Not by Productivity Alone: How Visibility and Specialization Contribute to Academic Earnings

Erin Leahey
University of Arizona

The popular adage "publish or perish" has long defined individual career strategies as well as scholarly investigations of earnings inequality in academe, as researchers have relied heavily on research productivity to explain earnings inequality among faculty members. Academia, however, has changed dramatically in the last few decades: it has become larger and more demographically diverse, and fears of overspecialization prompt calls for interdisciplinary approaches. In this new environment, other factors, in addition to productivity, are likely relevant to our understanding of earnings differentials. In this article, I assess whether two additional factors—visibility and the extent of research specialization—contribute to men's earning advantage. Using probability samples of tenure-track academics in two disciplines, a variety of data sources, and innovative measures, I find that both factors are highly relevant to the process by which earnings are determined. Women earn less than men largely because they specialize less. Lower levels of specialization hinder productivity, productivity enhances visibility, and visibility has a direct, positive, and significant effect on salary. I discuss the practical implications of these findings and lay the foundation for a broader theory of the role of research specialization in work processes.

Inequality is a core area of sociology, and earnings inequality in particular has been central to scholarly investigation because monetary resources serve as a basis for other resources, such as power, authority, and autonomy (Smith 2002). Although sociologists have examined earnings inequality across time (e.g., Maume 2004), place (e.g., Howell and Bronson 1996), industry (e.g., Kreft and De Leeuw 1994), and occupation (e.g., Weeden 2002), investigations of inequality *within* occupations are far more frequent (Morris and Western 1999). Studying inequality within occupations allows researchers to control important but difficult-to-measure occupational characteristics, like segregation and demand, and parse out the relative influence of achieved and ascribed characteristics, such as productivity and gender. Controlling for occupational-level characteristics, however, may obscure important changes over time that could alter the relevance and effect of these individual characteristics.

Within academe, for instance, large changes have occurred in the past few decades—changes that may have altered the landscape upon which individuals strive for success. First, academic research has grown exponentially, not only in terms of productivity (i.e., number of contributions to scientific journals) but also in terms of professional associations, journals, and training (Schofer 2004). Perhaps as a response to this rapid growth, academic fields have diversified—allowing more topics to fall under their

Please address correspondence to Erin Leahey, Department of Sociology, University of Arizona, P.O. Box 210027, Tucson, AZ 85721-0027 (leahey@arizona.edu). Support for this project was provided by the ASA Funds for the Advancement of the Discipline and the University of Arizona Social and Behavioral Science Research Institute. The author thanks Paula England, Barbara Entwisle, Kieran Healy, Linda Molm, and anonymous *ASR* reviewers for helpful comments, and Laura Hunter and Jason Crockett for their outstanding research assistance.

rubrics—which occasionally leads to the creation of hybrid fields (Dogan and Pahre 1989b) and encourages individuals to specialize. Historical analyses suggest that the rapid growth of scientific fields (Kuhn 1962) prompts scientists to carve out professional niches, often within specialty areas, to foster their professional identity and make large bodies of literature more manageable (Ben-David and Collins 1966; Price 1963). Working within a specialty area allows scientists to counteract overcrowding in their fields, to stand out more easily, and to avoid being spread too thin (Hackett 2005). Second, academia has been diversifying demographically: many disciplines, especially in the social sciences and humanities, have seen a rapid increase in the proportion of women and minorities who hold academic positions (Lee et al. 2005; Long and Fox 1995). Lack of parity between these groups and the white men who traditionally dominated such positions has been the subject of academic research (Ferree and McQuillan 1998), university gender equity reports,[1] and a controversial speech by a prominent university president (Summers 2005).

Reflecting these changes, those interested in studying inequality in academe have moved beyond productivity-based explanations for earnings differentials. When scientific fields were smaller and more homogenous, "publish or perish" was a viable strategy, and quantity of publications was considered the key determinant of valued goods in academe: upward mobility, promotion, and earnings (Bayer and Astin 1975; Reskin 1977, 1979; Zuckerman 1967). As scientific fields grew, scholars began to use more nuanced definitions of productivity that account for journal of publication, coauthorship, and utilization (Fox 1983; Long 1992) and to examine the relevance of visibility (Hargens and Schuman 1990; Sauer 1988). The changing demographics of scientific professions also prompted sociologists to refine the traditional model of faculty earnings. As younger scholars, including a growing proportion of women and minorities, entered academia, researchers began to incorporate contextual factors associated with success: institutional type, prestige, size, and selectivity (Danziger 1982; Rothausen-Vange, Marler, and Wright 2005; Tolbert 1986); social networks (Stack 2005); region (Mohanty, Dodder, and Karman 1986); sex composition of field (Bellas 1994); mobility and oversupply in the academic job market (Langton and Pfeffer 1994); and more comprehensive measures of human capital, such as time out of the labor force (McElrath 1992). Not surprisingly, many of these factors are related to gender, allowing researchers to conclude that women do not earn less than men simply because they produce less. Rather, women tend to be located in less research-oriented settings and in female-dominated fields and subfields, and they have different kinds of professional networks (Haberfeld and Shenhav 1990; Reskin 1978; Tolbert 1986).

Research institutions' norms and standards regarding promotion, tenure, and merit raises also reflect these changes, but they are simultaneously subject to a recent push toward interdisciplinarity (National Academies of Science 2005), creating a fair bit of tension. Institutions and departments emphasize not only the quantity of research produced, but they also expect scholars to make significant scholarly contributions (often through publication in prestigious outlets) and to become well-known and well-regarded in their fields. Toward this end, research institutions may be encouraging faculty members, especially junior faculty, to specialize to improve both productivity and visibility. This strategy has been recognized by the Center for Advanced Study in the Behavioral Sciences, which hopes to recruit promising young scholars who have "worked narrowly for 6–8 years to get tenure, [and] are now in a position to think more ambitiously about their work and to take greater intellectual risks."[2] At the same time, some have expressed grave concern, if not alarm, about overspecialization and narrow-mindedness in science (Blau 1994; Calhoun 1992; Collins 1994; Davis 1994; Karides et al.

---

[1] For examples, see studies by Rutgers University (http://fas.rutgers.edu/onlineforms/gender_report.pdf), North Carolina State University (http://www.ncsu.edu/equal_op/gender_equity/Reports/report.pdf), the University of Wisconsin (http://www.wisc.edu/provost/GEFSguide.html), and the Massachusetts Institute of Technology (http://web.mit.edu/gep/about.html).

[2] http://www.casbs.org/programs/fellowships/?PHPSESSID=98e3e0561914a258ed43006e9a210304

2001; Stinchcombe 1994; Turner and Turner 1990). Research funding agencies and professional associations, in a similar vein, have begun encouraging scholars to branch out and meld insights from multiple disciplines, convinced that an interdisciplinary approach to research is useful and potentially ground-breaking (Abbott 2001; Dogan and Pahre 1990). Although the shared norms and practices of specialty areas (Kuhn 1977) may help members grasp otherwise complex subjects in a manageable way (Abbott 2001; Dogan and Pahre 1990), they may also discourage innovative work on problems that fall between fields and subfields (Simon 1973; Star 1983).

How, then, have individuals charted their academic careers through this dynamic terrain? Are earnings still as dependent upon productivity? Or have new factors come into play as academic research has grown and become demographically diverse? I contend that in this age of scientific specialization, other factors—in addition to individual productivity and the contextual factors that sociologists highlight—are needed to understand the earnings attainment process. In this article I introduce, define, and measure two constructs, *visibility* and *the extent of research specialization,* which are critical to understanding earnings inequality in academia but have heretofore been neglected. Perhaps because of measurement concerns or the challenges collecting data, only a few studies of faculty salary have examined whether visibility in one's field affects earnings, and all such studies focus on the field of economics (Diamond 1986; Hamermesh, Johnson, and Weisbrod 1982; Sauer 1988). No research, on the other hand, has even theorized the influence of another important dimension of scholarly research, which I have introduced in a previous article (Leahey 2006): the extent of research specialization. Previous research on academics has examined only the impact of area of specialization (Barbezat 1987; Haberfeld and Shenhav 1990; Moody 2004; Ward and Grant 1995).

The constructs I introduce—visibility and the extent of research specialization—may not only elaborate the relationship between productivity and earnings, but they may also help us understand gender inequality in greater depth. Female scientists earn only 80 percent, on average, of what male faculty earn, and this disadvantage persists across all ranks and institutional types (American Association of University Professors 2003–04). The contextual, structural factors that sociologists have brought to bear on this topic have largely been able to explain women's lower productivity (Xie and Shauman 1998), and in turn, salary (Tolbert 1986). The goal of this article is not to explain more of the variation in earnings between men and women, but to elucidate the processes by which such differences arise. Following an overview of prior work and the theoretical development of hypotheses, I discuss the multiple data sources I use to study academics in two fields: sociology and linguistics. After controlling for important structural influences statistically and through my sampling design, I use path analytic techniques to specify complex interrelationships between gender, productivity, and the constructs I introduce, and to assess their influence on earnings. The results enhance our understanding of the processes through which inequality arises—a policy-relevant contribution that has been highlighted by a recent American Sociological Association president (Reskin 2003).

THE STANDARD MODEL OF COMPENSATION

Previous studies have modeled gender's effect on salary levels by incorporating both the human capital factors that economists deem important and the structural characteristics that sociologists highlight. Researchers typically account for other forms of human capital, including education (typically by sampling only Ph.D.s) and experience (by statistically controlling for professional age or academic rank), and explicitly test productivity's impact on earnings.[3] Although productivity is typically theorized to mediate the relationship between gender and salary, gender and productivity are typically modeled as two correlated explanatory variables that help explain salary differences, as depicted in Figure 1, Panel A. In various studies (Barbezat 1987; Bayer and Astin 1975; Bellas 1994; Langton and Pfeffer 1994; Levin and Stephan 1998; Morgan 1998), gender and productivity are specified to

[3] As in the broader literature on this topic, "productivity" refers to research productivity.

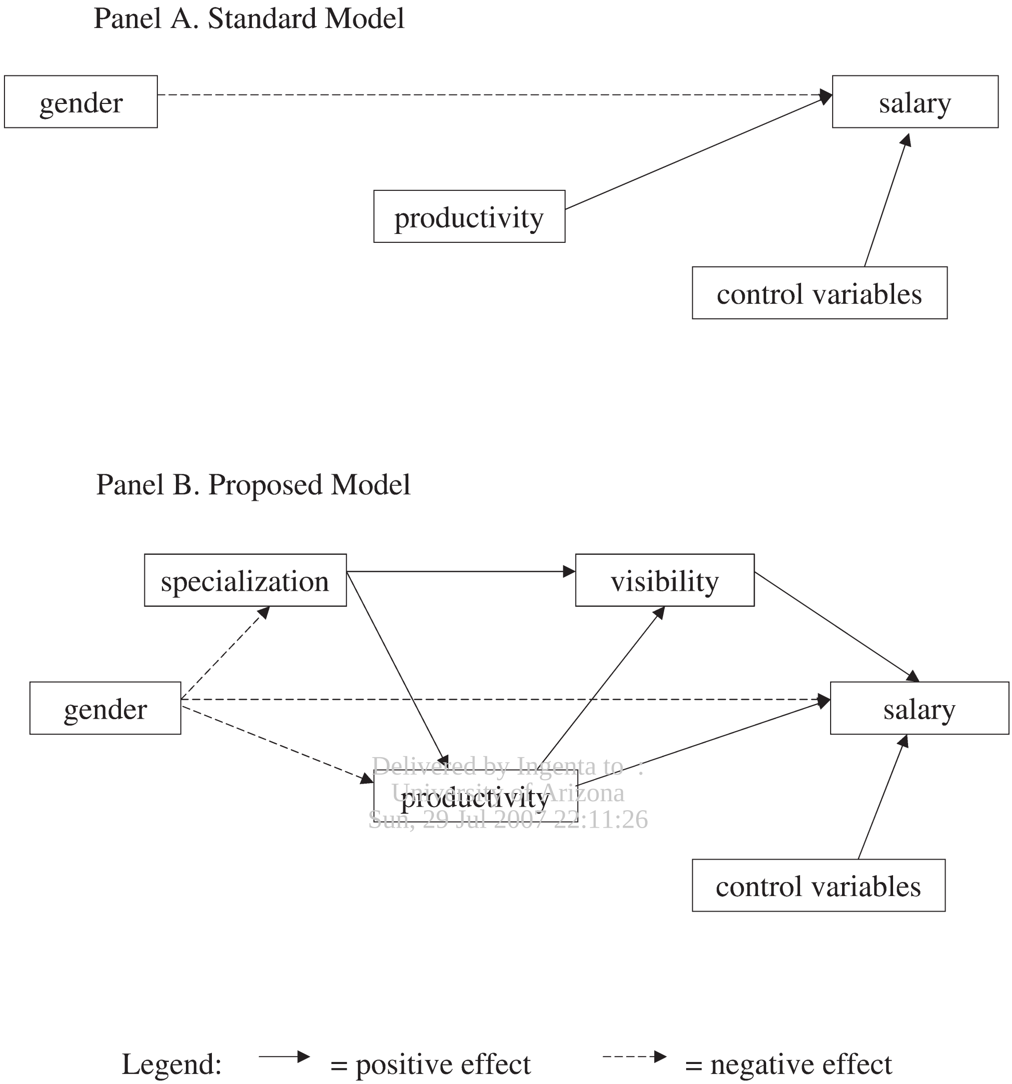

Figure 1. Conceptual Models of Compensation

Note: Gender is coded as "1" for women and "0" for men. And, as in any multivariate model, all exogenous variables in Panel A (gender, productivity, and controls) are intercorrelated.

affect salary, and other factors—often the structural characteristics that sociologists deem important, here referred to simply as control variables—are included in the conceptual model as well. However, the two studies that focus most closely on structural characteristics (Fox 1981; Tolbert 1986) fail to control for research productivity.

Occasionally, modifications are made to this standard model, but few of them adequately capture the process-oriented paths that I theorize. For example, researchers interested in differential returns to productivity for men and women specify an interaction between gender and productivity (Bellas 1993; Fox 1981; Haberfeld and Shenhav 1990; Tolbert 1986), typically by estimating separate models for women and men. Sociologists interested in structural characteristics such as institutional type view them theoretically as intervening variables, but resort to modeling them in the way depicted in Figure 1, Panel A: as contemporaneous explanatory variables (Burke et al. 2005; Fox 1985; Haberfeld and Shenhav 1990). One modification to the traditional model that I propose—theorizing visibility as a relevant mechanism—has only been undertaken in a few studies of economists (Diamond 1986; Hamermesh et al. 1982; Sauer 1988), and the key construct I develop—the extent of research specialization—has never been incorporated into a model of earnings inequality. Yet, as I will show, visibility and the extent of specialization are important components of scholarly research careers that are related to, yet theoretically distinct from, both productivity and the larger structural forces that sociologists highlight when explaining men's earnings advantage. I will discuss each concept in turn.

VISIBILITY

Like productivity, I conceptualize visibility as a form of capital. Visibility in an academic field is achieved when people know your name, are familiar with your work, and think highly of your intellectual contributions. Because the foundation of visibility is recognition by peers in one's scholarly community (van Dalen and Henkens 2005), I view it as social capital that provides opportunities to scholars who possess it and capitalize on it. These opportunities may include receipt of awards and prizes (Cole and Cole 1973; Zuckerman 1977), invitations to give a talk or edit a journal, the receipt of strong letters of support for promotion and tenure, and perhaps external job offers—one of the most critical determinants of salary increases. Thus, visibility is a nonpecuniary reward for scientific work (Diamond 1986) that could have pecuniary implications.

Despite visibility's import to award committees and recruitment and retention efforts, it is typically neglected in investigations of faculty salary. Research has shown that the visibility of scientists is critical to understanding the structure of scientific fields (Hargens 2000; Moody 2004; Small and Crane 1979), variation in career patterns and promotion (Clemens et al. 1995; Long 1992; Sonnert 1995), and mentors' influence (Chubin, Porter, and Boeckmann 1981). Thus it is surprising that visibility is almost always overlooked in studies of faculty salary. Only a few studies of the discipline of economics (Diamond 1986; Hamermesh et al. 1982; Sauer 1988) incorporate visibility as a key explanatory factor, and none of these studies focuses on gender differences.

Visibility is related to—but distinct from—both productivity and the more structural forces that sociologists emphasize when modeling salary differentials. Visibility is positively correlated with productivity; indeed, we will see that productivity is one of the largest contributors to visibility. The more scholars publish, the more their names and their work will become known to other members of their scientific communities (Cole and Zuckerman 1984; Garfield 1981). But I consider visibility to be a distinct construct, given that not all highly productive scholars become visible in their fields, and some scholars can become quite visible, and achieve great acclaim, through a single publication. Indeed, Sauer (1988) finds that visibility and productivity have unique net impacts on salary. Visibility is also related to the larger structural characteristics that sociologists highlight when trying to understand gender inequality in earnings. For example, visibility is somewhat dependent on the sex composition of the field and the tendency for scholars to cite scholars of their own gender (Ferber 1988; Ward, Gast, and Grant 1992).

THE EXTENT OF RESEARCH SPECIALIZATION

Unlike visibility, which is widely recognized as important to academic success, most academics have an intuition about the importance of research specialization, but it has never been incorporated into a model of academic earnings. The idea of specialization, broadly conceived, has informed sociological and economic research on gender inequality for some time, but the focus has been on areas of specialization to the neglect of another dimension: its extent. This is particularly true in studies of academics, which focus on scholars' subfields, or specialty areas (Grant and Ward 1991; Grant, Ward, and Rong 1987; Moody 2004; Stokes and Hartley 1989). These studies take the "building blocks of science" (Small and Griffith 1974) seriously and help us to understand the social organization of the field (Ennis 1992), in- and out-migration from specialty areas (Wagner-Dobler 1997), and intellectual influence and overlap (Cappell and Gutterbock 1992; Stokes and Hartley 1989). However, largely because they ignore the extent of specialization, these studies do not close the gap between the interest in scientific specialization and the number of concrete empirical investigations on the topic (Wagner-Dobler 1997).

Whereas most previous work on specialization focuses on the *content* of specialization, that is, the specialty areas scholars engage in, I highlight the *form* that specialization takes by examining each scholar's distribution of specialty areas. To what extent do scholars specialize, regardless of their areas of specialization?[4] I conceive of the extent of research specialization as a continuum along which scholars—or, more accurately, their research programs—are located. This assesses the extent to which an individual's body of work is internally homogenous or diverse. It is easy to imagine a categorical distribution of each scholar's various subfields, with some scholars' research spanning several subfields and others' being confined to one or two. Some scholars repeatedly engage with the same research topic(s) and tend to write multiple papers in that subfield for several years, if not their entire careers. I refer to such scholars as specialists. At the other end of the continuum lie scholars with very diverse research interests who write papers on a wide variety of topics and rarely publish on the same topic more than once.

I am particularly interested in the extent to which a scholar repeatedly engages in research on the same *substantive* topic, for it is the communities surrounding substantive research areas that should be critical to producing specialization's benefits. Certainly, other forms of specialization are possible. The extent of teaching specialization could assess whether faculty members teach the same courses repeatedly or diversify their teaching portfolios. The extent of service specialization might capture whether a scholar engages in the same kinds of department service (e.g., graduate studies director) year after year, or whether committee assignments are frequently rotated. Even within the realm of scholarship, different kinds of specialization are possible. For example, one could specialize to a great extent by method, by only engaging in experimental work or only in field research. A scholar could also specialize theoretically by employing the same theoretical framework even when studying a variety of substantive topics. However, I choose to investigate the extent of specialization in substantive research areas because these areas best correspond to accepted areas of expertise as delineated by professional associations[5]—few of which embody a single methodological approach or theoretical perspective.

Like visibility, I view the extent of research specialization as a form of capital that is related to (yet distinct from) both individual productivity and structural characteristics. Specializing serves as professional capital because it is foundational to almost every conceptual definition of professional expertise (Collins and Evans 2002), and expertise is associated with a host of benefits, including: legitimacy and credibility (Faulkner, Fleck, and Williams 1998); power, privilege, and influence (Turner 2001); status (Aiken and Sloane 1997); control (Braverman 1975); and authority (Smith 2002). As I detail in the next section, specializing should increase research productivity (Birnbaum 1981) because it allows a scholar to gain in-depth knowledge of a research area—its major works and debates—and thereby write more efficiently and improve chances of publication. Specialization is also related to some of the structural characteristics that soci-

[4] The extent of specialization (i.e., its form) and the area of specialization (i.e., its content) are distinct dimensions of specialization that are not necessarily related. Two academics could be similar in all regards—even with respect to their primary specialty area—but differ dramatically in the extent to which their successive papers and projects are related to their previous work: one could contribute repeatedly to the same subfield, whereas another could produce articles on a wide variety of topics. Two researchers could even conduct research in the same four areas (e.g., gender, family, law, and organizations) and yet specialize to different extents: one researcher could devote 70 percent of her research to one area and 10 percent to each of the remaining three areas, whereas the other researcher could devote 25 percent of his time to each area.

[5] See, for example, the American Sociological Association's list of sections (www.asanet.org/page.ww?section=Sections&name=Overview) and the newly devised list of specialty areas (http://www2.asanet.org/footnotes/septoct05/fn7.html).

ologists highlight, such as promotion and tenure standards, the extent of specialization in the larger discipline (Halliday and Janowitz 1992; Karides et al. 2001), and efforts to promote interdisciplinary work. Disciplinary norms may encourage scholars to specialize in order to develop a professional identity, whereas funding agencies and universities may encourage scholars to incorporate insights from multiple subfields and fields. In addition to tenure criteria, the range of specialty areas within one's field may shape the extent to which a scholar can diversify. The extent of research specialization in an individual's research program is shaped by larger forces, yet it is distinct from them and therefore deserves separate empirical attention.

A REFINED MODEL OF COMPENSATION

I build upon the standard model of compensation (Figure 1, Panel A) by incorporating visibility and the extent of research specialization and by outlining a theoretical process by which earnings differences arise. While it is common for social research to neglect psychologically-oriented factors, such as motivation and work ethic, the neglect of these aspects of scholars' research is surprising. Rather than assume that gender is unrelated to "unmeasured aspects of human capital or productivity" as Langton and Pfeffer (1994:245) do, I conceptualize and carefully measure these typically unmeasured aspects—including visibility and research specialization—and explicitly incorporate them into statistical models. Moreover, unlike Tolbert (1986) and Fox (1981), I simultaneously account for structural characteristics (such as institutional type and department prestige) and research productivity. These improvements upon previous models provide a more complete understanding of the general process by which earnings are determined, particularly how women continue to earn less than men in academic environs. Figure 1, Panel B presents the conceptual model that I develop and empirically test. In the following sections, I develop a theoretical case for each of these paths and present directional hypotheses.

GENDER'S EFFECTS

Women's tendency to produce less than men has been well-documented and largely explained, and for these reasons I expect *women to have lower levels of productivity than men.* Female scientists have been found to produce less than men (Long and Fox 1995; Ward and Grant 1995; Zuckerman, Cole, and Bruer 1991), mostly because women are less likely to possess the family circumstances, structural positions, and facilitating resources that are conducive to productivity. These include marriage, institutional type, research funding, research assistance, limits on teaching and service contributions, helpful social networks, experience beyond the doctoral degree, and placement in a research setting (Fox 2005; Xie and Shauman 1998). To the extent that I am unable to control for some of these factors, gender's direct effect on productivity should remain.

Women are also hypothesized to specialize less than men. We know from previous studies that men and women tend to differ in their *areas* of specialization, whether those are academic specialty areas (Ward and Grant 1995), areas of household work (Budig and England 2001), areas of educational focus in college (Davies and Guppy 1997), or areas of work (Tomaskovic-Devey and Skaggs 2002). These studies often highlight how females tend to specialize in different activity areas (e.g., subfields, household chores, college majors, and jobs) relative to their male counterparts. However, they do not provide much theoretical guidance as to whether men or women specialize to a greater extent.

To substantiate my hypothesis regarding women's tendency to specialize less than men, I turn to the literature on forms of capital—human, social, and cultural. Recall that I view specializing as professional capital because it begets all sorts of outcomes that are valued in professional settings, including productivity (Birnbaum 1981) and recognition (Rifkin et al. 1994). Because previous studies have found that women are disadvantaged with respect to human, cultural, and especially social capital, I also expect women to be disadvantaged in terms of professional capital—that is, to specialize less than men. Indeed, men receive better and different kinds of *human capital* (Weeden 2002), often specializing in more valued and financially rewarding specialty areas (Fuller and Schoenberger 1991; Gerhart 1990). Compared to women, men have more "specialized training" (Tam 1997) and different types of human capital (Paglin and Rufolo 1990) that help them secure higher earnings and other career benefits (Gerber and Schaefer 2004; Ishida, Spilerman, and Su 1997). Men are also advantaged with respect to *social capital.* For example, men not only have better social networks, but they tend to invoke them more freely than do women (Lin, Ensel, and Vaughn 1981; Wegener 1991). Women and men also possess difference amounts and kinds of *cultural capital* (Kanter 1977), which has been shown to influence workers' occupational futures (Deal and Kennedy 1982).

The expectation that *gender will have a direct effect on salary and an indirect effect on visibility* is also evident from my conceptual model. Women's disadvantage in terms of salary, which has been documented in most fields except perhaps engineering (Morgan 1998; but see Alessio and Andrzejewski 2000), should decrease in magnitude and possibly be rendered statistically insignificant with the inclusion of various intervening variables. Although research shows visibility to be gendered (Ferber 1988; Ward et al. 1992), these effects arise only indirectly, *through* productivity: that is, male and female authors become visible in a research community primarily through their published works (Cole and Zuckerman 1984).

PRODUCTIVITY'S EFFECTS

For similar reasons, *I expect productivity to positively affect both visibility and salary.* Research scholarship, more so than teaching, service, or mentoring, drives visibility in one's field, so as scholars publish more, they increase their chances of becoming known and influential in their scholarly communities (Cole and Zuckerman 1984; Garfield 1981). As scholars produce more scholarly works, they should also earn more money. This economic tenet, which lies at the heart of human capital theory, is specified as a direct path from productivity to salary in Figure 1, Panel B.

VISIBILITY'S EFFECTS

Visibility in one's field should have a strong, positive effect on salary. Rewards in science, including earnings, are largely based on contributions to the body of scientific knowledge (Merton 1959), which can be assessed through not only publications but also references to those publications by others—an indicator of visibility. Visibility is a nonpecuniary reward for scientific work (Diamond 1986), but if departments, universities, and disciplines value work that is important and useful to other scholars, then scholars' visibility should also be rewarded financially. Avenues for these increases include raises associated with retention and recruitment efforts (particularly counter-offers) as well as merit-based raises. In essence, visibility reaps economic rewards.

RESEARCH SPECIALIZATION'S EFFECTS

I posit that the extent of research specialization will have a direct and positive effect on two highly valued goods within academe—productivity and visibility—and an indirect effect on salary (see Figure 1, Panel B). These hypotheses are drawn from the literature on areas of specialization, which suggests that specialties are a prime source of rewards (Bourdieu 1975; Cole 1983) that are pertinent to both career mobility (Knorr-Cetina 1981:69) and claims of expertise (Abbott 1988; Gieryn 1999; Lamont and Molnar 2002). As Sonnert and Holton (1995:174) note, "a clearly focused research program in a well-defined research area is commonly considered more advantageous to a career than undertaking disjointed projects." How, exactly, is productivity enhanced by specializing? Specializing in one or a few subfields allows one to master the literature, to become familiar with important debates and gaps and recognize new developments—all of which can boost productivity by making successive papers on that substantive topic easier to write and more likely to be accepted for publication. How is visibility enhanced by specializing? By devoting a large portion of one's research to a limited number of areas, a scholar can come to know—and be known by—key players by attending smaller conferences and the relevant section meetings of larger conferences, reviewing peers' works in progress and manuscripts under review, and collaborating with researchers who have shared interests. Through increased productivity and heightened visibility, scholars can garner the fame that typically translates into fortune (or at least a raise), and for this reason I expect specialization to have an indirect effect on salary.

The pathways hypothesized here may vary by discipline. Previous research has found that status attainment patterns are associated with disciplinary consensus, which is known to be higher in the natural sciences (Hargens and Hagstrom 1982). However, even across the social sciences and humanities, which have been typically understudied (Guetzkow, Lamont, and Mallard 2004), the processes whereby resources such as specialization and visibility are transformed into material rewards are likely to vary. For example, linguistics has a very strong core (Dogan and Pahre 1989b) from which scholars choose a subfield (phonetics, phonemics, morphology, syntax, or pragmatics) without losing touch with the others; in this field, gender differences in the extent of specialization may be less pronounced, and specializing may not be necessary to jumpstart visibility. In contrast, sociology has expanded the definition of its subject matter (Karides et al. 2001) and fragmented into a large number of poorly connected subfields (Dogan and Pahre 1989b; Rhyne 1995). Indeed, Abbott (2000) argues that sociology is one of the few social scientific disciplines lacking a theoretical, methodological, *and* substantive core. Thus, in this field, specializing may be a particularly effective way to increase visibility.

While my primary interest is in conceptualizing, measuring, and modeling a neglected dimension of research specialization (its extent), an examination of the gender differences in specialty areas might add to this analysis. Area of specialization may mediate the direct link I theorize between gender and the extent of specialization. Perhaps women specialize less than men because they specialize in different areas—less productive areas that encourage members to branch out to find collaborators. Previous research suggests that women tend to rely on qualitative methods (Grant et al. 1987) and write on gender issues (Grant and Ward 1993; Lutz 1990) in sociology more often than men. Perhaps these areas are undervalued, thus encouraging women to diversify to add legitimacy to their research program. In addition, the topics that women are disproportionately drawn to may be inherently more intersubdisciplinary. Or perhaps women are less likely to engage in comparative-historical work that requires intensive historical knowledge and second-language skills, thereby decreasing incentives to remain in that subfield and become specialized. Women may also be more likely to work in broader, more differentiated subfields, and to follow a niche approach by creating their own areas of expertise (Sonnert and Holton 1995). Thus, incorporating area as well as the extent of research specialization may help illuminate gender differences in earnings.

DATA AND METHODS

Sample

The sample I have selected for this study—a 20 percent probability sample of tenure-track faculty at Research I universities, taken from faculty lists provided by professional associations and department Web sites—makes my test of gender and research specialization effects particularly stringent. Like most studies of academics, I begin with a cross-section of individuals and collect retrospective data on publications and current data on salary to test the hypotheses of interest. This sample of individuals already in academe (N = 418) is necessary given the publication-based measure of research specialization, which is incalculable for individuals outside (or not yet in) academe who lack publications. Thus, the population from which I have drawn my sample is rather selective, and this is particularly true of the women, who are more likely than men to withdraw from science at various stages leading up to academic employment (National Research Council 2001; Preston 2004; Rosser 2004) and to enter less prestigious institutional settings, such as teaching colleges (Grant and Ward 1991). Because the women in my sample have career patterns that most closely mirror men's, testing for any remaining gender differences is challenging. Moreover, by selecting only Research I universities—those that award 50 or more doctoral degrees per year in at least 15 disciplines (now referred to as extensive research universities [Carnegie Foundation for the Advancement of Teaching 2001])—and controlling for department prestige, I account for many structural, resource-based influences on salary, such as institutional budget and geographic cost of living, as well as time available to devote to research relative to teaching and administrative duties.

Although extensions of this analysis to other professions will be fruitful, I begin with academics for several reasons. First, the hierarchical nature of academic science (Smith-Doerr 2004) and the gender differentials that persist within academe (Etzkowitz, Kemelgor, and Uzzi 2000; Horning 2003; Preston 2004) demand explanation. Second, I have conceived of a unique way to measure the extent of research specialization for authors of published research. While measuring areas of specialization among a firm's employees seems feasible (perhaps by assessing overlap in job descriptions), it is more challenging to envision an accurate measure of the extent of specialization, except by gathering self-reported data on task homogeneity (e.g., types of surgery doctors engage in or types of cases lawyers take). Third, academia is unique in its high levels of competition, focus on reputation and originality, lack of structure, and minimal public demands (Reskin 1977)—thereby warranting separate, in-depth study. I agree with Xie and Shauman (1998:848) that "it is useful to restrict the population being studied to academic scientists, because publication is generally expected, facilitated, and rewarded for scientists employed in academic settings."

Focusing my investigation on the disciplines of sociology (N = 196) and linguistics (N = 222) also adds to the stringency of my hypothesis tests, for in these disciplines women have been incorporated to a greater extent than in the natural sciences. This is evident in an increasingly equitable gender distribution of recent Ph.D.s over time: in 1973, less than 15 percent of the professionally young (i.e., Ph.D. within the last 10 years), full-time, academic labor force in the social and behavioral sciences was women; this increased to 45 percent by 1995. This contrasts with much lower levels of integration in the natural sciences and engineering, where in 1995, women only constituted 20 and 11 percent of tenure-line faculty, respectively (National Research Council 2001). The relatively low levels of segregation in sociology and linguistics provide subsample sizes large enough to obtain a high level of statistical power for examining gender differences. While many previous studies of gender stratification in academe have focused on a single discipline (Keith et al. 2002; Long 1992; Reskin 1977), I examine two disciplines because processes of gender stratification have been found to differ across disciplines (Fox and Stephan 2001; Prpic 2002), and the social sciences and humanities have been neglected by the sociology of science and knowledge (Guetzkow et al. 2004). Although the two disciplines differ in age (sociology is older) and size (sociology is bigger in terms of membership), they both sit at the crossroads of several different disciplines and are inherently diverse fields, making an investigation of individual-level specialization particularly informative.

Data Sources and Measures

To collect data on this sample of linguists and sociologists, I relied on various secondary sources and also fielded a Web-based survey in Spring 2004. With these data, I constructed measures of the key constructs in my theoretical model: productivity, visibility, the extent of research specialization, and earnings.

Productivity. No single measure of productivity is adequate or universally accepted (Fox 1983; Long 1992), so I rely on two that are common in the literature. Because 38 percent of scholars in my sample have no experience publishing a book, I use a count of articles published in peer-reviewed journals as my primary measure of research productivity. Using *discipline-specific electronic databases*—Sociological Abstracts (SA) and Linguistics and Language Behavior Abstracts (LLBA)—I was able to access each scholar's list of articles published in peer-reviewed journals. These databases are extensive (they index articles from 6,000 and 2,000 periodicals, respectively, over a period of more than 30 years) and provide more accurate publication histories than do comparable databases.[6] Since the distribution of articles is right-skewed, I follow the lead of previous researchers and take the natural log (Allison and Long 1987; McBrier 2003; Prpic 2002).

[6] The Social Science Citation Index covers only 140 sociology journals since 1970 and the Arts and Humanities Citation Index covers 1,138 arts and humanities journals since 1990. The list of journals included in SA and LLBA are available online (see http://ca1.csa.com/ids70/serials_source_list.php?db=socioabs-set-c and http://ca1.csa.com/ids70/serials_source_list.php?db=llba-set-c).

Research has found alternative measures that account for coauthorship status to be highly correlated with article counts (Cole and Zuckerman 1984), but I assess the robustness of my results to a measure weighted by coauthorship nonetheless.

Although quantity of journal articles is often used to measure productivity among academics in research settings (Fox 1992, 2005; Levin and Stephan 1998; Long and McGinnis 1981) and is highly correlated with total productivity that includes books (Reskin 1977, 1978), I also incorporate data on books culled from the *Library of Congress, CVs,* and *faculty Web pages.* This is critical because preferred publication format may be related to other constructs in my model, namely gender, the extent of specialization, and visibility, in addition to specialty area (Ward and Grant 1985) and institutional type (Clemens et al. 1995). Following the lead of other scholars (Bellas 1994; Langton and Pfeffer 1994; Xie and Shauman 2003), I weight articles and books equally to construct a second measure of research productivity: each scholar's total number of publications (articles *plus* books).[7] I do not base my measures of research productivity on self-reports, as several other scholars have done (Fox and Faver 1985; Prpic 2002; Wanner, Lewis, and Gregorio 1981; Xie and Shauman 1998), because efforts to recall career-long productivity are subject to error and social desirability bias. To prevent underrepresenting women's productivity (given their more recent entrance into academia [Xie and Shauman 2003]), I control for professional age (and alternatively, academic rank) when estimating models. I do this instead of using time-specific productivity rates because earnings are dependent on productivity to date.

THE EXTENT OF RESEARCH SPECIALIZATION. The discipline-specific electronic databases, SA and LLBA, are the source of keyword descriptors that I use to measure the extent of research specialization. For every article published by every sampled academic, I collected the keywords used to describe the research, including the general classification codes (up to two are applied to each article) and the detailed major descriptors (up to nine are applied to each article), both of which are assigned by trained staff at Cambridge Scientific Abstracts (CSA), the umbrella organization that manages both databases.[8] The classification codes (CCs) correspond to research areas within disciplines (e.g., "social movements" in sociology and "language origins" in linguistics), whereas the major descriptors (MDs) best capture detailed content of the paper (e.g., "role models" in sociology and "implicature" in linguistics). Fortunately, the current lists of keywords (both MDs and CCs) are up-to-date and consistent across time. To measure the extent of specialization in scholars' research programs (see the Appendix), I compare their cumulative number of journal articles to the cumulative number of unique keywords that describe their articles. Specifically, to differentiate scholars who specialize (i.e., devote a large portion of their research program to a small set of specialty areas) from those who branch out (i.e., write successive papers on new topics), I use the ratio of the cumulative number of *unique* keyword descriptors to the cumulative number of publications (1 – [# of unique keywords / # of publications]). Higher values indicate greater specialization.

Because specialization scores depend on how detailed the keyword descriptors are (Blau 1977)—that is, detailed classification systems will make productive scholars look more diverse, whereas broad classification systems will make productive scholars look more specialized—I construct this measure using three kinds of keyword descriptors: 1) the detailed major descriptors (there are thousands for each field); 2) the broad classification codes (there are roughly 125 per field); and 3) the broadest classification code *families,* which best correspond to broad subfields within disciplines.

[7] Attempts to weight articles and books differently have been explored (McElrath 1992), but their reliability and validity have not been tested.

[8] The list of all possible classification codes for sociology can be found at http://www.csa.com/factsheets/supplements/saclass.php, and the list for linguistics can be found at http://www.csa.com/factsheets/supplements/llbaclass.php. These codes are applied by trained staff in a systematic and reliable way; coding instructions are also available from CSA.

The classification code lists for each discipline are nested into families comprised of a "parent" code and one or more subcodes; I collapse each parent code with its subcodes to create families. For example, the "complex organization" parent code and all its subcodes (including "military sociology" and "nonprofit organizations") constitute a single classification code family in sociology. Importantly, constructing the specialization measure using each scholar's distribution of classification code *families* allows me to account for the possibility that men and women specialize in areas that are differentiated to different degrees (i.e., have more subcodes), and using the detailed major descriptors circumvents the internal heterogeneity of subfields that Moody (2004:219) faced.

VISIBILITY. Visibility can be measured in a variety of ways, including a weighted count of articles, in which the weights are based on journal prestige or impact factor (Keith et al. 2002; Levin and Stephan 1989; McBrier 2003). Perhaps more than journal of publication, however, members of academic communities rely on citation counts to gauge the quality of work and the visibility of the author (Diamond 1986). Citation counts may be tapping constructs that are related to visibility, such as disciplinary alliances (Stinchcombe 1982), attempts to flatter potential reviewers (Latour 1987), or the quality, usefulness, or controversial nature of the article (Ferber 1986; Najman and Hewitt 2003), but they are also relied upon heavily in promotion and tenure decisions and have been shown to impact academic salary (Diamond 1986; Hamermesh et al. 1982; Sauer 1988). Thus, to measure visibility, I collected data on citation counts from the Institute for Scientific Information's (ISI) *Web of Science,* specifically, the Social Science Citation Index for sociologists and the Arts and Humanities Index for Linguists.[9] Because this variable ranges from 0 to more than 1,000, I take the natural log to alleviate right skewness.

Citations to articles provided by the Web of Science cannot capture visibility attained through the publication of a prominent book, so I also use data on book awards and book reviews. I determine the number of book awards received by each individual by coding information available on CVs and Web sites. The number of times a scholar's books have been reviewed in prestigious journals in the field *(AJS, Social Forces,* and *Contemporary Sociology* in sociology; *Language* and *Journal of Linguistics* in linguistics) is another measure of book-based visibility. I obtained this number by searching for each book in either SA (for sociologists) or LLBA (for linguists), as these databases index book reviews as well as journal articles. While higher values on both of these measures indicate greater visibility, only book awards capture visibility based on positive assessments; book reviews, of course, can be unfavorable.

SALARY. I obtained data on earnings from two sources. In a *Web-based survey* fielded in spring 2004, I asked the sampled academics to report their salary, rounded to the nearest $5,000, for the 2003 to 2004 academic year. Because the response rate was 50 percent (which is actually high for an online survey [Witmer, Colman, and Katzman 1998]), I consulted *employer records* to obtain salary data for the nonresponders. Although legal restrictions are gradually changing (American Association of University Professors 2004), I was able to secure salary information for almost all sampled faculty members who are employed at public institutions—not only the nonresponders. But because official earnings data are unavailable for individuals employed at private institutions, I rely on their self-reported earnings obtained from the Web-based survey, adjusting them to account for the common tendency for all but the wealthiest individuals to overreport their income. Using the subsample of individuals for whom I have both self-reported and employer-provided salary data, I calculate the difference between the two values (rounding employer-reported data to the nearest $5,000 to make it comparable to the self-reported data) and calculate the mean of the differences: on average, these individuals overreport their income by

---

[9] Unlike some studies that determine citation rates through a search on author name (Reskin 1978; Wanner et al. 1981), which only includes sole- and first-authored papers, I follow Long (1992) and Sonnert (1995) in obtaining citation rates for each article published by each sampled faculty member and summing them to obtain the total number of citations received by each individual.

$1,348.[10] I subtract this amount from the self-reported salary data provided by respondents at private institutions and use this as their salary value in all analyses. Neither the employer-provided data nor the adjusted self-reports include supplementary salary received from grants, contracts, or consulting work. Because the univariate distribution of salary is right-skewed, I use the natural log in all analyses.

CONTROL VARIABLES. I rely on a variety of data sources to construct additional variables, including gender, discipline, and multiple control variables. The gender of respondents is, in most cases, evident from an examination of first names. In ambiguous cases, I determine gender from a question on the Web-based survey or from Internet searches (which yielded pictures or short biographical sketches that used gender-specific pronouns). I use *university and department Web sites, guides to graduate programs, dissertation abstracts,* and *professional association membership directories* to determine each scholar's discipline, Ph.D.-granting institution, professional age (current year minus year of Ph.D. receipt),[11] and current institutional type (public or private). To control for salary compression, I calculate the number of years scholars have been at their current institutions from data available on CVs (which were uploaded by survey respondents or found online) and faculty members' Web sites. To handle unmeasured heterogeneity that remains even within Research I universities, I control for department prestige of individuals' current and Ph.D.-granting institutions, obtained from the National Research Council (Goldberger, Maher, and Flattau 1995). Data needed to construct additional control variables (e.g., marital and parent status and receipt of external funding) were obtained from the Web-based survey and CVs. For the subanalysis of areas of specialization, I construct measures of subfield characteristics including productivity (the relative percentage of articles in my sample that were published in each subfield) and prestige (the number of times each subfield was represented in its respective discipline's top journal—*ASR* and *AJS* for sociology; *Language* for linguistics—in 2000).

ANALYTIC STRATEGY

To assess whether visibility and the extent of research specialization affect faculty salary, especially how they may mediate the effect of gender, I use simultaneous equation modeling, also known as path analysis (Bollen 1989). This statistical method is ideal given that 1) the endogenous variables of interest (productivity, visibility, specialization, and ultimately, salary) are continuous, and 2) I am interested in not only the direct effects of gender on salary, but the indirect effects that gender might have *through* specialization and other variables like productivity. This process-oriented, theoretically-specified approach examines each part of the chain separately, thereby yielding greater understanding (Lieberson 1992:8) than the standard single-equation model of salary differentials (depicted in Figure 1, Panel A). The standard model, which serves as a baseline for my modeling efforts, is true to economic and many sociological accounts of earnings differences once I control for structural influences via sampling design (i.e., only sampling Research I universities) and control statistically for other contextual influences, such as discipline and department prestige. To the standard model I add my key constructs—visibility and the extent of research specialization—and specify their various mediating effects. I also estimate separate models for linguistics and sociology to assess disciplinary differences in the hypothesized pathways, and in these models I examine the influence of area as well as the extent of research specialization.

To estimate the models, I use the statistical package AMOS. Rather than deleting data in a

[10] The correlation between self-reported and employer-provided salaries is .89.

[11] Controlling for professional age is necessary given the gendered age structure in academia that resulted from women's more recent entrance into the profession (National Research Council 2001:130). I present results using professional age rather than a highly correlated proxy, academic rank, for theoretical reasons and to improve model parsimony. Previous research has found that adding academic rank to salary models produces conservative estimates of discrimination (Ferree and McQuillan 1998) because rank is a gender-biased variable that itself captures gender discrimination (Alessio 1999; Hoffman 1976; Long, Allison, and McGinnis 1993).

listwise fashion, which is the default strategy in most statistical packages, AMOS relies on a full information maximum likelihood estimation procedure. This strategy permits the inclusion of all available data (Anderson 1957) and bypasses the need to impute data, which is ideal given that sophisticated multiple-imputation procedures are difficult to combine with simultaneous equation models. The models I present assume linear relationships between the variables of interest; experimenting with the functional form (by including, for example, specialization squared) does not improve model fit. I do not present the effect of control variables that fail to reach statistical significance in all the specified models, including prestige of Ph.D.-granting institution, marital history/status, and the presence and number of children.[12] Given that the measures of salary, visibility, and productivity are logged, direct paths between them (β_{yx}) can be interpreted as the elasticity of Y with respect to X, in which a 1 percent rate of change in the explanatory variable, X, produces a β percent rate of change in the endogenous variable, Y.

RESULTS

I find significant bivariate differences between gender and each of the key endogenous variables of interest: the extent of research specialization, research productivity, visibility, and academic salary (see Table 1). Whether specialization is calculated using the detailed major descriptors (making scholars appear rather diverse, as indicated by the negative values), the broad classification codes (perhaps making most scholars appear more specialized), or the broader classification code families, women's research programs are significantly *less* specialized than men's, as hypothesized. Consistent with previous research, women publish less than men (they have six fewer publications on average, whether the count includes articles, or articles and books) and earn about $13,000 per year less than men, on average (not controlling for professional age or academic rank). Contrary to some prior research from other disciplines (Long 1990), but consistent with findings from sociology (Ferber 1986, 1988; Grant and Ward 1991), men's research is cited more than women's; however this may not be the case when I control for the number of publications in subsequent multivariate analyses. Men are also advantaged in terms of book-based visibility, as they receive more book awards and book reviews in prestigious journals compared to women.

The standard model of earnings for academic scientists—which includes research productivity, gender, and all control variables—is presented in Table 2, Model 1. According to many goodness-of-fit statistics used for testing simultaneous equation models, this model does not fit the data well: the TLI (Tucker-Lewis Index), IFI (Incremental Fit Index), and 1-RMSEA (Root Mean Square Error of Approximation) indices are surprisingly far from their ideal values of one. For this reason, I interpret coefficients cautiously. As might be expected, women and younger scholars are less productive in terms of research, and productivity improves earnings. Most of the variables used to explain variation in salary in previous studies are statistically significant and in the expected direction, and combined they eliminate the statistically significant bivariate relationship that exists between gender and salary. Although the importance of these control variables should not be overlooked (as productivity alone is not sufficient to remove gender's effect on salary, and together the control variables account for 50 percent of the variation in salary), my focus here is on the constructs of visibility and specialization and how they mediate the traditionally specified relationships between gender, productivity, and earnings.

Adding citation counts as a measure of visibility and specifying mediating effects improves the model considerably—the TLI, IFI, and 1-RMSEA values increase toward their ideal maximum of one—but the model still fits the data poorly (see Table 2, Model 2). Interpreting coefficients with caution, I find that visibility is a significant part of the process: men produce more, productivity increases visibility, and visibility increases salary. Specifically, a 1 per-

[12] Although I was careful to ask about "the number of children you have helped raise in your household," which could include biological, adopted, and stepchildren, more detailed information, perhaps on timing of child-bearing (Fox 2005), may be needed to completely understand the impact of children on salary.

Table 1. Bivariate Relationships Between Gender and Endogenous Variables

	Men	Women
SPECIALIZATION		
Extent of Research Specialization: Major Descriptors		
mean	–2.43***	–2.86***
median	–2.25	–2.73
SD	1.29	1.34
Extent of Research Specialization: Classification Codes		
mean	.40*	.35*
median	.5	.42
SD	.34	.34
Extent of Research Specialization: Classification Code Families		
mean	.49*	.43*
median	.58	.5
SD	.33	.34
PRODUCTIVITY		
Cumulative Number of Journal Articles		
mean	15.6***	9.5***
median	12.0	7.0
SD	13.5	8.15
Cumulative Number of Publications (articles plus books)		
mean	16.9***	10.3***
median	13.5	8.0
SD	14.8	9.0
VISIBILITY		
Cumulative Number of Citations to Journal Publications		
mean	202.7***	85.4***
median	54	23
SD	412.6	175.7
Number of Book Awards		
mean	2.6*	1.3*
median	0	0
SD	.8	.4
Number of Book Reviews in Top Journals		
mean	1.8*	1.3*
median	1	1
SD	2.5	1.4
SALARY		
2003–04 Academic Year Salary, in Dollars		
mean	85,002***	71,776***
median	75,000	65,000
SD	29,436	22,985
Subsample Size	255	162

Note: Significant group differences are indicated by * $p \leq .05$; ** $p < .01$; *** $p \leq .001$ (one-tailed tests).

cent increase in productivity produces a 2 percent increase in citations, and a 10 percent increase in citations produces almost a half of a percent (.4 percent) increase in earnings. Gender continues to have a significant and direct effect on productivity, but not on salary. This model, which incorporates a measure of visibility, wipes out the statistically significant relationship between productivity and salary that is apparent in Model 1. Human capital theory focuses on productivity, but in the "reputational work organizations" (Whitley 2000) of academia, visibility appears to be a stronger and more proximate predictor of salary levels than productivity itself.

Adding the extent of research specialization in addition to visibility provides the best-fitting model (see Table 2, Model 3). The TLI, IFI, and 1-RMSEA are much closer to their ideal value of one (.85, .96, and .80 respectively).

Table 2. The Mediating Effects of Visibility and Specialization on the Relationship Between Gender and Salary: Unstandardized Regression Coefficients and Standard Errors

	Model 1 Standard Model		Model 2 with Visibility		Model 3 with Specialization	
	Coef.	SE	Coef.	SE	Coef.	SE
Effects on Salary						
VISIBILITY (cumulative # citations)	—	—	.04***	.01	.04***	.01
GENDER (female = 1)	–.03	.02	–.03	.02	–.03	.02
PRODUCTIVITY (cumulative # articles)	.08***	.02	.01	.02	.02	.02
Field (sociology = 1)	.15***	.03	.11***	.03	.11***	.03
Professional age (years since Ph.D.)	.020***	.003	.02***	.00	.02***	.00
Public institution (yes = 1)	–.09***	.03	–.09***	.03	–.09***	.03
Department prestige ranking	–.01***	.00	–.01***	.00	–.01***	.00
Number years at current institution	–.01***	.00	–.01***	.00	–.01**	.00
External funding (yes = 1)	.05	.03	.04	.03	.04	.03
Constant	10.92***	.05	10.95***	.05	10.95***	.05
R^2	.50		.51		.51	
Effects on Visibility						
SPECIALIZATION (using MDs)	—	—	—	—	–.13*	.06
PRODUCTIVITY (cumulative # articles)	—	—	1.78***	.07	1.89***	.09
Constant	—	—	–.40***	.17	–.99***	.33
R^2	—		.60		.61	
Effects on Productivity						
SPECIALIZATION (using MDs)	—	—	—	—	.39***	.03
GENDER (female = 1)	–.40***	.09	–.44***	.09	–.25***	.09
Constant	2.35***	.06	2.32***	.06	3.28***	.09
R^2	.05		.05		.35	
Effects on Specialization						
GENDER (female = 1)	—	—	—	—	–.48***	.14
Constant	—	—	—	—	–2.45***	.08
R^2	—		—		.03	
Chi-square Test Statistic (T)	2005.5		1124.3		376.1	
Degrees of Freedom	27		24		20	
Tucker-Lewis Index (ideal = 1)	.40		.62		.85	
Incremental Fit Index (ideal = 1)	.76		.86		.96	
1-RMSEA (ideal = 1)	.6		.7		.8	
N	418		418		418	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed tests except for all hypothesized pathways [in CAPS]).

Results from this final model are also presented in Figure 2. I only include the hypothesized paths that are statistically significant *and* in the hypothesized direction. The largest and most significant pathway by which gender affects salary is as follows: women specialize less than men, specialization increases productivity, and productivity boosts visibility, which in turn enhances salary. By pursuing diverse rather than specialized research programs, women are not producing as much,[13] and by producing less they are not as visible, and this takes a toll on their salary. These processes operate even after controlling for various institutional-, departmental-, and individual-level characteristics. Contrary to expectations, however, I find that

[13] Adding specialization in Model 3 helps explain 30 percent of the variation in productivity and reduces the magnitude of the gender coefficient by 40 percent. Gender differences remain, likely because I have not controlled for all relevant structural characteristics, such as social networks, research assistance, hours devoted to teaching, service, and mentoring, as well as marriage type, all of which help explain women's tendency to produce less (Fox 2005; Tolbert 1986; Xie and Shauman 1998).

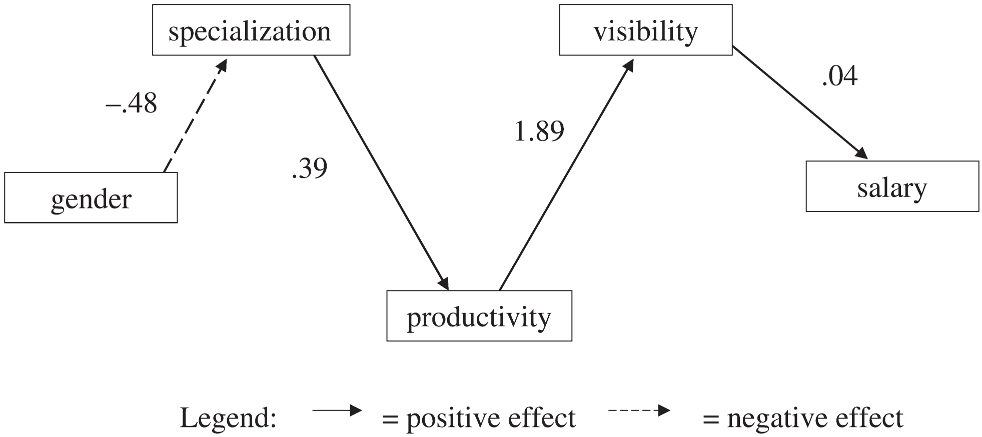

Figure 2. Significant Hypothesized Pathways from Table 3, Model 3 (Best-Fitting Model)
Note: Figure reports unstandardized effects.

specializing does not increase visibility, at least directly (the coefficient is actually negative and significant): it is only through increased productivity that specializing boosts visibility (the total effect of specialization on visibility *is* positive). The surprising negative effect of specialization on visibility cannot be attributed to either subfield productivity or subfield prestige: although scholars in prestigious subfields are less likely to specialize, neither subfield prestige nor productivity is significantly related to visibility at the 10 percent level (results not shown).

The main pathway by which gender affects earnings is robust to alternative measures and subsamples. When I use the number of publications (articles and books) or a coauthor-weighted count of journal articles to tap productivity, and the number of book awards or book reviews in top journals to tap visibility, the primary pathway of direct effects remains statistically significant (see Table 3, Models 3a to 3d), with the exception that the number of reviews published on a scholar's book(s) does not significantly impact earnings, likely because reviews can bring negative as well as positive visibility. The unexpected negative effect of specialization on visibility from Model 3 is the only result not robust to these alternative measures, and this is supported by additional analyses. If specialization *did* reduce visibility, we might suspect that specialists are productive and visible only in small, specialized niches rather than their larger "home" disciplines. However, specialists are no less likely to publish in "home" journals (i.e., journals with "soc" in the title for sociologists and "ling" or "lang" in the title for linguists), and their articles published in such journals do not garner a disproportionate share of their total citations. The results depicted in Figure 2 are also robust to more restrictive subsamples, as when I exclude scholars with three or fewer publications, and when I remove demographers and criminologists—whose productivity is underrepresented in SA[14]—from the subset of sociologists.

The implicit causal ordering specified in the models above holds up to additional empirical scrutiny. I conducted supplemental analyses that restrict the cumulative publication count to articles published before 1996 and citation counts to the years 1996 to 2004, and the results

[14] As suggested by a reviewer, I compared articles gleaned from CVs and articles obtained from the relevant discipline-specific electronic database (SA or LLBA) for 20 randomly selected scholars. For both fields, articles culled from CVs were four years older, on average (clearly an artifact of the databases' floors, before which articles are not indexed). In sociology, articles published by criminologists and demographers were underrepresented in SA—suggesting that my measures underreport their productivity. In Linguistics, there were few systematic omissions from LLBA, at least by substantive topic. It was mostly journals from other regions ("Journal of Arab Affairs") and disciplines (philosophy, geography, cultural studies, education) that were not included in LLBA.

Table 3. Respecification of Model 3 Using Alternative Measures of Specialization, Productivity, and Visibility: Unstandardized Coefficients for Hypothesized Pathways

	Model 3†	Model 3a	Model 3b	Model 3c	Model 3d	Model 3e	Model 3f	Model 3g	Model 3h
		Alternative Measure(s) Used:							
Specialization:	Major Descriptors					Relative to Theoretical Distribution	Relative to Empirical Distribution	Classification Codes	Classification Code Families
Productivity:	ln (# articles)	ln (# articles + # books)	ln (# articles + # books)	ln (# articles + # books)	ln (# articles weighted by authorship)				
Visibility:	ln (# cites)		receipt of book award	# book reviews in top journal					
Effects on Salary									
Visibility	.04***	.04***	.11*	.01	.04***	.04***	.04***	.04***	.04***
Gender	–.03	–.03	–.04	–.04	–.03	–.03	–.03	–.03	–.03
Productivity	.02	.02	.05**	.05**	.01	.01	.02	.02	.02
Effects on Visibility									
Specialization	–.13*	–.09	–.03*	–.43	–.07	–1.17*	–.02	–.34	–.27
Productivity	1.89***	1.06***	.05**	1.21***	1.76***	1.89***	1.78***	1.86***	1.85***
Effects on Productivity									
Specialization	.39***	.64***	.64***	.64***	.40***	3.30*	.03*	1.79***	1.99***
Gender	–.25***	–.18*	–.18*	–.18*	–.25***	–.28**	–.43**	–.33**	–.29**
Effects on Specialization									
Gender	–.48***	–.54***	–.54**	–.54**	–.48**	–.05**	–.49*	–.06*	–.08*
Sample Size	418	418	418	418	418	418	418	418	418

† This column is from Table 2, for reference.
Note: Although all control variables were included in each model, I only present results for hypothesized effects.
* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (one-tailed tests).

are robust to this change, suggesting that productivity does influence visibility. To temper endogeneity concerns regarding the relationship between specialization and productivity, I respecify the best-fitting model in several ways. First, the extent of specialization measure is recalculated by basing it only on articles published before the year 2000, and total productivity is calculated during a limited and later interval (2000 to 2004). Results are robust to this change. Second, even when I allow for a reciprocal effect between specialization and productivity (which is possible in path analysis), the direction and significance of specialization's effect on productivity do not change. Third, and perhaps most critically, I devised two alternative measures of specialization that are purged of productivity's influence. The positive correlation between specialization and productivity (.47) may very well be tapping a real relationship; however, the maximum specialization score one can obtain depends on the number of articles produced.[15] To account for this potential artifact, I calculate two relative measures of specialization: 1) I compare each scholar's absolute specialization score (described in the Appendix) to the *theoretically* possible value of specialization for *his or her productivity level,* and I use the resultant percentile value; and 2) I compare each scholar's absolute specialization score to the *empirical* distribution for his or her productivity level, capturing where, in percentile terms, the scholar falls relative to others in the sample with the same productivity level. Alternatively substituting in these two measures (see Table 3, Models 3e and 3f) does not alter the main substantive findings from the best-fitting model that are depicted in Model 3 and Figure 2.

The primary pathway by which gender affects earnings holds for each discipline, however, some differences are apparent. To compare disciplines, I use standardized coefficients and the more comprehensive measure of productivity that includes books as well as articles, because a larger percentage of linguists (65 percent) than sociologists (55 percent) has book publishing experience. Gender differences (see Table 4, Models 4a and 5a) are more pronounced in sociology than in linguistics: gender's negative effect on specialization (–.26) reaches a higher level of statistical significance and is double the size of the comparable effect in linguistics (–.13); and gender's negative effect on productivity and earnings is only apparent in sociology, not linguistics. More importantly, the nonrobust direct effect of specialization on visibility is, as initially hypothesized, *positive*—but only for sociology. Specialization's *total* effect on earnings is still positive in both fields, but the effect is slightly stronger in sociology (.22 in sociology versus .18 in linguistics). Even though I am less successful in explaining variance in visibility for linguists ($R^2_{sociology} = .59$, $R^2_{linguistics} = .37$), visibility is a stronger predictor of earnings for linguists than it is for sociologists: the standardized total effect of visibility on earnings is .13 in sociology and .33 in linguistics.

I also conducted a variety of supplemental analyses to help delineate *why* women specialize less than men in both disciplines. Women may specialize in areas with greater differentiation and breadth (i.e., more subcodes)—but when the extent of specialization is calculated using keywords at three levels of specificity (even the classification code families that collapse all subcodes), the results are robust (see Table 3, Models 3g and 3h), suggesting that the breadth of women's areas does not explain their propensity to specialize less than men. Or perhaps women work in smaller or less productive subfields, or in less valued, female-dominated subfields, which encourages them to branch out. To assess this possibility, I determine the modal specialty area (classification code) for each scholar and each area's productivity and prestige. Only in sociology do men and women tend to have different modal interests: women are likely to specialize in education and the family, whereas men tend to specialize in religion and intergroup relations. This is not the case in linguistics, where women's two most popular modal areas (phonology and syntax) are the same as men's. To the discipline-specific models (Table 4, Models 4a and 5a), I add binary variables for these subfields (as well as "sociology of gender," which previous research has found to be female-dominated [Ward and Grant

[15] For example, if two scholars have each studied one research area, the scholar with 10 publications on that topic will look more specialized (1 – [1/10] = .9) than the scholar with five publications on that topic (1– [1/5] = .8).

Table 4. Disciplinary Differences: Standardized Regression Coefficients and Standard Errors

	Model 3a Full Sample†	Model 4a Linguists	Model 5a Sociologists
	Std. Coef.	Std. Coef.	Std. Coef.
Effects on Salary			
Visibility (cumulative # citations)	.26***	.33**	.13*
Gender (female = 1)	–.05	.03	–.10
Productivity (cumulative # publications)	.09	.03	.20*
R^2	.50	.46	.60
Effects on Visibility			
Specialization (using MDs)	–.06	–.05	.26**
Productivity (cumulative # publications)	.71***	.64**	.56***
R^2	.61	.37	.59
Effects on Productivity			
Specialization (using MDs)	.75***	.83***	.67***
Gender (female = 1)	–.06*	.02	–.11*
R^2	.35	.69	.50
Effects on Specialization			
Gender (female = 1)	–.16***	–.13	–.26**
R^2	.03	.02	.07
Chi-square Test Statistic (T)	345.3	92.65	126.50
Degrees of Freedom	20	17	17
Tucker-Lewis Index (ideal = 1)	.86	.93	.91
Incremental Fit Index (ideal = 1)	.96	.98	.97
1-RMSEA (ideal = 1)	.82	.86	.83
N	418	222	196

† This column is Model 3a from Table 3, for reference, but here coefficients are standardized.
* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (one-tailed tests).

1995]) and variables tapping subfield productivity and prestige, allowing each to mediate the relationship between gender and the extent of specialization. Interestingly, however, not one of these variables is able to explain women's lower degree of specialization. Even though specializing in a prestigious subfield discourages specialization, women are not more likely than men to specialize in prestigious areas (results not shown). Finally, I explored the possibility that women specialize less than men because they are more likely to hold joint appointments, and thus need to publish widely to please two departments; however, this is not supported in my statistical models.[16]

DISCUSSION

Why do some individuals earn more than others? When academic fields were small and homogenous, researchers primarily relied on productivity to explain earnings differentials. As academic fields grew and diversified demographically with the influx of women and minorities, sociologists began accounting for important structural influences on earnings, such as institutional type and prestige. And now, as we recognize that a large degree of specialization has accompanied scientific progress (Blau 1994), I find that other factors are relevant, too. Even after accounting for productivity and various structural influences (discipline, department prestige, university type), I find

[16] I thank a reviewer for suggesting this intuitive possibility. Even if women are no more likely than men to hold joint appointments, their work may still be more interdisciplinary in nature. If this is the case, women's degree of specialization is likely overestimated, given the disciplinary nature of journals indexed in CSA databases, unless women's articles in non-CSA journals are on the same topics as their articles published in CSA journals.

that a typically neglected variable (visibility) and a heretofore unconceptualized variable (the extent of research specialization) play significant roles in the process by which earnings are determined. Specifically, specializing increases productivity (and for sociologists, visibility as well), productivity increases visibility, and visibility boosts earnings. Productivity is not, as human capital theorists like to think, the prime driver of earnings. In fact, at least in the academic realm studied here, only visibility has a direct effect on salary; productivity is a less proximate cause. These results are robust to a variety of alternative measures, subsamples, and model specifications.

These findings shed light on one of the most persistent dimensions of earnings inequality: the gender dimension (Fox 1981). Despite major legislative gains since the early 1970s, gender differences in salary persist not only between occupations (Kilbourne et al. 1994) but also within them (Bernhardt, Morris, and Handcock 1995), even in ostensibly meritocratic and universalistic fields like academic science (Merton 1949). Previous research by economists and sociologists has explained a large portion of the gender difference in earnings; indeed, the $13,000 difference between men and women's salaries in my sample of linguists and sociologists (evident in Table 1) is easily explained (that is, rendered statistically insignificant) by including research productivity as well as contextual variables culled from previous studies. My research adds an understanding of *how* gender, productivity, and salary are related. Why do women produce less than men? Largely because they do not specialize as much. Why do women earn less than men? Largely because they are not as visible in their scholarly communities. Visibility and the extent of research specialization are critical to a complete understanding of why female academics earn less than their male counterparts.

All of the hypothesized effects are statistically significant and in the expected direction, except for one: specialization's effect on visibility. This effect is not robust; its significance depends on the measure used and its direction depends on the subsample analyzed. As hypothesized, specializing does increase visibility, but only for sociologists. Although the total (direct plus indirect) effect of specialization on the ultimate outcome—earnings—is positive regardless of the measure or subsample used, the link between specialization and visibility should be explored further. With my data, I am able to determine that specialists in sociology are no more likely to publish in general, home-discipline journals and do not publish in a wider variety of journals—two factors that might have explained specialization's positive effect on visibility in that field. In sociology, perhaps specialists' work is more visible to colleagues in the same specialty than to colleagues outside it, and tight circles of mutual "referring" enhance visibility within a subfield and eventually broader fields. Linguistics' stronger core, however, may encourage even specialists to be aware of work going on in other subfields and fields—as Cole and Cole (1973) found in physics—such that specialists are cited just as frequently as non-specialists. Future research could explore whether specialization affects not only cumulative visibility (as tapped here), but also the speed with which authors' ideas become known to the scientific community (van Dalen and Henkens 2005).

Although my primary interest is the extent of specialization, I highlight the strong and robust effect that scholarly visibility has on earnings, especially for linguists. In fact, at least in the academic disciplines studied here, visibility trumps human capital theory's main explanation—productivity—for gender differences in salary. More accurately, we can conceive of productivity as more of a root cause (itself affected by specialization and gender) and visibility as more of a proximate cause of earnings differentials. Although reputation might be difficult to assess in anything but a rather crude way that distinguishes the best from the rest, a hierarchy based on reputation pervades every scientific field (Andersen 2000) and is clearly consequential for earnings. Assessing the monetary value of academic work, like other creative products (Beckert and Rossel 2004), is extremely difficult, so administrators and department heads reduce the uncertainty inherent in this task by taking visibility into account. My findings suggest that future studies of academic earnings should no longer neglect this key construct.

While previous research has found that specialty areas shape collaboration patterns (Moody 2004), publication outlet (Karides et al. 2001), and visibility (Ward et al. 1992), my data suggest that specialty areas do not help explain one of my key findings: that women specialize less than men. Indeed, neither binary variables capturing subfields nor variables capturing subfield characteristics such as productivity and prestige significantly mediate the relationship between gender and the extent of specialization. Perhaps women's propensity to specialize less than men is related to the quantity and types of their collaborative relationships, especially their embeddedness in advisor-based networks (Burt 1998; Kanter 1977), their tendency to follow a "niche approach" by creating their own areas of expertise (Sonnert and Holton 1995), or their views about what specializing implies: women may diversify because they think it demonstrates scholarly breadth, whereas men specialize because they think diversification indicates a failure to excel in one area (Zuckerman et al. 2003). Future studies intent on pursuing the link between gender and the extent of specialization should ideally gather a sufficient number of cases in each specialty area and collect data on scholarly networks, niche approaches, and views about what it means to specialize.

Importantly, my findings about specialization's positive effects on scholars' career outcomes cannot, and should not, be extended to other levels of analysis. My focus is specialization in individual scholars' research programs, not individual research papers or scientific fields as a whole. Specialized research *papers* may not reap the same benefits. In fact, boundaries between subfields are somewhat permeable (Stinchcombe 1994; Zuckerman et al. 2003) and my concurrent research suggests that papers that cannot be easily classified into one subfield are most likely to reap long-term benefits such as high citation counts (Leahey 2007). Increased specialization may also be disadvantageous for scientific fields more generally (Blau 1994; Calhoun 1992; Collins 1994; Davis 1994; Stinchcombe 1994; Turner and Turner 1990). We need more empirical evidence to assess whether specialization serves as a bedrock for more advanced, creative work or whether it signifies narrow, anti-intellectual trends (Abbott 2001; Dogan and Pahre 1989a, 1990; Foucault 1977; Kuhn 1977; Wagner-Dobler 1997). In this study, my goal was to examine individuals and their career outcomes to test hypotheses about gender differences in salary, but it may also serve as a foundation for evaluations of specialization trends in science more generally.

Further research is needed to validate, extend, refine, and assess the generalizability of the comprehensive model of earnings inequality that I put forward here. To the extent that sociology and linguistics are representative of their disciplinary types, I feel comfortable making claims about social scientific and humanities disciplines in academia. But extending this analysis to other fields in academia, particularly those in the natural and life sciences, is crucial, for in more capital-intensive and equipment-reliant bench sciences, specialization may operate quite differently. To construct a more general theory of how the extent of specialization alters or maintains gendered earnings patterns, it is also imperative to investigate nonacademic fields of work. The most difficult aspect of this effort will be developing ways to measure the extent of specialization in such fields. Tam (1997) was able to tap something similar—"specialized training"—using national survey data on a sample of employees in various fields, but the amount of time spent investing in job-specific, nontransferable skills is not equivalent to the construct of interest to me, which concerns the diversity or homogeneity of a person's work output. For lawyers, the extent of specialization may be assessed from their distribution of effort across types of law (e.g., family, criminal, tax, patent). For artists, it may be a function of the types of media they employ or the types of art they produce (e.g., oil, sculpture, charcoal). For business people, I can imagine a relative measure of specialization that assesses the degree to which one's job description is unique within the firm; though differences between this (possibly less portable) kind of specialization and specialization in academics' research programs may have important implications for the theory.

Knowing that visibility and specialization are critical to earnings inequality, especially along gender lines, has both applied and theoretical implications. Practically, it should help individuals chart their careers and help institutions devise strategies for ameliorating gender inequality in academia. Theoretically, my findings stand on a strong foundation of earlier work. Because the two key variables in my analysis—visibility and the extent of research specialization—serve as intervening rather than extraneous variables, the results of previous studies cannot be discounted, only illuminated. Productivity is part of the process, but alone it is not enough to explain earnings inequality. My findings, when paired with sociological accounts of structural influences on academic careers, provide a thorough, if complex, understanding of earnings disparity in academia. Combined, they contribute to a more process-oriented understanding and help answer the questions "how?" and "through what means?" These results suggest multiple avenues for future research on the mechanisms involved in creating and maintaining inequality, especially as academic fields continue to struggle with the perceived tension between individual specialization and broader interdisciplinary trends.

***Erin Leahey** is Assistant Professor of sociology at the University of Arizona. Her research examines the relationships among research methods and practice, scientific fields, and inequality. She has published articles on how professional status affects statistical significance testing (*Social Forces *2005) and data editing (*Sociological Methods and Research *2003), on mixed methods (*Social Science Research *2007), and on gender differences in productivity (*Gender & Society *2006). She is currently examining differences in the reception of subfield-specific and subfield-spanning research to understand one way by which innovative work is produced.*

APPENDIX

Table A. Construction of the Extent of Specialization Measure

Panel A. Publication-level information used to construct the measure

Underlined keyword descriptors are those that are new to the scholar's research program. Sociologist #1, who first began publishing in 1996, has the most diverse research program, covering seven unique subfields within sociology over the course of nine publications. Sociologist #3, who entered the field in 1984, has the most specialized research program, covering only two subfields (group processes and social network analysis) in his 12 publications since that time. Sociologist #2 has also only published in two subfields (occupations and professions and sociology of gender) but is professionally younger and has fewer publications, and thus his specialization score is not as high as that of Sociologist #3.

Year	Publication Outlet	Classification Code #1	Classification Code #2
<u>Hypothetical Sociologist #1</u>			
1996	Journal of Marriage and the Family	<u>1941</u>: sociology of the family	<u>1636</u>: sociology of law
1997	Social Science Research	1941: sociology of the family	
1997	Sociological Forum	1636: sociology of law	
1998	Deviant Behavior	<u>2151</u>: juvenile delinquency	
1999	Social Forces	2151: juvenile delinquency	
2000	Law and Society	1636: sociology of law	
2001	American Journal of Sociology	<u>2148</u>: social work	<u>2190</u>: family violence
2001	Sociological Inquiry	2151: juvenile delinquency	
2002	Gender and Society	<u>2983</u>: sociology of gender	
2003	Journal of Marriage and the Family	1941: sociology of the family	
2003	Law and Society	1636: sociology of law	
2004	American Sociological Review	1636: sociology of law	<u>1939</u>: adolescence and youth
<u>Hypothetical Sociologist #2</u>			
2001	Research in Stratification and Mobility	<u>1020</u>: occupations and professions	
2002	Sociology	1020: occupations and professions	
2003	Work and Occupations	1020: occupations and professions	
2003	Gender and Society	1020: occupations and professions	<u>2983</u>: sociology of gender
2004	Social Forces	2983: sociology of gender	
<u>Hypothetical Sociologist #3</u>			
1984	Advances in Group Processes	<u>0309</u>: group processes	
1985	Social Psychology Quarterly	0309: group processes	
1986	Sociological Perspectives	0309: group processes	
1986	Social Forces	0309: group processes	<u>0665</u>: social network analysis
1987	American Sociological Review	0309: group processes	

(Continued on next page)

Table A. *(Continued)*

Year	Publication Outlet	Classification Code #1	Classification Code #2
1988	Social Networks	0665: social network analysis	
1990	Social Networks	0665: social network analysis	
1991	Social Psychology Quarterly	0309: group processes	
1994	Annual Review of Sociology	0309: group processes	0665: social network analysis
1995	Sociological Methodology	0665: social network analysis	
1998	American Journal of Sociology	0665: social network analysis	0309: group processes
2001	Sociological Methods and Research	0665: social network analysis	

Panel B. Measure used in analyses

Because articles receive at the most two classification codes that describe their content, the measure has a minimum value of "–1" for scholars who pursue a new subfield with each publication (e.g., [1 – (2/1)] = –1) and a maximum value close to "1" for scholars who publish repeatedly on the same topic (e.g., [1 – (1/12)] = .92). The same range holds for the specialization measure when it is derived from classification code families. However, because each article can have up to nine major descriptors, and the major descriptors tap relatively narrow subjects, the number of unique major descriptors is typically much greater than the number of cumulative publications. Thus, when the specialization score is calculated using major descriptors, values less than –1 are common. Note that I always weight coauthored and single-authored pieces equally, as Wagner-Dobler (1997) and others have, because whether one worked on a piece alone or in collaboration with others should not diminish or enhance the prominence of that subfield in one's research program.

	#CCs	#PUBS	1 – (#CCs / #PUBS)
	the cumulative number of *unique* classification codes	the cumulative number of publications	extent of specialization measure
Sociologist #1	7	9	.22
Sociologist #2	2	5	.60
Sociologist #3	2	12	.83

REFERENCES

Abbott, Andrew. 1988. *The System of Professions: An Essay on the Division of Expert Labor.* Chicago, IL: University of Chicago Press.

———. 2000. "Reflections on the Future of Sociology." *Contemporary Sociology* 29:296–300.

———. 2001. *Chaos of Disciplines.* Chicago, IL: University of Chicago Press.

Aiken, Linda H. and Douglas M. Sloane. 1997. "Effects of Specialization and Client Differentiation on the Status of Nurses: The Case of AIDS." *Journal of Health and Social Behavior* 38:203–22.

Alessio, John C. 1999. "Using Discriminant Analysis to Predict Professorial Rank by Gender." *Journal of Applied Sociology* 16:123–43.

Alessio, John C. and Julie Andrzejewski. 2000. "Unveiling the Hidden Glass Ceiling: An Analysis of the Cohort Effect Claim." *American Sociological Review* 65:311–15.

Allison, Paul D. and J. Scott Long. 1987. "Interuniversity Mobility of Academic Scientists." *American Sociological Review* 52:643–52.

American Association of University Professors. 2003–04. "Faculty Salary and Faculty Distribution Fact Sheet." Prepared by John W. Curtis, AAUP Director of Research, for the Committee on Women in the Academic Profession (http://www.aaup.org/AAUP/pubsres/research/2003-04factsheet.htm).

———. 2004. "Don't Blame Faculty for High Tuition." The Annual Report on the Economic Status of the Profession. Washington, DC (http://www.aaup.org/AAUP/About/committees/committee+repts/compensation/ecstatreport2003-04/default.htm).

Andersen, Heine. 2000. "Influence and Reputation in the Social Sciences: How Much Do Researchers Agree?" *Journal of Documentation* 56:674–92.

Anderson, T. W. 1957. "Maximum Likelihood Estimates for Multivariate Normal Distribution When Some Observations are Missing." *Journal of the American Statistical Association* 52:200–03.

Barbezat, Debra A. 1987. "Salary Differentials by Sex in the Academic Labor Market." *Journal of Human Resources* 22:422–28.

Bayer, Alan E. and Helen S. Astin. 1975. "Sex Differentials in the Academic Reward System." *Science* 188:796–802.

Beckert, Jens and Jorg Rossel. 2004. "Art and Prices: Reputation as a Mechanism for Reducing Uncertainty in the Art Market." *Kolner Zeitschrift fur Soziologie und Sozialpsychologie* 56:32–50.

Bellas, Marcia L. 1993. "Faculty Salaries: Still a Cost of Being Female?" *Social Science Quarterly* 74:62–75.

———. 1994. "Comparable Worth in Academia: The Effects on Faculty Salaries of the Sex Composition and Labor Market Conditions of Academic Disciplines." *American Sociological Review* 59:807–21.

Ben-David, Joseph and Randall Collins. 1966. "Social Factors in the Origins of New Science: The Case of Psychology." *American Sociological Review* 31:451–65.

Bernhardt, Annette, Martina Morris, and Mark S. Handcock. 1995. "Women's Gains of Men's Losses? A Closer Look at the Shrinking Gender Gap in Earnings." *American Journal of Sociology* 100:302–28.

Birnbaum, Philip H. 1981. "Integration and Specialization in Academic Research." *The Academy of Management Journal* 24:487–503.

Blau, Peter J. 1977. *Inequality and Heterogeneity: A Primitive Theory of Social Structure.* New York: The Free Press.

———. 1994. *The Organization of Academic Work.* New Brunswick, NJ: Transaction.

Bollen, Kenneth. 1989. *Structural Equations with Latent Variables.* New York: Wiley.

Bourdieu, Pierre. 1975. "Scientific Method and the Social Hierarchy of Objects." *Actes de la Recherche en Sciences Sociales* 1:4–6.

Braverman, Harry. 1975. *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century.* New York: Monthly Review Press.

Budig, Michelle J. and Paula England. 2001. "The Wage Penalty for Motherhood." *American Sociological Review* 66:204–55.

Burke, Kathleen, Kevin Duncan, Lisa Krall, and Deborah Spencer. 2005. "Gender Differences in Faculty Pay and Faculty Salary Compression." *Social Science Journal* 42:165–81.

Burt, Ronald. 1998. "The Gender of Social Capital." *Rationality and Society* 10:5–46.

Calhoun, Craig. 1992. "Sociology, Other Disciplines, and the Project of a General Understanding of Social Life." Pp. 137–96 in *Sociology and its Publics,* edited by T. C. Halliday and M. Janowitz. Chicago, IL: The University of Chicago Press.

Cappell, Charles and Thomas M. Gutterbock. 1992. "Visible Colleges: The Social and Conceptual Structure of Scientific Specialties." *American Sociological Review* 57:266–73.

Carnegie Foundation for the Advancement of Teaching. 2001. "The Carnegie Classification of Institutions of Higher Education." Menlo Park, CA: Carnegie Publications.

Chubin, Daryl E., Alan L. Porter, and Margaret E. Boeckmann. 1981. "Career Patterns of Scientists: A Case for Complementary Data." *American Sociological Review* 46:488–96.

Clemens, Elisabeth S., Walter W. Powell, Kris McIlwaine, and Dina Okamoto. 1995. "Careers in Print: Books, Journals, and Scholarly Reputation." *American Journal of Sociology* 101:433–94.

Cole, Jonathan and Stephen Cole. 1973. *Social Stratification in Science.* Chicago, IL: University of Chicago Press.

Cole, Jonathan R. and Harriet Zuckerman. 1984. "The Productivity Puzzle: Persistence and Change in Patterns of Publication of Men and Women Scientists." *Advances in Motivation and Achievement* 2:217–58.

Cole, Stephen. 1983. "The Hierarchy of the Sciences?" *American Journal of Sociology* 89:111–39.

Collins, Harry M. and Robert Evans. 2002. "The Third Wave of Science Studies: Studies of Expertise and Experience." *Social Studies of Science* 32:235–96.

Collins, Randall. 1994. "Why the Social Science Won't Become High-Consensus, Rapid-Discovery Science." *Sociological Forum* 9:155–77.

Danziger, Nira. 1982. "Patterns of Earnings in the Academic System: The Case of Economics." *Sociological Focus* 15:203–17.

Davies, Scott and Neil Guppy. 1997. "Fields of Study, College Selectivity, and Student Inequalities in Higher Education." *Social Forces* 75:1417–38.

Davis, James A. 1994. "What's Wrong with Sociology?" *Sociological Forum* 9:179–97.

Deal, Terrence E. and A. A. Kennedy. 1982. *Corporate Culture: The Rise and Rituals of Corporate Life.* Reading, MA: Addison-Wellesley.

Diamond, Arthur M. 1986. "What is a Citation Worth?" *Journal of Human Resources* 21:200–15.

Dogan, Mattei and Robert Pahre. 1989a. "Fragmentation and Recombination of the Social Sciences." *Studies in Comparative International Development* 24:56–73.

———. 1989b. "Hybrid Fields in the Social Sciences." *International Social Science Journal* 41:457–70.

———. 1990. *Creative Marginality: Innovation at the Intersections of Social Sciences.* Boulder, CO: Westview Press.

Ennis, James G. 1992. "The Social Organization of Sociological Knowledge: Modeling the Intersection of Specialties." *American Sociological Review* 57:259–65.

Etzkowitz, Henry, Carol Kemelgor, Michael Neuschatz, Brian Uzzi, and Joseph Alonzo. 1994. "The Paradox of Critical Mass for Women in Science." *Science* 266:51–54.

Etzkowitz, Henry, Carol Kemelgor, and Brian Uzzi. 2000. "Athena Unbound: The Advancement of

Women in Science and Technology." Cambridge, England: Cambridge University Press.

Faulkner, Wendy, James Fleck, and Robin Williams. 1998. "Exploring Expertise: Issues and Perspectives." Pp. 1–27 in *Exploring Expertise: Issues and Perspectives,* edited by W. Faulkner, J. Fleck, and R. Williams. London, England: Macmillan Press.

Ferber, Marianne. 1986. "Citations: Are They an Objective Measure of Scholarly Merit?" *Signs* 11:381–89.

———. 1988. "Citations and Networking." *Gender & Society* 2:82–89.

Ferree, Myra Marx and Julia McQuillan. 1998. "Gender-Based Pay Gaps: Methodological and Policy Issues in University Salary Studies." *Gender & Society* 12:7–39.

Foucault, Michel. 1977. *Power/Knowledge: Selected Interviews and Other Writings: 1972–1977,* edited by C. Gordon. New York: Random House, Inc.

Fox, Mary Frank. 1981. "Sex, Salary, and Achievement: Reward-Dualism in Academia." *Sociology of Education* 54:71–84.

———. 1983. "Publication Productivity Among Scientists: A Critical Review." *Social Studies of Science* 13:285–305.

———. 1985. "Location, Sex-Typing, and Salary Among Academics." *Work and Occupations* 12:186–205.

———. 1992. "Research, Teaching, and Publication Productivity: Mutuality Versus Competition in Academia." *Sociology of Education* 65:293–305.

———. 2005. "Gender, Family Characteristics, and Publication Productivity Among Scientists." *Social Studies of Science* 35:131–50.

Fox, Mary Frank and Catherine A. Faver. 1985. "Men, Women, and Publication Productivity: Patterns Among Social Work Academics." *The Sociological Quarterly* 26:537–49.

Fox, Mary Frank and Paula E. Stephan. 2001. "Careers of Young Scientists: Preferences, Prospects, and Realities by Gender and Field." *Social Studies of Science* 31:109–22.

Fuller, Rex and Richard Schoenberger. 1991. "The Gender Salary Gap: Do Academic Achievement, Internship Experience, and College Major Make a Difference?" *Social Science Quarterly* 72:715–26.

Garfield, E. 1981. "The 1,000 Contemporary Scientists Most Cited 1965–1978." *Current Contents* 13:5–14.

Gerber, Theodore P. and David Schaefer. 2004. "Horizontal Stratification of College Education in Russia: Temporal Change, Gender Differences, and Labor Market Outcomes." *Sociology of Education* 77:32–59.

Gerhart, Barry. 1990. "Gender Differences in Current and Starting Salaries: The Role of Performance, College Major, and Job Title." *Industrial and Labor Relations Review* 45:418–33.

Gieryn, Thomas F. 1999. *Cultural Boundaries of Science: Credibility on the Line.* Chicago, IL: University of Chicago Press.

Goldberger, Marvin L., Brendan A. Maher, and Pamela Ebert Flattau. 1995. "Research-Doctorate Programs in the United States." Washington, DC: National Academy Press.

Grant, Linda and Kathryn B. Ward. 1991. "Gender and Publishing in Sociology." *Gender & Society* 5:207–23.

Grant, Linda and Kathryn B. Ward. 1993. "Women's Sociological Research and Writing in the Pre-WWII Era as Reflected in Journals." Presented at the American Sociological Association Annual Meeting, Miami, FL.

Grant, Linda, Kathryn B. Ward, and Xue Lan Rong. 1987. "Is There an Association Between Gender and Methods in Sociological Research?" *American Sociological Review* 52:856–62.

Guetzkow, Joshua, Michele Lamont, and Grégoire Mallard. 2004. "What is Originality in the Humanities and the Social Sciences?" *American Sociological Review* 69:190–212.

Haberfeld, Yitchak and Yehouda Shenhav. 1990. "Are Women and Blacks Closing the Gap? Salary Discrimination in American Science During the 1970s and 1980s." *Industrial and Labor Relations Review* 44:38–82.

Hackett, Edward J. 2005. "Essential Tensions: Identity, Control, and Risk in Research." *Social Studies of Science* 35:787–826.

Halliday, Terence C. and Morris Janowitz, eds. 1992. *Sociology and its Publics: The Forms and Fates of Disciplinary Organization.* Chicago, IL: University of Chicago.

Hamermesh, Daniel S., George E. Johnson, and Burton A. Weisbrod. 1982. "Scholarship, Citations, and Salaries: Economic Rewards in Economics." *Southern Journal of Economics* 49:472–81.

Hargens, Lowell. 2000. "Using the Literature: The Social Structure of Scholarship in the Sciences and Humanities." *American Sociological Review* 65:846–65.

Hargens, Lowell L. and Warren O. Hagstrom. 1982. "Scientific Consensus and Academic Status Attainment Patterns." *Sociology of Education* 55:183–96.

Hargens, Lowell L. and H. Schuman. 1990. "Citation Counts and Social Comparisons: Scientists' Use and Evaluation of Citation Index Data." *Social Science Research* 19:205–21.

Hoffman, E. P. 1976. "Faculty Salaries: Is there Discrimination by Sex, Race, and Discipline?" *American Economic Review* 66:196–98.

Horning, Lilli S. 2003. "Equal Rites, Unequal Outcomes: Women in American Research

Universities." New York: Kluwer Academic/Plenum Publishers.
Howell, Frank M. and Deborah Richey Bronson. 1996. "The Journey to Work and Gender Inequality in Earnings: A Cross-Validation Study for the United States." *The Sociological Quarterly* 37:429–47.
Ishida, Hiroshi, Seymour Spilerman, and Kuo-Hsien Su. 1997. "Educational Credentials and Promotion Chances in Japanese and American Organizations." *American Sociological Review* 62:866–82.
Kanter, Rosabeth Moss. 1977. *Men and Women of the Corporation.* New York: Basic Books.
Karides, Marina, Joya Misra, Ivy Kennelly, and Stephanie Moller. 2001. "Representing the Discipline: *Social Problems* Compared to *ASR* and *AJS*." *Social Problems* 48:111–28.
Keith, Bruce, Jenny Sundra Layne, Nicholas Babchuk, and Kurt Johnson. 2002. "The Context of Scientific Achievement: Sex Status, Organizational Environments, and the Timing of Publication on Scholarship Outcomes." *Social Forces* 80:1253–82.
Kilbourne, Barbara Staneck, George Farkas, Kurt Beron, Dorothea Weir, and Paula England. 1994. "Returns to Skill, Compensating Differentials, and Gender Bias: Effects of Occupational Characteristics on the Wages of White Women and Men." *American Journal of Sociology* 100:689–719.
Knorr-Cetina, Karin. 1981. *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science.* New York: Pergamon Press.
Kreft, Ita G. G. and Jan De Leeuw. 1994. "The Gender Gap in Earnings: A Two Way Nested Multiple Regression Analysis with Random Effects." *Sociological Methods and Research* 22:319–41.
Kuhn, Thomas S. 1962. *The Structure of Scientific Revolutions.* Chicago, IL: University of Chicago Press.
———. 1977. *The Essential Tension: Selected Studies in Scientific Tradition and Change.* Chicago, IL: University of Chicago Press.
Lamont, Michele and Virag Molnar. 2002. "The Study of Boundaries in the Social Sciences." *Annual Review of Sociology* 28:164–95.
Langton, Nancy and Jeffrey Pfeffer. 1994. "Paying the Professor: Sources of Salary Variation in Academic Labor Markets." *American Sociological Review* 59:236–56.
Latour, Bruno. 1987. *Science in Action.* Cambridge, MA: Harvard University Press.
Leahey, Erin. 2006. "Gender Differences in Productivity: Research Specialization as a Missing Link." *Gender & Society* 20:754–80.
———. 2007. "Conceptual Metaphors and Empirical Leaps: Measuring Scientific Innovation and its Impact." Department of Sociology, University of Arizona, Tucson, AZ. Unpublished manuscript.
Lee, Jenny J., John Cheslock, Alma Maldonado-Maldonado, and Gary Rhoades. 2005. "Professors as Knowledge Workers in the New, Global Economy." *Higher Education: Handbook of Theory and Research* 20:55–132.
Levin, Sharon G. and Paula E. Stephan. 1989. "Age and Research Productivity of Academic Scientists." *Research in Higher Education* 30:531–49.
———. 1998. "Gender Differences in the Rewards to Publishing in Academe: Science in the 1970s." *Sex Roles* 38:1049–64.
Lieberson, Stanley. 1992. "Einstein, Renoir, and Greeley: Some Thoughts About Evidence in Sociology." *American Economic Review* 57:1–15.
Lin, Nan, Walter M. Ensel, and John C. Vaughn. 1981. "Social Resources and Strength of Ties: Structural Factors in Occupational Status Attainment." *American Sociological Review* 46:393–405.
Long, J. Scott. 1990. "The Origins of Sex Differences in Science." *Social Forces* 68:1297–1315.
———. 1992. "Measures of Sex Differences in Scientific Productivity." *Social Forces* 71:159–78.
Long, J. Scott, Paul Allison, and Robert McGinnis. 1993. "Rank-Advancement in Scientific Careers: Sex Differences and the Effects of Productivity." *American Sociological Review* 58:703–22.
Long, J. Scott and Mary F. Fox. 1995. "Scientific Careers: Universalism and Particularism." *Annual Review of Sociology* 21:45–71.
Long, J. Scott and Robert McGinnis. 1981. "Organizational Context and Scientific Productivity." *American Sociological Review* 46:422–42.
Lutz, Catherine. 1990. "The Erasure of Women's Writings in Sociocultural Anthropology." *American Ethnologist* 17:611–27.
Maume, David J. 2004. "Wage Discrimination Over the Life Course: A Comparison of Explanations." *Social Problems* 51:505–27.
McBrier, Debra Branch. 2003. "Gender and Career Dynamics Within a Segmented Professional Labor Market: The Case of Law Academia." *Social Forces* 81:1201–66.
McElrath, Karen. 1992. "Gender, Career Disruption, and Academic Rewards." *Journal of Higher Education* 63:269–81.
Merton, Robert. 1949. *Social Theory and Social Structure.* Glencoe, IL: The Free Press.
———. 1959. "Priorities in Scientific Discovery: A Chapter in the Sociology of Science." *American Sociological Review* 22:635–59.
Mohanty, Danell Q., Richard D. Dodder, and Thomas A. Karman. 1986. "Faculty Salary Analyses by Region, Rank, and Discipline from 1977–1978 to

1983–1984." *Research in Higher Education* 24:304–17.
Moody, James. 2004. "The Structure of a Social Science Collaboration Network: Disciplinary Cohesion from 1963 to 1999." *American Sociological Review* 69:213–38.
Morgan, Laurie A. 1998. "Glass-Ceiling Effect or Cohort Effect? A Longitudinal Study of the Gender Earnings Gap for Engineers, 1982–1989." *American Sociological Review* 63:479–93.
Morris, Martina and Bruce Western. 1999. "Inequality in Earnings at the Close of the Twentieth Century." *Annual Review of Sociology* 25:623–57.
Mullins, Nicholas C. 1970. *Theory and Theory Groups in Contemporary American Sociology.* New York: Harper and Row.
Najman, Jake M. and Belinda Hewitt. 2003. "The Validity of Publication and Citation Counts for Sociology and Other Selected Disciplines." *Journal of Sociology* 39:62–80.
National Academies of Science, National Academy of Engineering, and Institute of Medicine. 2005. *Facilitating Interdisciplinary Research.* Washington, DC: The National Academies Press.
National Research Council. 2001. *From Scarcity to Visibility: Gender Differences in the Careers of Doctoral Scientists and Engineers,* edited by J. S. Long. Washington, DC: National Academy Press.
Paglin, Morton and Anthony M. Rufolo. 1990. "Heterogeneous Human Capital, Occupational Choice, and Male-Female Earnings Differences." *Journal of Labor Economics* 8:123–44.
Preston, Anne E. 2004. *Leaving Science: Occupational Exits from Scientific Careers.* New York: Russell Sage Foundation.
Price, Derek J. de Solla. 1963. *Little Science, Big Science.* New York: Columbia University Press.
Prpic, Katarina. 2002. "Gender and Productivity Differentials in Science." *Scientometrics* 55:27–58.
Reskin, Barbara. 1977. "Scientific Productivity and the Reward Structure of Science." *American Sociological Review* 42:491–504.
———. 1978. "Scientific Productivity, Sex, and Location in the Institution of Science." *American Journal of Sociology* 83:1235–43.
———. 1979. "Academic Sponsorship and Scientists' Careers." *Sociology of Education* 52:129–46.
———. 2003. "Including Mechanisms in Our Models of Ascriptive Inequality." *American Sociological Review* 68:1–21.
Rhyne, Edwin Hoffman. 1995. "The Identity Crisis of Contemporary Sociology." *Sociological Spectrum* 1:39–54.
Rifkin, William D., James Dow, Donal Carbaugh, Conrad G. Brunk, Doug Brent, Vincent M. Brannigan, and Markku I. Nurminin. 1994. "Who Need Not Be Heard: Deciding Who is Not an Expert." *Technology Studies* 1:60–96.
Rosser, Sue V. 2004. *The Science Glass Ceiling: Academic Women Scientists and the Struggle to Succeed.* New York: Routledge.
Rothausen-Vange, Teresa J., Janet H. Marler, and Patrick M. Wright. 2005. "Research Productivity, Gender, Family, and Tenure in Organization Science Careers." *Sex Roles: A Journal of Research* 53:727.
Sauer, Raymond D. 1988. "Estimates of the Returns to Quality and Coauthorship in Economic Academia." *Journal of Political Economy* 96:855–66.
Schofer, Evan. 2004. "Cross-National Differences in the Expansion of Science, 1970–1990." *Social Forces* 83:215–48.
Simon, H. 1973. "The Structure of Ill-Structured Problems." *Artificial Intelligence* 4:181–201.
Small, Henry G. and Diana Crane. 1979. "Specialties and Disciplines in Science and Social Science: An Examination of Their Structure Using Citation Indexes." *Scientometrics* 1:445–61.
Small, Henry G. and Belver C. Griffith. 1974. "The Structure of Scientific Literatures: Identifying and Graphing Specialties." *Science Studies* 1:445–61.
Smith, Ryan A. 2002. "Race, Gender, and Authority in the Workplace: Theory and Research." *Annual Review of Sociology* 28:509–42.
Smith-Doerr, Laurel. 2004. "Flexibility and Fairness: Effects of the Network Form of Organization on the Gender Equity in Life Science Careers." *Sociological Perspectives* 47:25–54.
Sonnert, Gerhard. 1995. "What Makes a Good Scientist?: Determinants of Peer Evaluation Among Biologists." *Social Studies of Science* 25:35–55.
Sonnert, Gerhard and Gerald Holton. 1995. *Who Succeeds in Science? The Gender Dimension.* New Brunswick, NJ: Rutgers University Press.
Stack, Steven. 2005. "Gender and Scholarly Productivity: 1970–2000." *Sociological Focus* 35:285–96.
Star, Susan Leigh. 1983. "Simplification in Scientific Work." *Social Studies of Science* 13:205–28.
Stinchcombe, Arthur L. 1982. "Should Sociologists Forget Their Fathers and Mothers?" *The American Sociologist* 17:2–11.
———. 1994. "Disintegrated Disciplines and the Future of Sociology." *Sociological Forum* 9:279–91.
Stokes, T. D. and J. A. Hartley. 1989. "Coauthorship, Social Structure, and Influence Within Specialties." *Social Studies of Science* 19:101–25.
Summers, Lawrence. 2005. "Remarks at NBER Conference on Diversifying the Science & Engineering Workforce." http://www.president.harvard.edu/speeches/2005/nber.html.
Tam, Tony. 1997. "Sex Segregation and Occupational

Gender Inequality in the United States." *American Journal of Sociology* 102:1652–92.
Tolbert, Pamela. 1986. "Organizations and Inequality: Sources of Earnings Differences Between Male and Female Faculty." *Sociology of Education* 59:227–35.
Tomaskovic-Devey, Don and Sheryl Skaggs. 2002. "Sex Segregation, Labor Process Organization, and Gender Earnings Inequality." *American Journal of Sociology* 108:102–28.
Turner, Stephen. 2001. "What is the Problem with Experts?" *Social Studies of Science* 31:123–49.
Turner, Stephen Park and Jonathan H. Turner. 1990. *The Impossible Science: An Institutional Analysis of American Sociology.* Newbury Park, CA: Sage Publications.
van Dalen, Hendrik and Kene Henkens. 2005. "Signals in Science: On the Importance of Signaling in Gaining Attention in Science." *Scientometrics* 64:209–33.
Wagner-Dobler, Roland. 1997. "Self-Organization of Scientific Specialization and Diversification: A Quantitative Case Study." *Social Studies of Science* 27:147–70.
Wanner, Richard A., Lionel S. Lewis, and David I. Gregorio. 1981. "Research Productivity in Academia: A Comparative Study of the Sciences, Social Sciences, and Humanities." *Sociology of Education* 54:238–53.
Ward, Kathryn B., Julie Gast, and Linda Grant. 1992. "Visibility and Dissemination of Women's and Men's Sociological Scholarship." *Social Problems* 39:291–98.
Ward, Kathryn B. and Linda Grant. 1985. "The Feminist Critique and a Decade of Research in Sociology Journals." *The Sociological Quarterly* 26:139–57.
———. 1995. "Gender and Academic Publishing." *Higher Education: Handbook of Theory and Research* 11:172–212.
Weeden, Kim A. 2002. "Why Do Some Occupations Pay More Than Others? Social Closure and Earnings Inequality in the United States." *American Journal of Sociology* 108:55–101.
Wegener, Bernd. 1991. "Job Mobility and Social Ties: Social Resources, Prior Job, and Status Attainment." *American Sociological Review* 56:60–71.
Whitley, R. 2000. *The Intellectual and Social Organization of the Sciences.* Oxford, England: Oxford University Press.
Witmer, Diane F., Robert W. Colman, and Sandra Lee Katzman. 1998. "From Paper-and-Pencil to Screen-and-Keyboard: Toward a Methodology for Survey Research on the Internet." Pp. 145–62 in *Doing Internet Research,* edited by S. Jones. Thousand Oaks, CA: Sage Publications.
Xie, Yu and Kimberlee A. Shauman. 1998. "Sex Difference in Research Productivity: New Evidence About an Old Puzzle." *American Sociological Review* 63:847–70.
———. 2003. *Women in Science: Career Processes and Outcomes.* Cambridge, MA: Harvard University Press.
Zuckerman, Ezra W., Tai-Young Kim, Kalinda Ukanwa, and James von Rittmann. 2003. "Robust Identities or Nonentities? Typecasting in the Feature-Film Labor Market." *American Journal of Sociology* 108:1018–74.
Zuckerman, Harriet. 1967. "Nobel Laureates in Science: Patterns of Productivity, Collaboration, and Authorship." *American Sociological Review* 32:391–403.
———. 1977. *Scientific Elite: Nobel Laureates in the United States.* New York: Free Press.
Zuckerman, Harriet, Jonathan R. Cole, and John T. Bruer. 1991. "The Outer Circle: Women in the Scientific Community." New Haven, CT: Yale University Press.