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College major, internship experience, and employment opportunities: Estimates from a résumé audit☆

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HIGHLIGHTS

- We present estimates from experimental data on the labor market for college graduates.
- Fictitious resumes are submitted to jobs in business-related categories.
- We find no evidence that business degrees improve job prospects.
- Internships improve employment prospects substantially.
- Internships appear to be signals of unobservables valued by employers.

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ABSTRACT

We use experimental data from a résumé audit to estimate the impact of particular college majors and internship experience on employment prospects. Despite applying exclusively to business-related job openings, we find no evidence that business degrees improve employment prospects. By contrast, internship experience increases the interview rate by 14%. The returns to internship experience are larger for (a) nonbusiness majors and (b) applicants with high academic ability. Our data support signaling as the most likely explanation regarding the effect of internships on employment opportunities.

1. Introduction

The reduction in initial employment opportunities for recent college graduates brought about by the last recession has led many policymakers, researchers, and prospective students to question the value of a college education. Popular internet newsboards regularly feature articles which reference academic research on the projected labor-market demand for and life satisfaction associated with particular undergraduate degrees. However, such information on degree choice might be influenced by those who advertise on the same webpages that feature the articles.[4]

In addition to academic decisions, a bevy of extra-curricular activities are available to college students. The National Association of Colleges

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[4] For example, see the article and corresponding advertisements in the find-a-program tabs through the following webpage: http://education.yahoo.net/articles/avoid_these_majors.htm.

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and Employers' (NACE) 2011 survey indicates that over 50% of graduating seniors had worked as interns at some point while completing their degrees.[5] Recent industry surveys of U.S. employers indicate that relevant work experience is the most important factor in the hiring process, and that on-the-job experience, even if only part time, for recent college graduates is more important than their relevant coursework (Cappelli, 2014).

We use experimental data from a résumé audit to estimate the effect on job opportunities of particular degrees and industry-relevant internship experience for recent college graduates. The study focuses on credentials job seekers accumulate prior to graduating from college.[6] From January 2013 through the end of July 2013, we submitted approximately 9400 randomly-generated résumés to online job openings in banking, finance, management, marketing, insurance and sales. The fictive job applicants each report a college graduation date of May 2010. Our experimental design circumvents common identification issues associated with self selection by randomly assigning academic majors and internship experience to fictitious job applicants.

The following nine academic majors are randomly assigned to job applicants: accounting, biology, economics, English, finance, history, management, marketing, and psychology. Because we apply exclusively for jobs in business-related industries, we are primarily interested in whether business degrees, i.e. accounting, economics, finance, management and marketing, generate better job opportunities than nonbusiness degrees, i.e. biology, English, history, and psychology.[7] To measure the impact of internship experience on employment prospects, a portion of the fictitious applicants are randomly assigned a three-month industry-relevant[8] internship, which occurred during the summer of 2009.

We find no evidence employers prefer to interview job seekers with business degrees over applicants with nonbusiness degrees, despite applying exclusively to business-related job openings. There is also no advantage, in terms of job opportunities, associated with particular business degrees. However, we find strong evidence internship experience improves employment prospects: the interview rate for applicants who worked as interns (Summer 2009) before they graduated with their Bachelor's degrees (May 2010) is about 14% higher than that for those who did not work as interns. The estimate for internship experience likely represents a lower bound for two reasons. First, the internship occurred approximately four years before date of application. Second, the fictitious applicants in our study were seeking employment at places other than where they interned, as it is common for people to be hired by the same firm for which they interned. Although the return to internship experience is quite large for all majors and applicants who do and do not signal high academic ability (via the inclusion of a high grade point average on their résumés), the effect is larger for applicants with nonbusiness degrees and applicants who signal high academic ability.

Our results suggest that promoting internships (e.g., through employer incentives or better coordination between universities and employers) could help smooth the transition from school to work for young workers. From a policy standpoint, it is important to understand whether internship experience signals unobservables, such as innate ability, or augments a worker's skill-set. It is also possible for internship experience to serve as a different type of signal. As an example, employers in the field of banking may use internship experience in the banking sector as a signal of fit or a desire on the part of applicants to continue working in the banking sector. Such a signal could improve the quality of employer–employee matches, which would be efficiency-enhancing. If internships only signal unobserved ability to employers, policy interventions could muddle the signal such that it no longer helps employers sort or rank job candidates. By contrast, if internship experience improves a job seeker's skill-set or the quality of employer–employee matches, it is possible to justify government interventions designed to increase the demand for interns.

Four aspects of our experimental data suggest signaling as the most likely explanation for the effect of internships on employment opportunities. First, the return to three-month industry-relevant internships, which occurred about four years before the date of application, is about half that of post-graduation industry-relevant work experience of 20–38 months that is more recent. This finding suggests internship experience reveals something other than relevant work experience to prospective employers. Second, there is no statistically significant interaction effect between internship experience and post-graduation work experience. It is difficult to reconcile the lack of an interaction effect with a human-capital model, as we would expect industry-relevant experience to be stackable (e.g., Neal, 1995). Third, we model the initial phase of the hiring process for entry-level jobs, in which a cursory overview of resumes often takes place (see Pager (2007), pp.126). Fourth, the internships took place approximately four years prior to application, making it likely that any skills gained would have depreciated substantially.

The remainder of the manuscript is organized as follows. Section 2 discusses the relevant literature and the theoretical channels through which college majors and internship experience could affect employment prospects. Section 3 describes our experimental design and data. Section 4 presents the estimates from our econometric models. Section 5 provides a summary of our findings and discusses the possible explanations for our findings. In addition, we provide an online appendix that contains supplementary estimates as well as detailed information on the experiment.

2. Theoretical background and previous studies

The return to education has long been of interest to labor economists. However, research on the effect of specific academic training on labor-market outcomes is relatively sparse. The existing literature focuses on the effects of college attendance, university quality, and degree choice on labor-market outcomes (e.g., Oreopoulos and Petronijevic, 2013; Altonji et al., 2012). These studies also share a common limitation: the choice of academic major could be driven by unobservables that make individuals more or less likely to have success in the labor market. To highlight this potential issue, the disparity in earnings between some undergraduate degrees has been shown to be as large as the difference between college and high-school graduates (Altonji et al., 2012).[9]

Many university degrees are designed for students to enter the work force in certain industries. Industry-specific skills acquired while studying for a degree may lessen training costs for new workers. For

[5] For more details, visit the following webpage: http://www.schools.com/news/survey-majority-of-internships-done-by-college-class-of-2011-were-paid.html.

[6] Using the same experimental data, Nunley et al. (2015a) examine the effects of unemployment and underemployment spells on employment prospects, while Nunley et al. (2015b) test for racial discrimination. In Nunley et al. (2015a), we find that applicants who take jobs after graduation that do not require a college degree are penalized in the job market, whereas the employment prospects of recent college graduates who experience spells of unemployment are unaffected. Nunley et al. (2015b) find that employers discriminate against candidates with black-sounding names, and the racial gap in interview rates is concentrated in customer-focused occupations and increases with perceived productivity characteristics.

[7] It is not clear how to classify economics degrees, as economics is a social science and many economics departments are housed outside of business schools. However, it is typically the case that business and nonbusiness students often take economics courses, regardless of the college/school in which the economics department is located. We check the robustness of our estimates by including economics in the nonbusiness-degree category, but the estimates are not sensitive to this reclassification.

[8] For example, an applicant who is randomly assigned internship experience would report an internship in the banking sector when applying to a job in the banking industry.

[9] Altonji et al. (2012) incorporate key elements of existing theoretical research on degree choice to develop a model in which specific areas of study are sequentially chosen when an agent is uncertain about his/her future wages, learning ability, and preferences for different fields of study and occupations. The complexity of sequential-choice models render them difficult to estimate without making simplifying assumptions and recent literature has attempted to bridge this gap (e.g., Arcidiacono et al., 2012). Although this area of research is clearly important to understand the return to specific degrees, our study sidesteps these issues by focusing exclusively on the initial phase of the hiring process.

example, job applicants with degrees in finance or economics may be more likely to receive interviews for financial and economic analyst positions. However, the majority of courses taken by college students in the United States are not specific to a major.[10] Because a small proportion of industry-specific courses could be taken during one's undergraduate years, the impact of specific degrees on initial and subsequent employment prospects may be less pronounced.

Although college graduates with business degrees (i.e. accounting, economics, finance, management and marketing) are more likely to work in business-related occupations, it is not uncommon for college graduates with degrees in biology, English, history and psychology to work in business-related occupations. In Panel A of Table 1, we present the share of workers employed in general and specific business-related occupations who possess the majors used in our experiment. For individuals with the same non-business degrees used in our experiment, over 10% of the workers in business-related (column 1) and specific business occupations (columns 2–6) possess such degrees. Among the specific nonbusiness majors, psychology majors are the most likely to work in business-related occupations. However, workers who possess the nonbusiness degrees used in our experiment tend to earn less than business majors in the same occupation categories (See Panel B of Table 1).[11]

Applicants who have worked in specific industries, either postgraduation or as college interns, may also be preferred because of the skills acquired through that experience (e.g., Neal, 1995).[12] To our knowledge, the economics literature on labor-market consequences associated with internship experience is currently limited to two studies: ours and Saniter and Siedler (2014).[13] The relative absence of economic studies on the impact of internship experience on labor-market outcomes is likely due to the lack of data on internships and/or the complications associated with identification. In the latter case, it is likely that high-ability students are more likely to obtain internships. Such students would also tend to have greater success in the labor market. Saniter and Siedler (2014) control for self-selection into internships by estimating the impact of mandatory internships and their subsequent abolishment in Germany. For those who complete internships, wages rise by approximately six percent. However, these wage gains appear to be driven by initial placement in workforce (e.g., working full time in lieu of part time) during the first five years after graduation.

Internship experience, particular degrees, and overall academic performance could also signal higher future productivity because the costs of acquiring such credentials could be greater for lower-quality job applicants. Although the résumé-audit framework allows the researcher to control for selection bias and experimenter effects, the observation of the hiring process ends at the conclusion of the first phase, i.e. whether an applicant receives an interview.[14] Hence, signaling may be more important for receiving an interview request and an applicant's skill-set may influence the hiring decision to a greater extent during the interview stage. Even if researchers conclude that signaling is the likely explanation behind a particular result, it is difficult to know what type of signaling is being sent. On the one hand, the signal could indicate unobserved ability. On the other hand, the signal may improve the quality of matches between employers and employees, creating a more efficient matching process.

Using our experimental data, we examine the human-capital and signaling hypotheses with our data by testing whether the returns to internship experience vary with (a) academic ability and (b) the type of work experience obtained after graduating from college. In our experiment, academic ability is signaled via the inclusion of one's grade point average (GPA). For the type of work experience obtained after graduating, the fictive applicants obtained either a job that matches or does not match the industry for which the applicant is applying. We refer to the former as in-field or industry-relevant experience and the latter as out-of-field experience.

3. Experimental design

From January 2013 through the end of July 2013, we submitted approximately 9400 randomly-generated, fictitious résumés to online job openings in the following job categories: banking, finance, insurance, management, marketing and sales.[15] We submitted résumés to cities with large labor markets in the northwestern, southwestern, northeastern, midwestern and southeastern regions of the United States. The cities in which applicants applied to job openings are Atlanta, GA, Baltimore, MD, Boston, MA, Dallas, TX, Los Angeles, CA, Minneapolis, MN and Portland, OR. We submitted résumés to jobs that were entry level, required a college degree, only required the submission of a résumé to be considered for the job[16] and did not require a certificate or special training. Four résumés were submitted to each advertisement.

The unit of observation in our study is the firm. Because firms are not human subjects, Institutional Review Boards (IRBs) generally deem such experiments exempt. Indeed, the IRBs at both Auburn University (AU) and University of Wisconsin–La Crosse (UWL) concluded our study did not constitute human-subjects research. However, three aspects of our experiment warrant brief discussion: the use of deception, legal liability and uncompensated work time for human resources personnel.[17] Our experiment uses deception as a means to maintain a pure subject pool. If firms were told beforehand they are the subjects of a hiring experiment, it is possible we would no longer elicit the behavior exhibited in actual hiring decisions. Per our agreement with the IRBs at AU and UWL, we were required to maintain the anonymity of the universities and firms included on the resumes as well as the identities of firms to which resumes were submitted, which alleviates concerns about firms being held accountable for discriminatory hiring practices. Our experiment imposes a cost on firms who receive the

[10] As an anecdotal example, at Auburn University, students majoring in economics are only required to take 36 credit hours (of the 120 credit hours required to graduate) of classes with economics as the subject heading. As another example, consider an accounting major at the University of Wisconsin–La Crosse. The successful accounting major must complete 48 general education credits and 34 accounting credits. The remainder of the 120 total credits required to graduate might come from other business-related courses (at least 16 credits must come from courses in the business school) or non-business-related courses. Thus, only about 30% of the student's coursework is required to be taken in the field of accounting.

[11] We note that the occupation categories provided by the American Community Survey (ACS) are broad. Thus, it is impossible to know whether business and nonbusiness majors are employed in the same jobs. That is, it could be that nonbusiness majors are more likely to place into lower-paying jobs within a particular occupation category, and that business majors are more likely to place in higher-paying jobs within the same occupation category. One would need detailed data on job titles to conduct such a comparison. Unfortunately, such data are not available.

[12] Unfortunately, we are unable to pin down whether or not industry-specific human capital is a channel through which internships affect employment opportunities because we do not randomly assign out-of-industry internship experience to any of our fictitious applicants.

[13] One example from the human-resources literature is Knouse et al. (1999), who use survey data to estimate the effect of internships on employment outcomes. They find that internships increase employment opportunities for business majors. However, they also find that those who receive internship experience had significantly higher grade point averages, which suggests that there may be estimation problems associated with self selection. Saniter and Siedler (2014) cite several studies from the education literature. But these studies, with the exception of Klein and Weiss (2011), lack identification strategies to address the problem of self selection. Klein and Weiss (2011) examine the effect of compulsory internships in Germany and find no effect of internships on employment outcomes.

[14] Although the résumé-audit framework does not allow the observation of employment outcomes beyond the interview request, differences in interview rates are strong predictors of differences in wages and employment (Lanning, 2013).

[15] We performed power calculations before beginning our experiment. For detectable effect size of 0.01, alpha error probability of 0.01, and power of 0.99, with 50 regressors (counting interaction terms), we would need 2407 observations. These requirements are more stringent than "conventional" effect size, alpha error and power criteria.

[16] Some job openings require that applicants complete a detailed firm-specific application. We did not submit résumés to these job openings for two reasons. First, the detailed application introduces unwanted variation into the experimental design that is difficult to hold constant across applicants. Second, the completion of detailed applications takes considerable time, and our objective was to generate as many data points as possible at the lowest possible cost.

[17] See Pager (2007) for more details.

Table 1
Percentage employed and earnings by major and occupation category.

	Occupation category					
	Business related	Banking/Finance	Insurance	Management	Marketing	Sales
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Percentage employed						
General degree						
Business	29.7%	46.5%	35.8%	23.7%	28.9%	31.9%
Nonbusiness	11.9%	10.1%	13.5%	12.8%	10.4%	10.8%
Accounting	2.3%	6.9%	1.9%	1.9%	0.5%	1.2%
Economics	14.8%	20.3%	18.8%	13.7%	9.9%	15.1%
Finance	5.1%	14.6%	8.7%	3.3%	1.8%	4.1%
Management	11.5%	14.8%	15.3%	10.6%	7.8%	12.2%
Marketing	7.5%	4.7%	6.3%	4.8%	16.8%	11.5%
Biology	2.4%	1.8%	2.6%	2.7%	1.6%	2.6%
English	2.7%	2.0%	2.5%	2.8%	4.1%	2.1%
History	1.9%	1.7%	2.6%	1.9%	1.5%	2.1%
Psychology	4.8%	4.5%	5.8%	5.4%	3.2%	4.0%
Panel B: Earnings						
General degree						
Business	$48,335	$49,532	$43,976	$47,740	$49,896	$48,880
Nonbusiness	$40,714	$38,563	$37,675	$40,459	$45,281	$42,003
Particular degrees						
Accounting	$43,698	$44,095	$40,547	$44,557	$57,384	$38,022
Economics	$47,508	$47,217	$42,507	$47,663	$52,109	$47,712
Finance	$55,493	$57,700	$48,867	$54,222	$63,933	$54,458
Management	$45,381	$41,262	$42,824	$45,786	$46,870	$49,549
Marketing	$46,453	$41,631	$41,772	$44,650	$50,810	$47,428
Biology	$43,607	$44,147	$37,366	$43,318	$44,805	$46,196
English	$38,141	$36,287	$36,371	$37,700	$41,181	$38,798
History	$43,088	$41,482	$43,419	$42,651	$51,875	$41,931
Psychology	$39,780	$36,337	$35,738	$39,692	$47,833	$41,116

Notes: Calculations are based on data from the 2010–2013 American Community Surveys (ACS). The sample is composed of respondents who are 24–28 years-old and employed in the previous year. In Panel B, the sample is restricted to include respondents who earn between $5000 and $250,000 per year. The occupation categories are based on the "occ1990" variable provided by the ACS (See Ruggles et al. (2015)).

fictive resumes. Because we apply to entry-level job openings, we contend that the cost imposed on firms is minimized (see Pager (2007)). For entry-level jobs, human-resources personnel typically spend less than one minute on each resume (Lahey and Beasley, 2009). In an effort to further minimize the costs imposed on firms, we promptly responded to callbacks/interview requests with an email indicating that the applicant had accepted another position.

The credentials listed on the résumés were chosen after reviewing many example résumés online. Ultimately, our goal was to create résumés similar to those used by actual job seekers. The resume credentials were randomly assigned to job seekers using the résumé-randomizer program developed by Lahey and Beasley (2009).[18] Lahey and Beasley (2009) program allowed us to automate the creation of thousands of different randomized résumés instead of relying on résumé templates, which could introduce experimenter bias. We randomly assigned the following characteristics to the fictive job seekers' résumés: a name, a street address, a university where they completed their Bachelor's degree,[19] an academic major, (un)employment status, whether they report their GPA, whether the applicant graduated with an Honor's distinction, the type of work experience the applicant obtained after completing their degree, and whether the applicant obtained internship experience while completing their degree.[20] In the next paragraph, we describe the résumé characteristics that are the focus of this study: college major and internship experience. The other aforementioned résumé characteristics are described in Appendix A.[21]

The first résumé characteristic that is the focus of this study is college major. Applicants are randomly assigned one of the following majors: accounting, biology, economics, English, finance, history, management, marketing and psychology. Each of these majors is assigned with equal probability. These majors were chosen because of their popularity and also to give us an opportunity to compare the relative return to degrees that are more specific to the job advertisements we answer. The second résumé characteristic that is the focus of this study is internship experience. In our experiment, 25% of applicants are assigned an "in-

[18] Lahey and Beasley's program as well as instructions on how to use it are available at the following website: http://www.nber.org/resume-audit/.

[19] It is important to point out that the universities that we used for this résumé attribute are likely recognizable to prospective employers, but it is unlikely that the universities would be regarded as prestigious or elite. While we are unable to disclose the names, the universities chosen were public, non-flagship universities. We cannot disclose the specifics of the admission criteria for these schools without potentially compromising the anonymity of the universities. However, two of the four schools have sliding scales based on GPA, high-school credits and ACT/SAT scores. One of the schools has a standard admission policy based on minimum standards for grades and ACT/SAT scores. Another one of the schools does not articulate admissions standards for test scores or grades in high school. With the exception of the school that does not have admission standards clearly described, the other three schools can be characterized as admitting students who are in the 60th percentile in high school grades and ACT/SAT scores. In our regressions, we find that the interview rates do not vary between the four universities assigned to applicants.

[20] Although the résumé-randomizer was used to assign résumé credentials, it is important to verify that the randomization of résumé credentials worked. Appendix Table A1 presents the randomization probabilities chosen for each résumé credential along with summary statistics for each of the résumé credential. It is clear from comparing columns (1) and (2) that the randomization of the résumé credentials was effective, as the sample means are similar to the randomization probabilities. While it appears that the randomization of the résumé credentials was effective, we demonstrate that the résumé credentials were assigned randomly to (a) business and nonbusiness majors and (b) applicants with and without internship experience in Appendix Table A2. The estimates in Table A2 are based on a linear regression of the business-degree and internship indicator variables on a constant and the other résumé characteristics. Ultimately, we find that the other résumé credentials are not statistically significant, individually or jointly, in these regressions.

[21] Appendix A1, which provides detailed information on the experiment, is organized as follows. Section A1.1 provides detailed information on each of the résumé characteristics; Section A1.2 provides examples of the résumés that were submitted to the job advertisements (with sensitive information suppressed); and Section A1.3 details the process through which applications were submitted.

field" (or "industry-relevant") internship that lasted for three months during the summer (2009) prior to graduating with their Bachelor's degrees (May 2010).[22] In our context, "in field" means that the internship matches the industry or job category. For example, internship experience is working as a(n) "Equity Capital Markets Intern" in the banking job category; "Financial Analyst" in the finance job category; "Insurance Intern" in the insurance job category; "Project Management Intern" or "Management Intern" in the management job category; "Marketing Business Analyst Intern" in the marketing job category; and "Sales Intern" or "Sales Future Leader Intern" in the sales job category. Internship experience and college majors are assigned independent of each other.

While the majority of résumé characteristics are randomly assigned, there are some features of the experiment that are held constant: (*i*) all of the fictitious job seekers graduated in May 2010; (*ii*) the fictitious job seekers have one job after graduating from college; (*iii*) résumés were submitted to job openings in business-related fields; and (*iv*) résumés were submitted to job openings in seven cities (See first paragraph of this section). These restrictions on the experimental design were imposed because the data from this study were collected to answer other research questions in addition to the subject of this study.

We focus on recent college graduates because it is well documented this group had a particularly difficult time finding employment during and immediately following the Great Recession (Spreen, 2013) and, conditional on finding a job, employment commensurate with their education level (Abel et al., 2014). In Nunley et al. (2015a,b), we examine the effects of unemployment (spells of 3, 6 and 12 months) and underemployment (working at a job below one's education level) on employment prospects, finding no statistical evidence of negative duration dependence[23] and a strong negative effect associated with underemployment. In addition, we simplified the work histories of our fictive applicants in an effort to study racial discrimination, as shorter and simpler work histories help in sorting out the mechanism through which racial discrimination operates (see Nunley et al. (2015a,b)). Lastly, we apply exclusive to job openings in business-related industries to study how mismatch in qualifications affects employment prospects (e.g., nonbusiness degrees, underemployment). The seven cities we chose for our experiment are large metropolitan areas that span all regions of the United States (i.e. the northeast, southeast, southwest, northwest and midwest regions).

We measure employment opportunities by examining whether an applicant receives a request for an interview from a prospective employer, which follows other researchers who use the résumé-audit framework (Baert et al., forthcoming; Bertrand and Mullainathan, 2004; Carlsson and Rooth, 2007; Eriksson and Rooth, 2014; Kroft et al., 2013; Lahey, 2008; Oreopoulos, 2011). We consider contact from a prospective employer an interview request when they call or email to schedule an interview and/or discuss the job opening in more detail. While the majority of the calls/emails received from employers are classified as interview requests, there are a few instances in which the proper way to code the inquiry from employers was unclear.[24] However, our estimates are not sensitive to ways in which these questionable calls/emails are treated.

Although using interview requests as an outcome variable has limitations, the receipt of an interview request is a necessary step to obtain employment. Lanning (2013) develops a search model calibrated with data from prominent résumé-audit studies combined with nationally-representative survey data, and he demonstrates that differences in callback/interview rates can translate into large differences in employment and earnings. Thus, it appears the initial step in the interview process is an important determinant of subsequent labor-market outcomes.

To gain insight into the interview rates for (a) business and nonbusiness majors and (b) applicants with and without internship experience, we present the average interview rates for all applicants and for each group in Table 2. The overall interview rate is about 16% (column 1); the interview rates for business and nonbusiness majors (columns 2 and 3) range from 16 to 17%; and the interview rate for applicants with internship experience is higher than that for those without internship experience (18.4 versus 16.1%).

4. Results

We begin by estimating the returns (in terms of interview requests) generated by business degrees and internship experience.[25] Formally, we estimate the following regression model:

$$interview_{imcfj} = \beta_0 + \beta_1 bus_i + \beta_2 intern_i + \mathbf{X}_i'\theta + \phi_m + \phi_c + \phi_f + \phi_j + u_{imcfj}. \quad (1)$$

The subscripts *i*, *m*, *c*, *f*, and *j* index applicants, months, cities, job categories/industries and job advertisements, respectively. The variable *interview* is a zero–one indicator equal to one when an applicant receives an interview request and zero otherwise; *bus* is a zero–one indicator that equals one when an applicant is assigned a business degree (i.e. accounting, economics, finance, management or marketing) and zero otherwise;[26] *intern* is a zero–one indicator equal to one when an applicant is assigned an industry-specific internship and zero otherwise; **X** is a vector of résumé controls;[27] ϕ_m, ϕ_c, ϕ_f and ϕ_j represent intercept terms for the month the résumé was submitted, the city where the résumé was submitted, the job category/industry in which the job advertisement fits (i.e. banking, finance, insurance, management, marketing and sales), and the job advertisement, respectively; and *u* represents unobserved determinants of the dependent variable not accounted for in Eq. (1). The β_0, β_1, β_2 and θ are parameters to be estimated. The random assignment of business majors and internship experience to fictitious job seekers implies the variables *bus* and *intern* are assigned independent of the error term in Eq. (1). Thus, the estimate for β_1 gives the causal average difference in the interview rate between business and nonbusiness majors, and the estimate for β_2 gives the average causal difference in the interview rate between applicants with and without internship experience. Although we interpret the estimates as causal effects, we must rely on existing theory to determine the channel through which business degrees and internship experience affect employment prospects. We return to this issue toward the end of this section.

Six columns of estimates are presented in Table 3, which vary based on the control variables held constant. The successive addition of right-

[22] While our IRB will not allow us to disclose their specific identities, the companies our applicants worked for as interns are nationally recognized firms.

[23] Kroft et al. (2013), Oberholzer-Gee (2008) and Eriksson and Rooth (2014) tests for negative duration dependence using data from résumé audits. These studies report, for the most part, evidence of negative duration dependence.

[24] Seventeen calls/emails, in particular, were difficult to classify in the "interview" or "non-interview" categories. These unclear "callbacks" consisted of employers asking whether the applicants were interested in other positions; requesting salary requirements; asking whether the applicants were interested in part- or full-time work; and inquiring about location preferences. In addition, there were 108 "callbacks" in which all four applicants that were submitted to an advertisement received a call/email from employers. These 108 cases could be due to an automated response, or such callbacks could be non-discriminatory. Our estimates are not sensitive to the ways in which these 125 employer responses are coded.

[25] All regression models are estimated as linear probability models. However, we check the robustness of the marginal effects by estimating logit/probit specifications, and we find similar results. In addition, standard errors are clustered at the job-advertisement level in all model specifications, which follows other studies based on data from résumé audits (e.g., Lahey, 2008; Neumark, 2012).

[26] As a robustness check, we estimate Eq. (1) with economics included in the nonbusiness degree, as students in business and liberal studies often take economics courses as a part of their major. In addition, some economics departments are housed in nonbusiness colleges/schools. However, it is likely that the prospective employers in our sample view economics as a business-related degree. In any case, the estimates are not sensitive to this alternative coding of the *bus* variable.

[27] Detailed information on the résumé attributes is provided in Section 3 and Appendix Section A1.

Table 2
Average interview rates.

	Overall	Business majors	Nonbusiness majors	With internship experience	Without internship experience
	(1)	(2)	(3)	(4)	(5)
Interview rate	16.6%	17.0%	16.2%	18.4%	16.1%
Observations	9396	5189	4207	2335	7061

hand-side control variables is a useful means to gauge the sensitivity of the estimates. In column 1, we present estimates from a regression model that includes none of the controls listed in Eq. (1). In columns 2–6, we successively add the controls listed in Eq. (1) (i.e. **X**, ϕ_m, ϕ_c, ϕ_f, and ϕ_j). The estimates for β_1 and β_2 are stable as control variables are successively added to the regression models. The stability of the estimates provides additional support that the randomization of résumé credentials was effective. We find no statistical evidence linking business degrees to interview rates, despite applying exclusively for jobs in business-related job categories. Furthermore, the sizes of the estimated differentials in interview rates between business and nonbusiness majors are small (i.e. less than one-half of a percentage point). By contrast, we find strong evidence that internship experience increases interview rates. Applicants with internship experience are 14% (2.2 percentage points) more likely to receive an interview request that those without internship experience.[28]

The estimates presented in Table 3 suggest business degrees do not materially affect employment prospects. However, it is possible that particular business degrees yield better job opportunities than particular non-business degrees. Our next specification examines this possibility. Formally, we estimate the following regression equation:

$$interview_{imcfj} = \beta_0 + \beta_1 actg_i + \beta_2 bio_i + \beta_3 econ_i + \beta_4 eng_i + \beta_5 fin_i + \beta_6 hist_i + \beta_7 mgt_i + \beta_8 mkt_i + X_i'\theta + \phi_m + \phi_c + \phi_f + \phi_j + u_{imcfj}. \quad (2)$$

The subscripts *i*, *m*, *c*, *f* and *j* and the variables *interview*, **X**, ϕ_m, ϕ_c, ϕ_f, ϕ_j and *u* are defined in Eq. (1). The variables *actg* (accounting), *bio* (biology), *econ* (economics), *eng* (english), *fin* (finance), *hist* (history), *mgt* (management) and *mkt* (marketing) are zero–one indicator variables that equal one when an applicant is assigned the particular undergraduate degrees and zero otherwise. The base category in Eq. (2) is *psych* (psychology).

Table 4 presents the estimated interview differentials between each non-business degree and each business degree.[29] Rather than comment on each of the estimates, it is sufficient to note that none of the particular business majors give job seekers an advantage, at least statistically, over the particular nonbusiness majors. Although the estimated differences are not statistically significant, economic significance could be argued for a few of the estimated interview differentials. In particular, finance majors have a 1.9 (column 3, row 1) and 2.3 (column 3, row 3) percentage point higher interview rates than biology and history majors, respectively. Additionally, economics majors have a 2.1 percentage point higher interview rate than history majors (column 2, row 3). The remaining estimated interview differentials presented in Table 4 are small in an economic sense. Because we find that particular business degrees do not generate markedly higher interview rates, we return to analyzing business degrees in general in the next and subsequent econometric specifications.[30]

Because the return to internship experience could depend on whether applicants possess business or nonbusiness degrees, we augment Eq. (1) by adding an interaction term between *bus* and *intern*. Thus, we estimate the following regression model:

$$interview_{imcfj} = \beta_0 + \beta_1 bus_i + \beta_2 intern_i + \beta_3 bus_i \times intern_i + \mathbf{X}_i'\theta + \phi_m + \phi_c + \phi_f + \phi_j + u_{imcfj}. \quad (3)$$

The subscripts *i*, *m*, *c*, *f* and *j* and variables *interview*, *bus*, *intern*, **X**, ϕ_m, ϕ_c, ϕ_f, ϕ_j and *u* are defined in Eq. (1). We are interested in a number of different parameters and linear combinations of parameters from Eq. (3), including the average difference between business and nonbusiness majors with internship experience ($\beta_1 + \beta_3$), the average difference between business and nonbusiness majors without internship experience (β_1), the average difference between job seekers with and without internship experience who have business degrees ($\beta_2 + \beta_3$), and the average difference between job seekers with and without internship experience who have nonbusiness degrees (β_2). In addition, the estimate for β_3 is of interest, as it tests whether the "return" to internship experience differs between business and nonbusiness majors.

The estimates for each of the aforementioned parameters and linear combinations of parameters are presented in Table 5. For applicants with and without internship experience, business and nonbusiness majors receive interview request rates that are not statistically different from one another. However, the signs of the estimated interview differentials differ: business majors with internship experience tend to receive fewer interview requests than nonbusiness majors with internship experience (column 1), while business majors without internship experience tend to receive more interview requests than nonbusiness majors without internship experience (column 2). The return to internship experience differs between nonbusiness and nonbusiness majors (columns 3 and 4). However, both business and nonbusiness majors with internship experience have higher interview rates than their counterparts who did not work as interns. In particular, relative to nonbusiness majors without internship experience, nonbusiness majors with internship experience have a 19% higher probability of receiving an interview request. In comparison to business majors without internship experience, business majors with internship experience have an 8% higher probability of receiving an interview request. The difference between the estimates in columns 1 and 2 (and, equivalently, columns 3 and 4), which tests whether the return to internship experience is statistically different for business and nonbusiness majors, is negative, but it is not statistically significant at conventional levels (column 5). However, an argument can be made for economic significance, as the estimate

[28] In Appendix Table A3, we present estimates from an augmented version of Eq. (1) by including a set of interaction terms between *intern* and ϕ_f, which allows us to test whether the return to internship experience varies across industries. Overall, we find the economic impact of internship experience is smallest in the banking and marketing industries, as we find null effects in those industries. By contrast, the returns to internship experience are economically large (between 2.6 and 3.0 percentage points) in the finance, insurance, management and sales job categories.

[29] It should be pointed out that *intern* is in the vector **X** in Eq. (2). We omit the estimated effects of internship experience because the point estimate is identical to that presented in Table 3.

[30] In Appendix Tables A4 and A5, we present estimates from Eq. (2) that test for differences in interview rates between particular business degrees (e.g., marketing versus management) (Appendix Table A4) and particular nonbusiness degrees (e.g., history versus biology) (Appendix Table A5). In Appendix Table A6, we present estimates on the impact of majoring in a degree program that matches the industry of the prospective employer (e.g., economics and finance "match" the banking and financial industries). In Appendix Tables A4, A5 and A6, we continue to find no statistical evidence linking particular majors to better (or worse) job opportunities.

Table 3
Business degrees, internships, and job opportunities.

	(1)	(2)	(3)	(4)	(5)	(6)
Business Degree	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)	0.003 (0.007)
Internship Experience	0.023*** (0.006)	0.022*** (0.006)	0.022*** (0.006)	0.022*** (0.006)	0.023*** (0.006)	0.022*** (0.006)
Controls:						
Résumé	No	Yes	Yes	Yes	Yes	Yes
Month	No	No	Yes	Yes	Yes	Yes
City	No	No	No	Yes	Yes	Yes
Industry	No	No	No	No	Yes	Yes
Advertisement	No	No	No	No	No	Yes
R^2	0.001	0.006	0.008	0.019	0.045	0.724
Observations	9396	9396	9396	9396	9396	9396

Notes: Estimates are marginal effects from linear probability models. Standard errors clustered at the job-advertisement level are in parentheses. *** indicates statistical significance at the one-percent level. To produce the estimates presented, we estimate Eq. (1). However, the estimates in columns (1)–(6) differ based on the control variables that are held constant in regression model. In column (1), we estimate a simple regression model that include no control variables; column (2) adds controls for the résumé characteristics (See Table 1); column (3) adds controls for the month in which the applications were submitted; column (4) adds controls for the city in which the applications were submitted; column (5) adds controls for the job category that describes the opening; and column (6) adds controls for the job advertisement.

Table 4
Differences between particular business and non-business degrees.

	Comparison group				
	Accounting	Economics	Finance	Management	Marketing
	(1)	(2)	(3)	(4)	(5)
Biology	−0.005 (0.013)	−0.018 (0.014)	−0.019 (0.013)	−0.010 (0.013)	−0.003 (0.014)
English	0.009 (0.013)	−0.004 (0.014)	−0.005 (0.013)	0.004 (0.013)	0.014 (0.014)
History	−0.008 (0.014)	−0.021 (0.014)	−0.023 (0.014)	−0.013 (0.014)	−0.000 (0.014)
Psychology	0.013 (0.013)	−0.004 (0.014)	−0.002 (0.014)	0.008 (0.013)	0.017 (0.014)

Notes: Estimates are marginal effects from linear probability models. Standard errors clustered at the job-advertisement level are in parentheses. Each column of estimates uses a different business degree as the base category (e.g., column 1 uses Accounting as the base category, column 2 uses economics as the base category, and so on). The estimates in columns (1)–(5) are based on Eq. (2), which uses the full set of control variables (i.e. the résumé characteristics and the dummy variables for the month, city, job category and job advertisement) and full sample of 9396 observations.

indicates that the return to internship experience is 11% lower for business majors than it is for nonbusiness majors.[31]

For signaling and human capital models, the returns to business degrees and internship experience should be greater for applicants with more innate ability. In our experiment, a portion of the fictitious job seekers report a high grade point average of 3.9 GPA on their résumé, which is a proxy for high academic ability. As a way to check whether the predictions of the signaling and human capital models are supported by our data, we estimate a regression model that includes interaction terms between business degrees and high academic ability and internship experience and high academic ability. Formally, we estimate the following regression model:

$$interview_{imcfj} = \beta_0 + \beta_1 bus_i + \beta_2 intern_i + \beta_3 gpa_i + \beta_4 bus_i \times gpa_i + \beta_5 intern_i \times gpa_i + \mathbf{X}_i'\theta + \phi_m + \phi_c + \phi_f + \phi_j + u_{imcfj}. \quad (4)$$

The subscripts i, m, c, f and j and variables bus, $intern$, $\mathbf{X}$, ϕ_m, ϕ_c, ϕ_f, ϕ_j and u are defined in Eq. (1). The variable gpa is a zero–one indicator that equals one when an applicant is assigned a high grade point average and zero otherwise, and $bus \times gpa$ and $intern \times gpa$ are interaction terms. From Eq. (3), we are interested in whether the "return" to business degrees and internship experience depends on the academic ability of applicants. In particular, we present estimates for the following estimated parameters and linear combinations of parameters in Table 6: β_1 and β_2 (column 1), $\beta_1 + \beta_4$ and $\beta_2 + \beta_5$ (column 2), and β_4 and β_5 (column 3). Table (4) is divided into two panels of estimates. Panel A presents the estimates for the differentials between business and nonbusiness majors, and Panel B presents the estimates for applicants without and with internship experience.

From Panel A of Table 6, the interview rates of business majors and nonbusiness majors are not statistically different from one another, regardless of whether a high grade point average is signaled (columns 1 and 2). The test for whether the impact of high academic ability differs between business and nonbusiness majors indicates no statistical evidence of an interview differential (column 3). From Panel B of Table 6, applicants with internship experience have higher interview rates than those without internship experience both without (column 1) and with (column 2) a high GPA. These estimated differentials are statistically significant at the 10- and one-percent levels, respectively. The return to internship experience is markedly higher for those who signal a high GPA (28% higher interview rate) than it is for those who do not signal a high GPA (8% higher interview rate). The greater return to internship experience for applicants who report a high GPA is also statistically different from that of applicants who do not report a high GPA.

The estimates presented in Tables 3, 4, 5 and 6 indicate that business degrees do not affect employment prospects in business-related occupations. By contrast, the return to internship experience is positive and significant in an economic and statistical sense. The return to internships is larger for nonbusiness majors and applicants who report high academic ability. The strong positive link between internships and employment opportunities warrants further attention, as it is important from a policy and theoretical perspective to determine whether internships signal unobservables, such as innate ability, or augment skill-sets. The estimates presented in Tables 3, 5 and 6 regarding the impact of internship experience on employment prospects are reconcilable with both signaling and human-capital models.

Our strategy to shed light on the mechanism through which internships affect employment opportunities is to estimate a regression model that interacts pre- and post-graduation industry-relevant work experience. In the context of this specification, a signaling interpretation could be justified if the returns to pre-graduation industry-relevant internship experience do not depend on post-graduation industry relevant work experience and the returns to post-graduation industry-relevant work experience do not depend on pre-graduation industry-relevant internship experience. By contrast, one could not reject the human-capital model in the event that there is a positive interaction effect between pre- and post-graduation industry-relevant work experience. A second way to examine the signaling hypothesis is to examine the relative returns to pre- and post-graduation industry-relevant experience. In particular, finding that industry-relevant internship experience provides a greater return (at the margin) than industry-relevant work experience would be indicative of signaling, as the internships occurred about four years prior to the date of application and the

[31] In Appendix Tables A7, A8 and A9, we present estimates based on an augmented version of Eq. (3), which replaces business degrees in general with the full set of specific college majors and interacts those variables with the internship-experience indicator. With this specification, we are able to test whether the return to internship experience varies across particular college majors. It is important to point out that the standard errors for the estimates are quite large. The inflated standard errors are due to the relatively small numbers of observations in the cells of interest. However, the size of the estimated interview differentials has the potential to be informative. Overall, the patterns in the data are somewhat nuanced. However, we can conclude from Appendix Table A7 that the overall greater return to internship experience realized by nonbusiness majors is driven primarily by relatively larger returns received by history and psychology majors (as opposed to biology and English majors).

Table 5
Returns to internship experience for business and nonbusiness majors.

	Business versus Nonbusiness majors		Internship versus No internship experience		Difference in return to internship experience between business and nonbusiness majors
	With internship	Without internship	Business majors	Nonbusiness Majors	
	(1)	(2)	(3)	(4)	(5)
Difference in interview rate	−0.010	0.008	0.014*	0.032**	−0.018
	(0.013)	(0.007)	(0.009)	(0.011)	(0.015)
Parameters and linear combinations of parameters	$\beta_1 + \beta_3$	β_1	$\beta_2 + \beta_3$	β_2	β_3

Notes: Estimates are marginal effects from linear probability models. Standard errors clustered at the job-advertisement level are in parentheses. * and *** indicate statistical significance at the 10- and one-percent levels, respectively. The estimates in columns (1)–(5) are based on Eq. (3), which uses the full set of control variables (i.e. the résumé characteristics and the dummy variables for the month, city, job category and job advertisement) and full sample of 9396 observations.

Table 6
Business degrees, internship experience and grade point average.

	High GPA not signaled	High GPA signaled	High GPA signaled versus high GPA not signaled
	(1)	(2)	(3)
Panel A: *Business degrees*			
Difference in the interview rate	0.003	0.006	0.003
	(0.007)	(0.013)	(0.014)
Parameter or linear combination of parameters	β_1	$\beta_1 + \beta_4$	β_4
Panel B: *Internship experience*			
Difference in the interview rate	0.013*	0.048***	0.035*
	(0.007)	(0. 015)	(0.018)
Parameter or linear combination of parameters	β_2	$\beta_2 + \beta_5$	β_5

internships only lasted for three months whereas post-graduation industry-relevant experience ranges from 20 to 38 months and is more recent.[32]

Formally, we estimate the following regression model:

$$interview_{imcfj} = \beta_0 + \beta_1 intern_i + \beta_2 infield_i + \beta_3 intern_i \times in\,field_i + \mathbf{X}_i'\theta + \phi_m + \phi_c + \phi_f + \phi_j + u_{imcfj}. \quad (5)$$

The subscripts i, m, c, f and j and variables *intern*, $\mathbf{X}$, ϕ_m, ϕ_c, ϕ_f, ϕ_j and u are defined in Eq. (1). The variable *infield* is a zero–one indicator that equals one when an applicant is assigned industry-specific work experience after graduation and zero when the applicant is assigned out-of-industry work experience after graduation, and *intern* × *infield* is an interaction term. From Eq. (5), we present the following parameters and linear combinations of parameters in Table 7: β_1 (column 1), $\beta_1 + \beta_3$ (column 2), β_2 (column 3) and $\beta_2 + \beta_3$ (column 4). From Table 7, the return to internship experience does not depend on the type of work experience obtained after graduation, as evidenced by identical percentage point differences in the interview rates between applicants with out-of-field work experience (column 1) and those with in-field work experience (column 2). Moreover, the return to post-graduate in-field work experience does not depend on whether the applicant had prior work experience as an undergraduate student, as the percentage point differences in the interview rates are identical (columns 3 and 4). The estimates presented in Table 7 are supportive of a signaling interpretation, as there is no interaction effect between internship experience and post-graduation work experience, which are both industry-relevant, and the return to a three-month internship that took place about four years prior generates about 55% of the return to industry-relevant work experience that is lengthier in duration and more recent.[33]

5. Summary and conclusions

We use experimental data from a résumé audit to assess the impact of different college majors and internship experience on job opportunities, which are measured via interview requests from prospective employers. Despite applying exclusively to business-related jobs, we find no statistical evidence linking business degrees in general or particular business degrees to better job opportunities. However, we find strong evidence that industry-relevant internship experience has a large, positive effect on employment opportunities. Job seekers with internship experience, obtained while completing their college degree, have interview rates approximately 14% higher than those without internship experience. The positive effects of internship experience are greater for those who obtain nonbusiness degrees and indicate a high academic ability on their resume (signaled via a high grade point average).

It is unclear why business degrees do not translate into better job opportunities, given that we applied exclusively to business-related job openings. We put forward four explanations for the null effects. First, the fictive applicants in our experiment completed their Bachelor's degrees approximately three years prior to submitting their résumés to the job openings. Thus, business degrees might matter for initial job placement, but their effects fade over a short period of time. Second, business and nonbusiness students take about 40% of their coursework from general education categories in the United States. Even for business students, about 60–70% of the coursework is taken in areas outside of their major. Hence, it is possible a business degree does not provide the requisite skill in a particular subject area to affect hiring. Third, nonbusiness majors applying for business-related jobs may send a strong, positive signal. Perhaps nonbusiness majors who apply for business-related jobs possess unobservables, on average, that employers value, such as ability, motivation, and/or general skills (e.g., communication and critical thinking). Indeed, statistics from the National ACT Profile Report for the graduating class of 2011 indicate that the ACT scores, which could proxy for cognitive ability, of students who planned to major in business are lower than those in most nonbusiness fields (http://www.act.org/newsroom/data/2011/pdf/profile/National2011.pdf, Table 4.1). Fourth, non-business degree holders earn less on average in business occupations, making it possible that some employers prefer to hire nonbusiness majors over business majors for entry-level positions in an effort to reduce costs.

[32] Note that the variation in months worked after graduation stems from the random assignment of different unemployment spells, either immediately after graduation or at the time of application, to the fictive applicants.

[33] We present the main effects from Eqs. (3), (4) and (4) in Appendix Table A10. The main effects from Eq. (2) are omitted from Appendix Table A10, but these estimates are available upon request.

Table 7
Returns to pre-graduation and post-graduation work experience.

	Returns to internship experience		Returns to infield experience	
	With out-of-field experience	With infield experience	Without internship	With internship
	(1)	(2)	(3)	(4)
Difference in the interview rate	0. 022**	0.022**	0.040***	0.040***
	(0.009)	(0.010)	(0.007)	(0.012)
Parameters and linear combinations of parameters	β_1	$\beta_1 + \beta_3$	β_2	$\beta_2 + \beta_3$

Notes: Estimates are marginal effects from linear probability models. Standard errors clustered at the job-advertisement level are in parentheses. ** and *** indicate statistical significance at the five- and one-percent levels, respectively. The estimates in columns (1)–(5) are based on Eq. (5), which uses the full set of control variables (i.e. the résumé characteristics and the dummy variables for the month, city, job category and job advertisement) and full sample of 9396 observations.

The empirical evidence supporting a positive link between industry-relevant internship experience and employment prospects is potentially policy-relevant, as the government could incentivize firms to offer internships and/or universities to work more closely with employers to facilitate internships. These interventions could be justified if internships help the transition from school to work for young college graduates, a group which has had a difficult time finding employment commensurate with their education during and following the Great Recession. However, it is important to determine whether internship experience signals unobservables or augments a worker's human capital. If internship experience simply signals innate, unobserved ability, a government intervention that boosts the demand for interns could muddle the effectiveness of the signal, which would make sorting and ranking job candidates more difficult for employers. However, it is possible to justify government interventions designed to increase the availability of internships if they improve employer–employee matching and/or enhance worker productivity.

Four aspects of our experiment support signaling as the mostly likely explanation for our findings. First, there is no evidence of a positive interaction effect between internship experience and post-graduation work experience, which are both industry-relevant. The absence of a positive interaction effect contests a human-capital explanation, as one would expect both types of industry-relevant work experience to complement each other. Second, post-graduation, industry-relevant work experience only generates about two times the return associated with industry-relevant internship experience. The internships lasted only three months and occurred about four years prior to the application date, whereas the industry-relevant post-graduation work experience lasted from 20 to 38 months and is more recent. Third, the human capital gained from an internship completed approximately four years prior to application probably would have substantially depreciated by the time the fictive applicants submit their résumés to job openings. Fourth, we analyze the initial stage of the hiring process, in which job seekers attempt to make themselves attractive to employers and employers search for characteristics that help them sort and rank applicants.

Although our experimental data suggests signaling is the channel through which internships affect employment probabilities, it is important to qualify our findings. First, résumé audits are limited because (a) the entire pool of applicants for any specific job advertisement is unobserved; (b) the complete interview process is unobserved; and (c) subsequent wage offers are unobserved. Second, it is impossible to differentiate between the different types of signaling that could be driving our results, as internships could improve job matching or simply signal ability and motivation. Third, it is possible signaling is important in the initial phase of hiring (i.e. the decision to extend an interview opportunity), but that skill-sets are a more important part of the interview phase. One key estimation problem to overcome for future research is heterogeneity of internships, as in the literature on apprenticeships (e.g., Adda et al., 2013; Fersterer et al., 2008). There are likely important interaction effects between degree choice, internship experience, and other extra-curricular activities that could also be captured in future studies.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.labeco.2015.11.002.

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