). In all figures, we present the baseline specification in a darker color and add the specifications with controls in lighter monochromatic colors. Consistent with the descriptive statistics in Section 4, we find that sorting on high school preparedness and SES into high-skill study jobs does not significantly change the estimates of the impact of an additional year of student work experience on post-graduation labor outcomes. The estimates in Figures 2-5 are never significantly different from each other and the confidence intervals are almost fully overlapping, thus $\hat{\delta}_t^s$ and $\hat{\alpha}_t^s$ are robust to the additional controls in X_{is}.

5.1. Earnings and the Probability of a High Skill Job

Figures 2 and 3 show the impact of an additional year of student work experience on post-graduation yearly earnings. Overall, we estimate that one year

of any type of student work experience is associated with a substantial earnings premium. This earnings premium is higher and more persistent for high-skill experience relative to low-skill experience. One year of high-skill student work is associated with a 20% higher income in the year after exit from higher education (Figure 2). The estimate is similar across levels of education and if using the measure of study-relevant work experience as main explanatory variable (Figure 3).

Figures 4 and 5 show the impact of an additional year of student work experience on the probability of working in a high-skill job after graduation. One year of high-skill work experience is associated with a 15-27 percentage points (pp) increase in the probability of working in a high-skill job in the year after exit from higher education (Figure 4). This effect fades out over time, but remains positive and significant fourteen years after exit for most degrees. On the other hand, the high-skill employment premiums are smaller for study-relevant work experience (Figures 5). This might indicate that part of the employment premium and its persistence is due to individuals staying in the same occupation (if not the same job) started during enrollment.

5.1.1. Dropouts

For dropouts, Figure 2 (a) shows that one more year of *any* type of student work experience is associated with an earnings premium of around 25% one year after exit from higher education. This premium decreases after the first year after exit, but remains high and persistent for all types of experience – around 20% (10%) for experience in high-skill (low-skill) study jobs and around 15% for experience in study-relevant study jobs; see Figures 2 and 3 (a).

Figures 4 and 5 (a) shows that high-skill work experience is associated with a substantial 20 pp increase in the probability of being employed in a high-skill job after dropout. This premium decreases to 10 pp over the years, but remains substantial. The effect of low-skill experience is significantly positive, but only a few percent.

Overall, any type of student work experience is (equally or) more valuable on the labor market for dropouts than for graduates. This may be because dropouts search for jobs in a wider (less study-specific) labor market than graduates, and employers may put more weight on their work experience than their academic credentials. Thus, the positive work experience signal becomes even more important given the negative signal of dropping out. An alternative explanation might be that they simultaneously started working and decided to drop out; e.g., they may have received an attractive job offer before master's graduation and never completed their master's thesis.

5.1.2. Graduates

For both types of professional degrees (KVU and MVU) the earning premiums are around 20-25% in the first year after exit, but fade out. Eight years af-

ter graduation, the earnings premium for high- and low-skill study experience is the same around 5%. The pattern is similar for the measure of study-relevance and for the high-skill employment premium; see Figures 2-5 (b) and (c).

For academic university degrees, Figures 2-5 (d) and (e) reveal a substantial difference between graduates with a bachelor's degree and graduates with a master's degree. Graduates with a bachelor's degree are more akin to dropouts in the sense that the natural progression of studies would have taken them to a master's degree. Both the earnings and employment premiums for high-skill experience decline over time since exit from enrollment, but remain significantly positive. These patterns again suggest that student experience in a high-skill job might partly counteract the negative signal of dropping out or having a bachelor's degree without a master's degree.

For graduates with a master's degree, Figure 2 (e) shows that the earnings premium for having an additional year of high-skill experience is double that of having one more year of low-skill experience. The premium is persistent over time, after an initial drop during the first years after graduation. Fourteen years after graduation, the earnings premium for high-skill student work experience is 10%. Figure 4 (e) shows that there is also an initial employment premium of 15 pp that fades away fourteen years after graduation. This indicates that master's graduates with and without study-relevant experience converge to the same job skill level eventually, but it takes more than a decade.

5.1.3. Field of Education

In Appendix* Figures A.1 to A.24 we show that the empirical estimates and patterns described above are robust across most fields, however, there are a few exceptions. For professionally oriented degrees in humanities, arts, and education as well as in life sciences there is a positive earnings premium to student work experience, but job type does not seem to matter much. The earnings premiums to high-skill experience are especially large and significant for university degrees in social sciences, business, and natural sciences. In health sciences we only estimate a significant earnings premium for professional bachelor's degrees (overwhelmingly nurses) and earnings converge seven years after exit, which could be driven by the fact that nursing programs have a significant component of on-the-job training embedded. For doctors (master's graduates in medicine), high-skill experience matters only in the early years. There is, however, an employment premium of high-skill experience. One possible explanation is that the earnings premium is only driven by the employment premium, but earnings converge as most health jobs are in the public sector where wages are compressed.[12]

6. Discussion and conclusion

Experience in student jobs, especially jobs with high skill content and in study-relevant occupations, matters for post-exit labor market outcomes. The

association is stronger in the first years after exit from higher education, but it is still significant fourteen years after exit for most levels and fields of education.

We document selection into relevant student jobs by level and field, but limited selection by widely used measures of skill and opportunity. We consider our analysis descriptive, since a causal interpretation relies on strong conditional mean independence assumptions. Nevertheless, given the large magnitudes, the selection on unobservables has to be extremely strong to drive the estimated student work experience premiums to zero. Which unobservables that are important determinants of labor market outcomes, and potentially also the selection into student jobs, are we missing from our analysis? Some candidate variables are motivation, socio-emotional and interpersonal skills. How important are these for the association between student work experience and later life outcomes? We leave this and several other important questions for future research. Are the labor market productivity gains from student jobs larger than the distortion effect they may have on academic achievement?[13] This will ultimately determine if policy makers should design policies to encourage, rather than discourage, working while enrolled in higher education. This paper suggests a role for creating more student jobs that can complement academic education.

Noter

* The appendix is available here: https://drive.google.com/file/d/1msbNMNW_xjgZr8gh_mqnoRvOkkILvMid/view

1. We thank the editor, Mette Ejrnæs, an anonymous referee, and Helena Skyt Nielsen for constructive comments. We gratefully acknowledge financial support from the Independent Research Fund Denmark (DFF) – Learning and Quality in Education research project "The life-cycle effects of student debt". Declarations of conflict of financial interest: None. The usual disclaimers apply.
2. University of Chicago, TrygFonden's Centre for Child Research – Aarhus University, and IZA. E-mail:jjoensen@uchicago.edu
3. Department of Economics and Business Economics and TrygFonden's Centre for Child Research – Aarhus University, Fuglesangs All´e 4, 8210 Aarhus V. E-mail: ematana@econ.au.dk.
4. Students self-finance a considerable amount of their higher education costs through working part-time. Leslie (1984) reports that college students in the U.S. self-finance around 20% of college costs and Bound et al. (2010) show that student employment has increased over time.
5. Ruhm (1997) provides a survey of the potential effects of student employment on subsequent labor market success.
6. Important policy decisions have even been made based on the belief that student employment adversely affects academic achievement (Stinebrickner and Stinebrickner, 2003), for example, the major 1988 study aid reform in Denmark (Nielsen et al., 2010; Arendt, 2013).
7. Maritime Education and Training Institutions also offer professionally oriented short cycle and bachelor's degree programs.
8. There are also university level institutions offering bachelor's and master's programs in architecture, design, music, fine and performing arts. Note that universities also offer PhD degree programs, but we abstract from them here as PhD students are more reasonably considered university employees as opposed to students.
9. Detailed variable definitions and source registers are listed in Appendix* Table A.2.

10. Primary field of enrollment is defined as the field in which the student is enrolled the longest during the enrollment period.
11. Figures A.1 to A.24 in the Appendix* display the corresponding estimates separately by level of highest completed education and primary field of enrollment.
12. In complementary work, Fadlon et al. (2020) estimate the subsequent labor market effects of the initial internship for physicians that is randomly assigned by lottery.
13. This is the focus of Joensen and Mattana (2022) who disentangle the mechanisms through which student employment affects academic and labor market outcomes. They find that while a few hours (up to around 9 per week) of student employment boosts academic course credit accumulation, the downside is that too many hours (more than around 18 per week) slow down academic progression.

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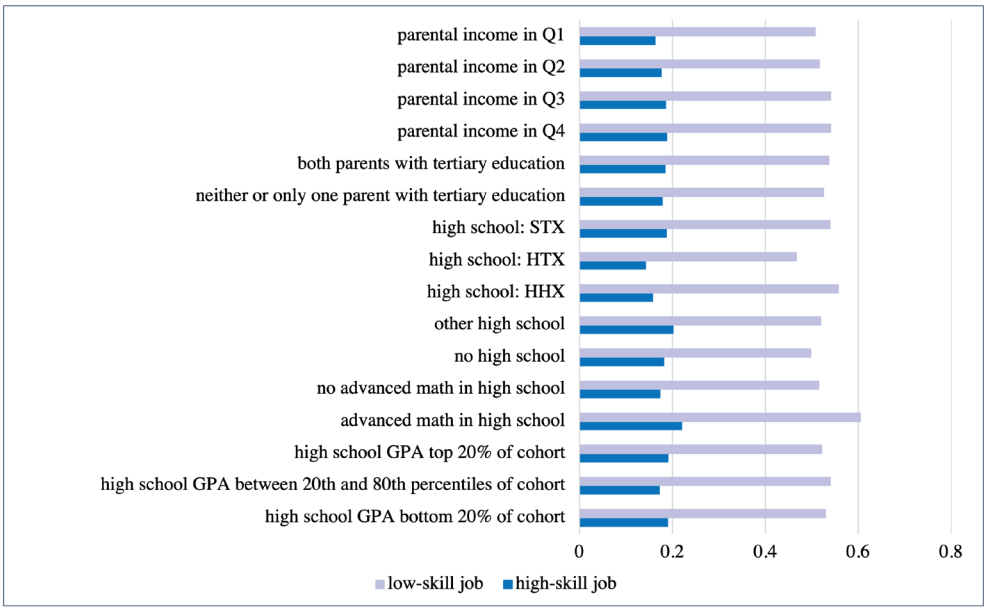
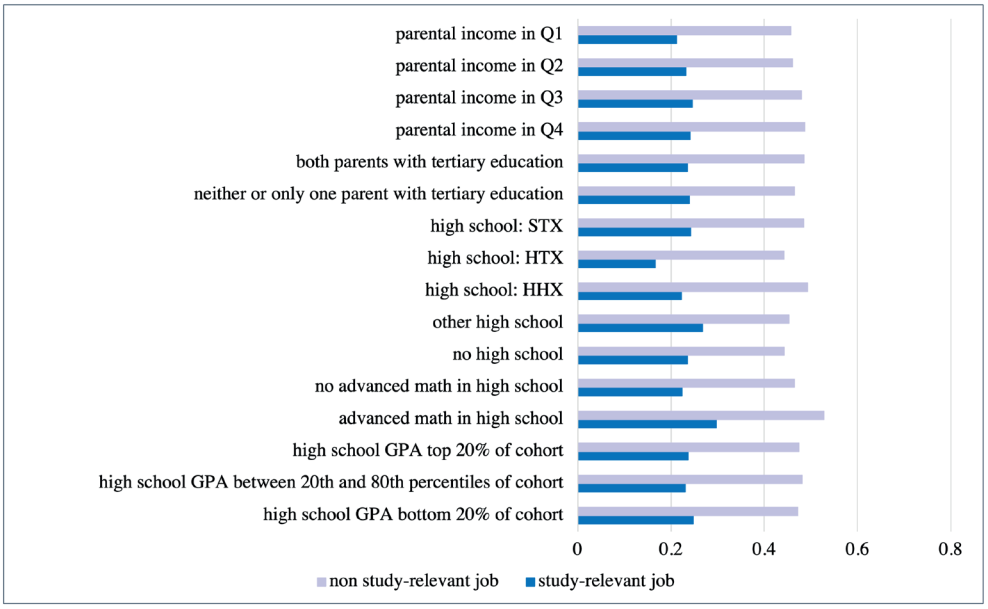
Figure 1: Sorting into student job types.



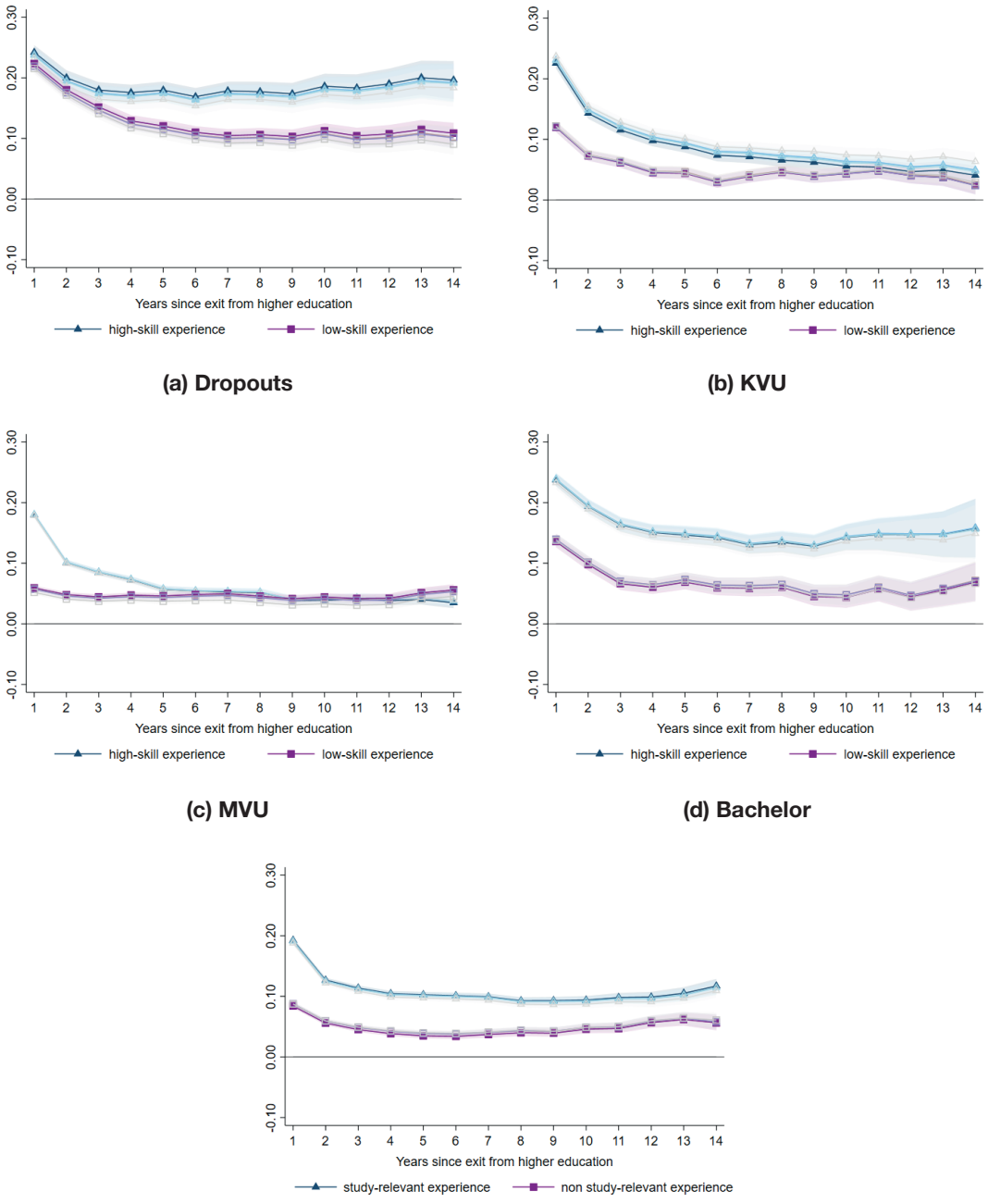
(a) skill content



(b) study-relevance

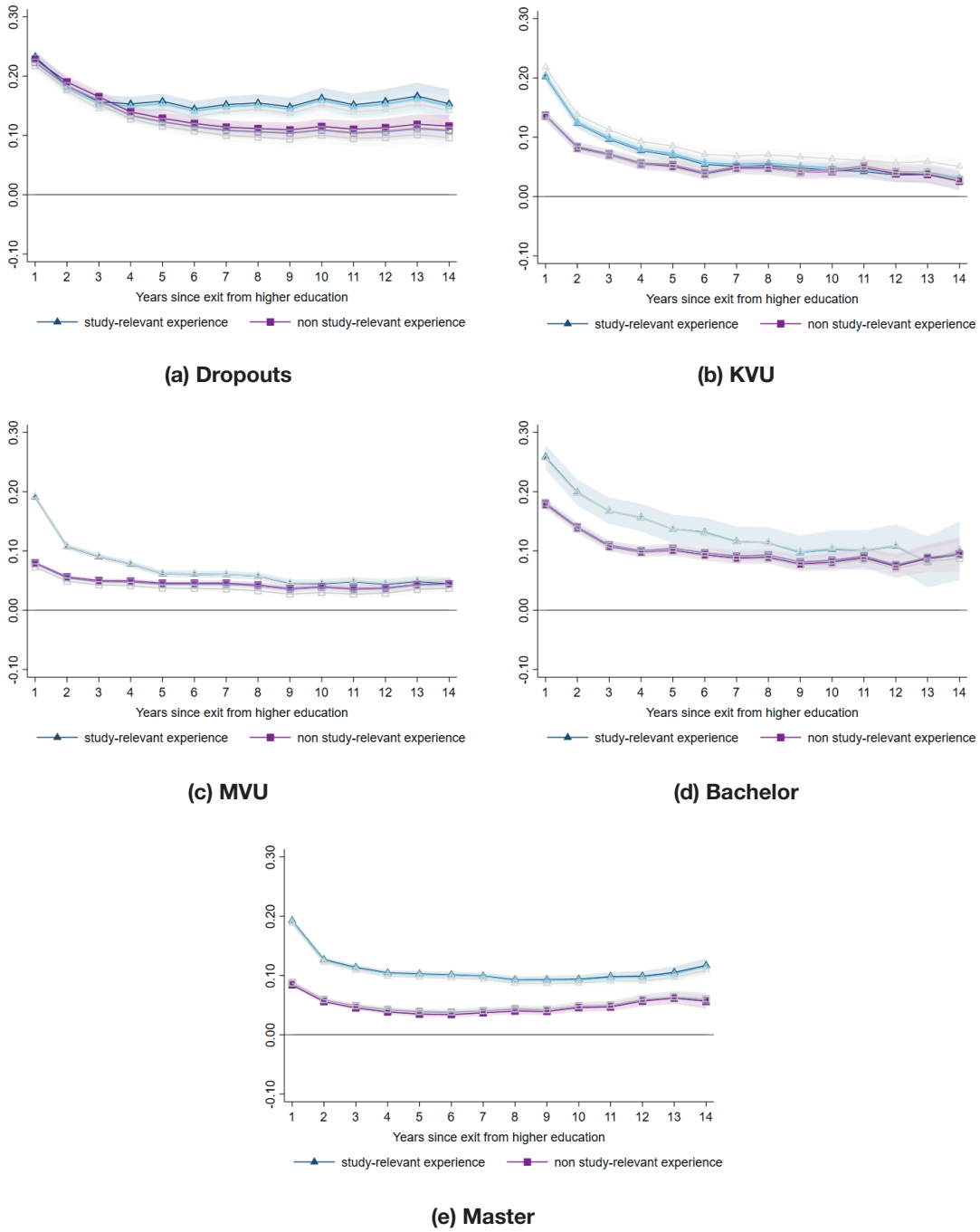
This figure shows the share of employment in the type of student jobs by individual background: by parental education and income; by high school GPA, track, and math course level. (a) shows employment shares in student jobs by skill requirements: low-skill and high-skill. (b) shows employment shares in student jobs by study-relevance: below and above median study- relevant occupation, respectively. Our measure of study-relevance is the employment share in the occupation among higher education graduates age 35-53 with the same level and field during the years 1996-2020. Occupations are defined using the 4-digit DISCO-08 code. Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark.

Figure 2: Impact of student work experience on earnings, by student job skill content.



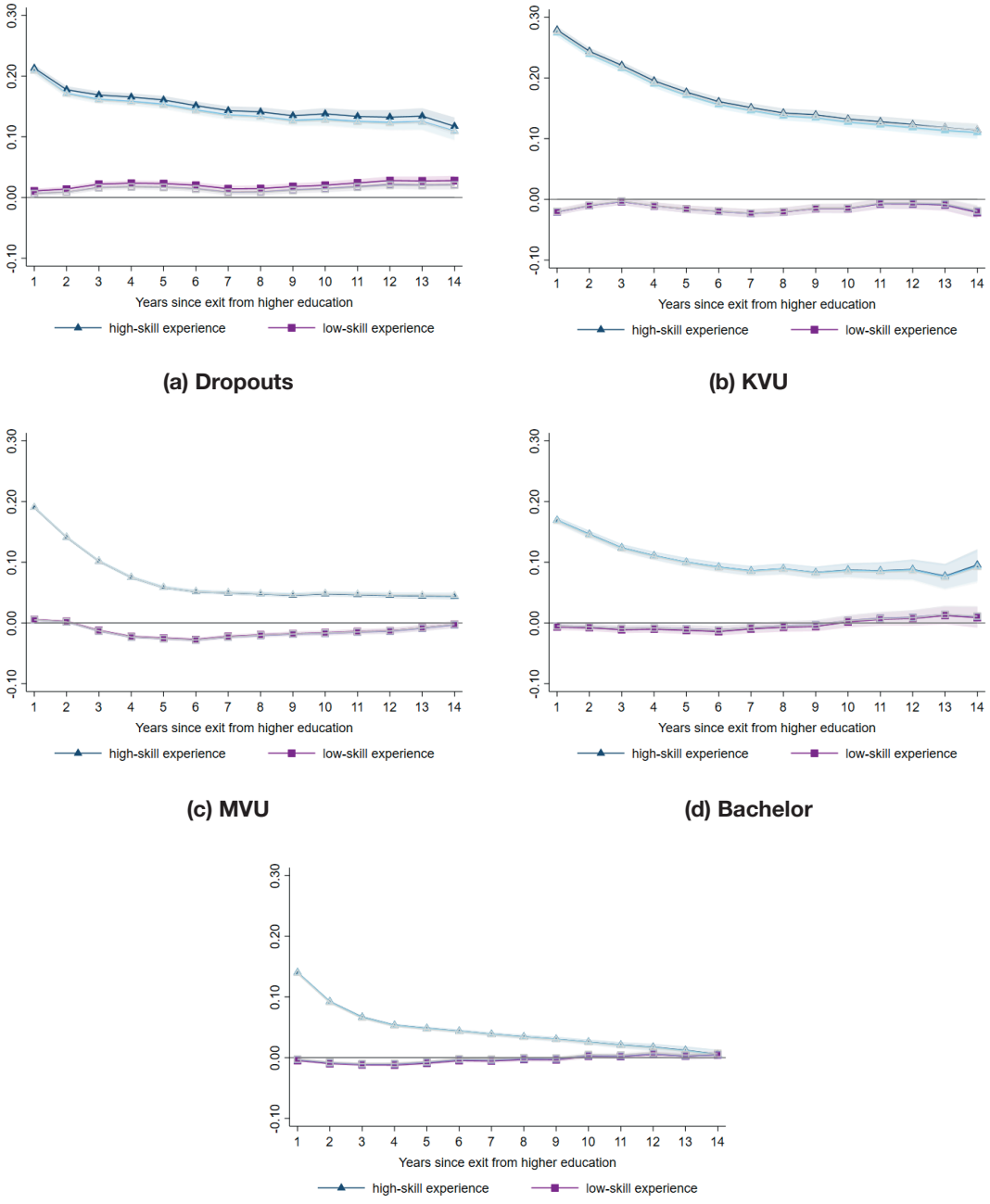
Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark. Sample split by highest completed degree. The figure displays OLS estimates of the impact of an additional year of student work experience in low-skill jobs (in violet squares) and high-skill jobs (in blue triangles) and corresponding 95% confidence intervals from the linear regression (1) plotted by years since higher education exit. Outcome variable: log(earnings). Baseline specification: controls include year since higher education exit, calendar year, and field of last enrollment. Additional specifications (lines of lighter monochromatic colors), sequentially add controls for high school track (STX, HHX, HTX, other high school equivalent) and GPA (top and bottom 20% of cohort GPA distribution), parental education and income quartiles, gender and location of residence at age 18 (Copenhagen, greater Copenhagen, large cities, rest of Denmark).

Figure 3: Impact of student work experience on earnings, by study-relevance of student job.



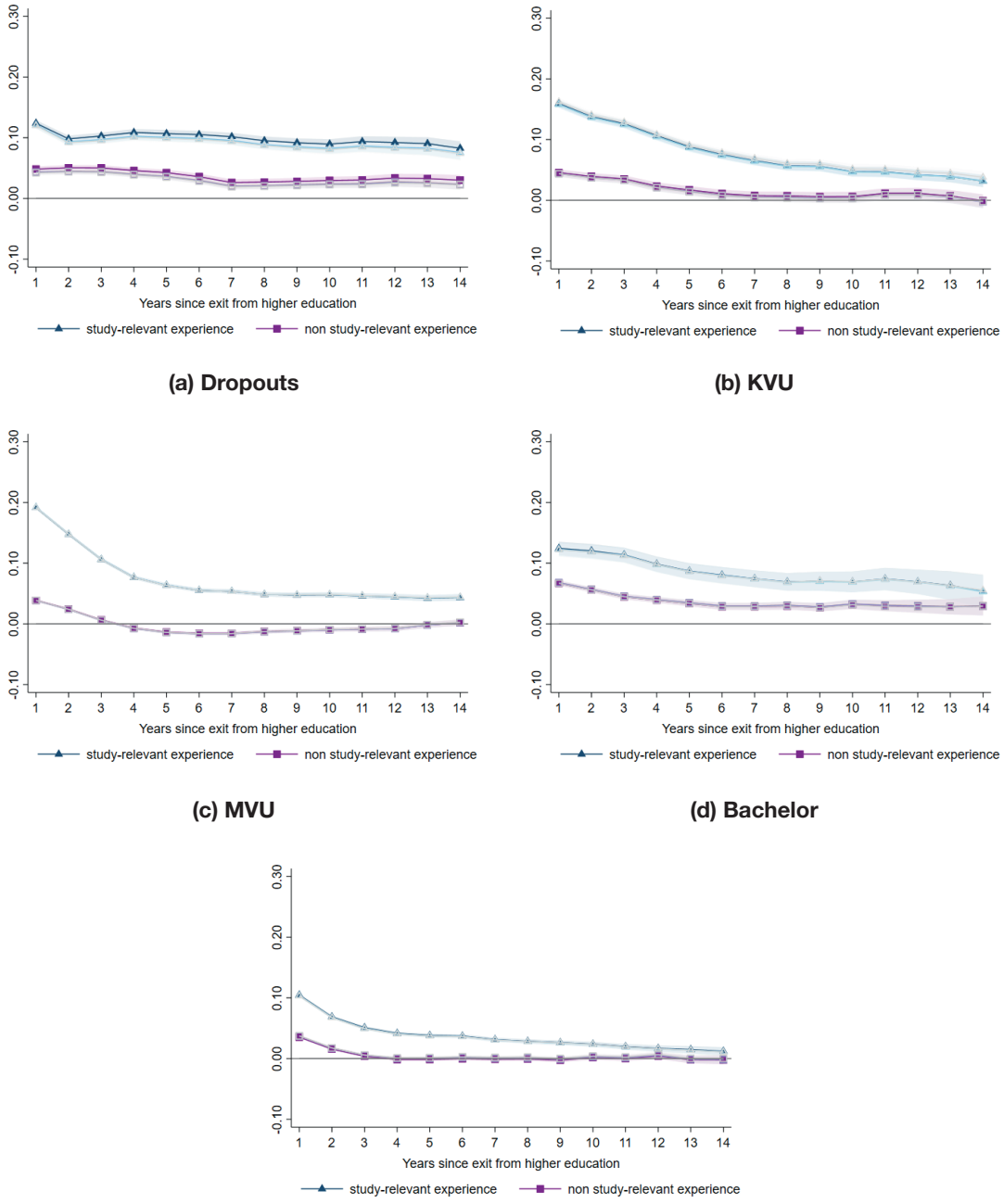
Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark. Sample split by highest completed degree. The figure displays OLS estimates of the impact of an additional year of student work experience in non-study-relevant jobs (in violet squares) and study-relevant jobs (in blue triangles) and corresponding 95% confidence intervals from the linear regression (1) plotted by years since higher education exit. Outcome variable: log(earnings). Baseline specification: controls include year since higher education exit, calendar year, and field of last enrollment. Additional specifications (lines of lighter monochromatic colors), sequentially add controls for high school track (STX, HHX, HTX, other high school equivalent) and GPA (top and bottom 20% of cohort GPA distribution), parental education and income quartiles, gender and location of residence at age 18 (Copenhagen, greater Copenhagen, large cities, rest of Denmark).

Figure 4: Impact of student work experience on probability of high-skill employment, by student job skill content.



Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark. Sample split by highest completed degree. The figure displays OLS estimates of the impact of an additional year of student work experience in low-skill jobs (in violet squares) and high-skill jobs (in blue triangles) and corresponding 95% confidence intervals from the linear regression (1) plotted by years since higher education exit. Outcome variable: employment in job requiring high-skill. Baseline specification: controls include year since higher education exit, calendar year, and field of last enrollment. Additional specifications (lines of lighter monochromatic colors), sequentially add controls for high school track (STX, HHX, HTX, other high school equivalent) and GPA (top and bottom 20% of cohort GPA distribution), parental education and income quartiles, gender and location of residence at age 18 (Copenhagen, greater Copenhagen, large cities, rest of Denmark).

Figure 5: Impact of student work experience on probability of high-skill employment, by study-relevance of student job.



Sample: All individuals who start higher education in Denmark during the years 1996-2015 and by age 25. Source: Administrative registers, Statistics Denmark. Sample split by highest completed degree. The figure displays OLS estimates of the impact of an additional year of student work experience in non-study-relevant jobs (in violet squares) and study-relevant jobs (in blue triangles) and corresponding 95% confidence intervals from the linear regression (1) plotted by years since higher education exit. Outcome variable: employment in job requiring high-skill. Baseline specification: controls include year since higher education exit, calendar year, and field of last enrollment. Additional specifications (lines of lighter monochromatic colors), sequentially add controls for high school track (STX, HHX, HTX, other high school equivalent) and GPA (top and bottom 20% of cohort GPA distribution), parental education and income quartiles, gender and location of residence at age 18 (Copenhagen, greater Copenhagen, large cities, rest of Denmark).