Employer Perceptions of Online Learners: Findings from a Discrete Choice Experiment
Report Draft

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Daniel Rossman | *daniel.rossman@ithaka.org*
Bethany Lewis | *bethany.lewis@ithaka.org*
Ini-Abasi Umosen| *ini.umosen@ithaka.org*
James Dean Ward | *james.ward@strada.org*

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Introduction

US colleges and universities received about $900 billion in total revenue in fiscal year 2024.[1] Public funding (e.g., state appropriations for public institutions, federal student aid dollars, and research funding) and students' tuition dollars comprise the lion's share of this revenue. Given the size of this public and private investment into higher education, institutions face a patchwork of oversight to ensure the dollars are used effectively and students and taxpayers are protected from fraud and waste.

The oversight "triad" includes accreditors, the federal government, and state governments. Accreditors are responsible for ensuring academic quality.[2] This "peer review" process of assessing quality is required for institutions to access federal student aid programs. The federal government enforces federal regulations such as institutional financial monitoring and public safety reporting, as well as the administration of federal student aid programs and the oversight of institutional compliance with programmatic rules. Finally, state governments fill a consumer protection role that ensures students are not defrauded by predatory institutions. In this role, states must authorize institutions to operate within their jurisdiction and provide a legal framework for ensuring state consumer protection laws are followed.

These three legs of regulatory oversight are meant to provide important mechanisms to ensure students receive a valuable education and taxpayer dollars are protected. However, each leg of the "triad" has

[1] Authors' calculations using IPEDS data.
[2] Robert Kelchen, *Higher Education Accountability* (Baltimore: Johns Hopkins University Press, 2018).

been criticized for various reasons. Accreditation is critiqued for lacking meaningful ways of ensuring quality as well as being a burdensome process for institutions.[3] The federal government has been criticized from the left for being too lax on enforcing federal rules and from the right for overreaching and inhibiting for-profit institutions. State authorization has been criticized for creating substantial administrative hurdles for institutions operating online programs across multiple states that need to receive authorization from each state in which they operate.[4]

To help address the burdens associated with state authorization, a group of higher education stakeholders developed the National Council for State Authorization Reciprocity Agreements (NC-SARA) in 2013.[5] NC-SARA is a private nonprofit organization designed to advance interstate reciprocity agreements that streamline the authorization process for institutions offering online education. States began joining SARA in 2014. As of 2026, all US states and the District of Columbia, with the exception of California, have joined SARA. As a result, institutions located in participating states can more easily enroll students who reside in other SARA member states in their online programming.

While reciprocity agreements make the authorization process easier by lowering the regulatory burden placed on states, some have criticized SARA for allowing states to abdicate their oversight responsibilities in two key ways.[6] First, critics argue that reciprocity allows institutions to seek authorization in the state with the weakest oversight, thus creating opportunities for predatory colleges to easily enter a national market. Second, SARA limits the ability of state attorneys general to enforce their state consumer protection laws, hold institutions accountable, and protect their residents from fraud and abuse. NC-SARA has argued that the reciprocity agreement actually raises oversight standards because institutions have to apply and be accepted into SARA, whose own standards are higher than those of many states.[7]

Despite the impact SARA has had on reshaping the state authorization process, there is little research examining its effects. Previous research from Ithaka S+R examined the effect of SARA on online enrollments in participating states and institutions.[8] We found that institutions, especially early adopters, experienced growth in online enrollments after joining SARA. Additional Ithaka S+R research examined

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[3] Clare McCann and Amy Laitinen, "The Bermuda Triad: Where Accountability Goes to Die," *New America*, last modified November 19, 2019, https://www.newamerica.org/education-policy/reports/bermuda-triad/.
Tiara Moultrie, "The Accreditation System Isn't Working: Heightened Transparency and Data Collection Could Fix It," *The Century Foundation*, October 26, 2023, https://tcf.org/content/commentary/the-accreditation-system-isnt-working-heightened-transparency-and-data-collection-could-fix-it/

[4] NC-SARA and NCHEMS, *Game Changer: The Value of SARA Participation* (April 2021), https://nc-sara.org/wp-content/uploads/files/2021-04/GameChanger_Final_4-13-21.pdf.

[5] NC-SARA, "Our Work," *NC-SARA*, accessed March 3, 2026, https://nc-sara.org/mission-history.

[6] The Institute for College Access & Success (TICAS), *Know the Facts: The Inaccuracies Surrounding NC-SARA* (November 2021), https://ticas.org/wp-content/uploads/2021/11/NC-SARA-November-11.8_700.pdf.

[7] "Eligibility for Participation," *NC-SARA*, accessed March 3, 2026, https://nc-sara.org/eligibility-participation/.

[8] James D. Ward, Heidi Booth, Elizabeth D. Pisacreta, and Benjamin Weintraut, "Breaking Down Barriers: The Impact of State Authorization Reciprocity on Online Enrollment," *Ithaka S+R*, last modified August 3, 2021, https://doi.org/10.18665/sr.315451.

enrollment patterns by program modality and how those patterns shifted before and after SARA.[9] Our analysis showed that students enrolled in out-of-state online degree programs are disproportionately female, Black, lower-income, and older. This finding suggests that expanding online markets may provide more access to groups of students who have been historically excluded from higher education.

At the same time, some have been concerned that reducing state authorization requirements may encourage predatory institutions to exploit an expanded national market. Our previous research, however, did not find that for-profit institutions–which have a history of predatory behavior and, on average, leave their graduates with more debt and fewer labor market opportunities–disproportionately benefited from SARA. This finding should help assuage concerns that reducing the administrative hurdles of gaining authorization across multiple states for online programs creates opportunities for predatory institutions to exploit students.

Though the expanded online postsecondary market does not appear to make students more vulnerable to predatory institutions, more research is needed to understand the value an online degree poses in the labor market, particularly those earned from an out-of-state institution. Enrollment data show that business is the most common degree field for online students, with one in four students enrolled in such a program. Yet online students are pursuing an increasingly diverse range of fields of study. How local employers perceive such postsecondary degrees, however, has yet to be explored.

Prior research indicates that institution type plays an important role in labor market signaling. For example, resume audit studies have demonstrated that resumes of applicants who graduated from a for-profit college result in fewer recruiter callbacks than other sectors, and appear to hold the same market signaling power as a high school diploma or fictional universities.[10] Institutional familiarity, selectivity, and reputation are also related to opportunities and wages. Given the potential biases of recruiters, it stands that the recognizability and local reputation of a nearby or in-state institution may have labor market benefits over an out-of-state institution that may have less name recognition. Such a bias has the potential to undermine the benefits of interstate enrollment and an expanded postsecondary market created by SARA.

In this study, supported by the Strada Education Foundation and Joyce Foundation, we conduct a discrete choice experiment with professional recruiters to better understand how they respond to online credentials, including those earned from out-of-state institutions. In the following sections, we

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[9] Ini-Abasi Umosen, "Exploring Online Enrollment Trends in the Era of State Authorization Reciprocity," *Ithaka S+R*, last modified November 13, 2025, https://doi.org/10.18665/sr.323979.

[10] David J. Deming, Noam Yuchtman, Amira Abulafi, Claudia Goldin, and Lawrence F. Katz, "The Value of Postsecondary Credentials in the Labor Market: An Experimental Study," *American Economic Review* 106, no. 3 (2016): 778-806, https://www.aeaweb.org/articles?id=10.1257/aer.20141757. Rajeev Darolia, Cory Koedel, Paco Martorell, Katie Wilson, and Francisco Perez-Arce, "Do Employers Prefer Workers Who Attend For-Profit Colleges? Evidence from a Field Experiment," *Journal of Policy Analysis and Management* 34, no. 4 (2015): 881-903, https://doi.org/10.1002/pam.21863. Nicole M. Deterding and David S. Pedulla, "Educational Authority in the 'Open Door' Marketplace: Labor Market Consequences of For-Profit, Nonprofit, and Fictional Educational Credentials," Sociology of Education 89, no. 3 (2016): 155-170, https://doi.org/10.1177/0038040716652455.

contextualize the current study with literature on the returns to postsecondary credentials and the labor market signaling of credentials. We then provide an overview of the study's experimental design and present findings of how recruiters evaluate job candidates with varying characteristics, including the type of credential they hold. Lastly, we discuss the substantive significance of the findings, the limitations of the study design, and implications for students and state policymakers.

Background

A college degree provides individuals with more labor market opportunities and higher wages. Research estimates that a bachelor's degree recipient will earn more than $1 million more than a high school graduate over the course of their lifetime. Descriptive analysis from Georgetown's Center for Education and the Workforce (CEW), summarized in Table 1, shows a graduated earnings premium from different postsecondary credentials.[11] While such an earnings premium may reflect innate qualities or individual contexts (e.g., familial wealth or geography) that cause someone to self-select into higher levels of education, a robust literature has helped confirm the causal relationship between more education and earnings.[12]

Table 1: Median Lifetime Earnings by Credential Level

Credential level	**Median lifetime earnings**
Less than high school	$ 1,204,725
High school diploma/GED	$ 1,576,059
Some college	$ 1,866,005
Associate's degree	$ 2,034,523
Bachelor's degree	$ 2,803,620
Master's degree	$ 3,238,709
Doctoral degree	$ 4,010,280
Professional degree	$ 4,730,621

[11] Anthony P. Carnevale, Ban Cheah, and Emma Wenzinger, *The College Payoff: More Education Doesn't Always Mean More Earnings* (Washington, DC: Georgetown University Center on Education and the Workforce, 2021), https://cew.georgetown.edu/cew-reports/collegepayoff2021.

[12] David Card, "The Causal Effect of Education on Earnings," in *Handbook of Labor Economics*, vol. 3, ed. Orley Ashenfelter and David Card (Amsterdam: Elsevier, 1999), 1801-1863, https://doi.org/10.1016/S1573-4463(99)03011-4. Louis Jacobson, Robert LaLonde, and Daniel G. Sullivan, "Estimating the Returns to Community College Schooling for Displaced Workers," *Journal of Econometrics* 125, nos. 1-2 (2005): 271-304, https://doi.org/10.1016/j.jeconom.2004.04.010. James J. Heckman, John Eric Humphries, and Gregory Veramendi, "Returns to Education: The Causal Effects of Education on Earnings, Health, and Smoking," *Journal of Political Economy* 126, no. S1 (2018): S197-S246, https://doi.org/10.1086/698760.

Source: Georgetown Center for Education and the Workforce

Higher earnings associated with additional education may reflect increased human capital development, as individuals gain knowledge and skills in college. Additionally, credentials may hold specific market signals that convey information to employers about ability and persistence that result in more labor market opportunities. This sheepskin effect signals to employers that an individual can complete something they start and that they possess a level of productivity beyond the specific knowledge and skills earned during schooling.[13] Researchers have tested this market signaling by using various experimental designs to assess how employers respond to different types of credentials and to better understand how specific elements of a credential impact employer perceptions. For example, resume audit studies have shown job biases against applicants who attended for-profit institutions,[14] transferred from a community college to a four-year institution,[15] attended less selective institutions,[16] or took longer to complete their bachelor's degree.[17]

A growing body of work has examined how employers respond to online credentials. Using a resume audit study conducted in the beginning of the COVID-19 pandemic, Bennett (2023) found that individuals with a master's in business administration (MBA) from an online program, regional public, or for-profit institution received similar callback rates as individuals with just a bachelor's degree, calling into question the value of MBAs from less selective institutions.[18] Lennon (2021) examined within-institution variation in degree modality and found a penalty for obtaining an online credential.[19] However, the study was conducted from 2015 through 2017, prior to the recent expansion of online programs in response to the disruption brought on by the COVID-19 pandemic. It is possible that increased familiarity with online learning since the implementation of these studies has reduced biases against online credentials. Nevertheless, these findings point to potential biases students who obtain online credentials under SARA may face. As such, we use a discrete choice experiment with hiring professionals to better understand how they respond to online credentials, including those earned from out-of-state institutions, informing the utility of reciprocity agreements for students.

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[13] David A. Jaeger and Marianne E. Page, "Degrees Matter: New Evidence on Sheepskin Effects in the Returns to Education," *Review of Economics and Statistics* 78, no. 4 (1996): 733-740, https://doi.org/10.2307/2109960.
[14] Tim Hyde, "Do Employers Frown on For-Profit Colleges and Online Degrees? Measuring the Labor Market Value of These Increasingly Common Credentials," *American Economic Association*, last modified March 23, 2016, https://www.aeaweb.org/research/do-employers-frown-on-for-profit-degrees.
[15] Zhengren Zhu, "Discrimination against Community College Transfer Students — Evidence from a Labor Market Audit Study," *Economics of Education Review* 97 (2023), https://doi.org/10.1016/j.econedurev.2023.102482.
[16] S. Michael Gaddis, "Discrimination in the Credential Society: An Audit Study of Race and College Selectivity in the Labor Market," *Social Forces* 93, no. 4 (2015): 1451-1479, https://doi.org/10.1093/sf/sou111.
[17] Michael D. Bloem, "Time to Baccalaureate Degree in the Labor Market: Evidence from a Field Experiment," *Journal of Policy Analysis and Management* 45, no. 1 (2026): e70010, https://doi.org/10.1002/pam.70010.
[18] Christopher T. Bennett, "Labor Market Returns to MBAs from Less-Selective Universities: Evidence from a Field Experiment during COVID-19," *Journal of Policy Analysis and Management* 42, no. 2 (2023): 525-551, https://doi.org/10.1002/pam.22448.
[19] Conor Lennon, "How Do Online Degrees Affect Labor Market Prospects? Evidence from a Correspondence Audit Study," *ILR Review* 74, no. 4 (August 2021): 920-47, https://doi.org/10.1177/0019793919899943.

Research Questions

Building on our previous report, which examined who enrolls in different program modalities and how those enrollment patterns shifted before and after the creation of SARA, this study aims to understand whether and to what extent online learners are earning credentials that are valued by the labor market. The research is guided by the following questions:

1. Do employers prefer job applicants with in-person degrees compared to online degrees?
2. Does this preference differ based on whether the degree was earned from an in-state or out-of-state institution?
3. How do preferences vary by other candidate characteristics as well as by respondent and employer characteristics?

Study Design

To answer these questions, Ithaka S+R designed and conducted a discrete choice experiment (DCE), a research method to measure preferences by asking participants to choose between hypothetical options that vary across defined characteristics, or attributes. The primary objectives of the experiment were to compare employer evaluations of job candidates who earned a bachelor's degree online with those who earned a bachelor's degree in person, and to assess whether and to what extent those evaluations varied depending on whether the degree-granting institution was in- or out-of-state, given SARA's influence on out-of-state online enrollment.

The DCE was administered through an online survey of individuals whose professional job responsibilities include recruiting and hiring new employees, such as hiring managers and human resource specialists. Participants reviewed pairs of hypothetical job candidates who varied across attributes that recruiters and hiring managers commonly use to assess an individual's academic preparation, technical aptitude, and potential success in a given job. Participants were asked to consider these candidates for a junior-level position appropriate for a recent bachelor's degree recipient, in order to emphasize the importance of the degree in hiring decisions. To minimize response bias, we did not disclose that the primary focus of the survey was to understand the role that degree program modality and its intersection with institution type play. After reviewing each pair of candidates, participants were required (through force response) to choose the individual they would invite for a job interview. Respondents were not given the option to select none/neither.

Because survey respondents were aware that they were participating in a survey, the results reflect stated rather than revealed preferences. Additionally, the DCE does not generate strong incentives for respondents to carefully consider their true preferences since their choices carry no real consequences

in these hypothetical scenarios.[20] See the Limitations section for further reflections on this aspect of the study design.

Following the discrete choice tasks, the survey included background questions about respondents (e.g., highest degree earned, number of years of work experience) and their employers (e.g., industry, geographic region). These questions were included to assess whether and to what extent respondent and employer characteristics influenced the results.

To recruit an appropriate sample, Ithaka S+R partnered with Alchemer, a panel management company, to identify and survey hiring professionals located in the United States. Alchemer managed participant recruitment, determined and distributed appropriate incentives for participation, and delivered a clean and validated dataset of survey responses. Ithaka S+R designed the survey and programmed it in Alchemer's platform before it was digitally deployed.

Attributes and Levels

Table 1 below summarizes the hypothetical candidate characteristics, or attributes, along with the corresponding levels that varied across candidates. By using Alchemer's conjoint question feature, the platform randomly assigned levels within each attribute to the hypothetical profiles included in each choice task. The order of the attributes in the table matches the order in which they appear in the choice sets. We intentionally did not place degree program modality or institution type at the top of the list to avoid signaling that these attributes were more important than others.

Although we initially considered including hybrid as a level within degree program modality, we decided against it. First, public discussions and debates typically pit online degrees against in-person degrees. Second, adding a third level would have decreased the frequency that each level appeared in the choice sets, thereby decreasing statistical power.

Institution type combines institutional control (i.e., public, private not-for-profit, and for-profit) and whether the institution is in-state or out-of-state. It is important to point out that in-state versus out-of-state is from the perspective of the respondent, not the student. We used this approach to better capture the degree of recognizability and familiarity a respondent may have with a given institution. One concern with the growth of enrollment across state lines is that students are increasingly earning degrees from institutions across the country. Employers and hiring managers may be less familiar with these institutions, and therefore perceive them as lower quality than schools with which they are more familiar with. Defining in-state status from the respondent's perspective more directly captures this

[20] Some studies have addressed this issue by generating incentives for respondents. For example, Kessler, Low, and Sullivan (2019) introduce an incentivized resume rating design, in which employers evaluate resumes they know to be hypothetical, but whose evaluations are used to form a packet of resumes of real job seekers that they receive following participation in the study. Judd B. Kessler, Corinne Low, and Colin D. Sullivan, "Incentivized Resume Rating: Eliciting Employer Preferences without Deception," *American Economic Review* 109, no. 11 (2019): 3713-3744, https://doi.org/10.1257/aer.20181714.

dimension of familiarity than basing it on the student's location. With this approach, a hypothetical applicant could have attended an institution in the same state as their residence, yet their institution would still be perceived as out-of-state if the respondent is located elsewhere.[21]

We also used institutional selectivity, defined by Barron's Selectivity Index (often used by the National Student Clearinghouse), as a proxy not only for familiarity but also brand recognition and prestige.[22] We considered constructing a measure that explicitly categorized institutions as nationally, regionally, or only locally recognized, but ultimately decided that such a measure would be too misaligned from information shared through resumes and how respondents evaluate institutions. Although respondents may not know an institution's specific admissions rate, selectivity serves as a reasonable proxy for brand recognition and prestige. Lower admissions rates typically correspond to higher selectivity and greater recognition and prestige, and vice versa.

While the attributes describing the degree earned were more obvious given their importance to our analysis, we relied on the literature to identify the attributes describing candidates' work experience and alignment with the requirements of the job. Specifically, we drew on the match of field of study and job tasks and relevant work experience attributes developed and implemented by Humburg and van der Velden (2015) and then applied similar logic to develop the attribute measuring the level of experience with job-relevant tools and software.[23]

Table 1. Attributes and Levels of Hypothetical Candidates

Attribute	Definition	Number of Levels	Levels
Match of Field of Study and Job Tasks	Indicates the extent to which the candidate's bachelor's degree field of study aligns with the	3	Field of study matches job tasks completely
			Field of study related to job tasks but not exact match

[21] This situation could arise if a candidate applies for a job located in their own state but the hiring manager is based outside of it, or if a candidate applies for a job outside of their own state where the hiring manager is located. However, in most cases, a hiring manager is located in the same state as their employer. In our sample, 90.6 percent of respondents' employers were based in the same state as their residence. Additionally, Kelchen and Webber (2018) found that only 10.4 percent of recent bachelor's degree recipients moved across state lines in 2015. In other words, most students remained in the same state after graduation, at least in the short term. That said, this finding does not capture the location of the jobs candidates applied to. Recent graduates may apply to positions in many states but ultimately remain in the state where they went to college. Robert Kelchen and Douglas A. Webber, "Examining the Interstate Mobility of Recent College Graduates," *Educational Researcher* 47, no. 3 (2018): 213-215, https://doi.org/10.3102/0013189X17753124.

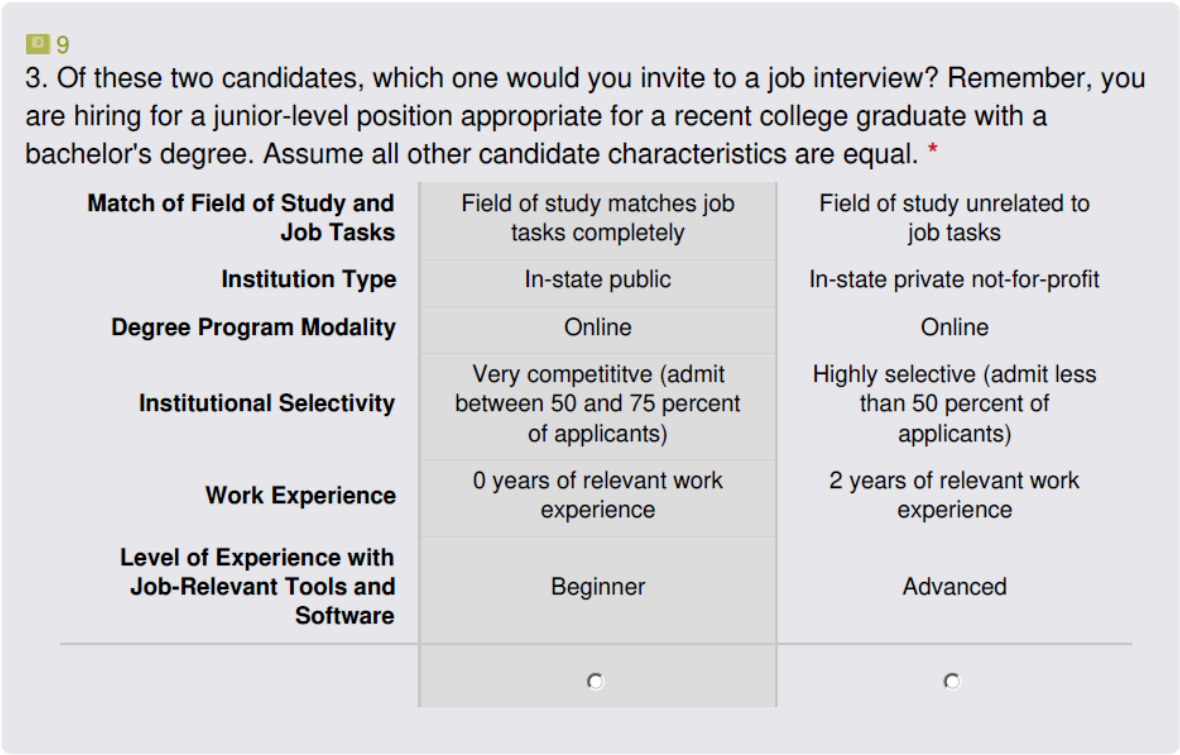
[22] National Student Clearinghouse Research Center, *Stay Informed: Data Methodology – Fall 2021* (Herndon, VA: National Student Clearinghouse, 2021), https://nscresearchcenter.org/wp-content/uploads/StayInformed_DataMethodologyFall2021.pdf.

[23] Martin Humburg and Rolf K. W. van der Velden, "Skills and the Graduate Recruitment Process: Evidence from Two Discrete Choice Experiments," *Economics of Education Review* 49 (2015): 24–41, https://doi.org/10.1016/j.econedurev.2015.07.001.

	requirements of the position.		Field of study unrelated to job tasks
Institution Type	Indicates the type of institution from which the candidate earned their bachelor's degree and whether it is located in or outside of your current state of residence.	5	In-state public
			In-state private not-for-profit
			Out-of-state public
			Out-of-state private not-for-profit
			Out-of-state for-profit
Degree Program Modality	Indicates whether the candidate earned their bachelor's degree through an online or in-person program.	2	In person
			Online
Institutional Selectivity	Indicates the admissions rate of the institution where the candidate earned their bachelor's degree.	4	Less selective/open admissions (admit more than 85 percent of applicants)
			Competitive (admit between 75 and 85 percent of applicants)
			Very competitive (admit between 50 and 75 percent of applicants)
			Highly selective (admit less than 50 percent of applicants)
Work Experience	Indicates the number of years of work experience the candidate has that it is relevant to the position.	3	0 years of relevant work experience
			1 year of relevant work experience
			2 years of relevant work experience
Level of Experience with Job-Relevant Tools and Software	Indicates the candidate's level of technical experience with tools and software relevant to the position.	3	Beginner
			Intermediate
			Advanced

Figure 1 below is an example of a choice task presented to respondents. The reminder of the prompt at the top of the choice task was also inspired by Humburg and van der Velden (2015).

Figure 1. Choice Set Example



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3. Of these two candidates, which one would you invite to a job interview? Remember, you are hiring for a junior-level position appropriate for a recent college graduate with a bachelor's degree. Assume all other candidate characteristics are equal. *

Match of Field of Study and Job Tasks	Field of study matches job tasks completely	Field of study unrelated to job tasks
Institution Type	In-state public	In-state private not-for-profit
Degree Program Modality	Online	Online
Institutional Selectivity	Very competititve (admit between 50 and 75 percent of applicants)	Highly selective (admit less than 50 percent of applicants)
Work Experience	0 years of relevant work experience	2 years of relevant work experience
Level of Experience with Job-Relevant Tools and Software	Beginner	Advanced
	○	○

Sample Size and Power

In any study, a sufficient sample size is crucial to ensure statistical power and reduce the risk of false negatives. According to Johnson and Orme (2003), the minimum sample size needed to estimate main effects is as follows:

$$n \geq 500c/(ta)$$

where t is the number of choice tasks per respondent, a is the number of candidates per choice task, and c is the largest number of levels for a single attribute.[24] Consistent with the literature, and to balance sample size and statistical power with respondent burden from survey length, we decided to present 12 choice tasks, each featuring two candidates per task, a design commonly used in DCEs. Given the maximum number of levels for any single attribute was five, a minimum sample of 105 was sufficient for main or average effects.[25]

[24] R. M. Johnson and B. K. Orme, *Getting the Most from CBC*, Sawtooth Software Research Paper Series (Sequim, WA: Sawtooth Software, 2003), https://www.sawtoothsoftware.com/resources/technical-papers/getting-the-most-from-cbc.

[25] In general, as the number of tasks per respondent and number of candidates increase, the sample size needed decreases. But as the number of attribute levels increase, the sample size needed increases.

In addition to analyzing main effects, we planned to use interaction effects to assess whether outcomes varied across combinations of levels, with a focus on the combination of degree program modality and institution type. In this case, *c* is equal to the largest product of levels of any two attributes. Assuming 12 choice tasks, two candidates per task, and a product of 20 (one attribute with a maximum of five levels and one attribute with a maximum of four levels), a minimum sample of 417 was sufficient for interaction effects. Based on these results, we planned to survey at least 500 respondents who met the study criteria to ensure sufficient power to estimate both main and interaction effects.

Final Study Sample

Alchemer fielded the survey over 12 days, from December 10, 2025 to December 22, 2025. The fielding began with a soft launch from December 10 to 11, during which 34 responses were collected. This phase allowed us to review initial results to verify that the survey was functioning as intended. After confirmation, the survey was fully launched and remained open until at least 500 validated responses were collected. In total, 534 validated responses were included in the final sample; 23 responses were removed for partial completion, and 232 respondents were disqualified for failing to meet the eligibility criteria. Because the 534 respondents were presented with 12 choice tasks each, the final number of observations for the analysis is 6,516.

Table 2 below presents descriptive statistics on the final sample, organized by respondent and employer characteristics. A plurality of respondents (42.4 percent) live in the South, higher than the national average of 39.2 percent. This is followed by the Midwest (22.8 percent) and the Northeast (18.6 percent). The West is underrepresented, with only 16.2 percent of respondents compared with 24 percent of the population nationally.[26] Nearly two-thirds of respondents report having between 6 and 15 years of work experience, while 8 percent have zero to five years, 15.3 percent have 16-20 years, and 10.9 percent have more than 20 years of experience.

Regarding educational attainment, nearly half of respondents (47.5 percent) report a bachelor's degree as their highest credential. The next most common credential is an associate degree, at 18.8 percent. Almost one-fifth of respondents report holding a master's degree, professional degree, or doctorate, while 14.4 percent earning a high school diploma only. The educational attainment of this sample is greater than the national average among adults aged 25 and older. For instance, nationally, fewer than one-quarter hold a bachelor's degree as their highest credential. Among respondents with an associate degree or higher, slightly more than one-quarter report having earned their degree exclusively online.

Among employer characteristics, the most commonly reported industries were Health Science and Medical Technology (18.4 percent), Manufacturing and Product Development (14.0 percent), and

[26] U.S. Census Bureau, "United States Population Growth by Region," *Population Clock*, U.S. Census Bureau, https://www.census.gov/popclock/data_tables.php?component=growth.

Business and Finance (11.6 percent).[27] Additionally, 30.4 percent of respondents reported working at a remote-first organization, where employees are not required to work in a physical office.

Table 2. Descriptive Statistics on the Study Sample

Respondent Characteristics		
	N	Percent
Geographic Region		
South	230	42.4
Midwest	124	22.8
Northeast	101	18.6
West	88	16.2
Work Experience		
0-5 years	45	8.3
6-10 years	183	33.7
11-15 years	173	31.9
16-20 years	83	15.3
21+ years	59	10.9
Highest Degree Earned		
High school diploma	78	14.4
Associate degree (e.g., AA, AS)	102	18.8
Bachelor's degree (e.g., BA, BS)	258	47.5
Master's degree (e.g., MA, MS)	73	13.4
Professional degree	25	4.6
Doctorate degree (e.g., PhD, EdD)	7	1.3
Highest Degree Earned Online		
Yes	123	26.4
No	342	73.6

[27] The survey presented respondents with 15 industry sectors, as defined by the Commission on Teacher Credentialing, as well as an option to select "other".

Employer Characteristics		
	N	Percent
Industry (top 3)		
Health Science and Medical Technology	100	18.4
Manufacturing and Product Development	76	14.0
Business and Finance	63	11.6
Remote-First Organization		
Yes	165	30.4
No	378	69.6

Analytic Approach

We employed ordinary least squares (OLS) regression models to assess the effect of the attributes listed in Table 1 on the likelihood of being selected for a job interview, with a focus on the effect of earning a bachelor's degree online relative to one in person. We draw heavily on Hainmueller et al. (2014), which argues that because all attribute levels in a DCE are independently randomized, OLS regressions consistently estimate the causal effects of individual attribute levels.[28] See Appendix A for a series of diagnostic tests that check the assumptions underlying this approach, as recommended by Hainmueller et al. (2014).

It is worth noting that other DCEs often rely on mixed logit or multinomial logit models because of their connection to utility theory and their usefulness for estimating willingness to pay (WTP). However, those approaches appear to be better suited for understanding consumer choice and valuation of product features, especially when price is involved. In contrast, this study's primary objective is to understand causal effects of attribute levels, rather than to identify utility functions or monetary tradeoffs.

The model for this analysis is as follows:

$$CHOSEN_i = \delta + \beta PROGRAM\ MODALITY_i + \alpha X_i + \varepsilon_i$$

Where *CHOSEN* indicates whether a given candidate is chosen, *PROGRAM MODALITY*, as the key independent variable, indicates whether a given candidate earned their bachelor's degree in person or

[28] Jens Hainmueller, Daniel J. Hopkins, and Teppei Yamamoto, "Causal Inference in Conjoint Analysis: Understanding Multidimensional Choices via Stated Preference Experiments," *Political Analysis* 22, no. 1 (2014): 1-30, https://doi.org/10.1093/pan/mpt024.

online, and *X* is a vector of control variables, defined as the differences in the five other attributes between the two candidates presented in each choice task. Because all respondents were forced to complete all 12 tasks, the data contain no missing observations. Standard errors are clustered at the respondent level.

To assess whether the effects of degree program modality varied across other candidate attributes or employer characteristics, we added an interaction term to the OLS model.

The model for this analysis is as follows:

$$CHOSEN_i = \delta + \beta PROGRAM\ MODALITY_i + \gamma OTHER\ CHARACTERISTIC_i + \theta(PROGRAM_i \times OTHER\ CHARACTERISTIC_i) + \alpha X_i + \varepsilon_i$$

Where *CHOSEN* indicates whether a given candidate is chosen, *PROGRAM MODALITY*, as the key independent variable, indicates whether a given candidate earned their bachelor's degree in person or online, *OTHER CHARACTERISTIC* represents a set of dummies for all attribute levels or characteristic categories, *PROGRAM MODALITY x OTHER CHARACTERISTIC* represents the interaction, and *X* is a vector of control variables, defined as the differences in the remaining attributes between the two candidates presented in each choice task.

Specifically, we present results in the next section from analyses examining interaction effects between degree program modality and the following:

- Institution type, given SARA's intended influence on out-of-state online enrollment.
- Institutional selectivity.
- Whether the respondent works in an industry aligned with a field of study that has an online presence.
- Whether the respondent works at a remote-first organization.

Results

Table 3 below presents how often each level was included in the profile of the selected candidate. Many of the results align with expectations. Respondents tended to choose candidates with more overall work experience, greater proficiency with job-relevant tools and software, and stronger alignment between field of study and job tasks. Candidates who earned their bachelor's degree in person were also selected slightly more often (51.6 percent) than those with an online bachelor's degree (48.4 percent). Candidates from in-state public institutions were selected most frequently, whereas candidates from out-of-state for-profits were selected least frequently. As a reminder, a candidate's institution is categorized as in-state or out-of-state from the perspective of the respondent, not the student.

The one counter intuitive result is related to the institutional selectivity attribute. As expected, candidates from less selective institutions were least often chosen. However, candidates who attended a

competitive institution, one of the two least selective options, were selected most often. This finding may reflect misunderstanding of how the levels were defined or that hiring managers do not differentiate quality among competitive institutions.

Table 3. Distribution of Attribute Levels in Selected Candidates

Match of Field of Study and Job Tasks	
Field of study matches job tasks completely	38.6%
Field of study related to job tasks but no exact match	33.3%
Field of study unrelated to job tasks	28.2%
Institution Type	
In-state public	20.7%
In-state private not-for-profit	20.4%
Out-of-state public	19.8%
Out-of-state private not-for-profit	19.9%
Out-of-state for-profit	19.3%
Degree Program Modality	
In person	51.6%
Online	48.4%
Institutional Selectivity	
Less selective/open admissions (admit more than 85 percent of applicants)	22.7%
Competitive (admit between 75 and 85 percent of applicants)	26.2%
Very competitive (admit between 50 and 75 percent of applicants)	25.4%
Highly selective (admit less than 50 percent of applicants)	25.7%
Work Experience	
0 years of relevant work experience	25.3%
1 year of relevant work experience	35.0%

2 years of relevant work experience	39.7%
Level of Experience with Job-Relevant Tools and Software	
Beginner	27.4%
Intermediate	34.3%
Advanced	38.3%

Main Effects

Table 4 below presents results of OLS regressions examining whether a candidate is chosen based on various attributes. The results of the regressions reflect average marginal component effects (AMCEs), which show how each level changes the probability, on average, that a profile is chosen relative to the reference level. Figure 2 below the table plots these AMCEs to clearly show how their magnitudes vary across attributes. For each attribute, one level is plotted on the dashed vertical line, which represents the reference level (e.g., in person within the degree program modality attribute). The horizontal solid blue lines represent 95 percent confidence intervals. A lack of overlap between the solid and dashed lines indicates that the results are statistically significant, meaning that the null hypothesis that the attribute level has no effect on selection can be rejected.

As indicated by the asterisks in the table and by the horizontal blue confidence intervals when they do not intersect the vertical line, all AMCEs are statistically significant relative to the reference level, except for the coefficient estimates on the levels within institution type.

The largest spreads across levels are associated with work experience, experience with job-relevant tools and software, and the match between field of study and job tasks, suggesting that differences in candidates' work experiences and skills play a substantially larger role in hiring managers' decisions on inviting candidates for an interview than degree program modality and institutional characteristics. For example, on average, increasing relevant work experience from zero to one year increases the probability that a profile is chosen by 15.3 percentage points, while increasing experience from zero to two years raises the probability by 21.4 percentage points. Similarly, increasing experience with job-relevant tools and software from beginner to intermediate increases the probability by 9.2 percentage points, while increasing experience from beginner to advanced increases the probability by 15.9 percentage points.

The smallest spreads across levels are institution type (none of which are statistically significant), degree program modality, and institutional selectivity. The predicted probability that a profile with an in-person degree is chosen is 51.3 percent while the predicted probability that a profile with an online degree is chosen is 48.7 percent. In other words, changing the degree program modality from in person to online

decreases the probability that a profile is chosen by 2.5 percentage points.[29] For institutional selectivity, the differences between less selective and the three more competitive categories are very similar: moving from less selective to competitive increases the probability of selection by 6.2 percentage points, moving from less selective to very competitive increases the probability by 5.4 percentage points, and moving from less selective to highly selective increases the probability by 5.6 percentage points. This finding suggests that employers discount degrees from less selective schools relative to competitive ones, while making little to no distinction between degrees from more competitive schools.

On the other hand, no levels within institution type are statistically different from the null hypothesis, though the coefficient of out-of-state for-profit is very close to being statistically significant at the 95 percent confidence level. These results suggest that holding all other characteristics constant, institution type alone does not influence hiring managers' decisions.

Table 4. Average Marginal Component Effects of Candidate Attributes on Selection

Attribute and Level	Coefficient	Standard Error
Match of Field of Study and Job Tasks		
Field of study matches job tasks completely	Reference	-
Field of study related to job tasks but not exact match	-0.078***	(0.01)
Field of study unrelated to job tasks	-0.151***	(0.01)
Institution Type		
In-state public	Reference	-
In-state private not-for-profit	<-0.001	(0.01)
Out-of-state public	-0.018	(0.01)
Out-of-state private not-for-profit	-0.010	(0.01)
Out-of-state for-profit	-0.027	(0.01)
Degree Program Modality		
In person	Reference	-
Online	-0.025**	(0.01)
Institutional Selectivity		
Less selective	Reference	-
Competitive	0.062***	(0.01)

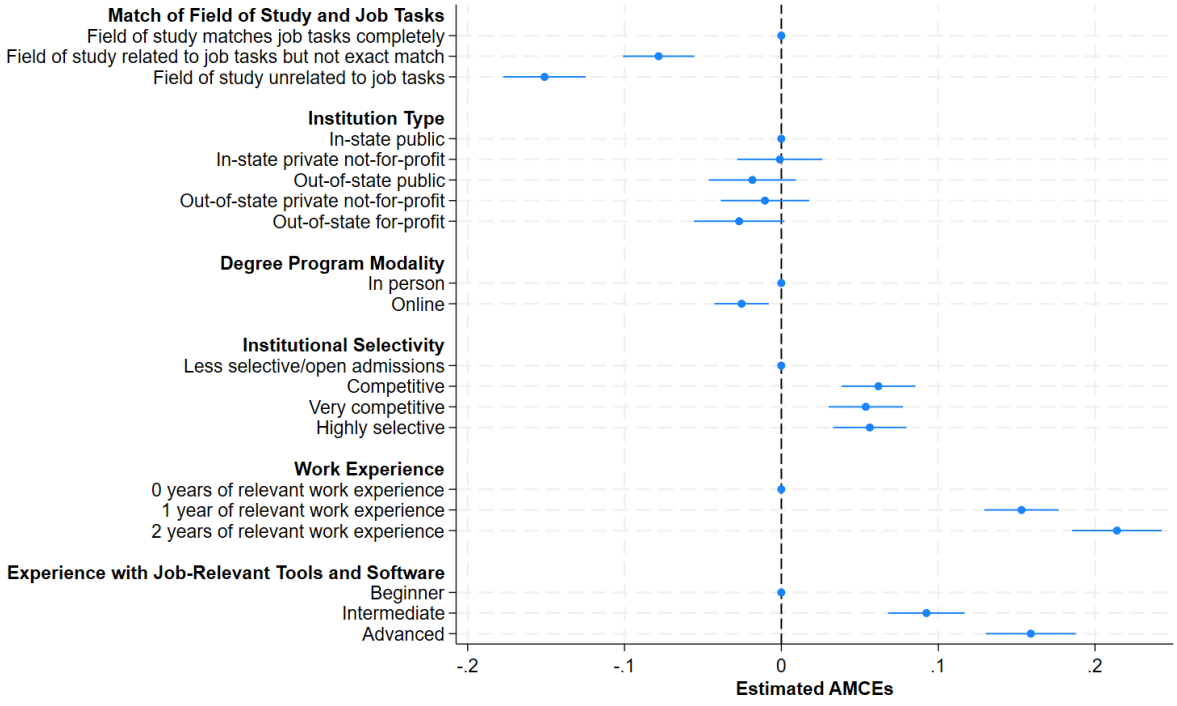
[29] The 0.1 percentage point discrepancy is due to rounding.

Very competitive	0.054***	(0.01)
Highly selective	0.056***	(0.01)
Work Experience		
0 years of relevant work experience	Reference	-
1 year of relevant work experience	0.153***	(0.01)
2 years of relevant work experience	0.214***	(0.01)
Level of Experience with Job-Relevant Tools and Software		
Beginner	Reference	-
Intermediate	0.092***	(0.01)
Advanced	0.159***	(0.01)

Standard errors adjusted for clusters at the respondent level are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2. Average Marginal Component Effects of Candidate Attributes on Selection



Interaction Effects of Degree Program Modality and Institution Type

The previous analysis of main effects assumes that the effect of degree program modality is constant across institution types. To test whether the importance of degree program modality varies by institution type given SARA's intended influence on out-of-state online enrollment, we employed the same OLS regression model, this time with an interaction of degree program modality and institution type. As discussed in the Attributes and Levels section, employers and hiring managers may be less familiar with out-of-state institutions, and therefore perceive them as lower quality than in-state institutions with which they are more familiar.

Table 5 below presents the results of this analysis. None of the coefficients are statistically significant except for the interaction of online modality and out-of-state public institutions. This interaction indicates that the penalty for earning an online degree from an out-of-state public institution is 5.0 percentage points larger than the penalty for earning an online degree from an in-state public institution.

The addition of the relevant coefficient estimates–online (-0.003), out-of-state public institutions (0.006), and the interaction (-0.05)–indicates that changing a candidate's profile from an in-person degree earned at an in-state public institution to an online degree earned at an out-of-state public institution decreases the likelihood of selection by 4.7 percentage points.

A more intuitive way to interpret these results is to compare the predicted probabilities of selection for the ten combinations of degree program modality and institution type generated by the OLS model presented in Table 5. These predicted probabilities are presented in Table 6. The results indicate that the penalty for online degrees is largest at out-of-state public institutions. The predicted probability that a profile is chosen when the degree is earned from an in-person program at an in-state public institution is 51.3 percent, compared to 46.6 percent when it is earned online at an out-of-state public institution, a reduction of 4.7 percentage points. Although online degrees from out-of-state public institutions are tied with online degrees from out-of-state for-profit institutions for the lowest predicted probability of selection (46.6 percent), in-person degrees earned at out-of-state public institutions have the second highest predicted probability of being selected (51.9 percent). These results suggest that degree program modality matters in combination with institution type: hiring managers penalize online degrees when they are earned at out-of-state public institutions.

Table 5. Average Marginal Component Effects of Interaction of Degree Program Modality and Institution Type on Selection

Attribute and Level	Coefficient Estimate	Standard Error
Degree Program Modality		

In person	Reference	-
Online	-0.003	(0.02)
Institution Type		
In-state public	Reference	-
In-state private not-for-profit	0.008	(0.02)
Out-of-state public	0.006	(0.02)
Out-of-state private not-for-profit	-0.006	(0.02)
Out-of-state for-profit	-0.010	(0.02)
Degree Program Modality x Institution Type		
In person x in-state public	Reference	-
Online x in-state private not-for-profit	-0.019	(0.03)
Online x out-of-state public	-0.050*	(0.03)
Online x out-of-state private not-for-profit	-0.010	(0.03)
Online x out-of-state for-profit	-0.035	(0.03)

Standard errors adjusted for clusters at the respondent level are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The coefficients for the remaining attributes are omitted from the table because they are similar to those in the main model without interactions.

Table 6. Predicted Probabilities of the Interaction of Degree Program Modality and Institution Type on Selection

Attribute and Level	Predicted Probability	Standard Error
Degree Program Modality x Institution Type		
In person x in-state public	0.513	(0.01)
In person x in-state private not-for-profit	0.521	(0.01)
In person x out-of-state public	0.519	(0.01)
In person x out-of-state private not-for-profit	0.507	(0.01)
In person x out-of-state for-profit	0.503	(0.01)
Online x in-state public	0.510	(0.01)

Online x in-state private not-for-profit	0.499	(0.01)
Online x out-of-state public	0.466	(0.01)
Online x out-of-state private not-for-profit	0.495	(0.01)
Online x out-of-state for-profit	0.466	(0.01)

Interaction Effects of Degree Program Modality and Institutional Selectivity

To test whether the importance of degree program modality varies by institutional selectivity, we employed the same OLS model described in the main effects section, this time with an interaction of degree program modality and institutional selectivity. One possibility is that online degrees earned from more competitive and prestigious institutions may be perceived as comparable in quality to in-person degrees from these institutions, whereas online degrees earned from open access may not be viewed in similar ways.

Table 7 below presents the results of that analysis. None of the coefficient estimates on the interactions between institutional selectivity and degree program modality are statistically significant, while the coefficients on the levels within each attribute remain statistically significant. These findings suggest that hiring managers' perceptions of online degrees do not vary by the selectivity of the institution where the degree was earned. Instead, candidates are independently penalized for earning degrees online and independently advantaged when earning a degree from a more selective institution.[30] The least favorable combination is earning an online degree from a less selective institution.

Table 7. Average Marginal Component Effects of Interaction of Degree Program Modality and Institutional Selectivity on Selection

Attribute and Level	Coefficient Estimate	Standard Error
Degree Program Modality		
In person	Reference	-
Online	-0.033*	(0.02)
Institutional Selectivity		
Less selective	Reference	-

[30] Because results from prior analyses revealed that hiring managers did not differentiate quality among competitive institutions, we conducted the same regression analysis with the three competitive categories collapsed into one, creating a variable consisting of two categories: less selective and competitive. The results are consistent across both approaches. Full regression tables are in Appendix X.

Competitive	0.065***	(0.02)
Very competitive	0.044**	(0.02)
Highly selective	0.048**	(0.02)
Degree Program Modality x Institutional Selectivity		
In person x less selective	Reference	-
Online x competitive	-0.007	(0.02)
Online x very competitive	0.020	(0.02)
Online x highly selective	0.017	(0.02)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The coefficients for the remaining attributes are omitted from the table because they are similar to those in the main model without interactions.

Effects by Employer Industry

There is also the question of whether perceptions of online degree holders vary by employer industry, which has practical implications for learners deciding which fields of study to pursue in college. The survey did not target hiring professionals in specific industries, in part because doing so would have made it difficult to recruit a sufficiently large sample. We also did not specify in the survey instructions the field of study in which a candidate earned their bachelor's degree.

However, the survey did include follow-up questions about respondents and their employers, allowing for analysis by industry. One pattern worth investigating is whether employer perceptions differ depending on whether an employer operates in an industry aligned with fields of study that have a strong online degree presence, defined as fields of study in which a relatively large share of degrees are earned online. Hiring managers in these industries may be more accustomed to seeing applicants with online degrees and may view them as a more common and acceptable pathway into the industry and occupation. This level of familiarity may lead them to view online degrees as comparable in quality to in-person degrees. This has important practical implications. If online degrees are viewed unfavorably primarily in industries where pursuing an online pathway is uncommon, then the overall average negative effect identified in earlier analyses may be less relevant and practical for online learners.

Drawing on findings from our previous report on in-state and out-of-state online enrollment before and after SARA, the three most common fields of study (out of a total of 23) for students earning online degrees are Business; Health Care Fields; and Education. While these fields do not perfectly map to the 15 industries included in our survey, three industry sectors align most closely: Business and Finance; Health Science and Medical Technology; and Education, Child Development, and Family Services. Using

this mapping, we grouped respondents working in these three industries into a “strong online presence” category and all remaining respondents into a “limited online presence” category.[31]

To test whether the importance of degree program modality varies by whether a respondent is in an industry aligned with a field of study that has an online presence, we employed the same OLS model described in the main effects section, this time with an interaction of degree program modality and an indicator for online presence.

Table 8 below presents the results. The coefficient of online indicates that among respondents who work in industries aligned with fields of study that have a limited online presence, changing a candidate’s degree from in person to online decreases the predicted probability of selection from 51.9 percent to 48.0 percent, representing a decline of 3.9 percentage points. In contrast, the coefficient of the interaction is nearly identical in magnitude to the main effect but opposite in sign. This indicates that among respondents who work in industries aligned with fields of study that do have an online presence, there is no statistically significant difference in the selection of candidates with online and in-person degrees (-0.039+0.038). These findings support our hypothesis that respondents who may be less familiar with online degrees impose a greater penalty on candidates who hold them.[32] The implications of this are explored in more detail in the Discussion section.

Table 8. Average Marginal Component Effects of Interaction of Degree Program Modality and Online Presence on Selection

Attribute and Level	Coefficient Estimate	Standard Error
Degree Program Modality		
In person	Reference	-
Online	-0.039***	(0.01)
Online Presence		
Limited	Reference	-
Yes	-0.018	(0.01)
Degree Program Modality x Online Presence		
In person x limited	Reference	-

[31] The three fields of study that make up the online presence category account for 49 percent of undergraduates enrolled in exclusively online out-of-state programs. The remaining 20 programs account for the other 51 percent, with each individual program ranging from zero to seven percent of enrollment.

[32] To further explore these findings, we implemented a three-way interaction of degree program modality, institution type, and online presence, to see whether the interaction of degree program modality and institution type differs across the two groups of respondents, and found no statistically significant difference.

Online x yes	0.038*	(0.02)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The coefficients for the remaining attributes are omitted from the table because they are similar to those in the main model without interactions.

Effects by Employer Modality

We also employed the same OLS model described in the main effects section, this time with an interaction of degree program modality and whether the respondent worked at a remote-first organization. We hypothesized that hiring professionals at remote-first organizations would be less likely to penalize online degrees. Their familiarity with remote work generally and online collaboration may lead them to view online and in-person degrees as comparable in quality.

While there is a two percentage point difference in the interaction of degree program modality and whether the respondent works at a remote-first organization, it is not statistically significant, so we are unable to reject the null hypothesis that the effect of degree program modality on the likelihood of selection varies across these respondent groups. Full regression tables are in Appendix C.

Discussion

Overall, we find that individuals who earned their degree online face a slight disadvantage when applying for a job. On average, changing the degree program modality from in person to online decreases the probability that a profile is chosen by 2.5 percentage points. By comparison, the effects of changing attribute levels associated with work experience, experience with job-relevant tools and software, and the match between field of study and job tasks were much larger. These results suggest that differences in candidates' work experiences and skills play a substantially larger role in hiring managers' decisions on inviting candidates for an interview than degree program modality and institution type.

Because this is a novel study, there are a limited number of studies to compare our findings with prior research. The most closely related work consists of resume audit studies that examine the relationship between degree program modality and the likelihood of selection for a job interview. Deming et al. (2016) found that candidates with a bachelor's in business from a for-profit online institution are about two percentage points, or 22 percent, less likely to receive a callback than similar candidates with degrees from nonselective public institutions.[33] While this estimate represents the combined effect of both online degree and the for-profit sector, differences in callback rates between the baseline group and other for-profit types were not statistically significant. Lennon (2021) used a resume audit study focused on recent undergraduates graduates and found larger differences: applicants with a traditional in-person degree were nearly twice as likely to receive a callback as those with an online degree (15.6 vs.

[33] Deming et al., "The Value of Postsecondary Credentials in the Labor Market."

8.3 percent).[34] In contrast, Bennett (2023), studying MBA applicants, found no statistically significant differences in callback rates across various MBA program types, including those earned online.[35]

To compare our results to prior studies, we report the percent decrease in the probability of being selected (4.9 percent) rather than the percentage point decrease (2.5 percentage points). The latter is based on a baseline selection rate that is substantially higher than the callback rate found in the resume audit studies. Our effect of 4.9 percent is much smaller than the 22 percent found in Deming et al. (2016) and the nearly 50 percent effect found in Lennon (2021). Even with the adjustment to a percent change, there are reasons to be cautious when comparing these effect sizes. The effect sizes from the audit studies are based on relatively low baseline callback rates, which can make treatment differences appear larger than they would in other contexts with higher baseline rates.

The average effect of 2.5 percentage points across all candidate profiles masks important differences across both candidate attributes and respondent characteristics. Further analyses indicate that this effect is driven by the type of institution that awarded the degree. Hiring managers penalize online degrees when they are earned at out-of-state public institutions specifically. On average, changing a profile from an in-person program at an in-state institution to an online program at an out-of-state public institution reduces the probability that the profile is chosen by 4.7 percentage points. The comparison of predicted probabilities provides additional evidence that the penalty for online degrees is largest at out-of-state public institutions.

By contrast, hiring managers' perceptions of degree program modality do not vary by the selectivity of the institution that awarded the degree. Instead, the two effects operate independently: candidates are disadvantaged for earning a degree online and advantaged for earning a degree from a more selective institution. In other words, earning an online degree from a less selective institution yields the lowest predicted probability of selection. However, the penalty associated with earning a degree online does not increase or decrease with institutional selectivity.

The modest disadvantage may overstate the penalty associated with online degrees, as we found evidence that the respondents driving this result work in industries where candidates with online degrees are rarely reviewed. Among respondents who work in industries aligned with fields of study that do not have a strong online presence, in-person degrees are viewed more favorably than online degrees. In contrast, among respondents who work in industries aligned with fields of study that have a strong online presence, there is no evidence that online degrees are perceived differently than those earned in person.

[34] Lennon, "How Do Online Degrees Affect Labor Market Prospects?"
[35] Bennett, "Labor Market Returns to MBAs."

Substantive Significance

Another important question is whether the effects that we estimated are substantively meaningful. In practical terms, what does it mean for candidates to be 2.5 percentage points or 4.9 percent less likely to be selected when outcomes of interest are binary, candidates are either selected or not, and candidates often apply to many jobs?

One way to understand these results is to calculate the probability of an applicant receiving at least one callback, conditional on the number of applications and average callback rate, using the following formula:

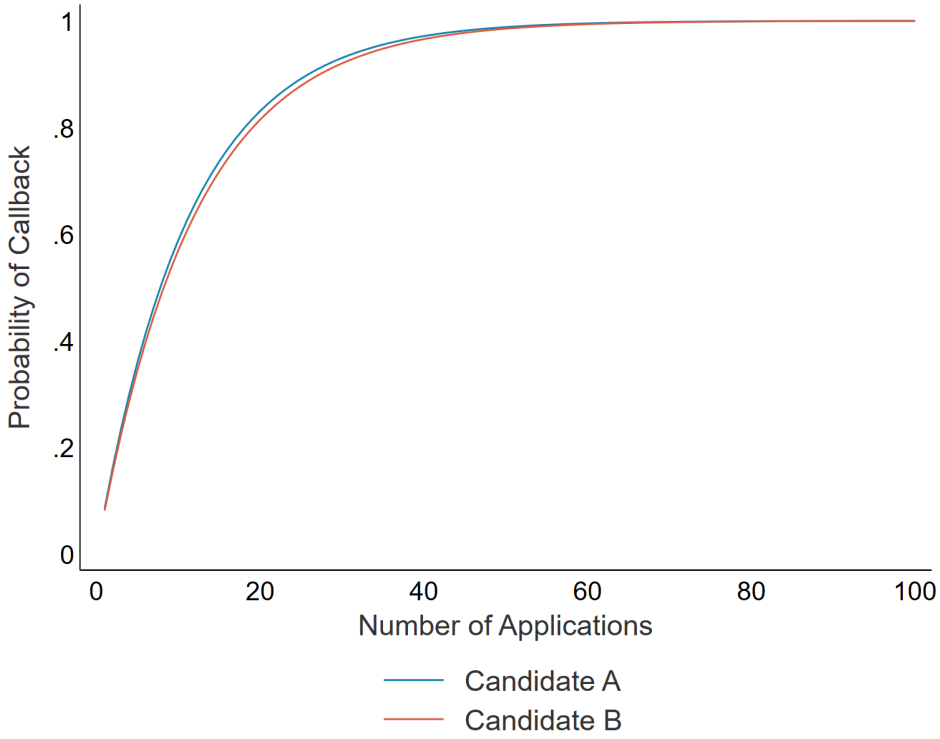
$$p = 1 - p(\text{no callbacks})^n$$

Assume that the average callback rate for a candidate with an in-person degree is 8.5 percent, based on Deming et al.'s finding that bachelor's degree recipients from both nonselective and selective public institutions (with no indication that their degree was earned online) received callbacks at this rate. This means that the probability of no callback from a single application is 91.5 percent. Applying our estimate that candidates who earn their degree online are 4.9 percent less likely to receive a callback, the callback rate of a candidate with an online degree is 8.08 percent, resulting in a 91.92 percent probability of no callback from a single application.[36]

Figure 3 below plots the probability of receiving at least one callback as a function of the number of applications submitted and the applicant's average callback rate for two candidates: Candidate A, who earned an in-person degree, and Candidate B, who earned an online degree. The gap in predicted probabilities is very small, and once the number of applications hits 30 or more, the lines become hard to distinguish. For example, if each applicant submits 40 applications, the probability that the candidate with an in-person degree receives at least one callback is 97.1 percent, compared to 96.6 percent for the candidate with an online degree, a difference of just 0.5 percentage points. Assuming that recent college graduates typically submit dozens of applications, this finding further diminishes the practical importance of the online penalty identified in the study.

Figure 3. Callback Probability by Number of Applications

[36] We use the percent decrease in the probability of being selected rather than the percentage point decrease because the latter is based on a baseline that is substantially larger than the callback rate used in the analysis.



Limitations

The most commonly cited limitation of DCEs is that they elicit stated rather than revealed preferences. This is a problem because respondents who are aware that they are participating in a study may alter their responses, including in ways they perceive to be more socially acceptable, which can be different from their actual thoughts, decisions, and behaviors. Additionally, DCEs typically do not generate strong incentives for respondents to carefully consider their true preferences since their choices carry no real consequences in these hypothetical scenarios. In contrast, research designs in which participants are not aware that they are being studied, like a resume audit study, typically elicit revealed preferences, in part because participants believe there are real stakes in their choices.[37] It is worth noting that the specific concern that respondents may alter their responses to appear more socially acceptable is unlikely in this study given that it does not elicit preferences related to candidates' gender, race, or socioeconomic status.

Relatedly, DCEs create scenarios that do not fully mirror how hiring decisions are made in practice. In the real world, hiring managers are not presented with two candidates and required to choose one to interview. In addition, similar to resume audit studies, the study's primary outcome of interest captures

[37] At the outset of this project, we intended to conduct a resume audit study, where fictitious resumes are sent to hiring managers who are unaware that call back rates are being measured, to identify how employers respond to online credentials. However, none of the online job platforms which we would have relied on to identify and apply to job openings permitted the use of their sites in such deceptive ways. As a result, we pivoted to a discrete choice experiment instead.

only the first stage of the hiring process, an initial interview invite. It does not measure final hiring decisions and therefore does not account for other factors that influence these decisions, including soft skills evaluated during interviews.

Further, some of the information included in the hypothetical profiles may not be easily deduced from resumes. For instance, hiring managers may not know that a degree was earned online if it was awarded by an institution that does not have a reputation for conferring such degrees and if the resume does not explicitly indicate modality.[38] Indeed, standard resume practice does not require applicants to disclose whether a degree was earned online, and hiring professionals we interviewed note that this information is rarely explicitly indicated. Additionally, hiring managers often lack complete and accurate information to differentiate candidates' match between field of study and job tasks and their level of experience across all job-relevant tools and software.

Another limitation is that the sample of respondents may not be nationally representative of professionals who are responsible for hiring decisions, a threat to external validity. The limited information we collected on the sample suggests it is not representative of professionals more broadly. It is difficult to assess the extent of this limitation given the lack of a comprehensive data source describing the characteristics of professionals responsible for hiring decisions.

The final limitation relates to the presentation of hypothetical candidates to respondents in industries where such profiles are unlikely. This concern is explored in our comparison of respondents working in industries aligned with fields of study that have a relatively large online presence compared to those that do not. For example, hiring managers for architecture firms may rarely review candidates with online degrees. As such, presenting such profiles may represent an unrealistic hypothetical, potentially leading to an overestimate of the practical effect of the penalty associated with online degrees.

Implications for State Policy

Despite these limitations, this study is, to our knowledge, the first to estimate in a causal way how employers value an online degree earned from an institution located outside the applicant/employer's state of residence. This question is directly relevant to SARA, which reduced regulatory barriers for states and institutions seeking to enroll students in online programs who live outside of the state. By lowering these barriers, SARA makes it substantially easier for students to pursue online degrees from out-of-state institutions. The key policy question, therefore, is whether degrees that SARA facilitates are valued similarly in the labor market to other types of credentials.

As previously discussed, the average online degree penalty is modest: earning a degree online is associated with a 2.5 percentage point reduction in the probability that a candidate profile is selected.

[38] In Deming et al.'s (2016) resume audit study, they explicitly note that it is rare for resumes to indicate that a degree was earned online. To implicitly indicate that a degree was earned online, they used institutions with a strong online presence and a reputation for conferring online degrees.

However, we find evidence that this average masks important differences. As shown in Tables 5, relative to the reference category of a profile with an in-person degree from an in-state public institution, a profile with an online degree from an out-of-state institution is 4.7 percentage points less likely to be chosen. For comparison, the penalty for an online degree from an in-state public institution relative to one earned in-person is a small and statistically insignificant 0.3 percentage points. These results suggest that there is a penalty for earning an online degree at a public institution outside of the employer's state of residence.

While nontrivial, this penalty should be interpreted in context. First, the 4.7 percentage point penalty is comparable to the effects of other degree characteristics. For example, attending an institution that has competitive admissions raises the likelihood of selection by 5 to 6 percentage points, and field of study plays an even more important role, as having a degree for a field of study that is unrelated to job tasks (versus a field of study that completely matches job tasks) results in a 15 percentage point penalty. The effect of having an online degree from an out-of-state public institution is also relatively small compared to the importance of work experience and level of experience with job-related tools and software.

Second, it is important to distinguish between the interaction penalty for an online, out-of-state degree and the standalone effect of attending an out-of-state institution. In practice, applicants may not always explicitly signal that a degree was completed online on a real resume. To the extent that degree modality is imperfectly observed by employers, the main effect of attending an out-of-state institution may be more policy relevant than the interaction between online status and out-of-state location. The standalone out-of-state penalties presented in Table 4 are small and statistically insignificant: 1.8 percentage points for public institutions, 1.0 percentage point for private not-for-profits, and 2.7 percentage points for for-profits. Although our study does not have enough statistical power to precisely estimate these effects, the point estimates suggest that attending an out-of-state institution likely does not substantially reduce employer interest.

Third, our design intentionally avoids using real institution names in order to ensure portability across respondents in different states. This limits our ability to assess the role of institutional reputation or name recognition beyond using institutional selectivity as an imperfect proxy. For example, well-known public flagships may be perceived differently than "generic" out-of-state public institutions.

Finally, as previously stated, the disadvantage may overstate the penalty associated with online degrees or distort the practical implications of the finding because respondents driving this result do not work in industries that are commonly reviewing candidates with online degrees.

In sum, our findings suggest that degrees facilitated by SARA are not viewed identically to traditional in-person, in-state credentials, but neither are they heavily discounted. For states considering their participation in reciprocity agreements, the evidence points to modest labor-market differences rather than large employer aversion. Additionally, if SARA primarily enables students to earn degrees they would not have pursued at all absent expanded online access, then even a credential that is slightly discounted by employers may leave students better off than having no degree at all.

Appendix A: Diagnostic Tests of Key Assumptions

Hainmueller et al.'s (2014) argument that OLS regressions can consistently estimate the causal effects of individual attribute levels relies on several key assumptions. We review each of these assumptions and, where possible, test them empirically.

Assumption 1: There are no carryover effects.

The first assumption is that there are no carryover effects. In other words, respondents would make the same choice when presented with the same two profiles, regardless of which profiles they have already seen or will subsequently see. One way to test this assumption is to examine whether AMCEs vary by rounds of choice tasks. To do this, we employed the same OLS regression model as described in previous sections, this time including an interaction of degree program modality and indicators for each of the 12 choice tasks. We then conducted an F-test of the null hypothesis that the AMCEs for degree program modality are identical across choice tasks. Table 9 below presents the AMCEs of the interaction effect only.

Table 9. Average Marginal Component Effects of Interactions between Degree Program Modality and Choice Task on Selection

Attribute and Level	Coefficient Estimate	Standard Error
Degree Program Modality x Choice Task		
In person x 1	Reference	-
Online x 2	-0.020	(0.04)
Online x 3	0.014	(0.04)
Online x 4	0.017	(0.04)
Online x 5	-0.047	(0.04)
Online x 6	0.047	(0.04)
Online x 7	0.028	(0.04)
Online x 8	0.007	(0.04)
Online x 9	-0.001	(0.04)
Online x 10	-0.011	(0.04)
Online x 11	0.035	(0.04)
Online x 12	-0.005	(0.04)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The coefficients for the remaining attributes are omitted from the table.

Based on the results of the F-test, we cannot reject the null hypothesis that degree program modality effects are identical across choice tasks (p-value=0.70). Therefore, we find no evidence of carryover effects, and the first assumption holds.

Assumption 2: There are no profile order effects.

The second assumption is the absence of profile order effects. This means that respondents ignore the order in which profiles are presented in a choice task, such that estimated AMCEs are similar whether the attribute appears in the first or the second profile. To test this, we employed the same OLS regression model as described in previous sections, this time with an interaction of degree program modality and an indicator for whether the profile is presented first or second. We then conducted an F-test of the null hypothesis that the AMCEs for degree program modality are identical across choice tasks. Table 10 below presents the AMCEs of the interaction effect only.

Table 10. Average Marginal Component Effects of Interactions between Degree Program Modality and Profile Order on Selection

Attribute and Level	Coefficient Estimate	Standard Error
Degree Program Modality x Profile Order		
In person x 1	Reference	-
Online x 2	0.028	(0.02)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The coefficients for the remaining attributes are omitted from the table.

Because profile order is binary, the F-test is equal to the p-value of the interaction term, which is 0.11. Based on the results of the F-test, we cannot reject the null hypothesis that degree program modality effects are the same across profile positions. Therefore, we find no evidence of profile order effects, and the second assumption holds.

Assumption 3: Randomization produces experimental groups that are well balanced.

In general, as Hainmueller et al. (2014) explains, this assumption is expected to hold because a key feature of the study design is the randomization of attribute levels presented in each candidate profile. However, it is worth confirming that randomization produces groups that are well balanced. One way to assess balance is to regress respondent characteristics on indicators for all profile attributes, excluding

the indicator for whether a profile is chosen. We conducted this regression separately for the following respondent characteristics: whether the respondent's highest degree earned is a high school diploma, whether the respondent works at a remote-first organization, and whether the respondent works in an industry that is aligned with a field of study that has a relatively strong online presence. For each regression, we then conducted an F-test of the null hypothesis that the profile attributes are jointly balanced across groups. The resulting p-values were 0.84, 0.14, and 0.72. Therefore, we cannot reject the null hypothesis and find no evidence that the experimental groups are imbalanced. The third assumption holds.

Assumption 4: There are no attribute order effects.

This assumption is that the estimated AMCEs do not vary based on the order in which an attribute appears within a choice task. In our study, however, the order of attributes was not randomized: the order shown in Table 1 is the same across all choice tasks. However, there is reason to believe that this does not pose a problem. According to Hainmueller et al. (2014), prior research suggests that attribute order effects tend to appear only when the number of attributes exceeds ten, which is significantly more than the six used in our study.

Assumption 5: Atypical profiles don't cause respondents to act differently.

One potential threat to external (but not internal) validity is the realism of profiles presented to respondents. A common issue is the inclusion of combinations of attributes that are impossible or extremely rare. To address this, researchers sometimes impose constraints to prevent certain combinations from appearing in profiles. We did not impose any such constraints because we did not identify any combinations as impossible or impractical.

With that said, the combination that yields the most unlikely profile is fully online degrees offered at highly selective institutions, defined in this study as those admitting fewer than 50 percent of applicants. While fully online degrees at highly selective institutions are uncommon, they do exist. One example is the University of Florida, which offers fully online bachelor's degrees and has an acceptance rate of around 20 percent.

Including such profiles can violate external validity if respondents react differently to atypical combinations than they would to more common ones. To assess this, we conducted the same OLS regression model as described in previous sections, with one consisting of typical profiles only and one consisting of atypical profiles only (i.e., choice tasks in which at least one of the profiles includes the combination of online and highly selective institutions). The results of the two regressions are similar. Table 11 below presents the AMCEs of degree program modality only.

Table 11. Average Marginal Component Effects of Degree Program Modality on Selection: Typical vs. Atypical Profiles

Attribute and Level	Typical Profiles		Atypical Profiles	
	Coefficient	Standard Error	Coefficient	Standard Error
Degree Program Modality				
In person	Reference	-	Reference	-
Online	-0.027*	(0.01)	-0.024	(0.02)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The coefficients for the remaining attributes are omitted from the table.

We also employed the same OLS regression model as described in previous sections, this time with an interaction of degree program modality and an indicator for whether the profile is atypical. The F-test yields a p-value of 0.96, indicating that we cannot reject the null hypothesis that the AMCEs for degree program modality are identical for typical and atypical profiles. These results suggest that respondents do not react differently to the inclusion of this atypical combination.

Appendix B: Understanding Effects Using Separate Models

An alternative way to examine the role that degree program modality plays in the likelihood of selection is to estimate the same OLS model separately for candidates who earned their degree in person and those who earned their degree online. This method allows us to compare AMCEs of the two groups side-by-side. However, a key step when using separate models is that statistically significant differences in coefficients across models cannot be assumed. Instead, a formal test is required to determine whether differences are statistically significant.

Table 12 below presents the coefficients for the five remaining attributes among candidates with in-person and online degrees. Figure 3 visually presents these AMCEs for both candidate types. The coefficients on match of field of study and job tasks, institutional selectivity, work experience, and experience with job-relevant tools and software are statistically significant in both models and their magnitudes are similar. Formal tests confirm that these effects do not differ significantly, with one exception: the effect of increasing work experience from zero to one year differs across models (p-value 0.03). This finding suggests that candidates who earned their degree in person receive a larger marginal return from one year of work experience than those who earned their degree online. Outside of this effect, these findings suggest that preferences along these dimensions are largely consistent across degree program modality.

None of the coefficient estimates for institution type are statistically significant among candidates who earned their degree in person. In contrast, among candidates who earned their degree online, the

coefficient estimates for out-of-state public and out-of-state for-profit institutions are negative and statistically significant. While the coefficient of out-of-state for-profit institutions is statistically significant in only one model, a formal test indicates that the difference between the coefficients is not statistically significant (p-value=0.21).

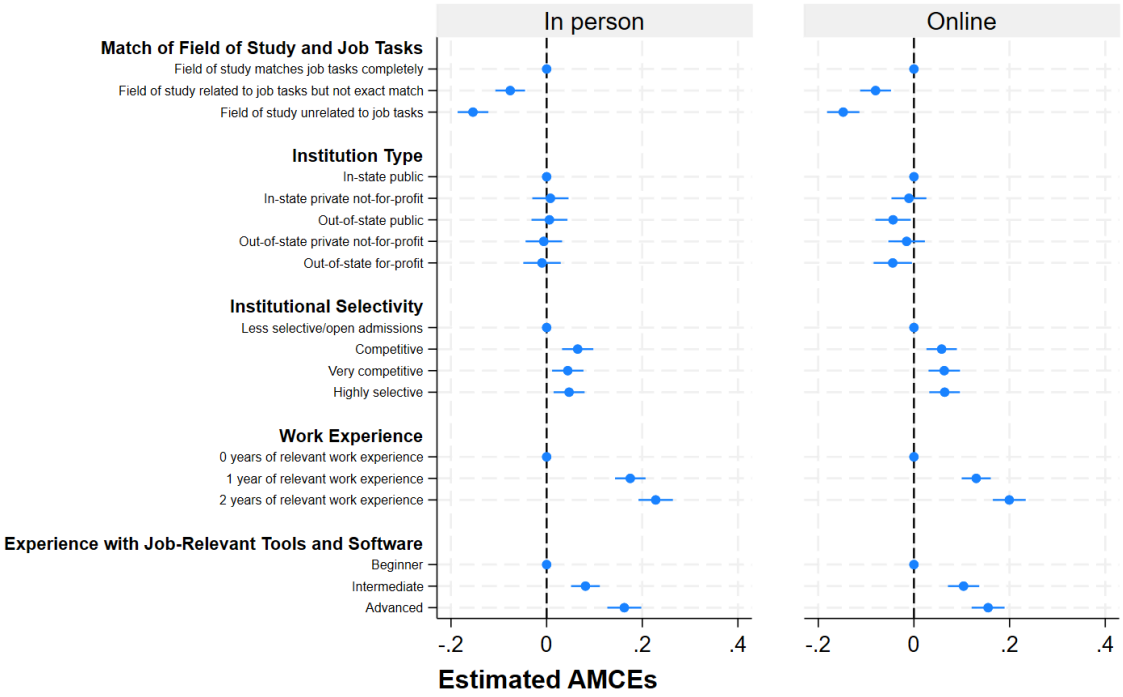
Table 12. Average Marginal Component Effects of Candidate Attributes on Selection: In-Person vs. Online Degree Candidates

Attribute and Level	In person		Online	
	Coefficient	Standard Error	Coefficient	Standard Error
Match of Field of Study and Job Tasks				
Field of study matches job tasks completely	Reference	-	Reference	-
Field of study related to job tasks but not exact match	-0.076***	(0.02)	-0.080***	(0.02)
Field of study unrelated to job tasks	-0.154***	(0.02)	-0.148***	(0.02)
Institution Type				
In-state public	Reference	-	Reference	-
In-state private not-for-profit	0.008	(0.02)	-0.010	(0.02)
Out-of-state public	0.006	(0.02)	-0.044*	(0.02)
Out-of-state private not-for-profit	-0.006	(0.02)	-0.015	(0.02)
Out-of-state for-profit	-0.010	(0.02)	-0.044*	(0.02)
Institutional Selectivity				
Less selective	Reference	-	Reference	-
Competitive	0.065***	(0.02)	0.058***	(0.02)
Very competitive	0.044**	(0.02)	0.063***	(0.02)
Highly selective	0.047**	(0.02)	0.064***	(0.02)
Work Experience				
0 years of relevant	Reference	-	Reference	-

work experience				
1 year of relevant work experience	0.175***	(0.02)	0.130***	(0.02)
2 years of relevant work experience	0.228***	(0.02)	0.199***	(0.02)
Level of Experience with Job-Relevant Tools and Software				
Beginner	Reference	-	Reference	-
Intermediate	0.081***	(0.02)	0.104***	(0.02)
Advanced	0.162***	(0.02)	0.155***	(0.02)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 5. Average Marginal Component Effects of Candidate Attributes on Selection: In Person vs. Online Degree Candidates



We employed a similar approach to alternatively estimate the difference in selection depending on whether respondents were in industries aligned with fields of study with an online presence.

Table 13 below presents the coefficients by group and Figure 4 plots these estimates. Because the coefficients for the four attributes other than degree program modality and institution type are very similar to those from previous models, they are omitted from this table.

The two models yield essentially opposite results. Among respondents who work in industries aligned with fields of study that have a strong online presence, there is no evidence that online degrees are perceived differently than those earned in person. Instead, these respondents differentiate candidates based on institution type. On average, changing a profile from an in-state public institution to an out-of-state public institution decreases the likelihood of being selected by 9.4 percentage points. An additional test confirms that the difference in coefficients between the two models are statistically significant (p-value=<0.01). However, the difference between coefficients of out-of-state for-profit institutions across the two models is not statistically significant (p-value=0.10).

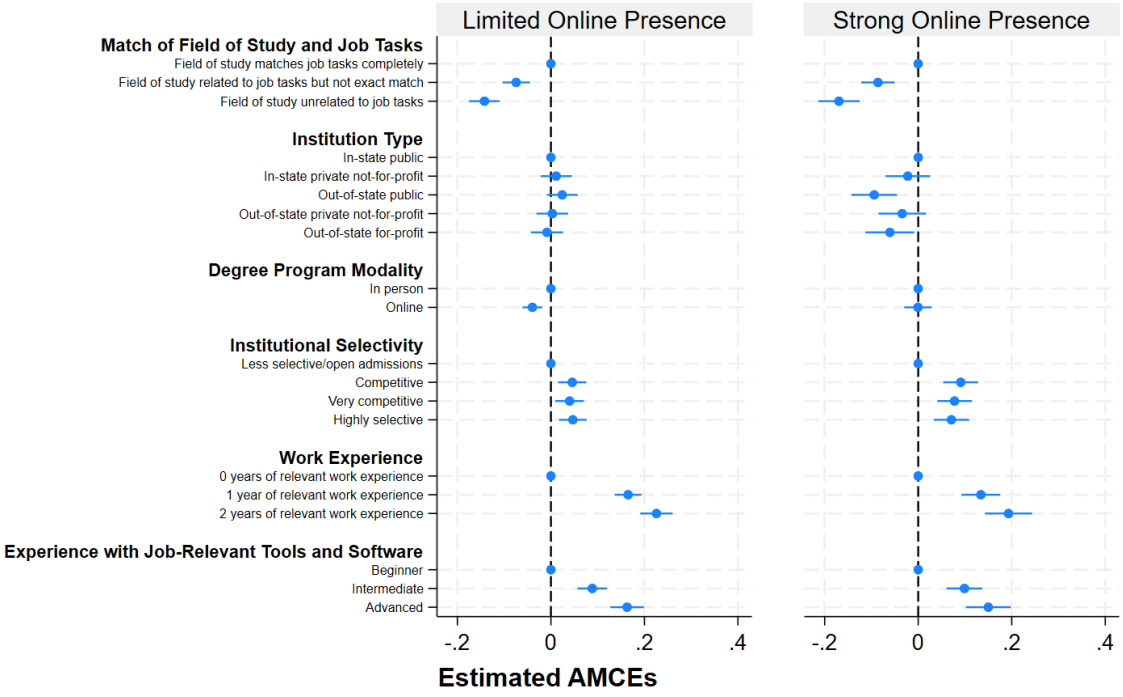
In comparison, respondents working in industries aligned with fields of study that do not have an online presence appear to penalize online degrees, while not differentiating degrees by institution type. Changing a profile from an in-person bachelor's degree to an online degree reduces the likelihood of being selected by 4.0 percentage points, on average. An additional test confirms that the difference in coefficients between the two models are statistically significant (p-value=0.03).

Table 13. Average Marginal Component Effects of Candidate Attributes on Selection: No Online vs. Online Presence

Attribute and Level	No Online Presence		Online Presence	
	Coefficient	Standard Error	Coefficient	Standard Error
Degree Program Modality				
In person	Reference	-	Reference	-
Online	-0.040***	(0.01)	-0.001	(0.01)
Institution Type				
In-state public	Reference	-	Reference	-
In-state private not-for-profit	0.011	(0.02)	-0.022	(0.02)
Out-of-state public	0.024	(0.02)	-0.094***	(0.02)
Out-of-state private not-for-profit	0.003	(0.02)	-0.034	(0.03)
Out-of-state for-profit	-0.008	(0.02)	-0.061*	(0.03)

Standard errors adjusted for clusters at the respondent level are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 6. Average Marginal Component Effects of Candidate Attributes on Selection: No Online vs. Online Presence



Appendix C: Regression Tables

The forthcoming tables in this appendix will present the full results of the regression models and analyses described in the report.