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Abstract

We analyze 6,400 letters of recommendation for more than 2,200 economics and finance Ph.D. graduates from 2018 to 2021. Letter text varies significantly by field of interest, with significantly less positive and shorter letters for Macroeconomics and Finance candidates. Letters for female and Black or Hispanic job candidates are weaker in some dimensions, while letters for Asian candidates are notably less positive overall. We introduce a new measure of letter quality capturing candidates that are recommended to "top" departments. Female, Asian, and Black or Hispanic candidates are all less likely to be recommended to top academic departments, even after controlling for other letter characteristics. Finally, we examine early career outcomes and find that letter characteristics, especially a "top" recommendation have meaningful effects on initial job placements and journal publications.

JEL classification: A11, A23, J15, J16
Key words: recommendation letters, gender in economics, race and ethnicity in economics, research institutions, professional labor markets

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Letters of recommendation from faculty advisors play a critical role in the job market for Ph.D. economists, especially for those just completing their graduate studies. Typically, a new or recent Ph.D. provides several pieces of information to prospective employers, including a *curriculum vitae* (CV) summarizing the candidate's research interests and accomplishments, education, and employment history; a recent example of the economist's research (the job market paper); and two or three letters of recommendation from faculty members who have worked closely with the candidate, typically as thesis advisors. These letters of recommendation summarize the candidate's research and provide an assessment of its quality and likely impact. More broadly, the letters provide assessments of the candidate's capacity to generate impactful research in the future, the quality of the candidate's teaching and, in many cases, what sorts of institutions should find the candidate to be of most interest.

Patterns in letters of recommendation matter because these letters provide information to prospective employers that might not be obvious from a candidate's CV and research papers alone. The letters can provide a better understanding of a candidate's research interests as well as an informed assessment of a candidate's future potential. At their best, they can be an effective way of conveying qualitative ("soft") information about a candidate. As such, recommendation letters can help employers sort through a large number of candidates and identify those appropriate for further attention, such as a first round interview or a fly-out for an onsite interview.

But these letters can also have shortcomings. First, they offer a subjective view of the candidate that can be difficult to put in context, especially if the prospective employer does not know the letter writer or the past candidates the writer has assessed. This can put candidates from less prestigious Ph.D. programs or those studying with more junior or less well-known faculty advisors at a disadvantage. Second, the information in the letters is not standardized, meaning that it is sometimes necessary to extract from the text the assessment the letter provides. Third, letters of recommendation can be subject to conscious or explicit bias or unconscious bias, to the extent that there are social stereotypes about different types of candidates. Finally, there may be similarity or affinity bias, a particularly difficult issue for the economics profession, where faculty members are overwhelmingly white and male.[2]

We examine 6,400 letters of recommendation submitted for more than 2,200 economics and finance Ph.D. candidates for entry-level economist positions at a large, research-oriented U.S. policy institution from 2018 to 2021. We look at letter characteristics such as length (number of words) and use of "standout" and "grindstone" words and find that letters for female and Black or Hispanic candidates are

[2] According to a 2020 Brookings report, 23 percent of economics faculty in academia are women and 21 percent are minorities (Black, Hispanic, Asian, and other minorities). See Akee (2020).

weaker in some dimensions while letters for Asian candidates are notably weaker overall. When we turn to a binary measure which places more importance on identifying students at the far-right tail of potential, the results are quite stark. Female, Asian, and Black or Hispanic Ph.D. candidates, all under-represented in the economics profession, are less likely to be described as candidates who should be placed in the very "top" departments, a finding that holds when we control for other letter characteristics, for field of specialization, and for the caliber of the Ph.D.-granting institution. Finally, we examine the impact of letter characteristics on early career outcomes, including initial job placements and journal publications, finding that letter length and a "top" recommendation are positively associated with these outcomes. Even controlling for letter characteristics, we find less positive early career outcomes for female, Asian and Black or Hispanic job candidates in at least some dimensions.

Previous research has explored differences in recommendation letters for underrepresented populations. This includes evidence of gender-based differences in recommendation letters submitted for positions across a variety of academic fields, including faculty positions in chemistry and biochemistry (Schmader et al. 2007), geoscience (Dutt et al. 2016), at medical schools or residency programs (Trix and Psenka 2003, Heath et al. 2019, Isaac et al. 2011, Lin et al. 2019), for assistant professor positions (Madera 2018), and for undergraduates applying for international research programs (Houser and Lemmons 2016). However, some papers using more recent data have found no or only minor gender-based differences in letters for medical residency programs (Chapman et al. 2022, French et al. 2019, Kobayashi et al. 2019, Powers et al. 2020) and some studies have found more positive letters for female candidates, including longer, more specific, more positive in tone letters for applicants to masters programs in data and computer science (Zhao et al. 2023) and few gender differences, or more positive letters for women in experimental particle physics (Bernstein et al 2022). Two of the more recent studies (Chapman et al. 2022 and Powers et al. 2020) also examine differences by race, finding that letters written for under-represented minorities were less likely to include "standout" descriptors such as "outstanding" or "exceptional" and/or more likely to include "grindstone" words such as "diligent" or "hard-working."

In a study closely related to our own, Eberhardt et al. (2023) examine letters of recommendation for economics faculty positions at a large U.K. research university and find widespread differences in the attributes emphasized for male versus female candidates. In particular, they find that letters for female candidates are more likely to use "grindstone" terms and, in some cases, are less likely to use terms citing ability. Similarly, Baltrunaite et al. (2022) find differences in language in letters written for male and female economics Ph.D. candidates at two large Italian research institutions and that these differences negatively affect subsequent career outcomes.

Our work draws on and extends the previous analysis of letters of recommendation in economics in several ways. First, our sample predominantly reflects candidates receiving Ph.D.'s in economics or finance from U.S.-based research universities, in contrast to earlier studies, which have created samples from European-based institutions. Further, based on self-identified information, we assess whether letters of recommendation vary systematically based on the applicants' race or ethnicity, as well as their gender. To the best of our knowledge, our paper is the first to examine these factors in economics recommendation letters. We also examine differences in letters by the candidate's field of study to see if there are meaningful differences across disciplines in the tone and content of letters. Finally, we examine differences in the letter content by gender of the letter writer, as in prior work.

We analyze the text of 6,365 recommendation letters received by a large U.S.-based research institution for 2,227 new Ph.D. job candidates during four recent annual recruiting cycles (2018 to 2021). These letters come from candidates who applied for entry-level economist positions that were widely advertised in venues typically accessed by Ph.D. candidates graduating from U.S., European and other Ph.D.-granting universities. About 80 percent of the applicants are from U.S. Ph.D. programs. While the candidates are thus not necessarily a random sample of all new Ph.D.'s on the market in those years, the demographic characteristics of the applicant pool are reasonably close to those of the overall cohort of new Ph.D.'s, based on comparisons with aggregate data published by the American Economic Association's (AEA) Committee on the Status of Minority Groups in the Economics Profession (CSMGEP) and the Committee on the Status of Women in the Economics Profession (CSWEP).

We pair the recommendation letters with information supplied by the candidates about their primary and secondary fields of research interest, their Ph.D. granting institution, and confidential information about their self-identified gender, race, and ethnicity.[3] From analysis of the letter writers, we identify the letter writer's gender and whether the writer is Asian[4] (based on name-matching supplemented by hand searches). Using Natural Language Processing (NLP) techniques, we identify key characteristics of each letter, including overall word count and the number of words associated with standout and grindstone characteristics, respectively. In this, we mirror much of the earlier literature, including Eberhardt et al.'s (2023) focus on "grindstone" versus "ability" language. We further identify language contained in many of the letters providing the letter writer's recommendation for the caliber of hiring institution

[3] Information on gender and race/ethnicity was collected for statistical purposes on a voluntary basis from all job applicants to the organization, not just for economists. This information candidates submitted was not used in the hiring process and was not provided to hiring managers or those reviewing or interviewing job candidates.

[4] We are unable to identify the race/ethnicity of the full set of letter writers, as current name-based identification techniques yield low-certainty outcomes except for Asian names.

appropriate for the candidate – in particular, whether the letter writer recommends the candidate to a "top" department. Finally, we name-match the sample of candidates to faculty lists at top 20 economics and finance departments following their PhD graduation year and to authors of journal publications from EconLit[5] in the three year-period following graduation to assess early career outcomes.

Considering our results in the context of other studies of economics Ph.D.'s (Baltrunaite et al. (2022) study of candidates at Italian universities and Eberhardt et al. (2023) study of the U.K.), our results are consistent with those papers' findings that letters for female candidates contain higher shares of grindstone words, which are sometimes interpreted as "damning with faint praise". Baltrunaite et al. (2022) find more evidence of differences in gender along some dimensions such as standout words, while our results are more similar to Eberhardt et al. (2023) that do not find statistically significant differences. It is then tempting to conclude that our work suggests economics may compare favorably to the broader context where studies of other fields have documented significant differences in letters for women. However, our finding that women are less likely to receive "top" recommendations, is more consistent with the significant differences found results from other fields where women appear less likely to get the highest praise.

One novel contribution of the paper is to analyze the relationship between letters and race and ethnicity, where we find the most meaningful differences, and which is not explicitly covered in the papers analyzing economics letters.[6] Letters for candidates who self-identify as Asian are significantly shorter, contain fewer standout words and more grindstone words, findings that remain when we correct for potential selection bias in the candidate pool by limiting the sample to candidates from top 10 U.S. economics and finance programs or who are focusing primarily in Macroeconomics. We also find systematic differences for letters written for candidates who self-identify as Hispanic or Black.[7] While the role of race and ethnicity in letters of recommendation in economics has not been studied to our knowledge, these results are consistent with those in some other fields where standout words are more likely to be used for white surgical residents (Powers et al. 2020).

[5] EconLit is published by the American Economic Association and provides bibliographic coverage of a wide range of economics-related literature.

[6] Baltrunaite et al. (2022) does not study race and ethnicity. Eberhardt et al. (2023) controls for ethnicity/race but does not discuss the estimated coefficients.

[7] Because the sample contains relatively few applicants who self-identify as Black or African American and due to privacy concerns given the small sample, we combine these candidates with those who self-identify as Hispanic. In results not reported here, estimated coefficients for Black candidates are more negative on some outcome variables such as letter length.

We also find significant differences in the length and substance of letters by discipline. Letters written for candidates who identify "Finance" or "Macroeconomics" as their primary field of interest are shorter and use fewer grindstone words. Letters for candidates focusing on Macroeconomics also use fewer standout words. The results are qualitatively similar when we limit our sample to candidates from top 10 economics and finance programs and so are unlikely to be driven by the sample selection bias (having a wider quality range of candidates in these fields than in other specializations). That said, candidates focusing on Finance are more likely to be receiving their degree from a business school than candidates in other fields, so the differences could reflect the type of school rather than the field *per se*. We also run specifications containing a control for business school as the Ph.D.-granting institution and the results continue to hold in these specifications.

We find meaningful differences by gender and race in whether a letter recommends a candidate to a very "top" economics department. Letters for female, Asian, and Black or Hispanic candidates are all significantly less likely to include such a recommendation. These differences persist when we control for the characteristics of the Ph.D.-granting institution, when we control for the characteristics of the letter writer (both female and Asian letters writers are less likely to make such recommendations), and when we limit our sample to candidates graduating from top 10 economics and finance departments. These differences are both statistically and economically important. Letters for female candidates are 18 percent less likely to contain a "top" recommendation than letters for male candidates, a result that holds even when the letter writer is female. Letters for Black or Hispanic candidates are 30 percent less likely to contain this recommendation than letters for white candidates, while letters for Asian candidates are 45 percent less likely to have a "top" recommendation.

We explore the roles of similarity preference by examining the interactive impact of both the candidate and the letter writer being female or Asian. We find that female letter writers are more likely to make "top" recommendations for female candidates but that this interaction is insufficient to overcome the lower rates of such recommendations by female letter writers and for female candidates in general – that is, female candidates are still less likely to receive a "top" recommendation as compared to other candidates even when the letter writer is female. In fact, because female letter writers are less likely to make "top" recommendations overall, the gap for female candidates is actually larger when the letter writer is also a woman.

While similarity in gender between the candidate and the letter writer is associated with better letters, all else equal, Asian letter writers are less likely to make a "top" recommendation for Asian candidates. While we cannot determine from our data how candidate-letter writer pairings are formed, our

results suggest that such pairings at best only partly offset and at worst actually exacerbate the lower overall probabilities that these candidates receive a "top" recommendation.

In the final section of the paper, we examine the impact of letter characteristics on early career outcomes. In particular, we examine initial job placements (whether a candidate's initial job is at top 20 economics or finance department) and publications (the number of top journal publications a candidate has within two years of receiving their Ph.D.). Controlling for candidate characteristics, field of interest, Ph.D.-granting institution characteristics, and letter writer characteristics, we find that stronger letters are indeed associated with better early career outcomes. Longer letters and a "top" recommendation are both positively associated with the probability of having a top 20 initial job and with the number of top journal publications. A higher share of standout words is associated with more top journal publications while a higher share of grindstone words is negatively associated with early career publications. We find evidence that early career outcomes are stronger for candidates from top 10 economics and finance programs and that some outcomes are weaker for female, Asian, and Black or Hispanic candidates, even after controlling for letter characteristics.

Taken together, our findings suggest that there are meaningful differences in the content of recommendation letters correlated with the gender, race, and ethnicity of the candidate, as well as with field of interest, and that these differences matter in predicting early career outcomes. This finding echoes findings in earlier work (Baltrunaite et al. 2022 and Eberhardt et al. 2023) focusing on the impact of gender. Our findings extend that analysis by focusing primarily on a set of candidates coming from U.S. economics and finance programs and by examining the impact of race/ethnicity of both the candidates and the letter writers.

The remainder of this paper is organized as follows. The next section (Section 2) describes how we constructed the core data set of recommendation letters and provides an overview of the key characteristics of the pool of applicants and letters. We also assess the representativeness of our sample by comparing it to available information on the characteristics of the broader pool of U.S. economics Ph.D. graduates. Section 3 discusses the techniques we used to characterize the content and tone of the letters and presents our primary results, including univariate and multivariate (regression) comparisons by gender, race and ethnicity, and field of interest of the candidate, as well as by the gender and ethnicity of the letter writer and analysis of how letter characteristics are associated with early career outcomes. The section also contains a series of robustness checks of the key findings. Section 4 is a summary and conclusion.

2. Data

Our dataset comes from applications for economist positions at a large U.S. policy institution focused on economic research. Applications were received in the falls of 2017 to 2020 and we limit the sample to candidates expected to receive their Ph.D.'s in the following year. Applications were solicited in each year in any field of economics, with a focus on the following JEL classifications: C – Mathematical and Quantitative Methods, D – Microeconomics, E – Macroeconomics and Monetary Economics, F – International Economics, G – Financial Economics, H – Public Economics, J – Labor and Demographic Economics, L – Industrial Organization, and R – Urban, Rural, Regional, Real Estate, and Transportation Economics. Upon completion of an initial indication of interest in the position, candidates were asked to submit up to three letters of recommendation.

The resulting sample includes 2,227 candidates. Letters were generally made available in PDF format and converted to text, resulting in a sample of 6,365 letters, an average of 2.86 letters per candidate (see Table 1). This number is slightly below the expected number of three as in some cases, we were unable to convert some letters submitted as PDFs into text files or because candidates submitted fewer than three letters. The average letter has about 1,150 words (see Table 4), with a significant amount of variability.

We also know the Ph.D. granting institution of the candidates. The vast majority (approximately 80 percent) of candidates come from U.S. institutions. A significant minority come from business schools, at approximately 11 percent of the sample. We categorize institutions as "Top 10 U.S. institutions" using the US News and World Report rankings for economics departments and the W.P. Carey Business Intelligence rankings of business school finance departments. Candidates from these institutions are overrepresented, constituting 20 percent of the sample.

A. Demographics

In addition to submitting letters of recommendation, job candidates filled in additional demographic information, which is summarized in Table 1. Candidates were asked to indicate, on a voluntary basis, their race and ethnicity using demographic groupings based on the U.S. Office of Management and Budget (OMB) categories for race and ethnicity: White, Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander. Candidates could also select "Two or More Races," or "Some Other Race," for people who do not identify with any of the OMB race categories. For ethnicity, candidates may select one of two OMB categories: "Hispanic or Latino" or "Not Hispanic or Latino." Candidates may also select "I do not wish to provide this information"; fewer than 1 percent of

candidates chose not to provide this information. We did not attribute race or ethnicity to candidates who did not self-identify – these candidates, along with those who selected "Two or More Races" or "Some Other Race" were dropped from the sample; approximately 2 percent of the original pool dropped for these reasons. Almost 40 percent of the resulting set of Ph.D. candidates identify as Asian and 13 percent as Hispanic. Very few candidates in our sample, approximately 1 percent, identify as Black or African American.

Candidates were also asked on a voluntary basis to identify their gender, which could be "Male", "Female" or "I do not wish to provide this information." For candidates who chose not to provide that information we made use of pronouns used in the letters to assign the candidates to genders.[8] Thirty percent of the candidates in our sample are women. As shown in Panel A of Table 2, female candidates are more likely to be Asian, less likely to be Black or Hispanic, and less likely to be graduating from a top 10 economics or finance department than male candidates.

Information on gender and race/ethnicity was collected for statistical purposes on a voluntary basis from all job applicants to the organization, not just for economists. This information candidates submitted was not used in the hiring process and was not provided to hiring managers or those reviewing or interviewing job candidates.

B. Fields of Interest

Candidates selected primary and secondary fields of interest from a drop-down menu of choices. We aggregate candidates' primary field of interest to: Finance, Macroeconomics, International Economics, Labor/Microeconomics, and Other. Appendix Table A1 shows the mapping of candidate fields of interest to the full set of these categories. The most common primary interest fields are Finance (20%) and Macroeconomics (26%).[9] Panel B of Table 2 shows candidates' demographic and degree-granting institution characteristics by primary field of interest. Each column shows the mean of the demographic variable for candidates with that primary field of interest. We compare candidates in each field of interest to the pool of candidates not in that field and indicate if the means are statistically significantly different, indicating a higher mean with + signs and a lower mean with – signs. Demographics vary significantly by field. Labor and Other fields have a higher share of female candidates, while Finance and Macroeconomics have lower shares of women (see also Panel A of the Table, which splits the sample by gender). Finance has a

[8] At least one of the letters for each of the candidates who selected "I do not wish to provide this information" included gendered pronouns that allowed for this assignment.

[9] "Other" is actually the most common response in the sample, at 32%, but contains a mix of underlying primary fields of interest.

higher share of Asian candidates and a lower share of Hispanic candidates than other fields in our sample, while Macroeconomics has the opposite (more Hispanic candidates and fewer Asian candidates). Finance candidates are much more likely to come from business schools (42% for finance candidates as compared to 5% or less for other fields).

C. Selection

Our sample is composed of candidates who chose to apply for an entry-level economist position at a single U.S. research institution. This construction could raise concerns that the sample might not be representative of the universe of Ph.D. candidates and thus that our results could reflect sample selection bias rather than true differences in the letter characteristics for different categories of candidates. These differences or omitted variables would have to arise from candidates of different quality being differently likely to apply to the institution in ways that vary with candidate characteristics. For example, if only the most talented women apply to this institution we would misattribute the positive selection of women candidates to the institution as a positive effect for women. A priori we have no reason to believe that there is differential selection by talent by candidate characteristics.

Ideally, we would address this concern by comparing characteristics of the candidates in our sample with information about the universe of candidates, including data on demographic characteristics and field of study. We are not aware of a comprehensive database of economics Ph.D. graduates with information on gender, race, ethnicity, and/or field of study. Instead, we make use of data from the American Economic Association (AEA) committees that publish information on graduates of U.S. Ph.D. programs to understand the representativeness of our sample. Table 3 tabulates statistics on gender, race, ethnicity, and institution type (Top 10) for the subset of 1,565 candidates in our sample who receive Ph.D.'s from U.S. economics (non-business school) programs. We compare the share of candidates who are female and who attend top 10 economics programs (first two rows of the tables) to data from the Committee on the Status of Women in the Economics Profession (CSWEP) for all U.S. economics programs. We compare those who self-identify as Asian, Black, or Hispanic (bottom 3 rows of the table) to U.S. citizens and permanent residents receiving Ph.D.'s from U.S. economics programs based on data from the Committee on the Status of Minority Groups in the Economics Profession (CSMGEP). We do not have information on citizenship or immigration status in our data, so our comparisons of race and ethnicity will include a broader set of candidates than in the CSMGEP data.

In our sample, 70 percent (1,565 of 2,227) of candidates receive Ph.D.'s from U.S. economics programs, so our comparisons cover a significant share of our regression sample. The remaining candidates

are either graduates of non-U.S. programs or of business schools, neither of which are captured in the AEA statistics. Turning to the table, the first thing to note is that our sample includes more than a third of new Ph.D. recipients from U.S. economics programs during the sample period (1,565 of 4,415, or 35 percent) so we are capturing a significant portion of the total.

In demographic terms, our sample is generally comparable to the universe of Ph.D. candidates graduating from U.S. economics programs. Our sample has a similar share of female candidates (31 percent versus 33 percent overall) so is representative in that dimension, but has a higher share of candidates who self-identify as Hispanic or Asian. The share identifying as Asian is notably higher than in the CSMGEP data (41 percent versus 14 percent), which likely reflects that our sample includes non-U.S. citizens and permanent residents. At least one study (Bayer and Rouse 2016) finds that half of Ph.D.'s granted by U.S. economics programs to temporary visa holders – candidates who would be in our sample but not in the CSMGEP data – go to Asian candidates, which would be consistent with our sample demographics. Finally, the share of candidates in our sample who self-identify as Black or African American is slightly smaller than in the full sample of candidates (2 percent versus 3 percent overall). The very low share of Black candidates is a documented feature of the economics profession at all levels from undergraduate majors to senior faculty (see, for instance, Committee on the Status of Minority Groups in the Economics Profession 2023) that applies to our sample as well.

A potentially important way in which our sample differs from the universe of candidates is that it has a higher portion of graduates from top 10 U.S. economics programs (27 percent versus 19 percent overall). This over-sampling from the strongest Ph.D. programs could affect our results if the demographic characteristics of these graduates differ significantly from the overall pool of candidates – if candidates from top programs are stronger, on average, than from other programs, we could misattribute these underlying quality differences to differences in demographic characteristics, if the demographics of top programs are different.[10] Overall, our sample includes more than half of the graduates of these programs during the sample period (425 of 831), based on CSWEP data. The share of female candidates from top 10 programs in our sample is nearly identical to the overall share (approximately 26 percent in both sets of candidates), suggesting that our sample is representative of these programs in this dimension, though the share of female candidates at top 10 institutions is lower than for the population as a whole.

Unfortunately, we cannot do a comparison based on other demographic characteristics since, as far as we have been able to determine, information about the race and ethnicity of top 10 program

[10] Our regressions include controls for candidates from top 10 programs, as well as whether the candidate is graduating from the U.S. program.

graduates is not available. We also cannot compare the distribution of candidates across fields of interest, although consistent with Sherman and Tookes (2022) who document relatively fewer women working on financial topics, the share of female candidates in our sample is lowest among women interested in Finance. In summary, the sample of letters we consider overrepresents the most prestigious programs and overrepresents candidates studying finance and macroeconomics, but otherwise appears similar to the universe of Ph.D. candidates.

3. Results

This section presents the main results of our analysis, focusing first on the core characteristics of the letters and then describing a new measure of letter quality based on whether the candidate is recommended to a "top" economics or finance department. In both cases, we examine how these quality indicators vary by the demographic characteristics of the candidate, controlling for characteristics of the Ph.D.-granting institution and the letter writer.

A. Core Letter Characteristics

We begin our analysis by examining the core characteristics of the letters: letter length and letter quality, as measured by the share of words reflecting positive attributes of the candidate. Summary statistics for letters are presented in Table 4. We begin with a simple count of the number of words in the letter, since longer letters potentially provide more detailed and in-depth discussion of the candidate. Letter length has also been used as an outcome variable associated with letter quality in other research. Letters have 1,154 words on average, but there is a significant amount of variation, with an interquartile range of 650 words (from 780 to 1,430 words per letter).

We then examine the content of the letter. Following the literature on letters of recommendation in other fields, we code words into those characterized as "standout" and those describing "grindstone". Previous research (Baltrunaite et al. 2022; Eberhardt et al. 2023) has found systematic differences in the language used in letters for male and female candidates in economics, finding that female candidates are more likely to be described using words stressing hard work, diligence, and personality, as compared to words stressing talent, skills, and accomplishments, which are more frequently used for male candidates. We take a similar approach to this earlier work, using a standardized dictionary of words associated with "standout" and with "grindstone". In particular, we use a dictionary of words drawn from the Linguistic

Inquiry and Word Count (LIWC) database, based on a word list from Bernstein et al 2022, modified for economics.[11]

"Grindstone" words, sometimes known as "effort" words, are positive words related to a candidate's efforts or willingness to work hard. While seemingly positive, research suggests that words such as "hard working", "methodical", and "diligent" may be backhanded compliments, faint praise, or even "doubt raisers" to the extent that they emphasize the amount of work more than describing a candidate's intellect or potential (for example in physics, Zhao et al. 2023). Baltrunaite et al. 2021 suggest that these words are more likely be used to describe women, due to an association with women as communal. The average letter has approximately 2.4 grindstone words, or 0.22 percent of the words in the letter.

"Standout Words", sometimes known as "accomplishment" words, in contrast, tend to illustrate achievement or excellence. Examples include "excellent", "superb", "outstanding", and "innovation". Standout words are more common in recommendation letters than are grindstone words, with an average of just under 13 words per letter, or 1.1 percent of the overall number of words per letter.

We also identify some demographic characteristics of the letter writers. Specifically, we identify whether the letter writer is female or Asian using name-based algorithms, supplemented by hand-coding for name that are not conclusively assigned to a gender by the algorithm.[12] Ideally, we would identify the race/ethnicity for the full set of letter writers, but the currently available name-based algorithms do not assign race/ethnicity with a sufficiently high degree of confidence other than for Asian names. Similar to Baltrunaite et al. (2021), letter writers are mostly male, with 17 percent of letters from female professors. Female candidates are more likely to have letters written by female faculty than male candidates – overall, 22 percent of letters written for female candidates are written by female faculty, as compared to 15 percent for male candidates. Twelve percent of the letters are from Asian letter writers, a much smaller share than the overall set of Asian candidates in the sample (40 percent). Asian candidates are twice as likely as white candidates to have letters written by Asian faculty, with 18 percent of letters for Asian candidates written by Asian faculty, as compared to 9 percent for white candidates.

[11] The full list of words can be found in Appendix Table A2. We remove from grindstone words "persist*" and "work*" as these words are frequently used in labor economics, macroeconomics, and econometric research. The analysis is sensitive to the selection of the word list. We also remove words related to top, since this is covered in our "Top" variable (see Section 3B).

[12] We ran the list of author names through the gender-guesser matching algorithms (available at gender-guesser · PyPI and Spreadsheet processing tool - Gender Guesser (gender-guesser.com). These algorithms gender-match names with a probability score based on an international database of name-gender matches. For matches with probability scores of 60 percent or lower, we supplemented the algorithm with a hand search of websites, CVs, and other material to confirm or change the gender match.

B. Regression Results: Letter Characteristics

This section presents the results of regressions of various letter characteristics on information about the candidate, letter writer, and institution awarding the Ph.D. The regressions have a similar format:

$$Y_{cw} = \beta_1 Candidate\ Characteristics + \beta_2 Candidate\ Field + \beta_3 Institution\ Characteristics + \beta_4 Letter\ Writter\ Characteristics + \varepsilon_{cw}$$

Where Y_{cw} is a feature of the letter written for candidate *c* by letter writer *w*; *Candidate Characteristics* include the gender and race/ethnicity of the candidate; *Candidate Field* are controls for the candidate's primary field of interest (Macroeconomics or Finance); *Institution Characteristics* include controls for whether the Ph.D.-granting institution is in the United States, whether it is a business school, and whether it is a top 10 finance or economics department. Finally, in some specifications, we include a control for female and Asian letter writers (*Letter Writer Characteristics*).

Table 5 presents the results for letter length, where letter length (Word Count) is regressed against a series of controls.[13] The first column contains dummy variables for the candidate's demographic characteristics, including gender (*Female*) and whether the candidate self-identifies as Asian or Black or Hispanic. We combine Black and Hispanic candidates into a single category since there are so few Black candidates in our sample, just 1 percent overall, and we were concerned about both the empirical stability of the resulting estimates and the potential for revealing information about individual candidates. This approach is not optimal, as Black and Hispanic candidates are distinct and could have differential letter characteristics and outcomes. In results not reported here, we have repeated our analysis using separate controls for Hispanic and Black candidates, respectively. The resulting coefficients are generally similar in size and statistical significance to those reported when the two sets of candidates are combined, though letters for Black candidates are less positive than those for Hispanic candidates in some dimensions. The second column includes controls for the two sub-specialty fields most frequently represented among the candidates, Finance and Macroeconomics.[14] Column (3) contains our main specification, including controls for demographic characteristics, sub-specialty field and Ph.D.-granting institution.

We find that letters for Asian candidates and candidates focusing on Finance and Macroeconomics are systematically shorter than letters for other candidates. The results suggest that letters for Asian

[13] We also estimate these regressions using the log of letter length instead of letter length (number of words). The results are qualitatively identical to those presented in Table 5.

[14] The omitted field of specialization includes all other areas of economics, including labor, international and "other". Together, these represent just over half of the letters in the sample.

candidates are approximately 100 words shorter than letters for other candidates – about 9 percent shorter, given an average letter length of 1,154 words. Including controls for the field of interest is important, as we see systematic differences in candidate characteristics by field of interest and significant differences in letter length by field. Candidates specializing in Finance and Macroeconomics also have shorter letters, with letters for Finance candidates having more than 150 (13 percent) fewer words. We do not find differences in letter length for female or for Black or Hispanic candidates; the coefficients on these variables are small and imprecisely estimated.

These results hold when we control for characteristics of the Ph.D.-granting institution, when we cluster residuals by candidate or by letter writer (columns (4) and (5)), and when we control for female and Asian letter writers (column (6)). These controls suggest that letters for candidates from U.S. schools are shorter but that letters from top 10 economics and finance programs are about 125 to 145 words (11 to 13 percent) longer than letters for candidates from other programs. To the extent that top 10 programs have stronger students than other programs on average, this difference is consistent with the idea that letter length is a signal of higher candidate quality. There is no difference in letter length between male and female letter writers, while letters by Asian letter writers are 50 words shorter than letters by non-Asian writers (column (6)).

Tables 6 and 7 report results for regressions examining the percentage of standout and grindstone words in the letters. The tables have the same format as Table 5, with column (3) containing our primary specification. The results show that letters describing female candidates have a higher share of grindstone words (Table 7) and the same share of standout words (Table 6) as male candidates. To the extent that grindstone words are viewed as less positive, these results are consistent with previous findings in economics and some other disciplines, which have generally found recommendation letters for women are less positive than those for men. On average, the share of grindstone words in letters for female candidates was nearly 10 percent higher than for male candidates[15], a result that holds after clustering errors by candidate or by letter writer (columns (4) and (5)) and when controlling for the characteristics, including gender, of the letter writer (column (6)).

Letters for candidates from top 10 economics and finance programs both have lower shares of grindstone words; to the extent that candidates from these programs are stronger on average than the rest of population, this finding is consistent with the idea that grindstone words are associated with weaker letters.

[15] The 0.02 percent higher percentage of grindstone words in letters for female candidates is a 9.5 percent increase over the average percentage of grindstone words for male candidates of 0.21 percent ($0.02/0.21 \approx 0.095$).

The results also suggest systematic differences in letter content by sub-specialty field. Letters for candidates focusing on Finance have smaller shares of grindstone words, while letters for candidates focusing on Macroeconomics have smaller percentages of both grindstone and standout words.

We document that the share of standout words is smaller for Asian and Black or Hispanic candidates, even after including all controls. The shares of standout words in letters for Asian and Black or Hispanic candidates are about 6 to 8 percent lower than the share for white candidates.[16] While overall grindstone and standout words are positively correlated, letters for Asian candidates include higher shares of grindstone words (0.01 percent more grindstone words, or about 4 percent higher than letters for white candidates). However, there is no statistically significant difference in grindstone words for Black and Hispanic candidates.

The analysis thus far relies on standardized classifications of letter content and sentiment. To supplement this analysis, we develop a measure of letter quality based on whether a candidate is recommended for a job at the very "top" economics or finance department. Most recommendation letters contain a summary sentence – typically at the beginning or at the end of the letter – indicating the economics or finance department most suitable for the candidate. These sentences take a variety of forms, with a wide range of wording. However, the strongest recommendations indicate that the candidate would be appropriate for the "top 10", "very top", "very best", or "leading" departments. We develop an indicator variable for each letter that indicates whether the letter contains such a recommendation. Developing a measure specific to the economic research profession is consistent with the suggestions of Trix and Penska (2003) who highlight the importance of knowledge of what is "high status" in a field.

We used a two-step process to create the indicator variable. First, using the text file version of each letter, we identified all sentences containing the word "department" and then sorted those sentences according to whether the words "top", "best", "leading", "top tier", or "highest ranked" were also in the sentence. The algorithm then screened out sentences containing the words "outside", "other than", "except", "exception", and "apart from" to eliminate cases where the letter recommended the candidate to "all but the very best" or "all departments, except the very best". The algorithm also drops sentences with irrelevant words suggesting the sentence is not about the candidate, such as "department chair", "in the department", or "police department". We then hand-reviewed the algorithm results, making adjustments as necessary.[17] Overall, about 10 percent of the letters include a "top" recommendation and 19

[16] The 0.09 and 0.07 lower percentages of standout words for Asian and Black or Hispanic candidates, respectively, are 8 and 6 percent lower than the 1.16 percent of standout words in letters for white candidates.

[17] On the basis of the hand review, we changed 268 cases that the algorithm had identified as "Top" to not "Top" and 32 cases the algorithm had identified as not "Top" to "Top." A typical instance of the former is when the

percent of candidates in our sample received at least one letter with a "top" recommendation. Thus, at least in percentage terms, the "top" recommendation is limited to a meaningful, but small, portion of the sample.[18]

Table 8 contains the results of regressions of our "top" recommendation variable on candidate, institution, letter, and letter writer characteristics. The results are consistent with the idea that a "top" recommendation is a signal of candidate quality. Letters for candidates getting Ph.D.'s from top 10 economics and finance programs are more likely to include a "top" recommendation. Letters for candidates specializing in Finance are more likely to contain a "top" recommendation, though this result weakens when we include controls for the characteristics of the Ph.D.-granting institution (column (3)). Female and, in some specifications, Asian letter writers are less likely to include a "top" recommendation in their letters (column (4)).

Across all specifications, letters written for female, Asian, and Black or Hispanic candidates are less likely to contain a recommendation to a top economics or finance department. These differences are both statistically and empirically important. The probability that a letter written for a female candidate contains a "top" recommendation is 2 percentage points lower than for a male candidate, for whom 11 percent of letters contain this recommendation (an 18 percent lower incidence). The differences are even starker for Asian and Black or Hispanic candidate letters, where the probabilities of containing a "top" recommendation are 6 and 4 percentage points lower, respectively, than letters for white candidates. Since 13 percent of letters for white candidates contain a "top" recommendation, these coefficients imply a 45 and 30 percent lower incidence of "top" recommendations for Asian and Black or Hispanic candidates, respectively. These differences persist after clustering residuals at the candidate and letter writer levels (columns (5) and (6)) and controlling for other letter characteristics such as letter length and the percentage of grindstone and standout words (column (7)).

Column (7) also adds insight to our interpretation of the analysis of words in the letters. Consistent with the literature, longer letters and letters with higher percentages of standout words are more

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recommendation referred to the Ph.D.-granting department rather than the candidate ("we did not [place] any students at top departments") or if "very top" refers to a non-academic or non-Ph.D.-granting institution ("top teaching college"), and a typical instance of the latter is when the wording was particularly complex ("I would recommend [the candidate] to all economics departments (maybe outside the top 2) and to all business or policy schools, including the very best"). We also limited the "Top" indicator to recommendations to top 20 departments (e.g., a recommendation to a top 50 department would not be coded as "Top").

[18] Eberhardt et al. (2023) also develop an indicator based on letter language describing candidate quality, including signals that the candidate should be of interest to "very top" departments. However, their measure is broader than ours, as it reflects other types of positive language ("great hire" or "a star candidate"). Twenty-four percent of their letters contain these positive signals, as compared to 10 percent of our sample containing a "Top" recommendation.

likely to also include a "top" recommendation sentence. Letters with more grindstone words are less likely to contain a "top" recommendation, though the impact is imprecisely estimated.

As noted above, female candidates are significantly more likely than male candidates to have at least one letter written by a female letter writer and Asian candidates are more likely to have at least one letter written by an Asian letter writer. One question is whether there are differences in the content of letters when female or Asian candidates pair with a female or Asian letter writers (presumably, a faculty advisor or mentor) than when they pair with male or non-Asian letter writers, respectively. This might be the case if there are similarity preferences, and advisers write better letters for people who are more similar to themselves. Since characteristics differ for candidates and letter writers, with senior faculty letter writers less likely to be women or Asian, this could explain some of the result, if letter writers have preferences for people who are like them.

To explore this question, we cross the variables for female candidate (*Female*) and female letter writer *(Female Writer*) and Asian candidate (*Asian*) and Asian letter writer (*Asian Writer*). These results are presented in Table 9. The table presents the "top" recommendation regression specification controlling for candidate characteristics, institution characteristics, letter writer characteristics (columns (1) and (2)) and also including other letter characteristics (columns (3) and (4)). The results do not change meaningfully when the additional letter characteristics are included.

The coefficient estimates suggest that letters written by female faculty are more likely to include a "top" recommendation when the candidate is also female, though the coefficient is imprecisely estimated (columns (2) and (4)). However, this differential (positive 3 percent) is not sufficient to overcome the lower overall rate of "top" recommendations by female letter writers (negative 4 percent) and the lower overall probability that letters for female candidates contains a "top" recommendation (negative 2 percent). In fact, the estimates suggest that while letters for female candidates are less likely to contain a "top" recommendation whether the letter writer is male or female, this gap is actually *larger* when the letter writer is female. Letters written for female candidates by female letter writers are 3 percent less likely to contain a "top" recommendation than are letters for male candidates written by male letter writers (the sum of the coefficients on *Female, Female Writer, and Female x Female Writer*) versus 2 percent less likely when the letter writer is male (the coefficient on *Female*).[19]

[19] One potential explanation for the lower rate of "Top" recommendations by female letters writers is that female faculty members could be more junior on average than male faculty members (Baltrunaite et al 2022). In that case, our results would be confounding any gender-related effects with the impact of seniority. In future work, we plan to identify the seniority of the letter writers and control for this factor in our regressions.

Conversely, the results indicate that Asian letter writers are less likely to make a "top" recommendation for Asian candidates than for other candidates, though the coefficient is imprecisely estimated. Summing the coefficients in the specification, we estimate that Asian candidates are 7 percent less likely to receive a "top" recommendation when the letter writer is also Asian (the sum of coefficients on *Asian, Asian Writer*, and *Asian x Asian Writer*), as compared to 4 percent less likely when the letter writer is not Asian (the coefficient on *Asian*). Overall, the lower rate at which Asian letter writers make "top" recommendations appears to come primarily from the lower rate of making this recommendation for Asian candidates – once the cross-effect is controlled for, the coefficient on *Asian Writer* is essentially zero.

C. Regression Results: Early Career Outcomes

In this section, we explore an important follow-on question, which is whether weaker letters for female, Asian and Black or Hispanic candidates are correlated with early career outcomes for these candidates. Do candidates with stronger letters experience better career outcomes? Are there residual associations between candidate characteristics related to gender and race/ethnicity after controlling for letter content?

To explore these questions, we create variables intended to capture early career outcomes for the candidates in our sample.[20] The first variable captures initial job placements, in particular, a binary measure indicating whether the candidate's initial job placement was in a top 20 economics or finance department (*Top 20 Academic Job*). The other variables capture publications in the period up through two years following graduation. We count the number of publications for each candidate in top 100 (*Top 100 Publications*) and top 8 journals (*Top 8 Publications*), based on RePEC rankings.

To construct the initial job placement variable, we name match the candidates in our sample with lists of faculty at top 20 economics and finance departments, where ranking is based on the US News and World Report and W.P. Carey Business Intelligence rankings of economics departments and business school finance departments, respectively.[21] Only a small fraction (5 percent) of candidates have initial

[20] We focus on early career outcomes during the period from the year of graduation to two years after receiving a Ph.D. because our sample is based on candidates in the 2018 to 2021 job market cycles, who are all in the early phases of their careers as of the time of this analysis. We define "early career" as the three-year window starting with the year the candidate applied and expected to receive their Ph.D. and ending two years later because this is the longest period we observe for candidates in the 2021 job market cycle.

[21] In particular, we name-matched our candidates to economics faculty lists for the 2020-2021 academic year and finance department faculty lists for the 2019-2020 academic year, as reported by Hasselback. Ideally, we would match to faculty lists for academic year in our sample, but such lists were not immediately available. An important assumption is that the candidates did not change jobs in the first few years following receipt of their Ph.D. Finally,

jobs at these top departments (see Table 10). The share among candidates coming from top 10 Ph.D. programs is higher at 14 percent, consistent with higher shares of those candidates with more positive letters.

Table 11 contains results for initial job placements. As in earlier tables, column (3) contains our core specification including candidate, Ph.D.-granting institution, and field of interest characteristics, while column (4) extends this specification to include letter writer and letter characteristics. The results in Table 11 are based on letter-level regressions to focus on the association between letter characteristics and job outcomes; the results of candidate-level regressions in which we average letter characteristics for each candidate are essentially identical.

Consistently across the specifications, the results indicate that Asian job candidates are less likely to have an initial job placement at a top 20 academic department, while there are no meaningful differences for female and Black or Hispanic candidates. Consistent with department rankings, candidates from top 10 economics and finance departments are significantly more likely to join a top 20 department. These results are unchanged when we include letter writer and letter characteristics (column (4)). The results suggest that stronger letters are associated with higher probabilities of finding an initial job at a top 20 academic department. Both letter length and a "top" recommendation are strongly associated with higher probabilities of finding a top 20 academic job. These results are economically as well as statistically significant – a "top" recommendation is associated with a 14 percentage point higher probability of a candidate finding a top 20 academic job, a very large increment given the overall average probability in the sample of 5 percent.

To identify publications, we name-match the candidates in our sample to a listing of journal publications from EconLit for the top 100 academic journals as ranked by RePEC within two years from the Ph.D. date. We supplemented algorithmic first and last name matching with hand checks based on middle initials where available. We also confirmed name matches by hand for candidates with 7 or more matches, since it seems unlikely that candidates would have that many publications in a three-year period. In doing the hand-checks, we relied on information about the Ph.D.-granting institution to help identify papers written by candidates in our sample.

Nearly a quarter of candidates have at least one top 100 journal publication within two years of finishing their Ph.D.; the average number of such publications per candidate is 0.33 across the full sample.

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since the list of finance department faculty we use is for the 2019-2020 academic year, it will not contain any candidates who received their Ph.D. in 2020 or 2021, the final year of our sample. Similarly, since the list of economics department faculty is for the 2020-2021 academic year, it will not contain any candidates who received their Ph.D. in 2021. For these reasons, we drop all 2020 and 2021 candidates from the sample used in our initial job regressions.

Not surprisingly, the share of candidates and number of publications in top 8 journals is considerably lower, with just 6 percent of candidates having any publications in a top 8 journal within the first two years (the average number of top 8 publications per candidate is just 0.07). In the results presented below, we focus on the number of early career top journal publications; our results are not sensitive to the way the publications variables are defined (binary vs. counts).

Table 12 presents results related to early career publications. The first four columns present results for the number of top 100 journal publications while the fifth through eighth columns narrow in on the top 8 journals with highest impact. The results are quite similar for both publication measures and across specifications. In particular, female, Asian, and Black or Hispanic candidates have significantly fewer top journal publications than male and white candidates, respectively. These results are material – female candidates, for instance, have 40 percent fewer top 100 journal publications and 60 to 70 percent fewer top 8 journal publications[22], even after controlling for letter characteristics. Letter characteristics are in fact strongly associated with early career publication outcomes. Longer letters, letters with higher shares of standout words and lower shares of grindstone words, and most significantly, containing a "top" recommendation are all positively associated with the number of early career journal publications. Letters with a "top" recommendation are associated with a near doubling of the average number of top 100 journal publications (an increment of 0.27 to the average number of 0.33) and 2.5 times the average number of top 8 journal publications (an increment of 0.17 to the average of 0.07).

D. Interpretation

The strong relationship between letters and outcomes could be casual evidence of the importance of these letters for early career success. Better letters may lead to first round interviews with more and higher ranked departments. More job market interviews mean more opportunities to land a high-quality position. Academic publications benefit from additional interviews with more and higher ranked departments, particularly if interviews are converted to job talks. Interview conversations about candidate's research may result in improved paper quality and exposure to economics journal editors. This result is also consistent with a less direct channel whereby letters measure the extent of advisor support. Faculty advisor support may lead to better early career outcomes as advisors advocate for their students to get interviews recommend their students' work to editors and referees. If letters causally lead to early career

[22] The average number of top 100 journal publications in the entire sample is 0.33, so a coefficient on -0.12 to -0.13 represents a 36 to 39 percent lower number. The average number of top 8 journal publications in the entire sample is 0.07, so a coefficient of -0.04 to -0.05 represents a 57 to 71 percent lower rate.

success, and letters are systematically related to candidate characteristics, then this pattern suggests a channel through which underrepresented candidates may be disadvantaged in establishing careers in economics.

However, another explanation for the relationship between letters and outcomes is that the letters accurately capture the talent of PhD candidates. To the extent that early career success is a function of economics aptitude and research ideas, better candidates should receive better letters, get better jobs and have better publications outcomes. If letters simply reflect ability to succeed in the economics profession, then the next research question would be to explain why that ability would be associated with personal characteristics in the population of economics graduate students.

This paper does not shed light on the reasons for these results. We outline some possible explanations for future research to explore. For example, this could arise if admissions standards for economics graduate school vary systematically with race and gender, resulting in differences in the distribution of women, Asian and Black or Hispanic students. This could arise if admissions committees are less able to forecast aptitude for candidates with whom they have less experience. This could also arise if graduate schools are less able to train and educate students whose characteristics differ from faculty. Finally, this could arise if candidates are equal in ability when admitted to graduate schools, but the profession in terms of publications and jobs does not value research and research interests of women, Asian and Black and Hispanic students, or if the most talented of these students choose not to pursue academic positions.[23]

While we have combined in this paper some discussion of these characteristics as populations that are underrepresented in economics, the same forces may not be at play for different characteristics. After we control for letter quality, we find that women and Black or Hispanic candidates are no less likely to obtain top 20 academic jobs. But they are significantly less likely to publish papers in either top 8 or top 100 journals. However, even incorporating the negative effect from having worse letters, Asian candidates are both less likely to get a top academic position and less likely to publish papers in either top 8 or top 100 journals, although the latter effect is not statistically significant.

E. Robustness

We explored a number of dimensions of robustness. First, since we are uncertain about the type of selection we may have across Ph.D. granting programs, we limit the sample to candidates receiving

[23] For example, scholars such as Lisa Cook have said they were discouraged from some topics, saying "nobody wants to hear about women, and they sure don't want to hear about Black people" (Khang 2020).

Ph.D.'s from U.S. economics departments and business schools. It is possible that the content and impact of recommendation letters differs systematically between U.S. and non-U.S. graduate programs. There could also be letter differences if letter writers from non-U.S. programs do not use English as their primary language of communication. Finally, candidates coming from non-U.S. programs could differ in unobserved ways from candidates applying for such job who are already located in the United States.

Table 13 presents letter characteristics and early career outcome results for the U.S.-only sample. Not surprisingly, since candidates from U.S. programs make up 80 percent of our overall sample, the results are quite similar to those from the full sample. The most notable differences are that letters for female candidates have statistically higher shares of standout words in the U.S.-only sample (column (2) of Table 13) – while the coefficient was positive for the full sample, it was not estimated precisely. Additionally, the number of top 8 journal publications is statistically significantly lower for Asian candidates in the U.S.-only sample (column (7) of Table 13). In the full sample results, the coefficient was also negative but not always significant. Overall, however, these results do not provide any substantive evidence of meaningful differences between U.S. and non-U.S. candidates that affect our key findings.

Another approach is to limit the sample to subsamples of candidates that are more similar. First, we limit the sample candidates from the top 10 economics and finance departments. This may reduce selection bias and also effectively controlling for nonlinearities in selection into those schools and the properties of sub-specialty fields within those schools. The results are qualitatively consistent with those in the broader sample, and despite the smaller sample, the statistical significance of coefficients is sometimes increased (see Appendix Table A3). Another approach to unobserved variation in the candidates is to consider only candidates in a particular subspecialty. Since we have the most applicants with an interest in Macroeconomics and Finance, one concern could be that the depth of the candidate pools with these specialties differs from other fields of interest and that these differences could account for some of our findings. To explore this possibility, we run the same specifications in Appendix Table A4 only for candidates whose primary subspecialty is Macroeconomics, a subsample of 1,691 letters, and in Appendix Table A5 only for candidates whose primary subspecialty is Finance, a subsample with 1,326 letters. By looking across candidates within a field of interest, we eliminate differences that reflect the depth of the pool of candidates within a discipline. It also allows the effect of the control variables such as the type of university to be different within subfields of economics. Results are similar for Macroeconomics candidates as they are for the sample as a whole – letters for Asian students are shorter, contain fewer standout words and more grindstone words than letters for other candidates. Letters for female, Asian and Black or

Hispanic candidates are all less likely to contain a recommendation to a top economics or finance department. Results for candidates specializing in Finance also mirror those for the broader sample.

4. Conclusion

We document consistent patterns in letters of recommendation for new Ph.D. economics and finance job candidates. Asian candidates have weaker letters of recommendation across almost all dimensions. Consistent with other studies, we find differences by gender, with letters for female candidates containing higher shares of grindstone words, though no meaningful differences in letter length or in the share of standout words. When we turn to a binary measure which places more importance on identifying students at the far-right tail of ability, the results are quite stark. Female, Asian, and Black or Hispanic Ph.D. candidates, all minorities in the economics profession, are less likely to be described as candidates who should be placed in the very "top" departments, a finding that holds when we control for other letter characteristics, for field of specialization, and for the caliber of the Ph.D.-granting institution. Finally, we find that stronger letters, especially longer letters and letters containing a "top" recommendation, are strongly correlated with better early career outcomes, including having an initial job at a top 20 academic department and having more publications in top academic journals. We further find that female, Asian, and Black or Hispanic candidates have weaker early career outcomes, even after controlling for letter characteristics.

In addition to documenting important patterns in economics Ph.D. letters of recommendation that relate to candidates' personal characteristics, an additional important takeaway is the result that letters are different across fields. Presumably this does not matter much within a field, for example, if Finance candidates are always compared with other Finance candidates. However, for departments that are considering candidates across fields, having an understanding that there are differences based on field of interest is helpful information when comparing recommendation letters.

While this paper documents important patterns in letters of recommendation, we do not speculate as to why we find these differences. Since differences do not arise from innate ability associated with these characteristics, there may be a host of potential explanations including differences in unobserved quality, conscious or unconscious bias, and similarity bias or the match between letter writers and students. Since these letters are associated with outcomes, it is also important to understand if differences arise from the candidate pool admitted to graduate school, the ability or graduate school to educate candidate with different characteristics equally, differential faculty evaluations of candidates, or a lack of early career success for the types of methods and research questions that interest candidates with these

characteristics. Finally, we are not able to measure other types of underrepresentation, such as sexual orientation or socioeconomic background, and the extent to which these personal characteristics have similar implications for the quality of recommendation letters and early career outcomes.

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Tables

Table 1: Summary Statistics for Applicants

	Mean	St. Dev.
Candidate Characteristics		
Female	0.30	0.46
Asian	0.37	0.48
Black	0.01	0.12
Hispanic	0.13	0.33
Primary Field of Interest		
Finance	0.20	0.40
Macro	0.26	0.44
Institution Characteristics		
Top 10 U.S. Inst.	0.19	0.39
U.S. Inst.	0.79	0.41
B-School	0.11	0.31
Number of Letters		
No. Letters	2.86	0.70
N	2227	

Notes: Table presents summary statistics for full sample of 2,227 applicants from 20187-2021. *Female, Asian, Black,* and *Hispanic* are binary variables equal to 1 for candidates self-identifying those characteristics. *Finance* and *Macro* are binary variables equal to 1 for candidates indicating a primary interest in those fields. *Top 10 U.S. Inst.* is a binary variable equal to 1 for candidates matriculating at a top 10 economics or finance Ph.D. program. *U.S. Inst.* and *B-School* are binary variable equal to 1 for candidates matriculating institutions in the United States or business schools, respectively. *No. Letters* is the number of letters of recommendation candidates submitted for their application.

Table 2: Differences in Candidate Characteristics with the Sample

Panel A: By Gender

	Male		Female		T-Test	χ-Squared
	Mean	St Dev	Mean	St Dev	Mean Diff	P-Value
Asian	0.33	0.47	0.46	0.50	-0.13^{***}	0.00^{***}
Black	0.02	0.13	0.01	0.11	0.00	0.46
Hispanic	0.15	0.35	0.08	0.27	0.07^{***}	0.00^{***}
Black or Hispanic	0.16	0.37	0.09	0.29	0.07^{***}	0.00^{***}
Finance	0.22	0.41	0.14	0.35	0.08^{***}	0.00^{***}
Macro	0.29	0.45	0.21	0.41	0.08^{***}	0.00^{***}
Top 10 U.S. Inst.	0.20	0.40	0.17	0.37	0.04^{**}	0.05^{**}
U.S. Inst.	0.78	0.41	0.80	0.40	-0.02	0.40
B-School	0.11	0.32	0.09	0.29	0.02	0.12
N	1556		671		2227	2227

Panel B: By Field of Interest

	Finance		Macro		Int'l		Labor		Other Fields	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Female	0.22^{---}	0.42	0.24^{---}	0.43	0.26	0.44	0.44^{+++}	0.50	0.35^{+++}	0.48
Asian	0.42^{++}	0.49	0.33^{--}	0.47	0.46^{++}	0.50	0.36	0.48	0.36	0.48
Black	0.01	0.10	0.02	0.12	0.04^{+++}	0.19	0.01	0.08	0.02	0.12
Hispanic	0.08^{---}	0.27	0.16^{+++}	0.36	0.15	0.36	0.13	0.33	0.12	0.33
Black or Hispanic	0.09^{---}	0.28	0.17^{+++}	0.38	0.19^{++}	0.40	0.13	0.34	0.14	0.34
Top 10 U.S. Inst.	0.11^{---}	0.31	0.20	0.40	0.21	0.41	0.23^{+}	0.42	0.21	0.41
U.S. Inst.	0.66^{---}	0.48	0.73^{---}	0.45	0.81	0.39	0.86^{+++}	0.35	0.88^{+++}	0.33
B-School	0.42^{+++}	0.49	0.02^{---}	0.14	0.04^{---}	0.19	0.01^{---}	0.10	0.04^{---}	0.21
N	440		589		182		302		714	

Notes: Table presents summary statistics for full sample of 2,227 applicants from 2018-2021. Panel A cross-tabulates characteristics by candidates' primary field of interest and Panel B by gender. *Female, Asian, Black, Hispanic* are binary variables equal to 1 for candidates self-identifying those characteristics. *Top 10 US Inst.* is a binary variable equal to one for candidates matriculating at a top 10 economics or finance Ph.D. program. *U.S. Inst.* and *B-School* are binary variable equal to one for candidates matriculating institutions in the United States or business schools, respectively. Panel A reports both T-Tests and χ-Squared Test statistics for differences in means between male and female candidates, with the symbols ***, **, and * indicating statistical significance at the 1, 5, and 10 percent levels, respectively. In Panel B, the symbols indicate the sign and significance level of a χ-Squared Test of the difference in means between the candidates with each primary field of interest and all other candidates; +++, ++ and + indicate the average for the subsample is greater than the average for the rest of the sample at the 1, 5, and 10 percent levels, respectively, while ---, --, and – indicate that the average for the subsample is less than the average for the rest of the sample at the 1, 5, and 10 percent levels, respectively.

Table 3: Sample Selection in Applicant Pool

	US Economics Department Sample		AEA Sample	
	N	Mean	N	Mean
Female	1565	0.31	4415	0.33
Top 10 U.S. Inst.	1565	0.27	4415	0.19
Asian	1565	0.41	1807	0.14
Black	1565	0.02	1807	0.03
Hispanic	1565	0.14	1807	0.06

Notes: Table presents summary statistics for subsample of 1,565 applicants receiving Ph.D.'s from U.S. economics departments and are thus comparable to the pool of Ph.D. recipients for which there is data available from the American Economic Association (AEA). The AEA sample is based on information from the Committee on the Status of Women in the Economics Profession (CSWEP, first two rows) and the Committee on the Status of Minority Groups in the Economics Profession (CSMGEP, last three rows). The CSWEP sample includes all Ph.D. graduates from U.S. economics departments, while the CSMGEP sample includes U.S. citizens and permanent residents receiving a Ph.D. from a U.S. economics department.

Table 4: Summary Statistics for Letters

	Mean	Median	St. Dev.	P25	P75
Word Count	1153.69	1070.00	541.20	780.00	1430.00
Standout %	1.12	1.06	0.51	0.77	1.40
Grindstone %	0.22	0.18	0.21	0.08	0.31
No. Standout Words	12.79	11.00	7.83	7.00	17.00
No. Grindstone Words	2.42	2.00	2.31	1.00	3.00
Top Rec	0.10	0.00	0.30	0.00	0.00
Female Writer	0.17	0.00	0.38	0.00	0.00
Asian Writer	0.12	0.00	0.33	0.00	0.00
N	6365				

Notes: Table presents summary statistics for full sample of 6,365 letters for 2,227 applicants from 2018-2021. *Word Count* is the number of words in each letter. *Standout %* and *Grindstone %* are the number of standout and grindstone words as a percent of the total number of words in the letter. *No. Standout* Words and *No. Grindstone Words* are the number of standout and grindstone words in each letter. *Top Rec* is a binary variable equal to 1 for letters that indicate that a candidate is suitable to be placed at the very top economics or business school departments. *Female Writer* and *Asian Writer* are binary variables equal to 1 if the letter writer is female or Asian, respectively.

Table 5: Candidate and Institution Characteristics and Letter Word Count

	(1) Word Count	(2) Word Count	(3) Word Count	(4) Word Count	(5) Word Count	(6) Word Count
Female	-6.16	-20.74	-17.54	-17.54	-17.54	-18.52
	(14.52)	(14.77)	(14.72)	(17.16)	(15.17)	(14.75)
Asian	-110.97***	-108.16***	-99.44***	-99.44***	-99.44***	-95.69***
	(14.80)	(14.75)	(15.08)	(17.55)	(16.19)	(15.15)
Black or Hispanic	13.97	1.29	-4.92	-4.92	-4.92	-4.70
	(20.00)	(20.05)	(20.05)	(23.54)	(20.49)	(20.05)
Finance		-137.95***	-156.97***	-156.97***	-156.97***	-153.08***
		(16.37)	(18.99)	(22.15)	(21.67)	(19.17)
Macro		-41.81**	-45.80***	-45.80**	-45.80**	-45.91***
		(16.41)	(16.49)	(19.14)	(21.48)	(16.55)
Top 10 Econ			146.60***	146.60***	146.60***	144.35***
			(17.72)	(20.95)	(26.51)	(17.75)
Top 10 B-School			125.15***	125.15***	125.15***	125.12***
			(33.07)	(38.26)	(37.87)	(33.13)
U.S. Inst.			-61.58***	-61.58***	-61.58***	-57.59***
			(18.50)	(21.27)	(23.09)	(18.54)
B-School			3.99	3.99	3.99	2.27
			(26.97)	(31.36)	(29.34)	(27.02)
Female Writer						3.31
						(17.11)
Asian Writer						-50.93***
						(19.13)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No	No	No
Err Cluster	No	No	No	Cand	Writer	No
N	6365	6365	6365	6365	6365	6365
R-squared	0.01	0.02	0.03	0.03	0.03	0.03

Notes: Table presents results of an OLS regression on the letter word count based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer* and *Asian Writer*). Standard errors are robust and clustered at the candidate level in specification (4) and the writer level in specification (5). Omitted race is white. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 6: Candidate and Institution Characteristics and Percent of Standout Words

	(1) Standout %	(2) Standout %	(3) Standout %	(4) Standout %	(5) Standout %	(6) Standout %
Female	0.02	0.02	0.02	0.02	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Asian	-0.08***	-0.09***	-0.09***	-0.09***	-0.09***	-0.09***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Black or Hispanic	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Finance		0.03**	0.03	0.03	0.03	0.03
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Macro		-0.06***	-0.06***	-0.06***	-0.06***	-0.06***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Top 10 Econ			0.00	0.00	0.00	0.00
			(0.02)	(0.02)	(0.02)	(0.02)
Top 10 B-School			-0.01	-0.01	-0.01	-0.01
			(0.04)	(0.05)	(0.04)	(0.04)
U.S. Inst.			0.00	0.00	0.00	0.00
			(0.02)	(0.02)	(0.02)	(0.02)
B-School			0.02	0.02	0.02	0.02
			(0.03)	(0.04)	(0.03)	(0.03)
Female Writer						-0.00
						(0.02)
Asian Writer						0.02
						(0.02)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No	No	No
Err Cluster	No	No	No	Cand	Writer	No
N	6365	6365	6365	6365	6365	6365
R-squared	0.01	0.01	0.01	0.01	0.01	0.01

Notes: Table presents results of an OLS regression on the percent of standout words based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer* and *Asian Writer*). Standard errors are robust and clustered at the candidate level in specification (4) and the writer level in specification (5). Omitted race is white. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 7: Candidate and Institution Characteristics and Percent of Grindstone Words

	(1) Grind-stone %	(2) Grind-stone %	(3) Grind-stone %	(4) Grind-stone %	(5) Grind-stone %	(6) Grind-stone %
Female	0.03***	0.02***	0.02***	0.02**	0.02**	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Asian	0.01*	0.01*	0.01**	0.01*	0.01*	0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Black or Hispanic	0.00	0.00	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Finance		-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Macro		-0.06***	-0.06***	-0.06***	-0.06***	-0.06***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Top 10 Econ			-0.04***	-0.04***	-0.04***	-0.04***
			(0.01)	(0.01)	(0.01)	(0.01)
Top 10 B-School			-0.05***	-0.05***	-0.05***	-0.05***
			(0.01)	(0.02)	(0.02)	(0.01)
U.S. Inst.			-0.00	-0.00	-0.00	-0.00
			(0.01)	(0.01)	(0.01)	(0.01)
B-School			-0.01	-0.01	-0.01	-0.01
			(0.01)	(0.01)	(0.01)	(0.01)
Female Writer						0.01*
						(0.01)
Asian Writer						0.02*
						(0.01)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No	No	No
Err Cluster	No	No	No	Cand	Writer	No
N	6365	6365	6365	6365	6365	6365
R-squared	0.00	0.02	0.03	0.03	0.03	0.03

Notes: Table presents results of an OLS regression on the percent of grindstone words based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer* and *Asian Writer*). Standard errors are robust and clustered at the candidate level in specification (4) and the writer level in specification (5). Omitted race is white. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 8: Candidate and Institution Characteristics and "Top" Recommendation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Top Rec	Top Rec	Top Rec	Top Rec	Top Rec	Top Rec	Top Rec
Female	-0.03***	-0.02***	-0.02**	-0.02**	-0.02*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Asian	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Black or Hispanic	-0.03***	-0.03***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Finance		0.03***	0.01	0.01	0.01	0.01	0.02
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Macro		-0.00	-0.00	-0.01	-0.01	-0.01	-0.00
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Top 10 Econ			0.17***	0.17***	0.17***	0.17***	0.15***
			(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Top 10 B-School			0.15***	0.15***	0.15***	0.15***	0.14***
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
U.S. Inst.			-0.04***	-0.03***	-0.03***	-0.03***	-0.03***
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
B-School			0.03*	0.03*	0.03*	0.03*	0.03*
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Female Writer				-0.03***	-0.03***	-0.03***	-0.03***
				(0.01)	(0.01)	(0.01)	(0.01)
Asian Writer				-0.02*	-0.02*	-0.02	-0.01
				(0.01)	(0.01)	(0.01)	(0.01)
Word Count							0.00***
							(0.00)
Standout %							0.05***
							(0.01)
Grindstone %							-0.02
							(0.01)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No	No	No	No
Err Cluster	No	No	No	No	Cand	Writer	No
N	6365	6365	6365	6365	6365	6365	6365
R-squared	0.01	0.01	0.07	0.07	0.07	0.07	0.11

Notes: Table presents results of an OLS regression on a binary variable indicating whether a letter recommends the candidate to a "top" program based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer* and *Asian Writer*), as well as continuous variables for letter length and content *(Word Count, Standout %,* and *Grindstone %*). Standard errors are robust and clustered at the candidate level in specification (5) and the writer level in specification (6). Omitted race is white. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 9: Impact of Female/Asian Letter Writers for Female/Asian Candidates

	(1)	(2)	(3)	(4)
	Top Rec	Top Rec	Top Rec	Top Rec
Female	-0.02**	-0.02***	-0.02**	-0.02***
	(0.01)	(0.01)	(0.01)	(0.01)
Asian	-0.06***	-0.05***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Black or Hispanic	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Finance	0.01	0.00	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.01)
Macro	-0.01	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Top 10 Econ	0.17***	0.17***	0.15***	0.15***
	(0.01)	(0.01)	(0.01)	(0.01)
Top 10 B-School	0.15***	0.15***	0.14***	0.14***
	(0.03)	(0.03)	(0.03)	(0.03)
U.S. Inst.	-0.03***	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
B-School	0.03*	0.03*	0.03*	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)
Female Writer	-0.03***	-0.04***	-0.03***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Female x Female Writer		0.03		0.03
		(0.02)		(0.02)
Asian Writer	-0.02*	-0.01	-0.01	0.00
	(0.01)	(0.02)	(0.01)	(0.02)
Asian x Asian Writer		-0.03		-0.03
		(0.02)		(0.02)
Word Count			0.00***	0.00***
			(0.00)	(0.00)
Standout %			0.05***	0.05***
			(0.01)	(0.01)
Grindstone %			-0.02	-0.02
			(0.01)	(0.01)
Regression	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No
Err Cluster	No	No	No	No
N	6365	6365	6365	6365
R-squared	0.07	0.07	0.11	0.11

Notes: Table presents results of an OLS regression on a binary variable indicating whether a letter recommends the candidate to a "top" program based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer* and *Asian Writer*), as well as continuous variables for letter length and content *(Word Count, Standout %,* and *Grindstone %*). Standard errors are robust and clustered at the candidate level in specification (5) and the writer level in specification (6). Omitted race is white. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 10: Summary Statistics for Early Career Outcomes

	N	Mean	St. Dev.
Panel A: Full Sample			
Top 20 Academic	1181	0.05	0.21
No. Top 100 Pubs	2227	0.33	0.70
No. Top 8 Pubs	2227	0.07	0.30
Has Pub	2227	0.24	0.42
Has Top 8 Pub	2227	0.06	0.25
Panel B: Top 10 Economics and Finance Department Sample			
Top 20 Academic	277	0.14	0.34
No. Top 100 Pubs	532	0.45	0.81
No. Top 8 Pubs	532	0.17	0.45
Has Pub	532	0.31	0.46
Has Top 8 Pub	532	0.15	0.36

Notes: Table presents summary statistics for the full sample of 2,227 applicants from 2018-2021. *Top 20 Academic* is a binary variable equal to 1 for candidates that took a job at a top 20 academic department; it is available only for the 1181 candidates who applied in 2018 and 2019. *No. Top 100 Pubs* and *No. Top 8 Pubs* are the number of publications in the two years after receiving a Ph.D. in top 100 journals and in top 8 journals, respectively. *Has Top 100 Pub* and *Has Top 8 Pub* are binary variables equal to 1 for candidates that published in the two years after receiving a Ph.D. in a top 100 journal and in a top 8 journal, respectively. Panel A reports statistics for the full applicant sample and Panel B reports statistics for the subsample of applicants from top 10 economics and finance departments.

Table 11: Early Career Outcomes: Initial Job Placement

	(1) Top 20 Academic	(2) Top 20 Academic	(3) Top 20 Academic	(4) Top 20 Academic
Female	0.01	0.01	0.02	0.02
	(0.02)	(0.02)	(0.02)	(0.01)
Asian	-0.05***	-0.05***	-0.06***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Black or Hispanic	0.02	0.03	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.03)
Finance		0.03	0.02	0.02
		(0.02)	(0.02)	(0.02)
Macro		-0.02	-0.01	-0.01
		(0.01)	(0.01)	(0.01)
Top 10 Econ			0.11***	0.08***
			(0.02)	(0.02)
Top 10 B-School			0.13**	0.10*
			(0.06)	(0.06)
U.S. Inst.			0.02	0.03**
			(0.01)	(0.01)
B-School			-0.00	-0.00
			(0.03)	(0.03)
Female Writer				-0.00
				(0.01)
Asian Writer				0.02
				(0.01)
Word Count				0.00***
				(0.00)
Standout %				0.00
				(0.01)
Grindstone %				-0.01
				(0.02)
Top Rec				0.14***
				(0.03)
Regression	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full
Letter Year	2017-18	2017-18	2017-18	2017-18
FE	No	No	No	No
Err Cluster	Cand	Cand	Cand	Cand
N	3396	3396	3396	3396
R-squared	0.01	0.02	0.07	0.12

Notes: Table presents results of an OLS regressions on a binary variable indicating that the candidate took a job at a top 20 academic department based on the sample of 3,396 letters for 1,181 applicants from 2018-2019. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grind-stone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 12: Early Career Outcomes: Journal Publications

	(1) No. Top 100 Pubs	(2) No. Top 100 Pubs	(3) No. Top 100 Pubs	(4) No. Top 100 Pubs	(5) No. Top 8 Pubs	(6) No. Top 8 Pubs	(7) No. Top 8 Pubs	(8) No. Top 8 Pubs
Female	-0.13***	-0.13***	-0.12***	-0.12***	-0.05***	-0.05***	-0.04***	-0.04***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
Asian	-0.06*	-0.06*	-0.04	-0.00	-0.03**	-0.04**	-0.04**	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
Black or Hispanic	-0.10**	-0.10**	-0.11**	-0.09**	-0.05**	-0.04*	-0.05**	-0.04**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Finance		-0.01	-0.03	-0.02		0.08***	0.07***	0.07***
		(0.04)	(0.05)	(0.05)		(0.02)	(0.02)	(0.02)
Macro		0.04	0.03	0.03		-0.01	-0.01	-0.01
		(0.04)	(0.04)	(0.04)		(0.01)	(0.01)	(0.01)
Top 10 Econ			0.19***	0.12***			0.13***	0.09***
			(0.05)	(0.04)			(0.02)	(0.02)
Top 10 B-School			0.18*	0.13			0.15**	0.12**
			(0.10)	(0.10)			(0.06)	(0.06)
U.S. Inst.			-0.11***	-0.09**			-0.02	-0.01
			(0.04)	(0.04)			(0.02)	(0.02)
B-School			-0.02	-0.03			0.00	-0.01
			(0.07)	(0.06)			(0.03)	(0.03)
Female Writer				-0.01				0.01
				(0.02)				(0.01)
Asian Writer				-0.03				-0.01
				(0.03)				(0.01)
Word Count				0.00***				0.00***
				(0.00)				(0.00)
Standout %				0.09***				0.02**
				(0.02)				(0.01)
Grindstone %				-0.10**				-0.06***
				(0.04)				(0.02)
Top Rec				0.27***				0.17***
				(0.05)				(0.03)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Full	Full	Full	Full	Full	Full	Full	Full
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20	2017-20
FE	No	No	No	No	No	No	No	No
Err Cluster	Cand	Cand	Cand	Cand	Cand	Cand	Cand	Cand
N	6365	6365	6365	6365	6365	6365	6365	6365
R-squared	0.01	0.01	0.02	0.05	0.01	0.02	0.06	0.09

Notes: Table presents results of OLS regressions on the number of publications in the two years after receiving a Ph.D. in top 100 journals (*Top 100 Pubs*) and in top 8 journals (*Top 8 Pubs*) based on the sample of 6,365 letters for 2,227 applicants from 2018-2021. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*Top 10 Econ*, *Top 10 B-School*, *U.S. Inst.*, and *B-School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grindstone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 13: Robustness: Letter Characteristics and Early Career Outcomes:
U.S. Economics and Finance Departments

	(1) Word Count	(2) Standout %	(3) Grind-stone %	(4) Top Rec	(5) Top 20 Academic	(6) No. Top 100 Pubs	(7) No. Top 8 Pubs
Female	-14.07	0.03*	0.01**	-0.02**	0.02	-0.09***	-0.03***
	(16.51)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)
Asian	-98.69***	-0.09***	0.01	-0.06***	-0.06***	-0.00	-0.03**
	(16.64)	(0.02)	(0.01)	(0.01)	(0.02)	(0.04)	(0.02)
Black or Hispanic	-14.09	-0.07***	0.00	-0.05***	0.01	-0.09*	-0.04*
	(21.65)	(0.02)	(0.01)	(0.01)	(0.03)	(0.05)	(0.02)
Finance	-167.80***	0.04*	-0.03***	0.01	0.03	-0.05	0.08***
	(22.79)	(0.03)	(0.01)	(0.02)	(0.03)	(0.05)	(0.03)
Macro	-45.23**	-0.05***	-0.06***	0.01	-0.01	0.01	-0.01
	(18.46)	(0.02)	(0.01)	(0.01)	(0.02)	(0.04)	(0.02)
Top 10 Econ	148.27***	0.00	-0.04***	0.17***	0.07***	0.12***	0.10***
	(17.87)	(0.02)	(0.01)	(0.01)	(0.02)	(0.04)	(0.02)
Top 10 B-School	92.27**	-0.02	-0.04***	0.16***	0.10*	0.12	0.13*
	(37.26)	(0.04)	(0.02)	(0.03)	(0.06)	(0.10)	(0.06)
B-School	47.33	0.03	-0.02	0.03	-0.02	-0.01	-0.01
	(35.21)	(0.04)	(0.02)	(0.02)	(0.04)	(0.08)	(0.04)
Female Writer	8.51	0.01	0.01	-0.02**	-0.00	0.00	0.01
	(19.17)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)
Asian Writer	-47.80**	0.03	0.01	-0.02*	0.02	-0.03	-0.01
	(20.60)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)
Word Count					0.00***	0.00***	0.00***
					(0.00)	(0.00)	(0.00)
Standout %					0.01	0.08***	0.01
					(0.01)	(0.02)	(0.01)
Grindstone %					-0.01	-0.10**	-0.06***
					(0.02)	(0.05)	(0.02)
Top Rec					0.17***	0.25***	0.15***
					(0.04)	(0.06)	(0.03)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	U.S. Inst.	U.S. Inst.	U.S. Inst.	U.S. Inst.	U.S. Inst.	U.S. Inst.	U.S. Inst.
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-18	2017-20	2017-20
FE	No	No	No	No	No	No	No
Err Cluster	No	No	No	No	Cand	Cand	Cand
N	5020	5020	5020	5020	2591	5020	5020
R-squared	0.04	0.01	0.03	0.09	0.13	0.06	0.10

Notes: Table presents results of OLS regressions on letter characteristics (*Word Count*, *Standout %*, *Grindstone %*, and *Top Rec*) and early career outcomes (*Top 20 Academic*, *No. Top 100 Pubs*, and *No. Top 8 Pubs*) based on the sample of 5,020 letters for 1,756 applicants from U.S. economics and finance departments between 2018-2021; *Top 20 Academic* regression is just for 2, 591 letters for candidates who applied in 2018 and 2019. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*B-School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grindstone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Appendix

Table A1: Candidate Primary Field of Interest

	Mean	St. Dev.
Finance	0.20	0.40
International	0.08	0.27
Labor	0.14	0.34
Macro	0.26	0.44
Other Fields	0.32	0.47
Micro	0.05	0.22
Health, Education, and Welfare	0.03	0.18
Industrial Organization	0.06	0.24
Urban, Rural, and Regional	0.03	0.16
Applied	0.10	0.29
Public Finance	0.05	0.21
N/A	0.01	0.08
N	2227	

Notes: Table presents summary statistics for candidates by self-reported primary field of interest for the full sample of 2,227 applicants from 2018-2021.

Table A2: Standout and Grindstone Word List

Panel A: Standout Words			
achieve*	amazing	award*	best
challeng*	compelling	competitive	complete package
decisive	essential	excel*	exceptional
extremely	extraordinar*	fabulous	first-rate
full package	fundamental	highest possible	high quality
important*	impress*	innovat*	leader of the field
led	make our short list	magnificent	master*
most	natural*	novel	original
outstanding*	passion*	phenomenal	prestig*
remarkable	significant*	star	strong*
substantial	superb	supreme*	surpass
terrific*	tour de force	transforma*	unique
unmatched	unparalleled	wonderful	world class
single-author	single author	upper 5	upper 10
upper tier	first tier	top student	trailblazer
role model	academic star	rising star	superstar
star of the field	compares well with	would hire	best I've worked with
shortlist	top few students	the best student	one of the top
would be happy to hire	without any reservation	best postdoctoral fellow	best I have worked with
future leader of the field	compares favorably with	one of the best I have worked with	one of the two best I have worked with
head and shoulders above	strongest recommendation	strongest possible recommendation	
Panel B: Grindstone Words			
assiduous	busy	careful	conscientious
dedicate*	depend*	diligen*	disciplined
effective	effort*	hard-working	hardworking
hardest working	hard working	hard worker	industrious
methodical	meticulous	multitask	multi-task
organiz*	reliab*	responsib*	thorough*
trust*			

Notes: Words followed by a * denote word stems.

Table A3: Robustness: Letter Characteristics and Early Career Outcomes:
Top 10 Economics and Finance Department Sample

	(1) Word Count	(2) Standout %	(3) Grind-stone %	(4) Top Rec	(5) Top 20 Ac-ademic	(6) No. Top 100 Pubs	(7) No. Top 8 Pubs
Female	-21.67	0.00	0.00	-0.05**	0.03	-0.08	-0.07**
	(28.21)	(0.03)	(0.01)	(0.02)	(0.05)	(0.07)	(0.04)
Asian	-117.66***	-0.13***	0.01	-0.13***	-0.13***	-0.12	-0.11***
	(28.13)	(0.03)	(0.01)	(0.02)	(0.04)	(0.08)	(0.04)
Black or Hispanic	3.10	-0.03	0.02	-0.09***	0.04	-0.13	-0.08
	(38.32)	(0.03)	(0.02)	(0.03)	(0.07)	(0.09)	(0.05)
Finance	-154.45***	0.03	-0.03***	0.01	0.03	-0.13	0.08
	(33.74)	(0.04)	(0.01)	(0.03)	(0.06)	(0.10)	(0.05)
Macro	-54.47	-0.03	-0.05***	-0.02	-0.05	0.05	-0.01
	(34.49)	(0.03)	(0.01)	(0.03)	(0.05)	(0.10)	(0.05)
B-School	-19.76	0.02	-0.02	0.01	0.01	0.06	0.04
	(32.83)	(0.04)	(0.01)	(0.03)	(0.07)	(0.11)	(0.05)
Female Writer	-24.34	-0.02	0.00	-0.04	-0.02	-0.04	0.03
	(34.28)	(0.03)	(0.01)	(0.03)	(0.03)	(0.05)	(0.03)
Asian Writer	-31.10	-0.02	0.01	-0.01	0.07*	0.00	-0.05
	(37.55)	(0.04)	(0.01)	(0.03)	(0.04)	(0.06)	(0.04)
Word Count					0.00***	0.00***	0.00***
					(0.00)	(0.00)	(0.00)
Standout %					0.03	0.07	0.01
					(0.02)	(0.04)	(0.02)
Grindstone %					-0.04	-0.29***	-0.14***
					(0.05)	(0.10)	(0.05)
Top Rec					0.17***	0.27***	0.18***
					(0.05)	(0.07)	(0.04)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Top 10	Top 10	Top 10	Top 10	Top 10	Top 10	Top 10
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-18	2017-20	2017-20
FE	No	No	No	No	No	No	No
Err Cluster	No	No	No	No	Cand	Cand	Cand
N	1605	1605	1605	1605	861	1605	1605
R-squared	0.03	0.02	0.02	0.03	0.12	0.08	0.09

Notes: Table presents results of OLS regressions on letter characteristics (*Word Count*, *Standout %*, *Grindstone %*, and *Top Rec*) and early career outcomes (*Top 20 Academic*, *No. Top 100 Pubs*, and *No. Top 8 Pubs*) based on the sample of 1,605 letters for 534 applicants from top 10 economics and finance departments between 2018-2021; *Top 20 Academic* regression is for 861 letters for candidates applying in 2018-2019. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), field of interest (*Finance* and *Macro*), institution characteristics (*B-School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grindstone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table A4: Robustness: Letter Characteristics and Early Career Outcomes: Macroeconomics as Primary Field Sample

	(1) Word Count	(2) Standout %	(3) Grind-stone %	(4) Top Rec	(5) Top 20 Ac-ademic	(6) No. Top 100 Pubs	(7) No. Top 8 Pubs
Female	-8.66	-0.02	0.01	-0.03*	-0.02	-0.22***	-0.05***
	(30.35)	(0.03)	(0.01)	(0.02)	(0.02)	(0.06)	(0.02)
Asian	-69.48**	-0.06**	0.03***	-0.05***	-0.02	-0.01	-0.01
	(29.50)	(0.03)	(0.01)	(0.02)	(0.02)	(0.07)	(0.02)
Black or Hispanic	-11.92	-0.08**	-0.00	-0.06***	0.03	-0.15*	-0.04*
	(35.95)	(0.03)	(0.01)	(0.02)	(0.04)	(0.08)	(0.03)
Top 10 Econ	153.06***	0.04	-0.02*	0.14***	0.05	0.16*	0.11***
	(34.47)	(0.03)	(0.01)	(0.02)	(0.04)	(0.08)	(0.04)
Top 10 B-School	-68.05	0.23*	0.01	0.15	-0.11*	0.01	-0.04
	(167.17)	(0.14)	(0.04)	(0.13)	(0.06)	(0.80)	(0.04)
U.S. Inst.	-61.85*	-0.01	-0.03**	0.01	0.03**	-0.16**	-0.02
	(32.67)	(0.03)	(0.01)	(0.01)	(0.02)	(0.07)	(0.03)
B-School	-16.11	-0.22**	-0.05*	0.07	0.01	0.38	-0.03
	(139.83)	(0.09)	(0.03)	(0.08)	(0.03)	(0.45)	(0.03)
Female Writer	-13.41	-0.01	0.00	-0.03**	-0.00	-0.06	0.00
	(35.07)	(0.04)	(0.01)	(0.02)	(0.01)	(0.05)	(0.01)
Asian Writer	-43.42	0.09*	0.01	-0.02	-0.02**	-0.02	0.00
	(44.45)	(0.05)	(0.01)	(0.02)	(0.01)	(0.05)	(0.02)
Word Count					0.00	0.00***	0.00***
					(0.00)	(0.00)	(0.00)
Standout %					0.02	0.11***	0.03**
					(0.01)	(0.04)	(0.01)
Grindstone %					-0.04	-0.10	-0.06
					(0.03)	(0.10)	(0.04)
Top Rec					0.15**	0.37***	0.17***
					(0.06)	(0.10)	(0.06)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Macro	Macro	Macro	Macro	Macro	Macro	Macro
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-18	2017-20	2017-20
FE	No	No	No	No	No	No	No
Err Cluster	No	No	No	No	Cand	Cand	Cand
N	1691	1691	1691	1691	914	1691	1691
R-squared	0.02	0.01	0.02	0.06	0.12	0.10	0.11

Notes: Table presents results of OLS regressions on letter characteristics (*Word Count*, *Standout %*, *Grindstone %*, and *Top Rec*) and early career outcomes (*Top 20 Academic*, *No. Top 100 Pubs*, and *No. Top 8 Pubs*) based on the sample of 1,691 letters for 589 applicants from 2018-2021 who specified Macroeconomics as their primary field of interest; *Top 20 Academic* regression is for 914 letters for candidates applying in 2018-2019. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), institution characteristics (*Top 10* Econ, *Top 10 B*-School, *U.S. Inst.*, and B-*School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grindstone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table A5: Robustness: Letter Characteristics and Early Career Outcomes:
Finance as Primary Field Sample

	(1) Word Count	(2) Standout %	(3) Grind-stone %	(4) Top Rec	(5) Top 20 Ac-ademic	(6) No. Top 100 Pubs	(7) No. Top 8 Pubs
Female	-22.88	-0.00	0.03**	-0.03	0.06	-0.24***	-0.13***
	(31.10)	(0.03)	(0.01)	(0.02)	(0.04)	(0.06)	(0.03)
Asian	-51.03*	-0.01	0.01	-0.01	-0.10**	0.03	-0.03
	(28.46)	(0.03)	(0.01)	(0.02)	(0.04)	(0.07)	(0.04)
Black or Hispanic	-17.56	0.04	-0.01	-0.01	-0.09	-0.00	-0.02
	(55.15)	(0.05)	(0.02)	(0.04)	(0.06)	(0.11)	(0.08)
Top 10 Econ	137.54***	0.00	-0.05**	0.23***	0.13**	-0.08	-0.02
	(43.77)	(0.05)	(0.02)	(0.04)	(0.06)	(0.09)	(0.06)
Top 10 B-School	150.23***	-0.04	-0.05***	0.14***	0.08	0.13	0.18**
	(37.46)	(0.05)	(0.02)	(0.03)	(0.06)	(0.10)	(0.08)
U.S. Inst.	-97.35***	-0.00	0.00	-0.06***	0.05	-0.13*	0.00
	(34.12)	(0.04)	(0.02)	(0.02)	(0.04)	(0.08)	(0.04)
B-School	37.43	0.06	-0.01	0.05**	0.00	-0.06	-0.02
	(31.54)	(0.04)	(0.02)	(0.02)	(0.03)	(0.08)	(0.04)
Female Writer	49.28	-0.03	0.00	-0.04	0.05	0.00	0.05
	(39.51)	(0.04)	(0.02)	(0.03)	(0.03)	(0.05)	(0.03)
Asian Writer	0.24	0.00	-0.01	-0.05**	0.05*	-0.00	-0.01
	(30.94)	(0.04)	(0.01)	(0.02)	(0.03)	(0.05)	(0.03)
Word Count					0.00***	0.00*	0.00
					(0.00)	(0.00)	(0.00)
Standout %					0.01	0.08**	0.03
					(0.02)	(0.04)	(0.02)
Grindstone %					0.00	-0.10	-0.09*
					(0.04)	(0.10)	(0.05)
Top Rec					0.09*	0.31***	0.22***
					(0.05)	(0.09)	(0.06)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample	Finance	Finance	Finance	Finance	Finance	Finance	Finance
Letter Year	2017-20	2017-20	2017-20	2017-20	2017-18	2017-20	2017-20
FE	No	No	No	No	No	No	No
Err Cluster	No	No	No	No	Cand	Cand	Cand
N	1326	1326	1326	1326	788	1326	1326
R-squared	0.03	0.00	0.02	0.06	0.15	0.07	0.09

Notes: Table presents results of OLS regressions on letter characteristics (*Word Count*, *Standout %*, *Grindstone %*, and *Top Rec*) and early career outcomes (*Top 20 Academic*, *No. Top 100 Pubs*, and *No. Top 8 Pubs*) based on the sample of 1,326 letters for 440 applicants from 2018-2021 who specified Finance as their primary field of interest; *Top 20 Academic* regression is for 788 letters for candidates applying in 2018-2019. Explanatory variables include binary variables indicating candidate characteristics (*Female*, *Asian*, and *Black or Hispanic*), institution characteristics (*Top 10* Econ, *Top 10 B*-School, *U.S. Inst.*, and B-*School*), and letter characteristics (*Female Writer*, *Asian Writer*, and *Top Rec*), as well as continuous variables for letter length and content (*Word Count*, *Standout %*, and *Grindstone %*). Standard errors are robust. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.