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Intersectional Dynamics and Academic Advancement in the United States

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ABSTRACT

I use the intersectionality framework to understand how processes of tenure and promotion operate as a system that systematically advantages members of some groups while systematically disadvantaging members of other groups. Empirically, I examine how gender, race, ethnicity, and nativity combine to structure the institution of tenure and promotion in US universities. Consistent with original conceptualizations of intersectionality as a lens that illuminates social structure, this empirical work demonstrates that foreign-born White men are the most advantaged members in the institution of tenure and promotion. Only by accounting for all bases simultaneously does the latent function of the promotion and tenure institution come to light: One that especially advantages White men while disadvantaging women and people of color, both foreign and domestic.

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Introduction

The American professoriate has become increasingly diverse, with a number of consequences for society, higher education, and its workers. Despite increasing diversity on any number of bases, tenure and promotion as an institution was developed and implemented for a much more homogeneous professoriate ([American Association of University Professors \[AAUP\], 1940/1970](#)). This raises important issues about diversity in terms of ascriptive statuses that may lead to unequal outcomes in academic careers. Social stratification refers to social processes that result in rankings of groups of people. When demographic characteristics lead to social stratification in academic science, the principle of universalism is violated. The scientific norm of universalism posits that non-germane characteristics should not factor into assessments of science (Merton, [1942/1973](#)).

This research fills important gaps in the literature by supporting quantitative intersectional analyses of gendered, racial, ethnic, and nativity-based differences in academic tenure and promotion outcomes. Malcom et al. ([1976](#)) developed the term “double bind” to describe the disadvantage that women of color experience in the White and male dominated academic

science system. In philosophy, Frye (1983) discussed plural identities, and how they are made invisible by concepts that assume the subject is White, male, and heterosexual.¹ In law, Crenshaw (1991) developed the concept of intersectionality to reveal how the legal system operates to disadvantage Black women, who are neither male nor White (Crenshaw, 1991). The intersectional lens has been developed further in social science to conceptualize and demonstrate how analyses based on single categories obfuscate complex dynamic interplays of characteristics in specific circumstances (Browne & Misra, 2003; Choo & Ferree, 2010; Collins & Bilge, 2016; Davis, 2008).

The diversification of the American professoriate over the past 50 years from one that was nearly exclusively White and male is profound (Burrelli, 2011). Over the same period, the system of tenure and promotion has remained largely unchanged: Tenure track academics in the United States traverse a system of tenure and promotion developed for a less complex higher education system that employed a less diverse professoriate (AAUP, 1940/1970). In this analysis, we use the tenure and promotion decisions as the fulcrum against which diverse scholars in the 21st Century are evaluated by systems devised in the 20th.

Literature review

Diversification of professoriate

Higher education in the United States has significantly diversified. Over the period 1973 to 2015, women's representation in scientific fields rapidly increased so that by 2015, 16% of engineers, 22% of physical scientists, 24% of mathematicians, and 42% of life scientists were women. This represents a three-fold increase in the physical sciences, nearly five-fold increases in mathematics and life sciences, and a greater than 16-fold increase in engineering (National Center for Education Statistics [NCES], 2015; National Science Board [NSB], 2018). In 1973, 11.7% of science and engineering doctorate holders employed in academia were foreign-born,² rising to 26.9% in 2013 (National Science Board [NSB], 2016). In 2015, 21% of life scientists, 28% of physical scientists, 40% of mathematicians, and 54% of engineers were foreign-born, an increase over the period from two to four-fold. In 2015, ten percent of engineers, eight percent of life scientists, and six percent of mathematicians and physical scientists were members of underrepresented racial or ethnic minority groups (NSB, 2018). As with women and the foreign-born, these represent substantial increases over the period — from three to six-fold increases.

In fact, a significant source of racial and ethnic diversity in the academic labor force comes from the foreign-born: 91% of Asian, 37% of Hispanic, and 33% of Black³ faculty are foreign-born (Burrelli, 2011). This underscores the

importance of using an intersectional approach to understand the career progression dynamics of faculty in U.S. universities. In short, what was an occupation populated almost entirely by White native- and foreign-born men is now one with significant levels of diversity with respect to gender, race and ethnicity, and (nonwhite) foreign-born status. Despite the progress toward greater diversity, the population of professors still differs significantly from the general population, being disproportionately male and foreign-born (Burrelli, 2011). No empirical analyses simultaneously account for all three of these dynamics in depicting the academic scientific work force. National reporting tends to focus on each characteristic as if it exists independently of the others (NSB, 2016, 2018). In fact, women are a heterogeneous group, encompassing multiple races and ethnicities, and are both native-born and foreign-born. Members of racial and ethnic minority groups can be women, and both native and foreign-born. Foreign-born people also vary by gender and racial and ethnic background. Interesting theoretical and analytic issues emerge, then, when we consider that foreign-born academics are disproportionately male and disproportionately people of color. It underscores the necessity of including nativity in any conceptualization of intersectionality in academic science.

Intersectionality

A structural, intersectional perspective as applied to higher education implies an understanding that every member of the system participates in it, but not every member has equal access to the resources and privileges of that system. I follow Grindstaff (2022) and Zambrana (2018) in conceptualizing intersectionality in terms of the entire population within the space: Every member occupies a social location based on their particular combination of characteristics. In this way, intersectionality is not something that affects only members of intersecting minoritized groups. Rather, conceptualizing intersectionality in terms of the whole space means that some social locations derived from group membership result in advantages. Furthermore, social location in more advantaged spaces give those people additional power to structure opportunities for people occupying less advantaged parts of the social space.

In the next section, I discuss how higher education as a system advances the interests of dominant gender, national and racial groups, paying particular attention to the ways the institution of tenure and promotion operates. The sociology of science tradition constitutes an important secondary analytic framework. In the last century, it was exclusively concerned with studying how women were disadvantaged in science. In this millennium, the sociology of science approach to studying inequality was extended to examining the academic outcomes of faculty of color. At the same time, important theoretical and qualitative empirical work emerged to investigate the lived lives of faculty

of color. We end the literature review with a discussion of foreign-born faculty, who are often excluded from discussions about equity in the academy.

Tenure and promotion

Tenure is a peculiar institution in the American academy, originally designed to ensure faculty enjoyed freedom of thought and speech in order to pursue knowledge (AAUP, 1940/1970). In this research, we do not enter into debates about the viability of tenure as an institution (Worthen, 2021); rather, we study it as the outcome of a process whereby members of the population are recognized in a significant way by more senior members of the population. What makes promotion and tenure a particularly important locus of power is that it is controlled by the most senior members of the higher education space. Powerful tenure and promotion processes are the *de facto* gatekeepers of academic career trajectories. It is a locus in which bias — both conscious and unconscious, and both individual and systematic — can operate to create inequitable outcomes under the guise of equality (Arnold et al., 2016; Bray, 2010; Hart, 2016; Settles et al., 2021; Urrieta et al., 2015; Zambrana, 2018).

Intersectionality allows us to investigate how the institution of tenure and promotion operates across specific organizations and disciplines to structure the space systematically, resulting in unequal outcomes based on ascriptive characteristics. For tenure track faculty, no transition is more important than the tenure decision because of the “up or out” norms adopted by universities. Also important for career trajectories is the promotion to full professor, bringing with it enhanced prestige, influence, and pay. This study evaluates how the increasing heterogeneity of the US professoriate illuminates the institution of tenure and promotion in the United States.

Sociology of science, cumulative advantage, and cumulative disadvantage

Scholarship as an institution, and academic scientists in particular, were foci of social inquiry throughout the 20th Century (Allison & Long, 1990; Cole & Cole, 1973; Cole, 1979; Long & Fox, 1995; Long et al., 1993; Zuckerman, 1988). What all of these studies had in common was a concern with understanding universalism, a term Merton (1942/1973) coined to refer to the norm that scientific validity should be ascertained without reference to the attributes (or ascriptive characteristics) of the scientists themselves. This early work focused exclusively on gender dynamics in the scientific career, but was essential in establishing that universalistic norms do not operate with respect to gender, and demonstrating that women’s experiences stem from cumulative disadvantage across the life course relative to the cumulative advantage that characterized men’s experiences. Importantly, how other ascriptive characteristics — such as race, ethnicity, or nativity — operate within the scientific reward

system were not studied in this early body of work. Nevertheless, the concepts from this work — universalism, cumulative advantage and cumulative disadvantage — are useful to investigate how tenure and promotion operate in a diverse professoriate. We employ quantitative analyses common to this tradition in order to examine multiple ascriptive dynamics using an intersectional framework.

Quantitative empirical studies of the 21st century built on earlier studies to show that gender continues to be a major stratifying basis in science, with women being systematically disadvantaged in career advancement (Box-Steffensmeier et al., 2015; Weisshaar, 2017). Unlike earlier studies, this more recent research controls for race and ethnicity, although not in intersectional ways. Using direct testing of effects of gender and race, studies have found that women and members of minority groups are less likely to hold tenured positions or attain full professor rank (Fox & Gaughan, 2021; National Academies of Sciences [NAS], 2010; Perna, 2001; Wolfinger et al., 2008; Xie & Shauman, 2003), and are more likely to leave academia, in part related to promotion processes (Jayakumar et al., 2009; Settles et al., 2021).

A number of higher education studies using an intersectional framework employ qualitative methods, and tend to focus on issues of identity rather than structural positions in systems (Harris & Patton, 2019). Focus groups find that academic women of color are especially disadvantaged relative to white women and men of color (Turner et al., 2011; Turner, 2002). These qualitative studies give important insight into the lived experience of inhabiting multiply marginalized space. Scholarship using this framework has found that faculty of color and Whites interpret and navigate promotion and tenure ambiguity differently, with Whites better positioned to obtain clarity than faculty from minoritized groups (Cate et al., 2022). Effects of common experiences (e.g., stress) result in lower research productivity among faculty of color, but not among White faculty (Eagan & Garvey, 2015). Also related to the tenure decision, diverse faculty are more likely to engage in student-centered teaching (Eagan & Garvey, 2015; Hurtado et al., 2012). Multiply minoritized faculty face resistance by undergraduate students (Ford, 2011), particularly when they employ critical pedagogies in teaching courses not specifically focused on race or ethnicity (Haynes et al., 2020). Such negotiation is a continual and tiring process that increases stress for minoritized faculty in unsupportive institutions, with important implications for advancement (Arnold et al., 2016; Romero, 1997; Zambrana, 2018).

There is tremendous heterogeneity among Asians who occupy the same racialized system of higher education, but they are largely invisible in discussions of structural inequality (Teranishi, 2010). Indeed, the National Science Foundation does not recognize Asians as an underrepresented minority group. Teranishi (2010) illuminates the under-representation of Asian-Americans in the professoriate, even though they are overrepresented in

higher education. When Asians are included in discussions related to higher education equity, it is often through White cooptation surrounding affirmative action (Park & Liu, 2014), or in forwarding the myth of the “model minority” without acknowledging the significant heterogeneity within the group (Chou & Feagin, 2015).

Foreign-born professors

The 1965 Immigration and Naturalization Act (also known as the Hart-Celler Act) abolished the system of national origins in place since 1924. That immigration system encouraged immigration from Northern Europe while establishing strict quotas on legal immigration from Asia, Africa, and even Southern Europe. The impact of the 1965 Act has been seismic, fundamentally altering the demographic profile of the United States as a whole (FitzGerald & Cook-Martín, 2014), and American science in particular (Burrelli, 2011; NSB, 2018). Academic science benefits from foreign-born immigration, a dynamic fostered and maintained by decades of federal immigration policies that favor foreign-born scientists (Díaz-Briquets & Cheney, 2003). Powerful academic institutions assist foreign-born scholars by employing them, sponsoring their visas, and working with the federal government to facilitate temporary visas, permanent residency, and citizenship (Gaughan & Bozeman, 2019; Lowell, 2001).

Evidence suggests that foreign-born faculty work differently and are deployed differently than native-born faculty. In the academic sector, foreign-born scientists are more likely to work in research universities (Mamiseishvili & Rosser, 2009), and to report that a larger proportion of their jobs is devoted to research (Corley & Sabharwal, 2007; Mamiseishvili, 2010). Foreign-born professors are more likely to complete postdoctoral positions (Gaughan & Bozeman, 2019; Stephan & Ma, 2005), and, compared to all professors who completed postdoctoral fellowships, are currently employed as professors in higher prestige departments than native-born scholars (Su, 2013). Foreign-born scientists consistently publish more papers and patent at higher rates than native-born scientists (Corley & Sabharwal, 2007; Gaughan et al., 2018; Kim et al., 2011; Lee, 2004; Webber, 2012). Foreign-born scientists are disproportionately likely to be counted among the most-cited authors and inventors (Stephan & Levin, 2001), and they are more likely to be supported by research grants (National Science Board [NSB], 2018). Foreign-born scientists earn higher salaries than native-born scientists (Lan et al., 2015). Together, these findings suggest that foreign-born academics may enjoy advantages that native-born academics do not, which would support a cumulative advantage argument. All of these studies are limited by their focus on foreign-born scholars as a homogeneous group — they are theoretically and empirically blind to gender and racial and ethnic heterogeneity.

Xie and Shauman (2003) were the first in the Mertonian tradition to articulate that the experiences of foreign-born faculty are different from those of native-born faculty, and that those experiences are further affected by gender. There is evidence that foreign-born professors work more productively than their colleagues, but receive fewer and slower rewards to that work (Corley & Sabharwal, 2007; Lee, 2004). Foreign-born status is also brought into qualitative approaches to understand lived experiences. Lawless and Chen (2017) refer to the invisibility of Asian immigrant woman despite their reports of significant experience of gender and racial discrimination.

To date, foreign-born status has not been considered a basis for social stratification in the academy, although there are more foreign-born professors in most fields of science than there are women or members of domestically underrepresented racial and ethnic groups (Kim et al., 2011). Sabharwal (2011) observes that “foreign-born faculty members are often combined with race/ethnic categories and are not examined as a stand-alone group (p. 854).” These dynamics combine to create additional barriers for foreign-born scholars and their university employers, dynamics that play out during the critical period of establishing an academic career.

An intersectional approach

The simultaneous consideration of three major stratifying dynamics is difficult theoretically, and the small numbers of minority faculty make it exceptionally difficult to study these processes quantitatively (Bowleg, 2008; Choo & Ferree, 2010; Leggon, 2006; McCall, 2005). In this study, I control for direct effects while relying on strategic testing of interactive effects to examine how intersectionality operates in the institution of tenure and promotion.

Research questions and hypotheses

Universalistic meritocratic norms of science do not always hold, with ascriptive characteristics such as gender, race, ethnicity, and nativity playing a role in the evaluation of merit. The central empirical contribution of this study is its ability to support intersectional analyses, from which the following hypotheses are derived. Specifically, we expect the advantage of foreign-born status, and the disadvantage of being a woman or a faculty member of color to be evident in the baseline models. These previously documented relationships between ascriptive characteristics and advancement are expected to hold, but the interaction of nativity with gender and race and ethnicity will mediate those relationships, as the following hypotheses posit:

H1: Controlling for foreign-born status, women will earn tenure and promotion more slowly than men.

H2: Controlling for foreign-born status, faculty of color will earn tenure and promotion more slowly than non-Hispanic Whites.

H3: Foreign-born faculty of color will be advantaged relative to native-born faculty of color.

H4: Foreign-born women will be advantaged relative to native-born women.

Theoretically, the full interaction of nativity, gender, and race and ethnicity would allow us to disentangle direct, indirect, and interactive effects. Practically, the sub-group sizes are only sufficient to sustain sequential two-way interactions. Nevertheless, the contributions of this paper point the way forward for fully intersectional quantitative analysis.

Materials and methods

Sampling

The goal of the research was to study how diverse academic scientists perform their jobs. Because of the underrepresentation of women and members of underrepresented minority groups in scientific disciplines, the primary sampling objective was to identify sufficient numbers of STEM scientists and engineers to allow group comparisons. We chose to limit our focus to civil engineering, mathematics, biology, and biochemistry. These fields reflect low, moderate, and high levels of women's representation, respectively. To accomplish our goals for a diverse sample, we sampled a range of university types: all Research I (149) and Research II (110) universities, a 15% sample of master's I and II universities (96),⁴ and the Oberlin 50, a group of selective liberal arts colleges tracked by the National Science Foundation. For those not captured in the initial institutional sampling frame, we also sampled all Historically Black Colleges and Universities identified by the (Obama) White House Initiative on HBCUs, all Hispanic Serving Institutions (HSI), and all Women's Colleges. Hence, the initial sampling frame encompassed four disciplines in 441 institutions of higher education in the United States.

The second stage of sampling developed a frame for the target population: A diverse sample of people who are employed as tenured or tenure track professors. Teams of trained undergraduate assistants under the supervision of graduate students and study directors used publicly available institutional websites to enumerate 25,928 faculty for the sampling frame. Because women and members of racial and ethnic minorities are substantially

underrepresented in the focal fields of this study, we used a combination of first names, last names (Word et al., 2007), and photographs to enumerate the sampling frame of 25,928 faculty. This frame was comprised of 104 distinct cells representing different race, gender, discipline, and institution type. Hence, there are 104 distinct sampling weights used in the analyses to control for the complex sampling design. It should be emphasized that every respondent had the opportunity to self-identify on the survey: We asked respondents to identify their gender, racial, ethnic, and national backgrounds using demographic questions standard to the 2010 US census. These answers were employed to construct the categories used to conduct intersectional analysis.

The complex sampling design resulted in sampling probabilities ranging from 5.3% (White male mathematicians) to 100% (all minority women). The sample drawn was $n = 4196$ with a response rate 43%. Analysis of potential response bias indicates that women professors were more likely to respond than male professors. Because sampling weights control for over-sampling of women, and gender is used as a control variable in all multivariate models, this difference between the respondents and the target sample is not a threat to inferences (Winship & Radbill, 1994). Several noteworthy strengths emerge from the sampling approach: First, oversampling women included sufficient numbers of women to allow analysis by gender. Second, the study over-sampled for underrepresented minority status,⁵ which allows for race and ethnicity specific controls. The high representation of foreign-born and White male faculty in American universities results in sufficient numbers being sampled at random.

Measurement

In this section, I describe the measurement of the independent variables and controls. For the key bases of intersectionality, we employ a dummy variable for foreign-born status, the most common way researchers control for its effect in tenure models (Corley & Sabharwal, 2007), a dummy variable to indicate male and female, and a series of mutually exclusive categories for race and ethnicity. We acknowledge that each of these measures ignores important bases of heterogeneity in each group.

Career characteristics include the year the PhD was earned to account for professional age effects and to control for time. Postdoctoral positions necessarily delay entry into an academic career, but also provide important opportunities to improve employment prospects (Su, 2013, 2014). Scientific disciplines operate under different norms for achievement (Becher, 1994); hence, analyses are run with dummy controls for discipline, with biology serving as the reference category. Finally, peer-reviewed publication productivity is a key determinant of academic promotion in the United States system (Leahey et al., 2010; Weisshaar, 2017), and a primary indicator of scholarly

merit. It is measured by a self-report of number of peer-reviewed publications over a two year period.

Analytic approach

The problem with relying on a simple measure of years from beginning of observation to event is that one necessarily loses those who have not experienced the event, resulting in bias. These analyses employ event history analysis to account for censoring in time to milestones while accounting for characteristics known to affect timing, such as demographic, career, and disciplinary characteristics. These analyses employ a Cox proportional hazards model based on maximum partial likelihood estimation (Cox, 1972). The technique is robust to violations of distributional assumptions (Allison, 2010). The method was used by Lawson and Shibayama (2015) in their study of Japanese academic career transitions, and Lutter and Schröder (2016) in their study of German sociologists. The dependent variable is the hazard rate, which takes account of censoring by including only those individuals still at risk for earning tenure in any year. For the tenure analyses, the year of risk begins with entry into the first tenure track job and subsequent years of risk accrue until the person earns tenure or is right censored. For the promotion to full professor analyses, observation begins with tenure, and then follows until the person is promoted or right censored. There is no left censoring as every member of the sample is employed in a tenured or tenure track academic position. Using the phreg procedure in SAS 9.4 allows for accommodation of tied data, an issue given that promotion times are reported as years, resulting in a high percentage of ties. For these analyses, I use the Efron ties option, as that is the only SAS 9.4 ties procedure that also allows for sample design-based weighting.

Analysis

All analyses are weighted to account for different sampling probabilities because of the complex sample strategy. Table 1 presents univariate and bivariate statistics to convey the sense that overall, foreign-born STEM professors have different profiles from their native-born colleagues. Thirty-one percent of professors are foreign-born, consistent with national estimates of full-time tenured and tenure track faculty.

Table 1 shows that four-fifths of faculty in the sample are tenured, and just under half have been promoted to full professor rank. The average time to earn tenure is 5.82 years, and the average time to attain full professor rank among the tenured is 6.17 years. Referring to the bivariate comparisons in Table 1, foreign-born scholars differ significantly from their native-born colleagues. Pertinent to this inquiry, they are less likely to be either tenured or to have

Table 1. Weighted descriptive and bivariate statistics by nativity.

Variables	Mean	SD	Native	SD		Foreign	SD
Tenure, Rank, and Timing							
Tenured	0.8	0.61	0.83	0.59	***	0.71	0.65
Years to Tenure	5.82	4.24	6.09	4.44	***	5.4	4.09
Full Professor	0.48	0.76	0.5	0.79	***	0.42	0.71
Years to Full Professor	6.17	6.32	6.48	6.24	***	5.6	6.22
Demographic Characteristics							
Foreign Born	0.31	0.71	—	—	—	—	—
Woman	0.28	0.69	0.31	0.73	***	0.23	0.6
Non-Hispanic white	0.76	0.65	0.89	0.5	***	0.49	0.71
Black	0.04	0.3	0.04	0.29		0.05	0.31
Hispanic	0.04	0.31	0.03	0.26	***	0.09	0.4
Asian	0.14	0.53	0.03	0.27	***	0.37	0.69
Career Characteristics							
Year of PhD	1990	17.42	1989	18.31	***	1993	14.84
Postdoctoral Position	0.63	0.74	0.62	0.77	**	0.67	0.67
Assistant Professor	0.21	0.62	0.18	0.6	***	0.29	0.65
Associate Professor	0.31	0.71	0.33	0.74	*	0.29	0.65
Professor	0.48	0.76	0.5	0.79	***	0.42	0.71
Scholarly Productivity	5.14	12.27	4.43	11.73	***	6.78	13.1
Disciplines							
Biology	0.41	0.75	0.49	0.79	***	0.27	0.64
Biochemistry	0.11	0.47	0.12	0.51	**	0.09	0.41
Civil Engineering	0.17	0.57	0.14	0.55	***	0.23	0.61
Mathematics	0.32	0.71	0.26	0.69	***	0.41	0.7

* $p < .05$.** $p < .01$ *** $p < .001$

attained full professor rank. When they do achieve these milestones, they do so more quickly. The primary dependent variables in multivariate models are the hazard rates of tenure and later promotion to full professor.

Foreign-born faculty also differ from native-born colleagues on most demographic indicators: They are significantly more likely to be male, Asian, and Hispanic, and they are less likely to be non-Hispanic White. Given the importance of gender, racial and ethnic characteristics in predicting academic career trajectories, each of these characteristics constitutes an important component of a baseline model against which to evaluate the additional and interactive effects of foreign-born status. Career characteristics are also quite different between native- and foreign-born professors: The foreign-born earned their doctorates four years more recently than the native-born. Consequently, foreign-born professors are concentrated relatively more in the assistant and associate professor ranks. The foreign-born are also more likely to have completed postdoctoral positions.

Although we did not stratify for foreign-born status in our sampling strategy, the result of the gender focus also resulted in different disciplinary compositions by nativity. Native-born professors are more likely to be life scientists, while foreign-born professors are more likely to be civil engineers or mathematicians. We rely on weighted controls for discipline and institution type, focusing on between group differences of demographic characteristics. Finally, the average foreign-born professor publishes close to seven peer-

Table 2. Event history analysis of time to tenure and promotion, direct effects.

	Tenure		Full	
Year of PhD	−0.01 (0.001)	***	−0.03 (0.002)	***
Demographic Characteristics				
Woman	−0.12 (0.03)	***	−0.27 (0.05)	***
Black (a)	−0.19 (0.07)	**	−0.66 (0.11)	***
Hispanic	−0.29 (0.07)	***	−0.14 (0.11)	
Asian	−0.12 (0.05)	*	0.02 (0.06)	
Foreign Born	0.19 (0.04)	***	0.20 (0.04)	***
Career Characteristics				
Postdoctoral Position	0.13 (0.03)	***	0.41 (0.04)	***
Scholarly Productivity	0.00 (0.001)	***	0.02 (0.001)	***
Biochemistry (b)	0.03 (0.04)		0.26 (0.05)	***
Civil Engineering	0.11 (0.04)	**	0.45 (0.05)	***
Mathematics	0.14 (0.03)	***	0.15 (0.05)	***
Measures of Model Fit				
Likelihood Ratio	204.2		635.8	
d.f.	11		11	
(a) Reference group for race and ethnicity is non-Hispanic white				
(b) Reference group is Biology				

* $p < .05$.
** $p < .01$
*** $p < .001$

reviewed articles in a two-year period, compared to about four and one-half publications by native-born professors.

Table 2 presents the results of the baseline modeling, which explore known bases of difference in attainment of tenure (first column), and promotion to full professor (second column). Coefficients are presented in the table as log-odds coefficients, but I discuss the results in intuitively more appealing odds ratios. In all models presented, year of PhD controls for time dependence, and shows that the more recently the PhD has been earned, the less likely it is that tenure will have been achieved, a small but important impact to consider during estimation. Of note are the findings that women are 12% less likely to earn tenure, and Black, Hispanic, and Asian professors are 17, 25, and 11% less likely to earn tenure than non-Hispanic Whites. At the same time, foreign-born faculty are 20% more likely to earn tenure.

The model includes academic scientific career controls known to be influential in career progression to tenure. Having completed a postdoctoral position increases the likelihood of tenure by 14%. Controlling for scholarly productivity demonstrates the important effect of peer-reviewed scholarly productivity on earning tenure. Finally, assistant professors in civil

engineering and mathematics earn tenure more quickly than their colleagues in the life sciences. The overall results of the time to tenure modeling are consistent with findings in the literature based on single or dual controls. Women and faculty of color are consistently disadvantaged, and foreign-born status does not mediate this negative effect.

After tenure, the next big milestone is to be promoted to full professor. Unlike with the tenure decision, there is no formalized norm for the timing of this transition, and many professors remain at associate professor rank for the entirety of their careers. Considering first the demographic characteristics, we note that women are 24% less likely to be promoted to full professor as men. Black professors are half as likely to be promoted to full rank, an even greater magnitude of disadvantage than that observed for tenure. In contrast to the tenure findings, both Hispanics and Asians are equally likely to be promoted to Professor as non-Hispanic Whites. Foreign-born faculty are advantaged over the native-born by 22%.

Despite the length of time since completing a postdoc, those who completed them are 50% more likely to be promoted to professor. Mathematicians, civil engineers, and biochemists are all promoted to professor faster than biologists, and scholarly productivity remains a significant positive predictor. As with the tenure model, the promotion to professor models provide strong support for the cumulative advantage of being a foreign-born professor in the United States. Women continue to be disadvantaged, while the disadvantage of minority group membership is born only by Black faculty.

The analyses in [Table 2](#) have focused on direct effects, demonstrating the negative effects of being a racial or ethnic minority or a woman, and positive effects of being foreign-born. Because foreign-born faculty are disproportionately members of ethnic and racial minority groups, an intersectional approach is necessary to examine how racial or ethnic group membership and nativity combine to confer advantage or disadvantage. In [Table 3](#), the first column replicates the baseline tenure model from [Table 2](#). Then I enter the interactions of foreign-born status by racial or ethnic group one at a time. Each additional column represents the full model run with a single race/ethnicity by foreign-born status interaction. In other words, we are examining the interaction one focal group at a time, compared to all other groups. Direct effects of other indicators remain consistent throughout the models: Women are disadvantaged controlling for race, ethnicity, and nativity (Hypothesis 1), and the more productive, civil engineers and mathematicians, and those having completed postdoctoral fellowships are advantaged.

These models show a complex interplay among being foreign-born, being a member of a racial or ethnic minority group, and the interaction of the two. The inclusion of the foreign-born/Black interaction term mediates the negative direct effect of being Black, whether foreign-born or not. When the interaction term is introduced for Hispanics, native-born Hispanics are as

Table 3. Event history analysis of time to tenure, race and ethnicity interaction effects.

Interaction Effect:	Direct		Black *		Hispanic *		Asian *		White *	
Year of PhD	−0.01 (0.001)	***	−0.01 (0.001)	***	−0.01 (0.001)	***	−0.01 (0.001)	***	−0.01 (0.001)	***
Demographic Characteristics										
Woman	−0.12 (0.03)	***	−0.13 (0.03)	***	−0.13 (0.03)	***	−0.13 (0.03)	***	−0.13 (0.03)	***
Black (a)	−0.19 (0.07)	**	−0.16 (0.09)		−0.20 (0.07)	**	−0.20 (0.07)	**	—	
Hispanic	−0.29 (0.07)	***	−0.29 (0.07)	***	0.15 (0.10)		−0.31 (0.07)	***	—	
Asian	−0.12 (0.05)	*	−0.13 (0.05)	**	−0.15 (0.05)	**	0.21 (0.10)	*	—	
White	—	***	—		—		—		−0.10 (0.05)	
Foreign Born	0.19 (0.04)	***	0.19 (0.04)	***	0.24 (0.04)	***	0.22 (0.04)	***	−0.13 (0.06)	*
Interaction Term										
FB * Race/Ethnicity (b)	—	***	−0.10 (0.15)		−0.77 (0.14)	***	−0.40 (0.12)	***	0.42 (0.07)	***
Career Characteristics										
Postdoctoral Position	0.13 (0.03)	**	0.13 (0.03)	***	0.13 (0.03)	***	0.13 (0.03)	***	0.13 (0.03)	***
Scholarly Productivity	0.00 (0.001)	***	0.01 (0.001)	***	0.01 (0.001)	***	0.01 (0.001)	***	0.01 (0.001)	***
Biochemistry (c)	0.03 (0.04)		0.03 (0.04)		0.02 (0.04)		0.02 (0.04)		0.03 (0.04)	
Civil Engineering	0.11 (0.04)		0.11 (0.04)	**	0.11 (0.04)	**	0.12 (0.04)	**	0.13 (0.04)	**
Mathematics	0.14 (0.03)		0.14 (0.03)	***	0.13 (0.03)	***	0.14 (0.03)	***	0.14 (0.03)	***
Measures of Model Fit										
Likelihood Ratio	204.2		204.58		233.7		215		223.34	
d.f.	11		12		12		12		10	
(a) Reference group for race and ethnicity is non-Hispanic white										
(b) Reference group is foreign-born faculty who are not members of the focal group.										
(c) Reference group is Biology										

* $p < .05$.
** $p < .01$
*** $p < .001$

likely to earn tenure. By contrast, foreign-born Hispanics are less likely to earn tenure in any year. Asians exhibit an even more complex pattern: native-born Asians are advantaged and foreign-born Asians are disadvantaged (partial support for Hypotheses #2 and #3). Where, then, is this foreign-born advantage coming from? In the last model, I estimate the effect of being White and foreign-born relative to everyone else.⁶ There is no direct effect of being White, and being foreign-born is a disadvantage. In fact, it is foreign-born Whites that are significantly more likely to earn tenure in any period. In short, the foreign-born tenure advantage may actually be a White foreign-born advantage in American universities, which does not support the hypothesized advantage (Hypothesis 3) of being a foreign-born faculty member of color relative to native-born faculty of color.

In Table 4, I take the same analytic approach as in Table 3, but with a focus on promotion to professor. As with the tenure models, other effects not related

Table 4. Event history analysis of time to promotion to professor interaction effects.

Interaction Effect:	Direct		Black *		Hispanic *		Asian *		White *	
Year of PhD	−0.03 (0.002)	***	−0.03 (0.002)	***	−0.03 (0.002)	***	−0.03 (0.002)	***	−0.03 (0.002)	***
Demographic Characteristics										
Woman	−0.27 (0.05)	***	−0.27 (0.05)	***	−0.27 (0.05)	***	−0.27 (0.05)	***	−0.27 (0.05)	***
Black (a)	−0.66 (0.11)	***	−0.92 (0.15)	***	−0.66 (0.11)	***	−0.67 (0.11)	***	—	
Hispanic	−0.14 (0.11)		−0.14 (0.11)		−0.18 (0.17)		−0.16 (0.11)		—	
Asian	0.02 (0.06)		0.04 (0.06)		0.02 (0.06)		0.32 (0.12)	**	—	
White	—		—		—		—		0.12 (0.07)	
Foreign Born	0.20 (0.04)	***	0.17 (0.05)	***	0.2 (0.05)	***	0.23 (0.05)	***	0.26 (0.09)	***
Interaction Term										
FB * Race/Ethnicity (b)	—		0.73 (0.23)	**	0.05 (0.22)		−0.39 (0.14)	**	−0.05 (0.10)	
Career Characteristics										
Postdoctoral Position	0.41 (0.04)	***	0.42 (0.04)	***	0.41 (0.04)	***	0.41 (0.04)	***	0.42 (0.04)	***
Scholarly Productivity	0.02 (0.001)	***	0.02 (0.001)	***	0.02 (0.001)	***	0.02 (0.001)	***	0.02 (0.001)	***
Biochemistry (c)	0.26 (0.05)	***	0.26 (0.06)	***	0.26 (0.06)	***	0.26 (0.06)	***	0.27 (0.06)	***
Civil Engineering	0.45 (0.05)	***	0.44 (0.06)	***	0.45 (0.06)	***	0.47 (0.06)	***	0.47 (0.06)	***
Mathematics	0.15 (0.05)	***	0.16 (0.05)	***	0.15 (0.05)	***	0.16 (0.05)	***	0.16 (0.05)	***
Measures of Model Fit										
Likelihood Ratio	635.8		676.74		666.95		673.9		625.64	
d.f.	11		12		12		12		10	
(a) Reference group for race and ethnicity is non-Hispanic white										
(b) Reference group is foreign-born faculty who are not members of the focal group.										
(c) Reference group is Biology										

* $p < .05$ ** $p < .01$ *** $p < .001$

to race or ethnicity persist except that biochemists are also advantaged relative to biologists. Native-born Black faculty are significantly disadvantaged while foreign-born Black faculty are significantly advantaged in earning promotion to professor rank. This lends support to Hypothesis 3 of advantage to foreign-born faculty of color. The interactive model for Hispanic faculty indicates that Hispanic faculty earn promotion to full rank at the same rate as others, and there is neither advantage nor disadvantage conferred by being a foreign-born Hispanic (in contrast to the tenure model, where being a foreign-born Hispanic has a strong negative effect). A third pattern emerges when considering Asians: Native-born Asians are promoted to full rank faster than members of other racial and ethnic groups, which is particularly noteworthy given the strong negative effect of being a foreign-born Asian on earning promotion. This result is the opposite of the hypothesized advantage, whereby

native-born Asians are advantaged over foreign-born Asians. The White interaction model results in a loss of fit over baseline, and suggests no particular advantage to being White in the promotion to full professor decision.

In Table 5, I examine the interaction of gender with foreign-born status by the type of career milestone. The first column shows the baseline direct effect of being a woman and foreign-born on earning tenure, and the second column shows the effect of the interaction between gender and nativity on earning tenure. Columns three and four follow the same presentation for the estimation of promotion to full professor. Considering first the tenure decision, controlling for gender and foreign-born status fully mediates the effect of being a woman: It is foreign-born women who are disadvantaged in earning tenure, which is directly contrary to Hypothesis 4. Direct racial effects persist, with Black, Hispanic, and Asian faculty being disadvantaged in earning tenure (Hypothesis 2): The positive effect of being foreign born is enjoyed by White foreign-born men only.

Table 5. Event history analysis of time to tenure and promotion, gender interactions.

Interaction Effect:	Tenure		Tenure *		Full		Full *	
Year of PhD	−0.01 (0.001)	***	−0.01 (0.001)	***	−0.03 (0.002)	***	−0.03 (0.002)	***
Demographic Characteristics								
Woman	−0.12 (0.03)	***	−0.06 (0.04)		−0.27 (0.05)	***	−0.29 (0.05)	***
Black (a)	−0.19 (0.07)	**	−0.19 (0.07)	**	−0.66 (0.11)	***	−0.66 (0.11)	***
Hispanic	−0.29 (0.07)	***	−0.30 (0.07)	***	−0.14 (0.11)		−0.14 (0.11)	
Asian	−0.12 (0.05)	*	−0.13 (0.05)	**	0.02 (0.06)		0.01 (0.06)	
Foreign Born	0.19 (0.04)	***	0.24 (0.04)	***	0.20 (0.04)	***	0.19 (0.05)	***
Interaction Term								
FB * Woman	—		−0.25 (0.07)	***	—		0.08 (0.11)	
Career Characteristics								
Postdoctoral Position	0.13 (0.03)	***	0.13 (0.03)	***	0.41 (0.04)	***	0.41 (0.04)	***
Scholarly Productivity	0.00 (0.001)	***	0.00 (0.001)	***	0.02 (0.001)	***	0.02 (0.001)	***
Biochemistry (b)	0.03 (0.04)		0.02 (0.04)		0.26 (0.05)	***	0.26 (0.05)	***
Civil Engineering	0.11 (0.04)	**	0.11 (0.04)	*	0.45 (0.05)	***	0.45 (0.05)	***
Mathematics	0.14 (0.03)	***	0.14 (0.03)	***	0.15 (0.05)	***	0.15 (0.05)	***
Measures of Model Fit								
Likelihood Ratio	204.2		216.6		635.8		636.3	
d.f.	11		12		11		12	

(a) Reference group for race and ethnicity is non-Hispanic white

(b) Reference group is Biology

* $p < .05$

** $p < .01$

*** $p < .001$

The intersectional dynamics are different for the promotion to full professor decision. First, both native-born and foreign-born women are disadvantaged, but foreign-born women are not especially disadvantaged (as they are in the tenure decision). With respect to race and ethnicity, Black faculty are significantly disadvantaged relative to all other racial and ethnic groups. The positive effect of being foreign-born continues to be enjoyed by men, and the foreign-born advantage accrues to White, Hispanic, and Asian men.

Discussion and limitations

Using a sample of American professors in four broad scientific disciplines, I used event history analysis to evaluate whether foreign-born status operates similarly to other non-dominant ascriptive statuses to mediate or modify meritocratic norms in academic science. The scholarly literature on meritocracy in academia has tended to focus on women, or minorities, or on the foreign-born, with little attention to how those statuses may relate to one another in predicting career outcomes. Because of the dependence of the United States on foreign-born professors from diverse racial and ethnic groups, it is important that studies of meritocratic norms of science include foreign-born status in addition to other ascriptive statuses to understand how academic career trajectories unfold.

I demonstrate in analyses of direct effects that gender, racial and ethnic minority group membership operate to slow down career progression, consistent with decades of prior work on cumulative disadvantage. In general, women and faculty of color are disadvantaged throughout the career, and foreign-born faculty are advantaged. However, moving the analysis into interactive effects underscores how problematic it is to assume gender, racial, and ethnic homogeneity among STEM professors. The intersectional analyses show that relying on direct effects obscures important within-group differences. First, the positive foreign-born effects on tenure and promotion to full professor are driven by foreign-born White men. Among Hispanics, foreign-born status has a negative effect for both men and women for tenure, and no effect for promotion to professor. Women and foreign-born Asians are disadvantaged. Relative to their male and native-born women colleagues, foreign-born women are especially disadvantaged in the tenure decision, but the negative effect on promotion to full professor is borne equally by women irrespective of nativity. These analyses underscore that there is significant racial and ethnic heterogeneity among foreign-born scientists, and that the combination of the two with gender, race, and ethnicity reveals different patterns. These different patterns suggest that there is not a uniform foreign-born cumulative advantage in academic careers in US universities. Furthermore, racial and ethnic advantage and disadvantage depend on nativity, gender, and the specific career milestone under consideration.

This work enables the conclusion that White men are advantaged in both career milestones, with foreign-born White men being especially advantaged. Taking an intersectional approach in which White men are the reference group in most analyses provides a perspective that unveils a complex system of inequality based on gender, race, ethnicity, and nativity. It is a system in which members of most groups are disadvantaged relative to White men. It brings attention to the macro structure of the modern academic enterprise—one built on European ideals of meritocracy forged in histories of exclusion and colonialization. Intersectional theory ultimately asks us to confront systems of social injustice, systems that perpetuate inequalities without a single participant needing to engage in any “ism” (Harris & Patton, 2019). Intersectionality as an analytic frame allows us to see how macro social systems are structured to systematically advantage some while systematically disadvantaging many. The results of this quantitative intersectional analysis are consistent with intersectional qualitative analyses that reveal the lived complexities of faculty identifying with multiple groups that are historically disadvantaged in academic science.

Despite the strengths of this study, there are a number of limitations. Perhaps most obvious is that this is a study of professors in American universities. Because immigration policies and dynamics vary so much internationally — even in the globalized academic labor market — these results can only be generalized to the U.S. context. Perhaps most germane to this caution is the culturally specific ways that Americans conceptualize immigration, race and ethnicity, and the higher level of attention paid to gender dynamics in its higher education system. Our tenure and promotion system also operates differently from many of the other most developed science systems.

In a higher education system that has more than 4600 institutions, the sampling approach sought to identify major sectors, but ultimately missed many kinds of institutions such as community colleges, regional colleges, and tribal colleges, to name a few. It does go beyond consideration of only research universities, which is a strength, but there is still much to be explored throughout the higher education system. In addition, four broad fields of study were included to represent STEM disciplines. These are important fields in science and engineering, but the significant positive effects of mathematics and civil engineering on tenure rates (relative to biology and biochemistry) remind one that tenure remains a status conferred by universities, but only after extensive consultation with disciplinary peers that observe discipline-specific norms for the evaluation of tenure and promotion cases.

Another limitation is that this is a study of academic survivors. To be sampled, a professor had to be in a tenure track or tenured position. Faculty who never obtained a professorship, or those who did, but left before sampling were excluded from the study. Women, for example, are less likely to procure tenure track positions at the beginning of the career (Wolfinger et al., 2008),

and faculty of color are more likely to leave (Wapman et al., 2022). The direct and intersectional advantages and disadvantages may operate differently for career exit, just as they operate differently for the tenure and the full rank decisions. For example, nativity may play an important role in decisions by foreign-born faculty to leave an academic professorship. Family-based visa systems intersect with highly-skilled visa systems, which may affect the interaction of gender and nativity. This general topic of academic exits is worthy of additional in-depth study, but ultimately not possible in this study given the sampling design. This study was also limited to tenured and tenure-track faculty, a declining percentage of university faculty nationally. Career trajectories of non-tenure track faculty are inherently important, but also particularly relevant because such positions are disproportionately occupied by women and faculty of color (Porter et al., 2020). Incorporating promotion dynamics of non-tenure track faculty in tandem with tenured and tenure-track dynamics would lead to a better understanding of how intersectionality structures faculty employment in the neoliberal university.

The prestige structure of university spaces themselves are important in determining outcomes of all faculty, both in predicting scholarly productivity (Allison & Long, 1990), and as determinants of tenure and promotion (Long et al., 1993). In recent work, Wapman et al. (2022) showed that faculty who earned PhDs outside the elite domestic educational system are less likely to be recruited or retained. While this suggests possible implications for promotion and tenure timing, it is an empirical question not investigated here. This research studies survivors — that is, every member has already been recruited and retained long enough to reach the tenure and promotion decision.

The ability to sustain quantitative analyses by nativity, gender, and racial and ethnic group is a major contribution of this study. The empirical work demonstrates what the theory and literature on intersectionality predicts: gender, race, ethnicity, and nativity operate in complex ways that are not easily reduced to single-category explanations. This analysis incorporates several bases of heterogeneity but does not have the power to evaluate others that are likely to provide insight into the actual mechanisms at work. Racial and ethnic groups are themselves heterogeneous, which is not captured in this analysis. Gender is much more complex than the binary measure used here captures. Foreign-born scientists come from diverse science systems and cultural norms that may affect career trajectories. Each of these bases of heterogeneity are themselves worthy of investigation. For now, this research underscores that even an institution as structured as academic career trajectories is one that is affected by intersectional dynamics that are still poorly understood.

Inequality in science is a topic of longstanding interest, but analyses have tended to focus on single bases of stratification, such as gender, race, ethnicity or nativity. This makes it impossible to make sense of the intersectional

dynamics that are operating. This is particularly important given the dependence on foreign-born science professors in the United States. As such, this paper provides additional nuance and complexity to the structure of inequality in science. From a policy perspective, it should heighten awareness to the problem of treating the foreign-born as a homogeneous group in terms of race, ethnicity, and gender. The implications are two-fold: First, the representation of domestic racial and ethnic minority groups among STEM faculty is actually much worse than is commonly understood (insofar as foreign-born professors are a significant source of racial and ethnic diversity). Second, the common finding that foreign-born faculty are more successful on a variety of outcome measures ignores the racial, ethnic, and gender heterogeneity of the foreign-born. Finally, using an intersectional perspective structurally helps to make the invisible visible: The finding that the most advantaged people in the tenure process are foreign-born White men is perhaps not so surprising in light of the European roots of the American higher education system.

Notes

1. It is reasonable to hypothesize that LGBTQIA+ faculty are also disadvantaged in the intersectional social structure of universities. This study was not allowed (by an IRB) to ask about non-conforming gender identity or sexual orientation, which is ironic given Frye's (1983) analysis of invisibility.
2. The use of the term foreign-born is consistent with the definition and usage of the National Science Foundation.
3. I use the term Black as a more inclusive term that includes African Americans as well as foreign-born people of African descent.
4. We rely on Carnegie 2000 classification for its elegance. The Research Extensive frame excludes two universities that do not confer any PhDs in the sciences. The Master's I and II classifications also come from Carnegie (2000).
5. The U.S. National Science Foundation classifies African Americans, Hispanics, Native Americans, Hawaiians and Pacific Islanders as underrepresented.
6. Comparing White with everyone else erases the heterogeneity of everyone else, and should be avoided when statistical power allows. I include it here to examine the dynamics in a way that is more common in the sociology of science, when quantitative research rarely has the power to examine racial and ethnic dynamics at this level of granularity.

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