

## Data Appendix

### Appendix I. Description of Outcomes and Other Variables

#### Outcomes from individual-level administrative data

##### A. *Previous labor market experience*

These variables refer to the 12-month period before graduation (Ecuador) or entry into the program (Brazil). For a given student, her peers are those who graduated from the same program as her in the same year (Ecuador) or who entered the same program as her in the same year (Brazil). Previous labor market experience outcomes include the following:

*Percent of time employed before graduation/entry* is the number of months the individual was employed during that 12-month period divided by 12.

*Peer average percent of time employed before graduation/entry* is the average of the previous variable for the student's peers.

*Employed at least one month before graduation/entry* is a dummy that takes the value of one if the individual was employed for at least one month within the corresponding 12-month period.

*Percent of peers employed at least one month before graduation/entry* is the average of the previous variable for the student's peers.

##### B. *Graduation*

*Graduation* (only for Brazil) is a dummy that takes the value of one if the individual graduated within three years of entering the program.

##### C. *Labor Market Outcomes*

These variables (for Ecuador and Brazil) refer to the 12-month period following graduation. They include the following:

*Employed at least one month after graduation* is a dummy that takes the value of one if the individual was employed for at least one month during that period.

*Percent of time employed after graduation* is the number of months the individual was employed during that 12-month period divided by 12

*Average monthly wage (USD, PPP)* is the average monthly wage received by the individual during that 12-month period. If the student worked at least one month, average wage is equal to total wages divided by the number of months he worked (i.e., it is equal to her average monthly wage conditional on working). If she did not work at all, average wage is zero. Purchasing power parity (PPP) adjustment of wages was done using the 2019 (Ecuador) or 2017 (Brazil) PPP conversion factor.

### **Other variables based on individual-level administrative data**

*Student administrative variables (PCA score)* consist of an index created for Brazil and Ecuador through a Principal Component Approach with the goal of reducing the dimensionality of the student characteristics included in estimation. The index includes the following student characteristics: age, gender, mother's education level (less than primary, primary, high school, higher education, unknown), whether the student has children (Ecuador), and socioeconomic status index (Ecuador).

*Peer administrative variables (PCA score)* follows the same logic, but for peers' (average) characteristics. The variables included in the calculation of the index were average characteristics at the student's cohort level, which is defined as all students (excluding the student herself) who entered (for Brazil) or graduate in (for Ecuador) the same program in the same year. Thus, the calculation of the index includes peers' average age, percentage of peers who are women, percentage of peers with each level of mother's education, percentage of peers with children (Ecuador), and peers' average socioeconomic index (Ecuador).

### **Outcomes from survey data**

*Dropout rate* is the percentage of students that dropped out among those who were supposed to graduate the academic year before the survey.

*Extra time to graduate (ETG)* is the average percentage of additional time that students take to graduate relative to the theoretical duration of the program. For example, if a program is supposed to last two years and students take, on average, three years to graduate, then  $ETG=50\%$  ( $=1 \text{ extra year} * 100 / 2 \text{ years}$ ). To calculate ETG, we asked directors (i) the average time it took the last cohort to graduate from the program and (ii) the theoretical duration of the program.

*Formal employment* is a binary variable that equals one when the director reports that almost all the program graduates from the previous year are employed or self-employed in the formal sector. Directors were given three possible options regarding how many of the past year's graduates found employment or self-employment in the formal sector: almost all; some; almost none or none.

*Wages* is the average salary of the graduates from last year, whether they work in the formal or informal sector. Purchasing power parity (PPP) adjustment of wages was done using the 2019 PPP conversion factor.

### **Other variables based on survey data**

*Student characteristics (PCA Score)* consist of an index created to reduce the dimensionality of the average student characteristics at the program level available in the survey data. It was built using a Principal Component Analysis approach and includes the following student characteristics (see Panel B in Table 1): percent of full-time students, percent of female students, percent of students that are 25+ years old, academic deficiencies in incoming students. The latter are indicators of whether program directors reported that missing skills among incoming students in math, oral expression, reading, writing or other competencies.

*Program characteristics (PCA Score)* follows a similar logic and includes the following program characteristics (see Panel B in Table 1): program duration (semesters), number of cities where the HEI offers the program, whether the program has high quality accreditation, total number of students in the program last year, and program age (years).

*HEI characteristics (PCA Score)* also follows a similar logic and includes the following institution characteristics (see Panel B in Table 1): HEI age, whether the HEI is a university, whether the HEI is for profit, and number of programs in the HEI. Note that whether the HEI is public is not included in this index; it is included as a separate “fixed” control in our estimation strategy.

## Appendix Tables and Figures

**Table A1. Institutional Framework for WBSCPS Countries**

Indicator	Brazil	Colombia	Dominican Republic	Ecuador	Peru
<b>1. SCP enrollment share (%)</b>	12	32	4	14	25
<b>2. Program types</b>	Technological (2-3 yrs.)	Technical (2 yrs.) Technological (3 yrs.)	Technical (2 yrs.) Prof. technical ( <i>tecnico superior</i> ; 2-3 years)	Technical Technological (mostly 2 yrs.)	Technical (2 yrs.) Prof. technical (3-4 yrs.) Tech. bachelor's (3-4 yrs.)
<b>3. Number of HEIs offering SCPs</b>	HEI in Brazil: 1,700 HEI in SP + Ceará: 467	217	28	182	HEIs w/ licensed prog.: 75 Other HEIs: 747
<b>4. Private enrollment (%)</b>	Brazil: 84 SP + Ceará: 77	21	49	53	HEIs w/ licensed prog.: 97 Other HEIs: 50
<b>5. HEI types and enrollment shares (%)</b>	SP + Ceará: Universities 41 Univ. Centers 17 Schools 38 IF and CEFET 3	Universities 9 Univ. Institutes 13 Technol. Inst. 7 Technical Inst. 6 SENA 65	Universities 47 Tech. Institutes 53	Tech. & Technol. Inst.: 95 Univ. and Polytechnic Schools: 5	HEIs w/ licensed programs: Higher Education Institutes: 100
<b>6. Number of SCPs</b>	SP + Ceará: 2,388	2,130	209	543	Licensed programs: 392
<b>7. Public funding to students at public HEIs</b>	Zero tuition	Zero tuition at SENA Public HEIs: government scholarships; loans from public institution (ICETEX)	Zero tuition, but “academic fees.”	Zero tuition	Zero tuition
<b>8. Funding for students at private HEIs</b>	ProUni (government scholarship for low-income, high ability students) FIES (government and state-guaranteed student loans banks) FUNDACRED (loans)	Government scholarships Loans from public institution (ICETEX)	Government scholarships Loans from public institution (FUNDAPEC)	Loans from public bank ( <i>Banco del Pacifico</i> )	Public loans and scholarships (PRONABEC) for low-income, high-ability students
<b>9. Public funding to public HEIs</b>	Yes. Sources: federal, state, municipality	For SENA: yes (dedicated taxes) For other public HEIs: yes	Yes	Yes	Yes
<b>10. Public funding to private HEIs</b>	No	No	n/a	Partial for some private HEIs ( <i>cofinanciadas</i> )	No

<b>11. National mandatory entry exam</b>	ENEM (high school graduation exam) required by public HEIs Vestibular (HE entry exam) required by some HEIs	Saber 11 (mandatory for high school graduation)	POMA or PAA (mandatory for HE entry)	Ser Bachiller (mandatory for high school graduation)	Only for students applying to PRONABEC scholarship
<b>12. National mandatory exit exam</b>	ENADE (mandatory for HE graduation; only some majors tested in a given year)	Saber T&T (mandatory for SCP graduation)	n/a	No	No
<b>13. Operating license</b>	Mandatory (initial accreditation) by HEI and program.	Mandatory by HEI and program; must be renewed periodically	Mandatory; evaluation required to renew license every 5 years.	Mandatory by HEI	Mandatory by HEI and program; lasts 5 years.
<b>14. Accreditation</b>	At private HEIs, accreditation must be renewed, generally every 3 years.	High-quality accreditation is voluntary for HEIs and programs, mandatory for teaching programs. Lasts 4 years.	HEIs can voluntarily pursue international accreditation.	Periodic mandatory accreditation is needed to remain open.	Voluntary for HEIs and programs; mandatory for education, law and health programs.
<b>15. For-profit HEIs</b>	Allowed (36% of SCPs in Brazil; 39% in SP+ Ceará)	Not allowed	Not allowed	Not allowed	Allowed (75% of licensed SCPs)

Sources: Ferreyra et al. (2021).

Notes: HEIs in Brazil's S-System count as university centers or schools. For Colombia, *Servicio Nacional de Aprendizaje* (SENA) is not counted as an HEI in row (3) but its students are counted as part of public enrollment in row (4). For Ecuador, private share includes enrollment in private institutions with public funding (*cofinanciadas*). When an HEI has branches in multiple cities, each branch is counted separately. CEFET = Federal Centers for Technological Education (*Centros Federais de Educação Tecnológica*) (Brazil); ENADE = National Exam of Student Achievement (*Exame Nacional de Desempenho dos Estudantes*) (Brazil); ENEM = National Assessment of Secondary Education (*Exame Nacional de Ensino Médio*) (Brazil); FIES = Student Financing Fund (*Fundo de Financiamento Estudantil*) (Brazil); FUNDAPEC = Pro-Education and Culture Action Educational Credit Foundation (*Fundación Acción Pro Educación y Cultura [APEC] de Crédito Educativo*) (Dominican Republic); HEI = higher education institution; HE = higher education; IF = Federal Institute (Instituto Federal) (Brazil); ICETEX = Colombian Institute of Educational Credit and Technical Training Abroad (*Instituto Colombiano de Crédito Educativo y Estudios Técnicos en el Exterior*) (Colombia); PAA = Academic Aptitude Test (*Prueba de Aptitud Académica*) (Dominican Republic); POMA = (*Prueba de Orientación y Medición Académica*) (Dominican Republic); PRONABEC = National Program of Scholarships and Educational Credit (*Programa Nacional de Becas y Crédito Educativo*) (Peru); Prof. = professional; SCP = short-cycle program; Tech. = technical. WBSCPS = data from the World Bank Short-Cycle Program Survey.

**Table A2. Sampling frame and survey structure, by country**

Country	Sampling Procedure (1)	SCPs universe (2)	Replacement rate (3)	Assumptions for power calc. (4)	Stratification levels (5)	Sampling Frame (Universe) Source (6)
<b>Brazil</b>	Representative sample	2,388	50%	Effect size: 0.08 Power: 80% Alpha: 0.05 Formal employment at baseline: 9.23%	<i>State:</i> Ceara, Sao Paulo <i>HEI Administration:</i> Public, private <i>HEI academic organization:</i> Universidade, Centro Universitário, Faculdade, Instituto Federal de Educação, Ciência e Tecnologia	Higher Education Census ( <i>Censo da Educação Superior</i> ), 2017.
<b>Colombia</b>	Representative sample	2,130	50%	Effect size: 0.08 Power: 80% Alpha: 0.05 Formal employment at baseline: 10%	<i>Region:</i> Caribe, Centro-Oriente, Centro-Sur, Cafetero-Antioquia, Pacifico <i>HEI Administration:</i> Public, private <i>HEI academic organization:</i> University, technical center, technological center.	National Information System of Higher Education ( <i>Sistema Nacional de Información de la Educación Superior</i> ), 2017
<b>Dominican Republic</b>	Census	209	n.a.	n.a.	All programs	Ministry of Economics, Planning, and Development, 2019
<b>Ecuador</b>	Census	543	n.a.	n.a.	All programs	Secretariat of Higher Education, Science, Technology, and Innovation, 2019
<b>Peru</b>	Census	387	n.a.	n.a.	All licensed programs	Ministry of Education, 2019

*Notes:* For each country included in the WBSCPS, this table shows the sampling procedure (whether using the universe of programs or a representative sample) in column (1), size of program universes in column (2), replacement rate in column (3), and assumptions for power calculations in column (4). To determine the sample size, details on stratification levels used to calculate the number of programs to be included Colombia and Brazil samples and the source of sampling frame (universe or initial list of programs) are in columns (5) and (6). The assumptions to estimate sample size for Brazil were based on Almeida et al (2015). “n.a.” = not applicable.

**Table A3. Universes, Samples, and Response Rates, by country**

Country	Universe size (1)	Sample size (2)	Survey status				Closed Programs (7)	Adjusted response rate (8)
			Effective Surveys (3)	Declined to answer (4)	Not effective due to COVID (5)	Not effective due to other reasons (6)		
Brazil	2,388	1,203	601	162	0	174	266	64%
Colombia	2,130	1,314	900	93	15	99	207	81%
Dominican Republic	209	209	80	13	0	0	116	86%
Ecuador	543	543	294	66	0	124	59	61%
Peru	387	387	228	83	0	67	9	60%
Total	5,657	3,656	2,103	417	15	464	657	70%

*Source:* Own calculations using WBSCPS.

*Notes:* This table shows the universe, sample size, and effectiveness measures for the WBSCPS. For Dominican Republic and Ecuador, the universe of programs was included in the survey. For Peru, the universe of licensed programs was included. For Brazil and Colombia, representative samples were drawn from the States of Sao Paulo and Ceara and at the national level, respectively. Columns (1) and (2) show the number of programs in the universe and sample sizes for each country in the study, respectively. Columns (3) through (6) indicate the number of surveys by status for each country: column (3) indicates completed surveys; columns (4) and (5) indicate the number of surveys that SCP directors declined to answer or that did not answer because they were preparing for distance learning, respectively; and column (6) indicates surveys not answered for other reasons, such as lack of provost authorization. Column (7) shows the number of programs that were closed at the time of the survey but that were reported as open in the sampling frames. Columns (3) through (7) add up to total sample size (column 2). Adjusted response rate is the share of effective surveys (column 3) relative to all active programs in our sample (i.e., Sample size (2) – Closed programs (7)). For example, for Brazil, adjusted response rate =  $601 / (1,203 - 266) = 64\%$ .

**Table A4. Survey representativeness checks, by country**

Dependent variable:	Program is included in the survey	Program is an effective survey	Program is an effective survey, excluding closed programs
	(1)	(2)	(3)
<b><i>Panel A. Brazil</i></b>			
HEI is public	0.028**	0.042*	0.042*
Obs.	2,367	2,367	2,101
HEI is for-profit	0.039	0.032	0.042
Obs.	2,362	2,362	2,096
Total enrollment	-4.953	-2.232	-5.738
Obs.	2,362	2,362	2,097
Total graduates	-1.249	-0.506	-1.504
Obs.	2,359	2,359	2,094
Annual tuition cost	419.1*	288.3	305.0
Obs.	2,388	2,388	2,122
<b><i>Panel B. Colombia</i></b>			
Technical program	0.008	0.011	0.009
Obs.	2,130	2,130	2,015
Distance (virtual) program	0.011	-0.003	-0.001
Obs.	2,130	2,130	2,015
Annual tuition cost (in COP)	-28,285.2	80,234.1	87,502.3
Obs.	2,130	2,130	2,015
Total enrollment in 2017	66.7	-65.3	-88.9
Obs.	2,130	2,130	2,015
HEI is SENA	0.003	-0.014	-0.019
Obs.	2,130	2,130	2,015
Program has high quality accreditation	-0.006	-0.003	-0.002
Obs.	2,130	2,130	2,015
<b><i>Panel C. Dominican Republic</i></b>			
HEI is a university		-0.376**	-0.038
Obs.		209	93
HEI is public		0.073	-0.039



Obs.	156	86
<b><i>Panel D. Ecuador</i></b>		
HEI is public	0.346***	0.372***
Obs.	543	483
Total graduates	20.2**	19.9**
Obs.	465	405
Annual tuition cost	-387.2	-107.4
Obs.	333	291
Program is taught online	0.058*	0.052
Obs.	543	484
<b><i>Panel E. Peru</i></b>		
Technical program	-0.027	-0.026
Obs.	387	383
Professional program	0.027	0.026
Obs.	387	383
Annual tuition cost (in SOL)	1061.9	1460.4
Obs.	387	383
Program has high quality accreditation	-0.002	-0.007
Obs.	387	383
Face-to-face program	0.033	0.030
Obs.	387	383

*Source:* Own estimations using WBSCPS.

*Notes:* This table summarizes the results from representativeness checks performed using available program-level administrative data, by country. In each column, we present estimated coefficients from the following model:  $y_p = \alpha_0 + \beta D_p + S + \epsilon_p$  for Brazil and Colombia and  $y_p = \alpha_0 + \beta D_p + \epsilon_p$  for the rest of countries. In this model,  $y_p$  is the characteristic of program  $p$  (e.g., whether the program has high quality accreditation). We estimate a model for each characteristic available in the country's administrative data.  $S$  is the sampling strata variable, and  $D_p$  indicates a dummy that varies by model depending on the comparison. Column (1) presents the comparison of programs selected for the survey relative to the rest of non-selected programs within the universe of programs for which we have administrative information ( $D_p = 1$  if the program was selected for the survey, and 0 otherwise). This check only applies to Brazil and Colombia, the countries for which we drew samples. Column (2) shows results from testing for differences between programs with an effective survey and all other programs in the universe. Column (3) is similar to column (2) but compares effective surveys with all other programs in the universe *that have not closed*. All regressions estimate robust standard errors clustered at the HEI level. Significance levels: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A5. Validation of Outcomes Reported by Principals Using Administrative Data and Household Surveys**

Outcome data source		Survey Data (WBSCPS)	Survey Data, employment rate	Administrative Data	HH Survey (21-25 years old)	HH Survey (25-29 years old)	HH Survey (21-29 years old)
		(1)	(2)	(3)	(4)	(5)	(6)
Brazil	Graduation rate (%)	62.19		30.30			
	Dropout rate (%)	14.90					
	Extra time to graduate (%)	11.99					
	Employment rate (%)	73.52	69.65	65.6	76.00	82.00	80.00
	Wages (USD, PPP 2019)	10,730.00		10,006.40*	10,155.00	13,440.00	12,472.00
Colombia	Graduation rate (%)	58.41		61.00			
	Dropout rate (%)	14.25		23.00			
	Extra time to graduate (%)	24.04		25.00			
	Employment rate (%)	57.25	65.42	63.00	75.00	78.00	77.00
	Wages (USD, PPP 2019)	10,313.00		12,192.00	8,892.00	10,212.00	9,684.00
Dominican Republic	Graduation rate (%)	58.49					
	Dropout rate (%)	14.95					
	Extra time to graduate (%)	30.97					
	Employment rate (%)	52.50	65.42				
	Wages (USD, PPP 2019)	11,275.00					
Ecuador	Graduation rate (%)	54.71					
	Dropout rate (%)	12.45					
	Extra time to graduate (%)	18.52					
	Employment rate (%)	38.56	53.40	40.18	48.00	63.00	57.00
	Wages (USD, PPP 2019)	11,910.00		10,900.00	10,222.00	13,689.00	12,511.00
Peru	Graduation rate (%)	64.06					
	Dropout rate (%)	12.82					
	Extra time to graduate (%)	8.95					
	Employment rate (%)	42.32	56.40	40.00	38.00	46.00	43.00
	Wages (USD, PPP 2019)	7,481.00		12,167.00	7,545.00	8,829.00	8,229.00

*Source:* Own calculations using WBSCPS, administrative data, and households' surveys. The administrative data sources are the following: Annual Reports of the Social Security Institution (*Relação Anual de Informações Sociais*, RAIS) for Brazil for 2017, Social Security and Taxes database for 2019-2020 for Ecuador, *Observatorio Laboral para la Educacion* (OLE) for Colombia for 2016, and *Ponte en Carrera* for Peru for 2018. The household surveys are the original (unharmonized) surveys from these sources: Brazil: PNADC (*Pesquisa Nacional por Amostra de Domicílios Contínua*) for 2018; Colombia: GEIH (*Gran Encuesta Integrada de Hogares*) for 2018; Ecuador: ENEMDU (*Encuesta Nacional Empleo, Desempleo y Subempleo*) for 2018; Peru: ENAHO (*Encuesta Nacional de Hogares sobre Condiciones de Vida y Pobreza*) for 2017.

*Notes:* This table presents a validation exercise for the outcomes reported in the survey data. Graduation, dropout, time to degree, and employment are expressed as percentages. \* indicates that wages are expressed in annual USD PPP (2017) for Brazil when using administrative data (column 3). Column 1 presents outcome averages as reported by program directors in the WBSCPS; means are weighted by the WBSCPS sampling weights (see definitions of outcomes from survey data in Appendix 1). In column (2), we impute a formal employment rate based on the following survey questions: "Regarding the graduates of the program in recent years, how many were employed by a firm in the formal sector?" and "Regarding the graduates of the program in recent years, how many were self-employed in the formal sector?" Directors had to choose among three possible answers: almost all, some; almost none or none. We assume the following formal employment rates for those answers: 80, 40, and 10% respectively. Column (2) shows the resulting formal employment rate imputation. In column (3) we show average outcomes calculated using individual-level administrative data; wages refer to individuals working in the formal sector and the formal employment rate is the percentage of SCP graduates who work formally. Formal workers include the following: employed and self-employed in Colombia, Peru, and Ecuador; and employed in Brazil. Columns 4-6 report validation outcomes using household survey data for different age groups; wages refer both to formal and informal employees.

**Table A6. Average Annual Wages of SCP Graduates, by Country**

Average wage	Brazil	Colombia	Dominican Republic	Ecuador	Peru
	(1)	(2)	(3)	(4)	(5)
In dollars (USD PPP 2019)	\$10,730	\$10,313	\$11,275	\$11,910	\$7,481
In terms of the minimum wage	2.2	1.3	1.3	1.4	1.3

*Source:* Own calculations using WBSCPS and administrative data.

*Note:* This table reports the average annual wage per country, expressed in purchasing power parity (PPP) dollars or as a multiple of the country's annual minimum wage. Average wage in terms of the minimum wage (MW) is calculated using each country's MW in 2019 (Brazil, Ecuador, and Peru) and 2020 (Colombia and Dominican Republic). Average annual wage in terms of minimum wages = average annual wage / annual MW, where annual MW = monthly MW \* 12. Percentiles 1 and 99 are excluded from these calculations. Statistics are weighted by WBSCPS sampling weights. Only São Paulo and Ceará are included for Brazil, and licensed programs for Peru.

**Table A7. Descriptive Statistics for Programs in Brazil**  
*Using Program-Level Data from the WBSCPS and Administrative Sources*

Variable	Programs not matched with individual data		Programs matched with individual data		P-value diff. (1) – (3) (5)
	Mean (1)	Std.Dev. (2)	Mean (3)	Std.Dev. (4)	
Panel A. Program quality determinants					
Infrastructure					
Program offers at least one online class	0.34	0.47	0.33	0.47	0.74
>30% classes can be taken online	0.13	0.34	0.10	0.30	0.19
Number of workshops or labs available for practice	4.57	4.09	5.72	5.61	0.01
Has enough equipment or tools for practice	0.80	0.40	0.88	0.33	0.01
Maintenance of largest lab: every year	0.67	0.47	0.70	0.46	0.56
Training and curriculum					
Curriculum is fixed	0.75	0.43	0.80	0.40	0.23
Teaches numerical competencies	0.83	0.38	0.80	0.40	0.47
Teaches a foreign language	0.30	0.46	0.34	0.47	0.32
Teaches persistence in complex tasks	0.64	0.48	0.70	0.46	0.13
Remediation support					
Remediation classes before starting the program	0.46	0.50	0.46	0.50	0.84
Remediation classes during the program	0.87	0.34	0.89	0.31	0.47
Non-class-based remediation	0.44	0.50	0.45	0.50	0.83
Graduation requirements					
Professional association test	0.17	0.37	0.17	0.37	0.99
Thesis or research project	0.13	0.34	0.14	0.35	0.81
Years since last update to curriculum	1.63	1.66	1.97	2.01	0.04
Important reasons to update program:					
Government standards	0.48	0.50	0.53	0.50	0.22
Employment outcomes or employers' requests	0.85	0.35	0.88	0.32	0.29
HEI perception of labor market	0.86	0.35	0.88	0.32	0.42

Enrollment trends	0.50	0.50	0.47	0.50	0.48
Student feedback	0.85	0.36	0.83	0.38	0.53
More than once per year:					
Analyze student performance to solve problems	0.85	0.36	0.89	0.31	0.13
Collect student satisfaction data	0.71	0.45	0.67	0.47	0.30
Time assigned to practical training (%)	44.79	16.38	46.13	15.86	0.34
Internships outside institution are mandatory	0.25	0.44	0.30	0.46	0.20
Mandatory internships at the end of the program	0.10	0.30	0.11	0.31	0.77
<i>Costs</i>					
Funding options used by some students					
HEI scholarships	0.78	0.42	0.69	0.46	<b>0.02</b>
Government scholarships	0.80	0.40	0.74	0.44	<b>0.09</b>
Loans by HEI	0.26	0.44	0.27	0.45	0.70
Loans by banks	0.18	0.38	0.19	0.39	0.75
Other loans	0.24	0.43	0.31	0.46	<b>0.08</b>
HEI has received funding from					
Government	0.30	0.46	0.31	0.46	0.91
Private sector	0.14	0.35	0.19	0.39	0.21
Annual tuition (2019 PPP USD)	2,735.20	1,748.13	2,728.69	2,061.10	0.97
<i>Link with productive sector</i>					
Engagement with firms					
Collect employment data for graduates more than once per year	0.51	0.50	0.50	0.50	0.76
Communicate with local firms about their needs more than once per year	0.55	0.50	0.59	0.49	0.30
Industry helps with student evaluation or curriculum design	0.45	0.50	0.49	0.50	0.27
Industry has internship agreements with HEI	0.82	0.38	0.83	0.38	0.80
Industry has agreements with HEI to hire program grads	0.36	0.48	0.37	0.48	0.79
Industry has agreements to train faculty	0.27	0.44	0.26	0.44	0.84
Industry lends or provides equipment to program for student training	0.40	0.49	0.41	0.49	0.81
Somebody in charge of industry relations	0.83	0.38	0.80	0.40	0.45
Program has staff assigned to collect grads' employment data	0.42	0.49	0.39	0.49	0.45

Job search assistance					
HEI coordinates job interviews with firms	0.56	0.50	0.65	0.48	<b>0.04</b>
HEI trains students for job interviews	0.68	0.47	0.63	0.48	0.29
HEI provides job market information	0.75	0.43	0.81	0.39	<b>0.07</b>
HEI has an employment center	0.35	0.48	0.34	0.47	0.80
<hr/>					
<i>Faculty</i>					
Number of faculty	15.45	9.17	16.08	8.61	0.41
Percent of faculty					
<40 years old faculty	38.44	27.25	34.86	26.25	0.14
that are women	40.95	25.21	38.83	23.31	0.32
with BA degree	85.89	25.91	84.41	26.62	0.52
with graduate degree	70.12	28.25	65.40	29.85	<b>0.07</b>
with 5yrs+ industry experience	63.32	27.65	62.17	28.59	0.65
working in the industry	46.39	29.79	41.84	27.82	<b>0.07</b>
Important for faculty hiring					
Practical experience	0.87	0.34	0.88	0.33	0.75
Research skills	0.37	0.48	0.44	0.50	0.13
Important for faculty evaluation					
Classroom observation	0.53	0.50	0.49	0.50	0.26
Class planning	0.49	0.50	0.44	0.50	0.26
Student evaluation	0.79	0.41	0.70	0.46	<b>0.03</b>
Students and peers' informal comments	0.24	0.43	0.24	0.43	0.86
Peer evaluation	0.26	0.44	0.24	0.43	0.52
Almost all or all faculty participated in professional training last year	0.65	0.48	0.67	0.47	0.68
Faculty are evaluated more than once per year	0.77	0.42	0.77	0.42	0.97
<hr/>					
<i>Other Practices</i>					
Update or review admin data more than once per year	0.62	0.49	0.55	0.50	0.13
Percent of governing body that belongs to:					
Private sector	17.47	19.70	14.12	16.96	<b>0.03</b>
Government	5.47	11.29	7.78	13.92	<b>0.04</b>

Current students	15.34	14.51	16.42	15.64	0.42
Admission requirements					
General or specific knowledge test	0.83	0.37	0.90	0.30	<b>0.02</b>
Interview	0.23	0.43	0.18	0.39	0.12
Min. scores in HS GPA or national entry test	0.87	0.33	0.88	0.33	0.84
<b>Panel B. Student body, program, field of study, and institution characteristics</b>					
<i>Student body characteristics</i>					
Percent of students that are full-time	18.74	27.64	14.11	22.90	<b>0.03</b>
Academic deficiencies					
Mathematics is lacking in incoming students	0.79	0.41	0.83	0.37	0.15
Reading is lacking in incoming students	0.64	0.48	0.61	0.49	0.47
Writing is lacking in incoming students	0.67	0.47	0.69	0.46	0.57
Oral expression is lacking in incoming students	0.50	0.50	0.47	0.50	0.58
<i>Program characteristics</i>					
Program duration (semesters)	4.81	0.96	4.81	0.91	0.99
Program age (years)	8.71	5.19	10.55	5.41	<b>0.00</b>
Total number of students in the program last year	151.55	275.94	144.11	163.48	0.69
Program has high quality accreditation	0.23	0.42	0.21	0.41	0.65
<i>Institution characteristics</i>					
HEI is for profit	0.48	0.50	0.45	0.50	0.45
HEI is a university	0.29	0.45	0.33	0.47	0.30
Number of programs in the HEI	36.60	75.98	9.86	7.87	<b>0.00</b>
HEI is public	0.16	0.37	0.19	0.39	0.44
<i>Field of study</i>					
Education, Arts, Humanities, and Social	0.14	0.34	0.07	0.25	<b>0.01</b>
Economics, Management and Accounting	0.55	0.50	0.64	0.48	<b>0.04</b>
Health, Agronomy, Vet, Engineering and Architecture	0.31	0.46	0.29	0.45	0.60
<b>Panel C. Noise controls</b>					
Number of attempts to complete the survey	9.17	2.91	9.33	2.66	0.51
Survey completed by phone	0.45	0.50	0.42	0.49	0.47



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**Observations**

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200

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401

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*Source:* Own calculations using WBSCPS and administrative data.

*Notes:* This table shows descriptive statistics for the 601 surveyed programs in Brazil. The unit of observation is a program. Columns (1) and (2) refer to the 200 programs that do not match to students in the individual-level dataset; columns (3) and (4) refer to the 401 programs that match (with 2+ students per program); and column (5) presents the p-value for the t-test of the difference in means between columns (1) and (3). P-value is in boldface when the difference is significant at the 1, 5 or 10% level. Panel A refers to program quality determinants, classified by category. Panel B refers to student body, program, and HEI characteristics, and Panel C to noise controls. In the case of dummy variables, only those with a mean between 0.10 and 0.9 are included in this table and in the estimation. Statistics are weighted by the WBSCPS sampling weights.

**Table A8. Descriptive Statistics for Programs in Ecuador**  
*Using Program-Level Data from the WBSCPS and Administrative Sources*

Variable	Programs not matched with individual data		Programs matched with individual data		P-value diff. (1) – (3) (5)
	Mean (1)	Std.Dev. (2)	Mean (3)	Std.Dev. (4)	
Panel A. Program quality determinants					
Infrastructure					
Program offers at least one online class	0.37	0.48	0.35	0.48	0.78
>30% classes can be taken online	0.25	0.44	0.32	0.47	0.27
Number of workshops or labs available for practice	3.14	2.64	3.99	3.63	0.03
Has enough equipment or tools for practice	0.56	0.50	0.64	0.48	0.22
Maintenance of largest lab: every year	0.52	0.50	0.58	0.50	0.41
Training and curriculum					
More than once per year					
Analyze student performance to solve problems	0.86	0.35	0.85	0.36	0.88
Collect student satisfaction data	0.67	0.47	0.60	0.49	0.27
Important reasons to update program					
Government standards	0.61	0.49	0.73	0.45	0.05
Employment outcomes or employers' requests	0.76	0.43	0.75	0.44	0.85
HEI perception of labor market	0.69	0.46	0.83	0.37	0.01
Enrollment trends	0.55	0.50	0.63	0.49	0.21
Student feedback	0.68	0.47	0.65	0.48	0.61
Teaches numerical competencies	0.80	0.40	0.80	0.40	0.88
Teaches a foreign language	0.62	0.49	0.68	0.47	0.28
Graduation requirements					
Professional association test	0.52	0.50	0.71	0.45	0.00
Thesis or research project	0.95	0.22	0.91	0.28	0.26
Second language	0.13	0.33	0.11	0.32	0.76

Internships outside institution are mandatory	0.94	0.24	0.94	0.24	0.90
Mandatory internships during the program	0.54	0.50	0.36	0.48	<b>0.01</b>
Time assigned to practical training (%)	52.37	13.78	51.06	13.14	0.47
Remediation support					
Remediation classes before starting the program	0.54	0.50	0.65	0.48	0.11
Remediation classes during the program	0.30	0.46	0.41	0.49	<b>0.08</b>
Non-class-based remediation	0.30	0.46	0.37	0.49	0.21
Years since last update to curriculum	2.26	2.09	2.08	2.16	0.53
<hr/>					
<i>Costs</i>					
Annual tuition (2019 PPP USD)	1,049.59	1,389.20	1,546.45	1,701.53	<b>0.01</b>
Funding options used by some students					
Loans by banks	0.25	0.43	0.30	0.46	0.35
Loans by government program	0.36	0.48	0.38	0.49	0.80
Other loans	0.22	0.42	0.37	0.49	<b>0.01</b>
Government scholarships	0.45	0.50	0.38	0.49	0.26
HEI scholarships	0.64	0.48	0.75	0.44	<b>0.07</b>
<hr/>					
<i>Link with productive sector</i>					
Engagement with firms					
Collect employment data for graduates more than once per year	0.44	0.50	0.52	0.50	0.22
Communicate with local firms about their needs more than once per year	0.38	0.49	0.39	0.49	0.79
Program has staff assigned to collect grads' employment data	0.71	0.46	0.76	0.43	0.33
Industry helps with student evaluation or curriculum design	0.68	0.47	0.61	0.49	0.24
Industry has agreements with HEI to hire program grads	0.30	0.46	0.45	0.50	<b>0.02</b>
Industry has agreements to train faculty	0.32	0.47	0.40	0.49	0.22
Industry lends or provides equipment to program for student training	0.54	0.50	0.50	0.50	0.53
Somebody in charge of industry relations	0.85	0.36	0.89	0.31	0.29
Job search assistance					
HEI coordinates job interviews with firms	0.42	0.50	0.46	0.50	0.57
HEI trains students for job interviews	0.48	0.50	0.58	0.50	0.11

HEI provides job market information	0.78	0.42	0.81	0.39	0.54
HEI has an employment center	0.72	0.45	0.74	0.44	0.66
<i>Faculty</i>					
Important for faculty evaluation					
Classroom observation	0.78	0.42	0.76	0.43	0.79
Class planning	0.76	0.43	0.75	0.43	0.92
Students and peers' informal comments	0.41	0.49	0.40	0.49	0.89
Peer evaluation	0.60	0.49	0.53	0.50	0.27
Almost all or all faculty participated in professional training last year	0.71	0.46	0.69	0.47	0.77
Research skills are very important when hiring faculty	0.58	0.50	0.69	0.46	<b>0.08</b>
Number of faculty	12.18	8.55	18.69	17.91	<b>0.00</b>
Percent of faculty					
with BA degree	84.12	26.93	86.20	23.55	0.54
with 5yrs+ industry experience	61.88	33.41	58.43	38.12	0.47
working full-time	55.01	35.17	57.45	32.05	0.59
with graduate degree	34.68	23.98	38.56	24.70	0.23
working in the industry	43.58	37.50	38.46	35.76	0.30
with SCP degree	18.00	28.94	14.02	24.20	0.28
<40 years old	55.39	33.48	51.42	29.92	0.35
that are women	38.64	23.30	38.56	21.85	0.98
<i>Other Practices</i>					
Update or review admin data more than once per year	0.70	0.46	0.75	0.43	0.39
Percent of governing body that belongs to:					
Private sector	12.85	22.49	6.76	16.16	<b>0.02</b>
Current students	13.57	13.38	11.93	9.38	0.29
Other sector	9.57	18.82	20.21	26.19	<b>0.00</b>
Admission requirements					
General or specific knowledge test	0.65	0.48	0.65	0.48	0.91
Interview	0.44	0.50	0.35	0.48	0.15

Min. score in HS GPA or national entry test is an admission requirement	0.50	0.50	0.46	0.50	0.60
<b>Panel B. Student, program, field of study, and institution characteristics</b>					
<i>Student body characteristics</i>					
Percent of students that are full-time	61.01	40.41	65.47	39.01	0.39
Academic deficiencies					
Mathematics is lacking in incoming students	0.67	0.47	0.81	0.40	<b>0.02</b>
Reading is lacking in incoming students	0.50	0.50	0.51	0.50	0.96
Writing is lacking in incoming students	0.68	0.47	0.54	0.50	<b>0.02</b>
Oral expression is lacking in incoming students	0.71	0.45	0.58	0.50	<b>0.03</b>
<i>Program characteristics</i>					
Program duration (semesters)	5.05	0.60	5.06	0.73	0.85
Program age (years)	10.54	9.28	12.80	9.27	<b>0.06</b>
Total number of students in the program last year	162.88	291.68	393.95	613.07	<b>0.00</b>
<i>Institution characteristics</i>					
HEI is public	0.40	0.49	0.25	0.44	<b>0.01</b>
Program has high quality accreditation	0.26	0.44	0.45	0.50	<b>0.00</b>
Number of programs in the HEI	4.96	3.31	6.18	4.56	<b>0.02</b>
<i>Field of study</i>					
Health	0.04	0.19	0.08	0.27	0.17
Education, Arts, Humanities, and Social	0.49	0.50	0.27	0.44	<b>0.00</b>
Economics, Management and Accounting	0.22	0.42	0.27	0.45	0.41
Agronomy and Vet, Engineering and Architecture	0.24	0.43	0.38	0.49	<b>0.02</b>
<b>Panel C. Noise controls</b>					
Number of attempts to complete the survey	9.85	3.46	9.39	3.95	0.34
Survey completed by phone	0.22	0.42	0.18	0.39	0.42
<b>Observations</b>	153		92		

*Source:* Own calculations using WBSCPS and administrative data.

*Notes:* This table shows descriptive statistics for the 245 surveyed programs in Ecuador. The unit of observation is a program. Columns (1) and (2) refer to the 153 programs that do not match to students in the individual-level dataset and have at least two students; columns (3) and (4) refer to the 92 programs that match (with 2+ students per program); and column (5) presents the p-value for the t-test of the difference in means between columns (1) and (3). P-value is in boldface

when the difference is significant at the 1, 5 or 10% level. Some programs match but have only one student; they are not included in this table or in the estimation using individual-level data. Panel A refers to program quality determinants, classified by category. Panel B refers to student body, program, and HEI characteristics, and Panel C to noise controls. For dummy variables, this list and the corresponding estimations only include those with a mean between 0.1 and 0.9. Statistics are weighted by WBSCPS sampling weights.

**Table A9. Descriptive Statistics for Students in Brazil**  
*Based on Individual-Level Data for Graduates Matched to Surveyed Programs*

Variable	Mean	Std. Dev.
<b>Panel A. Student characteristics</b>		
Age	24.60	5.57
Female	0.47	0.50
Mother's education:		
Less than primary	0.11	0.31
Primary school	0.14	0.35
High school	0.19	0.39
Higher education	0.07	0.26
Unknown	0.49	0.50
Student administrative variables (PCA Score)	0.00	1.15
<b>Panel B. Peer (average) characteristics</b>		
Age	24.65	1.77
Percentage of female peers	0.47	0.28
Percentage of peers by mother's education:		
Less than primary	0.11	0.05
Primary school	0.14	0.06
High school	0.19	0.07
Higher education	0.07	0.06
Unknown	0.48	0.14
Peers' administrative variables (PCA Score)	-0.07	1.45
<b>Panel C. Outcomes</b>		
Graduated	0.30	0.46

*Sources:* Own calculations using individual-level administrative data for Brazil. For more details on data sources and variable definitions, see Section 3.3 and Appendix 1.

*Notes:* In this table, the unit of observation is a student. Statistics are weighted using WBSCPS sampling weights. For a given student, her peers are the other students who started her program in 2014. Means of PCA scores are different than zero due to the use of sampling weights. Number of observations is 29,453.

**Table A10. Associations between SCP Quality Determinants and Academic Outcomes**  
*Using Program-Level Data for all Survey Countries*

<i>Dependent variable:</i>	<i>Dropout Rates</i>	<i>Extra time-to- graduate</i>
	(1)	(2)
<i>Costs</i>		
HEI scholarships are used by some students	1.438 (0.876)	
Loans by banks are used by some students	-1.284 (0.834)	2.595* (1.555)
HEI has received funding from government	1.309* (0.739)	
HEI has received funding from private sector	1.466* (0.815)	
Annual tuition (2019 PPP USD, log)		-0.987** (0.427)
<i>Training and curriculum</i>		
Curriculum is fixed	-2.111** (0.899)	
Offers remediation classes during the program	-1.003 (0.782)	
Years since last update to curriculum	-0.0439 (0.111)	
Enrollment trends are very important to update program	-1.122 (0.703)	
Promotes work under hardship or pressure		-7.358*** (2.236)
Test required for graduation		1.988 (1.623)
Thesis or research project required for graduation		3.153* (1.778)
HEI perception of labor market is very important to update program		5.069*** (1.646)
Analyze student performance to solve problems more than once per year		-2.547 (2.358)
Collect student satisfaction data more than once per year		-1.135 (1.582)
<i>Link with productive sector</i>		
Industry helps with student evaluation or curriculum design	-0.667 (0.790)	-3.652** (1.752)
Industry lends or provides equipment to program for student training	-1.769*** (0.670)	
Somebody in charge of industry relations	-1.507 (1.198)	
HEI trains students for job interviews	-0.817 (0.876)	
HEI provides job market information	-2.198** (1.036)	
HEI has an employment center		1.289 (1.485)
<i>Faculty</i>		
Number of faculty (log)		
Percent of faculty working in the industry		-0.0524** (0.0205)
Percent of faculty with SCP degree	-0.0132 (0.0126)	-0.0546** (0.0266)
Percent of faculty with graduate degree	0.00629 (0.0127)	
Percent of faculty working in the industry	0.0217* (0.0118)	
Research skills are very important when hiring faculty	-1.096 (0.801)	



Students' and peers' informal comments are very important in faculty evaluation	-0.320 (0.705)	
Peer evaluation is very important in the faculty evaluation	-1.463* (0.788)	
Practical experience is very important when hiring faculty		-3.417 (2.234)
Almost all or all faculty participated in professional training last year		2.663* (1.467)
Faculty are evaluated more than once per year		-4.393* (2.305)
<i>Other Practices</i>		
Update or review admin data more than once per year	-0.274 (0.725)	
Student body, program, and HEI characteristics (PCA scores)	✓	✓
Noise controls, country-and field-fixed effects	✓	✓
Observations	1,525	1,692
Mean of dependent variable	14.03	18.58
R-squared	0.085	0.107
Adj. R squared	0.0613	0.0890

*Source:* Own estimations using WBSCPS data.

*Notes:* This table shows coefficients from the (second stage) OLS regressions of dropout rate and extra time to graduation (ETG) on the determinants selected by LASSO in the first stage. The unit of observation is a program. Regressions are weighted using WBSCPS sampling weights. See definitions of outcomes and PCA scores in Appendix 1. Specifications control for PCA scores of characteristics of the student body, program, and HEI as well as for survey noise controls, country fixed effects, and field fixed effects. Standard errors clustered at HEI level are in parenthesis. Significance levels: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

**Table A11. Associations between SCP Quality Determinants and Labor Market Outcomes**  
*Using Program-Level Data for all Survey Countries*

<i>Dependent variable:</i>	<i>Formal employment</i>	<i>Log Wages</i>
	(1)	(2)
<i>Infrastructure</i>		
Has enough equipment or tools for practice	0.0702** (0.0352)	0.0200 (0.0167)
<i>Training and curriculum</i>		
Teaches numerical competencies	0.133*** (0.0394)	0.0561*** (0.0189)
Offers remediation classes during the program	0.0525* (0.0317)	0.0275* (0.0146)
Offer non-class-based remediation		-0.0257* (0.0152)
Employment outcomes or employers' requests are very important to update program	0.0678 (0.0425)	
HEI perception of labor market is very important to update program	0.0400 (0.0356)	0.0395** (0.0179)
Enrollment trends are very important to update program		-0.0169 (0.0130)
Offers credits for longer degrees		0.0615*** (0.0207)
<i>Link with productive sector</i>		
Collect data on employment or employers' satisfaction more than once per year	0.0483* (0.0292)	
Industry has agreements to train faculty	-0.0488 (0.0320)	
Industry lends or provides equipment to program for student training	-0.0266 (0.0286)	
Program has staff assigned to collect grads' employment data	0.0576* (0.0313)	
HEI provides job market information		0.0126 (0.0188)
HEI has an employment center	0.0830*** (0.0311)	0.0252 (0.0161)
<i>Faculty</i>		
Percent of <40 years old faculty	-0.00175*** (0.000501)	
Percent of faculty with 5yrs+ industry experience	0.00101** (0.000441)	
Percent of faculty that are women		-0.000683** (0.000324)
Percent of faculty with BA degree		0.000469* (0.000250)
Class planning is very important in faculty evaluation	0.0470 (0.0293)	
Classroom observation is very important in faculty evaluation		0.0157 (0.0137)
Number of faculty (log)		0.0229** (0.0109)
Research skills are very important when hiring faculty		0.0207 (0.0160)
<i>Other Practices</i>		
Update or review admin data more than once per year	0.0468 (0.0302)	
Percent of governing body that belongs to current students	-0.000798 (0.000678)	-0.000614* (0.000318)
Percent of governing body that belongs to private sector		0.000367 (0.000349)

Interview is an admission requirement		0.0235 (0.0168)
General or specific knowledge test is an admission requirement		0.0281* (0.0150)
Student body, program, and HEI characteristics (PCA scores)	✓	✓
Noise controls, country- and field-fixed effects	✓	✓
Observations	1,270	1,751
Mean of dependent variable	0.591	9.209
Average wage (USD 2019 PPP)		10,424.17
R-squared	0.136	0.175
Adj R squared	0.113	0.158

*Source:* Own estimations using WBSCPS data.

*Notes:* This table shows coefficients from the (second stage) OLS regressions of formal employment and log wages on the determinants selected by LASSO in the first stage. The unit of observation is a program. Formal employment equals one if the director reports that almost all of the program graduates are employed or self-employed in the formal sector. Regressions are weighted using sampling weights from the WBSCPS. See definitions of outcomes and PCA scores in Appendix 1. Number of observations vary across variables due to differences in share of missing values. Specifications control for PCA scores of characteristics of the student body, program, and HEI as well as for survey noise controls, country fixed effects, and field fixed effects. See Appendix 1 for the list of the variables included in the PCA indexes. Standard errors clustered at HEI level are in parenthesis. Significance levels: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A12. Associations between SCP Quality Determinants and Labor Market Outcomes**  
*Using Individual- and Program-Level Data for Brazil*

	Graduation	Ever employed the year after graduation	Percent of time employed after graduation	Log average monthly wage
	(1)	(2)	(3)	(4)
<i>Infrastructure</i>				
Program offers at least one online class	0.0467** (0.0193)			
>30% classes can be taken online			2.560* (1.497)	
Number of workshops or labs available for practice	0.00149 (0.00236)			
Has enough equipment or tools for practice	-0.0211 (0.0240)		-1.506 (1.893)	
Maintenance of largest lab: every year	0.0345* (0.0202)		0.0472 (1.369)	
<i>Costs</i>				
HEI scholarships are used by some students	0.00990 (0.0197)			
Loans by HEI are used by some students	0.0173 (0.0207)			
Loans by banks are used by some students	0.0500** (0.0223)	0.0285* (0.0148)	4.994*** (1.569)	0.202* (0.104)
Other loans are used by some students	0.0136 (0.0190)			
HEI has received funding from government	-0.0290 (0.0211)		-2.682* (1.438)	
HEI has received funding from private sector	0.0342 (0.0221)			
<i>Training and curriculum</i>				
Curriculum is fixed			-1.558 (1.459)	
Teaches numerical competencies	-0.0285 (0.0255)	0.0382** (0.0190)	4.177** (1.822)	0.292** (0.133)
Teaches a foreign language	0.0177 (0.0210)			
Teaches persistence in complex tasks	0.00888 (0.0199)	0.0290** (0.0141)	1.654 (1.400)	0.158 (0.0996)
Offers remediation classes before starting the program	0.0171 (0.0165)	0.0228* (0.0118)		0.132 (0.0820)
Offers remediation classes during the program		-0.0512** (0.0208)	-0.614 (2.026)	-0.375*** (0.140)
Offer non-class-based remediation	-0.0232 (0.0180)			
Professional association test required for graduation	0.0549* (0.0280)	0.0348** (0.0172)	7.062*** (1.763)	0.201* (0.114)
Thesis or research project required for graduation	0.0259 (0.0235)	0.0166 (0.0200)	1.941 (1.773)	0.104 (0.133)
Years since last update to curriculum	0.00675* (0.00357)			
Government standards are very important to update program	-0.0359** (0.0167)			
Employment outcomes or employers' requests are very important to update program	-0.0152 (0.0295)		-2.561 (2.007)	
Enrollment trends are very important to update program			-1.152 (1.153)	
Student feedback is very important to update program	-0.0366* (0.0215)	0.0320** (0.0144)		0.241** (0.101)
Analyze student performance to solve problems more than once per year	0.0919*** (0.0298)	0.0476** (0.0211)	5.854** (2.313)	0.267* (0.146)
Collect student satisfaction data more than once per year	-0.0398** (0.0199)		2.386* (1.261)	

Time assigned to practical training (%)	-0.000699 (0.000557)			
Internships outside institution are mandatory	0.0169 (0.0205)			
Mandatory internships at the end of the program	-0.0448 (0.0294)			
<i>Link with productive sector</i>				
Collect employment data for graduates more than once per year	-0.0186 (0.0187)	-0.0260* (0.0132)	-2.686** (1.350)	-0.198** (0.0910)
Communicate with local firms about their needs more than once per year	-0.0371* (0.0204)			
Industry helps with student evaluation or curriculum design	-0.0137 (0.0169)		-4.414*** (1.214)	
Industry has internship agreements with HEI	-0.0440** (0.0218)		-1.799 (1.492)	
Industry has agreements to train faculty	0.0363* (0.0198)			
Industry lends or provides equipment to program for student training	-0.0174 (0.0188)			
Somebody (from board or staff) is in charge of industry relations	-0.0271 (0.0202)		1.680 (1.506)	
Program has staff assigned to collect grads' employment data	0.0320 (0.0201)			
HEI trains students for job interviews		-0.0392*** (0.0136)	-2.599* (1.500)	-0.258*** (0.0958)
HEI coordinates job interviews with firms	0.0121 (0.0179)			
HEI provides job market information	-0.0199 (0.0228)	0.0574*** (0.0155)	3.871** (1.656)	0.376*** (0.109)
HEI has an employment center	-0.0212 (0.0192)			
<i>Faculty</i>				
Faculty are evaluated more than once per year		0.0419*** (0.0153)	3.131** (1.587)	0.302*** (0.106)
Percent of <40 years old faculty	0.000567 (0.000351)			-
Percent of faculty that are women		-0.000444 (0.000287)	-0.0276 (0.0271)	0.00425** (0.00201)
Percent of faculty with BA degree	0.000433 (0.000344)		-0.0636** (0.0253)	
Percent of faculty with graduate degree		0.000633*** (0.000199)	0.0929*** (0.0213)	0.00531*** (0.00140)
Percent of faculty with 5yrs+ industry experience	-0.000571 (0.000399)			
Percent of faculty working in the industry	0.000721** (0.000348)		-0.0287 (0.0227)	
Practical experience is very important when hiring faculty	0.0207 (0.0265)			
Classroom observation is very important in faculty evaluation	0.00654 (0.0189)	0.0228* (0.0116)		0.183** (0.0808)
Class planning is very important in faculty evaluation	0.0171 (0.0185)	-0.0329** (0.0129)	-1.345 (1.284)	-0.218** (0.0895)
Students and peers' informal comments are very important in faculty evaluation	-0.0134 (0.0189)	-0.0290* (0.0148)		-0.191* (0.104)
Peer evaluation is very important in the faculty evaluation	0.0199 (0.0184)	0.0308** (0.0139)		0.210** (0.0980)
Almost all or all faculty participated in professional training last year	-0.0459** (0.0195)		-1.955 (1.228)	
<i>Other practices</i>				
Update or review admin data more than once per year	0.0130 (0.0169)	0.0473*** (0.0131)	4.222*** (1.194)	0.345*** (0.0900)
Percent of governing body that belongs to: private sector		0.000412 (0.000368)	0.107*** (0.0394)	0.00334 (0.00261)
Percent of governing body that belongs to: government or other sector			0.0744*	

			(0.0396)	
Percent of governing body that belongs to: current students	0.00206*** (0.000635)			
General or specific knowledge test is an admission requirement	0.0339 (0.0260)	0.0249 (0.0253)	4.516* (2.521)	0.163 (0.178)
Interview is an admission requirement		0.0478*** (0.0158)	4.977*** (1.477)	0.337*** (0.110)
Min. scores in HS GPA or national entry test is an admission requirement	-0.0141 (0.0251)			
Student body, program, and HEI characteristics (PCA scores)	✓	✓	✓	✓
Noise controls, state- and field-fixed effects	✓	✓	✓	✓
Graduation year fixed effect		✓	✓	✓
Observations	22,663	7,177	6,827	7,089
R-squared	0.126	0.122	0.109	0.135
Mean dependent variable	0.303	0.707	53.52	4.791
Average wage (USD 2017 PPP)				715.62
Adj R squared	0.124	0.117	0.103	0.131

*Source:* Own estimations using individual-level data from administrative sources and program-level data from the WBSCPS for Brazil.

*Notes:* This table shows coefficients from the (second stage) OLS regressions of student outcomes on the quality determinants selected by LASSO in the first stage. The unit of observation is an individual. Outcomes (dependent variables) are graduation within three years of starting the program (col. 1), and the following labor market outcomes pertaining to the 12-month period following graduation: whether the student is formally employed at least one month (col. 2); percent of months she is formally employed (col. 3); and average monthly wage (col. 4). Average monthly wage is computed over the months worked; it is zero if the individual does not work formally at all. Regressions are weighted using WBSCPS sampling weights. All specifications include noise controls as well as fixed effects for graduation year, state, and field. They also control for PCA scores for the following: student body characteristics (based on survey data), student characteristics (based on individual-level data, including proxies for previous labor market experience), program characteristics (based on survey data), HEI characteristics (based on survey data), and peer characteristics (based on individual-level data, including proxies of peers' previous labor market experience). See Appendix 1 for the list of the variables included in each index. Standard errors clustered at program level are in parenthesis. Significance levels: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.0$

**Table A13. Associations between SCP Quality Determinants and Labor Market Outcomes**  
*Using Individual- and Program-Level Data for Ecuador*

	Ever employed the year after graduation (1)	Percent of time employed after graduation (2)	Average monthly wage (log) (3)
<i>Infrastructure</i>			
Number of workshops or labs available for practice		2.645*** (0.445)	
<i>Costs</i>			
Government scholarships are used by some students		7.623* (4.241)	
<i>Training and curriculum</i>			
Analyze student performance to solve problems more than once per year		-8.775** (3.818)	
Collect student satisfaction data more than once per year	0.137*** (0.0446)	7.221* (3.678)	0.650** (0.277)
Government standards are very important to update program	0.0546 (0.0402)	21.14*** (3.658)	0.611** (0.246)
Enrollment trends are very important to update program		-5.478 (4.142)	
Student feedback is very important to update program		10.65*** (3.310)	
Teaches numerical competencies	0.209*** (0.0566)	17.42*** (6.273)	1.212*** (0.357)
Teaches a foreign language	-0.0850* (0.0434)		
Professional association test required for graduation	-0.100** (0.0443)		-0.682** (0.285)
Time assigned to practical training (%)		-0.253** (0.122)	
Offers remediation classes before starting the program		-6.298 (3.821)	
<i>Link with productive sector</i>			
Industry lends or provides equipment to program for student training		11.11*** (3.309)	
HEI trains students for job interviews	0.217*** (0.0522)	16.11** (6.982)	1.491*** (0.347)
HEI coordinates job interviews with firms		-11.31*** (4.048)	
HEI provides job market information	0.107** (0.0425)	21.23*** (3.710)	0.537* (0.297)
HEI has agreements with private firms to hire graduates		6.911** (3.341)	
Somebody (from board or staff) is in charge of industry relations	0.159*** (0.0604)	7.536 (4.980)	1.131*** (0.429)
<i>Faculty</i>			
Classroom observation is very important in faculty evaluation		7.454* (4.460)	
Students and peers' informal comments are very important in faculty evaluation		-9.928** (4.793)	
Research skills are very important when hiring faculty	-0.171*** (0.0488)	-26.70*** (4.485)	-1.331*** (0.275)
Number of faculty (log)	-0.0628 (0.0379)	-3.187 (2.836)	-0.363 (0.261)
Percent of faculty with 5yrs+ industry experience		0.177*** (0.0431)	
Percent of faculty working in the industry	-0.00122* (0.000631)	-0.110** (0.0514)	-0.00887** (0.00423)
Percent of faculty with SCP degree		-0.212*** (0.0680)	
Percent of <40 years old faculty		-0.218*** (0.0785)	

Percent of faculty that are women	-0.000868 (0.000789)	-0.0655 (0.0965)	-0.00500 (0.00517)
<i>Other practices</i>			
Percent of governing body that belongs to current students		0.0112 (0.210)	
Min. scores in HS GPA or national entry test is an admission requirement	0.0902** (0.0449)		0.761*** (0.288)
Student body, program, and HEI characteristics (indexes)	✓	✓	✓
Noise controls, and field-fixed effects	✓	✓	✓
Observations	1,214	1,201	1,206
R-squared	0.230	0.325	0.247
Mean of dependent variable	0.348	23.81	2.294
Average wage (USD 2019 PPP)			300.6
Adj R squared	0.214	0.303	0.232

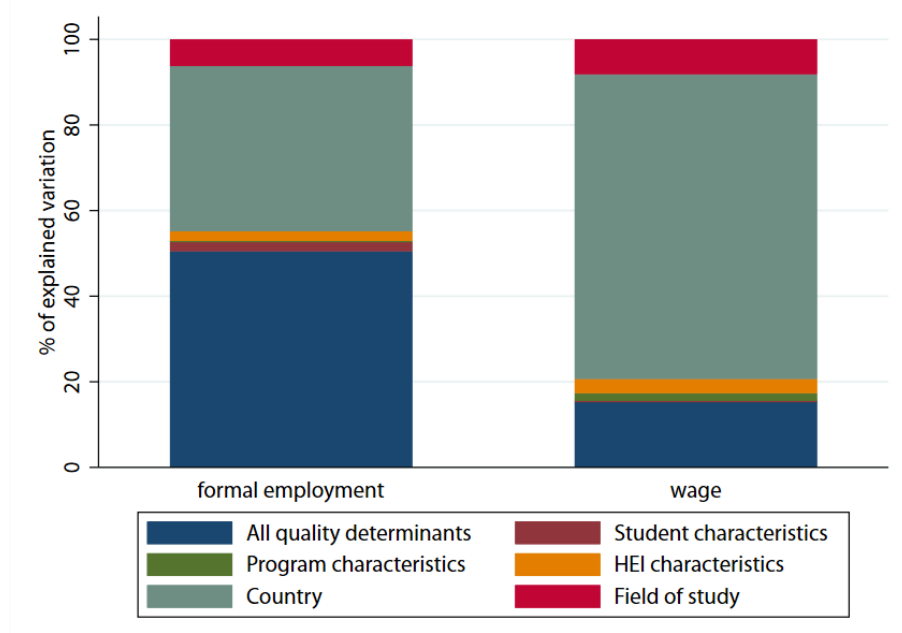
*Source:* Own estimations using individual-level data from administrative sources and program-level data from the WBSCPS for Ecuador.

*Notes:* This table shows coefficients from the (second stage) OLS regressions of student outcomes on the quality determinants selected by LASSO in the first stage. The unit of observation is an individual. Outcomes (dependent variables) are the following labor market outcomes pertaining to the 12-month period following graduation: whether the student is formally employed at least one month (col. 1); percent of months she is formally employed (col. 2); and average monthly wage (col. 3). Average monthly wage is computed over the months worked; it is zero if the individual does not work formally at all. Regressions are weighted using WBSCPS sampling weights. All specifications include noise controls as well as fixed effects for graduation year, state, and field. They also control for PCA scores for the following: student body characteristics (based on survey data), student characteristics (based on individual-level data, including proxies for previous labor market experience), program characteristics (based on survey data), HEI characteristics (based on survey data), and peer characteristics (based on individual-level data, including proxies of peers' previous labor market experience). See Appendix 1 for the list of the variables included in each index. Standard errors clustered at program level are in parenthesis. Significance levels: \* p<0.1, \*\* p< 0.05, \*\*\* p<0.0

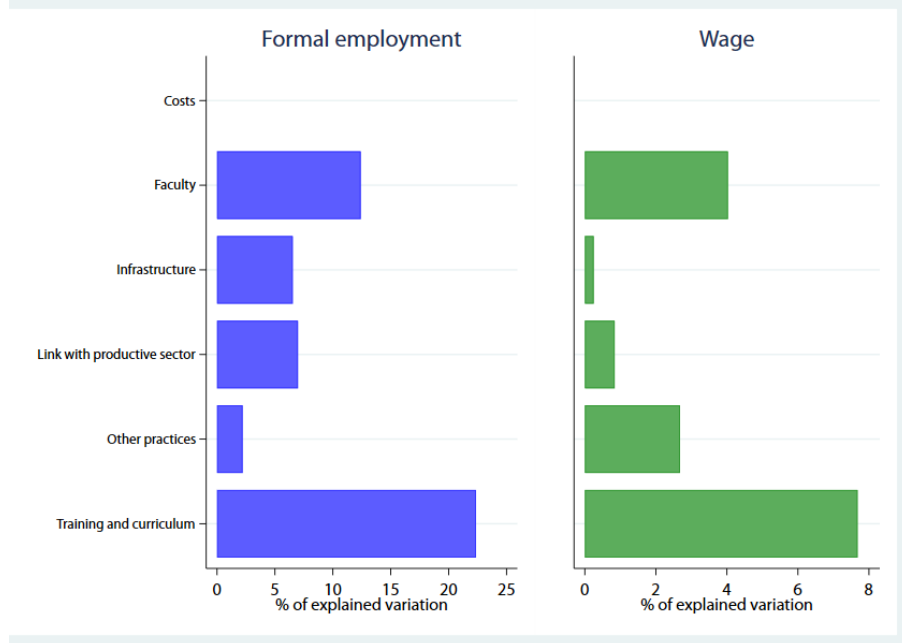


**Figure A1. R-Squared Shapley-Owen Decomposition**  
*Using Program-Level Data*

**Panel A. Percent of explained variance attributable to each set of variables**



**Panel B. Percent of explained variance attributable to quality determinants**

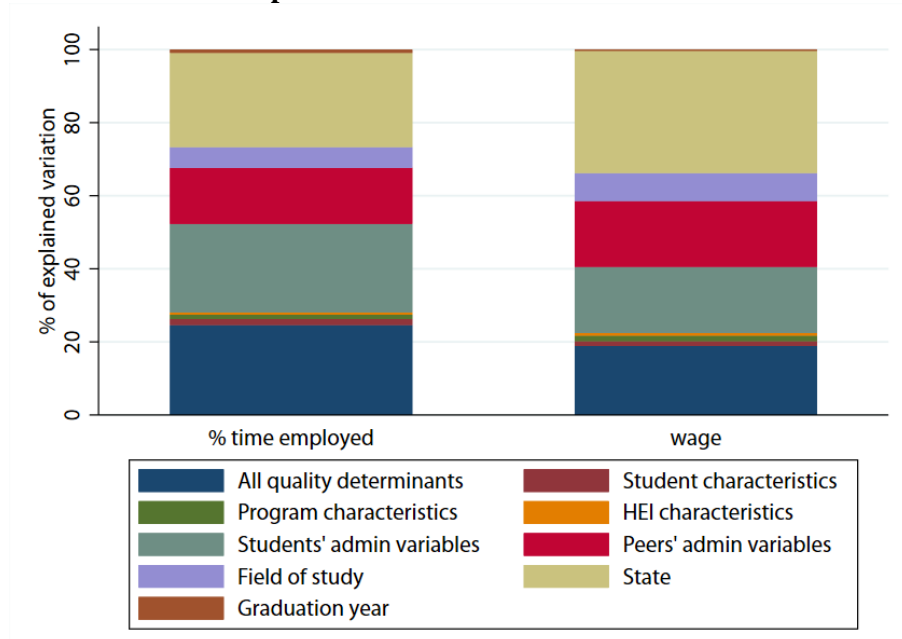


*Source:* Own estimations using WBCPS program-level data.

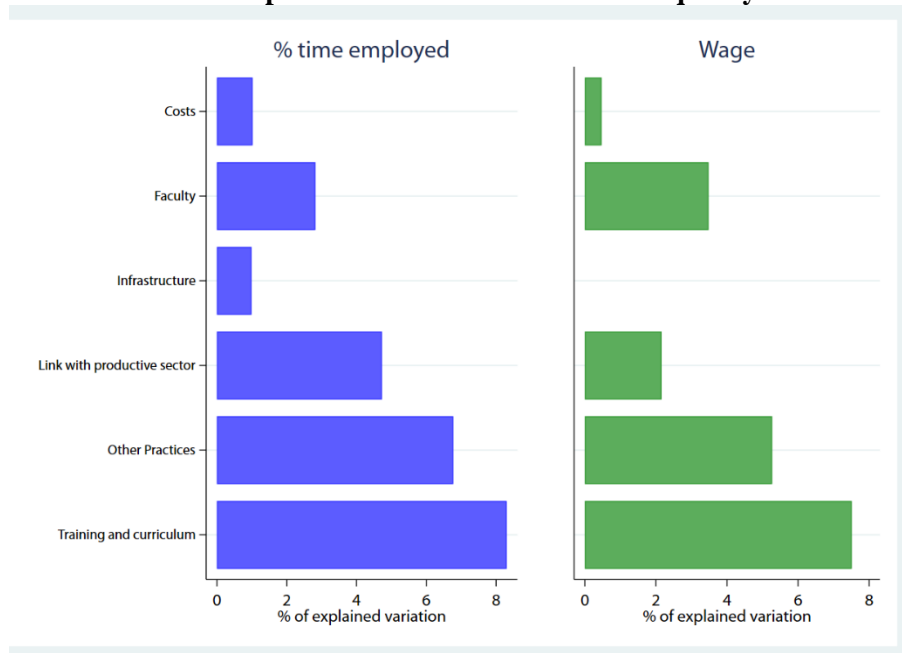
*Notes:* This figure illustrates the Shapley-Owen decomposition presented in Table 3. It focuses on two labor market outcomes: formal employment and log wages.

**Figure A2. R-Squared Shapley-Owen Decomposition**  
*Using Individual- and Program-Level Data for Brazil*

**Panel A. Percent of explained variance attributable to each set of variables**



**Panel B. Percent of explained variance attributable to quality determinants**

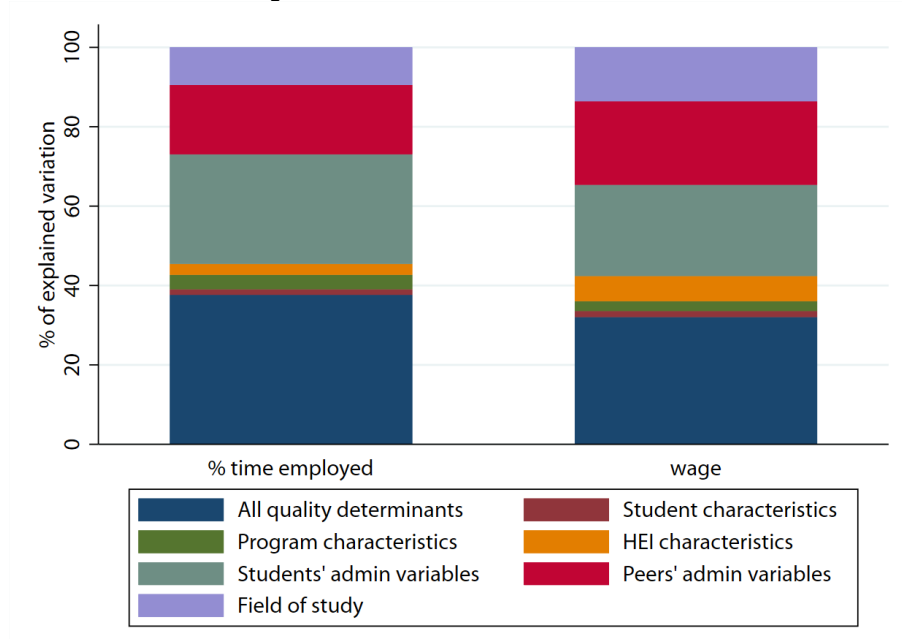


*Source:* Own estimations using WBSCPS program-level data and individual-level data from administrative sources for Brazil.

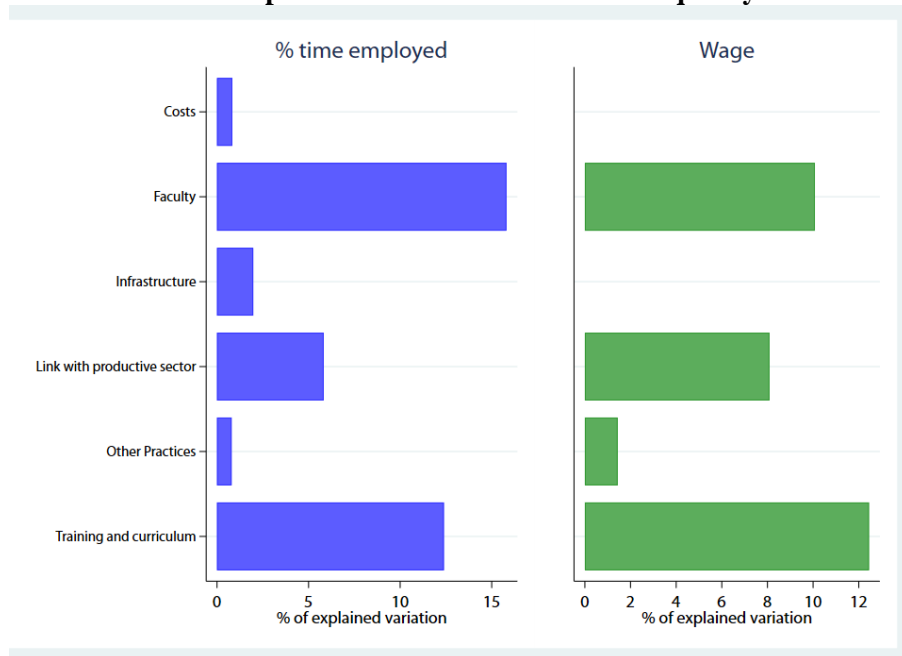
*Notes:* This figure illustrates the Shapley-Owen decomposition presented in Table 4. It focuses on two (labor market) outcomes: percent of time employed and log average wages.

**Figure A3. R-Squared Shapley-Owen Decomposition**  
*Using Individual- and Program-Level Data for Ecuador*

**Panel A. Percent of explained variance attributable to each set of variables**



**Panel B. Percent of explained variance attributable to quality determinants**



*Source:* Own estimations using WBSCPS program-level data and individual-level data from administrative sources for Ecuador.

*Notes:* This figure illustrates the Shapley-Owen decomposition presented in Table 5. It focuses on two (labor market) outcomes: percent of time employed and log average wages.