

CGHE Seminar
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Social Origin, Skills and Graduates' Outcomes in Employment in Brazil



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Motivation and research problem

Although the system has expanded rapidly in recent decades, completing higher education in Brazil continues to be a highly selective and unequal transition (Carvalhoes and Ribeiro, 2019; Knop and Collares, 2019; Rodrigues, 2023).

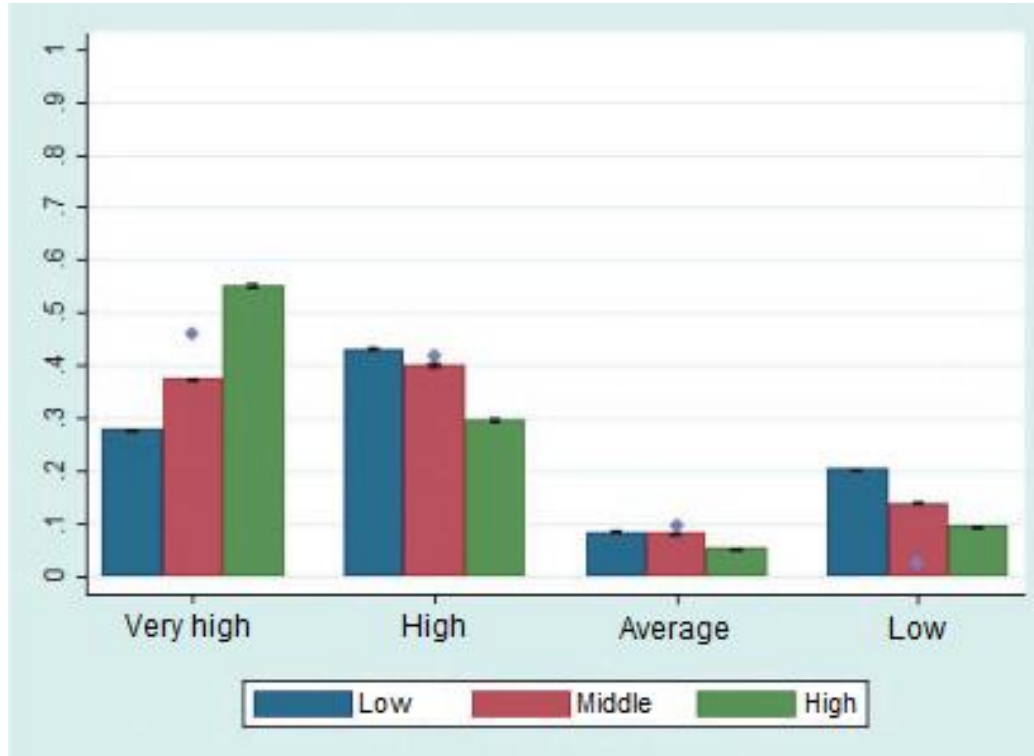
The participation of graduates in the labor market itself is highly heterogeneous, which has consequences for different outcomes of interest, such as wages, possibility of career progression and social recognition (Reis and Machado, 2015; Ribeiro and Schelegel, 2010; and Vieira, 2023a, 2023b).

Higher education matters for the results of graduates, but in a heterogeneous way (between social groups, majors, types of institutions, etc.) (Ribeiro and Schlegel, 2015; Caseiro and Maciente, 2019; Vieira, 2023).

*Since 2014, the National System of Evaluation of Higher Education (SINAES) has included follow-up actions for graduates in institutional evaluation.

Motivation (1): College completion is highly stratified among majors and institutions

Predicted probabilities of graduation by course returns and students' socioeconomic level (Brazil, 2007-2009)



Source: Carvalhaes and Ribeiro (2019), based on Enade/Inep 2007-2009.

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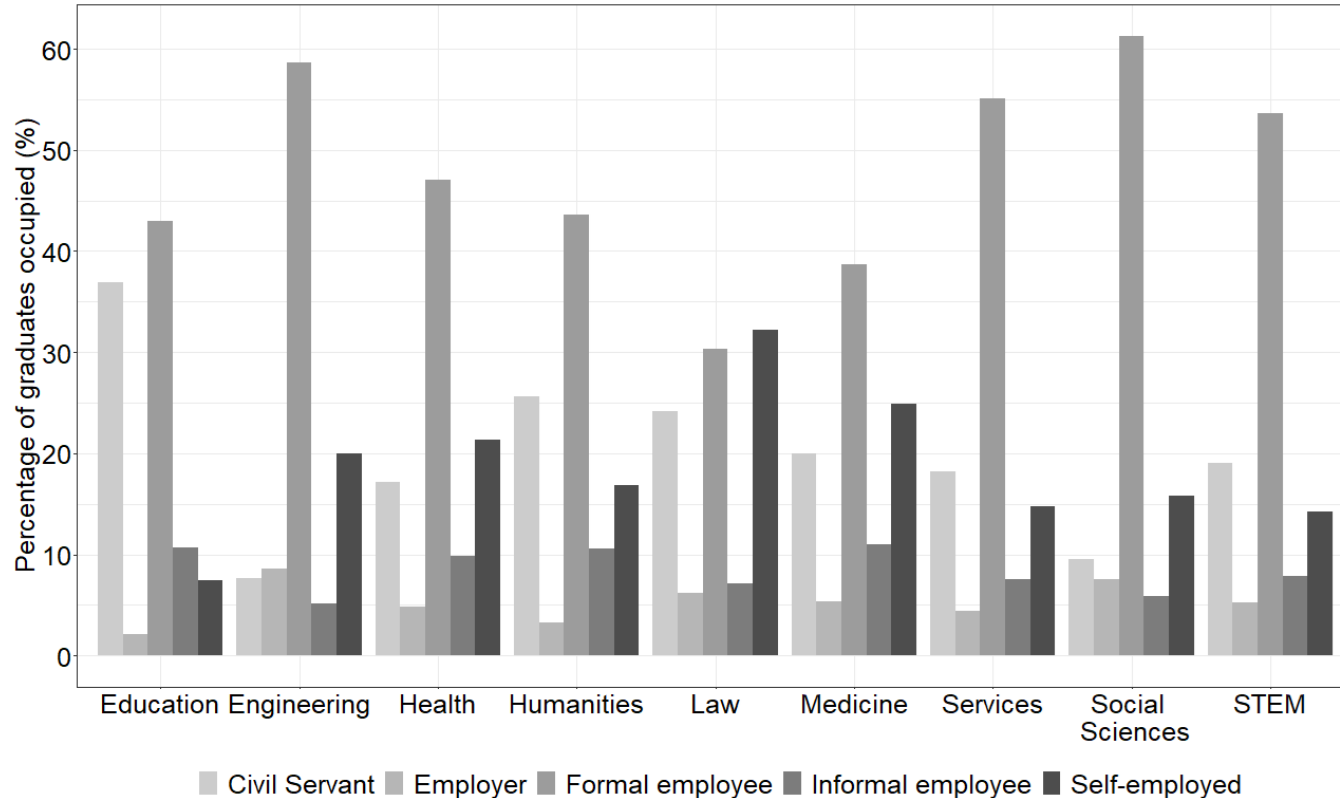
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Motivation (2): Participation in labor market varies across fields of study

Percentage of graduates among occupational positions, by field of study (Brazil, 2010)



Source: Population Census 2010.

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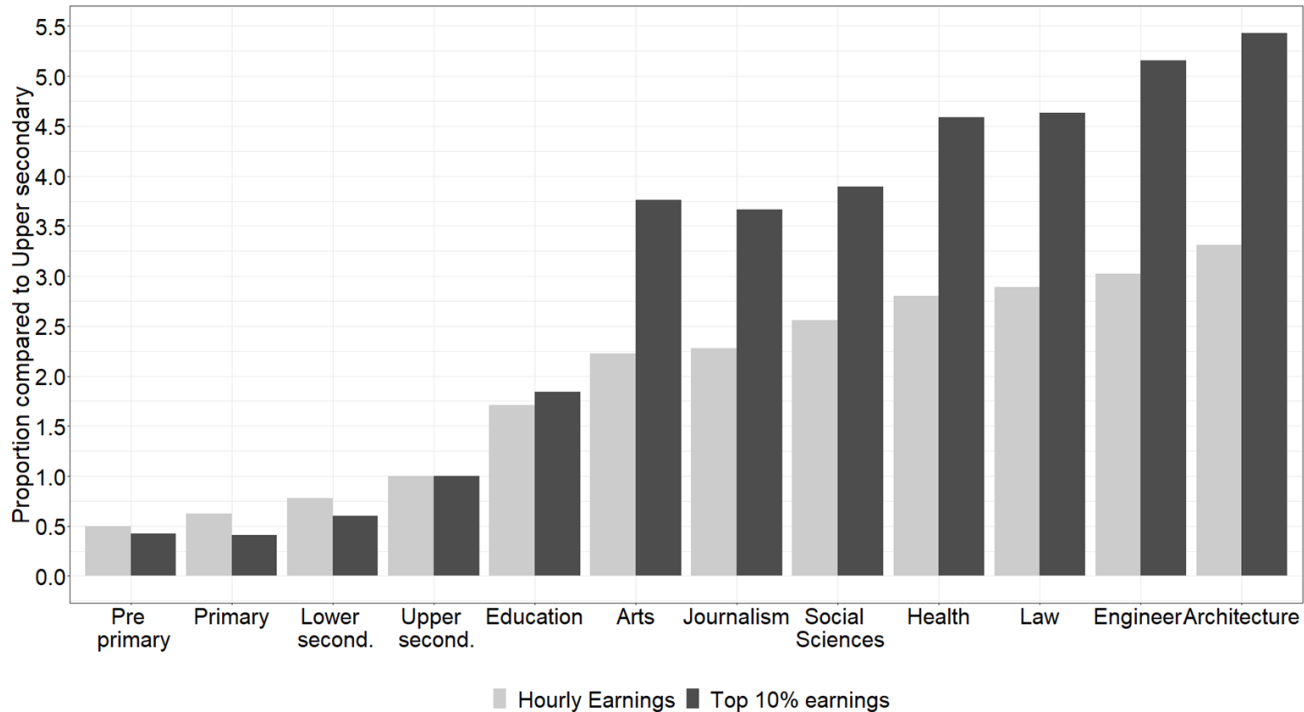
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Motivation (3): Graduates outcomes in labor market are horizontally stratified

Hourly earnings and participation in top 10% earnings compared to upper secondary (selected fields of study) (Brazil, 2010)



Source: Population Census 2010.

Research questions

- (1) How do distinctive characteristics of higher education training, such as the chosen field and the type of institution one attends, explain the differences in outcomes among graduates in formal employment?
- (2) What is the relationship between social disparities in the returns to a diploma in formal employment and qualitative differences in higher education training?
- (3) Do graduates of different undergraduate courses have higher or lower wage and occupational returns than they would have had they graduated from another major? In other words, does the observed returns result from selectivity bias or from a genuine effect of college education?
- (4) How, if at all, do the returns to undergraduate courses vary? Do we find evidence of negative or positive selection hypotheses?

Data and methods

Data sources

- a. Population Census 2010;
- b. National Exam of Student Performance (Enade) 2009-2011
- c. Annual Report of Social Information (RAIS) 2010-2015.

Outcomes

- a. Employment;
- b. Elite occupation (managers and professionals);
- c. Hourly wages;
- d. Top 10% earnings.

Covariates

Gender, race, type, age at graduation, socioeconomic status, region, moved to study, specific and general test scores.

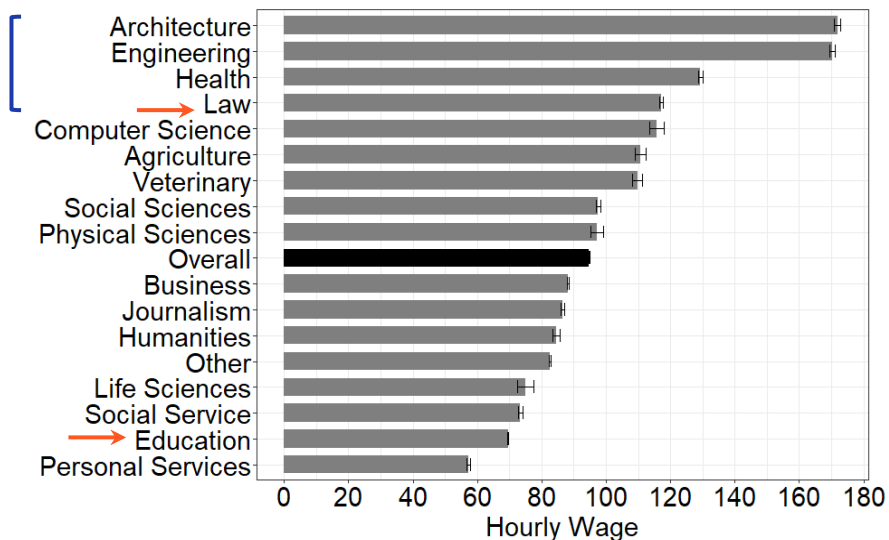
Analytical strategy

Regression models and augmented inverse probability weighted regressions (AIPW) (Giani et al. 2020; Glynn and Quinn 2010). AIPW seeks to overcome the problem of differential selection into “treatment” (e.g. Witteveen and Attewell, 2017; Payne, 2023).

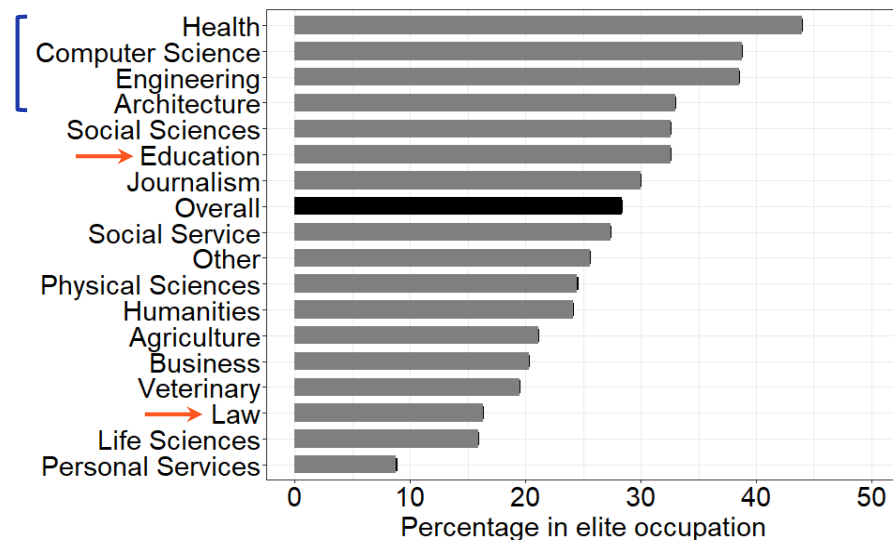
Descriptives by college major

Descriptive statistics by college major: hourly wage and elite occupation (Brazil, 2010-2015)

A - Hourly Wage

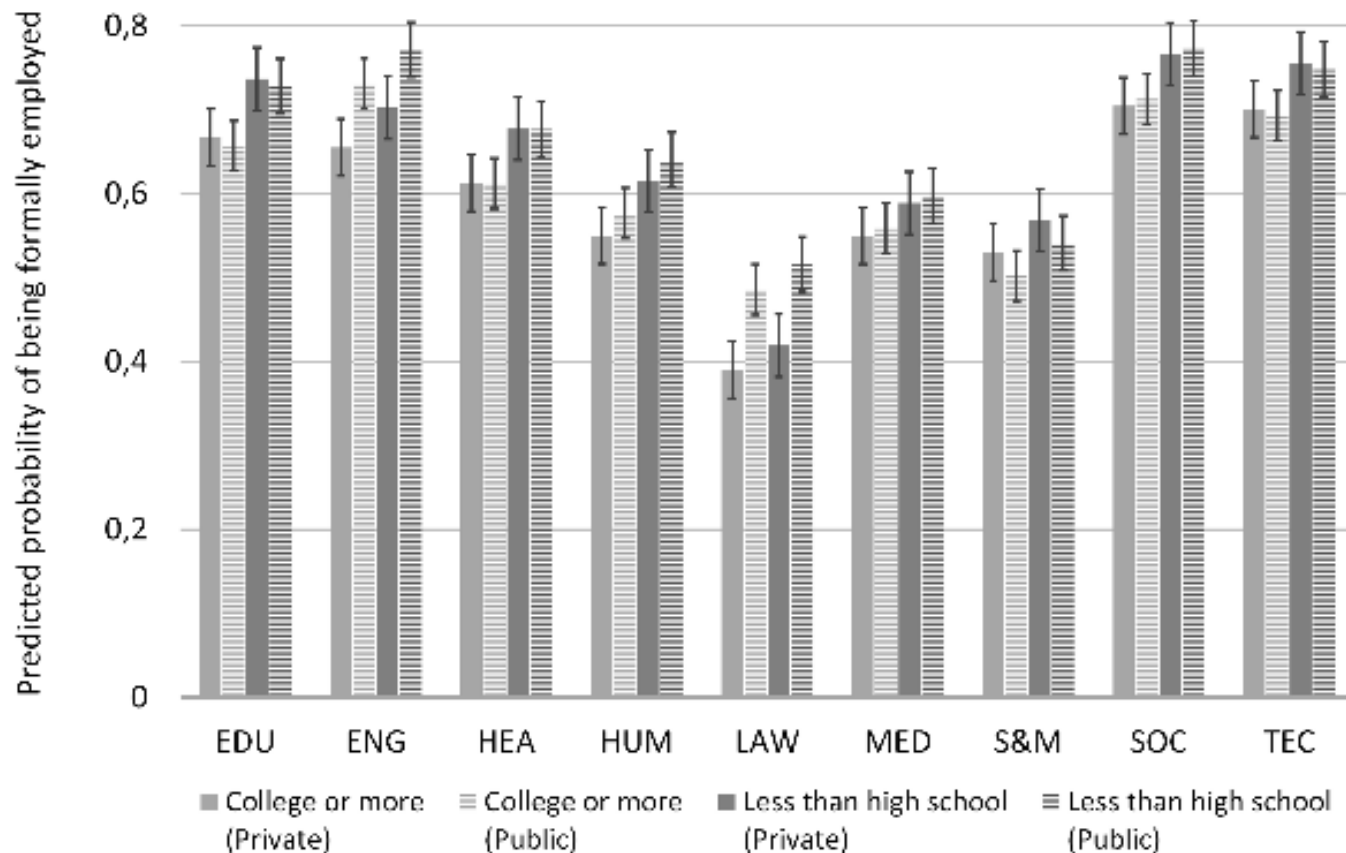


B - Elite occupation



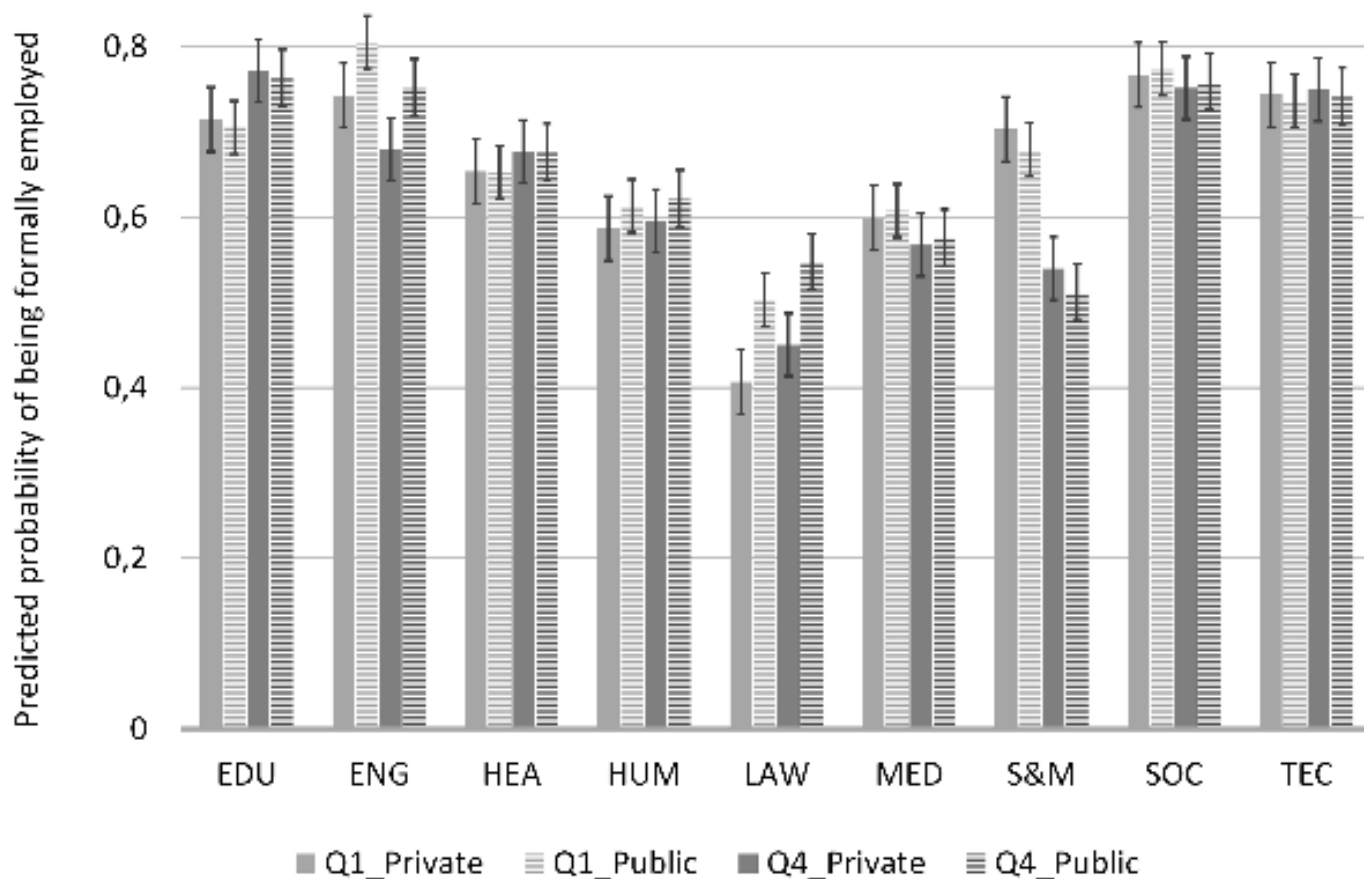
Source: Enade/Inep 2009-2011, RAIS/MTE 2010-2015.

Outcome (1): Predicted probability of being formally employed by social strata, by field of study and HEI sector



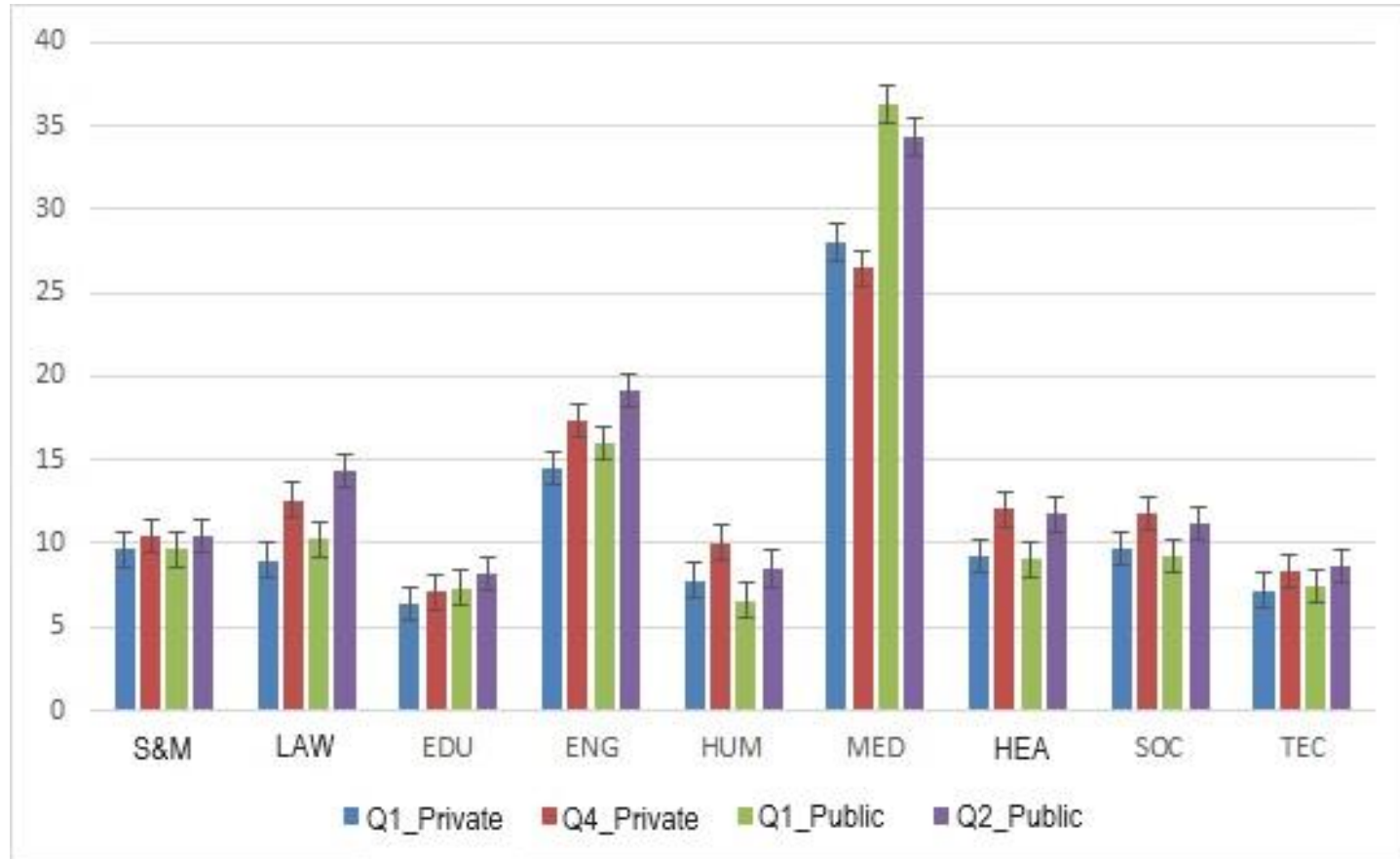
Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (2): Probability of being formally employed by quartile in career-specific knowledge, field of study and sector



Source: Enade 2009-2011, RAIS 2009-2015.

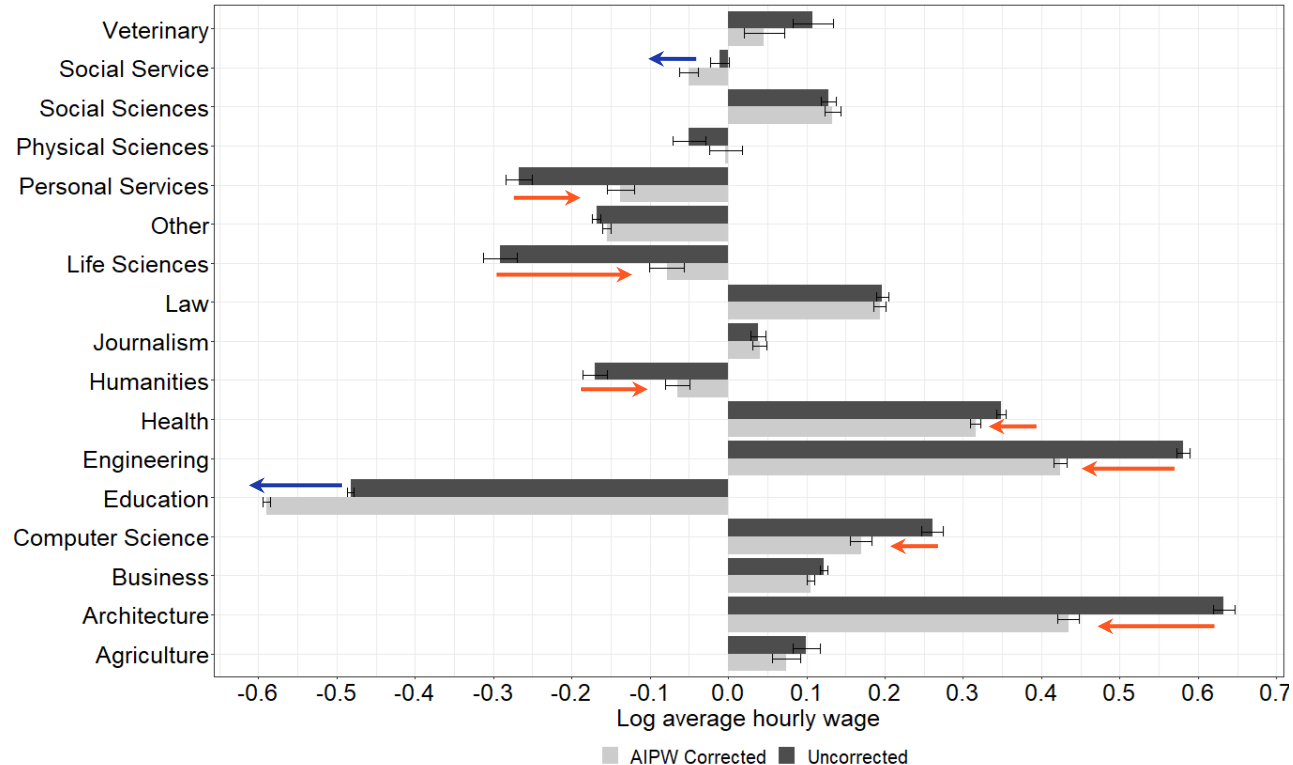
Outcome (3): Hourly wages by performance quartile in career-specific knowledge, field of study and sector



Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (5): Selection on observables: reweighting by inverse probability of graduation (AIPW)

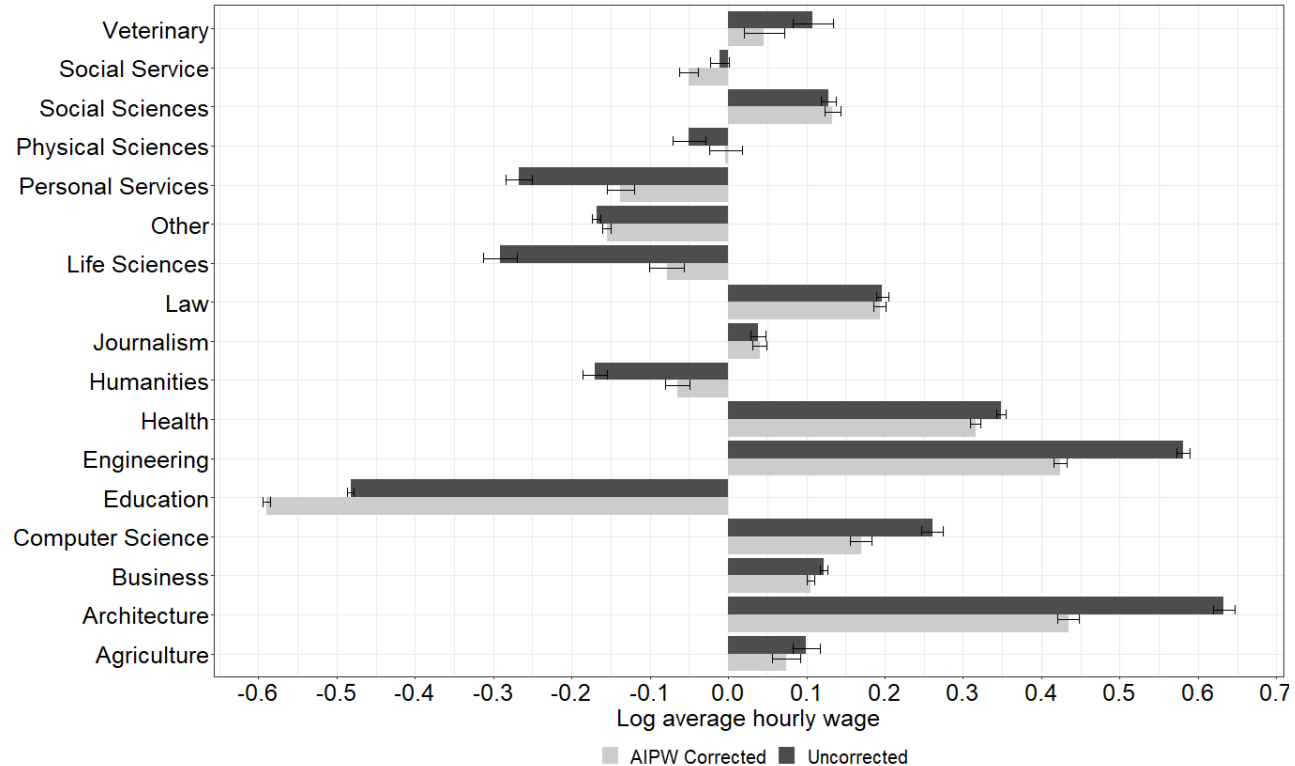
Average Treatment Effects of fields of study on logged average hourly wage using AIPW-corrected and uncorrected models (Brazil, 2010-2015)



Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (6): Selection on observables: reweighting by inverse probability of graduation (AIPW)

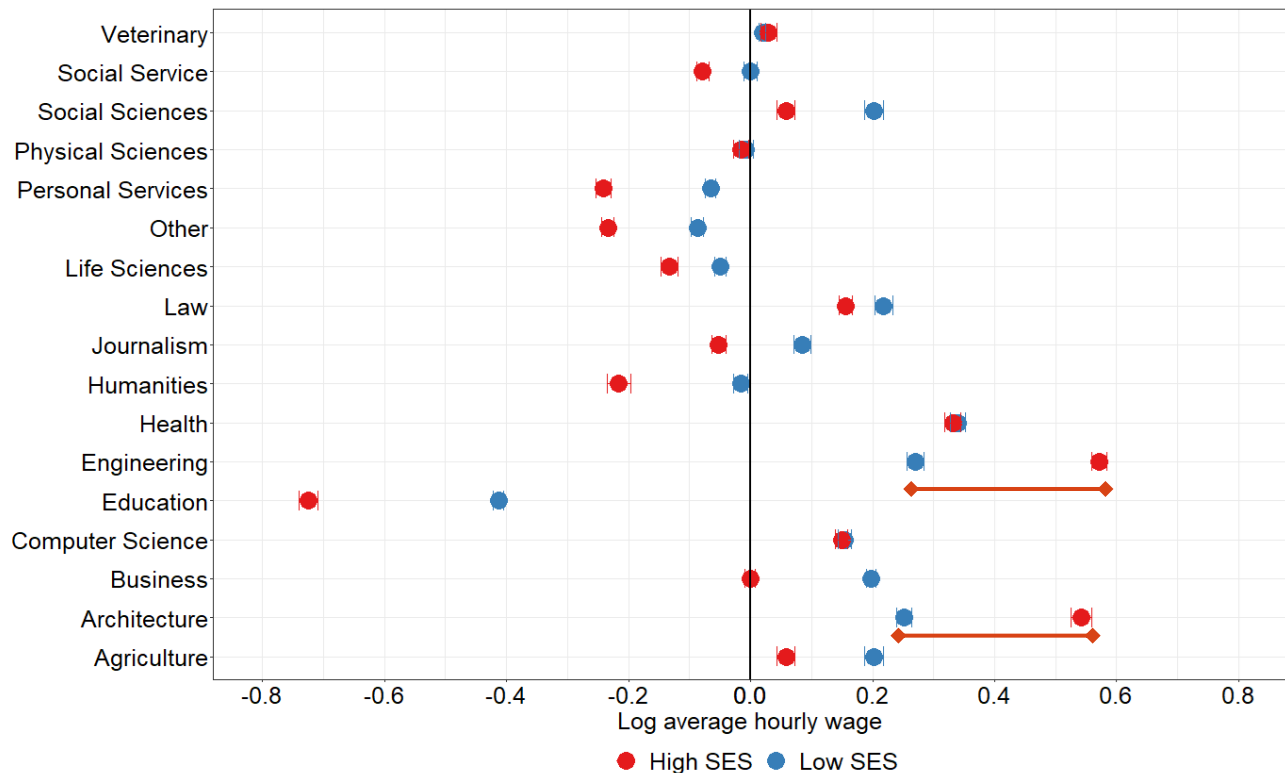
Average Treatment Effects of fields of study on logged average hourly wage using AIPW-corrected and uncorrected models (Brazil, 2010-2015)



Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (7): Selection on observables: reweighting by inverse probability of graduation (AIPW)

Average Treatment Effects of fields of study on logged average hourly wage using AIPW-corrected, by socioeconomic status (Brazil, 2010-2015)

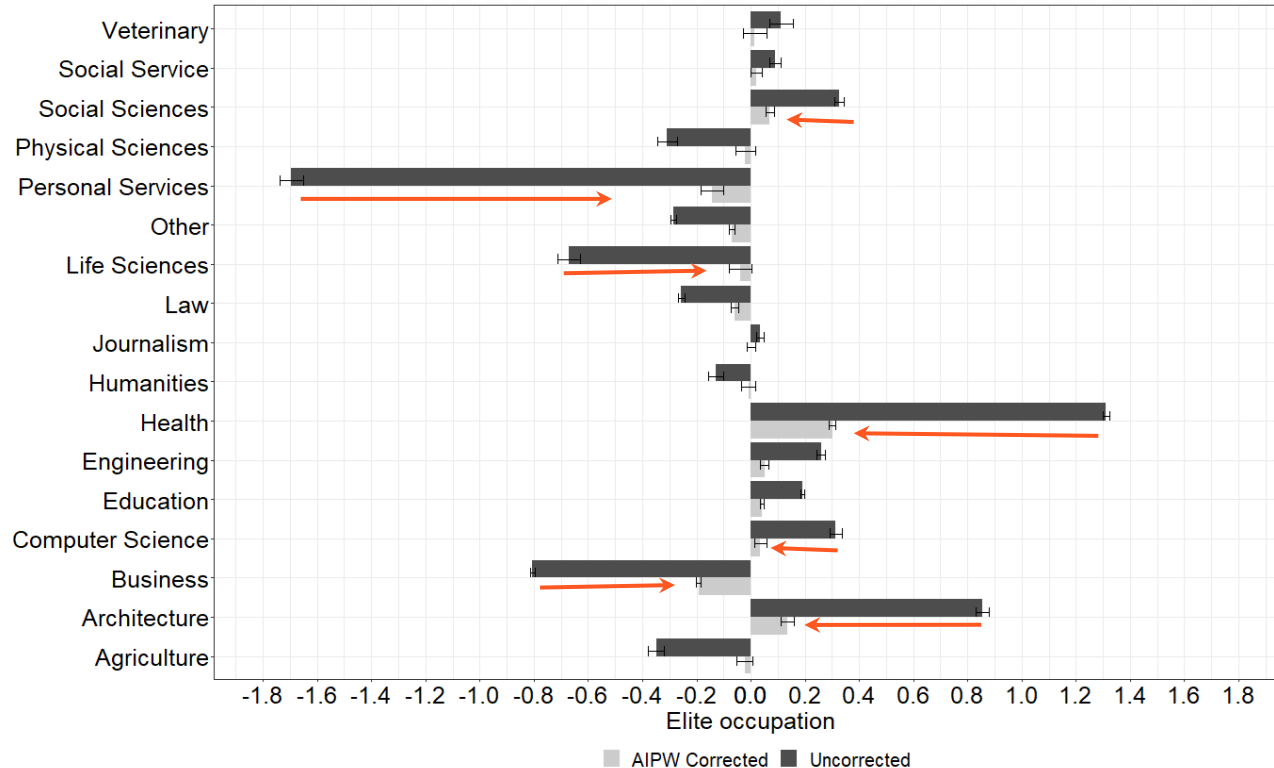


Exceptions to the pattern Low>High: Engineering, Architecture, Health, C.S., P.S.

Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (8): Selection on observables: reweighting by inverse probability of graduation (AIPW)

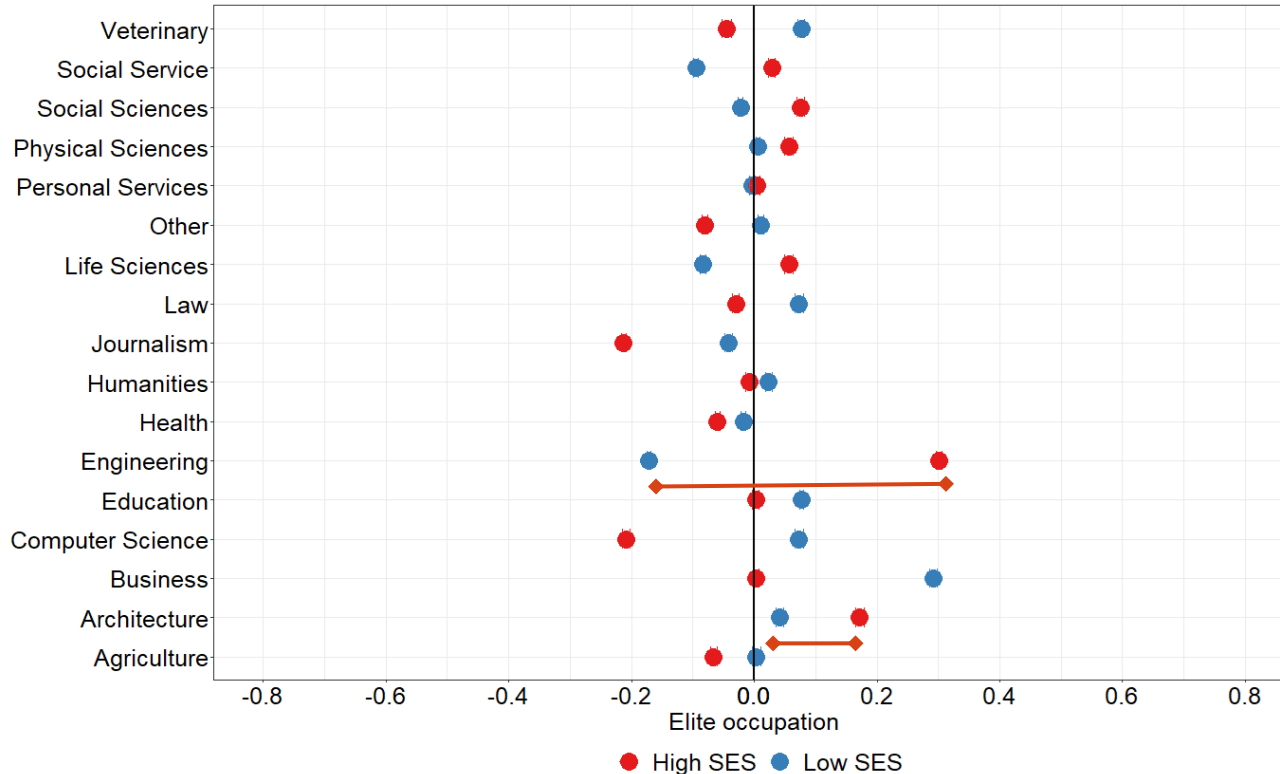
Average Treatment Effects of fields of study on elite occupation using AIPW-corrected and uncorrected models (Brazil, 2010-2015)



Source: Enade 2009-2011, RAIS 2009-2015.

Outcome (5=9): Selection on observables: reweighting by inverse probability of graduation (AIPW)

Average Treatment Effects of fields of study on elite occupation using AIPW-corrected, by socioeconomic status (Brazil, 2010-2015)



More mixed results:
- High SES: different return levels.
- Low SES: low occupational return (except for C.S.).

Conclusions

We find evidence that the effect of sample selectivity on the graduates outcomes in the labor market varies greatly between fields of study and labor market outcomes.

Although there is evidence of negative selection in a large number of areas, those with high returns (Architecture, Engineering, Health) show an inverted pattern, favoring above all high-SES graduates.

In general terms, the results indicate that the social origin effect survives, even after controlling for the selectivity effect, which points to possible limits for the “equalizing effect” of the diploma in Brazil or that controlling for selection into the college degree holder sample is insufficient.

Meanwhile, some questions remain open: Do degree effects persist after controlling for selection of unobservables? How do the effects vary between other institutional dimensions (type of institution, sectors etc.)?

References

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Cheng, S., Brand, J. E., Zhou, X., Xie, Y., & Hout, M. (2021). Heterogeneous returns to college over the life course. *Science Advances*, 7(51), eabg7641.

Dale, Stacy B., & Krueger, Alan B. (2014). Estimating the Effects of College Characteristics over the Career Using Administrative Earnings Data. *Journal of Human Resources*, 49(2), 323–358.

Kirkeboen, Lars J., Leuven, Edwin, & Mogstad, Magne. (2016). Field of Study, Earnings, and Self-Selection. *The Quarterly Journal of Economics*, 131(3), 1057–1111.

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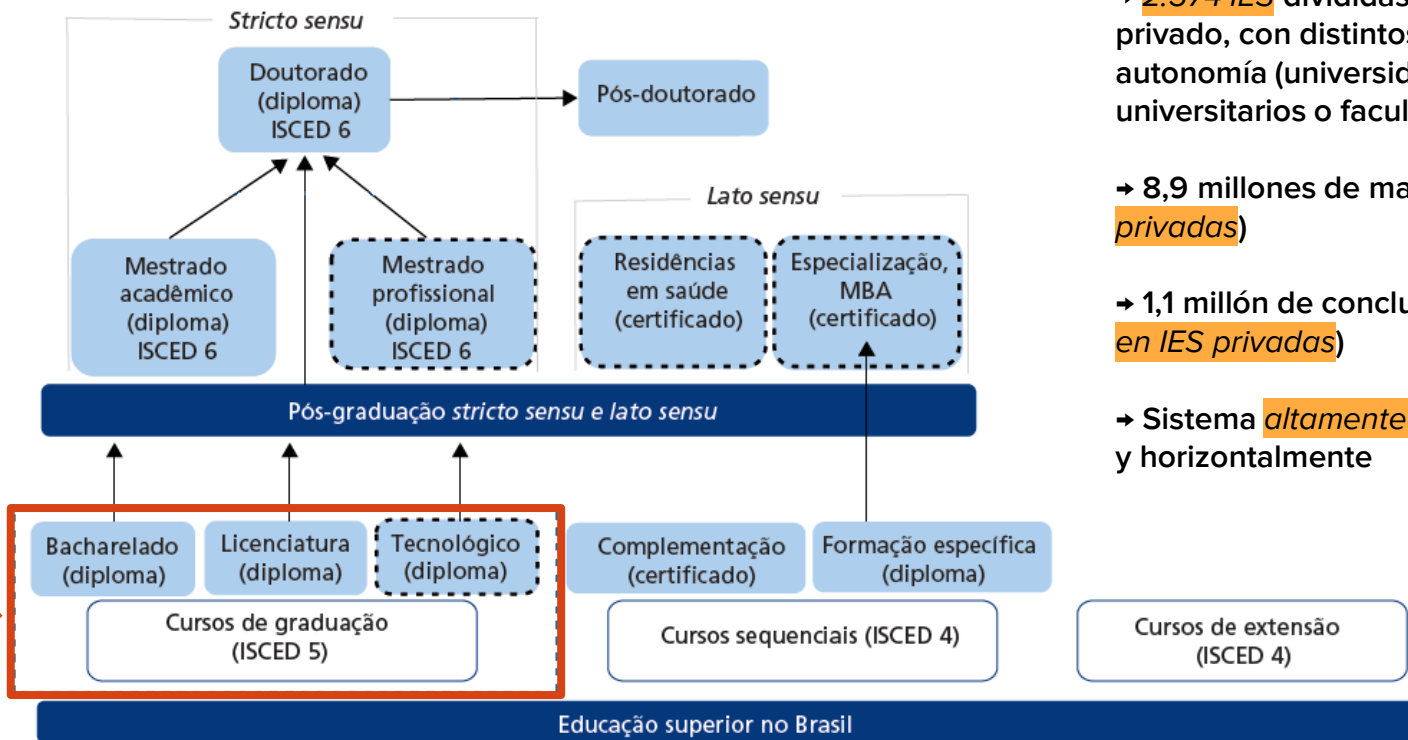
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Witteveen, D., & Attewell, P. (2017). The earnings payoff from attending a selective college. *Social Science Research*, 66, 154–169.

Appendix

¿Cómo funciona el sistema de educación superior brasileño?



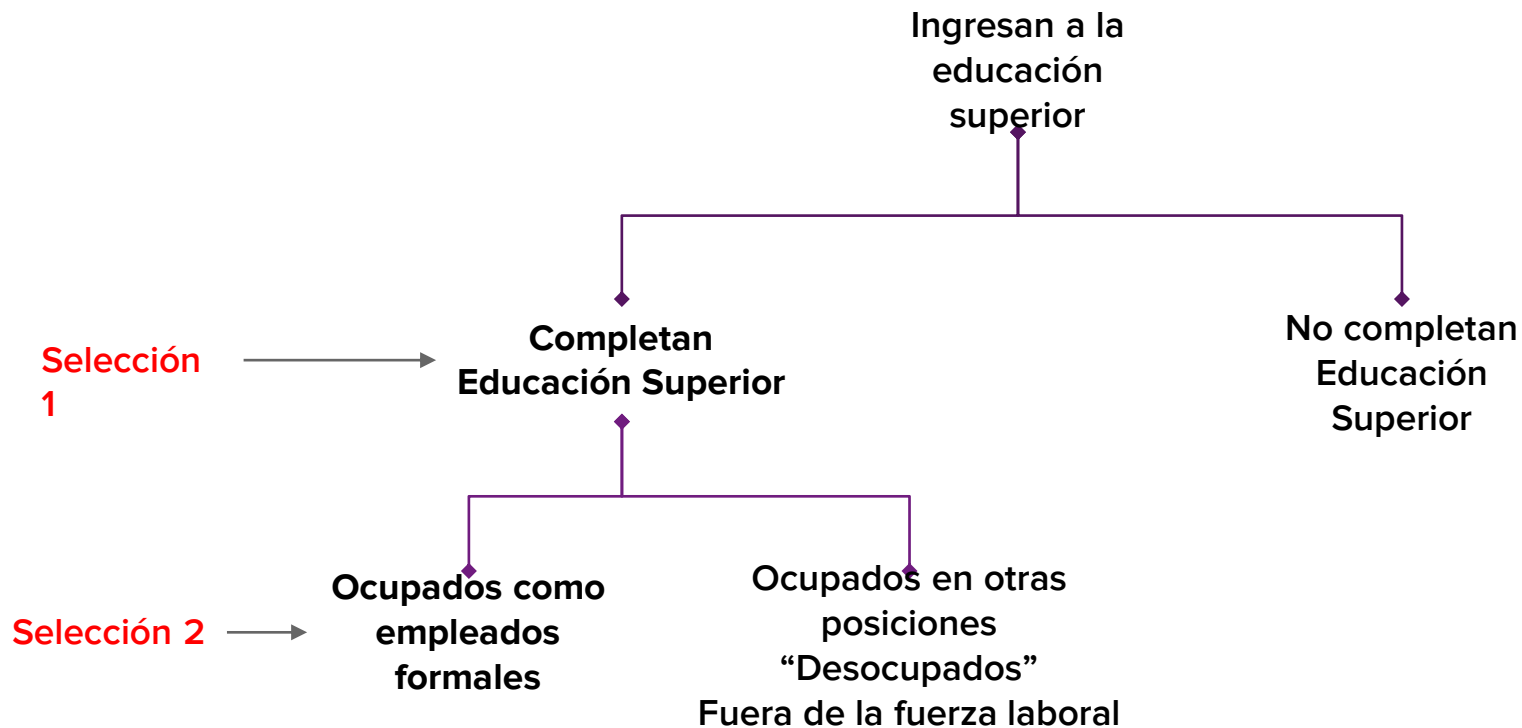
→ 2.574 IES divididas en sector público y privado, con distintos niveles de autonomía (universidades, centros universitarios o facultades).

→ 8,9 millones de matrículas (76,9% en IES privadas)

→ 1,1 millón de concluintes por año (83,5% en IES privadas)

→ Sistema altamente estratificado, vertical y horizontalmente

Motivación y problema de investigación



Graduados no Censo Demográfico

Tabela 3. Salários horários, probabilidade de estar entre os 10% e 1% maiores salários, e probabilidade de estar ocupado preditos, por grau de escolaridade e áreas de estudo de

Graduação/ Escolaridade/ Área de estudo	Salários horários		10% maiores salários		5% maiores salários		1% maiores salários		Ocupado	
Médio completo	6,48	1,00	0,10	1,00	0,04	1,00	0,01	1,00	0,72	1,00
Licenciaturas	11,05	1,71	0,18	1,84	0,07	1,76	0,01	1,48	0,84	1,17
Artes	14,40	2,22	0,36	3,76	0,17	4,54	0,03	4,52	0,81	1,13
Humanidades	12,03	1,86	0,22	2,30	0,09	2,33	0,02	2,15	0,82	1,14
Ciências sociais	16,58	2,56	0,37	3,89	0,18	4,81	0,04	5,07	0,79	1,10
Administração	13,61	2,10	0,31	3,20	0,14	3,67	0,03	3,88	0,82	1,14
Direito	18,72	2,89	0,44	4,63	0,23	6,11	0,06	7,65	0,81	1,12
Computação	14,38	2,22	0,37	3,83	0,16	4,32	0,02	3,33	0,83	1,15
Engenharia	19,58	3,02	0,49	5,15	0,25	6,55	0,05	6,14	0,80	1,10
Arquitetura	21,44	3,31	0,52	5,43	0,25	6,50	0,05	6,40	0,86	1,19
Saúde	18,16	2,80	0,44	4,59	0,24	6,22	0,05	6,03	0,87	1,20
Serviço Social	13,61	2,10	0,27	2,80	0,10	2,69	0,02	2,13	0,82	1,14

Fuente de datos: Enade 2009-2011, RAIS 2009-2015.

Tabela 2. Distribución de Graduados por Situación Laboral y Posición en la Ocupación en el Trabajo Principal, por Área de Estudio (Brasil, 2010)

Área de estudio	Situación ocupacional	Posición en la ocupación				
	Ocupado	Cuenta propia	Empleado formal	Militar y funcionario	Empleado informal	Empregador
C. Sociales Aplicadas	87,5	10,1	73,5	5,4	6,7	4,3
C. Exactas	84,6	11,3	62,4	12,4	10,6	3,2
Derecho	81,5	29,2	36,3	18,9	11,1	4,5
Educación	86,3	6,1	50,5	26,8	15,5	1,1
Ingeniería	86,7	12,6	71,2	5,4	7,3	3,6
Humanidades	83,2	12,8	53,5	17,8	13,9	2
Medicina	87,3	17,7	44,9	14,8	20,7	1,8
Salud y Bienestar	83	18,2	52,5	12,3	13,8	3,1
Servicios	82,4	11,8	63,7	12,6	8,7	3,2
Total	85,2	13,2	59,5	13,3	10,9	3,2

Fuente de datos: Censo Demográfico 2010 (IBGE).

Motivation (1): College completion is highly stratified among majors and institutions

Starting points:

- (1) Higher education matters for the results of graduates, but in a heterogeneous way (between types of diplomas, social groups, types of institutions, etc.) (Ribeiro and Schlegel, 2015; Caseiro and Maciente, 2019; Vieira, 2023).
- (2) There are selection criteria both among those completing higher education and those, once graduated, participating in the labor market or in formal employment (Carvalhoes and Ribeiro, 2019; Knop and Collares, 2019; Vieira, 2023).
- (3) Since 2014, the National System of Evaluation of Higher Education (SINAES) includes follow-up actions for graduates in institutional evaluation.

In that case, we have that:

- (1) The show was not randomly generated;
- (2) The explanatory variable (the degree title) is endogenous;
- (3) The selection process or the “truncation” of the sample must be considered to estimate the effect of the title on the results of the labor market.

Focus of the presentation: “Do the different careers in higher education open up different opportunities to access to the higher-paying jobs and elite occupations?”

Graduados no Censo Demográfico

Tabela 2. Salários horários, probabilidade de estar entre os 10% e 1% dos salários mais altos e probabilidade de estar ocupado, por grau de escolaridade

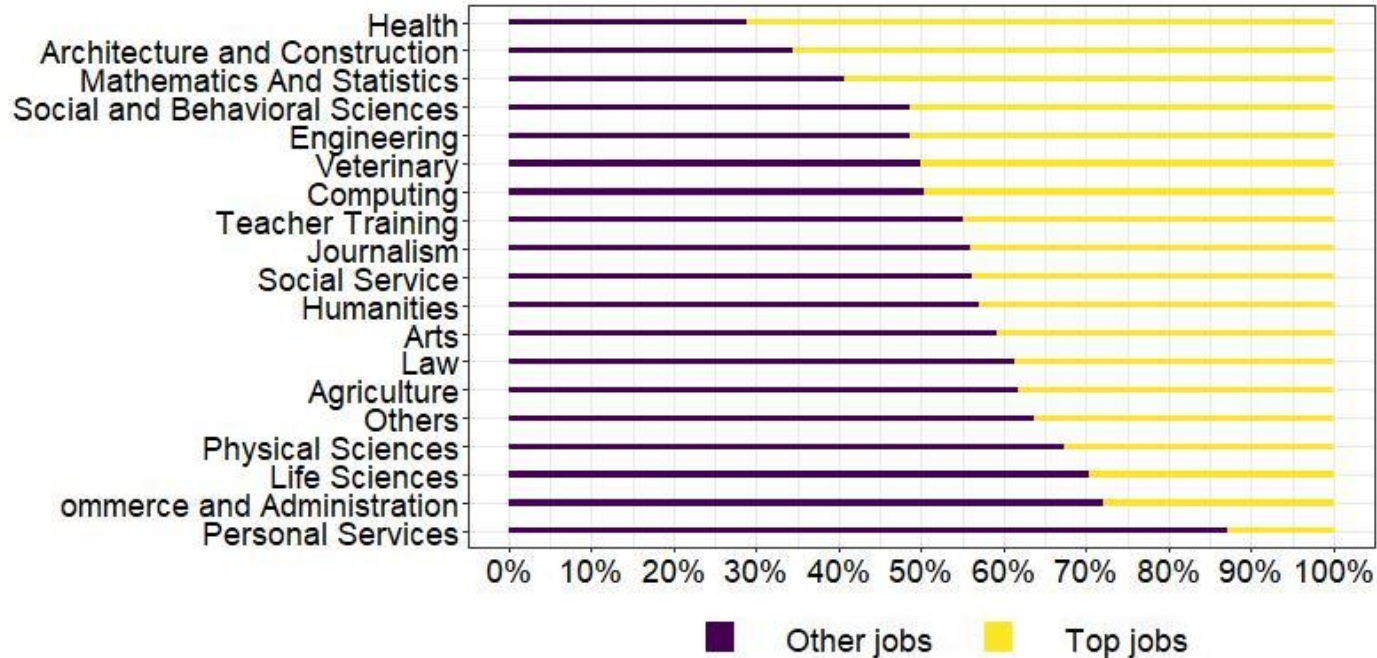
Escolaridade	Salários horários		10% maiores salários		1% maiores salários		Ocupado	
	Estimativa	Razão EM	Estimativa	Razão EM	Estimativa	Razão EM	Estimativa	Razão EM
Fundamental incompleto	3	0,50	0,04	0,43	0,00	0,56	0,46	0,64
Fundamental completo	4	0,62	0,04	0,41	0,00	0,41	0,60	0,84
Médio incompleto	5	0,78	0,06	0,60	0,01	0,67	0,67	0,93
Médio completo	6	1,00	0,10	1,00	0,01	1,00	0,72	1,00
Graduação	14	2,20	0,32	3,37	0,03	4,21	0,83	1,15
Pós-graduação	21	3,26	0,50	5,26	0,05	7,06	0,89	1,23

Graduados de áreas de maior prestígio alcançam com mais frequência os melhores salários

Área de estudo	99-100%	95-100%	90-100%	N Total
Saúde	3,9	8,8	15,8	43.228
Direito	2	7,1	16	27.121
Arquitetura e Construção	1,8	15,8	43,6	7.546
Engenharias	1,6	16,9	40,8	20.887
Matemática e Estatística	1,7	5,1	16,1	415
Humanidades	0,7	2,8	8	1.075
Serviço Social	0,4	1,2	3,6	10.281
Formação de professor	0,4	1,3	3,6	104.351
Administração	0,4	2,2	6,8	84.306
Ciências da Vida	0,3	1,5	4,7	2.988
Serviços pessoais	0,1	0,4	1,6	4.959

Motivation (3): Graduates outcomes in labor market are unequal and horizontally stratified

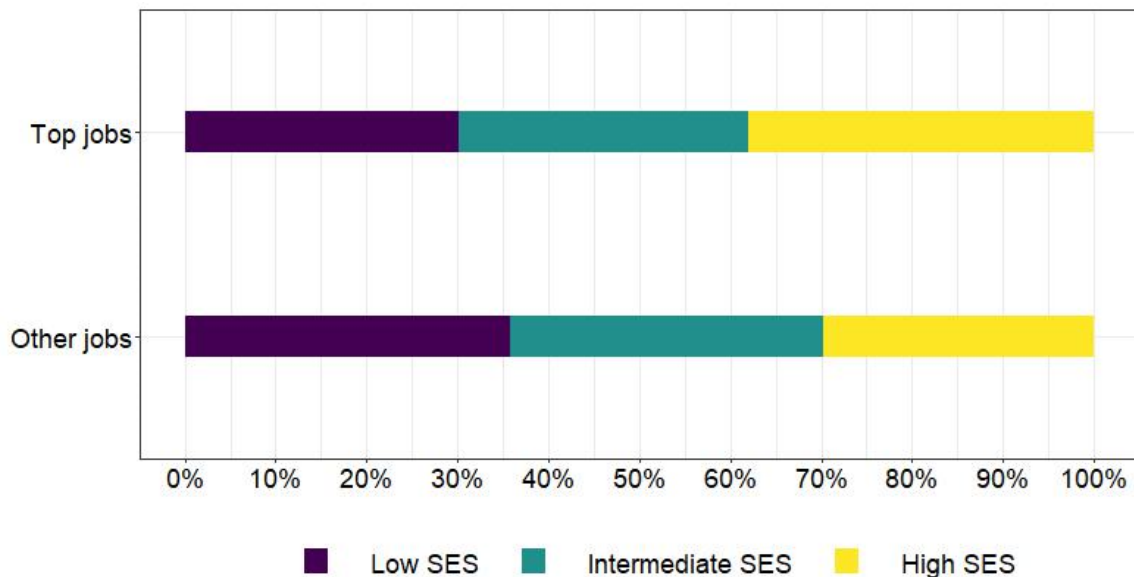
Distribution of employed graduates by type of occupation and selected fields of study



Source: Enade 2009-2011, RAIS 2009-2015.

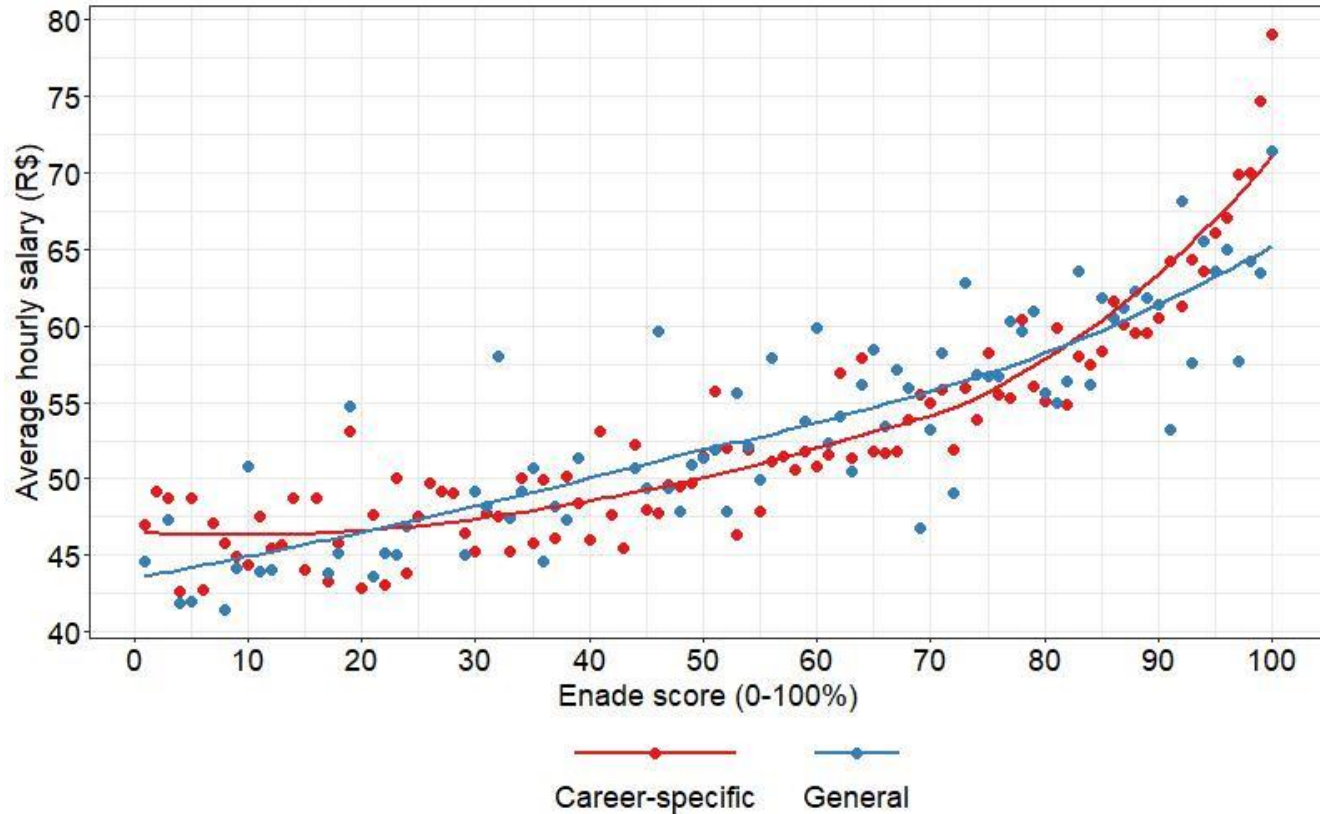
Presença maior de graduados de SES alto entre ocupações de elite

Figura 3: Distribuição de graduados empregados em ocupações de elite e outras ocupações, por nível socioeconômico



Fonte: Enade 2009-2011, RAIS 2009-2015.

Academic achievement matters, but some more than others



Source: Enade 2009-2011, RAIS 2009-

2015