

The Effect of Post-Baccalaureate Certificates on Job Search: Results from a Correspondence Study*

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Abstract

This paper tests how employers perceive the value of post-baccalaureate business certificates using a correspondence study. We randomly assign a post-baccalaureate certificate to fictitious résumés and apply to real vacancy postings for managerial, administrative and accounting assistant positions in several large cities on multiple large online job boards. We find no significant difference in callback rates between the non-certificate and certificate résumés. The 95 percent confidence interval is (-.0105, .0111) with a baseline callback rate of 9.0 percent. If we restrict our sample to only include certificates from extremely competitive schools, we still find insignificant results (.07 percentage point decrease in callbacks), indicating our result is not driven by having some less selective certificate schools in our sample.

JEL Classification: I21, I23, J23.

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1 Introduction

Post-baccalaureate certificates have experienced a substantial growth of 174 percent between 2000 and 2015¹. Based on data from the Delta Cost Project at American Institutes for Research the number of post-baccalaureate certificates awarded has increased from under 15,000 in 2000 to just under 40,000 in 2015. Despite this growth, there is a lack of causal evidence on the labor market impacts of these programs. In fact, schools are not even required to post completion rates or information about labor market outcomes of enrollees. Certificate programs are not eligible for Title IV federal financial aid which mean none of the regulations associated with eligibility to receive Title IV financial aid apply.²

These programs can be costly to students. For example, in 2018, Rutgers School of Business - Camden states that each course for the certificate will be billed at normal tuition rates and an additional \$70 application fee applies³. The University of North Carolina Greensboro website says the certificate takes 12-15 credit to complete and if a student enrolls in 6 credits in the semester it would cost an in-state student \$2,871.48 per semester and an out-of-state student \$6,906.18 per semester during the 2017-2018 academic year. Providing no data on expected benefits could result in students making sub-optimal enrollment decisions. Without evidence on which students benefit the most from these programs, school are unable to target those most likely to gain from enrolling.

For background information on business certificates specifically, we spoke with someone who works in a business school at a large research university. Business certificates are aimed at students who majored in fields not related to business as undergraduates. Often, the business certificate is a way to try out whether an MBA program is a good fit for the student, as some of the courses can potentially transfer over to an MBA program. There is variation in how long students wait after graduating with a bachelor's degree to enroll. Most

¹Post-baccalaureate certificates are interchangeable with the following terms: graduate certificate, graduate diploma, certificate of graduate study (COGS), certificate of advanced graduate study (CAGS) and professional development program.

²Anecdotal evidence suggests that many schools do not even collect data for themselves.

³<https://business.camden.rutgers.edu/pmac/postbafaq/>

enrollees are working full-time or are full-time students in degree granting programs.

Notwithstanding the increasing popularity, there are concerns about the perceived usefulness of graduate certificates. The first concern pertains to the lack of a clear definition of a post-baccalaureate certificate (Houston and Marksby (2003)). The term “degree” – associate’s, bachelor’s, master’s or doctor’s – is used to recognize a study over known time, known depth (subjects studied) and known standards while the term “certificate” is less clear in its meaning. This lack of standardization is further exacerbated by the lack of quality control in the market for certificates. Due to the profitability of such programs the field has attracted numerous for-profit firms and encouraged aggressive marketing of certificate programs. Deming et al. (2012) look at outcomes of for-profit students and find that they are more likely to complete short-term programs like pre-baccalaureate certificates but have higher unemployment and lower earnings six years after entering the program. Deming et al. (2016) use a correspondence study to find that for people applying for health care related jobs that have no pre-baccalaureate certificate requirement, having a pre-baccalaureate certificate from a for-profit college decreases the likelihood of a callback compared to having a pre-baccalaureate certificate from a public institution. Thus, if students are getting credentials from for-profit schools, they may have little value in the labor market.

On the other hand, post-baccalaureate certificates could augment human capital which should improve labor market outcomes. Also, post-baccalaureate certificates may work as a signal in the labor market that the worker is more productive than a similar worker without a certificate. Gaulke (2017) shows that people who enroll in post-baccalaureate off-the-job training are quite different from those who do not enroll. Using both multinomial logit and multinomial probit, she finds that higher Armed Services Vocational Aptitude Battery (ability) scores significantly increase the odds of off-the-job training versus no post-baccalaureate training. Additionally, people may use the certificate to signal to employers that they wish to change occupations. The post-baccalaureate certificate could also send a negative signal if it is viewed as a consolation prize to not getting an MBA.

To address the concern that people who self-select into the post-baccalaureate certificate program are different from those who do not, this paper uses a correspondence study.⁴ Using fictitious résumés allows us to control for observable characteristics while randomly assigning whether a candidate has a post-baccalaureate certificate or not. This allows us to estimate a causal impact of post-baccalaureate business certificates on callbacks.

We find causal evidence that post-baccalaureate business certificates do not significantly increase the likelihood of a callback for an interview. The point estimate is .0003 and the baseline callback rate is 9.0 percent. While our sample includes a range of selectivity in terms of the school the certificate is from, our results still hold if we restrict the sample to extremely selective institutions only (Ivy League and other very highly ranked schools). In this case, we find that having a post-baccalaureate business certificate results in a .07 percentage point decrease in the likelihood of receiving a callback, although the decrease is not statistically significant. Thus, the null finding is not driven by students getting certificates from less selective institutions. This study can not speak to other outcomes that may be affected by certificates such as wages or promotions. Thus, there may be benefits on those margins from completing a post-baccalaureate business certificate.

The remainder of the paper proceeds as follows. In Section 2, we give more detail on the related literature. In Section 3, we describe the experimental design. Section 4 reports the results and interpretation. Section 5 concludes.

2 Related Literature

Given that post-baccalaureate business certificate courses can sometimes count towards MBA programs, this paper relates to the literature on the returns to MBA programs. [Arcidiacono et al. \(2008\)](#) finds that the returns are lower for women than for men while [Montgomery and Powell \(2003\)](#) finds no differences in the return by gender. Additionally, [Arcidiacono et al. \(2008\)](#) find that controlling for individual fixed effects largely reduces the returns for

⁴The experimental protocol was reviewed and approved by the Institutional Review Board at Kansas State University. This study is registered in the AEA RCT Registry and the unique identifying number is: AEARCTR-0001992

top MBA programs, while the return actually increases for less selective MBA programs when individual fixed effects are included. [Grove and Hussey \(2011\)](#) look at variation in the returns to MBA programs by field of concentration and find the returns to finance and management information systems are twice as large. There has also been research exploring how much of the wage premium is due to human capital accumulation versus signally/screening. [Hussey \(2012\)](#) states that while human capital is part of the story, the majority of the gains are due to the signalling effect.

While there has been a paucity of work related to post-baccalaureate certificates, research on the labor market effects of pre-baccalaureate certificates has been done both nationally and at the state level⁵. Findings at the national level are mixed in terms of whether wage premiums exist. Papers using the National Longitudinal Study of the High School Class of 1972 or National Adult Literacy Survey found certificates yield zero returns ([Grubb \(1995\)](#), [Hollenbeck \(1993\)](#), [Rivera-Batiz \(1998\)](#) and [Surette \(1997\)](#)). Meanwhile, research using Survey of Income and Program Participation data indicate significant returns to pre-baccalaureate certificates ([Grubb \(1995\)](#) and [Ryan \(2005\)](#)). Studies using more recent longitudinal surveys from the US Department of Education ([Bailey et al. \(2004\)](#) and [Marcotte et al. \(2005\)](#)) have led to a lack of a consistent finding. Concerns about this strand of literature are due to small sample sizes and a lack of data on program length which likely impacts labor market returns ([Bosworth \(2010\)](#)).

In contrast to national level studies, papers that use state level administrative data (i.e. unemployment insurance records) are more consistent, although still suffer from the endogeneity issue. Some of these studies provide information on the value of programs by length and field of study ([Bosworth \(2010\)](#)). Certificate attainment overall has a positive correlation with earnings (for example, see [Friedlander \(1996\)](#) for California and [Jepsen et al. \(2014\)](#) for Kentucky). Field of study is a key determinant of labor market returns of certificates. [Jacobson and Mokher \(2009\)](#) show that, in Florida, median earnings of certificate holders

⁵Pre-baccalaureate certificates are awarded to those individuals with at least a high school diploma, but less than a baccalaureate degree by community colleges, technical institutes, proprietary and vocational schools.

approximate or even surpass median earnings for associate degree holders (especially those in pre-baccalaureate non-occupational fields who do not leverage their associate’s degree into a bachelor’s degree). With administrative data providing information about program length and program of study, researchers have found that long-term certificates are more valuable in the labor market than short-term certificates. In addition to wage benefits, [Jepsen et al. \(2014\)](#) also show that certificates were found to contribute positively to the probability of employment.

Even with administrative data, self-selection concerns have hampered the ability to make causal conclusions. More recently, research on the effects of education credentials on the labor market outcomes of workers have used résumé-based correspondence studies to circumvent these problems. In these field experiments, researchers prepare fictitious résumés and apply to real jobs online. The characteristics of job applicants including academic credentials are randomly assigned in the résumé so that on average, the résumés are identical except for their assignment of education attainment. [Darolia et al. \(2015\)](#) and [Deming et al. \(2016\)](#) use this method to examine how employers value job applicants with pre-baccalaureate certificates (or degrees) from for-profit colleges. The former does not show any significant effect of pre-baccalaureate certificates while the latter find that employers hiring for health jobs with no certificate or license requirements (primarily medical assistant jobs) strongly prefer applicants with pre-baccalaureate certificates from public institutions, compared with applicants with a for-profit pre-baccalaureate certificate or no credential at all.

3 Experimental Design

The correspondence study has been used to test for hiring discrimination based on race, ethnicity, immigration, gender, sexual orientation and age. Additionally, the method has been extended to identify hiring penalties associated with motherhood, physical unfittness, obesity and criminal record.⁶ The method involves applying to job vacancies by sending

⁶See [Bertrand and Mullainathan \(2004\)](#), [Arai et al. \(2016\)](#), [Arceo-Gomez and Campos-Vazquez \(2014\)](#), [Baert et al. \(2015\)](#), [Carlsson and Rooth \(2007\)](#), [Drydakis and Vlassis, 2010](#) and [Neumark et al. \(2015\)](#), [Correll et al. \(2007\)](#), [Rooth \(2011\)](#), [Rooth \(2009\)](#) and [Pager \(2003\)](#).

equally qualified résumés whose only difference is a characteristic that signals membership to a group. This paper employs this methodology to study how employers respond to a job applicant’s holding of a post-baccalaureate certificate compared to applicants who have none.

While there are benefits to using an experimental design, there are some caveats. By using a correspondence study, we can only compare callback rates and not rates of job offers. However, if people with post-baccalaureate certificates are not getting callbacks for interviews, this provides some information about job offers. There have been some concerns of online job ad coverage in correspondence studies, but [Carnevale et al. \(2014\)](#) report that there is better online job ad coverage among high-skilled, white-collar jobs. Thus, this is much less of a concern in this study since all applicants have college degrees. A 2015 survey by the Pew Research Center ([Smith \(2015\)](#)) found that 79 percent of individuals say they used online resources and information in their latest job search and 34 percent said that was their most valuable resource. Thus, we believe using online jobs postings will not distort our findings.

Our experiment started in January 2017 and ended in December 2017.⁷ Over this period, we surveyed eligible employment ads from multiple online job boards. We prepared a pool of résumés, and for each job ad, we sent a pair of fictitious résumés from our pool to employers. We then measured employers’ responses to our fictitious job seekers’ application.

The first step in our experiment is surveying for eligible job ads. We chose the following occupations: managerial, clerical/administrative assistant and accounting assistant jobs. We targeted these jobs for several reasons. First, according to Neumark, Burn and Button (2015) these types of jobs have similar skill requirements which allows us to easily create suitable generic résumés. Second, there are enough available jobs in online job boards in these fields to conduct a sufficiently powered study. We restricted our experiment to four cities: New York, Los Angeles, Washington DC and San Francisco. These cities were chosen based on

⁷We conducted a pilot study in the fall of 2016 to learn of potential issues and get data for a power analysis.

the size of their labor market (availability of enough job postings) and geographic proximity to certificate granting schools. We chose jobs that allowed direct uploads of résumés to apply. We eliminated any ad where applicants were asked to call or appear in person or that required résumés to be submitted to external websites. We recorded available information about the job, including the date the job ad was posted, position, company name, company address and job requirements (education level and skills required).

The next step is to prepare the résumés. Using the résumé randomizer developed by [Lahey and Beasley \(2009\)](#), we first created our pool of résumés by randomly assigning résumé details, most importantly the treatment/control assignment, to each résumé.⁸ Each résumé in the pool has a corresponding partner résumé and the two of them constitute one pair. Each résumé in the pair either has a post-baccalaureate certificate or none. Résumés that were randomly assigned the post-baccalaureate certificate belong to the treatment group while résumés that were randomly assigned none belong to the control group. For each job ad, a pair of résumés is sent.⁹ By differing the presence of a post-baccalaureate certificate in each of the résumés in each pair, we can identify the effects of post-baccalaureate certificates on the employment prospects of job seekers. The schools that our certificates come from differ in selectivity. Some schools in the sample are Ivy Leagues while other are public four-year schools that are less selective. None of the schools are for-profits and all of the schools have real programs.

All of the résumés in the pool indicated a completion of a bachelor’s degree from a university. To not send any additional signals such as race or religious affiliation we focused on public universities. We further restricted the schools to be ranked by the U.S. News and World Reports as a top fifty to top one hundred and fifty national university. National universities should be well known, and the ranking restriction should reduce variation in callback rates across the university of bachelor’s degree completion. We designed the assign-

⁸We exported these characteristics assignment to a spreadsheet, which was used as input to résumé creation in Microsoft Word using the Mail Merge function.

⁹Accordingly, we applied to 3,140 jobs, although sometimes the job ad was close before the second résumé was sent. However, the order which was sent first was randomized.

ment so that 75 percent of the time, the résumé would be assigned a university from the same state as the location of the position advertised and 25 percent of the time a university outside the state. We also designed the assignment of college major so that the distribution is close to the distribution of majors awarded in national surveys.

Since we targeted jobs that required 1 year or 2 years of experience, we designed the work histories such that the total years of experience was approximately 2 years. Each résumé was designed such that the applicant has only one job and were employed at the time of application. For each type of occupation (i.e. manager, accounting assistant or administrative assistant), their current job was related to the job description. Tenure in the applicant's current (and sole) employment is either one or two years. This, in turn, determined the year of graduation from college. For example, if the résumé was assigned a tenure of two years, the start date of the first job was two years before the current date (when the job application was sent). Details in the skills and the objective career sections were related to the position applied for and were randomly assigned across résumés.

We chose common first names in 1990 and last names that were most likely to signal that the applicant was Caucasian to prevent any name-based employment discrimination from influencing the results. For females, we used Jessica and Lisa. For males, we chose Michael and Robert.¹⁰ We used the phone service Vumber to get two online telephone numbers by city, one for each treatment group. These did not appear any different than regular phone numbers to the employer, but had the benefit that the calls and voicemails were recorded in an online account and no physical phones were required. Residential addresses on the résumés were selected carefully to ensure that they were realistic. We used Zillow.com to get real addresses, but we changed the housing/apartment number/letters to generate fictitious addresses. We created two résumé templates. Templates were randomly assigned to each résumé created. The same template was not used in a pair to prevent the employers from detecting the experiment. For each job ad, the résumé randomizer assigned whether the pair

¹⁰We used one female name and one male name for the treatment group and one female name and one male name for the control group.

would be all male or all female.

Once the résumés were generated, we converted the files to PDF formats. We made sure that the style of the file name differed within pair to minimize chances of detecting the experiment. Appendix 1 provides a sample résumé for each of the treatment groups, where the first page shows a sample résumé of an applicant without a certificate, and the second page an example with a certificate. In sending the résumés, we randomly assigned the order by which the résumés were sent. For each pair, the second résumé is sent at least a day after the first résumé was sent. We recorded the day the résumé was sent in the database. Due to having a gap between when the first and second résumé were sent, some job ads closed before the second one was sent.

We measured whether a given résumé receives a response from potential employers. For each phone, text or e-mail response, we matched the response to the corresponding résumé/job ad pair based on the content of the message left by the employer (name of the applicant, company name, telephone number for contact).¹¹ We defined a callback as a personalized phone or e-mail contact by a potential employer. Usually, the callback was a request for an interview, but employers also contacted applicants asking for more information or stated that they have a few questions. After hearing from employers, we sent a message to them that the applicant is no longer available for the job.

4 Results

The descriptive statistics, overall and separately by city, are shown in Table 1. The overall callback rate is 9.0 percent, with San Francisco having a substantially higher callback rate than the other cities, at 22.0 percent. This callback rate is lower than [Darolia et al. \(2015\)](#) (11.4 percent) and higher than [Deming et al. \(2016\)](#) (8.2 percent). Some of the job ads closed before we were able to send out the second résumé. Our experimental design is based on comparing outcomes between the control and treatment résumés in the pair so

¹¹Response by employers via postal mail cannot be measured in our experiment since the residential addresses are fictitious.

we restrict our sample to only include jobs in which both of the résumés in the pair had a possibility of getting a callback. We sent pairs of résumés to 2,777 jobs for a total of 5,554 résumés in the paired sample. If we do not restrict the sample to pairs only, then the number of résumés sent is 5,917 and our target was 6,000. To show that restricting our sample to pairs is not biasing our results, we run a linear probability model of whether the job ad closing is significantly related to the treatment status of the first résumé sent. We find that the treatment status of the résumé sent before the ad closed did not predict the probability that it closed.

Table 2 shows the callback rate by the control group (no certificate) and the treatment group (certificate), as well as by other groups. The overall callback rate is extremely similar with a 9.0 percent callback rate for the control group and a 8.9 percent callback rate for the treatment (had certificate) group.

Table 2 also shows the callback rate by gender, city, and occupation, again separately by control versus treatment groups. What stands out is the differences in callback rates by gender: for men the treated group has a higher callback rate while for women the treated group has a lower callback rate. Thus, the effect of having a certificate may vary by gender. This is similar to the findings in [Arcidiacono et al. \(2008\)](#) that women have less of a return to MBA programs. In our study, both men and women have certificates from the same set of schools so the result is not due to women selecting into less prestigious programs. By city, we find certificate holders have a .9 percentage point lower callback rate in New York, certificate holders have the same callback rate in San Francisco and higher callback rates in Los Angeles and Washington DC. By occupation, administrative assistants with certificates have callback rates .9 percentage points higher than non-certificate holders, but the callback rate is somewhat lower for certificate holders in the other occupations.

An advantage of our methodology - sending pairs of résumés to the same job ad - is that it allows us to look at how frequently neither, both, or just one job applicant received a callback and whether that varies by certificate. In Table 3, we compare the relative proportions of the

following four groups of outcomes for each application pair: 1) neither control nor treatment application received a callback; 2) only the control received a callback; 3) only the treatment received a callback; and 4) both treatment and control received a callback. For this table we only include résumés sent in pairs. The most common occurrence is that neither résumés receives a callback (86.9 percent of pairs). The number of cases in which only the non-certificate or only the certificate résumé receives a callback is essentially identical (4.2 versus 4.1 percent). These relative proportions are affected by the time between when the ad was posted and when our résumés were sent. If the non-certificate résumé was sent more quickly then it was more likely to receive a callback (5.0 versus 3.8) and if the certificate résumé was sent more quickly then it was more likely to receive a callback (4.5 versus 3.4). The randomization of the order appeared to work as we find overall the proportions are the same. We do control for time between posting of the job ad and applying for the job in our regressions.

We more thoroughly test the effect of having a certificate on the probability of a callback by estimating a series of linear probability regressions of the following form:

$$Y_{iomct} = \beta * Cert_i + X_{iomc} * \rho + \gamma_o + \lambda_c + \delta_m + \alpha_t + \epsilon_{iomc} \quad (1)$$

where i refers to the individual, o refers to occupation, m refers to major, c refers to city, and t refers to time. Y_{iomc} equals one if the applicant received a callback, and zero otherwise, while $Cert_i$ equals one if the applicant is in the treatment group (certificate), and zero otherwise. Our main outcome of interest is β which is the coefficient on having a post-baccalaureate certificate. In addition to the controls shown in the table, we also include controls for the month the job was posted, whether the application was the first or second of the pair sent, the number of days between when the job ad was posted and the application was sent, undergraduate university and undergraduate major group.

The results are shown in Table 4. Consistent with the previous discussion, the overall

effect of having a certificate on the probability of receiving a callback appears to be zero. Our 95 percent confidence interval indicates we can rule out benefits exceeding a 1.11 percentage point increase in the callback rate and penalties exceeding a 1.05 percentage point decrease in the callback rate. However, as suggested in Table 2, gender may affect the impact of holding a certificate. Thus, column (2) interacts the treatment variable (Certificate) with a female dummy variable. Now, the certificate variable is positive and insignificant, and its interaction with the female dummy variable is negative and significant at the ten percent level. These coefficients suggest that men with certificates have a callback rate that is 1.0 percentage points higher than men without certificates, but that the benefit of holding a certificate is 1.9 percentage points lower for women than men. Thus, the presence of a certificate appears to act differently on men than on women.

The final two columns repeat the estimation in column (1) but separately for men (column 3) and women (column 4). Men with certificates have a .9 percentage point higher callback rate than men without certificates, although this difference is not statistically different from zero. Women with certificates have a .9 percent lower callback rate than women without a certificate, although again this difference is not statistically significant.

We do find that applying to job ads quickly increases the likelihood of receiving a callback. Our “days between” variable controls for the time between when the job ad was posted and when the résumé was sent. With the exception of column 4 with the female only sample, taking longer to apply reduces the likelihood of a callback. We randomized which résumé was sent first and find that a dummy variable for being sent first is insignificant.

If we restrict our sample to only include certificates from extremely competitive schools, we still find insignificant results (.07 percentage point decrease in callbacks), indicating our result is not driven by having some less selective certificate schools in our sample. For a robustness check, we run a regression that instead includes pair fixed effects and drops controls that are common across the pair (for example gender). There is still no significant increase in the callback rates from having a certificate. The coefficient on the interaction

between female and having a certificate is no longer significant at the ten percent level though. Additionally, we again restrict our sample to the most selective certificate schools and use the pair fixed effects model. We still find a precisely estimated zero effect.

To test whether the certificate impacts the callback rate differently across occupations, the previous results are repeated separately by occupation, both with and without the interaction of our certificate dummy variable with the female dummy variable. The results are shown in Table 5. Having a certificate never has a statistically significant effect on callback rate within occupations. When interacting certificate with the female dummy variable, we observe negative coefficients as we did before. However, we do find that female applicants for accounting assistant jobs have marginally significantly higher callback rates than male applicants. The importance of applying quickly appears to be driven by the accounting assistant positions as that is the only occupation in which the “days between” variable is significantly negative. Being the first résumé sent also increases the likelihood of a callback for accounting assistant positions.

Finally, we test the impact of holding a certificate separately by city, with the results shown in Table 6. Again, both the baseline results as well as the results with certificate interacted with gender are shown. As with occupation, having a certificate does not appear to affect the probability of receiving a callback. However, the effect varies substantially by gender in New York: men with certificates have a callback rate that is .8 percentage points higher than men without, while the effect of having a certificate is 3.1 percentage points lower for women than men. However, women in New York were 3.3 percentage points more likely to receive a callback than men in New York. Thus, having a certificate and being a women in New York resulted in a similar callback rate to men in New York. New York City is the only city in which we do not find a significant decline in the callback rate by the time between job ad posting and sending the résumé. In Washington DC the same pattern holds of a significant increase in the callback rates for female applicants and a negative interaction (although not significant in this case) between being female and having a certificate. In San

Francisco there is still a negative coefficient on the interaction between female and certificate, but the female coefficient is zero. Los Angeles does not follow the same pattern. Being female and having a certificate leads to an increase in the callback rate of 1.7 percentage points, although this is not significant. The coefficient on being a female applicant in Los Angeles is actually negative, although not significantly so.

Overall our results consistently find positive but insignificant effects for men and negative effects for women. However, the coefficient for women is only significant in New York City, and given the number of coefficients estimated and our lack of a prior about how holding a certificate may vary by city, we are cautious about making any meaningful inference from this result.

5 Conclusion

This paper estimates the causal effect of post-baccalaureate business certificates on the probability that a job applicant receives a callback for recent college graduates. A correspondence study is used to find that a résumé randomly assigned a post-baccalaureate business certificate is not statistically significantly more more likely to receive a callback than those without a certificate. Based on our 95 percent confidence interval we can rule out increases in the callback rate larger in magnitude than 1.11 percentage points. Even if we restrict our sample to only the most prestigious certificate schools, we do not find a significant increase in the callback rate. In fact, we find for these schools there is a decrease in the callback rate of .07 percentage points. Thus, our results are similar to [Darolia et al. \(2015\)](#) which find no benefit to pre-baccalaureate certificates in terms of callback rates. Given the insignificant benefit and nonzero cost, we fail to find evidence that supports the hypothesis that these programs are cost-effective. However, these programs may benefit individuals in ways this study did not measure such as increased wages or a higher probability of promotion.

This finding is important because the government currently does not require that schools provide potential applicants to these certificate programs with data on outcomes of people who previously completed the certificate. Potential students are left reading testimonials

about how these programs benefit people. Individuals could make more informed enrollment decisions by taking into account our findings. The results raise the question of why additional schooling in the form of a post-baccalaureate business certificate does not seem to be viewed in a meaningfully positive way by potential employers.

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Appendix A: Sample Résumés

Jessica Murphy

Address 1

Address 2

Email: jessicamurphy1090@yahoo.com

Cell: 415-494-4158

OBJECTIVE

To contribute managerial skills and experience to your firm in a management capacity

WORK EXPERIENCE

Store Manager

X Company

San Francisco, CA

October 2015 - present

- Responsible for development of team to accomplish store's business objectives through recruitment, selection, coaching, investment, engagement, retention, and motivation.
- Directed merchandise presentation, restocking, and recovery to maximize productivity.
- Performed opening and closing procedures including maintaining registers, preparing bank deposits, preparing store for next day's business and accepting and receiving merchandise shipments.

SKILLS

Computer proficient in Microsoft Office: Word, Excel, PowerPoint, Access; Adobe InDesign

EDUCATION

BS in Chemistry, _____ University, 2015

LEADERSHIP

- Student Diplomat, Office of Admission
 - Served as student representative for prospective students and their families.
- Elected to positions to generate interest in multicultural organizations.
- Mentored at-risk junior-high students to help them improve their grades.
- Helped organize and coordinated events during the International Week

Lisa Turner

Address 1
City, State Zipcode

Telephone: 415-230-2392
Email: lisamaryturner@yahoo.com

OBJECTIVE

Seeking a managerial position

SKILLS

Microsoft Word, PowerPoint, Excel, SPSS

TRAINING AND CERTIFICATION

Online Business Administration Certificate, University of _____, August 2017

EDUCATION

BS in Education, University of _____, 2015

EXPERIENCE:

Sales Consultant/Sales manager

Y Company

San Francisco, CA

Apr 2015 - present

- Analyzed applicant's financial status, credit, and property evaluation to determine feasibility of granting loans.
- Adhered to all federal and state compliance guidelines relative to mortgage lending.
- Executed the loan origination process including appraisals, credit reports, ordering title, and closing procedures.

INTERNSHIP

- Special Events Intern, Company Z
 - Coordinated receptions and business meetings.
 - Helped design and distribute monthly employee newsletters.

EXTRACURRICULAR ACTIVITIES

- Developed and implemented class programs and spearheaded efforts to raise funds for nonprofit organizations.
- Generated funds for events and promoted alcohol-abuse awareness campus-wide.
- Volunteered with the local Boys and Girls Club.

Tables

Table 1: Descriptive Statistics

	(1) All mean/sd	(2) New York mean/sd	(3) San Francisco mean/sd	(4) Los Angeles mean/sd	(5) Washington D.C. mean/sd
Callback	0.090 (0.286)	0.056 (0.229)	0.220 (0.415)	0.059 (0.236)	0.072 (0.259)
Female	0.483 (0.500)	0.489 (0.500)	0.487 (0.500)	0.454 (0.498)	0.498 (0.500)
Occupation					
Manager	0.399 (0.490)	0.343 (0.475)	0.433 (0.496)	0.363 (0.481)	0.505 (0.500)
Acct. Assist.	0.321 (0.467)	0.363 (0.481)	0.287 (0.452)	0.321 (0.467)	0.279 (0.448)
Admin. Assist.	0.279 (0.449)	0.295 (0.456)	0.281 (0.449)	0.315 (0.465)	0.217 (0.412)
City					
New York	0.376 (0.485)				
San Francisco	0.180 (0.384)				
Los Angeles	0.223 (0.416)				
Washington DC	0.221 (0.415)				
Observations	5,554	2,090	998	1,238	1,228

Notes: Each observation is an application. Numbers represent fractions.

Table 2: Callback Rate, No Certificate (Control) versus Certificate (Treatment), by Group

	(1) No Certificate mean	(2) Certificate mean
Total	0.090	0.089
Gender		
Male	0.079	0.087
Female	0.101	0.092
City		
New York	0.060	0.051
San Francisco	0.220	0.220
Los Angeles	0.055	0.063
Washington DC	0.070	0.075
Occupation		
Manager	0.097	0.091
Admin. Assist.	0.081	0.090
Acct. Assist.	0.089	0.086
Observations	2,777	2,777

Notes: Each value is the callback rate of that group, which is the fraction of applications that received a response from employers. Column (1) shows callback rates for the group without a certificate (control), while column (2) shows callback rates for the group with a certificate (treatment).

Table 3: Distribution of Application Pairs Across Callback Types

	Number	Percent
No Callbacks	2,412	86.9
One Callback - No Cert	117	4.2
One Callback - Cert	115	4.1
Two Callbacks	133	4.8
Total	2,777	100.0

Notes: Table shows the distribution of application pairs across four types: 1) neither control nor treatment application received a callback; 2) only the control received a callback; 3) only the treatment received a callback; and 4) both treatment and control received a callback. Only applications where both in the pair were sent are included in this tables.

Table 4: Linear Probability Regressions, Callback

	All		Men	Women
	(1)	(2)	(3)	(4)
Certificate	0.000 (0.006)	0.010 (0.007)	0.009 (0.007)	-0.009 (0.009)
Cert X Female		-0.019* (0.011)		
Female	0.010 (0.009)	0.020* (0.011)		
City				
San Francisco	0.178*** (0.023)	0.177*** (0.023)	0.217*** (0.032)	0.140*** (0.033)
Los Angeles	0.010 (0.017)	0.009 (0.017)	0.038 (0.024)	-0.019 (0.026)
Washington DC	0.028 (0.019)	0.028 (0.019)	0.037 (0.025)	0.018 (0.030)
Occupation				
Admin. Assist.	-0.009 (0.011)	-0.009 (0.011)	-0.004 (0.016)	-0.014 (0.015)
Acct. Assist.	-0.000 (0.011)	-0.001 (0.011)	-0.012 (0.015)	0.011 (0.016)
Sent First	0.007 (0.006)	0.007 (0.006)	0.005 (0.007)	0.011 (0.009)
Days Between/10	-0.012*** (0.004)	-0.012*** (0.004)	-0.018*** (0.006)	-0.007 (0.006)
Observations	5,554	5,554	2,872	2,682
R ²	0.055	0.055	0.068	0.054

Notes: Dependent variable is binary, and equals one if the applicant received a callback, and zero otherwise. Omitted categories are *Manager* for occupation and *New York* for city. Columns (1) and (2) include the full sample, while column (3) includes only men and column (4) includes only women. All specifications include controls for month job was posted, undergraduate degree type, undergraduate school, days between job posting and when application was sent, and whether the application was the first of the pair sent.

Standard errors in parentheses, and are clustered at the job level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Linear Probability Regressions, Callback, by Job Type

	Manager		Admin. Assist.		Acct. Assist.	
	(1)	(2)	(3)	(4)	(5)	(6)
Certificate	-0.006 (0.009)	0.002 (0.011)	0.010 (0.011)	0.022 (0.014)	-0.001 (0.009)	0.008 (0.011)
Cert X Female		-0.016 (0.018)		-0.024 (0.021)		-0.018 (0.019)
Female	0.005 (0.014)	0.013 (0.017)	-0.004 (0.016)	0.008 (0.019)	0.029* (0.016)	0.038* (0.019)
City						
San Francisco	0.194*** (0.036)	0.194*** (0.036)	0.198*** (0.044)	0.197*** (0.044)	0.142*** (0.038)	0.142*** (0.038)
Los Angeles	-0.003 (0.029)	-0.004 (0.029)	-0.012 (0.031)	-0.013 (0.031)	0.050 (0.031)	0.049 (0.031)
Washington DC	0.026 (0.027)	0.026 (0.027)	-0.058** (0.026)	-0.058** (0.026)	0.111** (0.044)	0.111** (0.044)
Sent First	0.006 (0.009)	0.006 (0.009)	-0.008 (0.011)	-0.008 (0.011)	0.019** (0.009)	0.019** (0.009)
Days Between/10	-0.007 (0.007)	-0.007 (0.007)	-0.009 (0.007)	-0.009 (0.007)	-0.027*** (0.008)	-0.027*** (0.008)
Observations	2,218	2,218	1,552	1,552	1,784	1,784
R ²	0.076	0.076	0.087	0.088	0.044	0.044

Notes: Dependent variable is binary, and equals one if the applicant received a callback, and zero otherwise. Omitted category is *New York*. Results shown separately by job opening type, with managers in columns (1) and (2), administrative assistants in columns (3) and (4), and accounting assistants in columns (5) and (6). All specifications include controls for month job was posted, undergraduate degree type, undergraduate school, days between job posting and when application was sent, and whether the application was the first of the pair sent.

Standard errors in parentheses, and are clustered at the job level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Linear Probability Regressions, Callback, by City

	NY		San Fran.		LA		DC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Certificate	-0.007 (0.008)	0.008 (0.008)	0.001 (0.019)	0.016 (0.026)	0.009 (0.010)	0.001 (0.013)	0.002 (0.011)	0.015 (0.014)
Cert X Female		-0.031** (0.016)		-0.031 (0.039)		0.017 (0.020)		-0.026 (0.021)
Female	0.017 (0.012)	0.033** (0.015)	-0.016 (0.032)	0.000 (0.037)	-0.006 (0.016)	-0.015 (0.018)	0.031* (0.018)	0.044** (0.020)
Occupation								
Admin. Assist.	0.006 (0.016)	0.006 (0.016)	-0.022 (0.040)	-0.022 (0.040)	-0.025 (0.019)	-0.025 (0.019)	-0.053** (0.022)	-0.053** (0.022)
Acct. Assist.	-0.003 (0.013)	-0.003 (0.013)	-0.087** (0.037)	-0.087** (0.037)	0.030 (0.022)	0.030 (0.022)	0.021 (0.027)	0.021 (0.027)
Sent First	0.010 (0.008)	0.011 (0.008)	-0.032 (0.021)	-0.033 (0.021)	0.011 (0.010)	0.010 (0.010)	0.007 (0.011)	0.008 (0.011)
Days Between/10	-0.006 (0.007)	-0.006 (0.007)	-0.067*** (0.017)	-0.067*** (0.017)	-0.015** (0.008)	-0.015** (0.008)	-0.017* (0.010)	-0.017* (0.010)
Observations	2,090	2,090	998	998	1,238	1,238	1,228	1,228
R ²	0.016	0.017	0.046	0.046	0.037	0.037	0.054	0.054

Notes: Dependent variable is binary, and equals one if the applicant received a callback, and zero otherwise. Omitted category is *Manager*. Results shown separately by city, with New York in columns (1) and (2), San Francisco in columns (3) and (4), Los Angeles in columns (5) and (6), and Washington D.C. in columns (7) and (8). All specifications include controls for month job was posted, undergraduate degree type, undergraduate school, days between job posting and when application was sent, and whether the application was the first of the pair sent.

Standard errors in parentheses, and are clustered at the job level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$