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ABSTRACT

Catching up Is Hard to Do: Undergraduate Prestige, Elite Graduate Programs, and the Earnings Premium*

A commonly held perception is that an elite graduate degree can "scrub" a less prestigious but less costly undergraduate degree. Using data from the National Survey of College Graduates from 2003 through 2017, this paper examines the relationship between the status of undergraduate degrees and earnings among those with elite post-baccalaureate degrees. Few graduates of nonselective institutions earn post-baccalaureate degrees from elite institutions, and even when they do, undergraduate institutional prestige continues to be positively related to earnings overall as well as among those with specific post-baccalaureate degrees including business, law, medicine, and doctoral. Among those who earn a graduate degree from an elite institution, the present value of the earnings advantage to having both an undergraduate and a graduate degree from an elite institution generally greatly exceeds any likely cost advantage from attending a less prestigious undergraduate institution.

JEL Classification: D61, I24, I26, J24, J31, J44

Keywords: returns to education, higher education, education and inequality, graduate degrees, professional labor markets, human capital, wage differentials, cost-benefit analysis, earnings benefit

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Catching Up Is Hard to Do: Undergraduate Prestige, Elite Graduate Programs, and the Earnings Premium

1. Introduction

There is extensive evidence of a substantial premium to earning a bachelor's degree from an elite college or university. But students may instead attend less prestigious but less costly undergraduate schools, with the expectation of earning a more prestigious graduate degree. In fact, this seems to be conventional wisdom, as indicated by this quote from the *New York Times*: "College counselors have used this chestnut to assuage ambitious, cash-strapped students for decades: Don't worry about attending a top college. What matters is where you go to graduate school. A stellar master's degree can 'scrub' an undergraduate diploma from a less prestigious, and more affordable, institution."[1]

The assumption underlying this advice is that the benefits to an elite graduate degree dominate any benefits from an elite undergraduate degree to the point that the status of the undergraduate degree is nearly irrelevant. Thus, in deciding among colleges, differences in costs associated with undergraduate institutions are more relevant than differences in benefits from the status of the undergraduate degree. But there is no prior empirical support for this premise.

The question I address in this paper is whether students who did not attend an elite undergraduate institution can catch up monetarily by earning a post-baccalaureate degree from an elite institution. Although there are a large number of studies examining the premium to elite undergraduate education, whether the premium to an elite undergraduate degree persists among those with graduate degrees has not previously been examined. I find that the substantial premium to an elite undergraduate degree remains even among those who earn graduate or professional degrees at elite institutions. In combination with the far lower likelihood that graduates of nonselective institutions earn graduate or professional degrees of any kind, these findings have implications for individuals when choosing colleges as well as for the mechanism by which educational policy can affect income mobility.

[1] Nancy Hass, "Why You Can't Catch Up," *New York Times*, August 1, 2014. Available at https://perma.cc/F4KN-DZFY.

A key challenge to examining whether undergraduate institution continues to be related to earnings among those with elite graduate education is availability of data on a sufficiently large sample of graduate degree holders that also has information on educational institutions and on labor market outcomes. I use data from five waves of the National Survey of College Graduates (NSCG) conducted between 2003 and 2017. Data from these five survey years provide information on a nationally-representative sample of 456,861 college graduates, including 222,915 respondents with post-baccalaureate degrees.

The NSCG reports substantial information on individuals including field of degrees, college major, earnings, and extensive individual and employment characteristics. I categorize institutions using available information on the Carnegie classification, which, as I show, is highly related to the commonly-used Barron's selectivity categories. I limit the analysis to those earning post-baccalaureate degrees from elite institutions. Graduate school admissions are based largely on standardized test scores and grades (as well as selectivity of undergraduate institution), so conditioning the analysis sample on graduation from an elite post-baccalaureate program provides a lower bound on ability measures that are available to graduate admissions committees but unavailable in the NSCG. The motivating assumption is that irrespective of their undergraduate institution, students in comparable graduate programs should be subject to common quality standards.

The main finding of this paper is that the premium to an elite undergraduate degree remains large and statistically significant among those with elite graduate degrees even with extensive controls for individual characteristics, family background, and employment characteristics. I discuss possible mechanisms that may relate to the persistence of a premium to elite undergraduate degrees among those with elite graduate degrees.

At the individual level, it is widely established that family income is an important influence on whether a student attends a selective institution. As the *New York Times* quote in the first paragraph suggests, it seems to be conventional wisdom that attending a more-affordable college will not harm careers, and, furthermore, that a prestigious graduate degree can offset a less prestigious undergraduate credential. However, this paper challenges this advice on two dimensions. First, "scrubbing" a less prestigious undergraduate degree is rare—students who attend nonselective institutions for their bachelor's degrees rarely move up to an elite graduate or professional school for a post-baccalaureate degree. Second, even when students do earn a more

illustrious post-baccalaureate degree, my calculations show that any likely savings from attending a less prestigious school is quickly swamped by the lower earnings resulting from combining an elite graduate education with a nonselective undergraduate credential. At minimum, college counselors and high school students (and their parents) should recognize that even those students planning post-baccalaureate education face substantial long-run consequences from their initial college decisions.

2. Empirical motivation

The question of interest is whether graduation from an elite post-baccalaureate program can offset the earnings premium associated with a bachelor's degree from an elite institution. This question relates to two widely analyzed issues. First, it is well-established that graduates of more selective colleges have higher earnings.[2] Second, there is extensive evidence that high ability students from low income households do not attend, or even apply to, selective colleges that they would otherwise be qualified for (Hoxby and Avery, 2013). Although most of the focus has been on low income households, there is also evidence that a substantial share of high ability students across all household income levels attend colleges below their ability level (Dillon and Smith, 2017).

In line with the most common approach used in the large literature estimating the returns to elite undergraduate education, I estimate earnings equations controlling for a measure of college quality of the following form:

$$lnY_i = X_i\beta + Z_i\gamma + \varepsilon_i \quad (1)$$

where Y is a measure of earnings, X is a vector of individual characteristics, Z indicates college quality, β and γ are parameters to be estimated, ε is a random error term, and i indexes individuals. The main coefficient of interest is γ, which represents the relation of college quality with earnings.

In the literature examining the returns to elite undergraduate education, college quality Z is measured various ways, such as by Barron's selectivity categories, expenditures per student,

[2] There is a large literature devoted to estimating the return to elite education. In addition to estimating the return to elite education, Brewer and Ehrenberg (1996) provide a detailed summary of the literature through 1995. A partial list of studies since 1995 include Andrews, Li, and Lovenheim (2016), Behrman, Rosenzweig, and Taubman (1996), Black and Smith (2006), Brewer, Eide, and Ehrenberg (1999), Dale and Krueger (2002, 2014), Eide, Brewer, and Ehrenberg (1998), Griffith and Rask (2016), Hoekstra (2009), Hoxby (2001), Lang and Siniver (2011), Long (2008, 2010), Monks (2000), and Zhang (2005).

and average SAT scores of enrolled students. Because higher ability applicants are more likely to be admitted to selective colleges and universities, in order to mitigate the expected upward bias of the estimated return to college quality, studies typically include in the vector X indicators of individual ability, such as SAT percentile and high school GPA or class ranking, as well as often highly detailed information on family background and high school characteristics. Some studies include limited labor market information as part of the X vector, but most do not. Graduate degrees earned, if any, are not taken into account in the earnings equation estimations, for reasons of research interest (which generally has been focused on whether attending an elite institution for undergraduate studies pays off in the form of higher earnings even if more costly than a nonelite alternative) as well as data availability, as noted below.

While not being able to definitively prove causality, these studies, using a variety of data sets and identification strategies, consistently find a substantial premium to elite undergraduate education that is not solely due to ability.[3] A second approach that supports a causal interpretation is by use of a discontinuity introduced by an admissions cutoff. Hoekstra (2009) shows in a regression discontinuity analysis that there is an earnings premium of 20 percent for white men to graduation from a state's flagship institution relative to just falling short of the admissions cutoff. Studies also using a regression discontinuity design based on non-US data similarly find a premium to earning a degree in a more selective university or program (Anelli, 2016; Canaan and Mouganie, 2018; Hastings, Neilson, and Zimmerman, 2013; Kirkebøen, Leuven, and Mogstad, 2016). However, this approach requires data that are rarely available, specifically information on where the student falls relatively to an admissions cutoff matched to earnings post-graduation.

Although there is substantial and consistent evidence of a premium to elite undergraduate education net of measures of individual ability, it is unknown whether the earnings premium associated with an elite undergraduate education continues even among graduates of elite graduate programs. There are several reasons to expect that the premium to elite undergraduate

[3] Two papers by Dale and Krueger (2002, 2014) are notable exceptions. Dale and Krueger find that, except for low income students, earnings are not affected by selectivity of undergraduate college once individual characteristics are accounted for. However, their research is based on data from students at a limited number of highly selective colleges and universities. This means that those students who were admitted to more selective schools than they ultimately entered were still attendees (and usually graduates) of highly selective institutions, and does not mean that the same individual would have been equally successful had they instead attended a nonselective college.

education can be offset by earning an elite graduate degree, net of the role of ability, so that catching up monetarily is possible. There are also several reasons other than ability that catching up monetarily is unlikely.

Starting with reasons why catching up seems possible, one important factor is that those who earn graduate and professional degrees comprise a highly selected group who have received substantial information through the course of their undergraduate career about their ability, and accordingly deem their prospects sufficiently attractive to warrant the considerable opportunity cost, as well as direct costs, of continuing their education. Second, because graduate programs focus on field-related education, employers may consider the graduate degree to be more informative than the undergraduate degree about job-specific skills. Third, graduate school admissions are based largely on standardized test scores and grades. To the extent that students attend undergraduate institutions below their ability level, the graduate degree-granting institution may indicate a closer ability match, and thereby have a more important relation to earnings than status of an individual's undergraduate institution.

Fourth, noncognitive skills matter in educational as well as in labor market outcomes.[4] Graduation from an elite graduate program demonstrates actual motivation, ambition, and persistence. Fifth, Arum and Roksa (2011) find little improvement in critical thinking, complex reasoning, and writing during college, leaving an important role for other types of abilities correlated with post-baccalaureate BA degree attainment that are not necessarily directly influenced by status of undergraduate institution.

There are also reasons to expect that catching up by earning an elite graduate degree may be unlikely. One obvious barrier is that the quality of subject-specific education at less-selective institutions is less challenging, placing graduates at a disadvantage in highly demanding graduate programs regardless of standardized test scores and grades. Second, many of the same family and social background characteristics that are more prevalent among graduates of selective institutions, such as parents who are more educated and college peers who are from families with higher socioeconomic status, may continue to prove valuable to graduates of selective institutions throughout their careers.

[4] This is the subject of a large literature by James Heckman and his coauthors, as well as many others. See for example Heckman, Stixrud, and Urzua (2008) and Lundberg (2013).

Third, an additional disadvantage arises from differential access on the basis of undergraduate institution to highly selective graduate programs. Also categorizing institutions using Carnegie classifications, Eide, Brewer, and Ehrenberg (1998) find that graduates of elite institutions are more likely to earn post-baccalaureate degrees as well as more likely to earn their graduate degrees from higher-status institutions. Status and type of undergraduate institution are related to not only the likelihood of attending graduate school, but also the type of graduate program an applicant is admitted to, whether the individual completes the graduate program, and the type and status of jobs available after earning a graduate degree. Even among applicants with similar standardized test scores, selectivity of undergraduate institution matters in graduate school admissions (Attiyeh and Attiyeh, 1997). There is evidence that grading has become more generous over time at elite undergraduate institutions while remaining the same at less selective institutions, and that grades are higher at private institutions than at equally selective public institutions (Rojstaczer and Healy, 2012), both factors which may also increase the likelihood of admission to top graduate programs among graduates of selective undergraduate programs.

Fourth, for a number of reasons, such as lack of information or advice from their faculty advisors, even qualified graduates from less selective institutions may not apply to the most selective graduate programs. Thus, applicants from less-selective undergraduate programs may not be represented within the most highly selective graduate programs, which, especially within professional programs such as law and business, may limit their access to the highest paying jobs (Rivera, 2012).

The NSCG used to estimate equation 1 does not provide information on the specific institution or on Barron's selectivity categories and does not provide information on individual standardized test scores or grades. However, no other data set would be adequate to address the question of interest. The data sets that have been used to examine the returns to elite undergraduate education that do include information on individual ability would not provide enough observations for a reliable examination of whether earning an elite graduate degree can offset a less prestigious undergraduate degree. Specifically, because most high school students do not graduate from college, even initially large samples become fairly small after restrictions to college graduates with reported earnings are imposed.[5] Further restrictions to those with

[5] For instance, Monks (2000) uses the relatively large NLSY79; from the initial sample of 12,686, his analysis sample is reduced to 734.

graduate degrees would lead to a far smaller number of observations, with especially few observations for those with an undergraduate degree from nonselective undergraduate institution but a graduate degree from an elite institution. As indicated by the paucity of studies that have available some source of exogenous variation that may be helpful in identifying a causal relation of elite education on earnings (e.g., admission cutoff to the state flagship university as in Hoekstra, 2009), it likewise seems unlikely that there is some unexplored exogenous variation that would be useful in identifying a causal effect of elite graduate education on earnings across a range of degrees and fields, and even less likely that this approach would be feasible to study the question of interest here.

As I discuss in the next section, in order to construct a measure of college quality Z, I use information available in the NSCG on Carnegie classification to group institutions on the basis of selectivity. Because the NSCG used in this paper does not include information on standardized test scores or on grades, I restrict the sample used to estimate the earnings equation to those who earned a graduate or professional degree from an elite institution. As discussed earlier, graduate school admissions are based largely on standardized test scores, grades, and selectivity of undergraduate institution. Restricting the earnings sample to those with a post-baccalaureate degree from a selective institution largely places a lower bound on test scores and undergraduate grades. Indeed, as the ethnographic study conducted by Posselt (2014) identifies, admissions committees at highly-ranked PhD programs express great risk aversion and rely strongly on high GRE scores and grades to minimize the risk of admitting applicants who they fear would waste faculty members' time, as they anticipate students with weaker observable credentials are more likely to struggle with a demanding graduate program. It seems unlikely that selective graduate programs would apply lower standards for standardized tests or grades to students from nonselective undergraduate institutions, as these students would seem to be more risky. Those individuals who move up for their graduate degrees, and successfully earn an elite graduate degree, may be more motivated and ambitious than their counterparts who had an easier path to an elite graduate program. Furthermore, admissions tests scores are used as inputs into the widely followed U.S. News rankings.[6] It likewise seems unlikely that graduate programs would

[6] Robert Morse, "How U.S. News Calculated the 2020 Best Graduate School Rankings," *U.S. News & World Report*, March 11, 2019. Available at https://www.usnews.com/education/best-graduate-schools/articles/how-us-news-calculated-the-rankings.

risk a decline in their U.S. News ranking by admitting graduates of less selective undergraduate institutions who have lower standardized test scores.

Furthermore, to the extent that GRE scores of admitted students differ by type of undergraduate institution, the value of GRE scores diminishes quickly in predicting graduate school success. Studies show that the GRE is a far better predictor of first year graduate school grades than of degree attainment (Kuncel, Hezlett, and Ones, 2001; Sedlacek, 2004). In addition, the characteristics that result in professional success can be hard to identify ex ante and may only be loosely related to test scores and grades. For example, as Conley and Önder (2014) demonstrate, even the highest ranked economics PhD programs that enroll the best students produce few graduates who would achieve a tenurable publication record at a medium research university in six years, and graduates of lower ranked programs have records not dramatically weaker than graduates of top programs. Presumably if applicants are matched to PhD programs by their objective information (GREs and grades) so that the highest ranked PhD programs have the highest ability students and lower ranked PhD programs are mainly comprised of lower scoring students, the top PhD programs would produce a far larger share of successful students relative to lower ranked programs.

The empirical analysis that is restricted to those with a graduate degree from an elite institution accounts for a diverse set of factors including ability, motivation, and other unobserved individual characteristics. The full relation of earning a bachelor's degree from a selective institution over a nonselective institution is provided by the coefficient on Z in equation 1. To the extent that graduates of less-selective schools are disadvantaged in graduate admissions net of actual ability for graduate study, and are admitted to lower ranked schools within the group of elite institutions, the coefficient on Z correctly reflects the full relation of earning an elite undergraduate degree relative to a nonelite degree. And, by inclusion of a sufficiently rich set of covariates, bias arising from selection on observables is expected to be mitigated.

To examine the labor market mechanisms by which undergraduate institution is related to earnings among those with a graduate degree from an elite institution, I also examine the separate contributions of undergraduate background, type of degree earned, and employment characteristics by estimating an expanded version of equation 1 as follows:

$$lnY_i = X_i\beta + Z_i\gamma + M_i\delta + D_i\theta + LM_i\rho + \varepsilon_i \quad (2)$$

As in equation 1, X is a vector of individual characteristics and Z indicates college quality. M is a vector representing undergraduate major, D is a vector representing type of graduate or professional degree, and LM is a vector of employment characteristics. Undergraduate major, type of graduate or professional degree, and employment characteristics may be influenced by type of undergraduate institution. A smaller coefficient on Z in equation 2 relative to equation 1 indicates that part of the return to an elite undergraduate degree is manifested through factors such as access to higher paying undergraduate majors, completion of higher paying graduate or professional degrees, or access to jobs and occupations with characteristics associated with higher pay. I report earnings estimates separately by gender; many studies examine men only or else pool men and women in order to have a sufficiently large sample for adequate statistical power. The specific variables included in each vector are discussed next.

3. The National Survey of College Graduates

I use data drawn from fives waves of the NSCG for the survey years 2003, 2010, 2013, 2015, and 2017. This survey is nationally representative of the US population of college graduates and includes 456,861 college graduates residing in the US who were under age 76 in the year they were surveyed.[7] Individuals who participate in the survey report detailed information about their education and degrees, employment characteristics, earnings, and personal characteristics, including parents' education. Most notably, there are 222,915 respondents with post-baccalaureate degrees.

Although the NSCG does not report information on specific institutional quality or selectivity, it does report the 1994 Carnegie classification for respondents who are graduates of US institutions, and this information is used in this paper to categorize institutions. The Carnegie classifications are designed to group institutions based on similarity of structure and mission (e.g., undergraduate teaching, graduate education) and take into account institutional focus (e.g.,

[7] The NSCG is based on a stratified sample design, where selection probabilities are based on demographics and whether the respondent has a science and engineering (S&E) degree or S&E occupation. I use the sample weights throughout to account for differential selection probabilities. The sample weights also adjust for nonresponse and undercoverage of smaller groups and assure that the sample is representative of the college-educated population in the US. All data collected in the NSCG are subject to the Census Bureau's confidentiality and privacy restrictions, and information on specific schools is not provided in the data file because it would pose a disclosure risk to the individuals selected for the NSCG.

priority given to research, federal research funding) and field breadth and quantity of graduate degrees (if any) awarded. The NSCG survey also indicates whether the institution is private or publicly funded.

The Carnegie classifications are not designed to rank institutions by selectivity. By comparing the individual institutions within the 1994 Carnegie classifications to Barron's Profiles of American Colleges for 1994, Hersch (2013) creates a grouping into four tiers. Barron's rankings are based on quality indicators of the entering freshman class (SAT or ACT, high school GPA and high school class rank, and percent of applicants accepted) and are widely used in studies estimating the return to college status. Hersch's tier groupings are constructed so that the share of schools rated by Barron's as most or highly competitive is significantly different between groups.[8] Figure 1 shows the number of institutions grouped into tiers 1–4 by Carnegie classification that are categorized by Barron's as most or highly competitive. All schools in the chart that do not fall into tiers 1–3 are grouped into tier 4. Tier 1 institutions are private Research I and private Research II universities; tier 2 institutions are private Liberal Arts I colleges (selectivity is taken into account in the distinction between Liberal Arts I and Liberal Arts II); tier 3 are public Research I universities; and tier 4 are the remaining four-year colleges and universities with Carnegie classification available, excluding specialized institutions which focus on a narrow curriculum, such as schools of art, music, and design or theological seminaries, and professional schools in fields such as law, business, and medicine.

Figure 2 shows the distribution of the NSCG respondents based on their bachelor's degree institution type. More than half of the college graduates—58 percent—graduated from colleges and universities in tier 4. The share of the US population that enroll in tier 4 schools is actually far higher, because graduation rates are far lower in these schools than in the more-selective institutions in tiers 1–3 (U.S. Department of Education, 2018a).

Barron's is a ranking of undergraduate institutions, and there is no corresponding system that ranks universities overall based on their professional and graduate degree programs,

[8] See Hersch (2013) for details. There are 40 institutions in tier 1; 159 institutions in tier 2; 59 institutions in tier 3; and 1,144 institutions in tier 4. The numbering from tier 1 to tier 4 represent the ordering of the share of institutions within each grouping that are ranked by Barron's as most competitive or highly competitive. These shares are 80.0 percent for tier 1; 34.0 percent for tier 2; 18.6 percent for tier 3; and 1.7 percent for tier 4. Of the institutions in tiers 1–3, 33 percent are ranked by Barron's as most competitive or highly competitive, and 64 percent are ranked by Barron's as most competitive, highly competitive, or very competitive. Thus, these tier divisions correspond reasonably closely to the frequently used Barron's selectivity categories. The institutions in tiers 1–3 are listed in Appendix Table 1 of this paper.

although numerous rankings of specific programs exist.[9] Post-baccalaureate degrees are therefore also grouped into tiers using the same Carnegie classifications and are indicated by the prefix 'post-BA.' I also compared these constructed tier classifications with the U.S. News & World Report (U.S. News) rankings of corresponding specific degree programs.

The relative ranking of post-BA tiers requires some explanation. As noted above, post-BA tier 1 includes private Research I and private Research II institutions and post-BA tier 3 includes public Research I institutions. Tier 2 institutions are selective private liberal arts colleges. Liberal arts colleges offer few graduate degrees, although many do offer some graduate degrees, and the status of graduate programs awarded by tier 2 institutions varies.[10] For example, a review of U.S. News rankings of law and MBA programs offered by tier 2 institutions indicates that they are typically ranked below the corresponding programs in tier 1 and tier 3 institutions and are ranked similarly to tier 4 institutions.[11] Other master's degrees offered by tier 2 institutions, however, are typically ranked similarly to the overall institution. Because so few respondents earn graduate degrees from tier 2 institutions no results are affected by how these respondents are treated in the analyses.

Finally, the relative ranking of specialized institutions that do not fall into tiers 1–4 defined above differs by type of degree. There are 18 law schools and 12 business schools classified as specialized by the 1994 Carnegie classifications, and these institutions are typically ranked below those in tiers 1–4 based on U.S. News rankings (or are not ranked at all). But 42 of the 141 accredited medical schools are classified in the Carnegie classifications as specialized, including some associated with major public research universities as well as medical schools associated with major hospitals such as the Mayo Clinic. The U.S. News ranking of medical schools classified as specialized varies considerably, with, for example, 7 ranked in the top 25 and 17 unranked. There are too few graduates of other specialized graduate programs such as arts or theology to analyze separately.

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[9] For example, the American Economic Association website lists links to seven websites and four papers that rank graduate programs in economics. See https://www.aeaweb.org/gradstudents/Rankings.php.

[10] All rankings in this section refer to the 2015 U.S. News rankings or to website searches conducted in 2015. Based on a review of college websites, approximately 62 of the 159 tier 2 institutions offer some graduate programs, most frequently a master's of education degree or a master's of fine arts degree.

[11] For instance, there are five private Liberal Arts I (tier 2) colleges that offer law degrees. Two of these are ranked among the top 100 law schools in the 2015 U.S. News law school rankings of 202 ABA-approved law schools, with Washington and Lee ranked 43 and Lewis and Clark ranked 72. Similarly, there are nine tier 2 colleges offering MBA degrees, and none of them are ranked in the top 100 business programs in the 2015 U.S. News MBA program ranking. There are no liberal arts colleges that offer medical degrees, although a few offer some PhD degrees.

Clearly, each tier grouping includes schools that range in selectivity. For example, although 32 of the 40 schools combined into tier 1 are rated by Barron's as most or highly competitive, the grouping combines schools recognized as the most prestigious (such as Harvard) together with other schools that are grouped into the same Carnegie classification (and, for that matter, the same Barron's category) but are not Harvard. As discussed earlier, if graduates of less-selective institutions are disadvantaged in admission to the highest-ranked graduate programs within a given tier, then the premium to elite undergraduate in equation 1 correctly reflects the full relation of earning an elite undergraduate degree relative to nonelite undergraduate degree. But, because the NSCG data used here does not provide information on test scores or grades, nor on the actual school awarding degrees, a direct test of whether the estimated premium to elite undergraduate institutions is due to unobserved ability cannot be conducted.[12] However, my analysis of the data (discussed later) suggests that graduates of less-selective undergraduate institutions are not necessarily disproportionately represented in the lower ranked graduate programs.

The NSCG data reports two measures of earnings. One question asks about basic annual salary on the principal job, excluding additional sources of income such as bonuses and overtime. A second question asks for total earned income from all sources in the preceding year.[13] Because the latter measure of earnings is more inclusive of the types of compensation received in many high-paying occupations, such as bonuses and commissions, the main results are based on total earned income from all sources in the preceding year. For both questions, for confidentiality, the survey does not report actual earnings for very high earners (those in the top 0.5 percent of earnings), but instead reports an average value among these very high earners.[14] All earnings values reported here are adjusted for inflation and are in $2017.

[12] Applicant data would also be necessary, as students from less selective undergraduate institutions may refrain from even applying to the top graduate programs regardless of their objective credentials. Anecdotally, as well as by observation, it seems many students apply to graduate programs on the recommendation of faculty with whom they develop a relationship. Faculty at less selective institutions are often not graduates of top graduate programs and may tend to steer students to their own alma mater.

[13] Basic annual salary excludes bonuses, overtime, or additional compensation for summertime teaching or research. Total earned income from all sources in the preceding year includes all wages, salaries, bonuses, overtime, commissions, consulting fees, net income from businesses, summertime teaching or research, or other work associated with scholarships.

[14] To the extent that the highest earners are of exceptional ability and attended the highest-ranked universities for both undergraduate and graduate degree, this compression of the far-right tail of the earnings distribution reduces their influence on the earnings equation estimates.

In the earnings analyses, I restrict the sample to those with annual earnings in the preceding year of at least $10,000 in $2017, in order to consider those with some minimal level of employment in the preceding year and to eliminate likely reporting errors (for instance, reported annual income is as low as $1 in the sample).[15]

In addition to earnings information and Carnegie classification discussed above, the NSCG includes detailed information about educational attainment. I group field of bachelor's degree into eight categories: (Arts/Humanities; Business/Economics; Education; Engineering; Math/Computer Science; Science; Social Science; and other fields such as architecture, social work, communications, journalism, home economics, or library science). Combining information on field of study and type of degree (recorded as bachelor's, master's, professional, or doctorate), I create eight mutually exclusive categories for highest degree PhD, MD,[16] JD, MBA, MA in education, MA in a field other than education or business, other professional degree, and highest degree bachelor's.[17]

The labor market information available in the NSCG is quite detailed. The earnings regressions corresponding to equation 2 control for tenure and potential experience (with potential experience defined as elapsed time since highest degree, as actual years of work experience are not requested by the survey). I also include indicators for full-time employment, class of worker (self-employed, government employer, or private employer), occupation grouped into nine categories based on the 2010 Standard Occupational Classification (SOC) intermediate aggregation level (Management, Business, Financial; Computer, Engineering, Science;

[15] As explained later, the earnings regressions are also restricted to those employed at the time of the survey as well as with elite post-baccalaureate degrees. Only 3.3 percent of the NSCG sample has an elite post-baccalaureate degree, is currently employed, and had positive earnings in the preceding year of less than $10,000. Among those who had positive earnings in the preceding year of less than $10,000, 35.0 percent had previously retired from another position (48.8 percent of men and 29.9 percent of women). In contrast, among those with earnings of at least $10,000 in the preceding year, 7.2 percent had previously retired (7.2 percent of men, 5.3 percent of women). I note as well that it is common to set some lower bound in earnings regressions; $10,000 corresponds to $5 per hour for a full-time worker, below the federal minimum wage but similar to cutoffs commonly used.

[16] All professional medical degrees, including dentistry, optometry, osteopathy, podiatry, and veterinary, are recorded with the same 6-digit code.

[17] A small share of respondents is currently students. Students are included in the descriptive statistics based on the highest degree earned. One reason for doing so is that starting a program is not the same as earning a degree from that program, so the relevant highest degree earned will be the highest degree they report, whether they continue as students. Most full-time students are eliminated from the sample used to estimate the earnings equations by the sample restrictions, and I include in the regressions an indicator variable to account for any remaining full-time students. Those who are students but not eliminated by the sample restrictions may be enrolled in degree programs such as executive MBA programs and master's programs in education that are commonly done while employed full-time.

Education, Legal, Community Service, Arts, Media; Healthcare Practitioners and Technical; Service; Sales and Related; Office and Administrative Support; and Natural Resources, Construction, Maintenance, Production, Transportation, Material Moving (referred to in tables as 'traditional blue-collar'); and a final category for occupations not reported), firm size (in eight categories of number of employees: less than 10; 10–24; 25–99; 100–499; 500–999; 1,000–4,999; 5,000–24,999; 25,000 or more), and for employer located in the South.

Individual information includes indicators for ethnicity (whether Hispanic/Latino), race (white, Black/African American, Asian, all other races or multiple races), age, and native-born US citizen. Parents' education is recorded for each parent in eight categories (less than high school, high school graduate, some college, bachelor's degree, master's degree, professional degree, PhD, education not reported). High school location is grouped into region (Northeast, West, Midwest, South, outside US). Because about 80 percent of individuals who attend college were from the state where they enrolled, and there is a concentration of selective colleges in the Northeast, controlling for high school region provides a partial control for the costs of attending a selective college.[18]

4. Parents' education and degree attainment by undergraduate tier

4.1 Parents' education

The NSCG does not report information on parents' actual income or wealth. But earnings are strongly related to education, and families with more-educated parents have higher income. Parents' education is also a strong predictor of family wealth (Charles, Hurst, and Killewald, 2013). As we see from Figure 3, there is a substantial difference in parents' educational attainment by tier. Bachelor's degree graduates of tier 1 and tier 2 schools are nearly twice as likely as graduates of tier 4 schools to have parents who are themselves college graduates.

Appendix Table 2 provides additional information on the distribution of parents' educational background based on undergraduate tier of the sample member and indicates statistically significant differences between tiers. As Appendix Table 2 shows, not only are parents of tier 1 and 2 graduates more likely to have at least a bachelor's degree, but they are also far more likely to have a professional degree or a PhD. Specifically, the fathers of 22 percent of

[18] See College Board, *Trends in College Pricing 2018*, Figure 23. Available at https://perma.cc/74HV-HHUP.

tier 1 graduates have a professional degree or a PhD, in contrast to less than 6 percent of the fathers of tier 4 graduates.[19]

4.2 Own highest degree by tier

The likelihood of earning a post-baccalaureate degree and the type of graduate degree is strongly related to undergraduate institution. There are stark differences by undergraduate tier in the share of graduates who earn advanced degrees. Figure 4 gives the share by undergraduate tier and gender with highest degree PhD, MBA, or other professional degree such as MD or JD. (Additional detail is provided in Appendix Table 3.) As Figure 4 shows, looking within gender, the share of college graduates with a professional degree or a PhD drops steadily as we move from tier 1 to tier 4, with tier 1 graduates about 3 times as likely to earn a professional degree or PhD as those of the same gender in tier 4.

The detailed statistics reported in Appendix Table 3 show large differences in the likelihood of earning specific degrees as we move from tiers 1 and 2 to tier 4. For instance, among male tier 1 graduates, 8 percent have medical degrees and 11 percent have law degrees. In contrast, among male tier 4 graduates, less than 2 percent have medical degrees and less than 3 percent have law degrees.

4.3 Distribution of post-BA outcomes by undergraduate tier, all college graduates

Figure 4 examines, by undergraduate tier, the likelihood of earning a professional, PhD, or MBA degree from an institution of any type. Figures 5 and 6 provide more detailed information on the relation between undergraduate tier and the likelihood of earning any post-baccalaureate degree (including master's in addition to professional, PhD, or MBA) and the post-BA tier of the graduate institution awarding any post-baccalaureate degrees. (Additional detail is provided in Appendix Table 4.)

[19] The NSCG does not classify MBA as a professional degree, so parents with an MBA will be recorded as having a master's degree. Parents of tier 4 graduates are also far less likely to have a master's degree of any kind than parents of those in tiers 1–3, so the gap in parents with professional degrees on the basis of undergraduate tier may be far larger.

Among tier 4 graduates, the highest degree earned is the bachelor's degree for 70 percent of men and 67 percent of women. In contrast, more than half of male tier 1 and tier 2 graduates have a post-baccalaureate degree, as do nearly half of the female tier 1 and tier 2 graduates.

Figures 5 and 6 also indicate the post-BA tier of those with graduate degrees. The likelihood of moving from a nonselective to a selective institution for a graduate degree of any kind is low. In part because tier 1 graduates are also far more likely to earn a graduate degree, tier 1 graduates are about 10 times more likely to have a graduate degree from a tier 1 institution than is a tier 4 graduate. Specifically, among tier 1 graduates, 27 percent of men and 20 percent of women also earn a tier 1 post-BA degree. In contrast, the odds of a tier 4 graduate having a graduate degree from a tier 1 institution are quite small—2 percent among both men and women. The probability of a tier 4 graduate earning a graduate degree from a tier 3 institution is higher, in part because tier 3 institutions are considerably larger, but is still quite small, at 4 percent for both men and women.

4.4 Distribution of BA tier by post-BA tier

As Figures 5 and 6 show, not only does the likelihood of earning a post-baccalaureate degree differ by undergraduate tier, but also most college graduates who earn a post-baccalaureate degree earn their degrees from institutions similar to their undergraduate institution. But, because the majority of college graduates are graduates of tier 4 institutions, even though a smaller share of tier 4 graduates earn a post-BA degree, tier 4 graduates may well form a large share of elite graduate programs. Figures 7 and 8 show that BA graduates of tier 4 institutions remain in the minority among post-BA graduates of selective institutions.[20]

These figures also offer suggestive information on whether undergraduates from tier 4 institutions systematically place lower in the graduate school hierarchy relative to graduates of tiers 1–3. Based on the tier groupings, tier 1 institutions are more likely to be highly selective than are tier 3 institutions. If BA graduates of tier 4 institutions are less qualified for graduate study than are tier 1–3 BA graduates, we would expect them to form a larger share of post-BA tier 3 graduates relative to post-BA tier 1 graduates. Figures 7 and 8 show that occurs, but, notably, the difference is fairly minor. Among men, 25 percent of tier 1 post-BA graduates, and

[20] Because tier 2 institutions offer few (if any) graduate degrees, tier 2 is grouped with not classified institutions in Figures 7 and 8.

30 percent of tier 3 post-BA graduates, have tier 4 BA degrees. Similarly, among women, 30 percent of tier 1 post-BA graduates, and 37 percent of tier 3 post-BA graduates, have tier 4 BA degrees. In contrast, BA graduates of tier 3 form a far smaller share of graduates with post-BA degrees from a tier 1 institution than from a post-BA tier 3 institutions. Among tier 1 post-BA graduates, only 20 percent of men and 17 percent of women have tier 3 BA degrees, in contrast to 43 percent of men and 41 percent of women who are graduates of tier 3 post-BA institutions. While clearly not conclusive, the pattern does not indicate that undergraduate tier 4 graduates are primarily sorting to lower ranked institutions within tiers.[21]

5. Earnings by tier

Before turning to regression estimates of earnings equations, it is useful to look at some descriptive statistics for earnings on the basis of undergraduate tier. (Appendix Table 5 provides additional information as well as reports tests for statistically significant differences between pairs of undergraduate tiers.) Figure 9 shows average income by tier and gender among those with income of at least $10,000 in the preceding year. A few things to note: First, the earnings pattern within gender follows the pattern of selectivity of the undergraduate institution, with tier 1 graduates having the highest average earnings and tier 4 graduates the lowest. Second, graduates of tier 1 schools earn considerably more than all other graduates. On average, male graduates of tier 1 schools earn 31 percent more than male tier 2 graduates, 40 percent more than male tier 3 graduates, and 76 percent more than male tier 4 graduates. Female graduates of tier 1 schools earn 20–22 percent more than female tier 2 or tier 3 graduates, and 49 percent more than

[21] This does not mean that sorting of tier 4 undergraduates to lower ranked institutions within tiers does not occur. As discussed in section 2, it probably does and may be interpreted as a component of the disadvantage experienced by tier 4 graduates who earn an elite post-baccalaureate degree. However, the extent of sorting is likely to be limited. In addition to the distribution of tier 4 undergraduates among graduate tiers discussed above, additional suggestive evidence can be inferred from U.S. News rankings and graduate enrollment within individual institutions. Drawing again on the 2015 U.S. News rankings of national universities (excluding Rockefeller University which is not ranked by U.S. News), of the 39 universities in tier 1, 21 are ranked in the top 25 and 32 are ranked in the top 50. In contrast, of the 59 universities in tier 3, 2 are ranked in the top 25 and 14 are ranked in the top 50. Furthermore, the higher ranked schools within tier 1 enroll a large share of graduate students within that tier. Graduate enrollment in the 21 universities ranked in the top 25 represents 63.5 percent of the total graduate enrollment in tier 1 universities. The graduate enrollment in the 32 universities that are ranked in the top 50 represents 86.7 percent of the total graduate enrollment in tier 1 universities. Thus, despite within-tier heterogeneity, most graduate students within tier 1 will have earned their graduate degree from a highly ranked university and that is likely to be ranked above most tier 3 institutions. Enrollment data are drawn from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) 2018. Available at https://nces.ed.gov/ipeds/datacenter/DataFiles.aspx.

female tier 4 graduates. Third, on average, women earn far less than men, even when they graduate from similarly selective schools, and even when we only include in our average those earning at least $10,000 per year (so that we are not averaging in zero earnings of those women who are not in paid employment). Fourth, although women's average earnings decline as we move from tier 1 to tier 4, the disparity in earnings by tier is smaller for women than it is for men, reflecting the lower labor market activity and corresponding lower career investment made by female graduates of elite institutions as identified in Hersch (2013).

To examine a more homogeneous group, Figure 10 compares average income on the basis of undergraduate tier for those who earn a post-BA degree from an institution in tiers 1–3. To the extent that ability and motivation differences are reduced, we should see a smaller disparity in earnings on the basis of undergraduate tier among graduates with post-BA degrees from selective institutions.

Figure 10 shows that, as expected, average earnings are higher among those with a post-baccalaureate degree from a selective institution than in the full sample that includes all college graduates, regardless of whether they have a graduate degree and the status of any graduate degree. But most importantly, even among those with graduate degrees from elite institutions, the earnings gap between those with bachelor's degrees from tier 4 institutions and between those with bachelor's degree from institutions in tiers 1–3 remains large. For example, compared to those with post-BA degrees from similarly selective institutions, male tier 1 graduates earn on average around 26–29 percent more than male tier 2 and 3 graduates and 45 percent more than male tier 4 graduates. Female tier 1 graduates earn on average 18–20 percent more than female tier 2 or tier 3 graduates, and 30 percent more than female tier 4 graduates. Thus, although the disparity between tiers is reduced, earning an elite graduate degree does not eliminate the substantial pay gaps associated with an elite undergraduate degree.

Finally, consider only those with graduate degrees from the most selective institutions that are grouped into tier 1. Figure 11 demonstrates that there is no remaining pay gap between men who have bachelor's degrees from institutions in tiers 1–3. However, the earnings gap between men in tiers 1–3 relative to tier 4 remains substantial (as well as statistically significant), with men with bachelor's degrees from tiers 1–3 earning on average 38–44 percent more than men with bachelor's degrees from a tier 4 institution. Even among those with post-BA degree

from the most selective institutions, women with a bachelor's degree from a tier 1 institution earns on average 26 percent more than women with bachelor's degrees from a tier 4 institution.[22]

6. Earnings regressions: All elite post-BA degrees

The figures reporting average earnings do not take into account characteristics that influence earnings other than tier of undergraduate degree. In particular, even in Figures 10 and 11 which are restricted to those with elite graduate degrees, the averages do not take into account the far greater share of professional degrees earned by those with bachelor's degrees from tiers 1–3 relative to those with bachelor's degrees from tier 4 institutions. Of course, as noted earlier, because status of undergraduate institution is strongly related to type of graduate program and status of the post-BA institution, these unadjusted differences provide information of the full relation between earnings and attainment of an elite undergraduate degree.

In this section, I summarize estimates of the relation between earnings and undergraduate tier controlling for other individual and work-related characteristics. I estimate equations separately for men and women and restrict the sample to those with annual income of $10,000 or more in the preceding year, who earned a post-BA degree from an elite institution, and who are employed at the time of the survey.[23] The dependent variable in the regressions is the log of real annual income in the preceding year; estimates using basic annual salary on the current job as the dependent variable yield similar results.

[22] To compare to annual earnings data by highest degree reported by the U.S. Census Bureau (see https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-03.html), the average annual earnings in the preceding year (if positive) in $2017 for all respondents in the NSCG for the years 2003–2017 are as follows: master's degree, $92,781; professional degree, $182,974; doctorate, $117,188. The average annual earnings values in the NSCG sample for those with master's degrees and doctorate degrees are similar to those reported by the census, but the average for those with professional degrees is higher in the NSCG by about 30 percent. This disparity is likely due to differences in how income is reported by the NSCG versus the Annual Social and Economic Supplement used to provide the census values. Differences in how income is reported is likely to matter more for those with professional degrees who are far more likely than those with master's or doctorates to be self-employed. Specifically, within the NSCG sample, 33 percent of those with professional degrees are self-employed, in contrast to 11 percent of those with master's degrees and 10 percent of those with doctorates.

[23] Many of the questions about employment, such as job tenure, hours worked, and firm size, are asked only for those who are employed at the time of the survey. Unemployment is low among those with graduate or professional degrees from elite universities. The percent unemployed for those with elite post-BA degrees ranges from 2.3 percent (tier 4 undergraduates) to 3.1 percent (tiers 1 and 3 undergraduates). The average real income values in the preceding year reported in the charts and appendix tables are based on all observations with real income in the preceding year of at least $10,000, whether or not the individual is employed at the time of the survey. Descriptive statistics for the sample used in these earnings regressions are provided in Appendix Table 6.

Table 1 summarizes results for those with post-BA degrees from an institution in tiers 1–3, and Table 2 summarizes corresponding results from those with post-BA degrees from tier 1 institutions in order to examine the smaller set of graduates from the most selective private institutions.[24] Column 1 of Tables 1 and 2 report estimates that correspond to equation 1 and take into account only tier of undergraduate institution and demographic characteristics (Hispanic/Latino, race, native-born US citizen, age and its square, location in South, and survey year). Because family background has consistently been shown to be strongly associated with whether a student attends an elite undergraduate institution, column 2 of Tables 1 and 2 add indicator variables for each parent's highest education and for location of high school to the regressions summarized in column 1. The importance of unobserved characteristics associated with family background is indicated by a comparison of the coefficients on undergraduate tier reported in column 1 relative to column 2.

Column 3 of Tables 1 and 2 add to the specification reported in column 2 indicator variables for college major and for highest degree. Institutions differ in types of undergraduate degrees offered and graduates of elite undergraduate institutions are more likely than tier 4 BA degree holders to earn professional degrees that are typically high paying. The importance of college major and highest degree in explaining the premium to elite undergraduate education is demonstrated by a comparison of the coefficients on undergraduate tier in columns 1 and 2 relative to column 3.

Lastly, in order to gain some information on the mechanism by which elite undergraduate education relates to earnings among graduates of elite graduate programs, such as by improving access to private sector jobs in large firms, column 4 of Tables 1 and 2 provides estimates of equation 2 by adding controls for job characteristics, specifically tenure and its square and potential experience and its square, and indicators for full-time employment, class of worker, occupation, and firm size.

Starting with the estimates summarized in Table 1 which are based on the sample with post-BA degrees from institutions in tiers 1–3, column 1 that controls only for demographic

[24] The complete regressions for the results summarized in Table 1 are reported in Appendix Table 7 for men and Appendix Table 8 for women. Because much of the explanatory power in typical earnings regressions arises from variation in educational attainment, the seemingly low R^2 values found in columns 1 and 2 indicate that other measureable individual-specific characteristics are not that important once the regression sample is restricted to those with post-baccalaureate degrees from elite universities. This is especially likely for the regressions for specific degrees reported in Tables 3 and 4.

characteristics and tier shows a substantial earnings premium to a bachelor's degree from a tier 1–3 institution relative to those with a bachelor's degree from a tier 4 institution. For example, among those with graduate degrees from an institution in tiers 1–3, relative to those with tier 4 undergraduate degrees, earnings are 35 log points (41 percent) higher for men and 22 log points (25 percent) higher for women who have a bachelor's degree from a tier 1 university. Those with bachelor's degrees from tier 2 or tier 3 institutions also have higher earnings relative to tier 4 graduates, but the coefficients are considerably smaller.

Inclusion of information on parents' education and high school location, summarized in column 2, reduces the coefficients on undergraduate tier for women and for men, but with the exception of those men with their BA from a tier 2 college, all coefficients remain statistically significant. Thus, the comparison of estimates in columns 1 and 2 suggest that to the extent that unobserved characteristics are the source of the premium to elite undergraduate education, these unobserved characteristics would also need to have a low correlation with family background. Because ability and personality traits are linked to family status, these results suggest that undergraduate institutional status has a relation with earnings that is not explained solely by observed or unobserved characteristics.

The estimates summarized in column 3 add indicators for college major and type of graduate degree and, with the exception of men who are tier 2 graduates, continues to show a substantial and statistically significant premium to elite undergraduate education. For example, relative to those with a tier 4 undergraduate degree, earnings are 21 log points higher for men and 7 log points higher for women who have a bachelor's degree from a tier 1 university. Thus, even taking into account the larger share with professional degrees among those with elite undergraduate degrees, the premium to elite undergraduate education generally remains substantial. Once again, because unobserved characteristics are likely correlated with type of highest degree, these findings suggest that undergraduate educational status itself has a relation with earnings.

Lastly, column 4 of Table 1 adds employment characteristics. Even with extensive controls for characteristics that may be correlated with status of undergraduate institution, such as occupation and firm size, the results show a strong premium for both men and women to earning a BA from a tier 1 institution, and a smaller premium for women from a tier 2 or 3 institution, relative to graduation from a tier 4 institution. For example, relative to those with tier

4 undergraduate degrees, earnings are 13 log points higher for men and 8 log points higher for women with a bachelor's degree from a tier 1 institution. The smaller coefficients on undergraduate tier in the comparison between columns 3 and 4 indicate that part of the premium to elite undergraduate education arises from favorable employment characteristics.

Table 2 reports estimates that correspond to the estimates in Table 1 but with the samples restricted to those who earned their post-BA degree from a selective private research university in tier 1. For both men and women, the estimates in columns 1 and 2 show that the premium to a bachelor's degree from a tier 1 institution relative to a bachelor's degree from a tier 4 institution is about half the size as shown in Table 1, although the magnitudes of the premium continue to be large at 22 log points for men and 15 log points for women (column 1) and 21 log points for men and 12 log points for women (column 2). Columns 1 and 2 also show that relative to those with bachelor's degrees from tier 4 institutions, those with bachelor's degrees from tier 3 institutions show a larger premium than reported in Table 1, with the premium comparable to those with bachelor's degree from a tier 1 institution. Thus, earning a post-BA degree from a tier 1 university reduces but does not come close to eliminating the gap between tier 1 and tier 4 undergraduate degree holders, and largely equalizes the earnings premium of tier 1 and tier 3 graduates relative to tier 4 graduates.

As reported in column 3 of Table 2, inclusion of college major and type of degree further reduces the coefficient on undergraduate tier, although the premium remains statistically significant and substantial for all men and for women who are BA graduates of tier 3 institutions, ranging from 10 log points to 19 log points. Lastly, the estimates in column 4 which add employment characteristics shows a continued substantial premium to elite undergraduate tier, indicating that only some of the advantage to elite undergraduate degrees is associated with favorable employment characteristics.[25]

[25] Removing the $10,000 lower bound on earnings to consider all observations with positive earnings shows the same pattern of results and generally a larger advantage of a tier 1–3 undergraduate degree relative to tier 4 for the overall results in this section as well as for specific degrees reported in the next section. In addition, to mitigate concerns that some tier 4 undergraduates may be admitted to elite graduate programs for diversity reasons, I generated estimates excluding tier 4 undergraduates who identify as a racial or ethnic minority; these estimates yield similar results.

7. Specific professional and graduate degrees: MBA, JD, MD, and PhD

Some graduate degrees may be more—or less—valuable in raising income beyond tier of undergraduate degree. For instance, law school is a prime example of a professional degree program in which first year grades have an important impact on career trajectory, influencing whether you are selected for the staff of the school's flagship law review (selected after year 1), which in turn influences the likelihood of a prestigious clerkship, and distinctions such as Order of the Coif (top 10 percent ranking on the basis of grades). Graduates of more selective institutions likely arrive better prepared even relative to those with similar LSAT scores and undergraduate grades, and it would not be surprising to find that those with bachelor's degrees from tier 4 institutions are unable to catch up with their peers in selective law schools. In contrast, PhD programs are of longer duration and there is less reliance on grades as a means of distinguishing top students, which may work to the advantage of high ability tier 4 students who have a longer period to catch up.

The regression estimates summarized in Tables 3 and 4 examine those who earn MBA, JD, MD, or PhD degrees from an elite institution. As noted earlier, although about one-third of the selective private liberal arts colleges classified into tier 2 offer some graduate degrees, none offer MD degrees, and the JD and MBA degrees, if offered, are generally not ranked highly. For these results by separate degrees, I include only those with their post-BA degree from a tier 1 or tier 3 institution. Most of the highly ranked MBA, JD, and PhD programs are associated with major research universities. Also, as discussed earlier, MD programs are offered in specialized programs such as by hospitals as well as by major research universities, with some specialized MD programs highly ranked and others unranked. The results for MDs compare, on the basis of undergraduate tier, those who earn their MD from an institution that is associated with a major research university.

It is important to keep in mind that very few bachelor's degree graduates of tier 4 institutions are graduates of elite professional or PhD programs. Despite the resulting reduction in statistical power from having few undergraduate tier 4 graduates within the estimating sample, most of the regression results continue to show statistically significant premiums to an elite undergraduate institution.

Table 3 reports the coefficients on undergraduate tier for those with post-BA degrees from tier 1 or tier 3; Table 4 reports the corresponding coefficients for those with post-BA

degrees from tier 1 institution. The regressions include information on individual demographics, family background, and college major (corresponding to the estimates in column 3 of Tables 1 and 2). In general, the pattern for specific post-BA degrees earned from an elite institution follow the patterns shown in Tables 1 and 2 which combine all observations with a post-BA degree from an elite institution.

Turning first to the estimates reported in Table 3, for all of the specific degrees, men with an undergraduate degree from a tier 1 institution who earn a post-BA degree from a tier 1 or tier 3 university have a large and statistically significant premium relative to men with an undergraduate degree from a tier 4 institution. The premiums for these men relative to those with undergraduate degrees from a tier 4 institution is quite large, at about 17 log points for those with an MBA or PhD, 24 log points for those with MD degrees, and 35 log points for those with JD degrees. There are also substantial premiums for men with an undergraduate degree from tier 2 or tier 3 institutions that vary by type of degree. Among men with MBA degrees, those with undergraduate degrees from tier 2 institutions have the largest premium relative to men with an undergraduate degree from a tier 4 institution, at 31 log points. Many liberal arts colleges encourage development of strong interpersonal and social skills and also have strong alumni networks which would seem to provide advantages, at least for MBAs. The lower pay among PhDs of men with an undergraduate degree from a tier 2 institution may reflect the tendency of graduates of liberal arts colleges who earn a PhD to become employed at similar colleges that are generally lower paying.

Women with tier 1 undergraduate degrees who have either a JD or PhD degree have a large earnings premium relative to tier 4 graduates, of 28 log points for JDs and 16 log points for PhDs. But there is limited evidence that undergraduate tier is related to earnings among women with MBAs or MDs from a tier 1 or tier 3 institution; in fact, tier 3 graduates who earn MD degrees actually have lower earnings than tier 4 graduates.

Consider now those who earn post-BA degrees from tier 1 universities reported in Table 4. For most of the degrees, the gap between those with tier 1–3 undergraduate degrees relative to those with tier 4 undergraduate degrees is not diminished and in many cases is larger. For example, among men with MBA degrees, those with undergraduate degrees from tier 2 institutions have the largest premium relative to men with an undergraduate degree from a tier 4 institution, at 67 log points. Among those with JDs, the premium to tier 1 or tier 3 undergraduate

education for those with their JD from tier 1 universities relative to a tier 4 BA graduate remains large, at 42 to 44 log points.

The premium to tier 3 undergraduate education for men with MDs who earn their degree from a tier 1 medical institution relative to tier 4 graduates is also large at 19 log points. But earning a top medical degree appears to eliminate the advantage of a tier 1 undergraduate education. And, among those with PhDs from a tier 1 institution, those with undergraduate degrees from tier 1 institutions have a large premium relative to those with undergraduate degrees from a tier 4 institution. However, for both men and women, the premium is about half the size of that for JDs, which is consistent with the possibility that the longer duration of PhD programs relative to JD programs may work to the advantage of those with undergraduate degrees from tier 4 institutions.

8. Benefit-cost comparisons

It is well-established that graduation from a more selective college pays off monetarily compared to the cost of the investment (Hoxby, 2001). Our interest here is whether the monetary calculation still holds among those earning an elite graduate degree. While there is a clear continued premium to earning an elite undergraduate degree even among those with an elite graduate degree, it may still be a wise financial decision if the marginal costs of attending the more selective institution are sufficiently large. In this section I report the present value of the marginal earnings advantage to an elite undergraduate degree among those with elite graduate degrees to provide some reference points to compare to the marginal costs. These comparisons include only the private benefits and costs to individuals. I do not provide calculations of the social rate of return to these educational investments, which, as identified in Blomquist et al. (2014), may be substantially higher than the private rate of return.

In the following comparisons, a key assumption is that students who successfully earn a graduate degree from an elite institution were, or could have been, admitted to colleges across a range of selectivity for their undergraduate degree. Furthermore, because the interest is in whether the motivating maxim—that an elite graduate degree can "scrub" a less prestigious undergraduate degree—the comparison is conditional on the assumption that the students expect to earn a post-baccalaureate degree and in particular, an elite graduate degree.

Many factors influence the college match process, the choice of major conditional on the institution they attend, and the career trajectory following graduation. From the standpoint of a high school senior, I assume that the benefit-cost comparison is based on average earnings of those with elite graduate degrees observed within the sample, without controlling for uncertain and possibly endogenously determined characteristics such as undergraduate major, graduate or professional degree type, or employment characteristics. That is, the present value calculations simply address the expected average difference in lifetime earnings from attending more or less selective undergraduate institutions among those with graduate degrees from elite institutions. I base the calculations on average earnings per year from ages 25 to 70, to allow time for many—but not all—to have earned their post-baccalaureate degree. The average earnings per year are based on the same sample as in the regression analyses; that is, annual earnings of at least $10,000 or more in $2017 and employed when surveyed, and all earnings values are weighted by the sample weights. I stratify by gender to account for gender differences in labor force participation. Because all of the salary comparisons are made based on current $2017, not adjusted for inflation over time, I assume a real discount rate of 3 percent to reflect the current interest rate on federal student loans of 5 percent with the assumption of a 2 percent rate of inflation over time.

To provide a baseline cost comparison, average total tuition, fees, room, and board for full-time students in 4-year degree granting institutions was $26,120 for private institutions and $19,189 for public institutions for 2015–2016 (U.S. Department of Education, 2018b). Different institutions charge different amounts and provide different discounts to students, with many paying less than the listed price, but these values provide a ballpark showing that the cost difference between different tiers of institutions is likely to be small for most students.

Table 5 summarizes these present value calculations and shows substantial greater lifetime earnings associated with a more selective undergraduate institution. For example, for men who earn a graduate degree from a tier 1, 2, or 3 institution, having an undergraduate degree from a tier 1 institution instead of a tier 4 institution is associated with lifetime earnings that is more than $1.5 million greater—a premium that dominates any plausible differences in the cost of attending the more selective institution. The corresponding premium for women is about half the size but also dominates any plausible differences in costs.

A typical decision that students may face is between tier 3 and tier 4 institutions. Tier 3 institutions are large public research institutions and include most of a state's flagship universities. Tier 4 includes a number of public universities as well as a number of private institutions. The tier 3 to tier 4 differences in the present value of earnings are around $525,000 for men and $293,000 for women. For students who are choosing between public institutions within a state, even substantial differences in the value of scholarships will be swamped by the earnings premium from attending the more selective institution.

9. Conclusion

The objective of this paper is to identify whether your less prestigious undergraduate credential can be "scrubbed" by earning an elite graduate degree. If so, then talented graduate-school-bound students could choose their undergraduate institution based solely on cost or for any other reason. This paper shows the perils of this strategy. The benefit-cost analysis shows that the substantial premium to elite undergraduate education is not overcome for those with a nonelite undergraduate degree even by earning a post-graduate degree from an elite institution. Few graduates of nonselective institutions continue on to graduate or professional schools, and among those who do, very few move to higher-ranked post-BA programs. And even when they do, their earnings do not catch up to their counterparts with elite undergraduate degrees, even taking into account type of degree and work characteristics that are themselves related to status of undergraduate degree. Furthermore, any costs savings from attending a lower cost institution for the undergraduate degree is generally quickly swamped by the persistent marginal earnings benefit to an elite undergraduate degree.

The relation between family background in influencing undergraduate institution status, and undergraduate institutional status in influencing post-baccalaureate outcomes, implies that "undermatching" may have permanent consequences if students who do not attend elite institutions for their bachelor's degree are unable to overcome their initial placement by moving up to an elite graduate or professional school for a post-baccalaureate degree.

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Figure 1

Comparison of Carnegie Classifications and Barron's Selectivity Categories

	Public			Private		
Carnegie classification	Barron's competitiveness category: Most	Barron's competitiveness category: Highly	Number in Carnegie classification	Barron's competitiveness category: Most	Barron's competitiveness category: Highly	Number in Carnegie classification
Research I	1	10	59	16	7	29
Research II	0	0	26	2	7	11
Doctoral I	1	1	28	1	1	23
Doctoral II	0	2	38	2	1	22
Master's I	0	4	249	0	3	186
Master's II	0	0	26	0	1	68
Liberal Arts I	0	1	7	14	40	159
Liberal Arts II	0	0	79	0	1	392

Tier 3

Tier 1

Tier 2

This table reports by Carnegie classification and public or private institutional control the total number of institutions awarding bachelor's and higher degrees and the number of institutions that are classified by Barron's as most competitive or highly competitive. See Carnegie Foundation for the Advancement of Teaching (c1994) and Barron's Educational Series (1994).

Figure 2

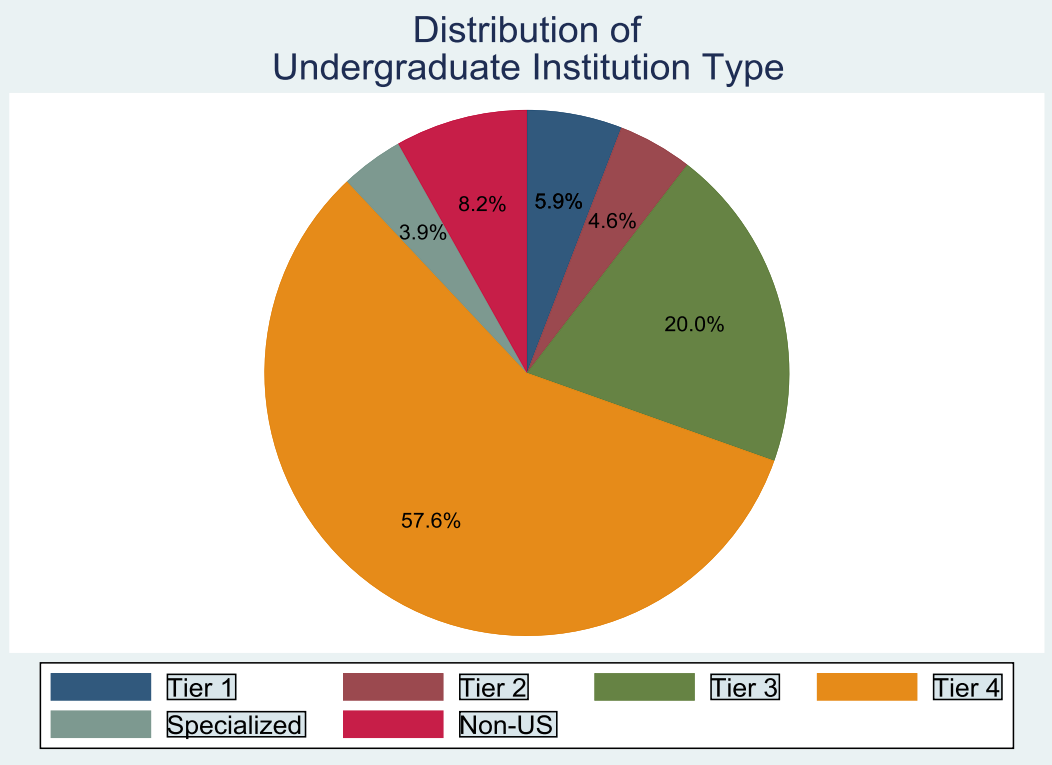
Distribution of
Undergraduate Institution Type
5.9%
4.6%
20.0%
57.6%
3.9%
8.2%
Tier 1
Tier 2
Tier 3
Tier 4
Specialized
Non-US

Figure 3

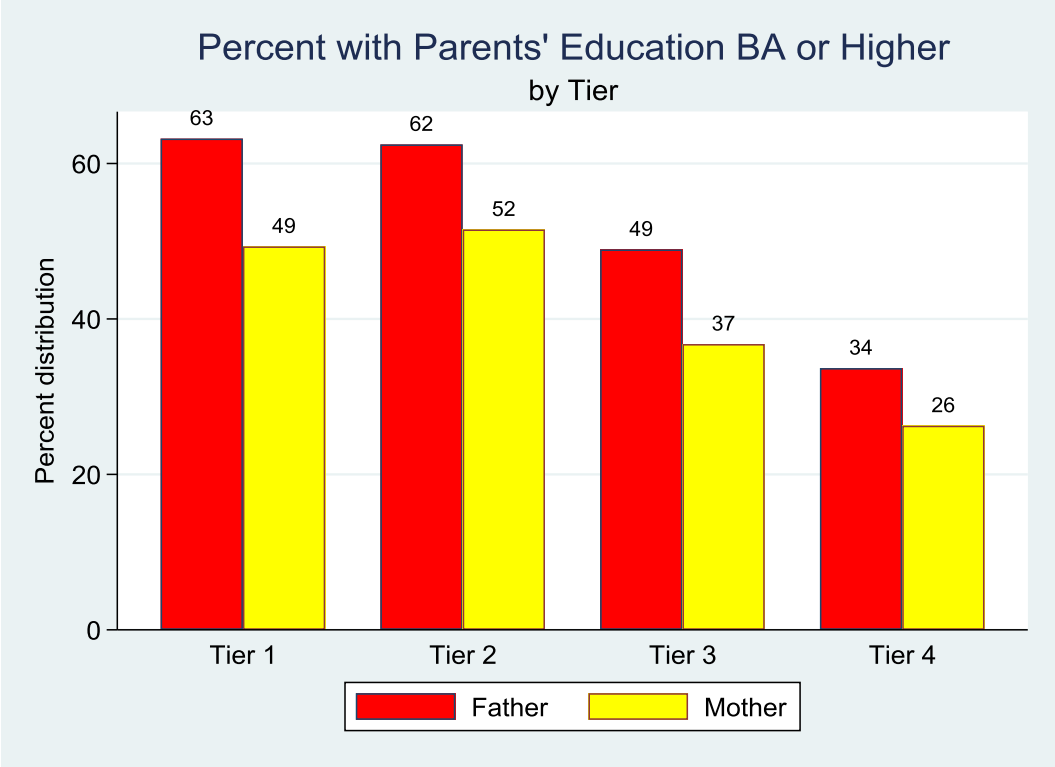
Percent with Parents' Education BA or Higher
by Tier
Percent distribution
0
20
40
60
63
49
62
52
49
37
34
26
Tier 1
Tier 2
Tier 3
Tier 4
Father
Mother

Figure 4

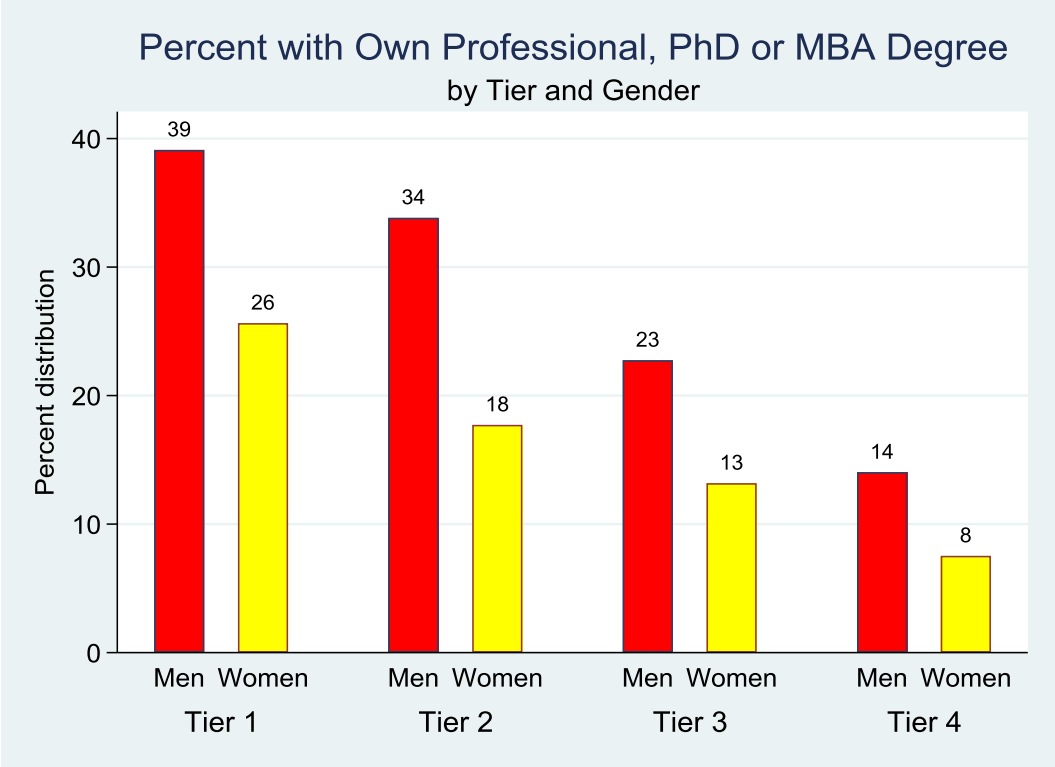
Percent with Own Professional, PhD or MBA Degree
by Tier and Gender
Percent distribution
0
10
20
30
40
39
26
34
18
23
13
14
8
Men
Women
Tier 1
Tier 2
Tier 3
Tier 4

Figure 5

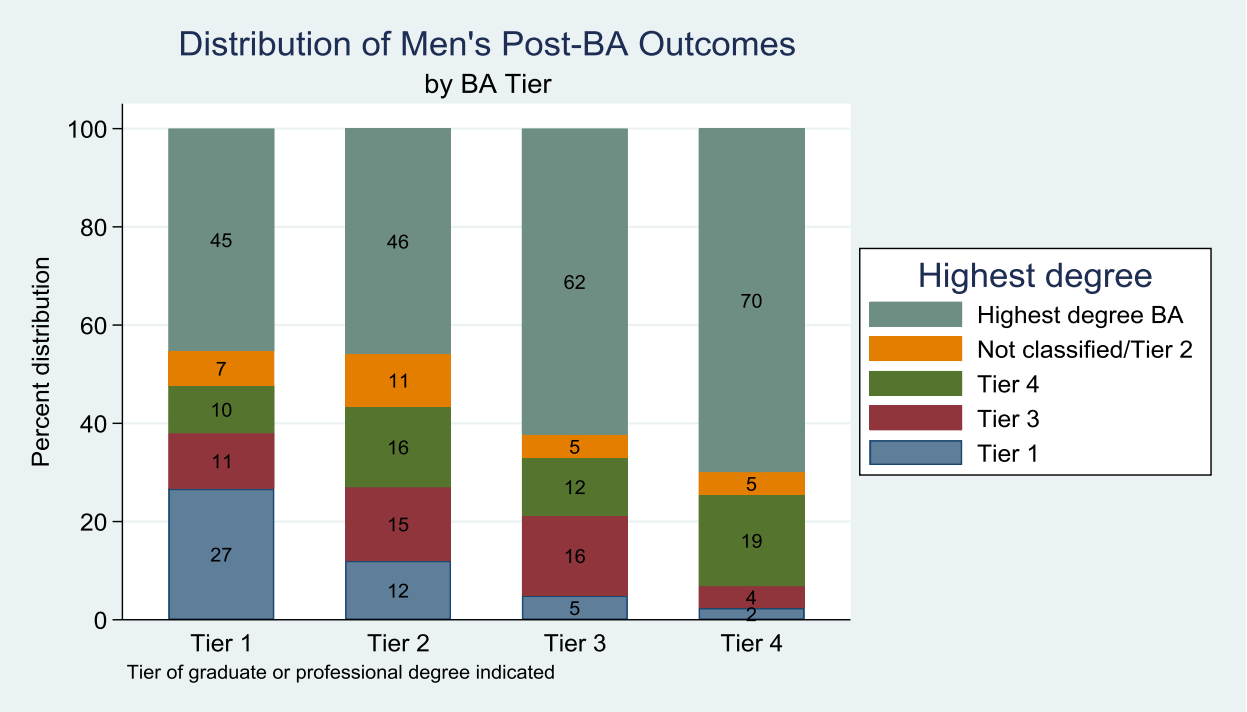
Distribution of Men's Post-BA Outcomes
by BA Tier
Percent distribution
100
80
60
40
20
0
45
7
10
11
27
46
11
16
15
12
62
5
12
16
5
70
5
19
4
2
Tier 1
Tier 2
Tier 3
Tier 4
Tier of graduate or professional degree indicated
Highest degree
Highest degree BA
Not classified/Tier 2
Tier 4
Tier 3
Tier 1

Figure 6

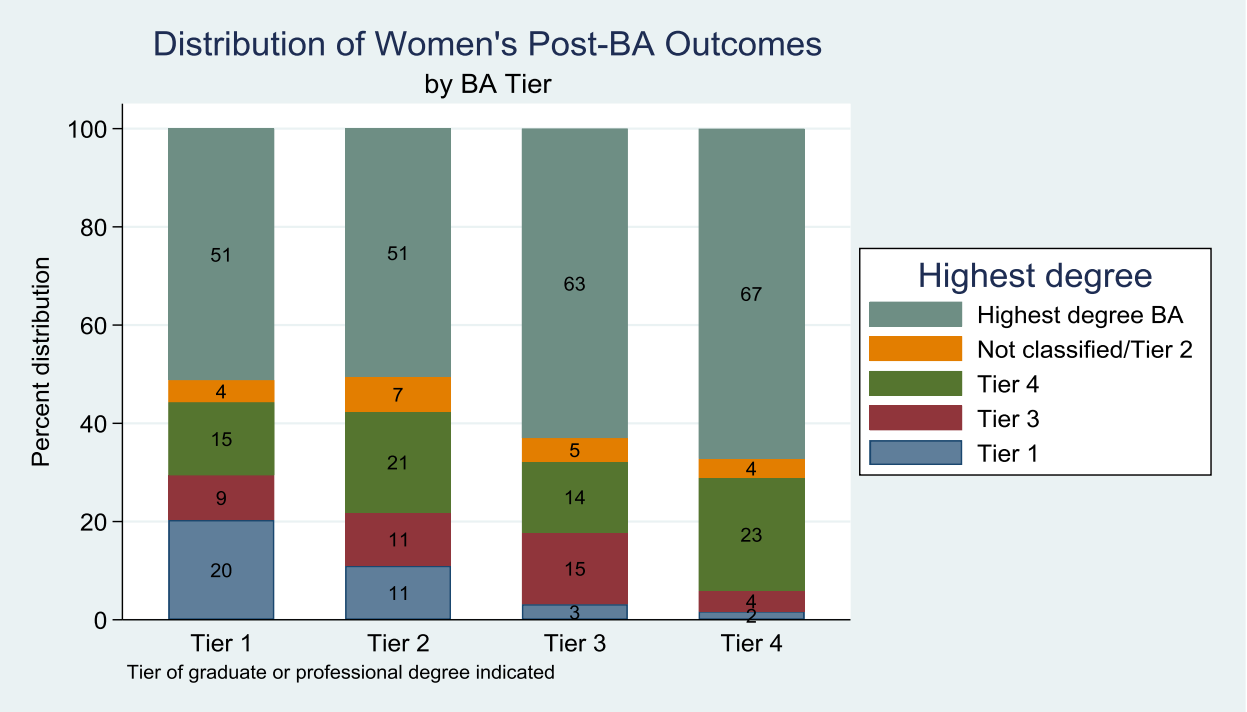
Distribution of Women's Post-BA Outcomes
by BA Tier
Percent distribution
100
80
60
40
20
0
51
4
15
9
20
51
7
21
11
11
63
5
14
15
3
67
4
23
4
2
Tier 1
Tier 2
Tier 3
Tier 4
Tier of graduate or professional degree indicated
Highest degree
Highest degree BA
Not classified/Tier 2
Tier 4
Tier 3
Tier 1

Figure 7

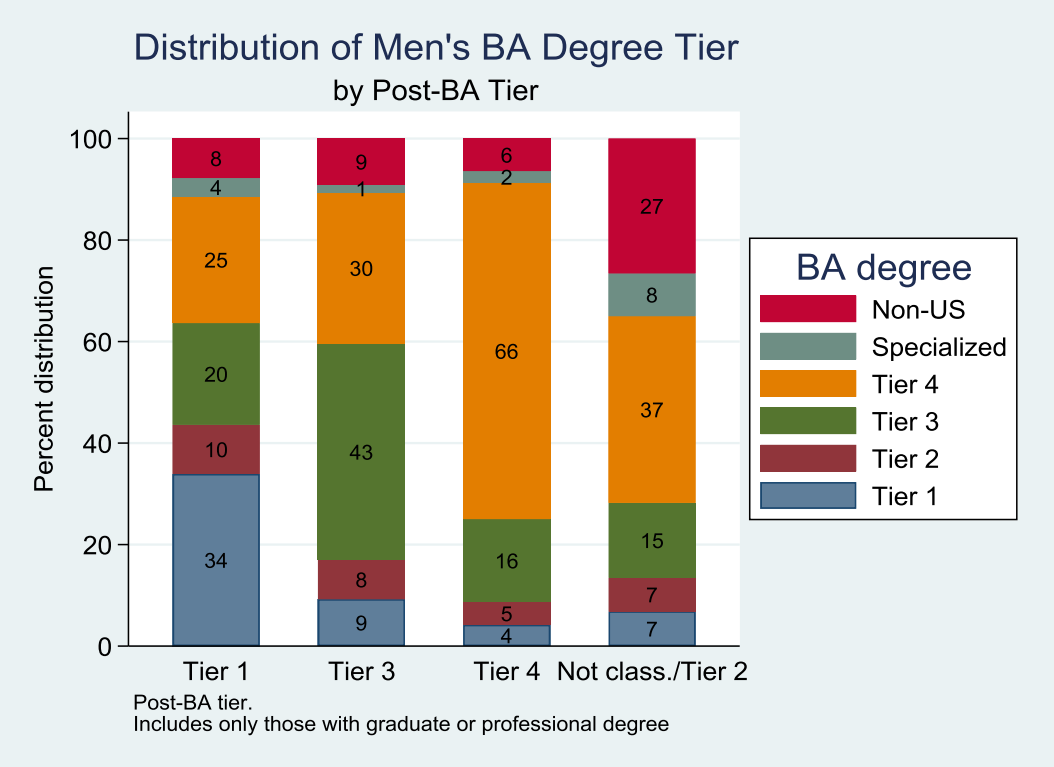
Distribution of Men's BA Degree Tier
by Post-BA Tier
Percent distribution
100
80
60
40
20
0
8
4
25
20
10
34
9
1
30
43
8
9
6
2
66
16
5
4
27
8
37
15
7
7
Tier 1
Tier 3
Tier 4
Not class./Tier 2
Post-BA tier.
Includes only those with graduate or professional degree
BA degree
Non-US
Specialized
Tier 4
Tier 3
Tier 2
Tier 1

Figure 8

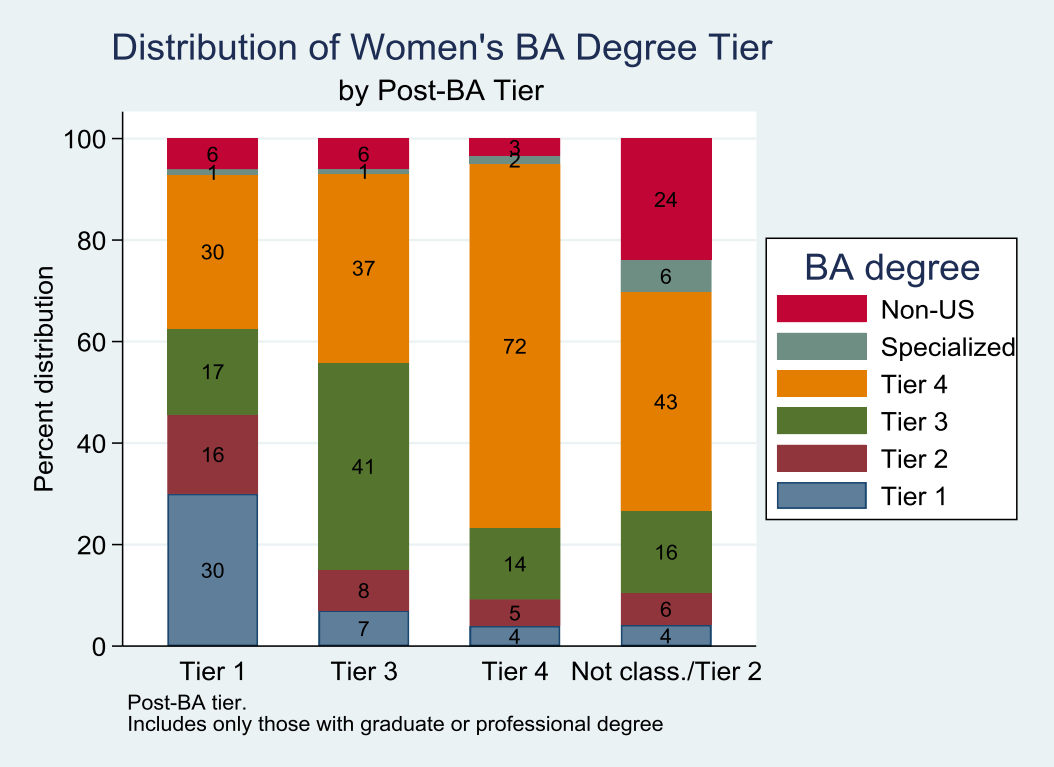
Distribution of Women's BA Degree Tier
by Post-BA Tier
Percent distribution
100
80
60
40
20
0
6
1
30
17
16
30
6
1
37
41
8
7
3
2
72
14
5
4
24
6
43
16
6
4
Tier 1
Tier 3
Tier 4
Not class./Tier 2
Post-BA tier.
Includes only those with graduate or professional degree
BA degree
Non-US
Specialized
Tier 4
Tier 3
Tier 2
Tier 1

Figure 9

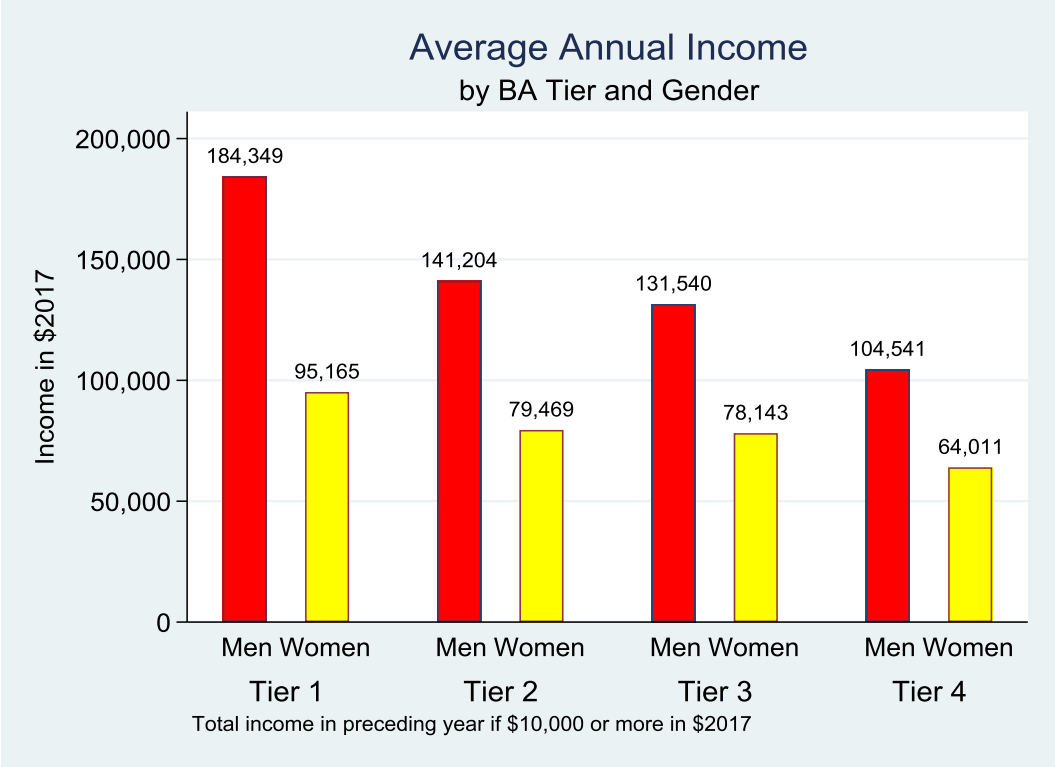
Average Annual Income
by BA Tier and Gender
Income in $2017
200,000
150,000
100,000
50,000
0
184,349
95,165
141,204
79,469
131,540
78,143
104,541
64,011
Men Women
Men Women
Men Women
Men Women
Tier 1
Tier 2
Tier 3
Tier 4
Total income in preceding year if $10,000 or more in $2017

Figure 10

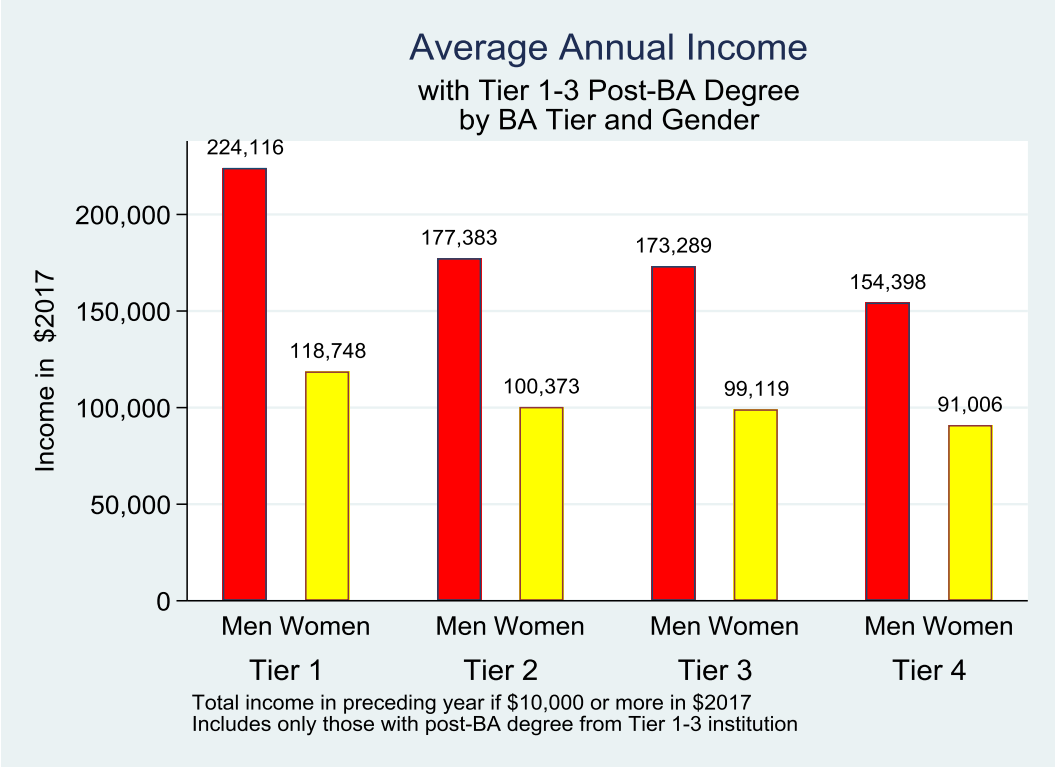
Average Annual Income
with Tier 1-3 Post-BA Degree
by BA Tier and Gender
Income in $2017
0
50,000
100,000
150,000
200,000
224,116
118,748
177,383
100,373
173,289
99,119
154,398
91,006
Men Women
Tier 1
Men Women
Tier 2
Men Women
Tier 3
Men Women
Tier 4
Total income in preceding year if $10,000 or more in $2017
Includes only those with post-BA degree from Tier 1-3 institution

Figure 11

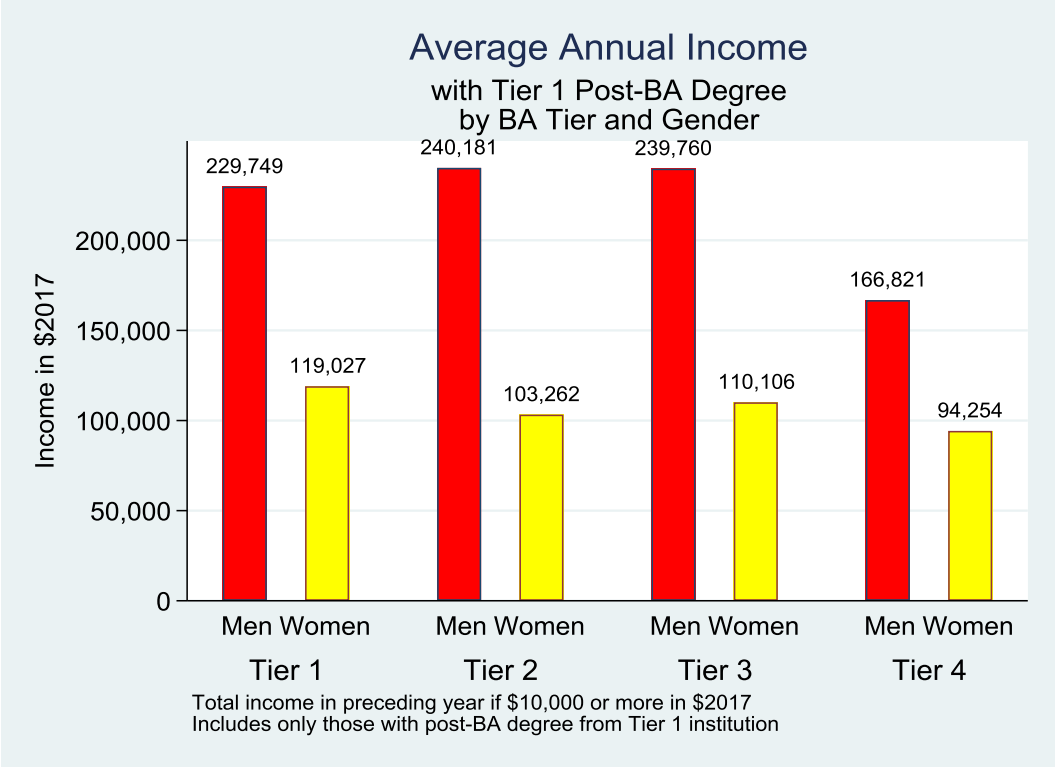
Average Annual Income
with Tier 1 Post-BA Degree
by BA Tier and Gender
Income in $2017
200,000
150,000
100,000
50,000
0
229,749
119,027
240,181
103,262
239,760
110,106
166,821
94,254
Men Women
Tier 1
Men Women
Tier 2
Men Women
Tier 3
Men Women
Tier 4
Total income in preceding year if $10,000 or more in $2017
Includes only those with post-BA degree from Tier 1 institution

Table 1: All Tier 1–3 post-BA degrees
Dependent variable: Log(real total income)

	(1)	(2)	(3)	(4)
Men				
Tier 1 BA	0.345**	0.300**	0.210**	0.128**
	(0.012)	(0.012)	(0.011)	(0.010)
Tier 2 BA	0.030*	–0.007	0.016	–0.019
	(0.015)	(0.015)	(0.015)	(0.013)
Tier 3 BA	0.115**	0.117**	0.068**	0.012
	(0.010)	(0.010)	(0.010)	(0.009)
Adjusted R-squared	0.13	0.15	0.25	0.38
Women				
Tier 1 BA	0.221**	0.179**	0.065**	0.081**
	(0.013)	(0.013)	(0.013)	(0.011)
Tier 2 BA	0.093**	0.063**	0.041**	0.027*
	(0.014)	(0.014)	(0.014)	(0.012)
Tier 3 BA	0.078**	0.075**	0.041**	0.037**
	(0.010)	(0.010)	(0.010)	(0.008)
Adjusted R-squared	0.08	0.09	0.21	0.41
Own demographics	yes	yes	yes	yes
Family background	no	yes	yes	yes
College major and highest degree	no	no	yes	yes
Employment characteristics	no	no	no	yes

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. Sample includes those with a post-baccalaureate degree from an institution in Tier 1, Tier 2, or Tier 3, with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Number of observations: men, 42,954; women, 30,784. All values are calculated using the NSCG sample weights. See text or Appendix Tables 6 and 7 for additional variables included in equations.

Table 2: All Tier 1 post-BA degrees
Dependent variable: Log(real total income)

	(1)	(2)	(3)	(4)
Men				
Tier 1 BA	0.223**	0.208**	0.140**	0.074**
	(0.018)	(0.018)	(0.018)	(0.016)
Tier 2 BA	0.129**	0.107**	0.101**	0.049*
	(0.026)	(0.026)	(0.025)	(0.023)
Tier 3 BA	0.230**	0.242**	0.188**	0.146**
	(0.021)	(0.021)	(0.020)	(0.019)
Adjusted R-squared	0.13	0.14	0.23	0.36
Women				
Tier 1 BA	0.149**	0.122**	0.025	0.053**
	(0.019)	(0.020)	(0.019)	(0.016)
Tier 2 BA	–0.005	–0.014	–0.047*	–0.053**
	(0.023)	(0.024)	(0.023)	(0.020)
Tier 3 BA	0.128**	0.142**	0.094**	0.088**
	(0.022)	(0.023)	(0.021)	(0.018)
Adjusted R-squared	0.10	0.11	0.24	0.44
Own demographics	yes	yes	yes	yes
Family background	no	yes	yes	yes
College major and highest degree	no	no	yes	yes
Employment characteristics	no	no	no	yes

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. Sample includes those with a post-baccalaureate degree from an institution in Tier 1, with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Number of observations: men, 15,379; women, 10,847. All values are calculated using the NSCG sample weights. See text or Appendix Tables 6 and 7 for additional variables included in equations.

Table 3: Tier 1 or Tier 3 MBA, JD, MD, and PhD degrees
Dependent variable: Log(real total income)

	(1) MBA	(2) JD	(3) MD	(4) PhD
Men				
Tier 1 BA	0.173**	0.351**	0.238**	0.176**
	(0.037)	(0.052)	(0.051)	(0.020)
Tier 2 BA	0.309**	–0.032	–0.093	–0.101**
	(0.056)	(0.067)	(0.066)	(0.023)
Tier 3 BA	0.073*	0.184**	0.009	0.028+
	(0.032)	(0.052)	(0.047)	(0.017)
Observations	4,920	2,517	2,215	11,999
Adjusted R-squared	0.15	0.14	0.23	0.17
Women				
Tier 1 BA	0.031	0.277**	0.072	0.164**
	(0.058)	(0.062)	(0.061)	(0.024)
Tier 2 BA	–0.124	0.082	0.020	0.034
	(0.078)	(0.070)	(0.071)	(0.026)
Tier 3 BA	0.072	0.090+	–0.125*	0.013
	(0.052)	(0.052)	(0.058)	(0.020)
Observations	1,979	1,637	1,168	6,768
Adjusted R-squared	0.12	0.11	0.24	0.14

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1% Sample includes those with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Additional variables in each equation are own demographics, family background, and college major, and correspond to the variables listed in column 3 of Appendix Tables 7 and 8 (excluding indicators for highest degree type). All values are calculated using the NSCG sample weights.

Table 4: Tier 1 MBA, JD, MD, and PhD degrees
Dependent variable: Log(real total income)

	(1) MBA	(2) JD	(3) MD	(4) PhD
Men				
Tier 1 BA	0.141**	0.440**	0.085	0.214**
	(0.052)	(0.077)	(0.075)	(0.031)
Tier 2 BA	0.674**	0.220*	–0.111	–0.096*
	(0.079)	(0.102)	(0.101)	(0.039)
Tier 3 BA	0.330**	0.415**	0.190*	0.110**
	(0.056)	(0.095)	(0.094)	(0.034)
Observations	2,442	1,215	829	3,929
Adjusted R-squared	0.20	0.14	0.30	0.26
Women				
Tier 1 BA	0.037	0.480**	0.011	0.247**
	(0.079)	(0.087)	(0.113)	(0.039)
Tier 2 BA	0.081	0.193+	–0.144	–0.013
	(0.117)	(0.100)	(0.119)	(0.041)
Tier 3 BA	–0.159+	0.598**	–0.142	0.119**
	(0.093)	(0.094)	(0.146)	(0.043)
Observations	943	804	439	2,218
Adjusted R-squared	0.21	0.19	0.32	0.18

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1% Sample includes those with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Additional variables in each equation are own demographics, family background, and college major, and correspond to the variables listed in column 3 of Appendix Tables 7 and 8 (excluding indicators for highest degree type). All values are calculated using the NSCG sample weights.

Table 5: Present value of earnings differences between undergraduate tiers (in $2017)

BA tier comparison	Tier 1–3 post-BA degrees	Tier 1 post-BA degrees
Men		
Tier 1–Tier 4	1,548,176	1,478,942
Tier 2–Tier 4	625,919	1,682,713
Tier 3–Tier 4	525,323	1,331,400
Tier 1–Tier 3	1,022,853	147,542
Women		
Tier 1–Tier 4	788,354	705,539
Tier 2–Tier 4	318,455	311,071
Tier 3–Tier 4	292,761	592,349
Tier 1–Tier 3	495,594	113,190

Note: The table reports the present value in $2017 of the difference in lifetime earnings between those with undergraduate degrees in the indicated tiers. The present value is calculated assuming a 3 percent discount rate and a worklife from ages 25 to 70. Sample includes those with elite graduate degrees and annual earnings of at least $10,000 or more in $2017 and employed when surveyed. All values are calculated using the NSCG sample weights.

Appendix Table 1: Institutions categorized into Tiers 1–3

Tier groupings are created in Hersch (2013) and based on a comparison of the 1994 Carnegie Classification with Barron's selectivity categories. See text for additional information. Institution names are listed in the indicated categories in Carnegie Foundation for the Advancement of Teaching, A Classification of Institutions of Higher Education/with a foreword by Ernest L. Boyer – 1994 ed.

Tier 1	
Private Research I	
Boston University	Northwestern University
Brown University	Princeton University
California Institute of Technology	Rockefeller University
Carnegie Mellon University	Stanford University
Case Western Reserve University	Tufts University
Columbia University in the City of New York	University of Chicago
Cornell University	University of Miami
Duke University	University of Pennsylvania
Emory University	University of Rochester
Georgetown University	University of Southern California
Harvard University	Vanderbilt University
Howard University	Washington University
Johns Hopkins University	Yale University
Massachusetts Institute of Technology	Yeshiva University
New York University	
Private Research II	
Brandeis University	Rice University
Brigham Young University	Saint Louis University
George Washington University	Syracuse University Main Campus
Lehigh University	Tulane University
Northeastern University	University of Notre Dame
Rensselaer Polytechnic Institute	

Tier 2		
Private Liberal Arts I		
Agnes Scott College	Grinnell College	Reed College
Albion College	Guilford College	Rhodes College
Albright College	Gustavus Adolphus College	Ripon College
Allegheny College	Hamilton College	Saint John's University (MN)
Alma College	Hamline University	Saint Olaf College
Amherst College	Hampden-Sydney College	Salem College
Antioch University	Hampshire College	Sarah Lawrence College
Augustana College (IL)	Hanover College	Scripps College
Austin College	Hartwick College	Siena College
Bard College	Hastings College	Simon's Rock College of Bard
Barnard College	Haverford College	Skidmore College
Bates College	Hendrix College	Smith College
Beloit College	Hiram College	Southwestern University
Bennington College	Hobart and William Smith Colleges	Spelman College
Berea College	Hollins College	St. Andrews Presbyterian College
Bethany College (WV)	Hope College	St. John's College (MD)
Birmingham Southern College	Houghton College	St. John's College (NM)
Bowdoin College	Huntingdon College	St. Lawrence University
Bryn Mawr College	Illinois College	Swarthmore College
Bucknell University	Illinois Wesleyan University	Sweet Briar College
Carleton College	Judson College (AL)	Thomas Aquinas College
Central College (IA)	Juniata College	Transylvania University
Centre College	Kalamazoo College	Trinity College (CT)
Chatham College	Kenyon College	Union College (NY)
Christendom College	Knox College	University of Dallas
Claremont McKenna College	Lafayette College	University of Judaism
Coe College	Lake Forest College	University of Puget Sound
Colby College	Lawrence University	University of the South
Colgate University	Lewis and Clark College	Ursinus College
College of Saint Benedict	Luther College	Vassar College
College of Wooster	Macalester College	Virginia Wesleyan College
College of the Atlantic	Manhattanville College	Wabash College
College of the Holy Cross	Marlboro College	Wartburg College
Colorado College	Middlebury College	Washington College
Concordia College-Moorhead	Mills College	Washington and Jefferson College
Connecticut College	Millsaps College	Washington and Lee University
Cornell College	Monmouth College (IL)	Wellesley College
Davidson College	Moravian College	Wells College
DePauw University	Morehouse College	Wesleyan College
Denison University	Mount Holyoke College	Wesleyan University
Dickinson College	Muhlenberg College	Western Maryland College
Drew University	Nebraska Wesleyan University	Westminster College (MO)
Earlham College	Oberlin College	Westminster College (PA)
Eckerd College	Occidental College	Westmont College
Erskine College	Oglethorpe University	Wheaton College (IL)
Franklin & Marshall College	Ohio Wesleyan University	Wheaton College (MA)
Franklin College of Indiana	Pitzer College	Whitman College
Furman University	Pomona College	Whittier College
Georgetown College	Presbyterian College	Willamette University
Gettysburg College	Providence College	William Jewell College
Gordon College (MA)	Radcliffe College	Williams College
Goshen College	Randolph-Macon College	Wittenberg University
Goucher College	Randolph-Macon Woman's College	Wofford College

Tier 3	
Public Research I	
Arizona State University	University of Colorado at Boulder
Colorado State University	University of Connecticut
Florida State University	University of Florida
Georgia Institute of Technology	University of Georgia
Indiana University at Bloomington	University of Hawaii at Manoa
Iowa State University	University of Illinois at Chicago
Louisiana State University and Agricultural and Mechanical College	University of Illinois at Urbana-Champaign
Michigan State University	University of Iowa
New Mexico State University Main Campus	University of Kansas Main Campus
North Carolina State University	University of Kentucky
Ohio State University, Main Campus, The	University of Maryland College Park
Oregon State University	University of Massachusetts at Amherst
Pennsylvania State University Main Campus	University of Michigan-Ann Arbor
Purdue University Main Campus	University of Minnesota-Twin Cities
Rutgers the State University of New Jersey New Brunswick Campus	University of Missouri-Columbia
State University of New York at Buffalo	University of Nebraska-Lincoln
State University of New York at Stony Brook	University of New Mexico Main Campus
Temple University	University of North Carolina at Chapel Hill
Texas A&M University	University of Pittsburgh, Pittsburgh Campus
University of Alabama at Birmingham	University of Tennessee, Knoxville
University of Arizona	University of Texas at Austin
University of California-Berkeley	University of Utah
University of California-Davis	University of Virginia
University of California-Irvine	University of Washington
University of California-Los Angeles	University of Wisconsin-Madison
University of California-San Diego	Utah State University
University of California-San Francisco	Virginia Commonwealth University
University of California-Santa Barbara	Virginia Polytechnic Institute and State University
University of Cincinnati Main Campus	Wayne State University
	West Virginia University

Appendix Table 2: Parents' education by undergraduate tier of sample member

	Overall rate	Tier 1	Tier 2	Tier 3	Tier 4	Tier differences
Panel A: Percentage of parents with indicated highest degree, summary						
Father-BA or higher	40.47	63.21	62.46	48.94	33.68	all but 1–2
Father-PhD or professional	8.72	22.47	19.76	11.17	5.81	all
Mother-BA or higher	30.92	49.33	51.51	36.77	26.26	all
Mother-PhD or professional	2.19	6.07	4.69	2.35	1.47	all
N	456,861	31,081	20,560	99,510	214,256	
Panel B: Percentage of parents with indicated highest degree, details						
Father's education						
Less than high school	13.79	7.58	5.93	10.21	15.21	all
High school graduate	25.92	14.75	16.46	22.33	29.73	all
Some college	18.38	13.60	14.45	17.76	20.11	all but 1–2
Bachelor's degree	21.22	25.26	26.15	24.72	18.84	all but 1–2 & 1–3
Master's degree	10.53	15.48	16.55	13.06	9.03	all
Professional degree	5.06	14.28	12.18	6.33	3.34	all
PhD	3.65	8.19	7.57	4.84	2.47	all
Education missing	1.45	0.86	0.69	0.76	1.28	1–4, 2–4, 3–4
Mother's education						
Less than high school	12.60	5.92	5.01	8.52	12.49	all
High school graduate	33.23	24.52	21.73	30.89	37.00	all
Some college	22.39	20.02	21.64	23.50	23.79	all but 3–4
Bachelor's degree	19.71	27.10	29.17	23.54	17.29	all
Master's degree	9.02	16.17	17.66	10.87	7.51	all
Professional degree	1.14	3.31	2.05	1.20	0.76	all
PhD	1.05	2.76	2.64	1.15	0.70	all but 1–2
Education missing	0.86	0.20	0.12	0.32	0.65	all but 1–2 & 1–3
N	177,590	31,081	20,560	99,510	214,256	

Note: Author's calculations from 2003–2017 National Survey of College Graduates. The overall rates are based on all respondents in the NSCG sample. Percentages reported in columns headed tier 1–tier 4 report the education of the parents among those in the NSCG sample with a bachelor's degree from an institution in that tier. Significant differences in percentages between tiers at the 5% level based on a Bonferroni multiple comparison test are indicated in the last column. All values are calculated using the NSCG sample weights.

Appendix Table 3: Percentage with own highest degree type by undergraduate tier

	Overall rate	Tier 1	Tier 2	Tier 3	Tier 4
Panel A: Men					
PhD	4.60	7.95	8.69	4.41	2.56
MD	3.38	8.40	7.11	3.90	1.63
JD	3.65	11.27	9.94	4.92	2.57
Other professional	0.29	0.09	0.14	0.25	0.21
MBA	8.12	11.41	7.96	9.28	7.06
MA-education	3.90	1.82	4.93	2.59	5.26
MA-other	13.13	13.79	15.38	12.34	10.76
Highest degree BA	62.93	45.28	45.85	62.32	69.94
N	249,833	18,042	9,322	57,633	110,205
Panel B: Women					
PhD	2.53	5.02	4.69	2.80	1.57
MD	1.64	4.90	2.93	1.92	0.81
JD	2.28	7.83	5.41	3.77	1.38
Other professional	0.46	0.24	0.42	0.53	0.27
MBA	4.28	7.66	4.27	4.16	3.49
MA-education	10.79	6.50	11.53	9.35	12.87
MA-other	14.08	16.65	20.21	14.47	12.44
Highest degree BA	63.94	51.20	50.54	62.99	67.16
N	207,028	13,039	11,238	41,877	104,051

Note: Author's calculations from 2003–2017 National Survey of College Graduates. The overall rates are based on all respondents in the NSCG sample. Percentages reported in columns headed tier 1–tier 4 are based on those in the NSCG sample with a bachelor's degree from an institution in that tier. All values are calculated using the NSCG sample weights.

Appendix Table 4: Percentage with post-baccalaureate outcomes by undergraduate tier: Full sample

	Overall rate	Tier 1	Tier 2	Tier 3	Tier 4
Panel A: Men					
Post-BA Tier 1	5.22	26.67	12.01	4.91	2.39
Post-BA Tier 2	0.31	0.34	1.31	0.31	0.24
Post-BA Tier 3	8.17	11.33	14.96	16.28	4.45
Post-BA Tier 4	15.34	9.65	16.42	11.73	18.60
Post-BA specialized	3.43	3.89	7.52	2.86	2.74
Post-BA non-US	2.80	1.25	0.60	0.38	0.21
Post-BA Carnegie missing	1.81	1.59	1.33	1.20	1.43
Highest degree BA	62.93	45.28	45.85	62.32	69.94
N	249,833	18,042	9,322	57,633	110,205
Panel B: Women					
Post-BA Tier 1	3.51	20.31	11.00	3.17	1.75
Post-BA Tier 2	0.45	0.32	2.29	0.46	0.38
Post-BA Tier 3	6.73	9.12	10.83	14.61	4.14
Post-BA Tier 4	19.28	14.89	20.53	14.47	22.98
Post-BA specialized	2.51	2.47	3.46	2.71	2.13
Post-BA non-US	1.91	0.53	0.38	0.20	0.14
Post-BA Carnegie missing	1.68	1.16	0.98	1.40	1.31
Highest degree BA	63.94	51.20	50.54	62.99	67.16
N	207,028	13,039	11,238	41,877	104,051

Note: Author's calculations from 2003–2017 National Survey of College Graduates. The overall rates are based on all respondents in the NSCG sample. Percentages reported in columns headed tier 1–tier 4 are based on those in the sample with a bachelor's degree from an institution in that tier. All values are calculated using the NSCG sample weights.

Appendix Table 5: Average annual income in $2017 by BA tier and post-BA tier, by gender

	All	BA Tier 1	BA Tier 2	BA Tier 3	BA Tier 4	Tier differences
Panel A: Men						
All	117,945	184,349	141,204	131,540	104,541	all
N	*217,734*	*15,742*	*8,052*	*50,570*	*94,711*	
Post-BA degree	146,535	221,896	162,670	161,051	124,209	not 2–3
N	*103,999*	*9,631*	*4,949*	*22,088*	*36,429*	
Post-BA degree Tier 1–3	175,404	224,116	177,383	173,289	154,398	not 2–3
N	*44,865*	*7,261*	*2,941*	*14,212*	*10,440*	
Post-BA degree Tier 1	209,063	229,749	240,181	239,760	166,821	1–4, 2–4, 3–4
N	*16,071*	*5,035*	*1,249*	*3,027*	*3,343*	
Post-BA degree Tier 3	156,875	213,065	136,567	154,476	151,292	all but 2–4 and 3–4
N	*28,228*	*2,182*	*1,549*	*11,091*	*6,877*	
Post-BA degree Tier 4	121,623	157,484	126,088	139,018	114,002	all
N	*38,126*	*1,496*	*1,433*	*5,937*	*21,620*	
Post-BA degree specialized	144,200	236,027	180,455	159,169	125,873	not 2–3
N	*6,348*	*522*	*397*	*1,224*	*2,623*	
Panel B: Women						
All	70,040	95,165	79,469	78,143	64,011	not 2–3
N	*165,566*	*10,565*	*9,088*	*34,067*	*83,495*	
Post-BA degree	83,500	106,861	87611	92960	74757	all
N	*87,296*	*6,733*	*5,791*	*17,556*	*39,593*	
Post-BA degree tier 1–3	98,654	118,748	100,373	99,119	91,006	not 2-3
N	*32,259*	*4,646*	*3,182*	*10,050*	*9,387*	
Post-BA degree tier 1	105,791	119,027	103,262	110,106	94,254	1–2,1–4, 3–4
N	*11,396*	*3,127*	*1,482*	*2,051*	*3,028*	
Post-BA degree tier 3	96,608	119,871	96,872	97,311	93,175	1–2,1–3,1–4
N	*20,240*	*1,488*	*1,547*	*7,885*	*6,091*	
Post-BA degree tier 4	73,637	80,511	71,020	85,812	69,651	not 1–2 or 2–4
N	*40,112*	*1,508*	*1,974*	*5,689*	*25,732*	
Post-BA degree specialized	94,500	113,274	99,950	94,222	79,896	not 1–2 or 2–3
N	*5,734*	*357*	*409*	*1,148*	*2,660*	

Note: Author's calculations from 2003–2017 National Survey of College Graduates. Sample includes those with total income in preceding year of $10,000 or more in $2017. The overall averages are based on all respondents in the NSCG sample with the indicated post-BA degree. Averages reported in columns headed tier 1– tier 4 are based on those in the NSCG sample with a bachelor's degree from an institution in that tier. The rows headed "N" indicate the number of observations in that category. Significant differences in averages between tiers at the 5% level based on a Bonferroni multiple comparison test are indicated in the last column. All values are calculated using the NSCG sample weights.

Appendix Table 6: Descriptive statistics for samples used in earnings regressions

	Mean (standard deviation) or percent	
	Men	Women
Real total income	177,657	98,805
	(248,951)	(130598)
Tier 1 post-BA	38.2	33.4
Tier 2 post-BA	2.2	4.2
Tier 3 post-BA	59.6	62.5
Tier 1 BA	18.1	13.9
Tier 2 BA	8.3	11.0
Tier 3 BA	31.8	30.7
Tier 4 BA	26.0	32.7
Specialized BA	2.2	0.8
Non-US BA	8.8	5.9
Carnegie missing BA, US	4.8	5.0
South	29.1	29.9
Hispanic/Latino	4.2	6.0
White	82.8	80.6
Black/African American	3.8	5.5
Asian	11.6	10.9
Other races	1.8	3.0
Native-born US citizen	84.0	86.6
Age	47.8	44.3
Year 2010	19.7	19.7
Year 2013	19.9	20.2
Year 2015	21.3	22.6
Year 2017	21.5	22.1
Father-less than high school graduate	9.3	8.4
Father-high school graduate	18.9	19.1
Father-some college	14.4	14.2
Father-bachelor's degree	24.6	23.4
Father-master's degree	14.0	16.7
Father-professional degree	10.4	10.5
Father-PhD	7.8	7.1
Mother-less than high school graduate	8.3	7.6
Mother-high school graduate	27.4	22.6
Mother-some college	20.0	23.6
Mother-bachelor's degree	25.6	23.7
Mother-master's degree	14.4	17.1
Mother-professional degree	1.9	2.9
Mother-PhD	2.0	2.4
High school-Northeast	24.6	26.1
High school-Midwest	25.4	23.7
High school-West	16.9	16.3
High school-South	19.8	23.4
High school-outside US	13.2	10.5
Arts/Humanities	12.2	17.1
Business/Economics	17.0	7.4
Education	2.7	10.6

Engineering	18.3	4.5
Math/Computer Science	6.4	3.5
Science	21.7	23.4
Social Science	14.2	22.5
Other Fields	3.1	6.7
PhD	19.6	14.1
MD	10.4	7.1
JD	12.9	9.8
Other professional degree	0.7	1.9
MBA	19.7	9.4
MA education	3.9	14.4
MA other	32.8	43.2
Full-time student	1.7	2.5
Tenure	9.6	7.0
	(10.2)	(8.0)
Potential experience	19.0	14.9
	(12.7)	(10.9)
Full-time	90.2	80.4
Self-employed	22.2	14.3
Government	23.9	35.8
Private employer	53.8	49.6
Other employer type	0.1	0.3
Management, Business, Financial	21.4	14.4
Computer, Engineering, Science	16.8	8.0
Education, Legal, Media, Community Service, Arts	21.5	34.0
Healthcare Practitioners and Technical	9.6	13.8
Service	1.0	0.7
Sales and Related	4.3	2.7
Office and Administrative Support	0.6	1.7
Traditional Blue-Collar	0.8	0.2
Other occupations	0.4	0.7
Number of employees < 10	16.8	12.8
Number of employees 11-24	5.4	4.9
Number of employees 25-99	8.7	8.9
Number of employees 100-499	12.5	14.4
Number of employees 500-999	6.3	9.4
Number of employees 1,000-4,999	14.9	15.2
Number of employees 5,000-24,999	14.3	15.7
Number of employees 25,000 or more	21.9	18.7
Observations	42,954	30,784

Note: Author's calculations from 2003–2017 National Survey of College Graduates. Sample includes those with post-baccalaureate degree from an elite institution with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. All values are calculated using the NSCG sample weights.

Appendix Table 7: Earnings regressions for men with Tier 1–3 post-BA degree
Dependent variable: Log(real total income)

	(1)	(2)	(3)	(4)
Tier 1 BA	0.345**	0.300**	0.210**	0.128**
	(0.012)	(0.012)	(0.011)	(0.010)
Tier 2 BA	0.030*	–0.007	0.016	–0.019
	(0.015)	(0.015)	(0.015)	(0.013)
Tier 3 BA	0.115**	0.117**	0.068**	0.012
	(0.010)	(0.010)	(0.010)	(0.009)
Specialized BA	0.057*	0.066*	0.034	0.105**
	(0.027)	(0.027)	(0.025)	(0.023)
Non-US BA	0.069**	0.094**	0.038+	0.018
	(0.021)	(0.024)	(0.022)	(0.020)
Carnegie missing BA, US	0.072**	0.075**	0.150**	0.084**
	(0.020)	(0.020)	(0.021)	(0.019)
South	0.037**	0.011	0.016+	0.013
	(0.008)	(0.010)	(0.009)	(0.008)
Hispanic/Latino	–0.041*	–0.007	–0.039*	–0.037*
	(0.020)	(0.020)	(0.019)	(0.017)
Black/African American	–0.281**	–0.246**	–0.283**	–0.207**
	(0.021)	(0.021)	(0.019)	(0.018)
Asian	0.020	0.036*	–0.007	–0.028+
	(0.017)	(0.017)	(0.016)	(0.014)
Other races	–0.100**	–0.077**	–0.036	–0.004
	(0.029)	(0.029)	(0.027)	(0.025)
Native-born US citizen	–0.018	–0.074**	–0.091**	–0.094**
	(0.017)	(0.019)	(0.018)	(0.017)
Age	0.170**	0.169**	0.151**	0.095**
	(0.002)	(0.002)	(0.002)	(0.003)
Age squared/100	–0.167**	–0.164**	–0.148**	–0.103**
	(0.002)	(0.002)	(0.002)	(0.003)
Year 2010	0.027*	0.018	0.023+	–0.011
	(0.013)	(0.013)	(0.012)	(0.011)
Year 2013	0.087**	0.074**	0.062**	0.013
	(0.013)	(0.013)	(0.012)	(0.011)
Year 2015	0.108**	0.093**	0.081**	0.038**
	(0.012)	(0.012)	(0.012)	(0.011)
Year 2017	0.169**	0.153**	0.143**	0.112**
	(0.012)	(0.012)	(0.012)	(0.017)
Father-high school graduate		0.032*	0.012	0.008
		(0.016)	(0.015)	(0.014)
Father-some college		0.023	0.001	–0.010
		(0.017)	(0.016)	(0.015)
Father-bachelor’s degree		0.089**	0.052**	0.022
		(0.017)	(0.016)	(0.015)
Father-master’s degree		0.040*	0.025	–0.005
		(0.019)	(0.018)	(0.016)
Father-professional degree		0.275**	0.174**	0.119**
		(0.020)	(0.018)	(0.017)

Father-PhD	0.029	0.035+	–0.012
	(0.021)	(0.020)	(0.018)
Mother-high school graduate	0.124**	0.090**	0.071**
	(0.017)	(0.016)	(0.014)
Mother-some college	0.145**	0.076**	0.076**
	(0.018)	(0.017)	(0.015)
Mother-bachelor's degree	0.129**	0.076**	0.082**
	(0.018)	(0.017)	(0.016)
Mother-master's degree	0.143**	0.084**	0.095**
	(0.020)	(0.019)	(0.017)
Mother-professional degree	0.141**	0.072*	0.134**
	(0.033)	(0.031)	(0.028)
Mother-PhD	0.151**	0.130**	0.153**
	(0.032)	(0.030)	(0.028)
High school-Northeast	0.001	0.027*	0.015
	(0.013)	(0.012)	(0.011)
High school-Midwest	–0.067**	–0.079**	–0.093**
	(0.013)	(0.012)	(0.011)
High school-West	–0.083**	–0.077**	–0.049**
	(0.014)	(0.013)	(0.012)
High school-outside US	–0.103**	–0.043+	–0.035+
	(0.024)	(0.023)	(0.021)
Business/Economics		0.266**	0.155**
		(0.014)	(0.013)
Education		0.089**	0.101**
		(0.026)	(0.024)
Engineering		0.342**	0.203**
		(0.014)	(0.013)
Math/Computer Science		0.329**	0.213**
		(0.018)	(0.016)
Science		0.153**	0.065**
		(0.014)	(0.013)
Social Science		0.132**	0.093**
		(0.014)	(0.013)
Other Fields		0.231**	0.204**
		(0.023)	(0.021)
PhD		0.138**	0.195**
		(0.011)	(0.010)
MD		0.689**	0.607**
		(0.014)	(0.017)
JD		0.484**	0.506**
		(0.013)	(0.013)
Other professional degree		0.398**	0.192**
		(0.044)	(0.041)
MBA		0.377**	0.279**
		(0.011)	(0.011)
MA education		–0.231**	–0.147**
		(0.021)	(0.019)
Full-time student		–0.653**	–0.295**
		(0.028)	(0.027)
Tenure			0.016**
			(0.001)

Tenure squared/100				–0.026**
				(0.003)
Potential experience				0.026**
				(0.002)
Potential experience squared/100				–0.023**
				(0.003)
Full-time				0.508**
				(0.012)
Self-employed				0.178**
				(0.011)
Government				–0.344**
				(0.009)
Other employer type				0.032
				(0.089)
Management, Business, Financial				0.215**
				(0.015)
Computer, Engineering, Science				–0.031+
				(0.016)
Education, Legal, Media, Community Service, Arts				–0.080**
				(0.016)
Healthcare Practitioners and Technical				0.075**
				(0.021)
Service				–0.363**
				(0.036)
Office and Administrative Support				–0.624**
				(0.043)
Traditional Blue-Collar				–0.397**
				(0.039)
Other occupations				-0.123*
				(0.052)
Number of employees 11–24				0.331**
				(0.017)
Number of employees 25–99				0.396**
				(0.015)
Number of employees 100–499				0.479**
				(0.014)
Number of employees 500–999				0.550**
				(0.017)
Number of employees 1,000–4,999				0.598**
				(0.014)
Number of employees 5,000–24,999				0.530**
				(0.015)
Number of employees 25,000 or more				0.630**
				(0.014)
Constant	7.434**	7.365**	7.524**	7.947**
	(0.059)	(0.062)	(0.060)	(0.075)
Adjusted R-squared	0.13	0.15	0.25	0.38

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1% Sample includes men with post-baccalaureate degree from an elite institution with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Number of observations is 42,954. Omitted categories are as follows: for race, White; for parents' education, less than high school; for college major, Arts/Humanities; for highest degree, MA other; for occupation, Sales and Related; for class of worker, private employer; for firm size, < 10 employees. All values are calculated using the NSCG sample weights.

Appendix Table 8: Earnings regressions for women with Tier 1–3 post-BA degree
Dependent variable: Log(real total income)

	(1)	(2)	(3)	(4)
Tier 1 BA	0.221**	0.179**	0.065**	0.081**
	(0.013)	(0.013)	(0.013)	(0.011)
Tier 2 BA	0.093**	0.063**	0.041**	0.027*
	(0.014)	(0.014)	(0.014)	(0.012)
Tier 3 BA	0.078**	0.075**	0.041**	0.037**
	(0.010)	(0.010)	(0.010)	(0.008)
Specialized BA	0.089+	0.072	0.079+	0.135**
	(0.046)	(0.046)	(0.043)	(0.037)
Non-US BA	–0.066**	0.026	0.048+	0.046*
	(0.023)	(0.027)	(0.025)	(0.022)
Carnegie missing BA, US	0.082**	0.108**	0.117**	0.060**
	(0.020)	(0.020)	(0.021)	(0.018)
South	0.046**	0.076**	0.072**	0.029**
	(0.009)	(0.010)	(0.010)	(0.008)
Hispanic/Latino	–0.019	0.029	0.034*	0.025+
	(0.018)	(0.018)	(0.017)	(0.015)
Black/African American	0.102**	0.131**	0.116**	0.053**
	(0.018)	(0.018)	(0.017)	(0.015)
Asian	0.217**	0.221**	0.152**	0.082**
	(0.017)	(0.017)	(0.016)	(0.014)
Other races	0.076**	0.087**	0.116**	0.087**
	(0.024)	(0.024)	(0.022)	(0.019)
Native-born US citizen	–0.043*	–0.098**	–0.044*	–0.037*
	(0.017)	(0.019)	(0.018)	(0.016)
Age	0.113**	0.112**	0.094**	0.040**
	(0.003)	(0.003)	(0.002)	(0.003)
Age squared/100	–0.114**	–0.113**	–0.093**	–0.044**
	(0.003)	(0.003)	(0.003)	(0.003)
Year 2010	0.031*	0.032*	0.014	0.014
	(0.014)	(0.014)	(0.013)	(0.011)
Year 2013	0.055**	0.051**	0.027*	0.011
	(0.014)	(0.014)	(0.013)	(0.011)
Year 2015	0.017	0.014	–0.010	–0.042**
	(0.013)	(0.013)	(0.013)	(0.011)
Year 2017	0.099**	0.095**	0.052**	–0.046*
	(0.013)	(0.014)	(0.013)	(0.019)
Father-high school graduate		0.034+	0.033*	0.005
		(0.018)	(0.016)	(0.014)
Father-some college		0.152**	0.124**	0.082**
		(0.019)	(0.017)	(0.015)
Father-bachelor’s degree		0.122**	0.105**	0.056**
		(0.019)	(0.017)	(0.015)
Father-master’s degree		0.100**	0.079**	0.049**
		(0.020)	(0.018)	(0.016)
Father-professional degree		0.134**	0.067**	0.012
		(0.021)	(0.020)	(0.017)

Father-PhD	0.140**	0.094**	0.064**
	(0.023)	(0.022)	(0.019)
Mother-high school graduate	0.006	–0.019	–0.000
	(0.018)	(0.017)	(0.015)
Mother-some college	–0.042*	–0.041*	–0.010
	(0.019)	(0.018)	(0.015)
Mother-bachelor's degree	0.007	–0.055**	–0.025
	(0.020)	(0.019)	(0.016)
Mother-master's degree	0.048*	0.011	0.032+
	(0.021)	(0.020)	(0.017)
Mother-professional degree	0.063*	–0.001	0.019
	(0.031)	(0.029)	(0.025)
Mother-PhD	–0.153**	–0.146**	–0.117**
	(0.033)	(0.030)	(0.026)
High school-Northeast	0.111**	0.107**	0.086**
	(0.013)	(0.012)	(0.011)
High school-Midwest	0.037**	0.015	0.004
	(0.013)	(0.012)	(0.011)
High school-West	0.064**	0.034*	0.050**
	(0.015)	(0.014)	(0.012)
High school-outside US	–0.110**	–0.107**	–0.066**
	(0.024)	(0.023)	(0.020)
Business/Economics		0.140**	0.102**
		(0.018)	(0.015)
Education		0.020	–0.012
		(0.017)	(0.015)
Engineering		0.367**	0.222**
		(0.021)	(0.019)
Math/Computer Science		0.286**	0.185**
		(0.022)	(0.020)
Science		0.135**	0.055**
		(0.013)	(0.011)
Social Science		0.084**	0.046**
		(0.012)	(0.011)
Other Fields		0.007	–0.002
		(0.017)	(0.015)
PhD		0.242**	0.213**
		(0.012)	(0.011)
MD		0.629**	0.657**
		(0.016)	(0.015)
JD		0.509**	0.510**
		(0.014)	(0.012)
Other professional degree		0.521**	0.390**
		(0.029)	(0.026)
MBA		0.428**	0.244**
		(0.015)	(0.014)
MA education		–0.021	0.045**
		(0.014)	(0.012)
Full-time student		–0.445**	–0.229**
		(0.024)	(0.021)
Tenure			0.019**
			(0.001)

Tenure squared/100				–0.030**
				(0.004)
Potential experience				0.031**
				(0.001)
Potential experience squared/100				–0.055**
				(0.003)
Full-time				0.571**
				(0.009)
Self-employed				0.059**
				(0.013)
Government				–0.168**
				(0.008)
Other employer type				0.071
				(0.061)
Management, Business, Financial				0.199**
				(0.018)
Computer, Engineering, Science				–0.055**
				(0.020)
Education, Legal, Media, Community Service, Arts				–0.176**
				(0.017)
Healthcare Practitioners and Technical				–0.005
				(0.019)
Service				–0.458**
				(0.042)
Office and Administrative Support				–0.519**
				(0.030)
Traditional Blue-Collar				–0.232**
				(0.081)
Other occupations				–0.214**
				(0.041)
Number of employees 11–24				0.153**
				(0.019)
Number of employees 25–99				0.205**
				(0.017)
Number of employees 100–499				0.302**
				(0.016)
Number of employees 500–999				0.359**
				(0.017)
Number of employees 1,000–4,999				0.376**
				(0.016)
Number of employees 5,000–24,999				0.386**
				(0.016)
Number of employees 25,000 or more				0.444**
				(0.016)
Constant	8.471**	8.375**	8.611**	9.018**
	(0.063)	(0.065)	(0.062)	(0.069)
Adjusted R-squared	0.08	0.09	0.21	0.41

Note: Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1% Sample includes women with post-baccalaureate degree from an elite institution with total income in preceding year of $10,000 or more in $2017 and employed when surveyed. Number of observations is 30,784. Omitted categories are as follows: for race, White; for parents' education, less than high school; for college major, Arts/Humanities; for highest degree, MA other; for occupation, Sales and Related; for class of worker, private employer; for firm size, < 10 employees. All values are calculated using the NSCG sample weights.