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Who Becomes a Tenured Professor, and Why?

Panel Data Evidence from German Sociology, 1980–2013

Mark Lutter and Martin Schröder

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Abstract

Prior studies that try to explain who gets tenure and why remain inconclusive, especially on whether non-meritocratic factors influence who becomes a professor. On the basis of career and publication data of virtually all sociologists working in German sociology departments, we test how meritocratic factors (academic productivity) as well as non-meritocratic factors (ascription, symbolic, and social capital) influence the chances of getting a permanent professorship in sociology. Our findings show that getting tenure in sociology largely depends on scholarly output, as previous studies have shown. Improving on existing studies, however, we show specifically that each refereed journal article and each monograph increases a sociologist's chance for tenure by 10 to 15 percent, while other publications affect one's likelihood for tenure only marginally and in some cases even negatively. Regarding non-meritocratic factors, we show that network size and individual reputation matter, while international experience and the reputation of one's university do not directly affect the likelihood of tenure. Women need on average 23 to 44 percent fewer publications than men to get their first permanent position as university professor. Thus, all else being equal, they are about 1.4 times more likely to get tenure than men. The article contributes to a better understanding of the role of meritocratic and non-meritocratic factors in achieving scarce and highly competitive job positions.

Zusammenfassung

Bei der Frage, wer eine Professur bekommt, sind sich bisherige Studien insbesondere über den Einfluss nichtmeritokratischer Faktoren unschlüssig. Auf Basis von Lebenslauf- und Publikationsdaten fast aller an soziologischen Instituten in Deutschland beschäftigten Sozialwissenschaftlerinnen und Sozialwissenschaftlern testen wir, wie meritokratische (wissenschaftliche Produktivität) und nichtmeritokratische Faktoren (Askription, symbolisches und soziales Kapital) die Chance beeinflussen, auf eine Soziologieprofessur berufen zu werden. Es zeigt sich, dass eine Berufung vor allem von der Anzahl wissenschaftlicher Publikationen abhängt. Mit jedem referierten Zeitschriftenaufsatz und jeder Buchpublikation steigt die Chance auf eine Berufung um 10 bis 15 Prozent an, während andere Publikationsarten sie nur moderat oder sogar negativ beeinflussen. Unter den nicht-meritokratischen Faktoren zeigen sich insbesondere Netzwerkfaktoren wie auch individuelle Reputation als relevant. Internationale Erfahrung sowie das Prestige der Herkunftsinstitution weisen keine direkten Effekte auf. Frauen, so das weitere Ergebnis der Untersuchung, benötigen im Schnitt 23 bis 44 Prozent weniger Publikationen als Männer, um einen Erstruf zu erhalten. Unter sonst gleichen Faktoren liegt ihre Chance auf eine Professur um das 1,4-fache höher als die ihrer männlichen Kollegen. Insgesamt leistet die Studie einen Beitrag zur Beantwortung der Frage, wie und wie stark meritokratische und nichtmeritokratische Faktoren die Chancen auf sehr knappe, zugleich hoch kompetitive Berufspositionen beeinflussen.

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1 Introduction

Robert Merton (1973: 272f.) posits in his theory on "The Normative Structure of Science" that to "restrict scientific careers on grounds other than lack of competence is to prejudice the furtherance of knowledge." He also claims, however, that such "[u]niversalism is deviously affirmed in theory and suppressed in practice." This article tests whether Merton is right.

Using event history modeling on a unique longitudinal career dataset of an almost complete population of sociologists in the German academic labor market, we test whether and to what extent meritocratic and non-meritocratic factors influence the likelihood of getting a tenured position in German sociology departments. In particular, we test four theoretical approaches, one meritocratic and three non-meritocratic ones. First, theories of human capital suggest that academics get a tenured position through academic performance, as reflected by a strong publication record. Second, theories of ascription highlight that academics may be advantaged or disadvantaged because of ascriptive characteristics, such as their gender. Third, theories of symbolic capital assume that reputation through membership in prestigious institutions, international research experience, or the accumulation of academic awards influences who gets tenure, regardless of academic productivity. Fourth, social capital approaches argue that the chances for tenure increase, again independently of mere productivity, with the number of personal network ties within the academic labor market.

Our study contributes to prior research in several ways. Existing studies mostly rely on surveys and cross-sectional data to explain success in the academic labor market. When these studies use longitudinal information, they generate it through retrospective survey questions (Cruz-Castro/Sanz-Menéndez 2010; Jungbauer-Gans/Gross 2013; Plümper/Schimmelfennig 2007; Möller 2013). Therefore, findings are vulnerable to survey-related biases: response and nonresponse biases due to self-reporting and self-selection, social desirability, recall errors, and problems of endogeneity. Especially survivor biases might occur if studies focus solely on those who already pursued a successful academic

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career. While these studies offer interesting insights into the question of who gets tenure, it is uncertain whether their results remain valid when compared to nonresponsive longitudinal data.

Additionally, the findings of prior research are far from being clear in identifying the factors that actually determine success in academia. While there is consensus that meritocratic factors such as publication output are essential in becoming a professor (Sanz-Menéndez/Cruz-Castro/Alva 2013), results about the exact importance of non-meritocratic factors remain inconsistent (Musselin 2010). As we outline below, most studies postulate effects of social and symbolic capital, but empirical results have been mixed. Gender effects remain contested largely because of possible survivorship biases. For these reasons, existing research urges that "future studies investigating academic careers have to select from PhD cohorts" (Jungbauer-Gans/Gross 2013: 75) or even to follow careers from the earliest stages onwards until scholars have received tenure (Schubert/Engelage 2011: 439, 453). Hence, it is still not clear whether and to what extent non-meritocratic factors determine career success in academia.

Our results show that getting tenure in sociology does indeed depend largely on scholarly output. In addition to previous research, however, we analyze what types of publications affect tenure and to what degree. We also find that several non-meritocratic factors matter. This is partly the case for variables measuring social and symbolic capital. Network size and individual reputation both show significant effects on tenure. Transnational and institutional symbolic capital, however, do not directly affect tenure. With regard to ascriptive characteristics, women have a 40 percent higher chance of being hired as a professor than their male colleagues, holding scholarly publications and all other factors constant.

By integrating and testing several approaches simultaneously on a full population dataset, this article opens the black box of who gets a tenured position in German academia and why. More generally, it aims to contribute to a better understanding of the distinct roles of meritocratic and non-meritocratic factors in achieving scarce and highly desired job positions.

Academia is a labor market that is particularly well suited to study the role of meritocratic and non-meritocratic factors and to understand labor market inequalities in general. Productivity and performance are relatively easy to measure within academia, whereas in fields outside academia, productivity is not a straightforward concept. Thus, when it is argued that cultural capital, social capital, or gender discrimination affect labor market outcomes, it is hard to weigh these arguments against (nonmeasurable) differences in productivity. This is possible in academia, where publications are a widely accepted measure of productivity (Merton 1973: 270; Hix 2004: 296ff.; Long 1978; Long/Allison/McGinnis 1993). For this reason, we think that studying who gets a highly desirable job in academia can shed light on other labor markets, in which productivity is inherently more difficult to measure.

We chose the field of sociology for two reasons. First, in terms of methodology and epistemology, sociology is located between the sciences and the humanities. Drawing on formal, experimental, and quantitative approaches, but also on qualitative, historical, and critical approaches, sociology is, in our opinion, a "representative" case for academia in general. Second, the percentage of women among graduates in sociology is relatively equal to the percentage of women in the main population. Contrary to the natural sciences, where the percentage of women is far below that of the main population, and contrary to the humanities, where it tends to be higher, sociology is a representative case in this sense as well.

German sociology is a particular instructive labor market to study, because it has no tenure-track system and offers only very few permanent jobs below a full professorship, contrary to U.S., British, or French academia. This means that every postdoc in sociology either has to become a tenured full professor or eventually has to drop out of the system (usually around the age of 40). Contrary to the United States, aspiring researchers applying for a permanent position are not evaluated internally by their colleagues, as in the case of tenure-track committees, but (usually) apply for a position at a different university. In this sense, German academia is an external market. Therefore, German sociology offers a very generalizable case to study the effects of meritocratic and non-meritocratic factors on labor market outcomes.

2 Theory: What explains who gets tenure?

Human capital: Academic output

The null hypothesis in merit-based societies is that applicants displaying the highest achievement are to be rewarded with the most desirable positions (Davis/Moore 1944: 243; Durkheim [1897]1967: 121). Investments in human capital should, therefore, indicate who gets a highly desirable job (Becker 1960: 347ff., 1964: 7ff.). In the tradition of Merton's (1973: 270) popular dictum that "the institutional goal of science is the extension of certified knowledge," it is widely accepted that human capital in the field of academia is best measured in terms of output, notably by scholarly publications, especially when these have passed a double-blind peer review process (Hix 2004: 296ff.; Jungbauer-Gans/Gross 2013: 84; Münch 2006: 473; Gerhards 2002: 19f.; Long/Allison/McGinnis 1993: 703).

That publication output does indeed matter for getting tenure is an established finding. Existing studies of the German academic labor market show that publications increase the likelihood of being hired as a professor in political science (Plümper/Schimmelfennig 2007: 115), sociology (Jungbauer-Gans/Gross 2013: 85), and economics (Heining/Jerger/Lingens 2007: 23). In addition, studies on the U.S. academic labor market show

that department chairs later deem their colleagues more competent and regret prior recruitment decisions less frequently when tenure was granted based on publications in prestigious journals (Rothgeb 2014: 185). However, previous studies mostly measure the absolute number of publications, neglecting the possibility that different types of publications may have different impacts. Differentiating between double-blind peer-reviewed journal articles and other publications is especially relevant. Anonymously peer-reviewed publications should especially be counted as merit-based because the identity and thus possible ascriptive, social, or symbolic criteria of the author are unknown, by definition.

Ascription

This leads to the second explanation of tenure success, namely discrimination grounded in ascriptive characteristics. Hiring committees may base their decisions on a "taste for discrimination" (Becker [1957]1971: 14; 1993: 387), meaning they are willing to prefer less-qualified candidates over those from less advantaged or less legitimate social groups, such as women or ethnic minorities (Burt 1998; Lin 2001). A "taste for discrimination" might result from a masculine symbolic order (Fotaki 2013) within the primarily male-dominated academic system, which leads to disadvantages for women. Hiring committees may practice what Phelps (1972b) calls "statistical discrimination," whereby the committees infer someone's productivity by this person's membership to ascribed characteristics such as race or sex, instead of estimating productivity through the actual individual attributes of a candidate (Phelps 1972b: 659, 1972a: 25f.; Arrow 1972: 96).

Empirical studies indicate that some form of discrimination seems likely, as the share of women in academia diminishes with successive career stages (Long/Allison/McGinnis 1993: 704). Studies describe this as a "cooling out" or "leaky pipeline" effect (Wolfinger/Mason/Goulden 2009; Leemann/Dubach/Boes 2010; Krais 2002), which may result from "allocative" discrimination (Petersen/Saporta 2004). This means that women are successively discouraged from pursuing an academic career with each additional career step. Field experiments using CVs of the same quality, where only the applicant's gender differs, show that females are judged by a harsher standard when applying for academic entry-level jobs (Moss-Racusin et al. 2012) but not when applying for tenure at later career stages (Steinpreis/Anders/Ritzke 1999: 522f.).

Other research shows that publications and academic achievements pay off more for men than for women, a finding which has been called the "Matilda effect" (Lincoln et al. 2012; Knobloch-Westerwick/Glynn/Huge 2013). Moreover, women in academia face stronger structural hurdles than men, leading to lower rates in academic success (Ding/Murray/Toby 2006: 666; Xie/Shauman 1998; Long 1990: 1313).

Following this prior research, one would expect that women face disadvantages in the academic labor market. However, empirical studies of the German academic labor market suggest the opposite: Plümper and Schimmelpfennig (2007) indicate that women in political science have a higher likelihood of getting tenure than men, after controlling for publications (Plümper/Schimmelfennig 2007: 115). In sociology, Jungbauer-Gans and Gross (2013) show that women are more than twice as likely as men to get tenure in sociology, after holding publications constant. Jungbauer-Gans and Gross (2013: 86) hypothesize that this results from the creation of professorships in gender studies, a field in which women specialize disproportionately.

However, as indicated above, these studies draw on self-reported survey data from advanced postdocs (academics with the German postdoctoral qualification known as the habilitation), so the female advantage they portray may be exaggerated as a result of the survivorship effect, since only the most successful women might stay in academia long enough to be sampled by existing studies (Plümper/Schimmelfennig 2007: 102f.; Jungbauer-Gans/Gross 2013: 74ff; Heining/Jerger/Lingens 2007). Schubert and Engelage's (2011: 450f.) study suggests that young women publish less prior to their PhD, have fewer networks through which to find their first job, and are less integrated into academic networks. However, once they "survive" the postdoc period, they are equally integrated into academic networks as men, possibly because unproductive women have already dropped out of academia. Therefore, it is unclear whether the finding that women have better chances of becoming a tenured professor is a statistical artefact due to survivor bias. Nor do we know whether the finding would lose explanatory power if leaky pipelines – that is, the fact that women leave academia disproportionately to men before starting a postdoc – were taken into account.

Symbolic capital: Reputation from institutions and academic awards

Apart from productivity and ascriptive discrimination, success in academia may be influenced by symbolic capital (Bourdieu 1986: 18). Symbolic capital results from reputation gained through membership in prestigious national or international institutions. This is essentially a spill-over effect: academics accumulate symbolic capital through the institutions with which they have been associated; these associations become signals of individual excellence, which in turn influence one's chance of getting a position, independently of mere academic productivity (Allison/Long/Krauze 1982). This seems to be a pertinent mechanism in U.S. sociology, where a department's prestige depends more on its previous reputation than on recent publications (Keith/Babchuk 1998: 1522). Hence, symbolic capital generates cumulative advantages that provide access to better resources and thereby additional rewards (DiPrete/Eirich 2006).

Another indicator of symbolic capital is the reputation gained through academic awards. While these awards may indicate high-quality scholarship, they can also reward academic potential, innovation, or even conformity to established academic norms. In any case, if awards influence tenure success irrespective of an individual's actual publications, they also function as a form of symbolic capital affecting that individual's success independently of scholarly output.

Research on how symbolic capital affects tenure is still underdeveloped. To date it is unclear whether and to what extent academic awards influence getting tenure, irrespective of academic performance and publications. While some studies suggest no clear effect of a department's prestige on academic productivity (Long 1978), others find the opposite (Allison/Long 1990). Studies of the U.S. academic labor market find that individuals from prestigious PhD-granting institutions are more likely to get tenure later on (Baldi 1995; Bedeian et al. 2010; Crane 1970). In Germany, however, no such effect has been shown so far (Baier/Münch 2013). Studies on German academia argue instead that there is increasing competition between the symbolic capital of departments and warn that this may overshadow individual competition based on publications (Hartmann 2010: 385; Münch 2006: 477f.; Baier/Münch 2013). However, it is not yet clear whether the ostensible quality of one's department indeed influences a sociologist's chance for tenure, when holding personal productivity constant.

Social capital: Network effects

A fourth strand of theory argues that tenure largely depends on "who one knows," which is commonly defined as social capital (Lin 2001). Bourdieu (1986: 21) and Coleman (1988) understand social capital as adherence to a durable, close network of personal relations that may help in getting a job by providing access to important information or tacit knowledge (Granovetter 1995; Reagans/McEvily 2003).

In academia, however, job offers are publicly announced, so there is little room for getting privileged information about job openings through personal ties. Instead of providing information barred from others, network ties may increase the probability that a candidate is personally known to members of a search committee. In that case, the committee can estimate more accurately whether a candidate is reliable, trustworthy, friendly, and agreeable to work with, which reduces the uncertainty connected to a hiring decision (Fernandez/Weinberg 1997; Musselin 2010: 112ff.).[1] Since the chance of being known to someone in the search committee increases with the number of social ties someone has in academia, candidates with more social ties should have better

1 However, research shows that professors whose tenure has been granted on the basis of "collegiality" are later deemed as less competent by their fellow department chairs (Rothgeb 2014: 184).

chances to get tenure, even if they have fewer or lower-quality publications than candidates unknown to the search committee. Hence, the social capital approach assumes that tenure is furthered by a larger personal network within the academic field.

Empirical research indeed indicates a positive social capital effect within academia. A sociological study of the U.S. academic labor market shows that it is not necessarily academic productivity but the social network structure generated through the exchange of PhDs among departments that explains a department's prestige (Burris 2004: 256). Social networks also affect citations and scholarly impact (Wuchty/Jones/Uzzi 2007).

However, previous studies that analyze the effect of social networks on who gets tenure remain inconclusive. Godechot and Mariot (2004), analyzing the network density of PhD committees in French political science, find that both dense and weak committee networks have positive effects on the candidates' future careers. Moreover, having a PhD advisor in the hiring committee doubles the odds of getting hired (Godechot 2014). For Germany, Plümper and Schimmelpfennig (2007: 115) as well as Jungbauer-Gans and Gross (2013) find virtually no effects of informal networks on tenure after controlling for publications. This could lead one to assume that success in German academia is less influenced by personal networks than in American and French academia.

3 Data and methods

We test the above-mentioned theories by using event history models on a unique panel dataset that covers full career profiles of virtually all sociologists currently employed (i.e., in 2013) at a German university, including all doctoral students, postdocs, tenured, and untenured faculty members. Based on a list of all German universities and two research institutes, we identified 77 existing sociology departments and coded CV information and publications from the personal webpages of all faculty members who have at least one publication.[2] To produce a coherent timeframe, we did not include faculty members who obtained their PhD prior to 1980.[3] We collected all publications either until the year the respective individual got a tenured position as a professor or until the study's timeframe ended (the year 2013). This yields an unbalanced panel dataset, in which the number of entries per sociologist equals the number of publications until the event occurs (getting tenure) or until the timeframe ends. Hence, our dependent variable is the time duration from the first publication to the appointment as a tenured professor.

2 In rare cases, the university had no sociology department, but a larger social science department. In these cases, we collected the data of the sociology chairs and their associated colleagues.

3 The academic labor market arguably was much different prior to 1980 with respect to job chances, publication habits, and other criteria.

The authors and four research assistants coded the data from March to December 2013. Codings were double-checked by a second coder. Subsequently, the authors performed validity checks on the data to correct coding errors. We also performed intercoder reliability tests, which showed no significant differences in results between coders.[4] Some faculty members do not provide their full list of publications, but an incomplete "selected" list. In these cases, we coded a dummy variable for that person to estimate and control for incompleteness in our regression models (see below).

The final dataset contains a total of 28,545 publications by 1,260 sociologists (of whom 41.7 percent are female). Of these sociologists, 530 are PhD students (of whom 46.6 percent are female), 433 have a postdoctoral position (of whom 42.9 percent are female), including 36 employed as junior professors (of whom 47.2 percent are female). A total of 297 of them have received a tenured position as university professor (of whom 31.6 percent are female). Of those who mentioned that their first tenured professorship was a "W2" (or formerly "C3") professorship, which is comparable to an associate professor in the U.S. system, women represented 46 percent. Of all those who mentioned that their first tenured position was a "W3" (formerly "C4") professorship, which is comparable to the full professor in the U.S., 21 percent were women.[5]

Variables

Table 1 presents descriptive information on all variables used. We measure human capital by the accumulated number of publications at time point *t*. We distinguish between six publication types. First, the variable *SSCI journal articles* covers the total number of double-blind peer-reviewed SSCI journal articles a person has published at time *t*. Second, the variable *Non-SSCI articles* measures the same for non-SSCI journals. Third, *Books* covers all monographs, including textbooks, published dissertations and habilitation theses. The fourth and fifth variables are *Edited volumes* and *Book chapters*, which measure the equivalent in terms of edited books and book chapters, respectively. Sixth, the variable *Gray literature* comprises all remaining publications, including reports, working papers, book reviews, etc.

To account for the fact that co-authored publications should not be weighted equally with single-authored ones, we adjust each publication by the formula $p=2/(n+1)$, where n is the number of authors. The value p shows how each publication is weighted. Thus, being the sole author of a publication is weighted as 1, being a co-author as .67, being one of three authors as .5, being one of four authors as .4, and so on.

4 Results of these tests can be made available upon request.

5 However, only in 46 percent of all cases could we find out what sort of tenured professorship someone had received. So, from this point on, we do not differentiate between W2/C3 or W3/C4, as all of these positions are tenured professorships.

Table 1 Descriptive statistics of all variables used in this study

Variable	Obs.	Mean	Std. dev.	Min	Max
SSCI journal articles	1260	1.57	2.92	0	26.67
Non-SSCI articles	1260	3.57	5.66	0	80.63
Books	1260	1.33	1.57	0	9.67
Edited volumes	1260	0.75	1.47	0	12.85
Book chapters	1260	7.68	10.83	0	96.20
Gray literature	1260	3.90	7.07	0	68
Female	1260	0.42	0.49	0	1
Prestige graduation	1260	10.21	2.14	3	14
Prestige doctorate	1260	9.88	1.81	3	14
Prestige habilitation	1260	9.71	1.11	3	14
Awards	1260	0.20	0.69	0	9
Months abroad	1260	24.82	61.53	0	540
Studied abroad	1260	0.18	0.39	0	1
Doctorate abroad	1260	0.04	0.19	0	1
International publications	1260	4.69	8.90	0	101
Mobility	1260	1.99	1.83	0	13
Interim professor	1260	0.34	0.77	0	7
Department size	1260	6.85	4.14	1	20
Incomplete	1260	0.11	0.32	0	1
Co-authors	1260	15.73	26.15	0	404
Open positions	1260	15.24	5.85	5	27
Habilitation	1260	0.86	2.30	0	25
Habilitation (squared)	1260	6.03	27.70	0	625
Assistant professor	1260	0.18	0.95	0	10

Notes: Statistics refer to the person level, based on 28,545 publication-person data.

We operationalize symbolic capital by the variables described in the next three paragraphs. First, *Prestige graduation*, *Prestige doctorate*, and *Prestige habilitation* capture symbolic capital from institutional affiliations and measure the prestige of a department with which a sociologist has been associated during his or her career. To generate a prestige score, we rely on ranking data of sociology departments provided by the German Council of Science and Humanities in 2005, which is widely considered the most reliable ranking of sociology departments in Germany (for details, see Wissenschaftsrat 2008). We apply the overall index score of the ranking to the department at which a sociologist obtained his or her master degree, doctorate, and postdoctoral qualification. For missing data and non-rated institutions, we take the overall mean as a best possible estimator.[6]

Second, *Awards* accumulates all academic awards listed on the CV, including best-paper, best-graduation, or general awards from professional associations. We assume that the number of awards measures symbolic capital because each award increases an individual's academic reputation. Controlling for performance and human capital, we expect this measure of reputation to influence the likelihood for tenure success.

6 For these variables, we had to replace missing data about where people studied in 20.1 percent of all cases, where they earned their PhD in 27.6 percent of the cases, and where they achieved their habilitation in 23.5 percent of the cases.

The third group of variables are *Months abroad, Studied abroad, Doctorate abroad*, and *International publications*; they measure accumulated transnational symbolic capital (Gerhards/Hans 2013). *Months abroad* is the number of months spent abroad, either during undergraduate or graduate studies or later during doctoral or postdoctoral research. The dummy variable *Studied abroad* controls for international experience at the undergraduate or graduate level. *Doctorate abroad* is a dummy that measures whether the person received his or her doctorate at a non-German institution. *International publications* is the number of publications written in English and thus reflects international visibility.

We operationalize social capital through four measures. The first is *Mobility,* which is the sum of the number of institutions someone has been attached to at each point of his or her career. We assume that the more institutions someone was working at, the more professional, work-related relationships this person could establish, which should increase the likelihood of tenure.[7] The second social capital measure is *Interim professor*, which is the sum of the number of times someone temporarily substituted for a full professor. An interim professorship (the German *Vertretungsprofessor*) is a nontenured, short-term faculty position at which an advanced postdoc (often from a different university) takes over responsibilities as a full professor, usually for one or two semesters. We assume that the more positions a person has held as an interim professor, the larger that candidate's work-related network is and the better the chances for getting tenure become. *Department size* measures the total number of fully tenured professors at the department where the person received his or her doctorate.[8] We assume that the larger the department, the larger the number of potential professional relationships someone can draw on for getting a job. *Co-authors* measures the accumulated number of co-authorships at each career phase, based on prior publications. We assume that the social capital of a person is higher if the number of prior collaborators is larger.

Controls

We use the dummy variable *Incomplete* to control for the problem that arises when people have not posted all their information on the web. We assigned it to persons who only posted a selection of their publications (usually under the heading "selected publications"). Including this information in the regression models enables us to rule out possible bias caused by the underreporting of data.[9] *Open positions* measures the number of open professorship positions per year, lagged by one year. In controlling for the

7 While we do not measure the quality of these relationships, we assume with Granovetter (1973, 1995) that beneficial returns generally increase with a larger, albeit weaker, network.

8 For PhD students, we use their current department. We replace missing data with the overall mean (as is the case for 55 persons).

9 This applies to 11 percent of all coded persons. As we show below, the results remain essentially the same if we drop all incomplete cases (see Model 1 in Table 4 for details).

number of open positions, we take the opportunity structure of the labor market into account. This is important because the number of open positions varies substantially across time. Notably, only about four positions per year were filled in the 1980s and 1990s, a figure that rose to about 25 per year after 2000.[10] The variables *Habilitation* and *Assistant professor* represent the number of years since a sociologist achieved his or her habilitation or started a position as a "Junior Professor" (*Juniorprofessur*, the German variant of an assistant professorship, but generally without tenure track and limited to six years). Both variables measure academic seniority and job experience, which should increase the chances for tenure. We do not control for grant money, for example from the German Research Foundation (DFG), as it provides an input into the research process. If effective, grants should result in increased output, which we measure directly through the number of publications (Münch 2006: 472; Gerhards 2002: 32). Accordingly, existing empirical studies have found no effect of grant funding on the likelihood of getting tenure, after controlling for publications (Plümper/Schimmelfennig 2007: 111). We also do not measure academic merit through quantity and quality of teaching. While both probably influence tenure, we do not think that either should differ between candidates in a systematic way so as to bias our results. First, the quantity of teaching in German academia is largely set by law, depending on one's working contract. The most conceivable way the quantity of teaching could have an effect beyond this is when people publish more in order to get positions where they have to teach less and can do more research. Thus, this variable should be endogenous to our publication variables.[11] Second, regarding the quality of teaching, studies analyzing student ratings suggest no systematic differences between courses led by males or females (Marsh 2007; Wolbring 2013; Feldman 1993). Thus, while we believe that teaching influences hiring decisions, there is reason to believe that it does not systematically bias the results we present below.

4 Results

Descriptive results

Table 2 shows what characterizes sociologists who receive tenure. By the time sociologists get their first permanent position as a university professor, 15.54 years have passed on average since their first publication (see first column in Table 2). They have published an average of 3.99 SSCI journal articles, 7.87 non-SSCI articles, 2.58 mono-

10 The reason is a wave of retirements after 2000, resulting from the expansion of academic education in the 1970s, a period during which many universities were newly established and the number of sociology chairs increased significantly.

11 Only 83 of our 1,260 sociologists are employed not at a university, but at a non-university research institute. We thus have reason to assume that almost all of them have similar teaching obligations at each career step.

Table 2 What characterizes sociologists who have just received tenure?

	Overall mean (st. dev.)	Men mean (st. dev.)	Women mean (st. dev.)	T-test Sig.
Years to professorship	15.54 (5.00)	16.19 (4.79)	14.24 (5.19)	***
SSCI journal articles	3.99 (4.40)	4.68 (4.96)	2.62 (2.49)	***
Non-SSCI articles	7.87 (6.66)	9.13 (7.14)	5.36 (4.68)	***
Books	2.58 (1.74)	2.86 (1.93)	2.02 (1.07)	***
Edited volumes	1.74 (1.95)	1.88 (2.02)	1.44 (1.78)	+
Book chapters	17.06 (12.79)	18.89 (13.57)	13.39 (10.17)	**
Gray literature	7.94 (10.62)	9.34 (12.13)	5.14 (5.73)	**
International publications	9.46 (12.58)	9.76 (13.33)	8.85 (10.97)	
Awards	0.37 (0.89)	0.30 (0.84)	0.52 (0.96)	+
Months abroad	39.96 (79.93)	37.91 (80.59)	44.07 (78.94)	
Studied abroad	0.12 (0.32)	0.10 (0.31)	0.15 (0.36)	
Doctorate abroad	0.06 (0.24)	0.05 (0.22)	0.09 (0.28)	
Mobility	3.29 (2.12)	3.29 (1.98)	3.29 (2.39)	
Interim professor	0.84 (1.10)	0.85 (1.09)	0.82 (1.13)	
Department size	7.93 (4.40)	7.99 (4.42)	7.80 (4.39)	
Co-authors	27.24 (26.4)	30.06 (27.65)	21.6 (22.85)	*
Habilitation	0.75 (0.44)	0.77 (0.42)	0.69 (0.47)	
N	243	162	81	

Notes: Mean differences between men and women significant at + $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$ (two-sided tests). Cases with incomplete publications (n = 54) were dropped.

graphs, 1.74 edited volumes, 17.06 book chapters, and 7.94 publications that we rated as "gray" literature. On average, 9.46 of these publications are in English. At the time of hiring, a typical sociologist has received 0.37 academic awards and spent 40 months abroad. In 6 percent of all cases, the sociologist wrote his or her dissertation in a foreign country. Upon receiving tenure, this person has 3.3 documented changes of location and has acted as interim professor 0.8 times. The accumulated number of co-authors is about 27, and in 75 percent of all cases, the sociologist has written a habilitation thesis.

However, large standard deviations from the mean indicate that many researchers have done much more or much less than these averages imply. For instance, 21.6 percent of all tenured professors have no SSCI journal article, and 19.2 percent do not have any English-language publications. Table 2 also shows significant differences between men and women. The time period between the first publication and a tenured appointment is, on average, two years longer for men. However, by the time men do get tenure, they have published 1.8 times as many SSCI-articles (significant at $p < .001$), 1.7 times as many non-SSCI articles ($p < .001$), 1.4 times as many books ($p < .001$), 1.3 times as many edited volumes ($p < .1$), 1.4 times as many book chapters ($p < .01$), and 1.8 times as much "gray" literature as women ($p < .01$). Men also have a higher number of co-authors ($p < .05$). Women, however, accumulate an average of 0.52 awards, which is about 1.7 times more than men ($p < .1$). Apart from these variables, which reflect productivity and symbolic capital, men and women are not significantly different when getting their first tenured professorship, as the t-test results show. For example, they do not exhibit a significant difference in their international experience, mobility, or habilitation status. The next section shows what actually determines tenure, based on these variables.

Regression models

Table 3 presents the results of a series of nested Cox regressions (Cox 1972), which estimate the factors that increase or decrease the likelihood that the event of interest occurs, that is, that a researcher gets a tenured position. We display the hazard ratios to facilitate the interpretation of results. This implies that an effect is positive if the hazard ratio is above 1, and negative if below 1. The models use robust, panel-corrected standard errors clustered by persons to adjust for non-independence of observations (Lin/Wei 1989). In addition, the models rely on the Efron method for tied events, which is widely considered the most appropriate (Cleves/Gould/Gutierrez 2004: 143). We use logged values for publication measures and other independent variables. This accounts for possible nonlinear effects and decreasing marginal returns of publications, meaning, for example, that to have 14 publications instead of 10 is probably less consequential than to have 4 publications instead of none. For non-logged results, we provide Table A1 in the appendix as additional information.[12]

Model 1 in Table 3 is a baseline model that includes all control variables. Model 2 adds the human capital measures. Models 3 through 6 subsequently add non-meritocratic predictors from the remaining three theoretical approaches. As can be seen from Model 1, the control variables are mostly in line with our expectations. Incomplete information shows a significant effect in terms of tenure success, as tenured professors often do not list all of their publications on their websites. Interestingly, the number of open positions does

12 Assuming linear relations, however, is a more restrictive model, yielding a lower model fit and partly poorer estimation results.

Table 3 Main results: Cox regressions on the hazard of getting a tenured position

	(1) Controls only	(2) Publications added	(3) Gender added	(4) Symbolic capital added	(5) Transnational capital added	(6) Social capital added
SSCI journal articles (ln)		1.866*** (8.016)	1.923*** (8.044)	1.853*** (7.373)	1.728*** (5.937)	1.687*** (5.670)
Non–SSCI articles (ln)		0.981 (–0.200)	0.997 (–0.027)	0.993 (–0.067)	0.997 (–0.028)	0.998 (–0.022)
Books (ln)		1.450* (2.568)	1.519** (2.788)	1.565** (2.942)	1.665*** (3.348)	1.631** (3.183)
Edited volumes (ln)		1.350** (2.738)	1.373** (2.858)	1.394** (2.979)	1.361** (2.824)	1.333** (2.633)
Book chapters (ln)		1.206+ (1.792)	1.190+ (1.669)	1.197+ (1.749)	1.207+ (1.820)	1.171 (1.344)
Gray literature (ln)		0.846* (–2.510)	0.856* (–2.306)	0.853* (–2.293)	0.845* (–2.387)	0.851* (–2.284)
Female			1.440* (2.503)	1.439* (2.542)	1.403* (2.386)	1.412* (2.438)
Prestige graduation (ln)				0.866 (–0.483)	0.870 (–0.469)	0.735 (–0.966)
Prestige doctorate (ln)				0.782 (–0.832)	0.753 (–0.942)	0.667 (–1.304)
Prestige habilitation (ln)				1.149 (0.438)	1.193 (0.540)	1.254 (0.669)
Awards (ln)				1.650*** (3.295)	1.605** (3.127)	1.506* (2.571)
Months abroad (ln)					1.047 (1.216)	1.017 (0.410)
Studied abroad					1.281 (1.504)	1.163 (0.885)
Doctorate abroad					1.121 (0.498)	1.111 (0.465)
International publications (ln)					1.059 (0.771)	1.083 (0.992)
Mobility (ln)						1.380* (2.529)
Interim professor (ln)						0.941 (–0.413)
Department size (ln)						1.230+ (1.872)
Co-authors (ln)						0.996 (–0.055)
Incomplete	1.620** (2.891)	1.785*** (3.304)	1.861*** (3.547)	1.934*** (3.697)	1.916*** (3.625)	1.956*** (3.732)
Open positions (ln)	1.027 (0.253)	1.160 (1.298)	1.127 (1.025)	1.113 (0.918)	1.085 (0.710)	1.074 (0.615)
Habilitation	1.830*** (6.852)	1.553*** (5.766)	1.565*** (5.751)	1.551*** (5.590)	1.565*** (5.637)	1.556*** (5.417)
Habilitation (squared)	0.953*** (–4.219)	0.965*** (–3.869)	0.964*** (–3.874)	0.965*** (–3.768)	0.964*** (–3.797)	0.964*** (–3.689)
Assistant professor (ln)	2.780*** (7.110)	2.352*** (5.411)	2.221*** (5.075)	2.304*** (5.411)	2.230*** (5.073)	2.263*** (5.545)
Pseudo R^2	0.060	0.091	0.094	0.097	0.099	0.103
Log–likelihood	–1533.089	–1481.678	–1478.266	–1472.024	–1468.757	–1463.396
Degrees of freedom	5	11	12	16	20	24
Chi^2	183.295	293.512	298.958	302.158	327.770	346.278
AIC	3076.178	2985.356	2980.532	2976.047	2977.513	2974.791
BIC	3117.474	3076.207	3079.643	3108.195	3142.698	3173.013
Number of events	297	297	297	297	297	297
N (persons)	1260	1260	1260	1260	1260	1260
N (persons-publications)	28545	28545	28545	28545	28545	28545

Notes: Exponentiated coefficients (hazard ratios); *t* statistics in parentheses; ln = logged values; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001 (two-sided tests).

not affect the chances of being hired. It is not surprising that the years spent after one's habilitation or appointment as a junior professor lead to tenure, since tenure is usually awarded after a habilitation or a junior professorship. Notably, the significant squared term demonstrates an inverse u-shaped relationship between the years since habilitation and tenure: the years since habilitation increase the chances of getting tenure up to a certain threshold. If one does not get tenure in the first seven years after completing a habilitation, however,[13] chances to get tenure substantially decrease with each additional year.

Model 2, which includes the human capital variables, confirms that productivity in the form of publications leads to tenure. However, this is not equally true for all types of publications. Especially the number of SSCI journal articles strongly increases the chances of becoming tenured: each unit increase in the log of an SSCI article boosts tenure chances by a factor of 1.866, that is, by 86.6 percent. Note that logging accounts for nonlinearity in the relationship in the sense that a log increase from 0 to 1 equals a net increase from 0 to about 2 publications; a log increase from 1 to 2 equals a net increase from 2 to about 6 articles, and so on. In the linear, non-logged estimation (Table A1), each additional SSCI article increases the chance for tenure by about 11 percent, holding everything else constant. Compared with all other variables, the SSCI variable is by far the strongest predictor (see the coefficient's t-statistic, which is highest for this variable). Books and edited volumes have positive but somewhat weaker effects (about 45 and 35 percent greater chances, respectively, with each log increase – corresponding to about 12 and 5 percent, respectively, for each additional publication in the non-logged model). Publishing book chapters is only significant at the .1-level. Interestingly, publishing articles in non-SSCI journals does not affect the "hazard" for tenure, while publishing gray literature (such as reports, etc.) even has a significantly negative effect.

Model 3 adds our ascriptive variable "female." The variable's hazard ratio of 1.44 indicates that – among men and women with the same number and types of publications – women are 44 percent more likely to get tenure. This fits the descriptive statistics above, which indicate that women get their first tenured position slightly earlier than men, even though men publish between 1.3 and 1.8 times more than women (depending on publication type). As the subsequent models show, adding more predictors does not affect this result. The effect remains robust throughout. We present additional analyses on this gender difference below.

Model 4 adds variables that indicate symbolic capital. It shows that the prestige of the university where someone first graduated or received a doctorate or achieved habilitation does not affect the likelihood of receiving tenure. However, the prestige of a candi-

13 This is the result of a model prediction based on Model 6 in Table 3 (available upon request). We also estimated a squared term for years of being an assistant professor but did not find the same inversely u-shaped relationship. In part, this has to do with the fact that the German junior professor is a relatively new position (the first were established in 2001), which means that it is too early to judge at this point – simply due to lack of a sufficient number of cases – whether or not a nonlinear relationship occurs also in these career trajectories.

date's postdoctoral institution becomes significant if we do not control for publications and English-language publications.[14] This suggests that institutional prestige indirectly affects tenure success, insofar as it leads to more publications. By contrast, winning awards strongly increases the chances for tenure. Therefore, it is not the prestige of one's university that affects tenure, but the individual reputation generated through accumulating academic awards. Remarkably, the number of awards is the second strongest predictor after SSCI journal articles (see t-statistic).

Model 5 adds variables that specify transnational symbolic capital. Interestingly, none of these affect the hazard of receiving tenure, indicating that German sociology does not reward international experience. However, the number of months spent abroad becomes significant at the 10 percent level if we drop publications and all other transnational variables from the models. Spending time abroad may therefore have a small effect on publication success, which eventually yields a tenured position.[15]

Model 6 adds the social capital variables, showing that personal mobility and department size positively affect the hazard of tenure, while taking up an interim professorship does not. Co-authorship also has no effect: sociologists who publish more often in teams have the same chance of getting tenure as those who publish more often as single authors. Mobility and department size suggest that the larger the professional network of a candidate, the more likely that person is to get a tenured position, all else being equal.

Table 4 presents alternative specifications to explore further issues and to test for the robustness of the main findings. Model 1 shows that there are essentially no differences in the results if we drop the incomplete cases. Model 2 adds a dummy variable controlling for the year prior to and the year after 2000. As can be seen, the results do not differ from those presented above, which suggests that our results are largely unaffected by period effects. In other words, what counted in getting a professorship prior to the year 2000 also counts afterwards.[16]

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14 Details can be made available upon request.

15 There is also a positive correlation between the number of months spent abroad and English publications ($r = .29$, $p < .001$), as well as between the number of months spent abroad and SSCI journal publications ($r = .19$, $p < .001$).

16 Table A2 in the appendix tests possible changes over time. The table examines interaction effects between the post 2000 dummy and the logged number of SSCI articles, monographs, awards, and the female dummy. First, the analysis shows that the overall results remain unaffected and robust when we do control for these interactions. Second, while the interaction effects themselves are insignificant, their main effects now display the predictor effect when the post 2000 dummy is zero, e.g., the years prior to 2000. As can be seen, SSCI articles as a type of publication still has a significantly strong effect prior to 2000, but one that is less strong than the overall effect (see Model 1). By contrast, published books matter slightly more (Model 2), and the number of awards do not count at all prior to 2000 (Model 3). Notably, the female effect (1.887) is even stronger in the 1990s than it is overall (Model 4). We chose the year 2000 because it splits our population data into two groups of roughly equal size.

Table 4 Robustness tests and gender effects

	(1) Full model, incomplete cases dropped	(2) Post2000 dummy added	(3) Non-gender studies chairs	(4) Cumulative female advantage	(5) Men only	(6) Women only
SSCI journal articles (ln)	1.643*** (4.883)	1.686*** (5.674)	1.727*** (5.766)	1.702*** (5.711)	1.842*** (5.714)	1.782** (2.913)
Non-SSCI articles (ln)	1.080 (0.727)	0.998 (–0.023)	1.018 (0.180)	1.005 (0.050)	0.953 (–0.423)	0.987 (–0.074)
Books (ln)	1.683** (2.909)	1.630** (3.169)	1.560** (2.867)	1.546** (2.862)	1.375+ (1.927)	3.274** (3.102)
Edited volumes (ln)	1.381** (2.578)	1.333** (2.631)	1.335** (2.585)	1.407** (3.056)	1.215 (1.610)	2.651*** (3.950)
Book chapters (ln)	1.174 (1.137)	1.170 (1.338)	1.169 (1.305)	1.221+ (1.705)	1.292+ (1.899)	0.757 (–1.003)
Gray literature (ln)	0.868+ (–1.774)	0.851* (–2.274)	0.848* (–2.304)	0.849* (–2.303)	0.824* (–2.420)	0.861 (–1.083)
Female	1.404* (2.200)	1.413* (2.432)	1.355* (2.028)	1.570** (3.242)		
Prestige graduation (ln)	0.861 (–0.443)	0.734 (–0.968)	0.883 (–0.382)	0.716 (–1.044)	0.665 (–1.036)	0.717 (–0.664)
Prestige doctorate (ln)	0.681 (–1.101)	0.667 (–1.303)	0.556+ (–1.920)	0.756 (–0.888)	0.324** (–2.984)	1.054 (0.095)
Prestige habilitation (ln)	1.196 (0.447)	1.254 (0.669)	0.965 (–0.107)	1.158 (0.443)	1.102 (0.232)	1.969 (1.354)
Awards (ln)	1.438* (2.191)	1.509* (2.569)	1.409* (2.071)	1.491* (2.525)	1.067 (0.292)	3.595*** (5.131)
Months abroad (ln)	1.045 (0.999)	1.016 (0.406)	1.011 (0.275)	1.021 (0.509)	1.018 (0.381)	0.977 (–0.322)
Studied abroad	1.182 (0.889)	1.163 (0.878)	1.181 (0.949)	1.246 (1.343)	1.306 (1.236)	1.040 (0.134)
Doctorate abroad	1.047 (0.173)	1.111 (0.467)	1.116 (0.476)	0.981 (–0.085)	0.806 (–0.890)	1.806 (1.346)
International publications (ln)	1.091 (0.984)	1.084 (1.003)	1.101 (1.177)	1.109 (1.289)	1.127 (1.285)	1.182 (1.137)
Mobility (ln)	1.380* (2.263)	1.380* (2.530)	1.388* (2.529)	1.402** (2.715)	1.435* (2.466)	1.402 (1.437)
Interim professor (ln)	0.862 (–0.954)	0.941 (–0.413)	0.944 (–0.383)	0.852 (–1.088)	0.895 (–0.634)	1.086 (0.305)
Department size (ln)	1.222+ (1.660)	1.230+ (1.864)	1.276* (2.114)	1.210+ (1.706)	1.291* (1.980)	1.781* (2.181)
Co-authors (ln)	0.982 (–0.193)	0.996 (–0.056)	0.987 (–0.161)	1.001 (0.009)	0.945 (–0.575)	1.064 (0.350)
Incomplete		1.956*** (3.735)	1.916*** (3.556)	1.838** (3.250)	1.831** (2.948)	2.884*** (3.301)
Open positions (ln)	1.183 (1.260)	1.087 (0.564)	1.059 (0.490)	1.100 (0.821)	1.114 (0.792)	0.855 (–0.696)
Habilitation	1.653*** (4.999)	1.557*** (5.422)	1.558*** (5.200)	1.546*** (5.636)	1.428*** (4.597)	2.455*** (3.810)
Habilitation (squared)	0.958*** (–3.434)	0.964*** (–3.692)	0.965*** (–3.413)	0.966*** (–3.815)	0.974** (–3.062)	0.915** (–2.873)
Assistant professor (ln)	2.111*** (4.763)	2.267*** (5.523)	2.267*** (5.404)		2.233** (2.911)	2.435*** (4.295)
Post2000		0.977 (–0.122)				
Pseudo R^2	0.108	0.103	0.106	0.094	0.096	0.216
Log-likelihood	–1151.987	–1463.389	–1383.249	–1477.323	–921.057	–336.677
Degrees of freedom	23	25	24	23	23	23
Chi^2	288.718	346.344	344.020	286.815	229.218	210.934
AIC	2349.973	2976.779	2814.498	3000.647	1888.114	719.354
BIC	2537.489	3183.260	3012.241	3190.609	2069.716	881.986
Number of events	243	297	283	297	203	94
N (persons)	1117	1260	1246	1260	734	526
N (persons-publications)	25664	28545	27981	28545	19846	8699

Notes: Exponentiated coefficients (hazard ratios); *t* statistics in parentheses; ln = logged values; + p < 0.1, * p < 0.05, ** < 0.01, *** p < 0.001 (two-sided tests).

Models 3 through 6 in Table 4 deal with different aspects of the gender effect. Using different data, Jungbauer-Gans and Gross (2013: 86) show that women in sociology are more than twice as likely (plus 117 percent) as men to get tenure, after controlling for publications. They argue that this is the case because women are disproportionately appointed to gender studies chairs. In other words, their advantage results from specialization, which can lead to benefits in the labor market (Leahey 2006, 2007; Leahey/Jason Lee/Hunter 2008). To test whether specialization plays a role, we looked at who got tenure for a professorship affiliated with gender studies. Indeed, while only 2 out of 203 tenured men were appointed to a gender studies chair, 12 out of 94 tenured women received such an appointment. Thus, women are more successful in getting appointed to gender studies chairs, which might explain the overall gender difference in hiring. To test this, Model 3 in Table 4 changes the dependent variable, focusing only on who got tenured for a chair that was not in gender studies (thereby dropping 14 cases). As can be seen, women are still 36 percent more likely to be appointed than men, even to positions outside gender studies. Thus, only part of the higher female likelihood can be explained by a disproportionate recruitment of women to chairs in gender studies.

Since women are more likely than men to get a full professorship with the same number of publications, a similar effect might exist for getting an assistant or junior professorship. In that case, a woman's advantage would accumulate, first by getting a junior professorship, and subsequently by having preferential access to a full professorship. Model 4 checks this effect by not controlling for years spent as a junior professor. Indeed, by not controlling for who becomes a junior professor in the first place, the regressions show that women have a 57 percent higher chance of becoming a tenured professor than men, controlling for productivity and all other factors.[17]

The results above suggest that getting tenure depends on different characteristics for women and men. Models 5 and 6 therefore replicate the full model separately for men and women. As can be seen, the road to success indeed differs in important respects for the two genders. For men, the strongest predictor is publishing in SSCI journals. Books and book chapters count as well, but to a lesser degree ($p < .1$). Edited volumes do not matter, and gray literature is even detrimental for tenure. Apart from academic productivity, social capital (mobility and department size) show significant effects as well.[18] Strikingly, the institutional prestige of the university where men get their PhDs negatively impacts their chance for tenure. If we do not control for productivity, however, this effect becomes insignificant.[19]

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17 In an additional analysis not shown but available upon request, we separately analyze gender effects on first positions either as full (W3/C4) or associate (W2/C3) professors. It turns out that women have a (statistically significant) 65 percent higher chance than men of becoming tenured as an associate professor, while their chance is about 20 percent higher for full professorships (but this is not or only at 10 percent statistically significant).

18 Though these are not very robust, as they become insignificant in the non-logged model (Table A1).

19 This may be because the most prestigious universities also produce the largest numbers of PhDs per year, of which the majority will not stay in academia.

For women, SSCI articles also strongly increase chances for tenure, but other factors are more important, notably publishing books and edited volumes (see the t-statistics). This might be explained by specialization: women specialize more often in fields like gender studies, which is largely a qualitative field of research in which scholars are more prone to publish books than peer-reviewed articles.

Women's strongest predictor for tenure is – by far – the accumulated number of academic awards. An increase in the log of each award increases women's chances for tenure by a factor of 3.595, or by 360 percent. In the non-logged model (Table A1), this amounts to a 67 percent increase in the chances for tenure with every additional award. This is a sharp difference to the results for men, for whom winning academic awards does not count at all.[20]

In sum, while for men the number of SSCI journal articles is the most important predictor in getting a tenured position, for women it is individual reputation, the publication of edited volumes, books, SSCI articles, and, to a lesser degree, department size.

5 Discussion

As we have shown above, results of existing studies attempting to understand who gets tenure are inconclusive. Prior research generally agrees that productivity in the form of publications explains success but it remains undecided about the effects of non-meritocratic criteria. Based on large-scale career data of an almost full population of German sociologists in academia, this study has aimed to elucidate the career patterns that lead to tenure. In this section, we highlight our main results and discuss how they advance existing knowledge on the determinants of academic career success.

First, our findings show that publishing books and articles in SSCI-listed journals are the strongest predictors for becoming a tenured professor in German sociology. The chances of getting tenure increase by about 10 percent with every published SSCI article, by about 12 to 14 percent with every published book, by about 2 percent with every published book chapter, and by about 5 percent with every edited volume. This is good news, as it implies that the more productive a researcher is in terms of scholarly publications, the higher the chances are of getting tenure. With this finding, we confirm the results of prior studies. However, we heed the call of these studies and draw on panel data design to better control for survivorship biases and possible "leaky pipeline" effects (Plümper/Schimmelfennig 2007; Jungbauer-Gans/Gross 2013).

20 Note that the female dummy remains significant when we control for the number of awards, as Table 3 has shown. Hence, the female advantage is not simply the result of women having gained greater reputation through academic awards.

Second, in terms of ascription, our results do not support theories of female disadvantage. Women whose measures for publications, years of experience, as well as social and symbolic capital on the national and international levels equal that of men's are about 1.4 times more likely to get a professorship than men. This result is contrary to what prior research suggests (Fotaki 2013) but is in line with others (Jungbauer-Gans/Gross 2013; Plümper/Schimmelfennig 2007). Our effect, however, is weaker than that of Jungbauer-Gans and Gross (2013: 86), who document that women are 2.17 times more likely than men to get tenure, after controlling for a number of confounding factors. Our result can be considered as an improvement over existing research, since the stronger effect shown by prior research is probably the result of a survivorship bias.

While Jungbauer-Gans and Gross argue that women may have a higher likelihood of getting a professorship because they specialize on gender topics and therefore have preferential access to chairs in gender studies, we show that this explains only part of the story. Indeed, 12 out of 94 women who got tenure landed a position devoted to gender studies, compared to 2 out of 202 men. However, for chairs in fields other than gender studies, women are still 36 percent more likely to get tenure, after controlling for everything else. The regressions additionally show that the female advantage in getting a professorship grows from junior to tenured professorships. The female effect equals 57 percent if years spent as an assistant professor are not taken into account. Moreover, our findings do not support the idea of the so-called "Matilda Effect" (Lincoln et al. 2012), according to which academic achievements are valued less for women than for men. Instead, we find the opposite to be true: while academic awards do not count for men, they are the strongest predictor for women in increasing their chances of getting a tenured position.

Third, our results confirm that institutional prestige does not directly influence academic success in German sociology (Baier/Münch 2013; Jungbauer-Gans/Gross 2013). Where a sociologist graduated, received a doctorate, or achieved habilitation does not affect tenure after controlling for personal productivity – at least with regard to the measure used here. This is contrary to the situation in the United States, where a stratified academic system generates rankings of institutional status that exist independently of academic merit (Burris 2004).

Fourth, our results shed light on whether social capital influences tenure. While studies of the private sector have shown that hiring people through social networks can be beneficial (Fernandez/Weinberg 1997), studies of U.S. academia show the opposite (Rothgeb 2014: 184; Horta/Veloso/Grediaga 2010). We have found comparably small but positively significant effects of social capital on the likelihood of getting tenure. However, the strongest predictor for tenure are publications that have undergone a double-blind peer review process, which is most removed from the influence of social networks because the publications are, by definition, reviewed anonymously.

Our findings carry practical implications for young researchers. Mainly, our results indicate the importance of publishing in SSCI-rated journals, which is the strongest and most reliable predictor for tenure success, for each additional article increases chances for tenure by 10 percent. The impact factor of the journal, however, is of less importance.[21] It is also important to publish books and edited volumes. Book chapters probably do not hurt, but have a very small effect. Publishing non-SSCI articles has no effect and publishing gray literature is even detrimental to becoming a tenured professor. Going abroad or to prestigious universities is important only insofar as it helps to write good scholarly articles or books, but apart from possibly enhancing productivity, it has no independent effect. Knowing people and being mobile seem to be important, as our measures of mobility and department size indicate. Overall, our findings are encouraging in that peer-reviewed publications are the best predictor of tenure, suggesting that the German academic labor market is indeed meritocratic in this respect.

However, getting tenure follows different logics for men and women, so that the advice our data spell out for young researchers is different for the two sexes. First and most generally, the results indicate that publications matter for both men and women. While SSCI articles are the safest strategy among men, books and (to a lesser degree) edited volumes have an even stronger impact for women. While not counting at all for men, the strongest predictor to get tenure for women is to win academic awards.

Finally, our results have implications for hiring practices. They show that affirmative action strategies most likely increase women's chances in academia, at least in German sociology. However, they also show that women get tenure with fewer publications, and therefore each of their publications is more strongly rewarded in terms of tenure, as compared with men. Hence, hiring decisions should not be made on the assumption that a productive woman is more easily overlooked than a productive man at the point of hire.

While we hope that our study answers relevant open questions, it leaves others unanswered. First, though we are able to measure productivity in academia in a generally accepted way, it remains to be seen whether our results are indicative of general labor market trends. Although it is widely accepted to use publications to measure academic performance, we could not measure performance in terms of citations, teaching quality, student satisfaction, or the acquisition of grant money. While the acquisition of grant money seems to have no effect, as prior research shows (Plümper/Schimmelfennig 2007: 111), more research is needed to consider the role of these other factors.

21 In additional analysis not shown here, we weighted each SSCI article by the impact factor of the respective journal. The weighted SSCI effect shows a still significant but slightly smaller effect, suggesting that the impact factor does not matter as long as one publishes in an SSCI-rated journal. All other variables remained largely unaffected by the inclusion of the impact factor of the journal.

Moreover, we could not take into account soft skills such as motivation or persuasiveness, which might be relevant for academic success. It is possible that the gender gap is partly explained by these unobservable factors. A study on research attitudes, for example, finds that female postdocs show higher career motivation than their male counterparts (Fitzenberger/Schulze 2014). Women's greater motivation, argues the study, could be a direct result of their better opportunities in academia, as compared to nonacademic careers. Future research should take these factors into account. In order to fully tackle possible leaky-pipeline effects, follow-up studies could analyze in greater detail either those who leave academia or those who enter it. Making sense of (natural) experiments seems to be a promising direction (Breda/Ly 2012; Godechot 2014; Zimmerman 2003; Bosquet/Combes/Garcia-Peñalosa 2014). Future research might also take a closer look at the role of research specialization, and whether or not this affects the chances of male and female postdocs differently. More generally, future studies might examine in greater detail the possible cumulative or multiplicative effects between gender and social or symbolic capital on career success (Lutter 2015). Another aspect that we left out is the role of childrearing. If women overall have a higher likelihood of becoming a professor in German sociology, then what is the role of motherhood and fatherhood? Are there significant differences between men and women without children, or between mothers and fathers, and if so, how significant are they?

Appendix

Table A1 Replication of main results without logged values

	(1) Gender added	(2) Symbolic capital added	(3) Trans-national capital added	(4) Social capital added	(5) Men only	(6) Women only
SSCI journal articles	1.112*** (7.232)	1.102*** (6.448)	1.101*** (5.218)	1.100*** (5.017)	1.106*** (4.838)	1.165* (2.389)
Non-SSCI articles	0.987 (–1.083)	0.988 (–0.962)	0.989 (–0.901)	0.987 (–1.101)	0.984 (–1.244)	1.001 (0.047)
Books	1.122** (2.747)	1.132** (2.858)	1.139** (3.041)	1.144** (3.116)	1.097* (1.987)	1.465** (3.134)
Edited volumes	1.050 (1.421)	1.052 (1.449)	1.046 (1.272)	1.039 (1.081)	1.019 (0.480)	1.189+ (1.885)
Book chapters	1.021** (3.202)	1.020** (3.128)	1.021** (3.250)	1.025** (3.234)	1.029*** (3.726)	0.996 (–0.164)
Gray literature	0.984+ (–1.938)	0.985+ (–1.822)	0.986+ (–1.687)	0.987 (–1.570)	0.987 (–1.508)	0.989 (–0.372)
Female	1.336* (2.017)	1.362* (2.164)	1.355* (2.140)	1.375* (2.289)		
Prestige graduation		1.004 (0.130)	1.006 (0.199)	0.999 (–0.037)	0.991 (–0.204)	1.048 (0.790)
Prestige doctorate		0.978 (–0.679)	0.981 (–0.583)	0.976 (–0.702)	0.927 (–1.636)	0.974 (–0.435)
Prestige habilitation		1.040 (1.095)	1.039 (1.043)	1.039 (1.036)	1.029 (0.635)	1.113+ (1.933)
Awards		1.230** (2.938)	1.221** (2.831)	1.194* (2.449)	1.074 (0.748)	1.667*** (4.283)
Months abroad			1.001 (0.708)	1.000 (0.064)	1.000 (0.209)	0.998 (–0.819)
Studied abroad			1.226 (1.149)	1.188 (0.982)	1.335 (1.294)	1.117 (0.368)
Doctorate abroad			1.313 (1.147)	1.257 (0.960)	0.991 (–0.034)	1.678 (0.893)
International publications			0.996 (–0.558)	1.001 (0.140)	1.002 (0.258)	1.029 (1.409)
Mobility				1.067* (2.103)	1.059 (1.417)	1.064 (1.292)
Interim professor				0.901 (–1.639)	0.890 (–1.538)	1.012 (0.091)
Department size				1.011 (0.768)	1.011 (0.679)	1.065* (2.559)
Co-authors				0.997 (–1.017)	0.996 (–1.272)	0.995 (–0.522)
Incomplete	1.837*** (3.620)	1.935*** (3.841)	1.942*** (3.895)	1.928*** (3.871)	1.836** (3.183)	3.375*** (3.808)
Open positions	1.007 (0.811)	1.007 (0.857)	1.007 (0.768)	1.006 (0.694)	1.011 (1.075)	0.990 (–0.516)
Habilitation	1.624*** (5.605)	1.625*** (5.532)	1.631*** (5.421)	1.637*** (5.321)	1.469*** (4.486)	2.540*** (3.567)
Habilitation (squared)	0.961*** (–3.633)	0.961*** (–3.617)	0.961*** (–3.558)	0.960*** (–3.513)	0.973** (–2.886)	0.907** (–2.682)
Assistant professor	1.307*** (5.791)	1.320*** (5.927)	1.323*** (5.937)	1.307*** (5.606)	1.325** (3.106)	1.347*** (4.085)
Pseudo R^2	0.083	0.087	0.088	0.090	0.084	0.191
Log-likelihood	–1495.249	–1489.602	–1488.066	–1484.572	–933.638	–347.729
Degrees of freedom	12	16	20	24	23	23
Chi^2	330.687	327.121	346.859	344.188	229.004	177.012
AIC	3014.497	3011.205	3016.132	3017.143	1913.276	741.459
BIC	3113.608	3143.353	3181.317	3215.365	2094.879	904.091
Number of events	297	297	297	297	203	94
N (persons)	1260	1260	1260	1260	734	526
N (persons-publications)	28545	28545	28545	28545	19846	8699

Notes: Exponentiated coefficients (hazard ratios); *t* statistics in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001 (two-sided tests).

Table A2 Testing changes and robustness over time

	(1)	(2)	(3)	(4)	(5)	(6)
SSCI journal articles (ln)	1.686***	1.499**	1.684***	1.687***	1.700***	1.536**
	(5.674)	(2.813)	(5.667)	(5.687)	(5.719)	(2.849)
Non-SSCI articles (ln)	0.998	0.996	0.998	0.999	0.994	0.993
	(–0.023)	(–0.046)	(–0.023)	(–0.015)	(–0.063)	(–0.067)
Books (ln)	1.630**	1.635**	1.673*	1.625**	1.637**	1.840*
	(3.169)	(3.169)	(2.034)	(3.159)	(3.178)	(2.211)
Edited volumes (ln)	1.333**	1.336**	1.332**	1.328**	1.334**	1.326*
	(2.631)	(2.640)	(2.616)	(2.586)	(2.625)	(2.556)
Book chapters (ln)	1.170	1.185	1.170	1.172	1.180	1.188
	(1.338)	(1.427)	(1.331)	(1.348)	(1.395)	(1.449)
Gray literature (ln)	0.851*	0.848*	0.852*	0.849*	0.847*	0.844*
	(–2.274)	(–2.304)	(–2.273)	(–2.313)	(–2.336)	(–2.370)
Female	1.413*	1.417*	1.412*	1.415*	1.887*	1.864*
	(2.432)	(2.440)	(2.424)	(2.436)	(2.114)	(2.026)
Prestige graduation (ln)	0.734	0.741	0.734	0.730	0.716	0.718
	(–0.968)	(–0.933)	(–0.970)	(–0.991)	(–1.041)	(–1.031)
Prestige doctorate (ln)	0.667	0.665	0.668	0.666	0.666	0.668
	(–1.303)	(–1.302)	(–1.295)	(–1.309)	(–1.300)	(–1.281)
Prestige habilitation (ln)	1.254	1.271	1.251	1.241	1.256	1.249
	(0.669)	(0.704)	(0.659)	(0.638)	(0.666)	(0.641)
Awards (ln)	1.509*	1.496*	1.510**	1.271	1.500*	1.303
	(2.569)	(2.496)	(2.576)	(0.582)	(2.527)	(0.656)
Months abroad (ln)	1.016	1.016	1.016	1.018	1.016	1.016
	(0.406)	(0.397)	(0.400)	(0.435)	(0.401)	(0.394)
Studied abroad	1.163	1.161	1.159	1.156	1.174	1.153
	(0.878)	(0.877)	(0.855)	(0.843)	(0.939)	(0.829)
Doctorate abroad	1.111	1.109	1.113	1.093	1.095	1.088
	(0.467)	(0.455)	(0.472)	(0.388)	(0.404)	(0.367)
International publications (ln)	1.084	1.076	1.084	1.084	1.079	1.077
	(1.003)	(0.916)	(1.009)	(1.004)	(0.950)	(0.917)
Mobility (ln)	1.380*	1.372*	1.382*	1.380*	1.367*	1.369*
	(2.530)	(2.471)	(2.525)	(2.536)	(2.457)	(2.452)
Interim professor (ln)	0.941	0.953	0.941	0.943	0.944	0.956
	(–0.413)	(–0.322)	(–0.411)	(–0.399)	(–0.393)	(–0.299)
Department size (ln)	1.230+	1.230+	1.230+	1.228+	1.234+	1.233+
	(1.864)	(1.864)	(1.865)	(1.856)	(1.882)	(1.878)
Co-authors (ln)	0.996	0.997	0.996	0.996	0.997	0.999
	(–0.056)	(–0.036)	(–0.052)	(–0.055)	(–0.041)	(–0.014)
Incomplete	1.956***	1.949***	1.955***	1.951***	1.968***	1.951***
	(3.735)	(3.706)	(3.722)	(3.712)	(3.733)	(3.671)
Open positions (ln)	1.087	1.090	1.087	1.092	1.086	1.091
	(0.564)	(0.582)	(0.563)	(0.588)	(0.557)	(0.583)
Habilitation	1.557***	1.555***	1.556***	1.556***	1.553***	1.550***
	(5.422)	(5.437)	(5.407)	(5.418)	(5.393)	(5.382)
Habilitation (squared)	0.964***	0.964***	0.964***	0.964***	0.964***	0.965***
	(–3.692)	(–3.699)	(–3.676)	(–3.692)	(–3.671)	(–3.652)
Assistant professor (ln)	2.267***	2.261***	2.265***	2.271***	2.292***	2.283***
	(5.523)	(5.450)	(5.512)	(5.557)	(5.556)	(5.508)
Post2000	0.977	0.811	1.017	0.944	1.063	1.057
	(–0.122)	(–0.786)	(0.043)	(–0.284)	(0.297)	(0.123)
Post2000*SSCI articles (ln)		1.169				1.137
		(0.963)				(0.758)
Post2000*Books (ln)			0.967			0.861
			(–0.117)			(–0.485)
Post2000*Awards (ln)				1.228		1.176
				(0.495)		(0.395)
Post2000*Female					0.704	0.715
					(–1.089)	(–1.000)
Pseudo R^2	0.103	0.103	0.103	0.103	0.103	0.103
Log-likelihood	–1463.389	–1462.962	–1463.383	–1463.247	–1462.867	–1462.399
Degrees of freedom	25	26	26	26	26	29
Chi^2	346.344	345.857	352.711	348.216	341.794	349.764
AIC	2976.779	2977.924	2978.765	2978.495	2977.734	2982.798
BIC	3183.260	3192.664	3193.505	3193.235	3192.474	3222.315
Number of events	297	297	297	297	297	297
N (persons)	1260	1260	1260	1260	1260	1260
N (persons-publications)	28545	28545	28545	28545	28545	28545

Notes: Exponentiated coefficients (hazard ratios); *t* statistics in parentheses; ln = logged values; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001 (two-sided tests)..

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