

Time to Baccalaureate Degree in the Labor Market: Evidence from a Field Experiment*

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Abstract

About 42 percent of bachelor's degree graduates take longer than four years to complete their degree. In this paper, I study whether the amount of time students take to complete their bachelor's degree affects labor market outcomes after graduation using a resume-based field experiment. I randomly assign a time to degree of either four or six years, as well as the selectivity of the public colleges where the degrees were received, to fictitious resumes of recent graduates where all other resume attributes are equivalent on average. I send over 7,000 resumes to real job vacancy postings for entry-level business jobs on a large online job board and track employer response rates. In the full sample of jobs, resumes listing bachelor's degree completion in six years received about 3 percent fewer employer responses than resumes indicating graduation in four years, but this difference is statistically insignificant. Meanwhile, I estimate that listing a relatively more selective college increases response rates by about 13 percent, and by about 33 percent among higher paying jobs. However, the full sample estimates of the effect of time to degree mask heterogeneity by characteristics of the job posting. For jobs with relatively large applicant pools, resumes listing six years to degree receive 17 percent fewer responses.

JEL Codes: I23, I26, J24, J63, M51

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1 Introduction

The time between initial postsecondary enrollment and completion of a bachelor's degree is considered an key indicator of student success. While earning a college degree is associated with substantial labor market benefits, the diverse paths students take towards completing their degrees may be important determinants of labor market outcomes after graduation. Bachelor's degree graduates often take longer than four years to graduate, which is the standard "on-time" number of years. While 58 percent of graduates finish in four years, 26 percent finish in five years, and 16 percent finish in six or more years ([Denning, Eide, Mumford and Sabey, 2022](#)). Since employers routinely make inferences about a worker's productivity based on observable characteristics such as on a resume, time to degree could be meaningful in the labor market if employers value it as a signal of an applicants' potential performance as an employee.

Does time to bachelor's degree affect labor market outcomes after graduation? I study this question by conducting a resume audit experiment that is designed to examine employer preferences for job applicants who completed a bachelor's degree in a different number of years. I include two educational treatments on the resumes: 1) time to degree, either four or six years, indicated by the range of years listed next to the college the applicant graduated from, and 2) college selectivity, indicated by listing names of public colleges with distinct average SAT scores. This generates four resume types defined by the interaction of the two educational treatments. Including college selectivity as a secondary treatment provides a benchmark to compare estimates of the effect of time to degree. It also provides the ability to test for differences in how employers value time to degree between graduates of more or less selective colleges and test the extent to which time to degree may be a mechanism for the labor market returns to college selectivity. All other information listed on the resumes is designed to be independent of the treatments.

To carry out the experiment, I submit about 7,500 resumes to about 2,000 entry-level business jobs posted on a large online job board in seven major US metropolitan areas beginning in January 2022. I apply to jobs in occupations such as accounting, finance, marketing, and sales that require (or at least prefer) a bachelor's degree with at most three years of experience. All applicants list bachelor's degree completion in 2022. I track employer responses to each resume from emails,

phone calls, and text messages and compare response rates across the different educational treatment characteristics.

In the full sample of jobs, I find little evidence that employers place a high value on time to degree, on average, as a signal of an applicants' quality. Overall, resumes listing bachelor's degree completion in six years have a 3 percent (0.4 percentage points) lower response rate than resumes listing four years to degree, though this difference is not statistically significant. Moreover, the difference in the estimated effect of time to degree between more and less selective colleges is negligible.

There is evidence, however, that the full sample results mask heterogeneity in the effect of time to degree by characteristics of the job vacancy. For instance, the pattern of results is much different depending on the size of the applicant pool on the job board. Among jobs with larger applicant pools, there is a large delayed graduation penalty. Listing six years to degree on resumes decreases response rates by about 17 percent (2.8 percentage points) relative to listing four years to degree.

I interpret these results to suggest that many employers do not value on-time bachelor's degree graduation significantly more than delayed graduation. But time to degree does seem to be important for some employers. Since resumes listing six years to degree receive lower response rates for jobs with larger applicant pools, it appears the competitive environment of the job vacancy is important. When an employer has a large number of applicants, it has the luxury to be more selective in its pursuit of potential employees. Thus, on-time graduation becomes more important for applicants looking to stand out in a larger, more competitive applicant pool.

My results provide evidence that colleges and students should not have significant concerns about initial labor market consequences of delayed graduation. While employers may value time to degree on the margin when job openings are competitive, the skills and employment experiences graduates list on resumes are likely to carry more value. However, the tuition costs and opportunity costs associated with longer time to degree remain important issues worth considering and addressing with policy. An important caveat of this paper is that my analysis is conditional on college graduation. The true cost of extending enrollment beyond the standard on-time number of years may be on the graduation margin itself. Given the large labor market returns to having a degree relative to not having a degree, policy efforts should continue to focus on helping students graduate, regardless of how long it takes.

The first contribution of this paper is providing causal evidence on the labor market returns to time to bachelor's degree. A few papers have studied the heterogeneous labor market outcomes of graduates with different time to degree with observational data ([Fortin and Ragued, 2017](#); [Aina and Casalone, 2020](#); [Witteveen and Attewell, 2021](#)). Generally, these papers find a negative relationship between longer time to degree and labor market outcomes, at least in some capacity. However, research on this question is limited by a lack of credibly causal research designs. Observational studies are challenging since exogenous sources of variation in time to degree are scarce, and there are likely important differences between graduates with different time to degree that are also correlated with labor market outcomes that cannot be fully accounted for.

My research design avoids these problems by experimentally varying the information observed by employers. Since I randomly assign time to degree and college names to otherwise identical resumes, on average, differences in response rates represent a causal difference in how employers perceive applicants with a different educational history. My study follows a long tradition of resume audit experiments that study how employers respond to job seekers' characteristics.¹ This includes a set of papers that experimentally vary educational characteristics including the sector and selectivity of postsecondary institutions ([Darolia et al., 2015](#); [Deming et al., 2016](#)), internships during college ([Nunley et al., 2016](#); [Baert et al., 2021](#)), online degrees ([Lennon, 2021](#)), and college grades ([Quadlin, 2018](#); [Piopiunik et al., 2020](#)).

Another primary contribution of this paper is providing evidence on time to degree as a potential mechanism for the returns to college selectivity. There is a correlation between college selectivity and time to degree: more selective colleges have a lower time to degree on average. Meanwhile, a large literature generally documents positive labor market returns to college selectivity (or quality), but who accrues these returns and why is less understood ([Lovenheim and Smith, 2022](#)). Part of the returns to college selectivity could operate through time to degree if more selective colleges cause students to graduate in less time.

With my experimental design I can separately estimate the effect of time to degree and college selectivity, which is not possible in studies that use observational data, even those with exogenous variation in college selectivity. For example, I can compare outcomes between graduates of more and less selective colleges that

¹See for example, [Riach and Rich \(2002\)](#); [Bertrand and Mullainathan \(2004\)](#); [Lahey \(2008\)](#); [Kroft, Lange and Notowidigdo \(2013\)](#); [Eriksson and Rooth \(2014\)](#); [Agan and Starr \(2018\)](#); [Farber, Herbst, Silverman and von Wachter \(2019\)](#); [Neumark, Burn and Button \(2019\)](#).

graduate in the same number of years. Nevertheless, since I do not estimate large effects of time to degree, I also do not find strong evidence that time to degree is a major channel through which the returns to college selectivity operate.

A final contribution of this paper is providing a current estimate of the returns to college selectivity that is not subject to bias from spillover effects between resumes sent to the same job posting. This contribution is twofold. First, while there is a large literature that tends to find positive returns to college selectivity, these studies generally exploit natural experiments using observational data, which typically implies that estimates come from graduating cohorts of at least several years ago where data can observe individual's educational history and post-graduation outcomes. An advantage of my experimental setting is that the results reflect how the labor market currently views new bachelor's degree graduates with different educational characteristics. My results show that resumes listing a more selective college receive about 13 percent (1.7 percentage points) more responses than resumes listing a less selective college (with about 300 points lower average SAT scores). Although, with an estimated effect of about 33 percent, the return to a more selective college is much larger among higher quality jobs (using expected salary as a proxy for job quality).

Second, I assign treatment types to resumes using a non-stratified design where each resume has an equal probability of being each of the four treatments types, rather than a stratified design where exactly one of each resume treatment type is sent to each job. Consequently, my estimates avoid attenuation bias from spillover effects between resumes sent to the same job (Phillips, 2019), which has likely plagued previous resume audit-based estimates of the return to college selectivity. For example, Deming et al. (2016)—who randomizes postsecondary sector and selectivity to resumes using a stratified design within job vacancy—estimate a null effect of resumes listing a more selective public college relative to listing a less selective public college. Meanwhile, I estimate a positive return to listing a more selective college, and I also show evidence that while spillover effects exist in my context, the spillovers do not bias my estimates because they are differenced out in the non-stratified design.

The rest of this paper is organized as follows. [Section 2](#) describes the details of the experimental design, the labor markets studied, the job search criteria, the resume creation, and data collection. [Section 3](#) presents the main results from the full sample, shows evidence that my estimates are not subject to spillover bias, and

presents estimates of the heterogeneous effects of the educational treatments by job and applicant characteristics. [Section 4](#) engages with the interpretation of the results. Finally, [Section 5](#) concludes.

2 Experimental Design

2.1 Educational treatments

There are two educational treatments included in the experiment: time to degree (either four or six years) and the selectivity of the institution where the bachelor's degree was earned. I choose four years to degree since that is considered on-time graduation. I choose six years to degree as the delayed graduation comparison since it is distinct from four years to degree while still being relatively common. The interaction of the two educational treatments creates four resume types:

1. Four years to degree from a more selective public institution
2. Four years to degree from a less selective public institution
3. Six years to degree from a more selective public institution
4. Six years to degree from a less selective public institution

Time to bachelor's degree is signaled by the years listed next to the bachelor's degree granting institution indicated on the resume. This is a common revelation on resumes; exploring a sample of over 550,000 real resumes from an online job board reveals that 79% of resumes that indicate bachelor's degree completion include a year or range of years associated with that degree attainment, with about half of those listing a range of years. This is a similar signaling mechanism employed by resume audit experiments that are designed to test for age discrimination by listing different years in which applicants completed high school (e.g., [Lahey \(2008\)](#); [Neumark et al. \(2019\)](#); [Farber et al. \(2019\)](#)). Furthermore, evidence from resume audit experiments that study unemployment duration suggests that employers are capable of finely examining dates and date ranges on resumes (e.g., [Kroft et al. \(2013\)](#)).

I focus on recent bachelor's degree recipients. Thus, all resumes list bachelor's degree completion in 2022, with time to degree indicated by the listed start year (i.e., 2018 or 2016). Thus, resumes sent before May will hypothetically be forthcoming

Table 1. College names listed on resumes

Labor market	College name	Selectivity
Atlanta	Georgia Gwinnett College	Less selective
Atlanta	University of Georgia	More selective
Chicago	Northeastern Illinois University	Less selective
Chicago	University of Illinois at Urbana-Champaign	More selective
Dallas	Tarleton State University	Less selective
Dallas	University of Texas at Dallas	More selective
Los Angeles	California State University, Northridge	Less selective
Los Angeles	University of California, Irvine	More selective
New York City	SUNY Farmingdale State College	Less selective
New York City	Stony Brook University	More selective
Philadelphia	Penn State Brandywine	Less selective
Philadelphia	Penn State University	More selective
San Francisco	California State University, East Bay	Less selective
San Francisco	University of California, Davis	More selective

graduates, while resumes sent after May would be very recent graduates. Focusing on recent graduates has the advantage that educational signals are likely the most valuable to employers early in a worker's career (Altonji and Pierret, 2001; Lange, 2007).

I carefully choose the institutions in which the fictitious job applicants received their bachelor's degree according to two criteria. First, the institutions are well known public colleges located near the metro area of the job search such that it is common that graduates of the college to search for jobs in that labor market. Second, the colleges are clearly distinct in terms their selectivity. The college names of the more and less selective institutions listed on resumes in each labor market are shown in Table 1. Using data from Conzelmann et al. (2022), the corresponding labor market for each college is the most common labor market where graduates of that college work after graduation. Meanwhile, the average difference in SAT scores between the more and less selective college used across the seven labor markets is about 300 points.

I submit four resumes to each job opening, unless the job posting is removed before all four resumes can be submitted.² I use a non-stratified design when assigning resumes their treatment type within job vacancy. As opposed to sending exactly one of each resume type to each job vacancy, this means that each resume

²95 percent of jobs received all four resumes.

has an equal probability of being one of the four treatment types. Using a non-stratified design is important to avoid bias from spillover effects between resumes sent to the same job.

[Phillips \(2019\)](#) documents that resumes have positive within-vacancy spillover effects in audit studies that send multiple resumes to each job vacancy. These spillover effects will bias treatment effect estimates in audit studies that send exactly one of each treatment type to each job vacancy. In these stratified designs, the average treatment statuses of the *other* resumes sent to the same job will be systematically different across the *own*-resume treatment types. Since the spillover effects tend to be positive, the bias results in underestimating differences in employer response rates across resume treatments.

By using a non-stratified design, I ensure that the treatment statuses of the other resumes sent to the same job will be balanced across the own-resume treatment types. Thus, the spillover effects will “net-out” and the treatment effect estimates will not be biased by the spillover effects. The cost of using a non-stratified design is that job vacancy fixed effects cannot be included in the estimation without reintroducing bias from spillover effects, since the other resume treatment statuses are not balanced within job after conditioning on the vacancy fixed effects by construction. While job vacancy fixed effects are not necessary for internal validity, they would improve precision of the estimates. However, an additional benefit of the non-stratified design is that it provides the means to test for the presence of spillovers ex-post. I report results of this test in [Section 4.4](#) which confirm that spillovers exist in my setting but also that the spillovers do not bias my estimates of the effects of the educational treatments.

2.2 Study setting, labor markets, and occupations

I send resumes to openings for full-time, entry-level business jobs that require (or at least prefer) a bachelor’s degree, with at most 3 years of experience required. The focus on business jobs simplifies the resume creation and the job search process. Specifically, I apply to jobs in the occupations of banking, finance, accounting, management, marketing, and sales. Business occupations are the largest employers of bachelor’s degree holders and business-related fields are also by far the most common bachelor’s degree in the U.S.

I send the resumes to job postings in seven large cities in the U.S.: Atlanta, Chicago, Dallas, Los Angeles, New York City, Philadelphia, and San Francisco. I

study large cities to ensure a large stock of job postings to apply to and to increase the generalizability of the results across different regions of the country. The number of cities to include in the study is chosen to balance these benefits with the fixed costs of creating realistic educational and employment histories within each labor market.

I apply to jobs on [Indeed.com](https://www.indeed.com), a large online job board in the U.S. Many jobs posted on Indeed require following a link to the employer's website to apply. To avoid the less efficient application processes that characterize those jobs, I only apply to jobs where the employer allows applying to jobs and submitting resumes directly through Indeed's website.

2.3 Employment experience

Each resume includes a "Work Experience" section. These employment experiences are designed to be independent of the treatments such that work experience is similar between applicants with four and six years to degree. The work histories on my fictitious resumes are heavily influenced by real resumes posted online by job seekers. All resumes include two entries in their employment history section. The work experiences I list include various off-campus retail or food service jobs, such as "Customer Service Associate" at The Gap or Target or "Barista" at Starbucks, and on-campus jobs such as "Office Assistant" at the financial aid office, or "Food Service Worker" in the campus dining hall. The work experiences I list are likely relatively less valuable to employers than some work experiences typical of a top graduate (i.e., internships or other business industry experience) to mimic students that are more representative of students on the margin of longer time to degree.

Job titles and firm names are chosen based on commonly listed information on real resumes. All jobs indicate occurring within the past three years before graduation, to look like part-time work while enrolled in college, or potentially full-time summer work. Descriptions of work experiences are also based in part on actual job descriptions recorded on real resumes. However, to simplify resume creation and generate more generic work descriptions that can be used in many settings, I also use and adapt some descriptions from [Nunley et al. \(2016\)](#).

2.4 Other resume attributes

Names listed on resumes are chosen so that the job applicants would vary by gender and race. Although, following work by [Gaddis \(2016\)](#), names are chosen that are commonly given by mothers of relatively high education within race, to mitigate the socio-economic signal portrayed by the names. Resumes include contact information featuring email addresses and phone numbers corresponding to names that are generated through Google. To mimic a recent or forthcoming graduate, physical addresses are assigned to be in large apartment complexes with reasonable commutes to the institution in which the student earns their bachelor's degree.

Resumes are assigned one of seven business-related majors associated with their bachelor's degree: business, accounting, economics, finance, business management, marketing, or business economics. Resumes also list a high school name and graduation year. High schools were chosen to be a large and diverse public school located in the metropolitan area of the job search. High school graduation year is the same as the applicant's college start year, implying zero years between high school graduation and entry into college. I also include a high school start year, which always indicates four years spent in high school, to increase the salience of the range of years enrolled in college.

The final section of each resume is a "Skills" section. I create several skill "templates," based on resumes posted by real job seekers with bachelor's degrees in business fields. All templates list skills in "Microsoft Office" in some form since this is very common among real business job seekers. The templates also include some other technical skills such as "database management" or "Adobe software" and some templates may include some "soft" skills or general attributes, like "team player" or "detail-oriented".

2.5 Resume creation

To create resumes I use the "resume randomizer" software developed by [Lahey and Beasley \(2009\)](#). The program allows complete control over all components of and information included on each resume, including how attributes are randomized both within and across job vacancies. [Figure A1](#) shows an example of a resume used in the study. Each resume lists the sections in the same order, with name and contact information at the top, followed by the education section, the work

experience section, and lastly, the skills section.

Resumes sent to the same job posting are designed to be visually distinct to mitigate the possibility that employers detect the experiment. Within job vacancy each resume uses a different font and distinct formatting features. Moreover, names, physical addresses, high school names, work histories, and skills templates are never repeated among resumes sent to the same job. To further limit the risk of employer detection, I wait at least three hours in between submitting resumes to the same job. Also, I only submit a set of four resumes to one job per firm, per labor market.

2.6 Data collection

The outcome of interest is whether an employer responds positively to some applicants, typically a request for an interview, but not others. To track employer responses, I use the generated email addresses and phone numbers that correspond to applicant names. From these responses I create two outcomes: 1) any (non-perfunctory) positive response and 2) a request for an interview. In addition to tracking employer responses, I record information about the job posting itself such as the firm name, job title, the text of the job description summary, and if available, the number of expected hires.

I also collect data on the expected salary of each job, which comes from three sources. First, for roughly half of jobs the employer listed a salary or salary range on the job posting. Second, for about one-fourth of jobs, I use a salary range estimated by Indeed that the website sometimes lists on the job posting when an employer does not. Third, for the final one-fourth of jobs, I scrape median salaries from a separate tool on Indeed's website that allows one to search salaries based on job titles.³

Additionally, after applying to a job Indeed displays how many people have applied to the job in a range of five applicants (i.e., 21-25, 26-30, 31-35, etc.). I record the number of applicants after waiting at least two weeks after applying to the job to allow others to submit applications.

³The python script used to scrape these salaries is available upon request.

3 Results

3.1 Summary statistics

Table 2 and Table 3 present descriptive statistics for characteristics of jobs and applicants in the full experimental sample. I sent a total of 7,371 resumes and received a 13.6 percent response rate overall. This response rate is evidence of the validity of the resumes used in the study and that employers considered them realistic. Other comforting evidence of the validity of the study is that response rates are higher for lower salary jobs and jobs hiring more than one candidate, while response rates are lower for higher salary jobs and jobs hiring only one candidate.

About 28 percent of jobs in the full sample are in sales or customer service related occupations. Meanwhile, 24 percent of jobs are in finance, 18 percent in accounting, 10 percent in marketing, and 21 percent are in business administration or other business occupations. About 55 percent of job postings specified the number of applicants the employers is looking to hire, with about 17 percent of jobs overall indicating a desire to hire multiple candidates. The median number of people who applied to the jobs in the sample falls within a range of 26-30.

Resumes sent with names typical of Black applicants received fewer responses than White applicants, and women applicants received fewer responses than men, but both differences are not statistically significant. At the intersection of race and gender, White men applicants have response rates 1.9 percentage points higher than Black women, which is statistically significant at the 10 percent level.

I test for the balance of applicant characteristics across the four resume treatments by regressing each characteristic on indicators for the four treatments and running an F-test with a null hypothesis that the coefficients are jointly equal to zero. The results of these tests, presented in Table A1, show that randomization was successful. Out of the 40 characteristics tested, 2 characteristics reject the null hypothesis of the F-test at a 10 percent significance level, which is to be expected.

3.2 Main estimates

Given the random assignment of the resume treatments, a simple regression of an employer response outcome on indicator variables for the treatment characteristics can capture the causal difference in the probability of an employer response between

Table 2. Descriptive statistics by job characteristics

	Response rate	Number of resumes
Total	0.136	7,371
Atlanta	0.137	1,382
Chicago	0.149	1,034
Dallas	0.175	764
Los Angeles	0.183	564
New York	0.107	1,582
Philadelphia	0.138	727
San Francisco	0.118	1,318
Sales	0.224	1,342
Marketing	0.092	728
Finance	0.102	1,789
Accounting	0.111	1,292
Business Administration	0.081	962
Other	0.125	558
Above median salary	0.088	3,464
Below median salary	0.181	3,816
Salary posted by employer	0.177	3,952
Salary estimated by Indeed	0.090	1,810
Salary scraped from Indeed	0.087	1,518
Hiring one candidate	0.092	2,763
Hiring multiple candidates	0.092	1,263
Number of hires not specified on job posting	0.109	3,345
Above median number of applicants	0.144	3,527
Below median number of applicants	0.129	3,844

Notes: This table shows the number of resumes and response rates by characteristics of the job posting. The response rate is the share of resumes that received a non-perfunctory response from a potential employer.

the educational treatments. The estimating equations take one of two general forms:

$$\text{Response}_{ij} = \alpha_0 + \alpha_1^k \cdot T_i^k + \mu_{ij} \quad (1)$$

Table 3. Descriptive statistics by applicant characteristics

	Response rate	Number of resumes
Total	0.136	7,371
White man	0.143	1,771
White woman	0.140	1,839
Black man	0.138	1,903
Black woman	0.124	1,858
Business major	0.135	1,026
Marketing major	0.111	1,061
Accounting major	0.160	1,118
Economics major	0.134	1,041
Finance major	0.146	1,054
Business Management major	0.133	1,043
Business Economics major	0.132	1,028
BA degree	0.134	3,703
BS degree	0.138	3,668
1st resume sent	0.142	1,957
2nd resume sent	0.137	1,873
3rd resume sent	0.135	1,794
4th resume sent	0.130	1,747

Notes: This table shows the number of resumes sent and response rates by characteristics of the fictitious applicants. The response rate is the share of resumes that received a non-perfunctory response from a potential employer.

$$\text{Response}_{ij} = \beta_0 + \beta_1 \cdot 1(6 \text{ years to degree}_i) + \beta_2 \cdot 1(\text{Selective college}_i) + \epsilon_{ij} \quad (2)$$

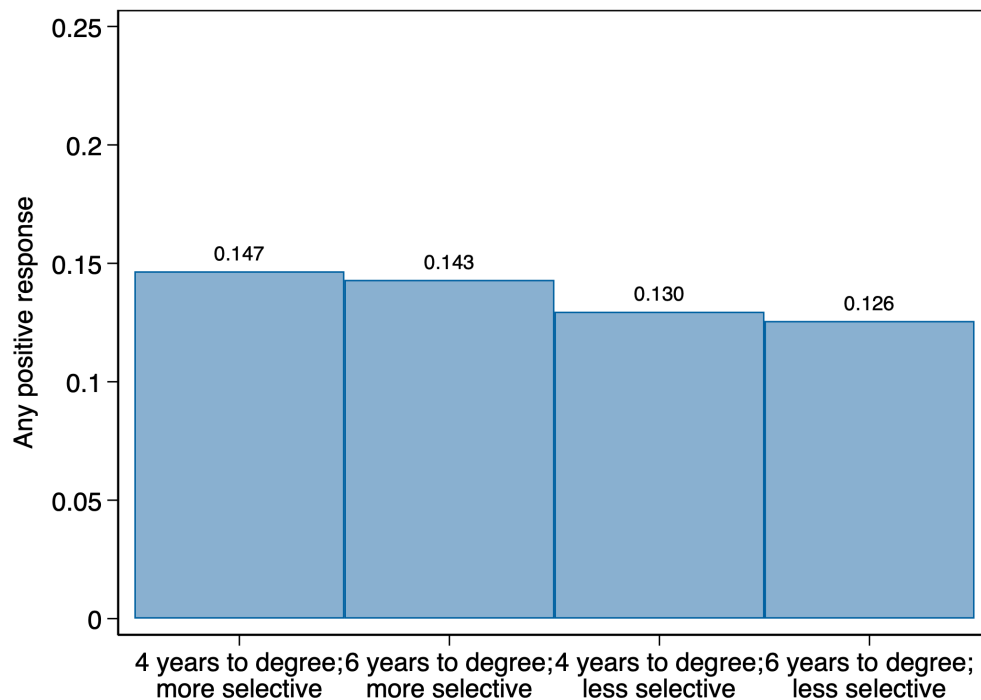
The outcome in both equations is an indicator variable that equals 1 if resume i gets an employer response for job vacancy j .⁴ Equation 1 regresses this outcome on indicators for each of the four resume types (denoted by the k superscripts), with one indicator omitted as a reference group. Equation 2 pools the treatments into indicators for whether the resume lists six years to degree (relative to listing four years to degree) and whether the resume lists a selective college (relative to

⁴I estimate both equations with a linear probability model using ordinary least squares. Results are identical when estimating with a logistic model. The full sample estimates using a logistic model are shown in Table A3.

listing a less selective college). Occasionally, I add to [Equation 2](#) the interaction between $1(6 \text{ years to degree}_i)$ and $1(\text{Selective college}_i)$ to test for differences in the time to degree effect between more and less selective colleges. In all results I cluster standard errors at the job vacancy level.

In either equation I occasionally include a set of controls for other information listed on the resume including college major, the degree type (BA or BS), gender, race, city, the work experience and skill template, and formatting details. These controls are not necessary for internal validity, but they can slightly improve precision by reducing residual variance in the outcome.

Figure 1. Employer response rates by resume treatment



Notes: This figure shows coefficients from a regression of employer responses on indicators for the four resume treatment types.

[Figure 1](#) summarizes the results in the full sample. The figure presents response rates by the four resume treatments using [Equation 1](#). Small differences exist between resumes listing six years to degree relative to listing four years to degree. For resumes listing a bachelor's degree from a more selective college, those that also list six years to degree have response rates 0.4 percentage points lower. For resumes indicating a less selective college, those listing six years to degree receive response

rates 0.4 percentage points lower. Meanwhile, regardless of time to degree, resumes listing a more selective college receive higher response rates than resumes listing a less selective college.

Column 1 of Table 4 presents the regression estimates from the pooled specification in Equation 2. Overall, resumes listing 6 years to degree have a response rate 0.4 percentage points lower than resumes listing 4 years to degree, though this is statistically insignificant. The standard errors allow me to rule out a time to degree effect larger in magnitude than -1.9 percentage points. Listing a more selective college, however, increases employer response rates by a statistically significant 1.7 percentage points, a 13 percent increase, relative to listing a less selective college. Column 2 shows that including resumes controls produces nearly identical results.

Table 4. Full sample estimates

	(1)	(2)	(3)	(4)
6 years to degree	-0.004 (0.008) [-2.9%]	-0.005 (0.008) [-3.6%]	-0.004 (0.011) [-3.1%]	-0.004 (0.011) [-3.1%]
Selective college	0.017** (0.008) [13.3%]	0.018** (0.008) [14.1%]	0.017 (0.011) [13.1%]	0.019* (0.011) [14.7%]
6 years to degree \times Selective college			0.000 (0.016)	-0.002 (0.016)
Resume controls		✓		✓
Observations	7,371	7,371	7,371	7,371

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer. Columns 2 and 4 include controls for other attributes of the resume including college major, the degree type (BA or BS), gender, race, city, the work experience and skill template, and formatting details. Standard errors are clustered at the job vacancy level and shown in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Estimates in terms of percent changes relative to the appropriate comparison response rate mean are shown in brackets.

Employers could interpret the time to degree signal differently between graduates of more or less selective colleges. For instance, the positive signal of attending a more selective college could mitigate any delayed graduation penalty. On the other hand, since longer time to degree is less common at more selective colleges,

delayed graduation could represent a particularly negative signal to employers. To test for these dynamics, column 3 of [Table 4](#) adds the interaction term between the indicators for six years to degree and selective college. The time to degree effect implied by these estimates is -0.4 percentage points among less selective colleges and -0.4 percentage points among more selective colleges, although the test of a different time to degree effect between more and less selective colleges is statistically insignificant. Results are nearly identical when including resume controls in column 4.

Finally, I test for differences in the effects of the educational treatments by the gender and race of the applicant which is signaled by the names listed on the resumes. Results for men and women applicants are reported in columns 1 and 2 of [Table 3](#) and [Figure A3](#), while results for White and Black applicants are reported in columns 3 and 4 of [Table A2](#) and [Figure A4](#). The point estimates for listing 6 years to degree and listing a selective college are both larger in magnitude for men applicants and for White applicants compared to women and Black applicants, respectively. Although, for both men and White applicants, the estimates of the time to degree effect are not statistically significant at conventional levels.

4 Interpretation

The main finding from the full sample analyses is that, while resumes listing a more selective college receive an response rate advantage, there is not a significant advantage for resumes listing graduation in four years relative to six years. A simple interpretation of this result is that, on average, many employers do not value time to degree as a signal of applicant quality. This section presents supplemental analyses to engage with alternative interpretations of the main results. First, I test whether estimates may be attenuated due to employers viewing applicants who graduated within four years as overqualified for the job and thus less likely to accept a job offer than those graduating in six years. Second, I assess whether employers simply did not notice the differences in time to degree indicated on the resumes. Third, I examine the robustness of the results to different subsamples of jobs. Lastly, I assess whether my estimates may be attenuated by bias from spillover effects between resumes sent to the same job.

4.1 Do estimates reflect employers' assessments of applicants with a different time to degree?

The results of the experiment broadly suggest that employers do screen resumes for signals of applicant quality, which is consistent with prior literature. For instance, I reject the hypothesis that employer response rates are equal across the work history templates listed on the resumes. Despite the resumes being designed to be similar to each other, employers are generally quite responsive to differences in resume attributes.

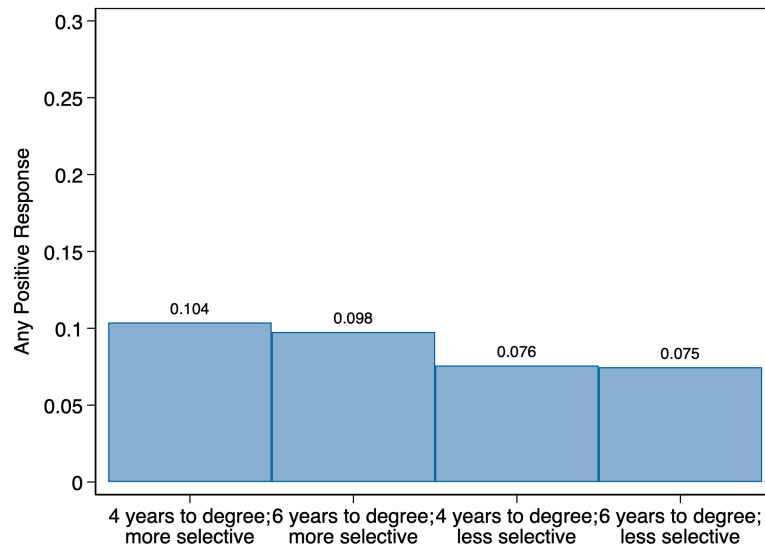
Since the full sample estimates find a small and statistically insignificant negative effect of a longer time to degree, does this imply that employers view the skills of applicants with different time to degree to be similar? An alternative explanation could be that resumes indicating degree completion in four years were viewed by employers as too highly qualified for the jobs in my sample. If this were the case, estimates of the effect of time to degree could be attenuated as response rates to resumes listing six years to degree are inflated because they are viewed to be more likely to accept a job offer. This phenomena has been referred to as “reverse discrimination” in audit studies based on applicant characteristics like race and gender ([Bertrand and Mullainathan, 2004](#)).

To test for whether “reverse discrimination” explains the full sample results, I assess how the results differ by the quality of the job, using expected salary as a proxy for job quality. Specifically, I split the sample of resumes by whether the jobs they were sent to are above or below the median expected salary and run the analyses separately for each subsample. If “reverse discrimination” explains the small estimated effect of time to degree in the full sample, there would likely be a larger time to degree effect among higher salary jobs.

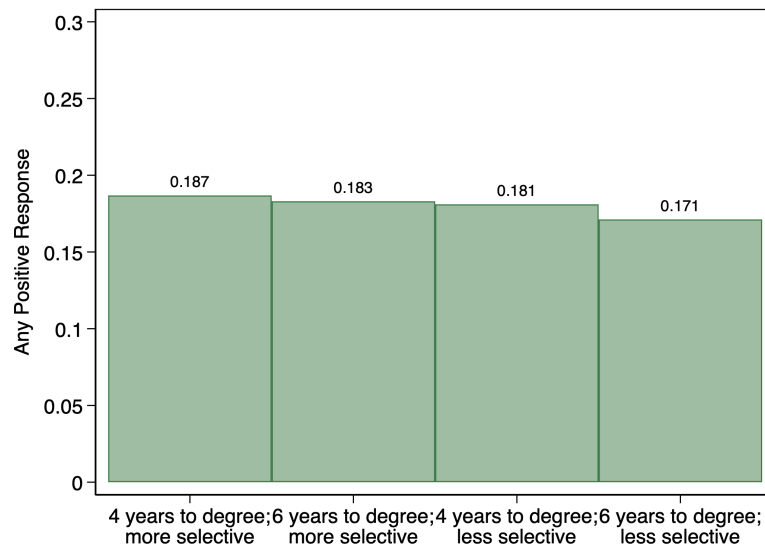
The results presented in [Figure 2](#) and columns 1 and 2 of [Table 5](#) shows little evidence of “reverse discrimination” based on time to degree, at least in the full sample. The estimated effect of listing six years to degree is actually larger in percentage point terms among lower salary jobs compared to higher salary jobs. But because overall response rates are much higher among lower salary jobs, these estimates are similar in magnitude when converted into percentages. Meanwhile, the effect of listing a more selective college is much higher among higher salary jobs, at about 33 percent (2.5 percentage points). This is consistent with higher salary jobs having higher standards for the quality of potential applicants and adds credibility to the conclusion that “reverse discrimination” does not contaminate

Figure 2. Results by job quality

(a) Higher salary jobs



(b) Lower salary jobs



Notes: This figure shows results from a regression of employer responses on indicators for the four resume treatment types separately by the expected salary of the job the resume was sent to. Panel (a) shows results for jobs above the median in expected salary, while panel (b) shows results for jobs below the median in expected salary.

the main estimates of the effect of time to degree.

Table 5. Results by job posting characteristics

	Higher salary (1)	Lower salary (2)	More applicants (3)	Fewer applicants (4)
6 years to degree	-0.004 (0.010) [-4.5%]	-0.007 (0.012) [-3.8%]	-0.028** (0.012) [-17.2%]	0.016 (0.011) [13.7%]
Selective college	0.025** (0.010) [33.2%]	0.009 (0.012) [5.1%]	0.016 (0.012) [11.3%]	0.019 (0.012) [16.4%]
Observations	3,464	3,816	3,577	3,406

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer. Columns 1 and 2 split the sample by whether the job was above or below the median expected salary. Columns 3 and 4 split the sample by whether the job posting had above or below the median number of applicants. Standard errors are clustered at the job vacancy level and shown in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Estimates in terms of percent changes relative to the appropriate comparison group's mean response rate are shown in brackets.

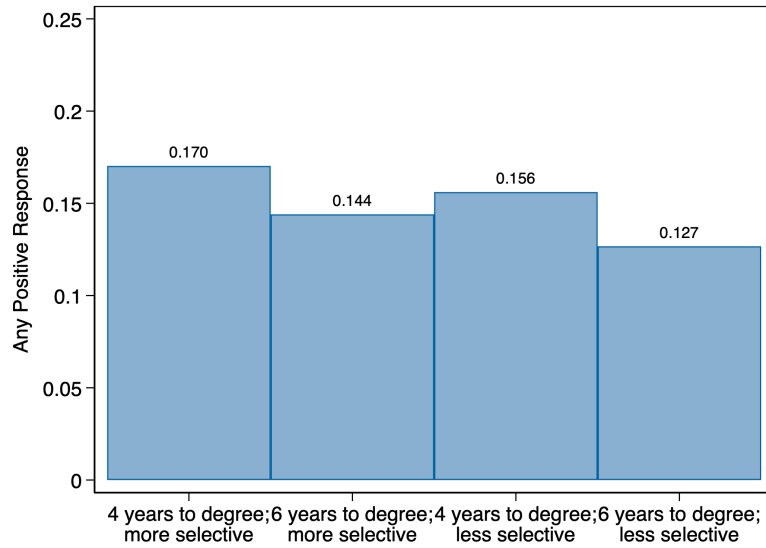
4.2 Do employers notice time to degree on resumes?

Another interpretation of the small (though not statistically significant) estimates of the effect of time to degree in the full sample is that employers simply do not notice differences in time to degree indicated on resumes. While there is evidence that employers can notice fine details on resumes such as the range of years enrolled in high school to indicate applicant age (Lahey, 2008) and date ranges to indicate unemployment duration (Kroft et al., 2013), there is no prior empirical evidence to suggest employers notice college enrollment year ranges to indicate time to degree.

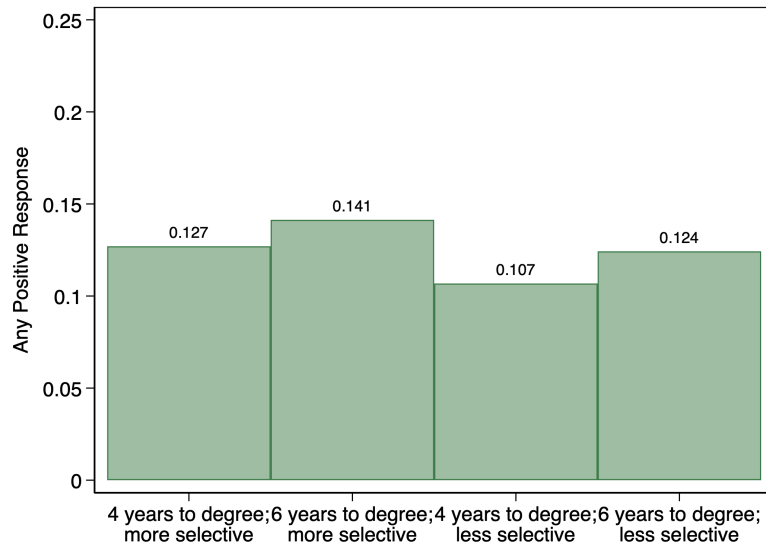
To assess whether employers can notice time to degree indicated on resumes, I focus on a subset of jobs that have a larger applicant pool where competition among applicants is relatively high and employers can be more selective with which characteristics to use to screen applicants. Specifically, I split the sample at the median number of applicants and run the analyses separately for each subgroup. Figure 3 and columns 4 and 5 of Table 5 report the results.

Figure 3. Results by number of applicants

(a) More applicants



(b) Fewer applicants



Notes: This figure shows results from a regression of employer responses on indicators for the four resume treatment types separately by the number of applicants to the job posting. Panel (a) shows results for jobs above the median number of applicants, while panel (b) shows results for jobs below the median number of applicants.

Among jobs with larger applicant pools, a response rate penalty emerges for resumes listing six years to degree. For resumes listing a more selective college, there is a response rate penalty of about 2.6 percentage points ($p\text{-value} = 0.141$) for listing six years to degree relative to four years to degree. Meanwhile, there is a 2.9 percentage point penalty ($p\text{-value} = 0.078$) for listing six years to degree among resumes also listing a less selective college. While these within-college selectivity estimates are not statistically significant at the 95 percent level, pooling across college types reveals a statistically significant 2.8 percentage point decrease in response rates for listing six years to degree.

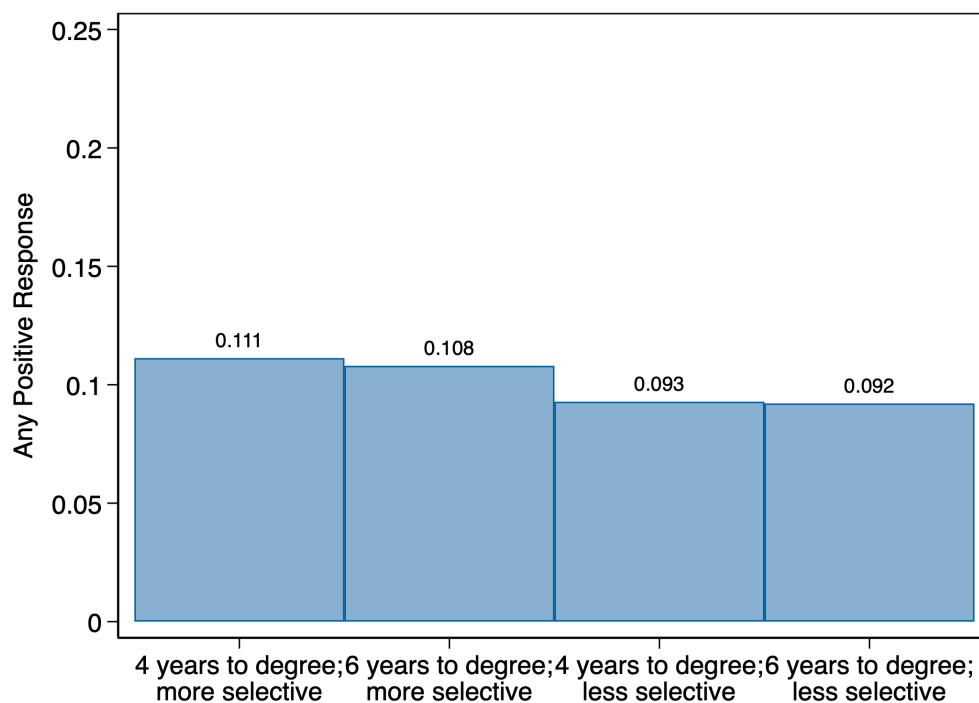
For jobs with smaller applicant pools, there is actually some evidence of a positive effect of listing six years to degree. For instance, among resumes listing a more selective college, those also listing six years to degree receive response rates 1.4 percentage points higher ($p\text{-value} = 0.392$) than those listing four years to degree. This delayed graduation penalty is 1.7 percentage points ($p\text{-value} = 0.220$) among resumes listing a less selective college. The pooled specification estimates a 1.6 percentage point effect ($p\text{-value} = 0.152$) of listing six years to degree.

These results suggest that employers do seem to recognize time to degree and some use it to screen applicants when the applicant pool is particularly competitive. The apparent positive effect of a longer time to degree among jobs with smaller applicant pools could be a case where employers are more aggressive in pursuing lower quality candidates who are perceived to be more likely to accept a job offer. Although, the data cannot rule out that employers of these jobs with small applicant pools could simply prefer the skills of candidates with longer time to degree.

4.3 Robustness to alternative subsamples

Finally, I examine the robustness of the main results to excluding certain jobs from the sample. A potential concern with the study setting is that the full sample results are driven by jobs that are looking to hire multiple candidates for their open positions. If these jobs have relatively low standards for responding to applicants it could be the case that characteristics like time to degree simply may not be important if hiring standards are lower than usual. In [Figure 4](#) and column 1 of [Table A4](#) I exclude job postings that indicate they are hiring multiple candidates to focus on jobs where resumes characteristics are plausibly considered with greater scrutiny. In this subset of jobs, the results look very similar to the full sample results.

Figure 4. Employer response rates excluding jobs hiring multiple candidates



Notes: This figure shows coefficients from a regression of employer responses on indicators for the four resume treatment types excluding jobs that indicated that the employer was looking to hire multiple candidates for the position.

I also consider whether jobs of a single occupation solely drive the results. In columns 2 through 7 of [Table A4](#) I report results from sequentially excluding a single occupation category from the sample. There is some variation in the coefficients across the samples for estimates of both time to degree and college selectivity, suggesting that the effects of the educational treatments are not homogeneous across occupations. However, the results are qualitatively similar across the samples and there is little evidence that results are driven by jobs in a single occupation.

4.4 Are estimates attenuated by bias from spillover effects between resumes?

[Phillips \(2019\)](#) shows that resumes have positive spillover effects on each other when multiple resumes are sent to the same job, which has the potential to introduce attenuation bias in the estimates of resume treatments. This section presents evidence that while spillover effects between resumes within job vacancies are present in my setting, my estimates are not subject to bias from these spillovers

due to the non-stratified setup of my experimental design. Column 1 of [Table 6](#) reprints the main estimates while excluding a small number of observations where only one resume was submitted to a job, since those singleton observations will be dropped naturally in the specifications in subsequent columns of the table.

Table 6. Test of within-vacancy spillovers

	(1)	(2)	(3)
<i>Own resume listing...</i>			
6 years to degree	-0.003 (0.008)	-0.002 (0.006)	-0.003 (0.008)
Selective college	0.017** (0.008)	0.002 (0.006)	0.018** (0.008)
<i>Share of other resumes to same job listing...</i>			
6 years to degree			-0.007 (0.020)
Selective college			0.044** (0.022)
Job vacancy fixed effects		✓	
Observations	7,287	7,287	7,287

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer. Column 2 includes fixed effects for the job vacancy. Column 3 includes variables that represent the share of other resumes sent to the same job that list the two educational treatments. Standard errors are clustered at the job vacancy level and shown in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

As described in [Section 2.1](#), including job vacancy fixed effects in the estimating equations will reintroduce bias from spillover effects that the non-stratified design used in this study were intended to avoid. This is because the composition of the treatment types of the *other* resumes sent to the same job are, by construction in a non-stratified design, systematically different between the *own*-resume treatment types. For illustrative purposes, column 2 adds the job vacancy fixed effects. Comparing columns 1 and 2, the coefficient on 6 years to degree remains similar, but the coefficient on selective college changes dramatically, dropping close to zero. This attenuation on the estimate of the effect of listing a selective college is consistent

with bias from spillovers as documented by [Phillips \(2019\)](#).

The non-stratified design also provides the ability to test for spillovers directly by including the share of other resumes sent to the same job that list the educational treatment characteristics. This tests explicitly whether the treatment types of the *other* resumes sent to the same job influences the probability that the own-resumes get a response. The non-stratified design makes this test possible since these other resume treatment types are exogenous to the own-resume treatments.

Column 3 of [Table 6](#) carries out the test for spillovers. Having all other resumes sent to the same job listing a selective college, relative to zero other resumes listing a selective college, increases the probability of the own resume getting a response from an employer by 4.4 percentage points. This is evidence of spillover effects in terms of college selectivity. The magnitude of these spillovers is consistent with the spillovers documented in [Phillips \(2019\)](#). Meanwhile, I estimate no significant spillovers coming from what other resumes list for time to degree. This makes sense since I find that employers do not seem to highly value time to degree on resumes in general.

Despite the presence of spillovers in terms of college selectivity, these spillovers do not bias my estimates since the effects “difference out” due to the non-stratified assignment of treatment statuses within job vacancy. The fact that the estimates on the own-resume treatments remain identical to column 1 when including the other resume treatments is strong evidence that the spillovers do not bias my estimates.

5 Conclusion

This paper asks how employers value otherwise-identical job seekers who completed bachelor’s degrees in different amounts of time. I use a resume audit study in which resumes were sent to thousands of online job openings for entry-level business jobs to estimate the causal effect of indicating taking six years to complete a bachelor’s degree on a resume relative to listing four years to degree on employer response rates.

In the full sample of jobs, I estimate small and statistically insignificant negative effects of listing six years to degree on resumes relative to listing four years to degree. Response rates differ by only 3-4 percent (0.5 percentage points). I also find no evidence in the full sample that the effect of time to degree differs by the selectivity of the college where the bachelor’s degree was earned. I do find a 13

percent increase (1.7 percentage points) in response rates for resumes listing a more selective college, and this premium increases to 33 percent among jobs in the top half of sample in terms of expected salary. There is evidence of some heterogeneous effects of time to degree based on characteristics of the job opening. In particular, there is a negative effect of time to degree among jobs with larger applicant pools.

Together, these results suggest that many employers do not place a significant value on time to degree as a signal of an applicant's quality. But it appears that some do. When applicant pools are larger, applicants face more competition and employers can be more selective in who they respond to. In these more competitive environments employers may begin to weigh resumes characteristics like time to degree more heavily. Or, it is possible that employers that draw larger applicant pools for their open positions could have more sophisticated or simply different processes for screening applicants.

My results provide evidence that colleges and students should not have significant concerns about the initial labor market consequences of delayed graduation. Employers may only value time to degree on the margin when job openings are particularly competitive. Even so, the skills and employment experiences that graduates are able to list on their resumes likely will be more valuable than time to degree. If students can afford it, extending college enrollment beyond the standard on-time amount of time may not have large private costs, especially if the extended enrollment allows a student to pursue a major in a more lucrative field. However, issues of the affordability of extended enrollment should not be minimized. The tuition costs and opportunity costs associated with extended enrollment are often large and worthy of consideration. Policy efforts should continue to focus attention on helping students to graduate, regardless of whether it takes an extra couple of years to do so. And given the continued labor market benefits, policies should also focus on guiding students toward higher quality colleges, if and where possible.

Finally, the experimental results warrant a few caveats. First, it should be noted that the context of this experimental study is fairly specific. Given the college enrollment ranges listed on the resumes, it is implied that the graduates in my study were enrolled in college during the Covid-19 pandemic. It is possible that employers are more lenient about delayed graduation after the onset of the pandemic than before. However, for similar reasons, graduating in four years may be viewed as more impressive now than before the pandemic. Also, the audit study occurred during a relatively tight labor market, and it also considered only jobs

within business occupations. Results could conceivably be different in other labor market conditions and in other occupations, although business occupations are the most common jobs held by bachelor's degree graduates and I applied to jobs in a regionally diverse set of cities.

Second, while this paper provides evidence of only small labor market consequences of delayed graduation, more research is warranted to provide a comprehensive understanding of the possible dynamics. For instance, a limitation of the audit study method is that I only observe initial contacts from employers. While there is evidence that employer response rates are informative about later hiring decisions ([Lanning, 2013](#); [Quillian et al., 2020](#)), it is possible that larger effects of time to degree materialize in later stages of the hiring process. Additionally, my study naturally conditions the analysis on graduation. The true labor market costs of extending college enrollment beyond the standard on-time number of years may be at the graduation margin. In this indirect way, time to degree should remain an important area of study, especially given the evidence on the returns to having a college degree relative to not having a college degree.

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A Appendix Tables and Figures

Table A1. Balance tests

	More selective; TTD = 4 years	More selective; TTD = 6 years	Less selective; TTD = 4 years	Less selective; TTD = 6 years	F-test p-value
Woman	0.485	0.495	0.525	0.501	0.097
Black	0.510	0.515	0.502	0.514	0.859
BA degree	0.505	0.487	0.508	0.509	0.526
BS degree	0.495	0.513	0.492	0.491	0.526
Business major	0.144	0.138	0.141	0.134	0.809
Marketing major	0.141	0.156	0.139	0.140	0.395
Accounting major	0.151	0.144	0.150	0.161	0.560
Economics major	0.146	0.139	0.146	0.134	0.663
Finance major	0.135	0.142	0.148	0.146	0.649
Business Management major	0.135	0.153	0.138	0.140	0.427
Business Economics major	0.148	0.128	0.138	0.145	0.303
Work history template 1	0.253	0.245	0.251	0.246	0.928
Work history template 2	0.256	0.255	0.253	0.246	0.907
Work history template 3	0.251	0.250	0.239	0.260	0.518
Work history template 4	0.239	0.250	0.257	0.248	0.665
Skill template 1	0.183	0.168	0.165	0.154	0.119
Skill template 2	0.167	0.174	0.164	0.161	0.755
Skill template 3	0.171	0.166	0.164	0.171	0.905
Skill template 4	0.165	0.156	0.164	0.167	0.816
Skill template 5	0.155	0.162	0.167	0.175	0.426
Skill template 6	0.158	0.174	0.175	0.172	0.515
1st resume sent	0.262	0.260	0.265	0.275	0.722
2nd resume sent	0.258	0.254	0.263	0.241	0.442
3rd resume sent	0.231	0.261	0.238	0.244	0.173
4th resume sent	0.249	0.226	0.234	0.240	0.411
Atlanta	0.191	0.185	0.184	0.190	0.910
Chicago	0.137	0.134	0.143	0.146	0.718
Dallas	0.101	0.114	0.104	0.095	0.291
Los Angeles	0.065	0.079	0.084	0.078	0.166
New York City	0.224	0.201	0.217	0.216	0.364
Philadelphia	0.095	0.101	0.098	0.101	0.909
San Francisco	0.185	0.186	0.171	0.173	0.461
tgbonum font	0.264	0.251	0.247	0.237	0.280
lmodern font	0.239	0.255	0.252	0.256	0.632
times font	0.255	0.240	0.242	0.255	0.602
charter font	0.242	0.253	0.259	0.252	0.661
Format template 1	0.249	0.252	0.251	0.254	0.991
Format template 2	0.265	0.263	0.234	0.244	0.080
Format template 3	0.248	0.249	0.249	0.249	1.000
Format template 4	0.238	0.235	0.266	0.254	0.111

Table A2. Heterogeneity by applicant characteristics

	Men applicants (1)	Women applicants (2)	White applicants (3)	Black applicants (4)
6 years to degree	-0.012 (0.012)	0.005 (0.011)	-0.011 (0.011)	0.003 (0.011)
Selective college	0.024** (0.012)	0.010 (0.011)	0.020* (0.011)	0.015 (0.011)
Observations	3,674	3,697	3,610	3,761

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer. Columns 1 and 2 split the sample by the gender of the applicant. Columns 3 and 4 split the sample by the race that is common among the names on the resumes. Standard errors are clustered at the job vacancy level and shown in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table A3. Full sample estimates using a logit model

	(1)	(2)
6 years to degree	-0.004 (0.008)	-0.005 (0.008)
Selective college	0.017** (0.008)	0.018** (0.008)
Resume controls		✓
Observations	7,371	7,371

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer using a logistic model instead of a linear probability model.

Table A4. Results using alternative samples

	Excl. multiple hire jobs (1)	Excl. sales jobs (2)	Excl. marketing jobs (3)	Excl. finance jobs (4)	Excl. accounting jobs (5)	Excl. business admin. jobs (6)	Excl. customer service jobs (7)
6 years to degree	-0.002 (0.008)	-0.003 (0.008)	-0.003 (0.009)	-0.006 (0.009)	-0.001 (0.009)	-0.005 (0.009)	-0.008 (0.008)
Selective college	0.017** (0.008)	0.013 (0.008)	0.021** (0.009)	0.021** (0.010)	0.015* (0.009)	0.023*** (0.009)	0.011 (0.008)
Observations	6,108	6,029	6,643	5,582	6,079	6,409	6,671

Notes: The dependent variable in the table above is an indicator variable for any non-perfunctory response from the potential employer. Each column excludes some type of jobs from the full sample. Column 1 excludes jobs the indicated the employers was hiring multiple candidates for the position. Columns 2 through 7 sequentially exclude jobs in a single occupation group. Standard errors are clustered at the job vacancy level and shown in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Figure A1. Example resume

Emily Martin

1000 Redwood Ln
Athens, GA 30606
(385) 450-7351
emily.martin3421@gmail.com

Education

2018-2022 University of Georgia – Athens, GA
B.S. in Finance

2014-2018 Midtown High School – Atlanta, GA

Work Experience

Student Tutor

University of Georgia – Atlanta, GA

2021-2022

- Provided instruction to diverse groups of students
- Developed supplemental course materials, and helped to thoroughly explained assigned coursework
- Taught tailored large-group review sessions before exams

Food Service Worker

University of Georgia – Athens, GA

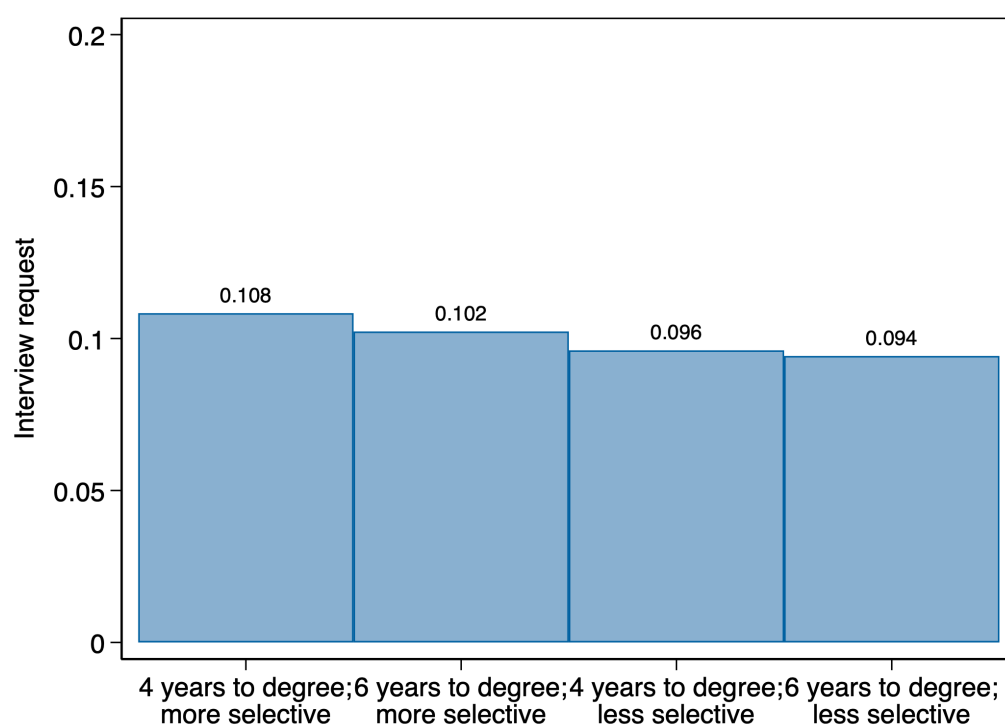
2019-2021

- Engaged in preparing foods, cleaning facilities and equipment, and preparing serving meal lines
- Responsible for the supervision and training of new food service employees on dining hall procedures
- Provided excellent customer service while handling varying sums of money as a cashier

Skills

- Microsoft Office suite
- Proficient in Spanish
- Excellent communicator
- Reliable, quick learner, hard worker

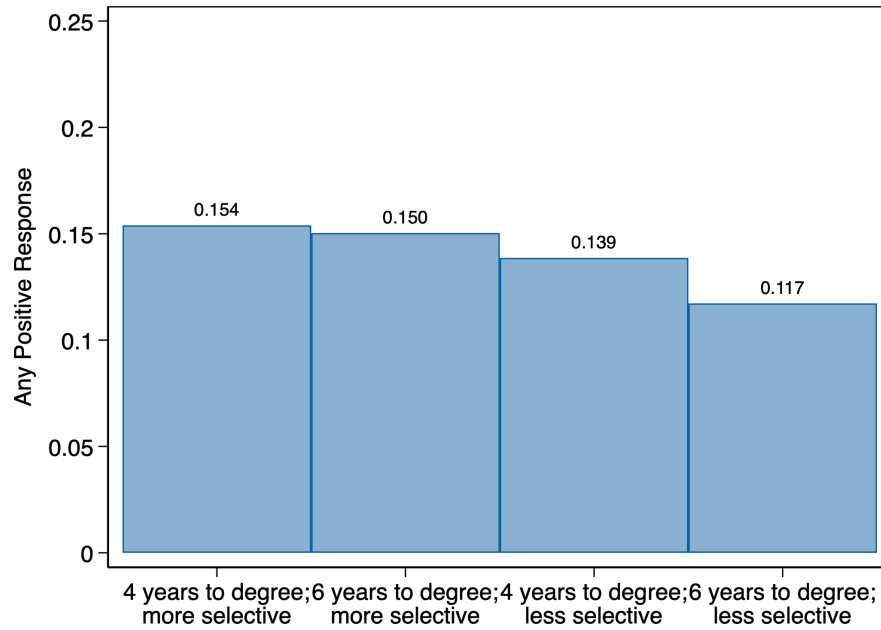
Figure A2. Interview request rates by resume treatment



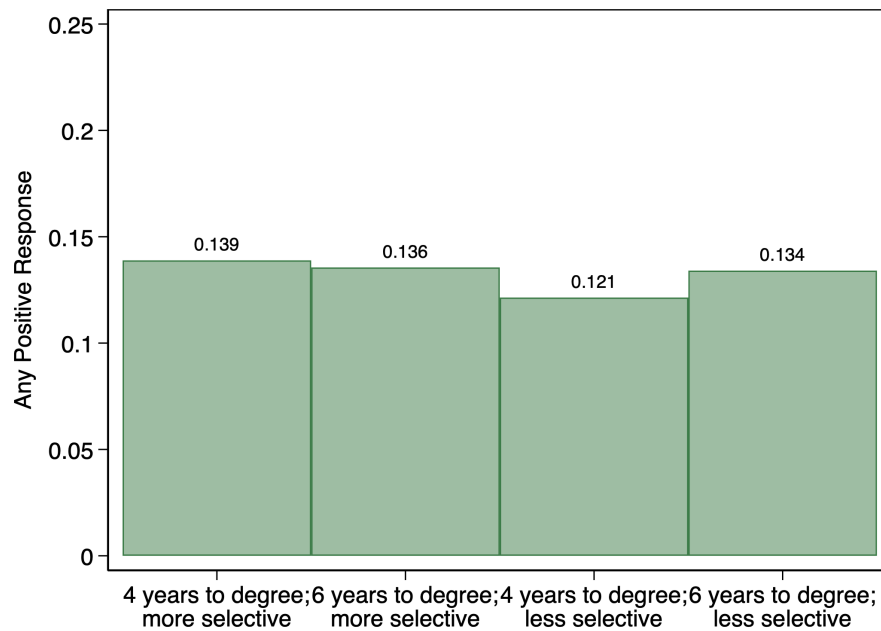
Notes: This figure shows coefficients from a regression of employer interview requests on indicators for the four resume treatment types.

Figure A3. Results by gender of the applicant

(a) Men



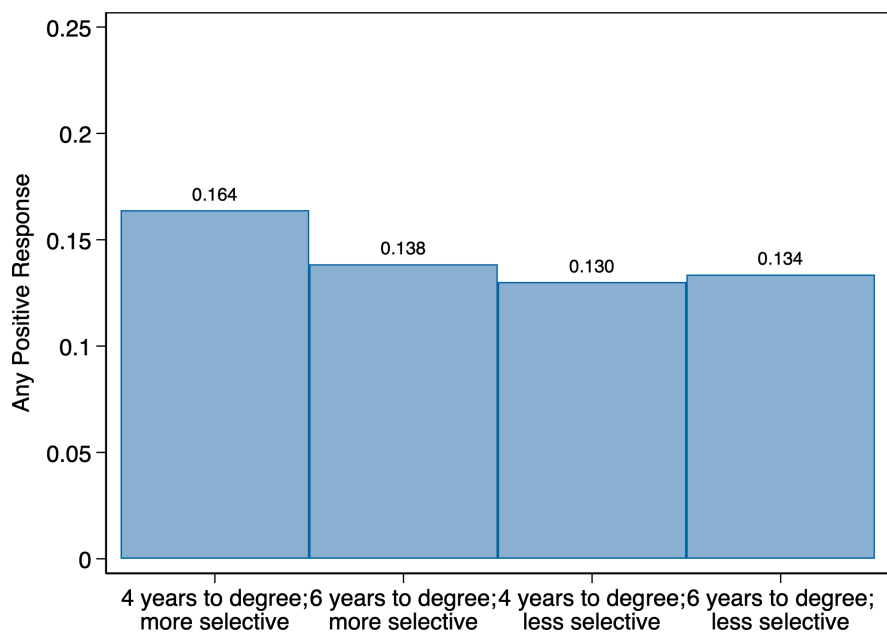
(b) Women



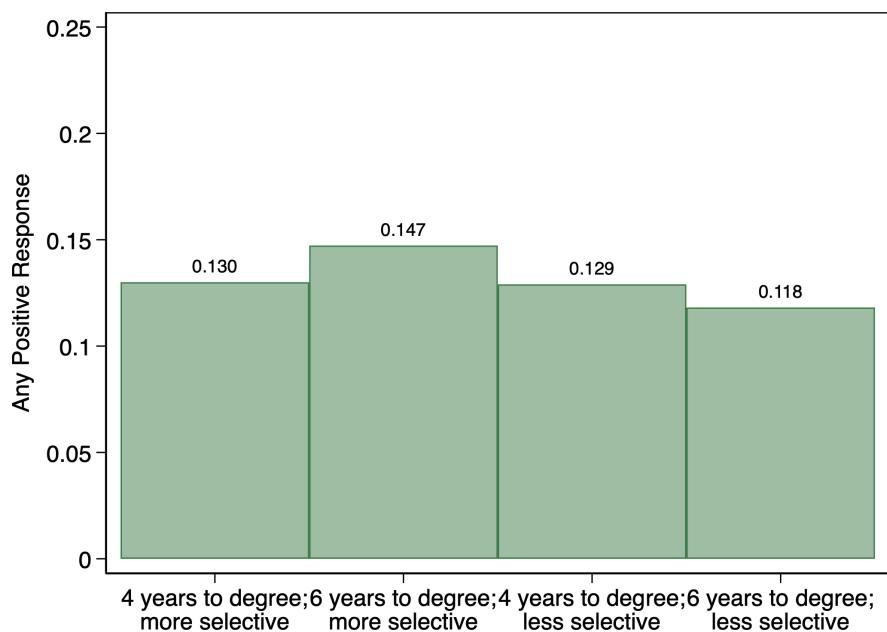
Notes: This figure shows results from a regression of employer responses on indicators for the four resume treatment types separately by the gender of the applicant. Panel (a) shows results for men applicants, while panel (b) shows results for women applicants.

Figure A4. Results by race of the applicant

(a) White applicants



(b) Black applicants



Notes: This figure shows results from a regression of employer responses on indicators for the four resume treatment types separately by the race of the applicant implied by the name on the resume. Panel (a) shows results for names common for white applicants, while panel (b) shows results for names common for black applicants.