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Gender differences in the determinants of becoming a tenured professor, obtaining a habilitation, research productivity, and leaving academia in Germany from 1980 − 2019

Dissertation im Fach Soziologie

zur Erlangung des akademischen Grades *Dr. rer. soc.*

durch die Fakultät für Human- und Sozialwissenschaften

der Bergischen Universität Wuppertal

vorgelegt von

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Februar 2022

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Acknowledgements/Danksagung

Über Karrieren in den Sozialwissenschaften zu promovieren war vermutlich eine der größten Herausforderungen, die ich als Nachwuchswissenschaftlerin (und vielleicht auch als Person) annehmen konnte. Gleichermaßen hat es mir einen professionellen Blick auf den akademischen Arbeitsmarkt erlaubt, dessen erste Hürde ich mit dieser Dissertation bestritten habe. Eine Hürde, die ich nicht ohne die zahlreiche Unterstützung anderer geschafft hätte.

Aus diesem Grund möchte ich insbesondere meinen Betreuern Mark Lutter und Martin Schröder danken. Durch eure außergewöhnliche Unterstützung, Geduld und zahlreichen Ratschlägen in allen Bereichen und allen Phasen meiner Promotion habt ihr nicht nur meine Forschung, sondern auch mein Selbstbild als Wissenschaftlerin geprägt. Ich bedanke mich für die Freiheiten und das Vertrauen, das ihr mir immer zugesprochen habt! Es ist mir eine Freude, auch in Zukunft mit euch zusammenarbeiten zu dürfen.

Meine bisherigen Jahre in der Wissenschaft sind von Einflüssen unterschiedlicher Universitäten geprägt. Ich danke deshalb meinen Mannheimer Kolleginnen und Kollegen von GESIS, die die ersten Weichen für meinen Weg in die empirische Sozialforschung gestellt haben − Weichen, die sich bis heute immer noch kreuzen. Neben meinen Kolleginnen und Kollegen der Universität Marburg möchte ich auch denen an der Universität Wuppertal danken, von denen viele eine wichtige Rolle für meine Promotion gespielt haben. Insbesondere danke ich hierbei Reinhard Schunk als weiteren Gutachter meiner Dissertation, ebenso Thomas Heinze, mit dem ich bereits zusammenarbeiten durfte.

Als einzige wissenschaftliche Mitarbeiterin des Forschungsprojekts wäre der zugrunde liegende Datensatz für meine Dissertation nicht ohne weitere Unterstützung entstanden. Mein Dank gilt deshalb allen (24!) Hilfskräften, die ich in den letzten vier Jahren einarbeiten und betreuen durfte. Ich hoffe, ich konnte euch einen Einblick in die empirische Datenerhebung geben und wünsche euch alles Gute für eure Zukunft. Mein Dank gilt deshalb Silvia Bonadiman, Marius Kaffai, Linus Weidner, Marie von der Heyden, Petra Metzlaff, Oumaima Laaraki, Anna Jansen, Mareen Labsch, Katharina Storch, Corinna Neuhoff, Simon Eckert, Leon Hartges, Mehtab Uelker, Stella Marceta, Gulistan Harimci, Alicia Mathes, Lena Weckesser, Marko Lolić, Charlotte Müller, Chiara Loi, Jasper Pfaff, Joana Reuter, Luca Hollricher und Megan Zipse.

Schließlich möchte ich mich noch bei denjenigen bedanken, deren Unterstützung weit über die kollegiale Ebene hinausging. Theresa Nutz, ohne dich wäre es nicht gegangen! Als Freundin und hochgeschätzte Wissenschaftlerin bist und bleibst du mir ein großes Vorbild. Die gleiche Wertschätzung und Dankbarkeit möchte ich Nina Hossain, Sonja Malich und Julia Liebnau widmen. Ich danke außerdem Randy Stache und Florian Vietze. Ihr habt mich beide auf meinen ersten Schritten in der Wissenschaft begleitet. Ebenso danke ich Nico Seifert, mit dir habe ich im Master die gemeinsame Leidenschaft für quantitative Sozialforschung und Sozialstrukturanalyse geteilt. Ich danke euch für den kollegialen und freundschaftlichen Austausch und die konstruktiven Diskussionen, die wir geführt haben − und hoffentlich noch führen werden.

Zuletzt bedanke mich für die endlose emotionale Unterstützung meiner Familie. Ich danke meinem Vater, ohne dich wüsste ich nicht, ob ich den Weg in die Wissenschaft gefunden hätte. Meiner Mutter danke ich für ihren stetigen Zuspruch und ihr offenes Ohr. Sarah und Uwe, euch danke ich, dass ich in dieser Zeit immer die Schwester und nicht die Soziologin war.

Isabel

Chapter 1: Introduction

In this dissertation, I focus on academic careers within the social sciences in Germany. Although "the social sciences" is usually used as an umbrella term for sub-disciplines including educational or religious studies, or ethnology, I focus in this thesis on the three main disciplines − sociology, psychology, and political sciences − as they are the largest. The question guiding this thesis is the often discussed but poorly answered question *why are there fewer women in higher academic positions?* To follow up on this question, the dissertation uses innovative and unique data from sociologists, political scientists and psychologists in Germany. For sociologists in particular, this dissertation builds up on a former research project that focused on academic careers leading to tenured professorships (see Lutter and Schröder 2016; Lutter and Schröder 2020), which I extend with a more advanced panel structure in my dissertation. The aim of this dissertation is, therefore, to offer a broader understanding of how the careers of social scientists are shaped, how female and male academics respond differently to challenges within the career pipeline (from doctoral and post-doctoral positions to tenured professorships), and what determines who leaves the academic labor market.

Gender differences in career tracks are often discussed in male-dominated disciplines, usually in the context of the STEM fields (science, technology, engineering, and mathematics). The reason behind this is the gender gap within those fields, because women are outnumbered by men at every career stage. Scholars have tried to explain how women get ahead when faced with hurdles that are unique to male-dominated disciplines, providing suggestions and practical guidelines for action on gender equality to boost the proportion of women in STEM fields (Beede et al. 2011; Blickenstaff 2005; Glass and Minnotte 2010; Jensen and Deemer 2019; Kahn and Ginther 2017).

What makes it interesting to focus on social scientists is that social sciences are traditionally gender-balanced disciplines, but the gender gap is increasing in higher academic positions. So the end of the career pipeline in the social sciences has proportionally higher numbers of male professors, similarly to the STEM fields. From an ideological perspective, a balanced gender ratio is ideal in the light of gender equality. From a scientific perspective, a balanced gender ratio is ideal because results are not biased by numerical imbalances and are hence representative of each gender. Since the "leaky pipeline" (the disproportional loss of women at each career stage) is not only prevalent in the STEM fields, I aim to offer a broader understanding of gendered career paths towards professorships that contributes to an overall understanding of gender inequality in academia.

The remainder of **Chapter 1** provides an overview of the body of this dissertation. First, I introduce my theoretical framework to indicate how (gender) inequality emerges in academia. In doing so, I explain how I derive each chapter's specific research question and indicate where it fits in the career pipeline (1.1). Eventually, I introduce my study design as the basis of each chapter (1.2). I then point out the hypotheses of each chapter and answer each research question by summarizing the key results (1.3). I conclude with a reflection on the study results in light of women in academia, and explain how the findings contribute to higher education research. Finally, I present the study's limitations and strengths (1.4). **Chapter 2** to **Chapter 8** then forms the main part of my thesis, each reporting comprehensively on individual the empirical studies that together comprise this dissertation.

1.1 Theoretical framework − Following Merton, Bourdieu, and Weber

The academic labor market involves a specific field of employees: academics. Academics are students, junior and senior researchers, and professors, all of whom strive for research and knowledge. By the nature of (social) scientists, they also make themselves the objects of their investigations, developing and evaluating maxims of action for their own field.

Self-evaluation began with the American economist and sociologist, Robert K. Merton, in his masterpiece about "The Sociology of Science" (1973 [1942]). Similarly, the German economist and sociologist Max Weber (1930) focused on "Science as a Vocation" ("*Wissenschaft als Beruf*"), and the French sociologist Pierre Bourdieu characterized scientists as a "homo academicus" (1988) who accumulates "scientific capital" (1975) for their careers. These scholars complementarily seek to answer questions on the norms that exist in academia (1.1.1), which resources are particularly beneficial in science/for a scientist (1.1.2), and, based on the previous questions, whether and how academic inequality arises (1.1.3). Framed by these questions, I focus on *gender differences* in the determinants of becoming a tenured professor, obtaining a habilitation, research productivity, and leaving academia, among social scientists in Germany.

1.1.1 Academic norms as "institutional imperatives"

Robert K. Merton defines four imperatives in the ethos of science (Merton 1973 [1942]:270–78). Accordingly, the "institutionalized goal" in academia is to produce certified knowledge as *common property* ("communism" as the 2nd imperative). In order to do so, science is subject to *organized skepticism* (4th imperative), the critical scrutiny of scientific claims. Talented scholars generate *disinterested* knowledge ("disinterestedness" as the 3rd imperative), for which they are evaluated and rewarded regardless of any personal characteristic. In this sense, *universalism* (as the 1st imperative) precludes evaluation that is subject to particularism, such as gender, race, or ethnic background.

According to universalism, Merton argues that scientific careers should be "open to talents" and, in this sense, "scientific [pursuit] is a functional imperative" so that careers may not be restricted "on grounds other than lack of competence" (Merton 1973 [1942]:272). *Universalism* is thus considered the most prominent imperative in science, since it addresses scientists in person, albeit in a contra-intuitive way: scientific evaluation should *not* be restricted to individual attributes but rather to personal talent, what Merton calls "the impersonal character of science" (Merton 1973 [1942]:270). Simply put, a scientist's progress should be based on the quality of their research, not on the person themselves. So, gender or ethnic background should be ignored when evaluating a scholar's talent. But what does academic talent actually look like, and how are scientific achievements considered?

1.1.2 Access to academia and the allocation of scientific resources

To fully grasp how scientific resources translate into beneficial skills and talent, we must first understand how the academic labor market works. Academic careers are pre-structured, so that *access to academia* is also restricted. Once part of academia, scientific resources can be systematically accumulated in the career pipeline and may "work" differently depending on gender.

Max Weber explains how academic systems differ across countries and that German academia follows "plutocratic premises" (Weber 1930:5; Weber 2004:2). Compared to the US, Germany has no comparable tenure-track system that offers employment prospects in early career stages.[1] While getting tenure is always competitive, academics in the German system face uncertainties due to long periods of temporary contracts, until only a select group of scientists obtain tenured positions. Max Weber noted in 1930 that the years of job insecurity in German academia[2] mean that academia is restricted to those who can (monetarily) afford long-term insecurity. In this sense, German academia is not open to all talent, as access is restricted to those who can compensate for "academic insecurity." This is not only a matter of monetary efforts and unemployment risk, but also a matter of life decisions. For example, the decision to start a family depends to a large degree on long-term employment security. Consequently, fewer female scientists have children compared to their male counterparts, a gap that increases with career stages in Germany (Rusconi and Solga 2011:18). In this way, academia is restricted to a particular group of people who are willing to face a high risk of job uncertainty and associated dependents in other aspects of life (i.e., family).

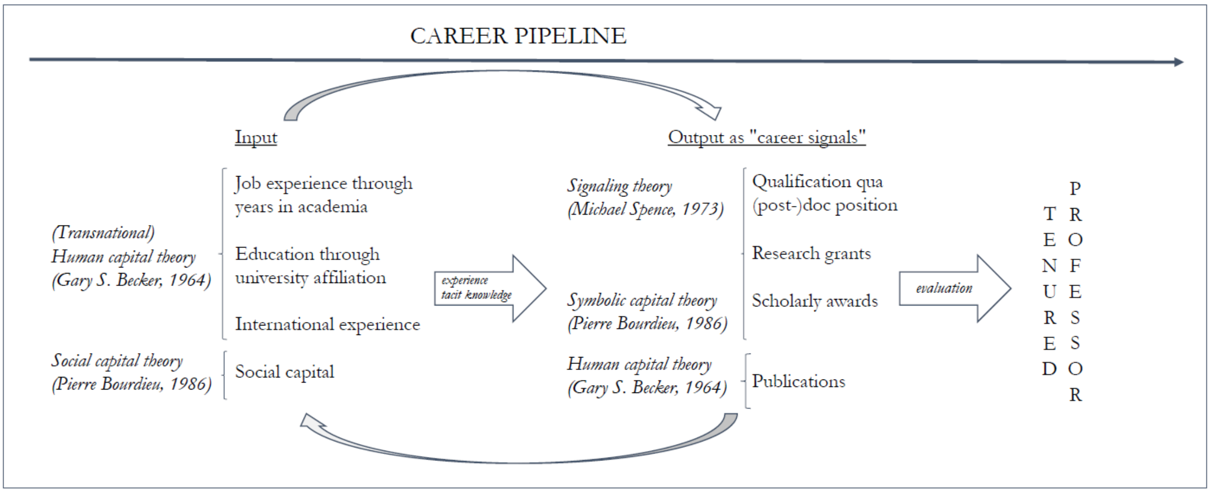
Not only is academic access selectively restricted but the allocation of *scientific resources* can also be highly selectively restricted in academia. In this sense, universities are locations in the struggle for status, control, and valued forms of capital (Bourdieu 1988). The existing literature still lacks a uniform definition of scientific resources − perhaps because "what is at stake in the struggle is itself an issue at stake in the struggle" (Bourdieu 1975:24). Scientific resources can be clustered by different dimensions of capital as, for example, (transnational) human capital (Becker 1993 [1964]), and social and symbolic capital (Bourdieu 1986), all of which I address in the following chapters to explain career achievements. At this point, however, I note that the different types of scientific capital act as input that breeds further

[1] Although the newly introduced (in 2002) junior professorships offer the possibility of tenure-track, virtually no tenure-track professorship exist in Germany yet.

[2] Usually, graduates in Germany must obtain a permanent position (usually professorships) after 12 years, otherwise they can no longer be employed in temporary positions (due to German laws on fixed-term contracts). Professors are tenured after around 13-15 years in the social sciences in Germany (see Chapters 2-4), so almost all academics have to pass this long period of insecurity unless they − literally − exit the system.

output throughout the career pipeline (Figure 1). In this sense, both academic input and output act as determinates of academic success.

Figure 1. Input-output model of the career pipeline.



According to Figure 1, different types of capital − human or social capital − increase job prospects in the academic labor market. *Job experience* as human capital (Becker 1993 [1964]) refers to the years spent in academia at certain universities or research institutes, and includes *international experience*. Similarly, the quality of a scientist's *education* (Becker 1993 [1964]) through, for example, German universities of excellence, may boost their progress and increase research productivity. *Social capital* through connections with other academics (Bourdieu 1986), in turn, is essential for scientists in order to increase support and collaborations, and "a bundle of experts" strengthen research productivity and abilities. All of this is incorporated as academic input.

As input breeds output, advancing along the career pipeline takes place through the output-evaluation of peers. Academic output refers to the *academic position* to which someone is hired, as this is the first evaluation by scientific peers and thus signals[3] (Spence 1973; Spence 1974) "pre-approval" for future positions. This may be the PhD and post-doc positions that enable a thesis to be written, or holding a

[3] According to signaling theory, labor market productivity can signal effort and success which cannot directly be quantified by outcomes.

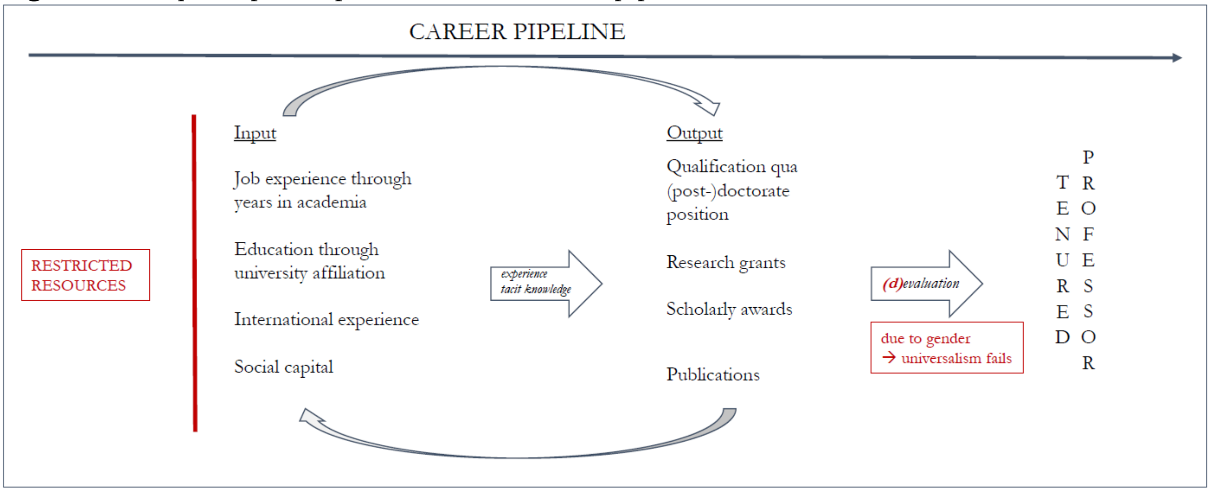
junior professorship (likewise later, for associate and full professorships); especially when degrees at German universities of excellence translate into prestigious career signals. Potential candidates have to pass and qualify for hiring because "the sociology of knowledge or of science is no more than the most irreproachable form of the strategies used to disqualify rivals" (Bourdieu 1975:40). However, not only positions of employment, but also *publications* literally offer proof of acceptability by peers ("peer-review"), and as such can also be seen as further human capital (Becker 1993 [1964]) that results in output and leads to further input. The same applies to *research grants* and *scholarly awards*, incorporated as career signals (Spence 1973; Spence 1974) and symbolic capital (Bourdieu 1986). In all these scenarios, academic performance needs to be justified and is approved by peers, and when it is, this signals future performance and outstanding achievements.

It is striking here that academia is a cycle. This is because all of what I call "output" acts as further "input," which improves performance, closing the career cycle. According to Merton's imperatives, however, the mechanism for the way evaluation works across the career pipeline is shaped by "pure universalism." But what happens when "[u]niversalism is deviously affirmed in theory and suppressed in practice?" (Merton 1973 [1942]:273)

1.1.3 Inequality in academia

Inequality in academia arises when universalism fails, and when (or so that) scientific resources are unequally distributed among scholars and achievements are valued according to their characteristics, such as gender (see Figure 2).

Figure 2. Unequal input-output model of the career pipeline.



1.1.3.1 Universalism fails

Universalism − the impersonal character of science − fails when there is particularism, that is, when race, gender, religion, or nationality are subject to scientific evaluation instead of impersonal criteria (Merton 1973 [1942]:270). In other words, discrimination arises in academia when merit is based upon gender. Drawing on this, Merton put his scientific imperative of universalism into perspective when he introduced the "Matthew effect in science" about 30 years later (1968). The Matthew effect is that scientists are more likely to receive an award if they have already received one in the past − even when other scientists are equally proficient. It is thus not only the scientific achievement that is honored, but the scientist who is also given preference over other scientists. That is contra-factual to the way Merton previously described universalism, as an "impersonal character."

This becomes even more crucial when other scholars extend this perspective by revealing inequalities depending on gender. Scholars introduced the Matilda effect (Lincoln et al. 2012; Rossiter 1993), which is about female scientists being less honored and less visible than male scientists, demonstrating particularism. This further refers to a broader discussion of "female devaluation," which is when the achievements of women are valued less for specific reasons based on discrimination (see "devaluation theory" in Cohen and Huffman 2003b; Cohen and Huffman 2003a; Magnusson 2008; Ochsenfeld 2014). As shown in Figure 2, female devaluation crucially arises when women are hired less often because their achievements are judged more critically, or rewarded less than male performance (Lincoln et al.

2012:308; Long and Fox 1995). Women may therefore need to make more effort to be equally considered for job opportunities alongside men, for example, they have to publish more, or receive more awards or grants, in addition to facing other barriers that hinder their progress (e.g., expectations of childcare, restricted beneficial networks, subtle discrimination).

1.1.3.2 Restricted scientific resources for particular (groups of) scientists

Hiring practices may contribute to unequal structures for gendered career tracks to professorships, but the resources necessary to accumulate scientific capital can also be restricted (see Figure 2). Maternity is one of the main reasons that scientific resources are restricted. Women progress along the career pipeline more slowly due to having children (Ginther and Kahn 2009:165; Mason, Goulden and Wolfinger 2013), and may leave academia altogether (Preston 2004; Van Anders 2004), they become less mobile (Ackers 2004; Moguérou 2004; Van Anders 2004), and they are less likely to take highly competitive career tracks (Buser, Niederle and Oosterbeek 2014). A penalty for motherhood thus becomes visible when mothers spend less time in the labor market due to part-time jobs or maternity leave. When women or mothers are less likely to accumulate scientific resources, they cannot be equally considered due to their individual merit − regardless of (or in addition to) whether their merit is valued less. This is based on traditional family roles reflecting women's family responsibilities, patterns that still seem to be evident and hinder women from progressing along the career pipeline (e.g., for academic couples in academia: Rusconi and Solga 2010; Solga and Rusconi 2007).

In addition to motherhood, there may be structural barriers due to academic networks. For example, access to beneficial information about the academic labor market through beneficial academic networks can be restricted to male scientists in higher positions (the so-called "old boys" network, see McDonald 2011). Discrimination structures are evident when women are intentionally excluded from informal networks (Durbin 2011). Such networks will be maintained and restrict resources for women as long as there is still a gender imbalance in academia.

Structural barriers can also be evident in university affiliation. In 2005, Germany introduced so-called "universities of excellence" to improve competitiveness and international visibility by boosting financial resources for certain universities.[4] Again, there is visible gender imbalance at such universities when women are less likely to follow highly competitive career tracks because they are either less prone to competitiveness ("agonal structure of academia" in Krais 2002), or decide to avoid such universities because they think men will be preferred for academic positions; patterns also seen in the US (Bielby et al. 2014:754).

In summary, if scientific resources are restricted only to men or to childless women, then women with children will suffer disadvantages throughout their career. This is crucial, because the career pipeline acts as an input-output model, as illustrated in Figure 2. This means early disadvantages accumulate within the "academic cycle," and is the counterpart of what Merton calls "the accumulation of advantages":

> "The concept of cumulative advantage directs our attention to the ways in which initial comparative advantages of trained capacity, structural location, and available resources make for successive increments of advantage such that the gaps between the haves and the have-nots in science (as in other domains of social life) widen until dampened by countervailing processes." (Merton 1988:606)

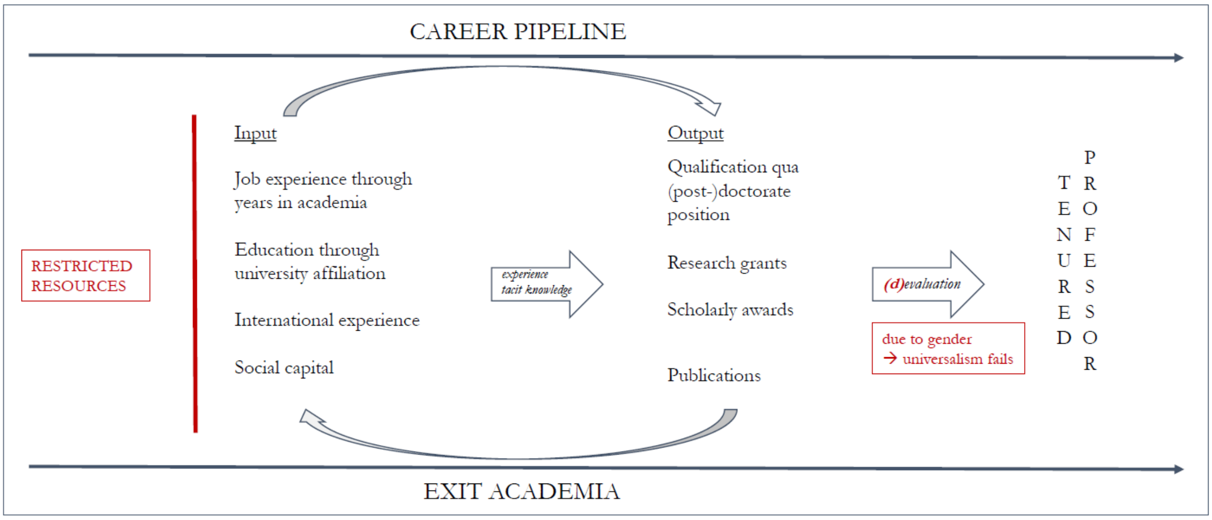
In framing this dissertation, I prefer to focus on "the accumulation of *dis*advantages" by gender throughout academic careers. Some scientists may accumulate advantages, while others accumulate *dis*advantages, such as those with limited resources and those whose work is valued less.

1.1.3.3 The consequence: Leaving academia?

As a consequence of restricted resources, the unequal accumulation of scientific resources (less-productive scientists), gender-specific outcome evaluations throughout the career cycle (female devaluation), or having children and thus a double burden (as mothers), scientists may exit the academic labor market entirely (see Figure 3).

[4] See Deutsche Forschungsgemeinschaft (DFG), Wissenschaftsrat, Bundesministerium für Bildung und Forschung (BMBF), Ministerien, Senatsverwaltungen und Behörden für Wissenschaft und Forschung der Länder 2013; Deutsche Forschungsgemeinschaft Wissenschaftsrat 2015.

Figure 3. Unequal input-output model of the career pipeline with the consequence of leaving academia.



I examine the career pipeline of social scientists, and focus especially on the question: At which career stage do academics leave science? According to the leaky pipeline, women disproportionally leave academia at each career stage. I therefore test whether there are gender-specific opt-out patterns at specific career stages, and − according to the introduced mechanisms − what determines who leaves academia. I use the overall results of my empirical studies to follow up on the question: *Why are fewer women in higher academic positions?*

1.2 Research design

1.2.1 Data

In order to address the research questions raised by the theoretical construct of the career pipeline, a research team first collected the curriculum vitae (CV) and publication records of sociologists, psychologists, and political scientists in Germany. In 2019, 14 student assistants collected the CVs and publication records for each department in these academic fields at German universities, and two of the main research institutes.[5] They used the internet sites of each university department and included scientists with at least one publication. The last possible observation year was 2019, but the observation

[5] For sociology and political science: Max Planck Institute for the Study of Societies and the WZB Berlin Social Science Center. For psychology: Max Planck Institute for Human Development and Max Planck Institute for Human Cognitive and Brain Sciences.

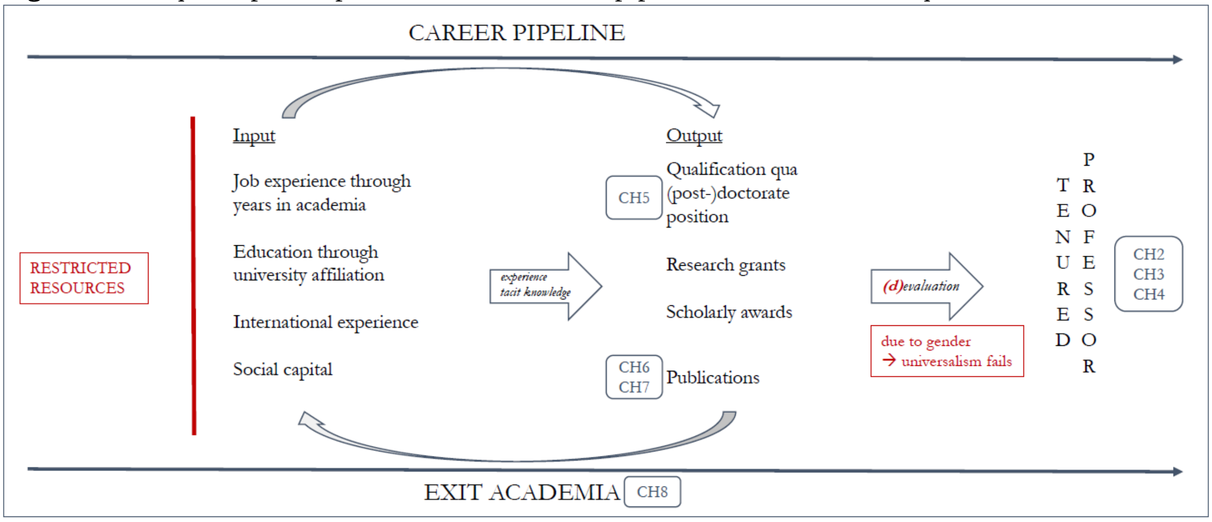
period ended with the last publication found. I thus can use retrospective data for career trajectories ranging back to 1980, with each publication taken as one observation. I checked all data for outliers and erroneous coding and used multiple consistency checks to ensure intercoder reliability. The study design allowed me to take advantage of non-reactive measurements through process-produced data using CVs. The independent CV variables I used to answer my research questions included different types of publications, the year and university of each qualification stage (graduation, PhD, habilitation, junior professorship, tenured associate and full professorship), international experience, mobility, co-authorships, interim professorships, and scholarly awards.

I added external data. First, I used the *Gepris* database of the German Research Foundation (DFG), as the biggest and leading funding agency for research grants in Germany. They provide information about the number and period of sponsored research proposals. I matched this information to all scientists included in the dataset. Similarly, I matched articles published in journals with those ranked in the SSCI (Social Science Citation Index) or the SCIE (Science Citation Index Expanded). I used the annual information provided by Clarivate Analytics' Journal Citation Report and added each journal's annual impact factor. I added information on the German Excellence Initiative introduced in 2005. I marked each German university that has since been endowed as a "university of excellence." Finally, I also conducted an email survey and sent it to all the academics in our dataset, asking whether they have children and when their children were born (response rates around 60%, see appendix for the online survey). In summary, I added the number of research grants by the DFG, journal citation reports (SSCI/SCIE), degrees from German universities of excellence, and having children.

The data collection took place in 2019 for psychologists and political scientists for the first time (first wave), but there was one peculiarity for sociology. In addition to the year 2019, the data collection for sociologists already took place in 2013 and 2016 (consecutively adding external data and conducting the email survey), so this dataset was a more advanced panel dataset by three waves of data collection. This is important in addressing the leaky pipeline in German academe: I can address those scientists who dropped out of academia after 2013, and also replicate prior single-wave-findings with multiple-waves, incorporating the leaky pipeline. The dataset covers a total of 2,193 sociologists (47% females) with 66,640 publications, 2,528 psychologists (56% females) with 82,427 publications, and 1,455 political scientists (38% females) with 54,423 publications.

In line with the different foci of each chapter and the proceeding study design, Figure 4 shows the whole career pipeline of scientists as regards my research questions in each chapter.

Figure 4. Unequal input-output model of the career pipeline: Where research questions are located.



As shown in Figure 4, I clustered the chapters of this thesis into four key questions. This allowed me to summarize the key findings from the academic fields of sociology, political science, and psychology and provide a representative picture of career trajectories within the social sciences in Germany. The leading research questions are as follows:

- What determines who becomes a tenured professor? (Chapters 2, 3, 4)
- Do mothers get lost at the post-doc stage? (Chapter 5)
- What explains who is productive? (Chapters 6 and 7)
- Who leaves academia and why? (Chapter 8)

Table 1 provides a comprehensive overview of each chapter.

Table 1. Overview of the chapters.

	Chapter 2: Publishing, Signaling, Social Capital, and Gender: Determinants of Becoming a Tenured Professor in German Political Science	**Chapter 3**: Gender Differences in the Determinants of Becoming a Professor in Germany. An Event History Analysis of Academic Psychologists from 1980 to 2019	**Chapter 4**: Female Advantage in German Sociology. The Effect of the Leaky Pipeline on Becoming a Tenured University Professor	**Chapter 5:** Do Mothers Get Lost at the Post-doc Stage? Event History Analysis of Academic Psychologists in Germany	**Chapter 6**: How Human Capital, Universities of Excellence, Third Party Funding, Mobility and Gender Explain Productivity in German Political Science	**Chapter 7**: Human Capital, Research Funding, and Gender: Determinants of Research Productivity in German Psychology	**Chapter 8**: Who Drops Out of Academia? Gender Differences in the Field of German Sociology Since 2013
Field of study	Political Science	Psychology	Sociology	Psychology	Political Science	Psychology	Sociology
Outcome variable	First tenured professorship	First tenured professorship	First tenured professorship	Habilitation	Productivity (SSCI/SCIE articles)	Productivity (SSCI/SCIE articles)	Academic exit
Data collection point(s)	2019	2019	2013, 2016, 2019	2019	2019	2019	2013, 2016, 2019
Individuals and observations (publications)	1,455 scientists 54,423 publications	2,528 scientists 82,427 publications	2,193 scientists 66,640 publications	2,528 scientists 82,427 publications	1,455 scientists 54,423 publications	2,528 scientists 82,427 publications	2,193 scientists 66,640 publications
Analytical approach	Cox regressions (time-to-event)	Cox regressions (time-to-event)	Cox regressions (time-to-event)	Cox regressions (time-to-event)	Random- and fixed-effects regressions (RE, FE)	Random- and fixed-effects regressions (RE, FE)	Cox regressions (time-to-event)
Authorship	Co-authorship with Mark Lutter and Martin Schröder	Co-authorship with Mark Lutter and Martin Schröder	Co-authorship with Mark Lutter and Martin Schröder	Single authorship	Co-authorship with Mark Lutter and Martin Schröder	Co-authorship with Mark Lutter and Martin Schröder	Single authorship
Publication status	Published in *PLoS ONE* (2021, DOI: 10.1371/journal.pone.0243514)	Published in *Research Policy* (2022, DOI: 10.1016/j.respol.2022.104506)	Submitted in *Soziale Welt* (accepted for consideration in the Special Issue: Career Paths Inside and Outside Academia)	Revised and resubmitted in *Higher Education*	Published in *Scientometrics* (2021, DOI: 10.1007/s11192-021-04175-8)	In preparation for submission	In preparation for submission

1.2.2 Methods

Given the longitudinal dataset, I used tailored methods to handle intra-individual career trajectories and time-to-event analyses. I used specific models of event history analyses to analyze the hazards in reaching certain career stages (professorships, habilitation) and academic dropout (Chapters 2, 3, 4, 5, and 8). More specifically, I used Cox regression analysis (Allison 2014), which is powerful, for analyzing longitudinal data such as career trajectories ranging from 1980 to 2019 and estimating the proportional hazards until a certain event occurs. Cox regression modeling also takes into account when a particular event occurs after the observation period ends (i.e., in 2019); so-called right-censored cases (Cox 1972). I therefore base my analyses on all scientists included in the dataset, irrespective of whether they are tenured yet (Chapters 2, 3, and 4), have obtained their habilitation yet (Chapter 5), or have left academia yet (Chapter 8).

In order to analyze the determinants of productivity instead of a certain event (Chapters 6 and 7), I used fixed- and random-effects models to explain productivity between academics, and their intra-individual productivity (Allison 2009). I used random-effects models to show which factors increase productivity, depending on the average number of publications in each field. In this first step, I focused on time-variant gender differences. In the second step, I ran fixed-effects models (which cannot consider time-invariant characteristics such as gender) to control previous publication trajectories and identify which factors alter a scientist's individual productivity. Integrating both models provides a comprehensive picture of the *between*-differences (RE) and *within*-differences (FE) of a scientist's research productivity within each field.

1.3 Summaries of the chapters: Hypotheses and key results

1.3.1 What determines who becomes a tenured professor? (CH2, CH3, CH4)

My first research strand addressed the question: What determines who gets tenured? This is the first study in Germany to answer this question for psychology, and only one comparable study exists for political sciences, but omits having children and comprehensive scientific capital (Plümper and Schimmelfennig 2007). The question of who becomes a professor has already been addressed for

German sociology, however, these studies analyze academic careers with regard to either the compositional structure or sampled selective academics, or else they miss essential factors such as having children (Auspurg, Hinz and Schneck 2017; Hillmert 2003; Jungbauer-Gans and Gross 2013; Lutter and Schröder 2016; Mau and Huschka 2010).

In order to answer the question of who gets tenured in political science, I hypothesize that the number of publications, career signals such as the years in career stages, degrees from universities of excellence, international experience, number of research grants and scholarly awards (Spence 1973; Spence 1974), and also social capital (Bourdieu 1986) increases the chance of getting tenure. Concerning gender differences, I further hypothesize that having children only has a detrimental effect on women.

I address gender differences in more detail within psychology. I outline the hypotheses above in light of the "devaluation theory" initially used to describe women's work as being less valued or rewarded (Lincoln et al. 2012:308; Long and Fox 1995; Magnusson 2008). I use interaction effects with each factor (see above) and gender to analyze whether reward is valued less for women, to test female devaluation theory. For example, do publications or awards count less for women than for men when it comes to hiring?

As the first data collection of sociologists took place in 2013, Lutter and Schröder (2016) had already tested the above hypotheses in sociology. One main finding of the original study design was that female sociologists have an increased chance of becoming professors than male sociologists with the same characteristics. This may be due to an artificial survivorship bias for women, because the data collection took place at one single point in time, in 2013. This means that, by design, sociologists who left academia before 2013 were not included. I thus replicate the original study by Lutter and Schröder with two follow-up waves in 2016 and 2019, including information on having children. I hypothesize that the female advantage is decreased when incorporating the leaky pipeline into the advanced panel design, and/or when considering children. In the next section, I summarize the key results across all academic disciplines with special emphasis on the particularities of each academic field.

1.3.1.1 Summarizing the main results

(1) Refereed *peer-reviewed articles* considerably increase the chance of becoming a professor. No other type of written work produces such a clear finding. It seems that not only publishing per se, but publishing via peer-reviews as an "extension of certified knowledge" (Merton 1973 [1942]:270) and institutional goal in academia is an integral for academics on their way to the top. Peer-review processes signal reliable standards to ensure knowledge, not only for academics whose knowledge is to be verified, but also to recruit and evaluate promising candidates for higher academic positions.

(2) The number of *research grants* as career signals (Spence 1973; Spence 1974) increases the chance of becoming a professor. It seems likely that research grants mirror what is already visible through publications: research grants are usually given to the most talented and productive scientists. They are therefore the most desirable candidates, and thus signal potential for future research output.

(3) *Mobility* strongly increases the chance of becoming a professor. I used mobility as a proxy for social capital accumulated by moving to another institution. In line with the theory of social capital and the theory of networks (Bourdieu 1986; Granovetter 1973; Granovetter 1983; Granovetter 1995 [1974]), "who one knows" is advantageous in finding a job, however, other measurements of social capital (interim professorships, co-authors) are not as important as mobility. It can therefore be debated whether mobility actually measures willingness to move to another job (as commitment and motivation to increase social capital), or the need to move to another university due to temporary contracts. This is because employment contracts at universities in Germany are limited in time (usually six years for each career stage unless getting a permanent position), in availability, and by internal bans (*Hausberufungsverbot*).

(4) Concerning *gender differences*, women do not have a lower chance of becoming a professor in their field than men with the same characteristics. Women, on average, publish less but do not need longer to progress along the career pipeline. They have a slightly higher chance (and significantly higher in sociology) of becoming a professor with the same characteristics as men. Women also achieve tenure more quickly than men once they receive their post-doctorate qualification (habilitation or junior professorship). In addition to merit-based criteria, male professors in political science and sociology are

more likely to have children than female professors. In psychology, it is the other way around. Across all three academic disciplines, having children is positively associated among men with getting tenured, and having children was not found to have a significant detrimental effect among women.

(5) Based on the *study design*, I hypothesized that the analyses could have been biased when women, who had children and/or were less career-orientated, left academia before the data was collected in 2013, so they cannot be equally considered in the analyses. Assuming that a systematically biased group of women left academia, the results of the studies could be biased due to a "*survivorship bias*." Survivorship bias occurs when only the most successful and career-orientated women remain in academia, resulting in a higher chance of getting tenure in the long term. I was able to address this selectivity issue within sociology because I used a more advanced panel dataset, considering all sociologists who left academia after 2013. When testing the hypotheses with the advanced panel data, including academic dropouts, however, female sociologists with the same characteristics as men still had a significantly higher chance of getting tenure, but were under-represented as professors.

(6) While a potential survivorship bias cannot explain the female advantage, neither can the theory of *female devaluation*. Assuming women's work counts less or is less rewarded than men's may result in their lower numbers in higher academic positions. I tested this for psychologists but was not able to support this hypothesis. Interaction effects reveal that neither having lower scientific capital nor having children can explain why fewer women are professors compared to men. On the contrary, women benefit more from their scholarly publications than men, which may suggest that they publish higher-quality papers. In sociology, however, where I found a significant female advantage, the relationship is the other way around. Compared to men, women's publications in sociology "count less" in becoming a professor, as interaction effects show.

1.3.2 Do mothers get lost at the post-doc stage? (CH5)

Building on the results of the determinants of becoming a tenured professor, I sought to answer the question of why fewer women are found in higher academic positions in earlier career stages in my second research strand. As shown in the previous section and by other authors, I cannot find a bias against hiring women (Ceci et al. 2014:101). According to the leaky pipeline, they might drop out of academia at earlier career stages, resulting in their underrepresentation at senior levels. I therefore analyzed gender differences for psychologists obtaining a habilitation as a post-doc qualification in Germany. In psychology, the habilitation is still the traditional path to qualifying for professorships (Statistisches Bundesamt 2020:330). The post-doc stage tends to be especially stressful for female academics due to time restrictions (by German fixed-term law) which coincide with life decisions about having children, for example, forcing them to leave academia (e.g., Dorenkamp and Weiß 2018). I therefore focus on the gender and parenting differences of post-docs in psychology to identify what determines who obtains a habilitation. In what I call the "worker explanation," I hypothesize a motherhood penalty such that mothers are less productive and less flexible, which reduces their opportunity to obtain a habilitation. I further hypothesize that women follow less likely prestigious university tracks and suffer due to time scarcity the longer they are "stuck" in the post-doc stage. In order to address the "discrimination explanation," I test the theory of female devaluation in research grants and scholarly awards (Lincoln et al. 2012:308; Long and Fox 1995; Magnusson 2008; Rossiter 1993), and whether this results in a reduced chance of obtaining a habilitation.

1.3.2.1 Summarizing the main results

(1) According to the "worker explanation," productivity through *SSCI/SCIE articles* increases the chance of obtaining a habilitation (similarly to becoming a professor). However, there is a significant difference in productivity between women and men, and also between mothers and fathers, such that increasing publications are a good indicator especially for women and mothers to obtain a habilitation. Women publish less than men overall, but mothers publish slightly more than fathers when they obtain their habilitation. This result might involve a selection effect when only highly successful and productive mothers "survive" along the career pipeline.

My study cannot confirm the assumption that parents are *less flexible* and *locally tied*, reducing the chance of obtaining habilitation. When they are awarded their habilitation, women and men are equally mobile, and mothers, conversely, move slightly more often to other universities in Germany than fathers.

Another trend is that the *years since the PhD* particularly increases a woman's chance of obtaining habilitation (and that of mothers), which indicates that women who obtained their PhD are also more likely to obtain habilitation. Women are not excluded from career tracks at *universities of excellence* and, in turn, having degrees from such universities is positively associated with their habilitation risk.

(2) According to the "discrimination explanation," the study does not support the female devaluation theory in *research grants* and *scholarly awards*. Women actually accumulate fewer awards and research grants compared to men (in a non-significant way), but not mothers compared to fathers. However, interaction effects showed that none of the two determinates translate into significant lower habilitation risk for women or mothers.

(3) In conclusion, the key finding is a remaining motherhood penalty for women that cannot be explained by either the "worker explanation" or the "discrimination explanation." Women with the same characteristics as men have a 50% less chance of obtaining a habilitation when they have children. Note that women do not suffer within the post-doc stage in academia per se, but mothers do. This is because the correlation between having children and the chance of obtaining a habilitation works differently for women than for men, as interaction effects show.

1.3.3 What explains who is productive? (CH6, CH7)

Following up on previous results, it becomes clear that publishing is an integral part of academic careers, and increases the chance of advanced positions in academia. While monographs from flagship publishers signal higher qualities than regular publishing houses in political sciences, it is the quantity of SSCI/SCIE publications that is most beneficial for getting tenure or a habilitation across the different types of publishing in the social sciences. In my third research strand, I therefore ask the question: what makes an academic productive in the first place? As already explained, research productivity can be seen as both an input and an output of scientific endowment, which is why I disentangle this relationship. I therefore answer the question of whether predetermined differences among academics explain productivity differences, or whether productivity results from differences in prior experience, accumulating to larger differences over time (illustrated in the career cycle, see Becker 1993 [1964]). I specifically address the well-documented productivity gaps of women, to answer this question, especially considering children. I hypothesize that the duration, quality, and social capital of one's education (Becker 1993 [1964]; Bourdieu 1986) and successfully acquired third-party funding affect academic productivity.

1.3.3.1 Summarizing the main results

(1) From an individual perspective, the main finding about how scientists become more productive relates to their prior publishing experience. When *comparing* researchers, prior productivity is an almost perfect predictor of future productivity. This insight helps to distinguish between future high- and low-productivity scientists, and is therefore important for decision-making in hiring. However, when looking *within* the career of an individual scientist, more publications in the past does not necessarily lead to more publications in the future. While past productivity helps when comparing productivity gaps between scientists, it also shows that the productivity of an individual scientist increases until tenure, but then decreases again. This may be reasonable, because having tenure reduces the incentive to publish, or because tenured professors have less capacity to publish when they have other responsibilities.

(2) From a structural perspective, not only are highly productive researchers more likely to obtain *research funding*, but their research productivity also increases due to third-party funding. This leads to two conclusions. First, it seems likely that the DFG especially chose scientists who were already pre-approved via their expertise in publications, which gives us important insights into what matters in their decisions to allocate funding. Second, it seems that the DFG achieves its goal of research funding in which a scientist's research productivity actually grows. The role of *universities of excellence* in Germany is different from those of third-party incentives, however. Similar to the allocation of research funding by the DFG, highly-productive scientists in particular (may) attend universities of excellence, so that prior publications seem to act as a pre-approval for their recruitment. It therefore seems likely, again, that these universities choose scientists with an already outstanding number of publications as a signal of future productivity (*"Bestenauslese")*. Unlike DFG funding, however, scientists at these

universities do not become more productive. This does not correspond to the goal of *increasing* productivity but rather to the concentration of highly productive scientists at such universities.

The results are interesting from a gender perspective when focusing on extrinsic incentives due to funding from the DFG or the German Excellence Initiative. When the models are separated for women and men, the results remain significant only for men. While the intrinsic incentives of early publishing are especially fruitful for women, the extrinsic incentives of external funding from the DFG or the Excellence Initiative in Germany are only relevant for men's productivity.

(3) Although *women* publish less than men with the same level of prior publication experience, they are less productive over their entire careers. This, in turn, can be explained neither by child-raising (children do not depress research productivity) nor by the leaky pipeline, which means fewer women reach advanced career stages. Similarly, I cannot explain this finding as due to other effects such as differences in international experience, social capital, or the quality of education, or research grants. According to my analyses, the prior publishing experience gained throughout the different career stages (but not the career stages themselves, per se) is the main predictor of later publishing output. This means that women need to publish early in their career; otherwise, they are punished by missing publishing experience, which accumulates into disadvantages across their careers (Merton 1988; Xie and Shauman 1998). However, the study results can be compared to the "theory of limited differences" (Cole and Singer 1991) for women. Women are slightly less productive than men at the same level of prior publication experience, but three times less productive without accounting for previous publishing experience. So small differences in missing publishing experiences accumulate to larger ones over the careers of women, and put them at a disadvantage.

This is a perfect example of the input-output model of a career cycle, however: since productivity acts as human capital, productivity gaps also affect other dimensions of the academic cycle. Publishing is therefore one of the purest examples of the academic cycle, as input breeds later output.

1.3.4 Who leaves academia and why? (CH8)

So far, I have focused on current social scientists in academia. To obtain a more comprehensive picture of social scientists on their way along the career pipeline, I finally focus in my fourth research strand on those who dropped out along the pipeline. I especially address what is metaphorically known as the "leaky pipeline": a disproportional loss of women at each career stage. I hypothesize that mothers in particular leave academia due to the additional burdens of child-raising. I identify potential barriers for women and test whether they increase the risk of women opting out: time scarcity within different career stages, a lack of social networks and access to prestigious universities, and disparities in publishing, scholarly awards, and research grants.

1.3.4.1 Summarizing the main results

(1) *Children* are not the main reason that scientists leave academia, for either women or men. A trend becomes visible such that mothers have a slightly higher risk of leaving academia, while fathers have a slightly lower risk. This trend can also be seen in the descriptive statistics, where female leavers are more likely to have children than male leavers, and when they do, they have more children on average. However, the results suggest that women − and not mothers per se − face higher risk of leaving academia: Women face a significantly higher risk of leaving academia, which cannot be explained by having children, career stages, universities of excellence, (international) academic networks, or differences in publishing, research grants, and scholarly awards.

(2) A clear trend becomes visible when examining *career stages* more closely: among all the sociologists who left academia between 2013 and 2019, more women left academia at the pre-doc stage, and more men tended to leave academia at the post-doc stage. This suggests that women do not genuinely pursue a scientific career in the long term or face hurdles especially at the pre-doc stage, which is why they exit the academic labor market at an early stage. Each additional year after obtaining a PhD, therefore, prevents female sociologists particularly from leaving academia.

(3) As already outlined in the previous sections, *publishing* plays an important role in determining academic career achievements. This can also be seen in the dropout risk for sociologists. Academic

leavers publish less than comparable academics who remain in academia, but each publication reduces their opt-out risk strongly. This is a finding that applies mainly to men, not to women. Women publish less than men either way, whether they leave or stay in academia. Edited volumes show a more specific result: acting as an editor significantly reduces the risk of leaving academia among men, while the risk is increased fourfold for women. The role of editors therefore goes beyond the publishing of certified knowledge when they act as the "gate-keepers" of scientific output: "the gatekeeper role is organized principally in the subroles (…) of editors and editorial staff who make the final determination of what shall enter this or that archive of science" (Merton 1973 [1942]:522). This, however, is a relationship that works only for men.

1.3.5 Gender differences in academia?

In summary, I find that there is a "female advantage" in becoming a professor, but a "female disadvantage" in leaving academia, and a "motherhood penalty" in obtaining a habilitation within the social sciences in Germany. According to my analyses, this cannot be explained by different endowment with scientific capital. The conclusions I have drawn from this dissertation is that, first, women more often leave academia before they finish their doctorate (sociology). Second, mothers suffer especially after obtaining their PhD, but before becoming professors (psychology). Once women (and mothers) reach the end of the career pipeline, their achievements are beneficially rewarded because they are more likely to become professors than men when productivity is considered (sociology, political science, psychology).

For future research, I suggest looking at earlier career stages to consider the guiding question of *why fewer women are in higher academic positions*. According to the career cycle, the disproportional loss of women in earlier career stages results in fewer women at the end of the career pipeline. Women suffer from productivity gaps early on, leading to greater differences in the long run. They are also more likely to leave academia in earlier career stages, leading to accumulated lower numbers at the end of the career pipeline. However, the studies also emphasize that when women "survive" to certain career stages, they are at an advantage. This is probably because we know about their difficulties throughout their careers.

When this is true, however, special consideration (e.g., affirmative actions) should not be given at the end of the career pipeline, but rather at an earlier stage.

1.4 Conclusions and outlook

1.4.1 Women in academia: A reflection

According to the results of this dissertation, one of the most prominent questions in academia still remains: *why are there fewer women in higher academic positions* when they have a higher chance of getting tenured than men when considering observable career signals and children? From a scientific perspective, I cannot fully answer this question based on my study results, however, I can draw conclusions that reflect my results. Apart from the contribution to higher education research, this study asks new questions and has potential for future research. In light of the proportion of women in academia, I first focus on the possibility of women taking another route inside academia (1.4.1.1). Second, I focus on the "female advantage," reflecting affirmative actions in Germany (1.4.1.2), and, third, I consider the changing academic landscape in Germany due to structural reformations in the last two decades (1.4.1.3). Fourth, I place the results of the German academic labor market in a global perspective (1.4.1.4).

1.4.1.1 Do women take other routes inside academia?

Two particular findings from my analyses indicate that women may not be taking the tenure-track path, yet continue to pursue an academic career. In order to explain my thoughts, I need to briefly outline the German science system in more detail. There are three central pillars in science in Germany: universities (with the exclusive right to award doctorates and habilitations), universities of applied sciences (with a focus on teaching), and research institutes (with a focus on research). I focused on the first pillar in this dissertation, since universities are responsible not only for research but also for the qualification of junior scientists: the next generation of future professors. When scientists take the traditional path to professorships in Germany, they must earn a doctorate and habilitation to qualify for a tenured professorship (with a few exceptions).

Another path in Germany leads to a professorship beyond the habilitation, that is professoriates at universities of applied sciences with a focus on teaching, as they have other recruitment preferences, such as outstanding experience in the non-academic labor market. The official 2019 statistics for Germany show that as many women as men hold a professorship in the social sciences at universities of applied sciences (Statistisches Bundesamt 2020:117), while fewer women are professors at universities. In my analysis, it appears that the "female advantage" in sociology becomes somewhat smaller when I exclude initial appointments at universities of applied sciences (which is more likely to apply to women). In addition, it is known from other research that women, especially women with plans to have a family, prefer teaching-intensive faculties rather than a highly competitive tenure-track pipeline "when they believe those tracks are more compatible with their family plans" (Ceci et al. 2014:121; Goulden, Frasch and Mason 2009:16). This may be a possible explanation for gender-specific career paths in universities of applied sciences, a trend that can also be seen in my dissertation but is less studied yet. This may further be an explanation for the "motherhood penalty" I found at the post-doc stage in German psychology, when women with children self-select from the traditional (publish-or-perish) university track by skipping the habilitation in order to become a professor at a university of applied sciences.

1.4.1.2 Affirmative action in German academia

In addition to the idea that women may take alternative routes to become professors within academia, special consideration should also be given affirmative action practices in Germany. While affirmative action started to be seen in the 1980s (e.g., via women's representatives at German universities), the increase in women in higher academic positions was only marginal (Wetterer 1994; Wetterer 2000).[6] The goal to increase the proportion of women within universities from bottom-up failed. It was only when external actors such as the *Wissenschaftsrat, the Deutsche Forschungsgesellschaft (DFG)* and the

[6] This can be observed in Europe as whole over the last two decades (Caprile et al. 2012:22).

Bundesministerium für Bildung und Forschung (BMBF) became involved after 2000, that actual changes became visible and measures to increase the proportion of women at universities were implemented (for a comprehensive overview of what has changed in the last 20 years, e.g., see Zimmermann 2016). Among other programs, the "*Profesorinnenprogramm*" introduced in 2007 and funded by the BMBF played a decisive role in increasing the proportion of women in higher academic positions, seeking to establish a total of 750 professorships for women by 2020 (Bundesministerium für Bildung und Forschung 2020). In doing so, they subsidized the earlier appointment of tenured professorships (W2/W3) for a maximum of five years. The total number of female professorships actually *did* increase, however: not the total number of professoriates, but professorships "reserved" only for women.

The "female advantage" in becoming a professor found in my dissertation may therefore reflect affirmative actions at universities while the proportion of women in academia has simultaneously increased in recent decades. Academia is structurally changing − at least in the short term. Whether "quantitative equality" leads to "gender equality" in the long run is still not known. It probably takes time to fully incorporate changing career patterns from the start until the end of the academic pipeline. It takes almost two decades to reach the end of the career pipeline as a tenured professor. It may take even longer for policy implications and structural changes to surface within academia: "[b]uilding more consistent links between analysis and policy making should be the main priority for research" (Caprile et al. 2012:23).

1.4.1.3 The role of the new "junior professorships" for women

In addition to affirmative action in the last two decades especially, academia in Germany was also reformed by law in 2002 (*Wissenschaftsbesoldungsgesetz*). The structure of professorships changed, and three main categories of professorships were distinguished ("W-salary"): (W1) junior professorships, comparable to assistant professorships in the US, but basically without being tenure-track[7]; (W2) associate tenured; and (W3) full tenured professorships. This policy change is connected to the US

[7] For an evaluation report, see e.g., Federkeil and Buch (2007).

academic system, bringing the German academic labor market up to international standards, and recruiting scientists from abroad.

But what happens in praxis? In Germany, most of the junior professorships are without tenure-track. US assistant professorships are supposed to lead to tenure after six years, but German junior professorships are limited to six years. Although junior professorships act as stepping stone positions for eventual tenured professorship (74% to 85% of junior professorships transition to tenured professorships or equivalent positions abroad, see Zimmer 2018:233), the period of employment uncertainty remains for another six years. This uncertainty is reflected, for example, in the fact that junior professors also write a habilitation (Kreckel and Zimmermann 2014:43), although this would ideally be an alternative to positive interim evaluation for junior professors. The lack of German tenure-track junior professorships was addressed when policy makers enabled 1,000 new tenure-track professorships in 2018, 16 years after the idea was structurally anchored[8].

What, then, is the role of women? While the proportion of men is already higher at the post-doctorate qualification level − traditionally the habilitation in Germany − women are more likely to hold junior professorships (Blome et al. 2013:34; Zimmer 2018:43). Although this was not the focus of interest in this thesis, my data supports prior research. The newly established junior professorships may be especially fruitful for women, resulting in the increased visibility of women in academia at first glance (Blome et al. 2013:34).

Contrary to the "*Professorinnenprogramm*", however, the tenure-track junior professorships established in 2018 are not reserved for women only. The absolute number of tenured professorships also has not changed at all. The implemented positions (1.000 tenure-track professorships in 2018, whereas 750 tenured professorships until 2020 for women only) are not additional tenure-track professorships, but are an extension of existing ones, for a maximum of 5 years in advance. Although the role of junior professorships is important in allowing women to become more visible in academia, is does not seem to structurally increase women in higher academic positions in the long term. When more women hold

[8] https://www.tenuretrack.de/de/tenure-track-programm/die-tenure-track-professur [retrieved November 15, 2021].

junior professorships, however, and being a junior professor is a beneficial career signal acting as "pre-approval" for future hiring as tenured professors, they can be an advantageous springboard positions for women. This might be seen in the future, as it has only recently been implemented.

1.4.1.4 The "leaky pipeline" and the "motherhood penalty" as a universal phenomenon

At the beginning of this dissertation, I explained why I focused on the social sciences as a reasonable starting point to analyze gender differences in academia (compared to the natural sciences). The "leaky pipeline" as a disproportional loss of women at each career level and the "motherhood penalty" are universal phenomena that are neither exclusive to the social sciences, nor to Germany (e.g., Ceci et al. 2014; Silander, Haake and Lindberg 2013). How then can I draw conclusions from this dissertation beyond the social sciences in Germany?

Studies that focus on gender differences in the social versus natural sciences argue that women tend to stay in fields with balanced gender compositions, as they perceive fields with a visible proportion of women as particularly "women-friendly" (Sanders, Willemsen and Millar 2009; Silander et al. 2013:185). The social sciences, as "book sciences," are further said to be more family-friendly than the "lab sciences," where scientists "need to put in long hours in a lab (…) [that] almost certainly put[s] mothers at a disadvantage in the race for tenure." (Mason et al. 2013:49). If we find a motherhood-penalty in the social sciences, then it is likely that this can also be found in the natural sciences, with a perceived more detrimental environment for mothers (e.g., Popp et al. 2019). Furthermore, career paths are predetermined, so that female scientists "have probably met with more or less the same difficulties on their career path (…) [so] that it is only realistic to expect that other women [will] have the same problems in the same situation" (Sanders et al. 2009:309). The findings of this dissertation regarding the social sciences thus appear to be somewhat conservative in nature, representing a "women-friendly" academic environment.

What does this mean for the "female advantage" in getting tenured, the "motherhood penalty" in obtaining a habilitation, and the "female disadvantage" in leaving academia? Assuming that the social sciences are particularly women-friendly, then the determinants of leaving academia and having children in the post-doc stage seem to be underreported in male-dominated disciplines. In turn, it remains to be seen whether the "women's advantage" in the social sciences will be offset in the race for a professorship in the natural sciences, as would be expected in male-dominated fields where women are significantly underrepresented from the outset. However, it seems likely that the underlying mechanism for unequal conditions in academia between women and men is not due to different academic fields, but gender per se:

> "gender is more salient than discipline in determining the reasons scientists provide for gender disparities between disciplines, suggesting that gender may act as a "master status," shaping the experiences of scientists regardless of the gender composition of the discipline" (Ecklund, Lincoln and Tansey 2012:693).

Future research will therefore show which of the findings may be generalizable beyond the social sciences in Germany to provide a comprehensive picture of the global academic labor market, shaping the career trajectories of women, men, mothers, and fathers. Future research will thus reveal which phenomena persist in academia (e.g., the "leaky pipeline" and the "motherhood penalty") in the coming decades, and which new phenomena will emerge and change based on empiricism.

1.4.2 Strengths and limitations

The dissertation and the underlying study design use CVs and publication records to analyze the career achievements of social scientists. This merit-based perspective makes it possible to reflect a realistic picture of the recruitment of scientists, since CVs serve to signal scientific capital. Even though CVs are standard in labor markets for hiring, they cannot comprehensively represent a career or what further correlates with careers (giving a real situation in labor markets). I thus supplemented the analyses with an online survey with questions about children. Nevertheless, this does not allow me to consider all potential influencing factors, which I will outline briefly.

1.4.2.1 Limitations

Concerning family decisions, the study would benefit from more comprehensive information about the cohabitation of spouses, especially concerning the division of labor in the household, career interruptions, and actual working hours. So far, I have tried not to overload the survey with questions, increasing the likelihood of participants quitting the survey. The role of dual-career couples as regards traditional family roles has also been studied by others (e.g., Rusconi and Solga 2010; Rusconi and Solga 2011; Solga and Rusconi 2007), and may provide further insight into the gendered division of roles within "academic families" and whether they reproduce gender differences in their career trajectories. The role of the mentor is also relevant in the context of social capital and important academic contacts. Studies show that early-career scientists significantly benefit from their mentors in the long term as regards their career outcomes, also reproducing gender differences (e.g., Long and McGinnis 1985; Van der Weijden et al. 2015; Zuckerman 1977); a correlation that is neglected in this dissertation.

Another limitation is that I cannot refer to other workload factors in academia. Women may spend more time in teaching and service activities to keep the university going, a workload that is often not formally recognized or rewarded, but is labor-intensive (Bird, Litt and Wang 2004:199; Valian 2005:205; Winslow 2010). As regards research productivity, women may follow different research styles (see also Fox and Mohapatra 2007). Women are more cautious and attentive in their research, so they may publish less on average, but their papers are of higher quality. This may in turn reflect their lower productivity rates and is probably why they are considered equally, with fewer publications.

I cannot measure discrimination per se. Patterns of discrimination have been known in labor markets for many years, including academia. However, the major challenge is to measure observable discrimination, which the study design is unable to do. I did venture into patterns that stem from discrimination theories, for example, by testing whether women's work counts less than men's work (female devaluation), discrimination as unequal gender opportunities (in getting tenured with the same characteristics), and through the social exclusion mechanisms of network structures.

1.4.2.2 Strengths

At this point, I briefly outline three main strengths of this dissertation. First, this dissertation gives new insights into the academic labor market in Germany, and how careers are shaped. Surprisingly, little research has so far focused on who gets tenured or obtains post-doc qualifications in Germany. The same is true of productivity gaps in academic careers in Germany, or academic leavers, which I have outlined in the respective chapters. Longitudinal/cohort studies are also virtually missing beyond Germany, so that "truly comparative research on gender differences in scientific careers is very scarce" (see the meta-analysis by Caprile et al. 2012:63).

Second, the study design also allowed me to study the academic careers of social scientists *comprehensively* by using a longitudinal study design that addressed almost all sociologists, political scientists, and psychologists embracing "the social sciences" at German universities from 1980 to 2019. The study design thus covers virtually all academics at each career stage, and so is not restricted to inferential statistics based on sample data. Due to the advanced panel dataset, which included three data collection points in sociology, I can also research academics who left academia since 2013, a challenge that previous research could not overcome.

A third (and foremost) strength is, in my opinion, that the underlying study design has the potential to address research questions that are not yet answered. As noted, German academia has been changing structurally in the last two decades, and also shaping individual career tracks. For example, junior professorships may play a crucial role for women. The Excellence Initiative was introduced in 2005 in Germany, and may eventually compare to what are already established in the US as "elite universities." Not only can the underlying research design address new dynamics in German academia, but additional data collection points can also provide a more robust picture in the future.

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Chapter 2: Publishing, signaling, social capital, and gender: Determinants of becoming a tenured professor in German political science[9]

1.1 Abstract

We apply event history analysis to analyze career and publication data of virtually all political scientists in German university departments, showing that each published refereed journal article increases a political scientist's chance for tenure by 9%, while other publications affect the chance for tenure only marginally and in some cases even negatively. Each received award and third party funding increases the chance for tenure by respectively 41 and 26%, while international experience, social capital, and children hardly have a strong influence. Surprisingly, having degrees from a German university of excellence strongly decreases the chance of getting tenure. Women with similar credentials have at least a 20% higher chance to get tenure than men. Our data, therefore, suggests that the lower factual hiring rates of women are better explained by a leaky pipeline, for instance, women leaving academia, rather than because women are not hired even when they are as productive as men. The article contributes to a better understanding of the role of meritocratic and non-meritocratic factors in achieving highly competitive job positions.

1.2 Introduction

Studies in political science show why women are less frequently parliamentarians (Norris 1985; Salmond 2006), party leaders (O'Brien 2015), cabinet ministers (Krook and O'Brien 2012), and heads of state (Jalalzai and Krook 2010). However, why women are less successful within political science itself is largely unclear. This study contributes to answering this question by showing which factors

[9] Schröder, Martin, Mark Lutter, and Isabel M. Habicht. 2021. "Publishing, Signaling, Social Capital, and Gender: Determinants of Becoming a Tenured Professor in German Political Science." *PLoS One* 16(1)e0243514. doi:10.1371/journal.pone.0243514. Please cite the original article.

correlate with getting a tenured professorship in German political science. This is not only of practical importance for young researchers but also helps resolving theoretical debates on how science operates.

Robert Merton (1973 [1942]:270) argues that science should be marked by "universalism," which means that "acceptance or rejection of claims entering the lists of science is not to depend on the personal or social attributes of their protagonist; his race, nationality, religion, class, and personal qualities are as such irrelevant," which means that "careers [must] be open to talents" (Merton 1973 [1942]:272). Others echo this, arguing that "individual performance alone must be the deciding factor in a person's life chances. Opportunities are said to be equal if gender or social background play no role" (Hüther and Krücken 2018:223; similarly see Sabatier, Musselin and Pigeyre 2015:42). The opposite of this is "particularism," where some groups are favored due to "functionally irrelevant characteristics, such as sex and race, as a basis for making claims and gaining rewards in science" (Long and Fox 1995:46).

To show who becomes a tenured professor in German political science, this study draws on a unique dataset of CV and publication data from virtually all academic political scientists in Germany. This circumvents a problem that plagues most labor market and academic labor market studies, which often cannot show whether people are unsuccessful because they do not want or do not get a job. German academia, however, is a strict "up or out system," as German law mandates that researchers can – with very few exceptions – only be employed on fixed-term contracts in academia for a maximum of 12 years after having graduated. As tenured professorships are virtually the only non-temporary contracts in German academia, academics either get a professorship or are forced out of the system. Everyone who stays in academia is therefore under the same institutionalized pressure to compete for the few tenured professorships. In the following, we show to which theoretical debates an analysis of this process contributes.

1.3 Factors that influence hiring decisions in academia

1.3.1 Publications

Classically, Émile Durkheim (1893:121) claims that there is only one legitimate way to divide work within modern societies: based on the capacity of individuals to perform what is seen as productive within a domain. Simply put, this implies that work should be done by those most capable of doing it. But what capacity is needed in the domain of science? Merton (1973 [1942]:270) claims that "the institutional goal of science is the extension of certified knowledge." Along these lines, studies on university careers argue that

> "[w]ithin a research university, the most highly valued activity is contributing to the body of certified knowledge. While teaching and service are also valued, in the absence of research productivity a faculty member's efforts at teaching and service are likely to receive little praise. Consequently, under the norm of universalism, advancement in rank should be most strongly affected by research productivity" (Long, Allison and McGinnis 1993:703).

Research productivity is often measured through publications, especially in reputable, peer-reviewed journals (Jungbauer-Gans and Gross 2013:84; Madison and Fahlman 2020:2; Münch 2006:473). This is also the case in political science, where "virtually all institutions value peer-reviewed publications over non-peer-reviewed publications, and more over fewer" (Birsl 2008:105; Hancock, Baum and Breuning 2013:510–13; Plümper and Schimmelfennig 2007:99; Rothgeb 2014:185). Publications, especially in peer-reviewed journals, should therefore contribute to getting tenure.

1.3.2 Signaling

However, hiring takes place under uncertainty. Even the most prolific author may stop publishing after tenure. To reduce uncertainty about their prospects, applicants may signal their potential to hiring committees by passing evaluations, visiting prestigious institutions, or acquiring third party funding (see Spence 1973:356–58). Certified evaluations that signal "readiness" for becoming a professor can be the German "habilitation" or the "junior professorship." A habilitation process, for which researchers author a second monograph and/or a collection of journal articles after their doctoral dissertation, is a procedure for which a faculty committee evaluates a candidate's publications, presentation, and external review reports. A positive evaluation brings the "venia legendi," the permission to teach and apply for tenured professorships. The so-called "junior professorship" was introduced as an alternative in 2002. After essentially working as an assistant professor for three years, a committee evaluates a researcher, which – if positive – is equivalent to a habilitation. Since 2002, hiring committees can also consider a candidate's publications as equivalent to a habilitation. Many researchers still write a habilitation, however, as this may signal "pre-approval" for a professorship, which reduces uncertainty for the hiring committee (Plümper and Schimmelfennig 2007:101-102, 115).

Preapproval can also be signaled through academic awards, which may be given for and thus certify "state of the art" research or teaching, particular creativity or innovativeness in either domain, as well as service to the profession. Academic awards thereby also signal a candidate's potential to deliver what universities may require. Receiving grants, such as funding from the German research council, similarly shows that external committees have evaluated a candidate's work positively, again reducing uncertainty for the hiring committee. This might unduly advantage men. In a much-cited study, Wold and Wennerås (1997:342) "found that a female applicant had to be 2.5 times more productive than the average male applicant to receive the same competence score." However, analyzing the same grant-giving body about ten years later does not show that women are judged as less competent (Sandström and Hällsten 2008:185). Thus, how grants bestow prestige, how this differs between men and women and how this impacts their careers is unclear from the literature.

Having been at a prestigious academic institution may increase scholarly productivity due to context or peer-group effects of socialization and learning. However, it may also signal pre-approval and potential, even if it is unrelated to higher actual productivity. Empirical studies argue that this is the case in the US, where "institutional reputations are far more important in determining present perceptions of departmental rank than are corresponding levels of scholarly productivity" (Keith and Babchuk 1998:1522; also see Baldi 1995:785–86). Gerhards and Hans (2013:102) claim that similarly, "the German academic system favors those who have degrees from US universities, simply because they carry greater prestige." While German universities traditionally carry similar prestige, this may have changed, as the German state-funded excellence-initiative endowed some universities with the title "universities of excellence." This lead to fear that signaling prestige through one's home institution substitutes actual individual productivity in hiring decisions (Baier and Münch 2013; Hartmann 2010:385; Münch and Baier 2009).

All of these factors might disadvantage women if their work is less recognized. Some studies argue that women may be seen as "less competent than men, even when women are performing at similar levels to their male colleagues" (Atchison 2018:280; Birsl 2008:116; also see Hesli, Lee and Mitchell 2012:478-479, 485; Kahlert 2015:60; Wold and Wennerås 1997:342). Research on the so-called Mathilda-effect (Lincoln et al. 2012:314–15) argues that accumulated advantages are less beneficial for women than men, partly due to a male-dominated academic culture and other forms of female devaluation. Therefore, it is important to test whether men generally get hired preferentially compared to women and whether this is due to having more publications, third party funding, and other assets.

1.3.3 Social capital

Applicants may not only be hired because of their publications or the potential they can signal but also based on their social capital (Plümper and Schimmelfennig 2007:97–98; similarly, see Sabatier et al. 2015:42). Understood as "resources which are linked to possession of a durable network of more or less institutionalized relationships" (Bourdieu 1986:21), social capital can be an asset by providing a strong professional network. Others stress the "strength of weak ties," of merely knowing someone rather than having a strong relationship (Granovetter 1973; Granovetter 1995 [1974]). German political scientists speculate that "you must have at least one friend in a hiring committee and you cannot have an enemy" (Plümper and Schimmelfennig 2007:102). Indeed, PhD candidates are more successful in French political science when having either strong or weak social ties in their committee (Godechot and Mariot 2004). The chance of getting shortlisted even doubles when a researcher's former PhD advisor is accidentally part of the committee (Godechot 2016:71; also see Musselin 2009:112–14). In US sociology, hiring among the most prestigious US universities is explicable largely through the social networks that exist between these institutions (Burris 2004:258). However, for German political science, getting tenure is only weakly related to embeddedness in social networks (Plümper and Schimmelfennig 2007:115).

If researchers were promoted based on who they know, rather than based on what they do, then this could exclude women (Hofstra et al. 2020; Jadidi et al. 2018) who may lack "access to predominantly male academic networks" (Atchison 2018:280; similarly, see Birsl 2008:115), which "convey critical job-related knowledge" (Hesli et al. 2012:477; also see Schubert and Engelage 2010). Women are also less likely to accumulate social capital because their mobility needs are less prioritized in relationships (Winslow and Davis 2016:407).

1.3.4 Gender and childcare

The preceding sections suggest how women may be disadvantaged, as men benefit more from signaling and social capital. This is a problem since

> "[p]ublic trust and confidence in academia rests on its ability to efficiently produce accurate and reliable knowledge, some of which may ultimately inform public debate and national policies. The principle of meritocracy is the best method we know to achieve this, and it has served science very well. To not select and promote the ablest individuals (regardless of sex, race, and political views) is, therefore, not only unfair to individual academics but potentially damaging to academia and even to society as a whole" (Madison and Fahlman 2020:2).

But are women indeed disadvantaged? The literature shows surprisingly unclear results.

The American Political Science Association surveyed all faculty members in US political science departments and related fields, showing that, descriptively, women are only half as likely to get tenure. However, the survey also shows that women publish less, leaving unclear whether fewer publications explain why women get hired less, which is compatible with meritocracy, or whether women are disadvantaged regardless of their publications (Hesli et al. 2012). Even in highly egalitarian countries such as Sweden, less representation does not clearly amount to a disadvantage because women do not get posts when performing on par with men (Madison and Fahlman 2020:14). Generally, findings are surprisingly unclear. Early studies among psychologists with identical CVs find that men are preferred for entry-level positions but not for tenure (Steinpreis, Anders and Ritzke 1999:526). Others show that women with identical credentials are seen as less competent and consequently less hirable by professors in biology, chemistry, and physics (Moss-Racusin et al. 2012), while Eaton et al. (2020:136) find women to be judged more critically in physics, but not in biology. Yet others show that, on average, women in different disciplines are clearly favored over men (Williams and Ceci 2015). However, while a large review of the literature argues that "[s]everal experiments have revealed that both female and male raters downgrade hypothetical job applicants who are female," these studies have dealt with undergraduates, so it remains "unclear whether they generalize to the hiring of tenure track professors" (Ceci et al. 2014:102). One explanation for different success is that "the stress of childcare and household responsibilities may be greater for women than for men" so that "for men, having children has a positive effect on promotion, although for women, children have a negative effect" (also see Althaber, Hess and Pfahl 2011:105; Ginther and Kahn 2009:183; Hesli et al. 2012:477; Long et al. 1993:705). However, others find that children do not actually depress the likelihood to get a professorship (Schubert and Engelage 2010; Schulze, Wiermann and Warning 2008:498).

While the findings of these studies are unclear, they tend to share similar problems—most select samples rather than using an entire population of scientists. In addition, they tend to show how PhD students or postdocs are evaluated, rather than who actually got tenure. Others sample from those who have a PhD or habilitation in the first place, thus biasing their selection towards those who are academically successful in the first place (Plümper and Schimmelfennig 2007). Qualitative studies cannot fill this gap either, as they show whether some women perceive themselves to be disadvantaged, but neither whether this represents a broader population, nor whether it is mirrored by lower actual hiring rates (Kahlert 2015:60). Political scientists therefore bemoan that claims about discrimination in their discipline are so far largely speculation (Birsl 2008:116). We contribute to filling this gap with the following methodology.

1.4 Methods and data

1.4.1 Data

From December 2018 to December 2019, a trained and supervised team of research assistants coded all CV and publication data from personal and faculty websites of academics with at least one publication in all political science departments of German universities and two research institutes. We complemented this with an email survey, asking every researcher whether and when they had children. The response rate was 64%. We checked all data for outliers and made sure that they were not due to erroneous coding.

The resulting dataset contains 36,875 observations clustered in 1,453 researchers, among which 247 are male and 109 female tenured political science professors. According to the German statistical office, political science has 250 male and 119 female professors (Statistisches Bundesamt 2019:107), which means we have a virtually complete dataset of German political science so that confidence intervals around effects can be interpreted as actual variation in German academia, rather than resulting from statistical sampling uncertainty.

1.4.2 Methods

We use nested Cox regressions (Cox 1972), which estimate how variables increase or decrease the chance of an event, in this case: tenure. To facilitate interpretation, we use hazard ratios. A hazard ratio of, for example, 1.12 implies that a variable increases the chance to get tenure by 12%, while a hazard ratio of 0.78 means that a variable decreases the chance to get tenure by 22%, for example. We use robust and therefore increased standard errors, which account for observations within one person depending on each other (Lin and Wei 1989). For tied events, we rely on the Efron method (Cleves et al. 2008).

1.4.3 Variables and modeling strategy

Our dependent variable is the duration from a researcher's first publication, and thus from the moment he or she enters a potential "race for tenure" until either getting tenure or reaching the year 2019. Our data is thus right-censored, which is why we use Cox regressions. We examine what increases or decreases the duration until tenure with the following independent variables.

Female is a dummy variable to analyze whether men or women are more likely to get a professorship, before and after accounting for other influences. *Incomplete* is a dummy variable that controls underreporting by marking researchers who only show "selected" publications on their websites. We offer later how this missing data is not a problem in our dataset (see Table A4 in the Appendix). The dummy *Before 2002* accounts for prior time periods, after which the changes mentioned above were introduced in the German tenure process.

A second model additionally accounts for a researcher's productivity through seven accumulated types of publications. *SSCI journal articles* accumulate publications at each time point in (Social) Science Citation Index (SSCI, SCIE) journals. Since only 6% of these articles are ranked in the SCIE and 94% in the SSCI, we will use the term "SSCI articles" in the following. As such articles underwent a double-blind peer review, they are likely to qualify as the "extension of certified knowledge," which Merton (1973 [1942]:270) claims is science's core task. We also coded the journal impact factor and weighted articles with it. However, since this does not significantly change the results, we use the unweighted version in the final models. This accords with existing studies, which argue that "[t]here is little evidence that the quality of research, as indicated by citations to the articles or the standing of the journals in which the articles are published, affects promotion" (Long et al. 1993:719).

The variable *Non-SSCI journal articles* similarly accumulates publications in non-SSCI journals. *Monographs* covers all monographs and textbooks. We split this variable into monographs published with "regular" and "highly reputable" publishing houses. Two of the authors coded all publishing houses into these two categories. Intercoder reliability was .73. We construct a variable for highly reputable publishers if both researchers blindly agreed on the high reputation of a publishing house and a second variable for regular publishing houses if they did not. A list of what publishers are qualified as reputable or regular is in the Appendix (Table A6). We also count the number of *Edited volumes* and *Book chapters*. *Gray literature* counts all remaining publications, including reports, working papers, book reviews, as well as listed but not otherwise published manuscripts. It is important to take up these variables because the existing literature shows that women tend to publish less than men do (Huang et al. 2020), especially when competing for tenure (Kelchtermans and Veugelers 2013:281). Taking up these variables, therefore, not only shows how publications are related to getting a professorship. Rather, controlling for publications also shows whether women get hired less because they have fewer publications or whether they even get hired less when having the same publications as men.

We adjusted each publication p with $p=2/(n+1)$, n being the number of authors. Being the sole author therefore counts as one publication. Being one of two authors as .67, being one of three as .5, and so on. We add 1 and log these variables to account for diminishing marginal returns, as having published 11 vs. 10 articles should count less than having 3 vs. 2 articles, for example.

While the publication variables show measurable productivity, a third model adds signaling variables that account for career stages, measured as years and years squared after a *Habilitation* and *Junior professorship.* This tests how much more likely researchers are to get hired after each career stage, allowing that researchers are less likely to get hired with each year after some point. Taking up these variables is important because it allows comparing candidates at similar career stages, which is necessary because women tend to drop out of academia more often than men do due to childbirth and thus do not make it to advanced career stages (Cech and Blair-Loy 2019:4184; Ginther and Kahn 2009:183; Goulden, Mason and Frasch 2011:148; Hancock et al. 2013), also because they worry more often than men that children are incompatible with an academic career (Ecklund and Lincoln 2011:4; Martinez et al. 2007). It is also important to control career stages because some of the existing literature argues that women publish less than men do as they do not reach higher career stages (Xie and Shauman 1998). Thus, controlling for career stages also controls selective departure from academia, which prevents women from advancing towards a tenured professorship. Holding for career stages additionally controls for resources that may come with advanced career stages. It allows showing, in other words, how likely men and women are to get hired, assuming that they make it to similar pre-tenure career stages in the first place.

International experience may signal a researcher's quality and is measured through *International publications* (written in English), *Months abroad* (at institutions outside of Germany), a *Graduate degree* and *PhD from abroad*. To further measure signaling, we control for accumulated prestige as the share of a researcher's degrees (graduation, PhD, habilitation) from so-called *Universities of excellence*, as ranked by the German "excellence initiative." The excellence initiative supports high-performing universities with additional funding to strengthen their research performance. The initiative aims at creating a set of German universities that are able to compete with the best international universities worldwide, for example, with Ivy League schools in the US.[10] Academic *Awards* is another important signaling factor, so we count all awards that researchers announce on their websites, such as best paper-, teaching- or other awards. The variable *DFG funding* measures how often a researcher has been funded by the DFG, Germany's main and most prestigious funding agency. We coded this from the Gepris databank, which lists all researchers and projects funded by the DFG (https://gepris.dfg.de/). We only take these variables into account after controlling for publications, showing the effect of signaling net of measurable productivity.

A fourth model accounts for social capital through three measures. *Mobility* counts all moves to a new institution. We also account for the times a researcher acted as an interim professor, as well as accumulated co-authors, assuming that each of these variables are related to the size of a professional network. Again, we only control for these variables after accounting for others, thus showing the effect of social capital net of publications, as well as signaling through career stages and accumulated prestige.

Model 5 additionally accounts for the effect of children on men and women by categorically measuring their presence. Researchers with missing data are coded with a dummy variable to account for non-

[10] For more information, see: https://www.dfg.de/en/research_funding/programmes/excellence_initiative/index.html [retrieved Januar 14, 2022].

response bias. This allows estimating whether children impact getting hired and whether the effect on any of the previous variables is mediated through parenthood.

Last, Models 6 and 7 test the full model specification separately for men and women to see whether scholarly productivity, signaling, or social capital affect men and women differently, as suggested above.

1.5 Results

1.5.1 Descriptive differences at tenure

Table 1 displays descriptives for men and women with complete data who just got tenure (see Table A1 in the Appendix for descriptive data on the entire sample, as well as a discussion of this data). As can be seen, both male and female political science professors in Germany spent about fourteen years after their first publications until they were tenured. When getting tenure, men have published about one SSCI article (or 31%) more than women (3.25 vs. 4.26), 35% more non-SSCI articles, 24% more book chapters, and 65% more gray literature. Men also take significantly longer to get tenure than women after their habilitation or junior professorship (69% longer for habilitation, 89% longer for junior professorship), and have received DFG funding more than twice as often. All other differences are not statistically significant at $p < .05$, except that we know of 43% of men who have children, but only 33% of all women who just got tenure. Non-response to our children-question is not statistically significant at conventional levels, suggesting no gender bias in answers about parenthood.

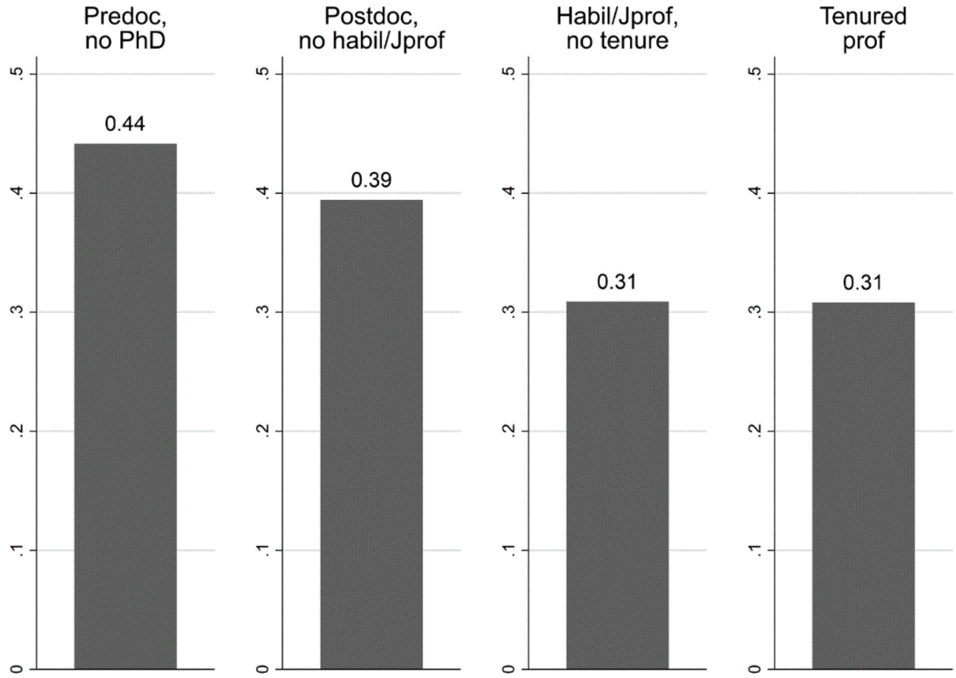
Table 1. What characterizes men and women with complete data that just got tenure?

	Mean men	Mean women	Difference	% difference	t-test
Time since first pub	14.06	14.06	-0.01	0%	
SSCI journal articles	4.26	3.25	1.01	31%	**
Non-SSCI journal articles	7.00	5.20	1.80	35%	**
Monographs, reputable	1.14	1.01	0.14	14%	
Monographs, regular	0.95	0.70	0.24	35%	
Edited volumes	1.61	1.32	0.29	22%	
Book chapters	14.73	11.89	2.84	24%	**
Gray literature	11.72	7.12	4.61	65%	***
Years since habilitation	2.12	1.26	0.86	69%	***
Years since junior prof	1.45	0.77	0.68	89%	**
University of excellence	0.29	0.29	0.00	0%	
Months abroad	28.19	29.77	-1.58	-5%	
Graduated abroad	0.19	0.22	-0.04	-17%	
PhD abroad	0.18	0.20	-0.02	-11%	
International publications	13.40	11.31	2.09	18%	
Awards	0.43	0.45	-0.01	-3%	
DFG funding	0.51	0.24	0.27	109%	***
Mobility	3.01	3.26	-0.24	-7%	
Interim professor	1.04	1.03	0.01	1%	
Co-authors	23.41	20.15	3.26	16%	
Childless	0.20	0.29	-0.08	-29%	
Parent	0.43	0.33	0.10	32%	*
No child info	0.36	0.38	-0.02	-6%	

*Notes: * p < 0.05, ** p < 0.01, *** p < 0.001. Data based on 205 men and 94 women at the year of tenure and complete data.*

Descriptively, this suggests that men and women need a similar time to get tenure, but when they do get tenure, men have more publications and DFG funding. As a second descriptive analysis, Figure 1 displays the share of women at each career step.

Figure 1. Share of women at each career step.



During their last recorded time point in our dataset, 44% of predocs are women. But their share among postdocs is a slightly lower 39%, and even only 31% among those with a habilitation or junior professorship are women. The female share among professors is as high as in the preceding career stage. This suggests that fewer women get professorship because they quit academia before reaching career stages that typically lead to a professorship. At the same time, the prior descriptive table suggests that among those who do get professorships, women are hired with fewer publications and third party funding.

1.5.2 Cox regressions

Table 2 displays the results of multivariate Cox-regressions. Model 1 shows that before accounting for other influences, women have a 6% but statistically non-significantly lower chance to get tenure than men. The model also shows that it was less probable to get a professorship before 2002, and that those with "incomplete" data have a statistically non-significantly higher chance to get a professorship, possibly because tenured professors are more likely to only show selected publications on their websites.

Model 2 adds publication variables. A log increase of SSCI articles multiplies the chance for tenure by 2.22 — a very strong effect. On average, 0 logged publications conform to .02 actual (co-author-adjusted) publications; 1 logged publication conforms to 1.6 publications, 2 logged publications to 5.8, and 3 to 15.5. It is approximately these jumps that each log increase shows. To facilitate interpretation, we replicate all results with a model that uses linear variables (see Table A2 in the Appendix). This indicates that each additional SSCI article increases the chance for tenure by 9%. However, that logged SSCI articles are more significantly related to tenure shows that articles have diminishing returns: each article counts less, the more one already has.

A log increase of monographs with a reputable publisher increases the chance for tenure by 48%, while the chance for tenure actually decrease for every book published with a regular publisher (minus 8% per book, but the effect is not statistically significant at conventional levels). Non-SSCI articles increase the chance for tenure by 18% at the 10% significance level (but only 1% for every article). Edited volumes increase the chance by 36%, and book chapters by 23% (3% for each chapter). Women have a 23% higher chance of getting a professorship with the same publications, but the relationship is only significant at the 10% level.

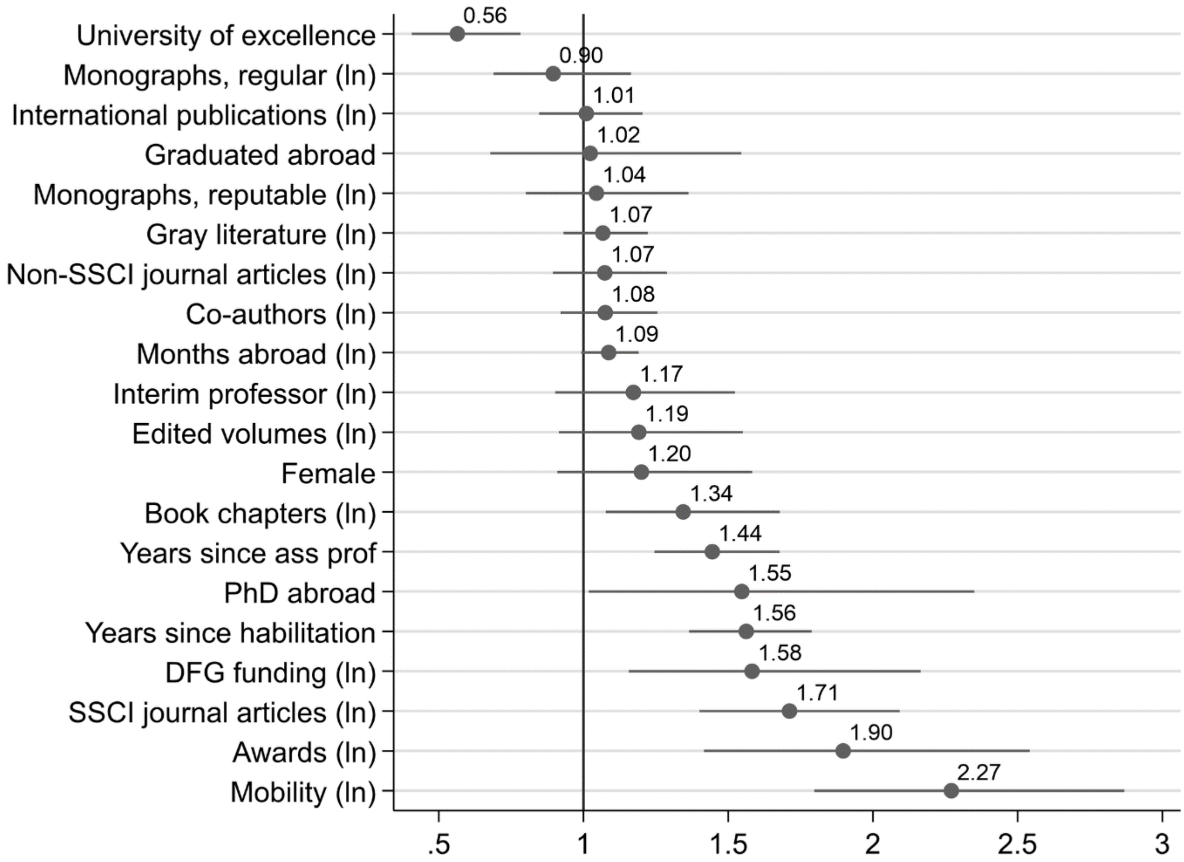
Table 2. Main results of cox regressions of becoming a professor.

	(1) Gender	(2) Publications	(3) Signaling	(4) Social capital	(5) Children	(6) Women	(7) Men
Female	0.94	1.23^{+}	1.32^{*}	1.20			
	(-0.58)	(1.65)	(2.04)	(1.29)			
SSCI journal articles (ln)		2.22^{***}	1.74^{***}	1.71^{***}	1.71^{***}	1.84^{**}	1.64^{***}
		(9.90)	(5.86)	(5.24)	(5.17)	(2.82)	(4.17)
Monographs, reputable (ln)		1.48^{**}	1.22	1.04	1.03	1.03	1.05
		(2.85)	(1.51)	(0.32)	(0.19)	(0.10)	(0.29)
Monographs, regular (ln)		0.92	0.88	0.90	0.88	1.35	0.75^{+}
		(-0.64)	(-0.94)	(-0.83)	(-0.92)	(0.97)	(-1.90)
Non-SSCI journal articles (ln)		1.18^{+}	1.19^{+}	1.07	1.06	1.01	1.15
		(1.93)	(1.88)	(0.76)	(0.64)	(0.03)	(1.26)
Edited volumes (ln)		1.36^{*}	1.22	1.19	1.21	0.79	1.33^{+}
		(2.53)	(1.55)	(1.30)	(1.39)	(-0.75)	(1.77)
Book chapters (ln)		1.23^{*}	1.34^{**}	1.34^{**}	1.35^{**}	1.71^{*}	1.25^{+}
		(1.98)	(2.65)	(2.62)	(2.70)	(2.37)	(1.70)
Gray literature (ln)		1.09	1.05	1.07	1.06	1.05	1.06
		(1.34)	(0.66)	(0.93)	(0.85)	(0.35)	(0.69)
Years since habilitation			1.65^{***}	1.56^{***}	1.56^{***}	1.51^{**}	1.70^{***}
			(7.75)	(6.47)	(6.53)	(2.71)	(6.71)
Years since habilitation²			0.96^{***}	0.96^{***}	0.96^{***}	0.96^{*}	0.96^{***}
			(-5.23)	(-4.61)	(-4.65)	(-2.06)	(-4.63)
Years since junior prof			1.49^{***}	1.44^{***}	1.46^{***}	0.99	1.77^{***}
			(5.72)	(4.84)	(5.14)	(-0.03)	(6.87)
Years since junior prof²			0.97^{***}	0.98^{**}	0.98^{**}	1.01	0.96^{***}
			(-3.57)	(-2.85)	(-3.09)	(0.53)	(-4.41)
International publications (ln)			1.00	1.01	1.01	0.93	1.07
			(0.05)	(0.11)	(0.08)	(-0.44)	(0.59)
Months abroad (ln)			1.12^{**}	1.09^{+}	1.09^{+}	1.11	1.10
			(2.71)	(1.79)	(1.94)	(1.11)	(1.62)
Graduated abroad			0.88	1.02	1.05	1.11	1.00
			(-0.66)	(0.11)	(0.24)	(0.24)	(-0.02)
PhD abroad			1.33	1.55^{*}	1.55^{*}	1.15	2.09^{**}
			(1.46)	(2.04)	(2.13)	(0.33)	(3.23)
University of excellence			0.66^{**}	0.56^{***}	0.53^{***}	0.55^{*}	0.53^{**}
			(-2.61)	(-3.43)	(-3.69)	(-1.97)	(-3.06)
Awards (ln)			2.00^{***}	1.90^{***}	1.90^{***}	2.30^{**}	1.81^{**}
			(4.68)	(4.29)	(4.34)	(2.98)	(3.19)
DFG funding (ln)			1.84^{***}	1.58^{**}	1.65^{**}	1.79	1.77^{***}
			(3.96)	(2.87)	(3.25)	(1.37)	(3.48)
Mobility (ln)				2.27^{***}	2.31^{***}	2.25^{***}	2.51^{***}
				(6.88)	(7.04)	(3.61)	(6.19)
Interim professor (ln)				1.17	1.18	1.46	1.05
				(1.19)	(1.26)	(1.51)	(0.30)
Co-authors (ln)				1.08	1.08	0.96	1.14
				(0.92)	(0.95)	(-0.32)	(1.38)
Childless woman					1.17	1.00	
					(0.60)	(.)	
Father					1.32		1.37^{+}
					(1.52)		(1.73)
Mother					1.19	1.00	
					(0.69)	(-0.02)	
W/o child info man					1.00		1.01
					(0.00)		(0.05)
W/o child info woman					1.66^{*}	1.17	
					(2.30)	(0.51)	
Before 2002	0.78^{+}	0.93	1.29^{+}	1.35^{*}	1.39^{*}	1.12	1.62^{**}
	(-1.85)	(-0.47)	(1.76)	(1.98)	(2.21)	(0.34)	(2.81)
Incomplete	1.27	2.22^{***}	2.22^{***}	2.27^{***}	2.23^{***}	2.45^{*}	2.50^{***}
	(1.46)	(4.23)	(4.25)	(4.35)	(4.28)	(2.22)	(4.09)
R^2	.0014	.062	.12	.13	.13	.15	.17
No. of individuals tenured	356	356	356	356	356	109	247
No. of individuals total	1453	1453	1453	1453	1453	550	903
Observations	35578	35578	35578	35578	35578	10203	25375

Exponentiated coefficients; t statistics in parentheses; cluster-robust standard errors*;*
$^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*

Model 3 adds signaling effects. This renders the gender effect much stronger, implying that women with the same publications and signaling capabilities have a 32% higher chance to get tenure than men, if only at the 5% significance level. Monographs, even with reputable publishers, lose some of their effects, and edited volumes become not statistically significant at conventional levels, suggesting that they are partially epiphenomenal to signaling: they signal the quality of a researcher, but other signaling mechanisms render their unique influence less important. Having reached advanced career stages also increases the chance for tenure, even net of actual publications. Months abroad increase the chance for tenure by 12%. Still, Table A2 shows no significant linear effect of each month abroad, suggesting that the longer one stays abroad, the less important each additional month becomes. Having graduated abroad has no clear effect, while a foreign PhD increases the chance for tenure. Conversely, researchers whose degrees come from a German "university of excellence" surprisingly have a 34% *lower* chance to get tenure. Receiving awards doubles the chance for tenure. This suggests that awards strongly signal a researcher's quality, even if they are unaccompanied by publications. DFG funding almost doubles the chance for tenure (with each funding increasing the chance for tenure by 42%). Model 4 adds social capital variables. Because it is the most comprehensive model, Figure 2 visualizes its most relevant effects.

Figure 2. Effects on chance to get tenure, visualized results based on Model 4 in Table 2.



A strong effect in the full model is that the chance to get a professorship more than doubles with mobility (plus 27% for every move, as Table A2 in the Appendix shows). However, neither having been an interim professor nor having more co-authors is related to a higher chance for tenure at conventional levels of statistical significance. Notably, the inclusion of social capital variables lets the female effect lose its statistical significance and renders it substantially weaker. With the same publications, at the same career stage and with the same international experience as well as social capital, women have a 20% and not statistically significant higher chance to get tenure. Note also that the confidence interval for the female indicator is 0.91 to 1.58, so while the effect is not statistically significant at conventional levels, its confidence intervals are clearly more on the side of favoring women than not. The previous model also shows that women have a 32% higher chance (significant at the .05 level) to get tenure with the same publications and signaling capacity, but before social capital variables were controlled. This suggests that higher or more effective social capital is one reason why women are more successful (if they have the same publications and signaling capacity). However, the effect of other variables does not change strongly due to the influence of social capital, which suggests that the impact of other variables is not based on an accumulation of social capital.

Model 5 adds the effect of children. Relative to a childless man, an otherwise-similar childless woman has a 17% higher chance to get a professorship. However, while a father has a 32% higher chance of getting a professorship, the chance for an otherwise-similar mother is only 19% higher. Note however that all of these effects are not statistically significant at conventional levels. The real surprise comes with non-respondents. While men who did not respond to our question about children have the same chance to get a professorship as childless men, women who did not respond have a 66% higher chance for a professorship. Thus, women who are more successful than their credentials would suggest were the most reluctant to tell us whether they have children. Importantly, this model also shows that none of the prior effects changed after accounting for children. This means that children neither have a strong impact on getting a professorship nor do they change which variables have an effect.

Model 6 calculates effects for women and Model 7 for men only. To show which effects influence women significantly differently than men, we also calculate a model where we interact every variable with being a woman (see Table A3 and the visualization in Figure B1). The comparison shows that women profit twice as much as men from publishing monographs at *regular* rather than reputable publishing houses (see Table A3: 1.99 at $p > 0.05$ vs. 1.03 at $p > 0.05$). Models 6 and 7 of Table 2 show that this is because men who publish with regular rather than reputable publishers have a lower chance for tenure, while women do not. Also, the chance for women to get tenure increases 1.8-times as much as men's when publishing book chapters (see Table A3: 1.77 at $p < 0.05$), while decreasing when publishing edited volumes, contrary to men's. Also, women get hired less directly after their habilitation. While the effect of other variables also differs between men and women, these interaction terms are not statistically significant, as Table A3 documents, so we refrain from drawing any firm conclusions about them.

1.5.3 Robustness tests

In separate regressions (see Table A4, Model 1), we multiplied each journal article with the impact factor of the publishing journal. Since this data is only available since 1997, we imputed the 1997 impact factor of 0.4 for prior years. However, weighting each journal article with the impact factor of the journal hardly changes the results. This means that while an article in a journal with double the impact factor may indeed count twice as much, our results are not biased because some researchers publish in better journals. We also add the accumulated impact factor of journals where researchers published their articles to the regressions. This has a slightly positive influence, meaning accumulating high impact factor publications is beneficial. However, this effect vanishes with controls, which means publishing in highly ranked journals may be a signaling mechanism that can be compensated by other signals, similar to what others find (Long et al. 1993:719).

Second, accounting for incomplete data with a dummy variable may be problematic as we do in the main calculations. Therefore, in the second model of Table A4, we only use researchers with complete data. While some results lose significance due to the smaller sample sizes, no indicator is strongly affected by incomplete data, suggesting that missing data does not bias our results.

Third, we use a dummy variable to allow for different rules before 2002, when the German higher education system was reformed. Our results might be different if we exclusively use data from after 2002. This is what Model 3 of Table A4 does. However, results again hardly differ from our main results. In separate calculations, we also interact every effect with a post-2002 dummy. This shows that monographs with a reputable publisher have become more important and the time after a habilitation less so, but this does not systematically change our main conclusions.

Fourth, among those who actually became tenured, different influences may count than among those who did not. Model 4 of Table A4 therefore repeats all calculations with those who did become professors. Results are similar to the full dataset, which suggests that one important assumption underlying Cox-models is met: Researchers in our dataset are also in our risk-set, as whatever leads to a professorship among those who got a professorship has a similar influence among those who did not. Put it differently: what explains who gets a professorship also explains who does not.

Fifth, while a larger share of degrees from a university of excellence may count negatively, it may be important to have studied there or to have a PhD or a habilitation from there. However, Model 5 in Table A4 shows that having graduated from a university of excellence comes with a slight and statistically not significant advantage while having a PhD or a habilitation from a university of excellence decreases the hazard for a professorship but the effect is also not statistically significant. This indicates that having been at a university of excellence indeed does not signal an applicant's quality and, by extension, does not positively influence getting tenure.

Sixth, the children variable may have an impact that varies with the number of children (Table A4, Model 6). Notably, the more children a researcher has, the more they may be handicapped in getting tenure. We know how many children each researcher has at each point in time, so we calculated – separately for men and women – how a researcher's number of children affects tenure. Compared to men and women without children, fathers have a 69% higher chance for tenure with two children, and women a 306% higher chance with three children. All other effects are not statistically significant at the 5% level. These results conform to a lifecycle effect, where tenure coincides with the age where people tend to have 2 or 3 children. The data does not show, however, that the chance for tenure systematically declines with the number of children.

Last, some scientists in our dataset may have found one of the very few permanent positions below a professorship, such as lecturers ("Außerplanmäßiger Professor" or "Lehrkraft für besondere Aufgaben"). Such positions pay less and have a higher teaching load. Still, academics who hold them might not apply for a full professorship, thus dropping out of the "race for tenure." To exclude this as a source of bias, we removed everyone who has an "Außerplanmäßige Professur" as well as those who stayed in our dataset for more than 15 years (and are thus likely on a permanent non-professorial position). This hardly changes our results, however, as Table A5 indicates. We therefore conclude that our results are robust to several alternative specifications, such as citation-weighting, accounting for missing data, period effects, variable coding decisions, and defining risk-sets.

1.6 Discussion

Based on a multiple source dataset covering CV and survey data, this paper showed what decreases or increases the duration of a full professorship. Our results suggest that success in German political science is based on legitimate achievement. Durkheim's (1893:121) idea that hiring decisions should be based on "capacity," and Merton's idea (1973 [1942]:270), that science is about extending knowledge through "certified scholarship" (Long et al. 1993:703) fits with SSCI articles having the strongest impact on who gets tenure, and with monographs from reputable publishers having a stronger impact than monographs with regular publishers. It confirms what existing studies suggest, namely that not only quantity but also the measurable quality of publications predicts success in political science (Birsl 2008; Hancock et al. 2013; Plümper and Schimmelfennig 2007).

However, signaling factors beyond measurable productivity also have important effects. Notably, passing formal evaluations through a habilitation or junior professorship increases success irrespective of publications and other observable factors. This is understandable, as an external committee's evaluation reduces uncertainty for those who hire an applicant. That awards signal quality may be unsurprising, as they can indicate potential above and beyond what is directly visible through publications. That external funding brings success even in the absence of publications closely mirrors existing findings, such as Mason et al.'s (2013:49) finding that "professors are 65% more likely to achieve tenure when directly supported by federal grants." Researchers who bring money may be more desirable candidates because having been chosen by the DFG may signal potential for future research output. However, some may find it worrying that needing more money to do research rather than actually producing more research is in itself a success factor.

A PhD from a foreign university is also a significant effect associated with becoming a professor, which mirrors findings from existing studies (Baldi 1995:785–86; Gerhards and Hans 2013:102). Discussions on the German excellence initiative express fear that German scholars may be recruited based on the prestige of their home institution rather than based on their actual productivity (Baier and Münch 2013; Hartmann 2010:385; Münch and Baier 2009). However, we find no support for this. In fact, we see the opposite. Scholars who passed all their career stages at a German university of excellence have an about 40% lower chance to get hired; and scholars who have gotten a PhD or a habilitation at a university of excellence also seem to be at a disadvantage. This suggests that international experience is a positive signal, while having been at a German university of excellence is not, which seems counterintuitive and merits further research.

After accounting for productivity as measured through publications and signaling, we find limited effects of social capital on success. Mobility is indeed strongly related to tenure, but this may be because it simply mirrors the willingness to move to a new job. Conversely, acting as an interim professor only has weak effects, just as having more co-authors. This contradicts studies arguing that "who one knows" determines success in academia (Burris 2004:258; Godechot 2016:71; Godechot and Mariot 2004). It concurs with studies that find relatively weak effects (Plümper and Schimmelfennig 2007:115). We also do not find that women are disadvantaged because they lack access to (male) social networks (Atchison 2018:280; similarly, see Birsl 2008:115).

Existing studies argue that in political science, women are seen as "less competent than men, even when women are performing at similar levels to their male colleagues" (Atchison 2018:280; Birsl 2008:116; also see Hesli et al. 2012:478–80; Kahlert 2015:60). Our results are not compatible with this view. Women with the same publications and resources to signal their quality actually have a 32% higher chance to get tenure than men. Some of this is due to higher benefits from social capital for women, accounting for which reduces their advantage to 20% and to levels that are not statistically significant at conventional levels. We also hardly find that women have to fulfill different criteria than men, contradicting that they are judged by a different standard. If anything, our results indicate that women are judged more benignly than male candidates, which is compatible with some results in political science (Plümper and Schimmelfennig 2007:115) and beyond (Hüther and Krücken 2018:224; Madison and Fahlman 2020:15). Notably, our results accord with views claiming that

> "[t]raditionally, observers attempted to explain women's underrepresentation in the academy on the basis of discrimination. We do not deny that women still face discrimination in the academy.

> However, our findings suggest that traditionally conceived gender discrimination no longer seems to account for the lower rate at which women get tenure-track jobs" (Mason et al. 2013:43).

Indeed, if anything, we find that men need to publish more to get hired than women so that discrimination at the point of hire seems an unlikely candidate to explain the lower proportion of female professors. But if discrimination at the point of hiring cannot explain the lower female representation in political science, what can?

Our results fit the "leaky pipeline" hypothesis in political science, which suggests that women get fewer professorships because they are less likely to stay in academia long enough to reach the advanced career stages that lead to a professorship (Abels and Woods 2015:87; Long et al. 1993; Sabatier et al. 2015:59). The data thus indicates that the problem is not that highly qualified women do not get hired when they apply, but that they leave academia before they can apply. Notably, our data shows that with every successive career step, the share of women declines. But among those women who do stay, no discrimination is visible, as the share that makes it from the last career stages to a professorship is as high as among men, and at the final stage, women get hired with fewer publications. Thus, efforts to promote female representation in political science should concomitantly focus on why women leave academia, rather than supposing that they are discriminated when applying for tenure, for which we find no evidence.

This confirms some studies, which show that women are hired preferably, compared to similarly qualified men (Steinpreis et al. 1999:521; Williams and Ceci 2015). But it is less compatible with other studies, which find that women are judged as less competent and consequently and as less employable in different disciplines (Eaton et al. 2020:136; Moss-Racusin et al. 2012). Using a review of the existing literature, Ceci et al. (2014) find that though women are underrepresented in very technical fields, they are actually favored when they apply for jobs. However, Ceci et al. (2014:116) also mention that "women are significantly less likely to be promoted in some of the fields in which they are most prevalent: life science and psychology." In this sense, our study might be a crucial case study (Eckstein

1975:122). Because compared to STEM fields, we look at a discipline with a sizeable number of women, where female disadvantage is predicted (Ceci et al. 2014:116). Yet we do not find such a female disadvantage. Instead, we find that, if anything, women who apply for tenured professorships in political science have a higher chance of being hired than men with similar qualifications and publications. That women have a higher chance to get hired when they apply may be explained through affirmative action, where one applicant is favored because of their sex. Some studies argue that "women must face a choice between having children or succeeding in their scientific careers, while men do not face these same choices" (Cech and Blair-Loy 2019:4184; Ginther and Kahn 2009:183; similarly, see Goulden et al. 2011:148). While women with children may leave political science careers more often than men do, we do not find that having children accounts for women having a lower chance of getting hired when they apply.

To sum up, ours is the first study to use a virtually complete sample of all German academic political scientists to show that women tend to be favored over men in the hiring process for tenured professorships, before and after controlling for various factors, most importantly productivity (for the discipline of sociology, see Lutter and Schröder 2016; Lutter and Schröder 2020). This means that women get hired with fewer measurable publications than men do, indicating no bias against women when judging their competency, which is different from what other studies found (Moss-Racusin et al. 2012; Wold and Wennerås 1997:342). Our study design has a few limitations, however. First, we measure productivity through the number of publications. While this accords with existing studies on what should be important in academia, it leaves out teaching. This problem is mitigated because Germany's teaching load is standardized, as a postdoc position (TvöD 13) has four hours of teaching per week, a doctoral student has half that, a junior professor has four hours in the first three, and six hours in the last three years, with minor variation between federal states. Therefore, controlling each person's career steps should be synonymous with controlling teaching load. In addition, empirical studies show that hiring committees usually do not require teaching evaluations (Plümper and Schimmelfennig 2007:99). Nonetheless, it would be interesting to see whether the quality of and effort for teaching influences who gets tenure. The same is true for impact in terms of citations, which we could model through the impact factor of the journals in which researchers have published. While citations are important, they take time to accumulate, so they may not be adequate to judge non-tenured faculty (Madison and Fahlman 2020:3; Plümper and Schimmelfennig 2007:100). Last, while existing studies indicate that administrative experience hardly plays a role in who gets tenure (Birsl 2008:106), a broader definition of productivity, which takes teaching, citations, and administration into account, might yield different results. Also, while we can show that women are not disadvantaged in getting a tenured professorship once they have a habilitation or junior professorship, the data indicates that they drop out of academia before they have either. We suspect that women might be disadvantaged in getting a habilitation or junior professorship and that children might be the reason. This, however, has to be shown by further research.

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Chapter 3: Gender differences in the determinants of becoming a professor in Germany. An event history analysis of academic psychologists from 1980 to 2019[11]

1.1 Abstract

Theories on gender bias argue that women in academia benefit less from their academic achievements than men do; women, as a result, show lower rates of success chances in becoming tenured professors. Based on longitudinal data from CVs of almost all psychologists in German academia, we analyze factors that lead to a first permanent professorship in German psychology departments. We find no overall gender differences in getting a tenured position when considering all psychologists and holding research productivity and other observable factors constant. Among currently tenured professors, women show a 32% higher chance of getting tenure than men. Interaction effects reveal that women's publishing or signaling investments are not devalued when they try to obtain tenure. We also find that women benefit more from their scholarly publications than men do. Hence, we find no support for gender bias or devaluation of women's academic achievements.

1.2 Introduction

Women in the academic labor market are still underrepresented among higher positions and more likely to have part-time or temporary contracts. The proportion of women in the social sciences has increased substantially in recent years, however. In German academic psychology, it changed from 43% to 61% over the last 20 years, while the share of female professors increased from 19% to 39%.[12] Although women's achievements are surely visible in these numbers, gender differences are still evident;

[11] Lutter, M., Habicht, I. M., & Schröder, M. (2022). Gender differences in the determinants of becoming a professor in Germany. An event history analysis of academic psychologists from 1980 to 2019. *Research Policy*, 51(6), 104506. doi:10.1016/j.respol.2022.104506. Please cite the original article.

[12] In 2003, women held 43% of full-time university staff (19% of chairs), 54% in 2008 (28% of chairs), and 61% in 2018 (39% of chairs), see Statistisches Bundesamt 2004:80; Statistisches Bundesamt 2009:102; Statistisches Bundesamt 2019:108.

especially regarding the highest or most reputable positions within academia, but also for citations, scientific impact, and employment conditions (D'Amico, Vermigli and Canetto 2011; Dion, Sumner and Mitchell 2018; Hoff et al. 2003; but also see Lynn et al. 2019 for a study showing gender equality). Social studies on science name this the "Matilda effect" (Lincoln et al. 2012; Rossiter 1993). In analogy to the well-known Matthew effect, the Matilda effect means that women receive fewer signals of reputation (academic awards and prizes, citations, funding), and if they do, these do not translate into the same recognition that men gain from them. Consequently, women's efforts translate less into tenured professorships than men's. In research on general labor markets, the "academic" Matilda effect is better known under the notion of "devaluation theory," meaning that women benefit less than men from their career performance (Cohen and Huffman 2003b; Cohen and Huffman 2003a; Magnusson 2008; Ochsenfeld 2014).

Drawing on this, this study examines whether men and women in academia benefit differently from their scholarly publications, signaling factors such as academic awards, institutional prestige or social capital when it comes to getting their first tenured professorship. We draw on a full-coverage panel dataset that includes all psychologists of all German psychology departments in 2019. The data connects life-course information and publication records from CVs on faculty websites. Based on this, we draw on survival (event history) analysis to estimate the hazards of getting a first permanent professorship in Germany.

Academic labor markets are highly competitive with scarce positions at the top, which is why they are often compared to tournaments (Auspurg, Hinz and Schneck 2017). In Germany, temporary and "legally" fixed-term contracts by German law shape the precarious career pipeline until a scarce tenured professorship. In contrast to the US, German academia has virtually no tenure-track system and permanent positions are reached late, if at all. The German academic labor market is therefore characterized by long periods of career uncertainty, forcing even highly talented scientists to leave. Academic labor markets are therefore highly stratified and, thus, jobs are only selectively available for "academic survivors." Few studies have analyzed gender differences in academic "tournaments" for professorships in Germany in the fields of sociology and political science (Auspurg et al. 2017; Jungbauer-Gans and Gross 2013; Lutter and Schröder 2016; Plümper and Schimmelfennig 2007).

Much evidence for the theory of the Matilda effect comes from historical and constructivist work (e.g., Fotaki 2013; Howe-Walsh and Turnbull 2016; Rossiter 1993; Tienari et al. 2013; Van den Brink and Benschop 2012). We contribute to a broader understanding of the effects of female devaluation on chair appointments in the German social sciences by examining psychology professorships based on quantitative data. Although psychology is a field classified as social science, it is located between the social and natural sciences, for example, in terms of quantity and types of publications (for an overview see: Chubin, Porter and Boeckmann 1981). In terms of gender, psychology is interesting as the share of women is high at the beginning of the career pipeline, but subsequently drops sharply, compared to sociology or political science.

Our findings do not confirm theories of female devaluation. While probably more women drop out of academia early on (the so-called leaky pipeline), we find no significant gender differences at the point of hiring. On the contrary, among currently tenured professors, women have a 32% higher chance of getting tenure than men, holding other observables constant. Examining whether women's publications or signaling factors count less than men's in the chance of becoming a professor, as female devaluation theory suggests, we find that women's achievements do not have smaller effects on hiring than men's. Instead, we find that women tend to benefit more strongly from their scholarly publications than men. We conclude that women's observable achievements are valued as highly as men's; their scholarly publications in peer-reviewed journals are valued even higher. Hence, this analysis shows no direct quantitatively observable support for female devaluation theory.

1.3 Devaluation of women's work in academic careers: Theory and hypotheses

Devaluation theory suggests that women's efforts may be valued less than men's (Magnusson 2008), leading to lower career attainment for women. Lincoln et al. (2012:308) argue that "a great deal of evidence suggests that women's scientific efforts are devalued compared with those of men" so that "women's efforts continue to be perceived as less important or valuable," referring to a discussion by Long and Fox (1995). Even if valuation differences are very small or happen indirectly and largely invisible, they can accumulate to self-perpetuating differences over entire careers. As we theorize below, female devaluation may occur in (1) research output (e.g., publications), (2) career achievements (such as obtaining a "habilitation"), (3) accumulated academic prestige, and (4) academic social capital.

(1) Productivity in academia is often equated with *publications*; mainly peer-reviewed articles (Allison and Long 1987; Judge, Kammeyer-Mueller and Bretz 2004; Long, Allison and McGinnis 1993; Warren 2019). In addition to peer-reviewed articles, books, as well as diagnostic and statistical manuals are usually cited as an indicator of productivity in psychology (Nederhof, Van Leeuwen and Van Raan 2010). Studies generally show that women are less productive in publishing articles (for psychology, see D'Amico et al. 2011; for other scientific fields, see Long 1992; Zuckerman 1987). Devaluation theory predicts that each publication counts less for women than for men when applying for a professorship.

While publications are a relatively direct measure of productivity, other measures function as a more indirect signal of productivity (Spence 1973), such as distinctive career achievements, prestige or social capital. Female devaluation theory predicts that women benefit less from these productivity signals than men.

(2) *Signals from career achievements*. In Germany, important career stages after the doctoral degree but before a tenured professorship are either a junior professorship or a habilitation.[13] Both are not mandatory (anymore) to apply for a tenured professorship but are often used as a stepping stone towards tenured positions. They do not only signal willingness to climb the career ladder but also indicate scientific efficiency, i.e., how fast scientists progress. Since candidates for junior professorships and

[13] Some obtain both. The German *Habilitation* is a post-doctoral examination, which comprises a (cumulative) thesis and lecture, which qualifies to apply for a professorship. As an alternative to the habilitation, in 2002 the junior professorship – comparable to the US assistant professorship – was introduced.

habilitation degrees have been selected and reviewed by external committees, these career stages can signal a candidate's potential.

With regard to female devaluation, the theory would predict that these stepping stones are valued less for women than for men. In fact, prolonged career stagnation is more detrimental for women's than men's future job promotion (Long et al. 1993:713). Studies also show that women drop out of science disproportionally, known as the leaky pipeline (Leemann, Dubach and Boes 2010; Wolfinger, Mason and Goulden 2009). However, the relatively few women who remain in academia may therefore be exceptionally talented or motivated. Their career steps can signal higher quality, which should increase their chance of getting tenured professorships. Due to these mixed predictions, it is unclear whether junior professorships or habilitation degrees affect the hiring chance in getting professorships differently for women.

(3) *Signals from academic prestige*. Prestigious universities, scholarly awards, grants or stays abroad signal academic achievement. This is because universities literally act as "brands" in CVs and signal their member's qualities accordingly (Caplow and McGee 1958:153). In line with female devaluation theory, men may be more successful than women in academia because men acquire prestige more easily, which turns into quality signals. In contrast, the prestige acquired by women may be devalued.

Prestigious universities have a long tradition in the US. Being associated with them may therefore act as a signal that confers a scientific advantage (Burris 2004). The German university landscape is far more egalitarian. However, the so-called "Excellence Initiative," launched in 2005, aims to "strengthen Germany as a location of excellent research, to enhance its international competitiveness, and to increase the visibility of top-level universities and research areas" (Wissenschaftsrat 2020:7). Therefore, attending these universities may signal excellence (Bordón and Braga 2020; Dale and Krueger 2002). If women's work or future potential is devalued, they might be selected into these universities less often and their signals from universities of excellence may be devalued. Long et al. (1993:719–20) indeed find that having visited prestigious universities aids women less than men in getting a professorship. Nolan et al. (2004) show that fewer women from high-ranking universities are hired than men. Haas and

Perrucci (1984) argue that having visited prestigious universities benefits male but not female psychologists. However, these results are based on data from over 30 years ago, and it is unclear whether similar results are found in German academia.

In addition, scientific awards augment advantages within a scientific career by signaling and cumulatively rewarding success (e.g. Matthew Effect in Merton 1968:57); they "emerged as a symbol of prestige and scientific standing" (Chan and Torgler 2015:861). However, awards can lead to an accumulation of (dis-)advantages (Crane 1965; DiPrete and Eirich 2006; Merton 1988). In particular, women may be disadvantaged because of their "systematic under-recognition," coined as the "Matilda Effect" (Rossiter 1993:337). Results on this are mixed, however. Consistent with female devaluation theory, Lincoln et al. (2012) show that female academics receive fewer scholarly awards, but if they do, they benefit less from them. Lutter and Schröder (2016), however, find that female sociologists not only receive more scholarly awards but also that they have a higher effect on women's likelihood to get a professorship.

Monetary research funding (grants) acquired by academics may also signal research quality and potential future productivity (Hornbostel 2001:536), which may be very beneficial in hiring procedures (Gross and Jungbauer-Gans 2007; Münch 2006). Studies find, however, that women receive fewer research grants, as they are less likely to apply for them (Grant, Burden and Breen 1997), but also because they lack some of the productivity that increases the likelihood to receive them (Lerchenmueller and Sorenson 2018). Some authors also suggest that women get rewarded less as their work is devalued (Wold and Wennerås 1997), which results in lower success rates for female applicants (van der Lee and Ellemers 2015). Therefore, we examine whether scientific awards or grants benefit men and women differently in becoming a professor.

Additionally, research stays abroad may enhance an academic's reputation, signaling cultural and transnational capital that may transform into research output (Gerhards and Hans 2013:102). Stays abroad may therefore be associated with an increasing chance of getting tenured. It is unclear however, whether women benefit less from experience abroad due to the lower accumulation of international experience (Rosenfeld and Jones 1987) or, according to female devaluation, whether women's transnational experiences are less valued. For German sociology, Lutter and Schröder (2016) find that female professors spent more months abroad than male professors on average, but this does not increase the overall chance of becoming a professor for women.

(4) *Signals from social capital*. Social capital may signal labor market advantages, as network ties can bestow information and career-enhancing tacit knowledge (Granovetter 1974; Granovetter 1983; Seibert, Kraimer and Liden 2001). Social capital can pay off differently for the two genders. Women's networks tend to be poorer in beneficial social capital because women's professional networks are more often gender- or status-homogenous (Etzkowitz, Kemelgor and Uzzi 2000; Feeney and Bernal 2010; Ibarra 1992; Long et al. 1993; Marsden 1987; McPherson, Smith-Lovin and Cook 2001). Women also tend to have larger but less dense social networks (Barthauer, Spurk and Kauffeld 2016:201). We therefore assume that social capital should affect the chance of women and men of becoming a tenured professor differently.

In addition to these four categories, having children may be particularly detrimental for women (Becker 1993 [1964]:19). However, findings are mixed. Mason, Goulden and Wolfinger (2013:48) find that children and marital status − surprisingly − cannot explain why women are less successful in academia overall. However, different from the humanities, women in the sciences face a less family-friendly academic environment, as scientists need to stay in the lab and/or acquire subjects (Mason et al. 2013:48–49). This is consistent with Krapf, Ursprung and Zimmermann (2017), who find depressed research productivity for mothers with young children. We therefore assume that children penalize mothers' research productivity, possibly reducing the chance for tenure.

1.4 Data and methods

1.4.1 Data

Based on university faculty websites of all German psychology departments (72 universities and two research institutes), we hand-coded CV data and publication records of all academic psychologists who published at least once. Research assistants collected this information from December 2018 to December 2019. The final data contains profiles of 2,528 persons with 44,711 publications, where each publication is one observation. We double-checked the data and used robustness tests to ensure intercoder reliability (see Appendix A1 Model 9). Since German department websites routinely include the CVs of both junior and senior academics, our dataset consists of 33% pre-doctorates (graduate students without a PhD, of which 64% are female), 40% untenured post-doctorates (61% female), 5% untenured researchers with a German habilitation or junior professorship (49% female), and 22% associate or full professors (37% female) (see Appendix A2).[14] Using university websites, we take advantage of non-reactive measurements through process-produced data. In addition, we conducted a supplement email survey, asking whether scientists have children and when their children were born (response rate: 61%).

1.4.2 Methods and Variables

We use survival analysis (Cox regressions) to handle both time-varying and time-constant variables. The method also takes into account right-censored data, in our case, scientists not (yet) having tenure when our coding ended in 2019 (Blossfeld, Rohwer and Schneider 2019:44). Our hierarchical Cox regression model employs an Efron approximation, which is more accurate due to our large number of failures (Cox 1972; Efron 1977). The dataset is unbalanced due to multiple annual publications. We generate a duration variable that randomly determines the order of the publications within a year. We use this variable to specify the analysis time, i.e. from the year of the first publication until a *first tenured professorship* as outcome variable. We start with the first publication, because the "race for tenure" starts with the first contribution to scientific knowledge. Notably, there is virtually no established tenure-track-system in Germany, as it exists in the US, for example (see footnote 14). Rather than such a position, what counts towards tenure are mainly publications (plus having PhD and post-PhD qualification −

[14] The German system distinguishes between W1 junior professorships (usually without tenure-track, contrary to the US assistant professorships), tenured W2 associate professorships and tenured W3 full professorships. The vast majority of professors in Germany become tenured without ever having been on position that could be clearly identified as “tenure track.”

which consist of publications). However, choosing a PhD as a scientific career's starting point yielded similar results (see Table A5).

1.4.2.1 Explanatory Variables

We add *females* as a dummy variable. From the survey, we build a categorical measure that shows whether scientists raise *children*, whether they remain *childless*, or whether they did not respond to our survey (*w/o child info*). This last category controls for a potential non-response bias.

We distinguish six categories of *publications*: the number of 1) journal articles ranked in the Social Science or Science Citation Index Expanded (SSCI/SCIE); 2) articles published in other journals; 3) monographs; 4) editorships; 5) book chapters; and 6) gray literature (reviews, working papers, commissioned work, etc.). An article is considered as (1) SSCI/SCIE if the publishing journal has been recorded in Clarivate Analytics' Journal Citation Reports (JCR).[15] We account for multiple-authorship using the formula *2/(number of authors+1),* weighting single-authored publications as 1, co-authored publications as 0.67, publications with three authors as 0.5, and so on.[16]

To measure career stages, we accumulate *years since habilitation* or *junior professorship*. The German academic fixed-term contract *(WissZeitVG)* requires scientists to be tenured within 12 years of employment after graduating (otherwise, they have to drop out of academia). Accordingly, we assume the probability of becoming a professor increases with seniority but only up to a certain threshold. Therefore, we consider years since career stages by a squared term as well.

We measure transnational prestige first through the accumulated *months* a researcher spent *abroad*. Second, we use a dummy variable for scientists who have completed their PhD outside of Germany *(PhD from abroad).* Third, we measure a scientist's share of academic degrees from German *universities of excellence* as institutional prestige (Baier and Münch 2013; Münch 2014). For example, if a student

[15] We additionally weight all SSCI/SCIE-articles according to the annual impact factor of the respective journal to assess the potential quality of the journal. Since we do not find any significant difference compared to the results presented here, we do not show the results.

[16] Instead of adjusting for the number of co-authors, we use only the number of publications (without author weighting). Results remain robust (see Appendix A1, Model 10).

graduated from a university of excellence, he or she is assigned the value 1; if she/he then completes the doctorate at a university that never had official excellence status, she/he obtains the value 0.5, and so on.[17] Fourth, we count the number of received scientific *awards*. Fifth, the number of *research grants* acquired from the German Research Foundation (DFG) measures future research potential, and signals both future research activity and scientific quality. We use the DFG's website, which documents all funded projects since 1999.

We operationalize social capital by 1) the cumulated number of job changes within academia (*mobility*), as each change of institution provides further access to labor market information and new social network ties. If there was missing data on the mobility measure, we use the average mobility value at each career level as an imputation score. We add 2) the cumulated number of *interim professorships* (*Vertretungsprofessor*), and 3) the cumulated number of *co-authors* within the career, both of which can indicate social capital.

We use the natural logarithm of all continuous explanatory variables because scientific capital does not increase linearly. For example, the second publication compared to the first doubles research output (increase by 100%), while, e.g., the 11th publication compared to the 10th increases research output by only 10% (10*1.1=11). The same applies to other career resources, such as co-authorships or scientific awards (see Table A1 for regression models with non-logged variables and different log specifications).

Finally, we generate two dummy variables. The first controls for *incomplete* publication records, marking those who published only "selected publications," which is especially true for professors who only share top publications. Another dummy variable controls for academic *entry cohorts* because labor market structures changed. In Germany, for example, junior professorships were introduced in 2002, together with a merit-based professorial pay scheme (*"W-Besoldung")*, while in 2007/2008, gender equity policies were changed to establish tenured professorships for women only

[17] Alternatively, we have introduced a categorical variable with [0] PhD from Germany, [1] PhD from abroad and [2] PhD from a German university of excellence (results not shown). Since the results for German universities of excellence remain robust, we use the operationalization that allows for time-variation.

("*Professorinnenprogramm*"). We therefore account for when academics started their careers by adding a dummy variable for cohorts whose first publication was *after 2009*.[18]

In collecting the data, in a few cases we found no evidence of something having occurred, for instance, when there was no indication that a researcher spent time abroad. We then replace the corresponding variables with 0. The only exception are mobility-values, where it seems likely that researchers have "average" mobility at each career stage, even if this is not on the internet. We omit data on teaching, since teaching assignments vary with career levels in Germany − a pre-doctoral researcher has two, a post-doctoral researcher four, and a junior professor four hours of teaching per week. The career variables should therefore absorb teaching. Furthermore, we do not use citations, as they are highly correlated with the number of articles (Long 1992:171–72), and as female and male social scientists accrue citations equally (Lynn et al. 2019).

1.5 Results

1.5.1 Descriptive results

Table 1 provides a characteristic overview of psychology professors at their initial appointment. On average, scientists were appointed 12.9 years after they started publishing. They had published 10.5 SSCI/SCIE articles at this point, as well as 3.3 non-SSCI/SCIE-articles, 0.7 monographs, 0.4 edited volumes, 5.6 book chapters and 2.5 pieces of gray literature (all co-author-adjusted). The distribution is highly skewed, with 75% of all appointed professors having published less than the average of 13.4 SSCI/SCIE articles, whereas the maximum is 74.2 SSCI/SCIE articles. Publications are therefore highly concentrated among a few scientists.

Additionally, tenured professors spent 22.6 months abroad, completed one-third of their degrees at German universities of excellence, received 0.6 scholarly awards and 1.1 research grants. Furthermore, about 10% did their PhD abroad, while they had an average of 2.6 moves to other research institutes

[18] We originally used four different groups of entry cohorts (<1989, 1990-1999, 2000-2009, >2010) to account for different years when academics start their careers. Because the pre-2009 cohorts show the same effect sizes, we only use pre- and post-2009 entry cohorts.

within Germany, as well as 0.5 substituted professorships and 91.1 co-authorships. At their appointment, about twice as many were parents rather than childless. 68% of appointed psychologists did a German habilitation, after which they were appointed after 3.1 years on average. Another 18% held a junior professorship, after which it took them an average of 5 years to get tenure.

Table 1. Summary statistics at initial appointments.

	N	Mean	St.Dev	min	max	p25	Median	p75
Years since first publication	471	12.93	4.21	4	32.01	10.03	13	15.13
SSCI/SCIE articles	471	10.52	7.67	0	74.2	5.67	8.98	13.39
Non-SSCI/SCIE articles	471	3.26	4.14	0	27.17	.67	1.9	4.07
Monographs	471	.73	1	0	5.35	0	0	1
Edited volumes	471	.35	.91	0	11.45	0	0	.4
Book chapters	471	5.58	6.99	0	82.56	1	3.67	8
Gray literature	471	2.47	5.25	0	59.88	0	.9	2.5
Months abroad	471	22.62	33.66	0	186	0	10	29
PhD from abroad (Dummy)	471	.1	.3	0	1	0	0	0
University of excellence	471	.29	.31	0	1	0	.25	.5
Awards	471	.64	1.27	0	9	0	0	1
Research grants	471	1.12	1.54	0	12	0	1	2
Mobility	471	2.58	1.55	0	9	2	2	3
Interim professor	471	.52	.8	0	5	0	0	1
Co-authors	471	91.14	87.72	2	787	36	68	116
Childless (Dummy)	471	.2	.4	0	1	0	0	0
Parent (Dummy)	471	.41	.49	0	1	0	0	1
W/o child info (Dummy)	471	.39	.49	0	1	0	0	1
Habilitation (Dummy)	471	.68	.47	0	1	0	1	1
Years since habilitation[1]	318	3.06	2.49	0	14	1	3	4
Junior professorship (Dummy)	471	.18	.38	0	1	0	0	0
Years since junior professor[1]	84	4.99	2.16	1	11	3	5	6

[1] Only professors who have had a junior professorship or did a habilitation before tenure.

Note: We only use complete publication records for summary statistics.

Table 2. Summary statistics at initial appointments, separately by gender.

	Male	Female	Mean(M)	Mean(F)	Difference	t-test	p-value
Years since first publication	300	171	13.11	12.6	.51		.21
SSCI/SCIE articles	300	171	11.5	8.8	2.7	***	0
Non-SSCI/SCIE articles	300	171	3.67	2.54	1.12	***	0
Monographs	300	171	.73	.73	0		.96
Edited volumes	300	171	.41	.25	.16	+	.07
Book chapters	300	171	5.92	5	.91		.17
Gray literature	300	171	2.89	1.73	1.16	*	.02
Months abroad	300	171	22.37	23.06	-.7		.83
PhD from abroad (Dummy)	300	171	.1	.11	-.01		.77
University of excellence	300	171	.28	.3	-.01		.62
Awards	300	171	.64	.65	-.01		.94
Research grants	300	171	1.17	1.03	.14		.35
Mobility	300	171	2.67	2.42	.25	+	.09
Interim professor	300	171	.55	.46	.09		.25
Co-authors	300	171	95.65	83.24	12.41		.14
Childless (Dummy)	300	171	.18	.25	-.07	+	.07
Parent (Dummy)	300	171	.39	.46	-.07		.14
W/o child info (Dummy)	300	171	.44	.3	.14	***	0
Habilitation (Dummy)	300	171	.69	.65	.04		.32
Years since habilitation[1]	207	111	3.19	2.8	.39		.19
Junior professorship (Dummy)	300	171	.13	.26	-.13	***	0
Years since junior professor[1]	39	45	5.21	4.8	.41		.61

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[1] Only professors who have had a junior professorship or did a habilitation before tenure.

Note: We only use complete publication records for summary statistics.

Table 2 shows summary statistics separately by gender. On average, women published significantly less than men until their initial appointment, although both have published the same number of monographs. Women were slightly less mobile than men, with 2.4 versus 2.7 university changes. However, women held junior professorships twice as often (13% of tenured men, 26% of tenured women). They had children as often as men but also have significantly lower non-response about their parental status. Other variables do not differ significantly. Nevertheless, while women needed an average of 12.6 years to get tenure, men needed an average of 13.1. Women were also appointed more quickly after their habilitation (2.8 versus 3.2 years) and after a junior professorship (4.8 versus 5.2 years).

Women thus have significantly fewer publications than men (except monographs and book chapters), but not significantly fewer other scientific resources (except institutional mobility). This raises the question of which scientific resources and productivity influence the hazard of getting a professorship. We now examine this through Cox regression models.

1.5.2 Cox regression models

Table 3 presents the results of the Cox models. The first model includes gender as well as the two baseline controls ("incomplete" and entry cohorts). Subsequent models add children (Model 2), publication variables (Model 3), habilitation and junior professorship as career stage indicators (Model 4), academic prestige variables (Model 5), and social capital variables (Model 6). Model 7 includes data from tenured professors only, which Models 8 and 9 split by gender. These last two models show whether becoming a professor follows from different variables for men and women, as devaluation theory would predict.

Table 3. Cox regression models on hazards of becoming a tenured professor.

	(1) Gender	(2) Children	(3) Publications	(4) Career stage	(5) Prestige	(6) Social capital	(7) Professor	(8) Female professor	(9) Male professor
Female	0.77^{**}	0.75^{**}	1.18^{+}	1.08	1.09	1.11	1.32^{**}		
	(-2.93)	(-3.18)	(1.70)	(0.70)	(0.87)	(1.00)	(2.67)		
Children		1.32^{*}	1.16	1.19	1.22	1.22	1.22	0.87	1.41^{*}
(ref. childless)		(2.11)	(1.15)	(1.20)	(1.41)	(1.49)	(1.61)	(-0.68)	(2.16)
W/o child info		1.01	1.05	1.05	1.08	1.09	1.07	1.12	1.09
(ref. childless)		(0.10)	(0.40)	(0.33)	(0.55)	(0.63)	(0.57)	(0.55)	(0.52)
SSCI/SCIE			3.30^{***}	2.71^{***}	2.40^{***}	2.28^{***}	1.55^{***}	1.66^{*}	1.55^{***}
journal articles (ln)			(14.32)	(11.14)	(9.87)	(7.26)	(4.52)	(2.55)	(3.89)
Non-SSCI/SCIE			0.92	0.92	1.02	1.07	0.97	1.07	0.94
articles (ln)			(-0.92)	(-0.95)	(0.18)	(0.76)	(-0.44)	(0.44)	(-0.73)
Monographs (ln)			1.16	1.07	1.19	0.98	0.84	0.79	0.84
			(1.13)	(0.45)	(1.33)	(-0.12)	(-1.35)	(-1.01)	(-1.21)
Edited volumes			1.27	1.41^{*}	1.27	1.29	1.23	1.15	1.29
(ln)			(1.32)	(1.98)	(1.35)	(1.33)	(1.21)	(0.46)	(1.35)
Book chapters			1.60^{***}	1.42^{***}	1.49^{***}	1.47^{***}	1.24^{**}	1.61^{***}	1.17^{+}
(ln)			(6.02)	(4.45)	(4.83)	(4.45)	(2.77)	(3.44)	(1.67)
Gray literature			1.08	1.26^{***}	1.24^{**}	1.15^{+}	1.04	0.93	1.02
(ln)			(1.25)	(3.39)	(3.22)	(1.93)	(0.62)	(-0.71)	(0.29)
Years since				1.49^{***}	1.43^{***}	1.36^{***}	1.28^{***}	1.31^{***}	1.26^{***}
habilitation				(7.05)	(6.77)	(5.00)	(6.39)	(3.91)	(4.87)
Years since				0.98^{***}	0.98^{***}	0.98^{**}	0.99^{***}	0.99^{*}	0.99^{***}
habilitation (sq.)				(-3.41)	(-3.50)	(-2.74)	(-4.34)	(-2.01)	(-3.83)
Years since junior				1.46^{***}	1.39^{***}	1.30^{***}	1.13^{**}	1.17^{*}	0.98
professor				(5.41)	(5.59)	(5.30)	(2.65)	(2.49)	(-0.19)
Years since junior				0.98^{**}	0.98^{**}	0.99^{**}	1.00	1.00	1.02^{+}
professor (sq.)				(-2.89)	(-2.99)	(-3.21)	(-0.25)	(-0.29)	(1.73)
Months abroad					1.13^{***}	1.13^{***}	1.06^{+}	1.09	1.03
(ln)					(3.52)	(3.32)	(1.84)	(1.57)	(0.65)
PhD from abroad					0.75	1.19	1.21	2.57^{**}	1.00
(Dummy)					(-1.50)	(0.86)	(0.87)	(2.58)	(0.01)
University of					0.85	0.83	0.60^{**}	0.48^{**}	0.63^{*}
excellence					(-1.13)	(-1.19)	(-3.29)	(-3.04)	(-2.34)
Awards (ln)					1.14	1.07	1.14	0.96	1.29^{*}
					(1.24)	(0.64)	(1.38)	(-0.24)	(2.05)
Research grants					1.69^{***}	1.61^{***}	1.30^{**}	1.28	1.28^{*}
(ln)					(5.47)	(4.73)	(2.92)	(1.59)	(2.14)
Mobility (ln)						3.28^{***}	3.09^{***}	4.20^{***}	2.97^{***}
						(10.87)	(10.10)	(7.59)	(7.74)
Interim professor						1.18	0.98	0.69	1.15
(ln)						(1.13)	(-0.18)	(-1.58)	(0.88)
Co-authors (ln)						1.07	1.29^{***}	1.44^{***}	1.30^{**}
						(0.89)	(3.67)	(3.35)	(2.87)
Incomplete	2.23^{***}	2.26^{***}	3.57^{***}	3.23^{***}	3.41^{***}	2.94^{***}	1.83^{**}	2.12^{*}	1.66^{*}
	(4.93)	(4.99)	(6.08)	(6.25)	(7.38)	(6.21)	(3.25)	(2.51)	(2.25)
Entry cohorts	0.44^{**}	0.44^{**}	0.41^{***}	0.43^{***}	0.47^{**}	0.44^{***}	4.41^{***}	4.20^{***}	4.28^{***}
after 2009	(-3.29)	(-3.26)	(-3.63)	(-3.41)	(-3.14)	(-3.49)	(5.13)	(3.61)	(3.52)
Pseudo R2	0.01	0.01	0.07	0.10	0.11	0.14	0.10	0.14	0.10
Log-likelihood	-3448.49	-3443.96	-3229.18	-3117.91	-3081.21	-2988.57	-2663.81	-757.75	-1531.77
Degrees of freedom	3	5	11	15	20	23	23	22	22
Chi2	49.77	54.12	264.26	455.72	603.71	745.47	692.36	416.98	385.20
AIC	6902.97	6897.91	6480.36	6265.81	6202.42	6023.14	5373.62	1559.49	3107.55
BIC	6929.10	6941.45	6576.14	6396.43	6376.58	6223.42	5555.30	1707.48	3273.18
Number of events (tenure)	554	554	554	554	554	554	554	203	351
N (persons)	2,528	2,528	2,528	2,528	2,528	2,528	556	205	351
N (persons-publications)	44,711	44,711	44,711	44,711	44,711	44,711	19,914	6,165	13,749

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

The coefficients in the regression tables show hazard ratios. A hazard rate of 1 denotes that the variable neither de- nor increases the hazard of becoming a professor. Hazard ratios larger (less) than 1 indicate a positive (negative) relationship between the variable and the hazard rate. For example, the dummy "incomplete" in Model 1 suggests that those who only present selected publications on their CVs have a 123% higher chance of obtaining tenure (2.23 at $p < 0.001$). In turn, the female dummy shows a value of 0.77 ($p < 0.01$). This means that – before conditioning on other variables − women have 23% lower chance of being appointed to a professorship compared to men.

Model 2 shows that parents have a 32 % higher chance ($p < 0.05$) of getting tenured compared to childless psychologists. Model 3 controls for publications to investigate whether this is due to parents being less productive. Simply put, a log-increase represents an approximately 3-fold increase in the respective publication variable.[19] Thus, an increase in the log of SSCI/SCIE publications multiplies the chance for tenure by 3.30 ($p < 0.001$), which is more than by the other publications. An increase in the log of published book chapters multiplies the baseline chance to get tenure by 1.60 or, in other words, increases it by 60% ($p < 0.001$). Holding publications constant shows that women and parents have a (insignificantly) higher chance to be appointed. Additionally, having children no longer has a significant impact on the chance of getting tenure, suggesting that gender and parenthood only influence getting tenure as it is related to research productivity.

Model 4 shows that years after a habilitation and a junior professorship significantly increase the chance of being appointed (habilitation: 1.49, junior professorship: 1.46; $p < 0.001$). Since the coefficients of the squared years are negative and significant, the chance of getting tenured first increases with each year and then eventually declines. Women's hazards are still close to 1 and statistically insignificant, meaning that after adjusting for parenthood, publications and career stages, the chance to get a tenured professorship do not differ significantly by gender.

[19] An increase in the natural logarithm by 1 means an increase in the variable by the factor of 2.72 (e^1=2.72; e^2=7.39 and so on). However, since we have added +1 to the logged variables in advance (as the log of 0 is not defined), the interpretation of the origin variables (without previously adding +1) slightly differs. For example, a log increase from 0 to 1 equals an increase from 0 to about 2 publications, a log increase from 1 to 2 publications equals an increase from about 2 to 6 publications, etc. For non-logged results and models that use log(2) for a more intuitive interpretation, see Appendix Table A1.

Model 5 additionally shows that logged months abroad increase the chance to get tenure by 13% and research funding by 69%. Having a PhD from abroad, academic awards or degrees from German excellence universities do not have significant effects. Controlling for these factors hardly changes the influence of variables that were already contained, meaning that their influence is not confounded by international experience.

Model 6 includes social capital variables. Among these, mobility significantly increases the chance of getting tenure by 228%, while co-authorships or interim professorships do not. Again, including these variables hardly changes the influence of the preceding ones. This suggests no differences in academic hiring between the two genders after controlling for accumulated prestige, experience and publications.

Models 7−9 reduce the sample and run the analysis on the subsample of all tenured professors (thereby excluding all postdocs and doctoral students). This selective sample of scholars consists of those who succeeded in the race for tenure. Among these tenured professors, the results reveal that women had a 32% higher chance of being appointed, conditioned on the same observable characteristics as tenured men (Model 7). This indicates that women who "survive" in academia long enough have a significantly higher chance of getting a professorship than similarly qualified men. This is also true for male professors with children (Model 9), while children are not an advantage for female professors (Model 8).

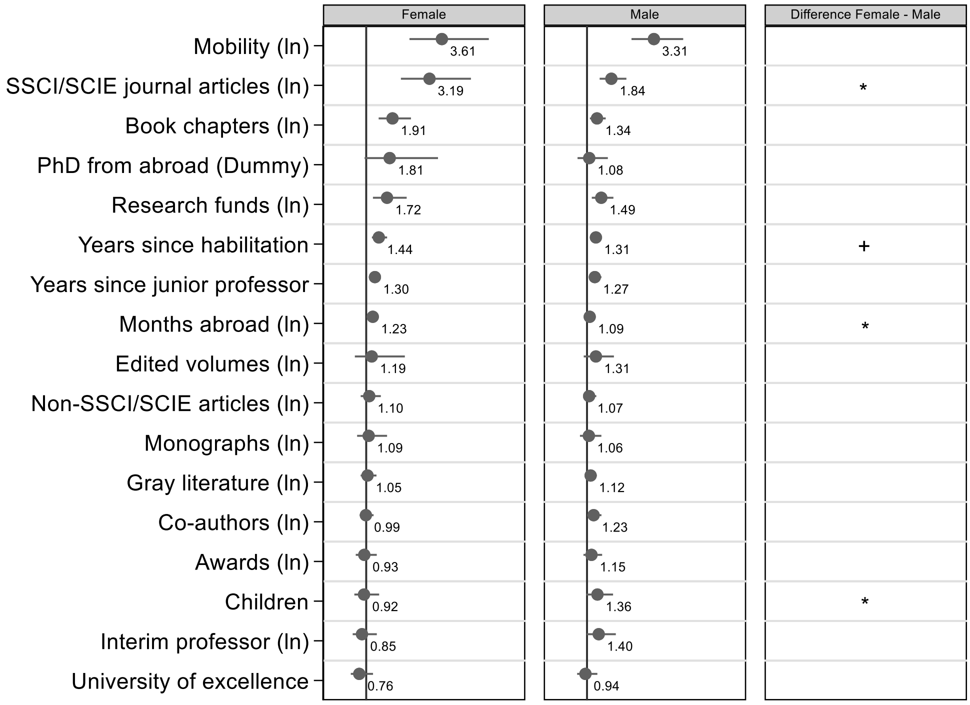
We additionally find that SSCI/SCIE-articles influence the chance of getting tenure for female professors more strongly than for male professors. Furthermore, SSCI/SCIE articles, book chapters, years since junior professorships, months and PhDs from abroad, as well as mobility and co-authors increase the chance for tenure more for women than for men. In turn, male professors benefit about 30% more from scholarly awards (Model 9).

While Models 8 and 9 calculate separate effects for male and female *professors*, we also replicate them for the full sample of *all psychologists* (including postdocs and doctoral students, based on Model 6) separately for women and men.[20] The results are plotted in Figure 1. We calculate interaction effects between female scientists and all predictors to test whether effects significantly differ between women

[20] See Table A1, Model 10-11.

and men (see Table A7). We use Figure 1 to interpret the results, in which we added the significances of the interaction terms from Table A7 (difference female - male). This tests whether the determinants of becoming a professor differ significantly between men and women, as female devaluation theory predicts.

Figure 1. Coefficient plot of Model 6 (Table 3), separated by gender.



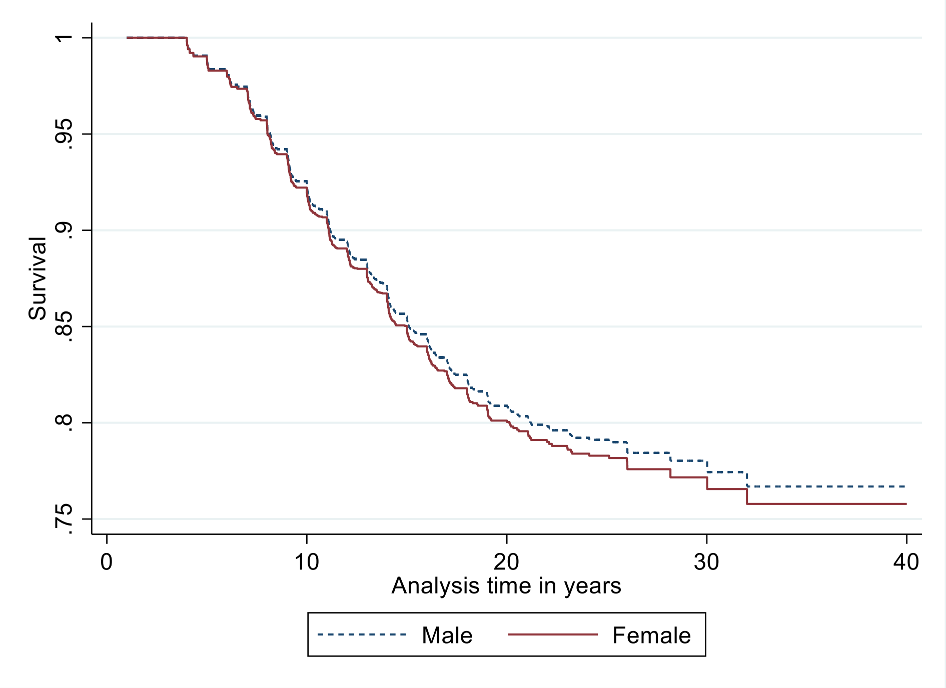
Notes: Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

As can be seen in Figure 1, influences on the chance of getting tenure remain relatively similar for male and female academics. The effect of SSCI/SCIE journal articles differs significantly between them, however. Contrary to devaluation theory, SSCI/SCIE articles increase the chance for tenure stronger for female than for male academics; women have a 3.19-fold higher chance of getting a professorship with each additional log of publication, compared to only 1.84 for men. In addition, (log) months spent abroad are more beneficial for women than for men (1.23 compared to 1.09 at $p < 0.05$). Similar to the subsample of male professors, fathers have a higher chance of getting tenured (1.36 at $p < 0.05$) than mothers (0.92 at $p < 0.05$) within the full sample of academics. All other factors show no difference at conventional significance levels, suggesting that women's achievements are not devalued relative to men's.

Figures 2 and 3 visualize the results using plotted survivor functions.[21] The survival plots show the probability of getting tenured throughout the career pipeline. The function considers all academics at the beginning of their careers, reduced by those who got tenured. Figure 2 displays covariate-adjusted survival curves based on Model 6 in Table 3. The two curves indicate that women with comparable CV and publication data are almost indistinguishable from men in their likelihood of leaving the dataset to become a tenured professor. The analysis shows almost no sign of gender bias, as the curve for women falls slightly faster. This means that women with comparable observable characteristics are appointed slightly faster than men. The differences are small and non-significant, however, as already shown with Model 6 in Table 3.

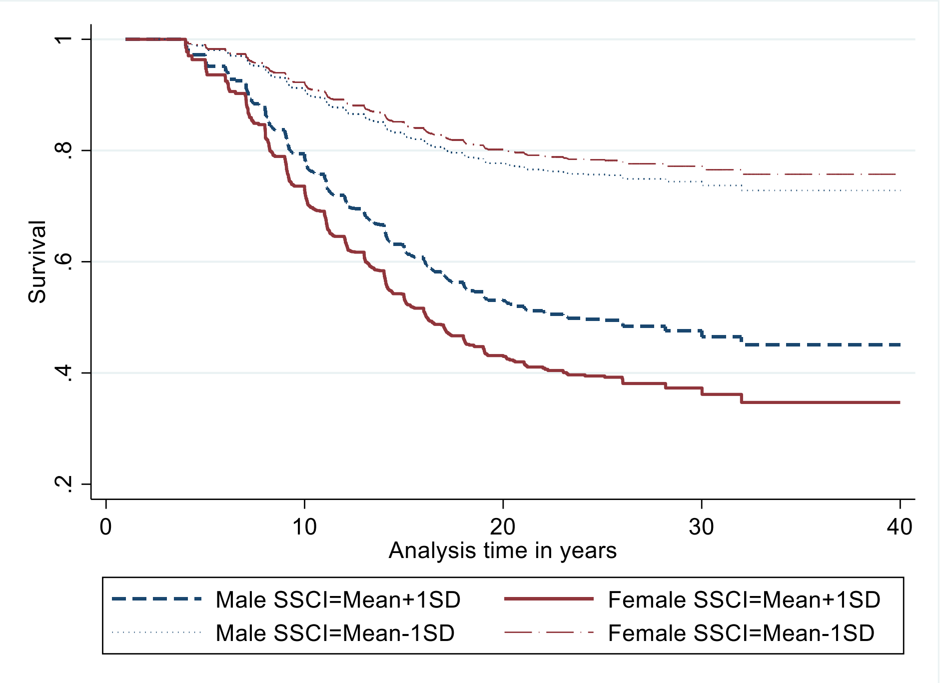
[21] Appendix B1 also shows the (conditional) estimated hazard function to see how the risk of becoming a professor changes over analysis time. The probability of women becoming a professor is consistently slightly higher than for men and peaks in both after 8 years.

Figure 2. Female and male psychologists model-based survivor functions.



Note: Based on Model 6 in Table 3 (all covariates constant at their means). The survivor plot includes all academics at the beginning of their career, reduced by those who got tenured.

Figure 3. Survivor functions of high- and low-productive psychologists, separately by gender.



Note: Based on Model 2 in Table A7 (all other covariates constant at their means). The survivor plot includes all academics at the beginning of their career, reduced by those who got tenured.

Figure 3 plots survivor functions for scenarios of high- and low-productive psychologists (based on Model 2 in Table A7), separated by gender. As the results above show, SSCI/SCIE-publications affect female and male psychologists differently. Therefore, we calculate high- and low-productivity scenarios and plot the respective "risk" of becoming a professor by gender. To construct above-average productivity, we use the overall mean of accumulated SSCI/SCIE articles for professors at the time of their first hiring plus one standard deviation, and keep all other covariates constant at their means; for the below-average scenario, minus one standard deviation from the overall mean.

As can be seen in Figure 3, we observe almost no gender differences for relatively unproductive female and male psychologists; however, highly-productive women get professorships much faster than similarly highly-productive men (i.e., their survivor rate is lower). This suggests that women's research is either (a) qualitatively better on average (while men's is of lower average quality), or that (b) women's research is valued higher when it comes to hiring decisions (while men's is devalued). In any case, the findings do not lend support for female devaluation theory.

1.5.3 Robustness checks

Additional sensitivity checks test the robustness of the results. German law allows no more than 12 years of employment on fixed-term contracts in academia. Thus, whoever has been in academia longer than this might have found one of the limited permanent academic jobs below a tenured professor. They therefore may not apply for a tenured professorship, so that they effectively drop out of the risk set.[22] We therefore right-censor our data 15 years after the first publication (rather than 12 due to parenthood-based extensions that exist in the German system), which reduces the dataset by 3.52%. This hardly changes the results (see Model 6 in Table A1).

[22] In our dataset, we observe other permanent positions in academia such as: 1) adjunct and honorary professors, 2) lecturers and *Lehrkraft für besondere Aufgaben*, 3) *Akademischer Oberrat*, 4) head of research institutes, here especially psychological institutes or university outpatient clinic *(Hochschulambulanz*) 5) or third party funded positions. On the one hand, we assume these are permanent positions (1-4), on the other hand, we observe temporary positions according to the German academic fixed-term contract (*WissZeitVG)* which allow scientists to "survive" in academia more than 12 years, even if they have not yet been appointed (5). We decide to include all academic staff in the analyses, as scientists with previously permanent jobs can (and do) apply for a professorship. The decision is reasonable, as the results remain robust even after censoring the data.

Instead of assuming that what is omitted in a CV did not happen, we also drop all cases with missing CV information, reducing the dataset by 12.6% (Model 7, A1). Again, without any significant change to the results. This is also true when using only complete publication lists, thus reducing the dataset by 5.1% (Model 8, A1). This suggests that our specifications do not suffer from bias due to missing CV information.

We further use a dummy variable for the years after 2008, where gender equity measures such as the *Professorinnenprogramm* were introduced (see Table A4). The results hardly change; however, the model shows a significantly reduced female effect within the subsample of tenured professors.

1.6 Conclusions

This study examines gender differences in getting a tenured professorship in German psychology. Female devaluation theory suggests that women benefit less from their career performance to become professors. However, using a large-scale career dataset of all academic psychologists at German universities, we find no systematic evidence of gender bias or devaluation of women's achievements with our data. On the contrary, among the subsample of professors, women have a 32% higher chance of getting tenure, holding all other observables constant. This conforms with results in Germany, where women in sociology have a higher likelihood to get tenure if they are as productive as men (Jungbauer-Gans and Gross 2013; Lutter and Schröder 2016); our study also corresponds with experimental evidence from northern Europe (Carlsson et al., 2021).

We do not find that raising children corresponds with women's chance of becoming tenured before adjusting for productivity and experience. This is in line with Mason et al. (2013), who conclude that children affect career decisions for women early on, so that they either drop out during early career stages, but if they do "survive" until later career stages, have established a work-family balance (Ginther and Kahn 2009; Mason et al. 2013:50; Preston 2004).

According to our results, productivity through SSCI/SCIE-articles ─ contrary to female devaluation theory ─ is particularly beneficial for women in the chance of becoming a professor. This finding can be due to women and men following different research styles as Fox and Mohapatra (2007) conclude. Due to women being more cautious and attentive in their research, they may present on average more in-depth analyses or better worked-out papers; therefore, each publication may weight higher for women when it comes to hiring decisions. This may further explain why female professors publish less than male − in line with our results. This is also consistent with other studies in the social sciences (Lutter and Schröder 2016; Schröder, Lutter and Habicht 2021). However, this contradicts the results in STEM subjects, where the overall productivity gap of women is explained by career-lengths differences when women drop out of academia early on (Huang et al. 2020).

Women who hold a junior professorship or did a habilitation take less time to get tenured than men, according to our results. This contradicts both female devaluation theory and existing empirical results (Valian 1999:248). After reaching these career steps, women are thus not at a disadvantage. However, reaching post-doctorate positions that qualify for professorships in the first place seems harder for women than men, as suggested by the leaky pipeline hypothesis (Leemann et al. 2010).

Female devaluation theory expects women's work to be valued less in terms of awards and expects awards to be less valuable for female careers (Lincoln et al. 2012; Rossiter 1993). Our data contradicts both contentions, showing that women accumulate as many awards as men, and then profit as much from them as men do. Among those who did actually become professor, however, men have profited more from awards than women.

Grant money clearly increases the chance for tenure. This means that having more resources is an advantage per se, even if these resources are not accompanied by more scientific output. Contrary to female devaluation theory, women profit as much from grants as men do. Female devaluation theory also suggests that women benefit less from institutional prestige. Studies indeed show that prestigious departments seem to benefit men, but not women (Haas and Perrucci 1984; Long et al. 1993). However, we find no such evidence for the influence of universities of excellence, which in our sample are unrelated to a higher chance of getting tenure, neither for men nor for women. Consequently, having attended prestigious universities rather boosts scientific research output than anticipating "pure prestige" of the department (Headworth and Freese 2016; Judge et al. 2004; Rodgers and Maranto 1989).

Since universities of excellence in Germany were only introduced in 2005, they might not have established the prestige necessary to further individual careers. Whether this changes in the future may be an important avenue for future research to see whether German universities will eventually fall into a reputational order similar to countries such as the US (Keith and Babchuk 1998:1526). Among tenured professors, we even find a significantly lower chance of becoming a professor among both men and women from universities of excellence. This may be due to a survivor bias where graduates from institutions with higher prestige are more likely to leave academia (Alper and Gibbons 1993:410).

In psychology, institutional mobility is the strongest predictor of tenure. Whereas other studies argue that social capital leads to higher productivity (Gonzalez-Brambila 2014), our research shows that mobility that may accrue social capital has an influence that is independently of productivity that it may spur. This holds for men and women equally and contradicts female devaluation theory, especially because among tenured professors, women profit even more from mobility than men.

Considering academic psychologists, however, our results show that achievements of women are not devalued when granting tenure. In this respect, we follow the conclusions of Carlsson et al. (2021), who argue that gendered evaluation of merits is not the key explanation for women's underrepresentation in professorships. Another explanation refers to the leaky pipeline in academia; it therefore remains to be examined why, and at what career stage, women leave science.

Consequently, a possible limitation of our approach is that we cannot rule out devaluation during early career stages. For instance, women's work may be judged with higher standards when they apply for grants or try to find co-authors or mentors (e.g., Preston 2004:92–110). Uhly, Visser and Zippel (2017) find that women are less likely to collaborate internationally, which is crucial for the visibility and impact of research, and thus might be a mechanism for gendered underrepresentation. In this sense, gender inequality in accessing and generating women's "scientific capital" may still occur. This study is limited in that we cannot control for access to resources resulting from gender-specific barriers or a discriminating academic environment. Unequal endowment of resources, in turn, can lead to cumulative disadvantages (in other resources) that can affect later career success (see Xie and Shauman 1998:849); although we can mitigate concerns on this.[23] For example, we find that grants enhance research productivity equally for both genders, fostering their later careers similarly, as Reskin (1976) also argued.

Gender segregation across social science departments may result from a gendered specialization in certain topics or methods (for sociology or economics, e.g., Dolado, Felgueroso and Almunia 2012; Leahey 2006; Leahey 2007; Leahey and Reikowsky 2008). We doubt, however, that this applies to psychology, which is a more homogenous research field than e.g. sociology. Further, our study cannot take into account that women may have to do more administrative work, such as participating in university commissions, or have to face double burdens in care work. Still, authors find employers favoring men in hiring because they expect them to perform better than women, causing discrimination (Reuben, Sapienza and Zingales 2014). These are important issues our research cannot address, which is why "gendered career-tracks" should remain in the interest of future research.

[23] We can mitigate concerns as we find no significant dependencies of signals like grants or social capital that affect other valuable predictors like publications differently for male and female scientists (see Tables A6).

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Chapter 4: Female advantage in German sociology. The effect of the leaky pipeline on becoming a tenured university professor[24]

1.1 Abstract

According to a study by Lutter and Schröder (2016), women have a higher chance than men of becoming a tenured sociology professor in Germany, controlling for publications and other observable career signals. We replicate this study based on updated career data of the original study plus two additional follow-up waves of data collection as well as information on parenthood. This allows us to consider gender-specific dropout dynamics and address potential selectivity issues due to women leaving academia disproportionally than men, leading to a possible overestimation of female advantage in the original study. However, our analysis does not lead to a reduction in female advantage as expected. To the contrary, the female advantage effect remains significant and even increases to a 48% higher chance when we additionally control for parenting dynamics and gender-specific dropouts. We find that women leave academia disproportionally at the pre-doc stage, while men more often drop out of academia at the post-doc stage, which is, however, not a relevant explanation for the female advantage effect.

1.2 Introduction

Lutter and Schröder (2016) examined the careers of German sociology professors and found a strong female advantage in becoming a sociology professor. According to their results, female professors become tenured about two years earlier than men and have published about 23 to 44% less than male professors at the time of starting their first tenured professorship position. Overall, female sociologists have a 44% higher chance of being appointed to a university professorship, controlling for the number

[24] This work is currently prepared for resubmission.

and different publication types and other observable career signals, such as scholarly awards or international experience.

An important critique of this study is that the effect of female advantage might be a methodological artifact due to gender-specific survivorship bias in their data. The results of Lutter and Schröder (2016) are based on retrospective panel data collected at one point in time. They use manually collected information about career trajectories (CV and publication records) from websites of academics at all sociology departments in Germany in 2013. By design, academics who had left academia before 2013 were not included. We know that women drop out of academia disproportionally to men (Blickenstaff 2005; Hancock, Baum and Breuning 2013; Joecks, Pull and Backes-Gellner 2014; Leemann, Boes and Da Rin 2009; Leemann, Dubach and Boes 2010; Pell 1996). Due to what is commonly known as the "leaky pipeline," only the most qualified or motivated women may remain in academia, while less career-orientated women may drop out and be unobservable. This survivorship effect may lead to a gender-specific selection bias that could explain the female advantage effect Lutter and Schröder found. If that is true, their result would then overestimate the female advantage in getting tenure.

In this paper, we replicate Lutter and Schröder's (2016) study with the original 2013 data plus two follow-up waves from the years 2016 and 2019. These two follow-up waves (1) add and update new publication and CV data of academics in the original 2013 dataset; (2) identify who left academia since 2013; and (3) include data of academics who entered academia after 2013. This more advanced panel design allows us to investigate whether the fact that women leave academia more often causes a survivorship bias that affects the results of the original study. Our first hypothesis is that the resulting female effect should be lower than in the original study because taking into account the two additional waves reduces a potential survivorship bias. In addition to the original study design, we also examine the possibly gendered effect of having children on getting tenure. Having children is a main factor why women drop out of academia. Our second hypothesis therefore is that the female advantage effect should be further reduced compared to the original results when we control for parenthood.

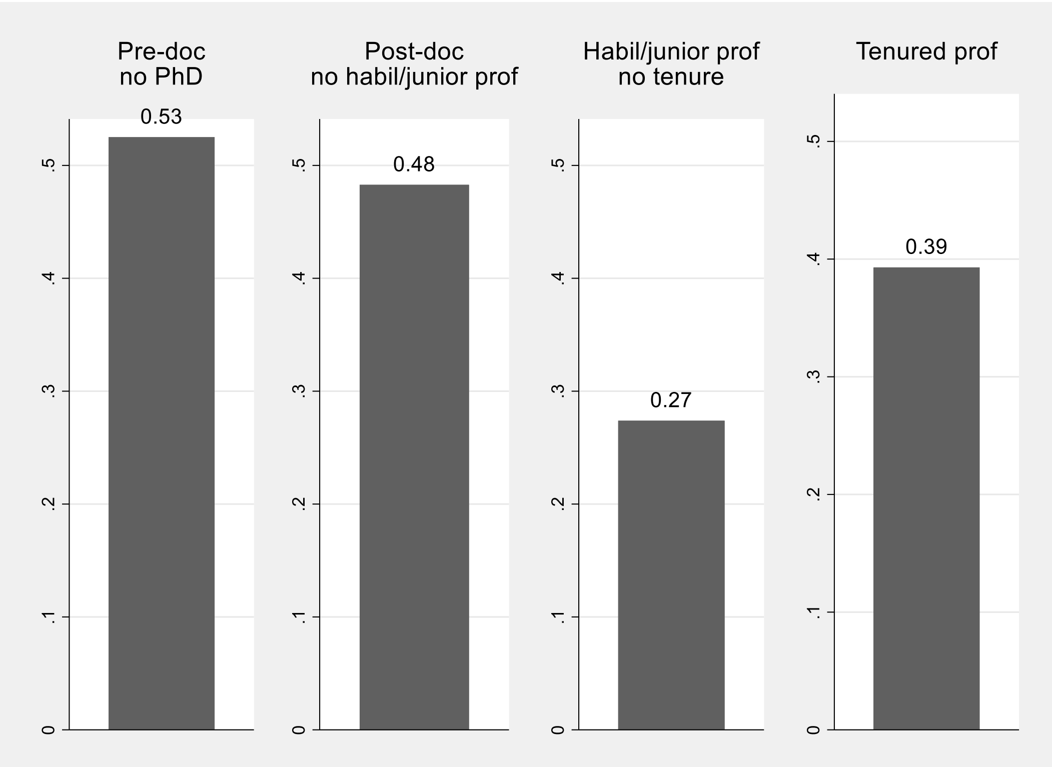
Conducting a more advanced panel design enables us to investigate whether gender-specific dropout rates explain the female advantage found by Lutter and Schröder (2016). Our results show that female advantage still occurs − and even slightly increases. None of the additional determinants (including robustness tests) can sufficiently explain women's significantly higher chance of becoming sociology professors.

1.3 A survivorship bias in academia?

To explain how survivorship bias can overestimate the female advantage found by Lutter and Schröder (2016), we must first understand how a survivorship bias can occur in academia and, second, whether and how theoretical and empirical evidence support this assumption. Lutter and Schröder used data of academics at one point in time (i.e., in 2013) to investigate their chance of becoming a professor. But what if women who selectively "survived" in academia until 2013 were particularly career-orientated, resulting in publications of higher quality? Then the result is a *selection* of extraordinarily motivated and productive women in academia, while less motivated women dropped out of academia and thus could not be sampled. This could explain Lutter and Schröder's findings that women have a higher chance of becoming a tenured professor with fewer publications.

To understand the underlying mechanism, Figure 1 shows the share of women in German sociology departments, indicating that fewer women remain in academia with each successive career stage. Assuming a survivorship bias in the data, the remaining women in higher positions are highly selective. Analyzing who gets tenure and why, and assuming that the group of women is "positively" biased, may result in an overall positively strong female advantage in the chance of becoming professor as found by Lutter and Schröder (2016).

Figure 1. Share of female sociologists at each career stage in 2019 in Germany.



Note: Own data collection. N = 2,290. $N_{pre\text{-}doc}$=699; $N_{post\text{-}doc}$=903; $N_{habil/junior\ prof}$=202; $N_{tenured}$=486.

The described self-selection of women in academia seems plausible based on theories and empirical research on the "leaky pipeline." Studies agree that women leave academia disproportionally (metaphorically speaking as a leaky pipeline) because of work-family conflicts (Goulden, Mason and Frasch 2011; Hancock et al. 2013:524; Leemann et al. 2009; Mason, Goulden and Wolfinger 2013), fewer supportive networks (Leemann et al. 2009; Leemann et al. 2010), or lower productivity (Cole and Zuckerman 1984; Schubert and Engelage 2011; Schucan Bird 2011). If systematic exit patterns exist, the remaining women in higher academic positions share systematic characteristics, too.

Many women systematically opt out of academia due to family responsibilities, especially when facing double burdens of child-raising (Ginther and Kahn 2009; Mason et al. 2013; Preston 2004). According to traditional gender roles, women are still mainly responsible for child-raising, which prevents women from succeeding in academia. As a consequence, fewer women have children compared to men in academia or women in non-academic jobs (Mason et al. 2013:3, 65), indicating family decisions matter for academic careers (or the other way around). However, balancing family with a tenure-track career seems to be particularly undesirable for women, as authors argue that women with family plans prefer teaching-intensives faculties alternatively "in favor of careers they believed were more compatible with their plans" (Ceci et al. 2014:121).

The remaining women in academia may be particularly committed to an academic career (Xie and Shauman 2003:13, 135), resulting in women selectively "surviving" in academia from the outset of their academic careers to qualify for scarce professorship, anticipating that they need to be more productive than men to be considered equally (Correll, Benard and Paik 2007). Again, a self-selection of women who excel early in their careers then accumulates advantages throughout the career pipeline (DiPrete and Eirich 2006; Merton 1973 [1942]:457). Because productivity correlates with other academic resources, like research grants or access to academic networks (Habicht, Lutter and Schröder 2021), it is likely that high-performing women share similar characteristics also in other scientific capital. These selection processes may lead to overestimated results in studies addressing women's applications for higher positions (e.g., Auspurg, Hinz and Schneck 2017; Lutter and Schröder 2016).

However, self-selection processes also matter at several levels. For instance, if only less productive scientists decide to become parents and leave science eventually ("negative" self-selection due to anticipated fertility), this inversely leads to "positively" self-selecting productive scientists, who become parents and stay in academia. The latter scenario is probably most relevant for female academics because high-productive women are more committed to handling both working on an academic career and starting or having a family at the same time (Kleven, Landais and Søgaard 2019:184). Studies indeed show that high-performing mothers tend to stay in academia (Joecks et al. 2014), and that "[l]ower-performing women tend to suffer a stronger motherhood penalty than better-performing women" (Lutter and Schröder 2020:1). These self-selection processes result in the remaining (group of) women in academia systematically sharing similar characteristics.

How, then, can we reduce survivorship bias? Problems of selectivity can only be reduced if we also observe data of nonsurvivors by gathering data at multiple points in time. We therefore supplement the career data of Lutter and Schröder (2016) and enlarge it with six more years of data. Our hypotheses are the following:

Hypothesis 1: If the assumption of the survivorship bias is true, i.e., if it is true that the female advantage is artificial because Lutter and Schröder (2016) sampled a selective group of extraordinarily qualified and motivated women, then the effect of female advantage found in the original study must be substantially lower if we use data that also includes nonsurvivors.

Hypothesis 2: If we further control for parenting dynamics (whether academics have children or not), the effect must be further reduced because we additionally control for a main factor of the leaky pipeline.

1.4 Data and methods

Lutter and Schröder's (2016) study consists of career data (publications and CV data) of virtually all academic sociologists (doctoral students, post-docs as well a tenured faculty) in Germany in the year 2013 (for details, see Lutter and Schröder 2016:1002–03). To test the first hypothesis, the authors of the current study updated the original dataset three and six years later (in 2016 and 2019). The two follow-up waves not only update publications and new relevant career moves of the original sample but also identify who left academia since 2013[25] and add publications and CV information for all academics who entered academia after 2013.

The complete dataset includes three waves of 2,290 sociologists (1,063 females) in total, of whom 486 are tenured professors (191 females) with 50,457 publication-years. We adjusted the study design in-between data collection points, so case numbers and results differ marginally from the original study (see Appendix "The study design: Differences between data collection points"). As in the original study, we use Cox regressions to capture influences throughout a career until getting tenured, which is the outcome variable (for details, see Lutter and Schröder 2016:1004). By design, we only consider career data until the first appointment to a tenured position. Due to the panel data design, other right-censoring

[25] Which we assume is the case if they can no longer be found in the web at any university or research institute either in Germany or abroad.

occurs if someone leaves academia, retires, passes away, or until the data runs out (the year 2019 is reached).

For the second hypothesis, we investigate whether *parenting* affects the chance of becoming a professor differently for women and men. In order to gather additional data on whether academics have children, we conducted two email surveys to ask scientists whether they have children and when their children were born. The first email survey took place in 2014, immediately after the first wave of data collection; the second in 2019 after the third wave. Fortunately, we reached a response rate of around 60% in both surveys. By including parenting dynamics, we expect the female advantage to decline further as we account for gendered academic dropout factors that drive the survivorship bias.

We add additional variables not included in the original study to test the robustness of the results. First, we add the number of *DFG funding* grants as a signal for scientific quality and future productivity (Hornbostel 2001:536), increasing the chance of getting tenured. We use the "Gepris" database of the German Research Foundation (DFG) to collect this information. We also add *entry cohorts* in the analysis.[26] As labor market structures have changed and equity policies have become established at universities, resulting effects may reflect dynamics of the past. To disentangle this, we capture cohort effects by the years when academics started publishing (i.e., entered academia), measured in ten-year cohorts (1980-1990, 1991-2000, 2001-2010, and 2011-2019). For a descriptive overview of all variables used in the analyses, see Table 1.

[26] As an alternate to academic entry cohorts, we use a dummy variable for the years after 2013 (*post 2013*). Because we assume the group of women is more heterogeneous after 2013 (when we particularly tagged scientists leaving academia as well as scientists that enter academia during this period), gender-specific drop-out rates may contribute to the positive female effect of the original study design. However, results hardly change (see Table A3, Model 2b).

Table 1. Descriptive statistics of all variables used in this study (corresponds to the variables of the original study, including new variables).

	N	Mean	SD	Min	Max
SSCI/SCIE articles	2290	1.86	3.02	0	31.68
Non-SSCI/SCIE articles	2290	3.21	5.07	0	79.8
Books	2290	1.15	1.52	0	22.5
Edited volumes	2290	.7	1.41	0	15.4
Book chapters	2290	7.01	9.93	0	121.67
Gray literature	2290	3.85	7.05	0	87.87
Female	2290	.46	.5	0	1
Prestige graduation[1]	2290	.3	.46	0	1
Prestige doctorate[1]	2290	.2	.4	0	1
Prestige habilitation[1]	2290	.06	.24	0	1
Awards	2290	.22	.66	0	9
Months abroad	2290	11.9	25.18	0	246
Studied abroad	2290	.31	.46	0	1
Doctorate abroad	2290	.09	.28	0	1
International publications	2290	5.49	8.75	0	92
Mobility	2290	1.96	1.75	0	11
Interim professor	2290	.31	.82	0	9
Department size	2290	9.77	7.39	1	37
Incomplete	2290	.12	.32	0	1
Co-authors	2290	18.3	27.49	0	390
Open positions	2290	18.36	7.93	4	34
Years since habilitation	2290	.86	2.62	0	27
Years since habilitation (sq.)	2290	7.62	38.11	0	729
Years since assistant professor	2290	.23	1.07	0	12
Childless	2290	.35	.48	0	1
With children	2290	.33	.47	0	1
W/o child info	2290	.31	.46	0	1
DFG funding	2290	.2	.56	0	6
Entry cohort before 1990	2290	.08	.27	0	1
Entry cohort 1990-1999	2290	.15	.35	0	1
Entry cohort 2000-2009	2290	.36	.48	0	1
Entry cohort after 2009	2290	.41	.49	0	1

Note: Based on 2.290 academics with 50,457 publications.

[1] Note that the conceptualization has changed in comparison to the original study. In 2013, the authors used data of the German Council of Science and Humanities *in* 2005 (see Lutter and Schröder 2016:1003). We now use "universities of excellence" introduced in Germany *since* 2005, here presented as dummy variables (not rankings).

1.5 Results

We start with an overview of what characterizes who gets tenure, including data of all three waves of data collections in 2013, 2016, and 2019 as well as the new variables (see Table 2, which is a replication of Table 2 of the original study). We then present a descriptive overview of academic dropouts since 2013 ("nonsurvivors") and compare their career characteristics (such as the number of publications or children) with those who stayed in academia (see Tables 3.1 and 3.2). We then replicate the main regressions of the original study using the new waves (Table 4) and present several robustness tests (Table 5 plus appendix).

1.5.1 Descriptive findings on who gets tenure

Table 2 presents statistics of all independent variables when sociologists receive tenure. We only address the differences in terms of number or significance levels compared to the original study design (Lutter and Schröder 2016:1005). Compared to the descriptive statistics using only one data collection point in 2013 (Lutter and Schröder 2016:1005), the time until tenure has leveled off for female and male sociologists (men are little faster, women little slower). Note that the difference is not statistically significant (anymore).

Table 2. What characterizes male and female sociologists who just got tenure (including waves 2013, 2016, 2019)?

	Overall		Men		Women		dif	sig.
	Mean	SD	Mean	SD	Mean	SD		
Years to professorship	15.4	4.84	15.65	4.77	15.01	4.94	.64	
SSCI/SCIE articles	4.43	4.24	5.09	4.65	3.43	3.31	1.66	***
Non-SSCI/SCIE articles	7.25	7.18	8.46	8.13	5.41	4.91	3.05	***
Books	2.43	1.99	2.76	2.26	1.94	1.36	.82	***
Edited volumes	1.67	1.94	1.75	1.88	1.55	2.03	.2	
Book chapters	15.89	12.03	17.23	11.7	13.85	12.27	3.38	**
Gray literature	7.69	9.78	8.77	10.77	6.04	7.78	2.74	**
Prestige graduation	.31	.46	.31	.47	.31	.46	.01	
Prestige doctorate	.3	.46	.3	.46	.29	.46	0	
Prestige habilitation	.19	.39	.24	.43	.11	.32	.12	**
Awards	.39	.96	.35	1.01	.45	.87	-.1	
Months abroad	21.94	34.07	19.9	30.53	25.06	38.75	-5.16	
Studies abroad	.27	.44	.23	.42	.33	.47	-.09	*
Doctorate abroad	.13	.34	.11	.32	.16	.37	-.05	
International publications	11.1	12.89	11.3	13.07	10.8	12.65	.5	
Mobility	3.25	1.77	3.28	1.78	3.2	1.76	.08	
Interim professor	.83	1.04	.85	1.02	.81	1.07	.04	
Department size	10.87	8.99	11.01	9.21	10.66	8.66	.35	
Co-authors	31.96	32.94	34.34	33.03	28.34	32.59	6	+
Habilitation	0.64	0.48	0.7	0.46	0.54	0.5	.16	**
Years since habilitation	2.02	2.63	2.46	2.85	1.35	2.09	1.11	***
Assistant professor	0.17	0.38	0.12	0.32	0.25	0.43	-.13	***
Years since assistant professor	.78	1.92	.52	1.57	1.17	2.31	-.64	**
Childless	.26	.44	.22	.42	.31	.46	-.09	*
With children	.48	.5	.52	.5	.43	.5	.09	+
W/o child info	.26	.44	.26	.44	.26	.44	0	
DFG funding	.56	.84	.53	.85	.6	.82	-.08	
Entry cohort before 1990	.29	.45	.35	.48	.19	.39	.16	***
Entry cohort 1990-1999	.4	.49	.4	.49	.41	.49	-.02	
Entry cohort 2000-2009	.29	.45	.24	.43	.36	.48	-.12	*
Entry cohort after 2009	.03	.16	.02	.13	.04	.19	-.02	

Notes: Cases with incomplete publication lists (n=90) were dropped. N_{male}=239, N_{female}=157. SD = standard deviation.
Mean differences between men and women significant at *+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*; two-sided tests).

The gender differences in the number of publications resemble in magnitude and significance levels most of the 2013 study results. Table 2 shows that men have published significantly more when getting their first tenured professorship (except for a nonsignificant difference in edited volumes). Men have 1.5 times more SSCI/SCIE articles at the point of hiring, 1.6 times as many non-SSCI/SCIE articles, 1.4 times as many books, and 1.2 times as many book chapter publications. Men also completed their habilitation at a university of excellence twice as often. No difference in the average number of academic awards exists, although women in the 2013 study had significantly more awards than men (the difference still exists but is not statistically significant anymore). Similar to the original results, more female sociologists studied abroad and earned their PhD abroad. The number of co-authors was statistically higher for men in the original study, but this has converged.

64% of tenured sociologists obtained a habilitation (75% in the original study), mainly due to fewer women obtaining this degree than in 2013. Twice as many women hold a junior professorship (12% vs. 25% for men). The junior professorships introduced in 2002 in Germany seem to have become increasingly important as an alternate to the habilitation, particularly for women.

Overall, 48% of tenured professors have children, 26% do not have children, and 26% did not respond to this survey question. Among these, more male than female professors have children (52% men vs. 43% women have children; 22% of men are childless vs. 31% of women). Women acquired slightly more DFG-grants when they got tenure. The share of women who started their careers after the year 2000 is significantly higher compared to men (40% vs. 26%). This reflects an overall increase of women in academia in the last two decades. Correspondingly, academics of the older cohorts who "survived" until 2019 are overrepresented by men.

1.5.2 Who left academia since 2013?

Because we hypothesize a gendered selection effect as a potential source of bias in the original study, we now take a closer look at those who left academia since 2013. Table 3.1 shows that 263 sociologists dropped out of academia between 2013 and 2019. Among these, 55% are females as opposed to 45%

males. There is a clear trend of gender-specific dropout rates by career stage: At early career stages (among doctoral students), dropout rates are much higher for women than for men (65 vs. 35% in the first wave; 60 vs. 40% in total). In contrast, dropout rates are higher for men in the post-doc phase (69 vs. 31% in the first wave, 52 vs. 48% over all waves). Women thus particularly drop out during early career stages before completing the PhD, while men tend to drop out after the PhD.

Table 3.1. Absolute numbers of academic dropouts, separated by gender and career stage (in parentheses: %).

	Career Stage		
	Pre-doc	Post-doc	Total
	Dropouts 1st wave (2013 – 2016)		
Male	31 (35)	20 (69)	51 (44)
Female	57 (65)	9 (31)	66 (56)
Total	88 (100)	29 (100)	117 (100)
	Dropouts 2nd wave (2016 – 2019)		
Male	39 (46)	27 (44)	66 (45)
Female	46 (54)	34 (56)	80 (55)
Total	85 (100)	61 (100)	146 (100)
	Total dropouts (2013 – 2019)		
Male	70 (40)	47 (52)	117 (45)
Female	103 (60)	43 (48)	146 (55)
Total	173 (100)	90 (100)	263 (100)

According to our theoretical discussion, lower productivity rates or having children should affect whether academics continue (or abandon) an academic career, particularly for women. Table 3.2 examines differences between academic dropouts and stayers for the number of SSCI/SCIE publications, book chapters, and children.[27] Most strikingly, the number of SSCI/SCIE publications significantly differs between those who leave and those who remain in academia. At the time of abandoning a career, academics publish 42% less than their staying counterparts (for women: 45%). Leavers also write fewer book chapters, a difference that is only significant at the 10% level among women, however. Female and male sociologists who leave academia are equally likely to have children as their staying counterparts (36% vs. 38% are parents overall). However, stayers and leavers differ in

[27] To compare both groups, we fix the number of publications, books, and children for stayers to a minimum of six years, since sociologists on average leave academia after six years. In Table 3.2, we therefore do not include academics who have been in academia for less than six years, which reduces the number of the stayers in Table 3.2.

the number of children. The last row of Table 3.2 shows that female leavers tend to have more children than female stayers (0.61 vs. 0.52 children on average), while male leavers tend to have fewer children than their staying counterparts (0.52 vs. 0.59 children on average).

Table 3.2. T-tests on academic dropouts versus stayers (matched at equal years).

	Stayers	Leavers	Mean (S)	Mean (L)	abs. dif (L/S)	rel. dif 1-(L/S)	sig.
Overall							
SSCI/SCIE articles (ln)	1305	241	.73	.42	0.58	-42%	***
Book chapters (ln)	1305	241	2.35	2.09	0.89	-11%	
% Parents	957	123	.38	.36	0.95	-0.5%	
# of children	957	123	.56	.57	1.02	+2%	
Only women							
SSCI/SCIE articles (ln)	568	130	.65	.36	0.55	-45%	***
Book chapters (ln)	568	130	2.27	1.8	0.79	-21%	+
% Parents	427	71	.36	.37	1.03	+3%	
# of children	427	71	.52	.61	1.17	+17%	
Only men							
SSCI/SCIE articles (ln)	737	111	.79	.49	0.62	-38%	*
Book chapters (ln)	737	111	2.42	2.42	1	0%	
% Parents	530	52	.39	.35	0.90	-10%	
# of children	530	52	.59	.52	0.88	-12%	

Notes: Cases with incomplete publication lists were dropped. Numbers of stayers after six years in academia (as the average time when sociologists leave academia).
Mean differences between men and women significant at *+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*; two-sided tests.

As a preliminary result, it seems that those who leave academia publish less, which is especially true for female dropouts. Female dropouts also have more children than female stayers, though the difference is insignificant.

1.5.3 Cox regression results

Table 4 shows hazard ratios for the chance on getting a tenured professorship in sociology. Testing our first hypothesis, Model 1 replicates the main results of the original study (see Model 6 of Table 3 in Lutter and Schröder 2016) with our more advanced panel design that includes all waves of data collection.[28] The subsequent Models 2 and 3 split the results by gender (replicating Models 5 and 6 of Table 4 in Lutter and Schröder 2016). To test our second hypothesis, we add parenthood in Model 4,

[28] For detailed results on the stepwise regression models, see Appendix Table A2.

examining it separately for women and men (Models 5 and 6). To show whether our results are robust, we present additional specifications further below.

Table 4. Cox regression models on getting tenure (including waves 2013, 2016, 2019).

	Test hypothesis 1 (replication)			**Test hypothesis 2 (children)**		
	(1) Full Model	(2) Only Women	(3) Only Men	(4) Full Model	(5) Only Women	(6) Only Men
SSCI/SCIE journal articles	1.67^{***}	1.36^{*}	2.01^{***}	1.66^{***}	1.36^{*}	1.98^{***}
(ln)	(6.16)	(2.16)	(6.41)	(6.16)	(2.22)	(6.24)
Non-SSCI/SCIE articles	1.20^{*}	1.29^{+}	1.16	1.19^{*}	1.27^{+}	1.16
(ln)	(2.38)	(1.87)	(1.56)	(2.33)	(1.77)	(1.49)
Books (ln)	1.63^{***}	1.59^{*}	1.57^{**}	1.59^{***}	1.58^{*}	1.53^{**}
	(4.20)	(2.16)	(3.26)	(3.99)	(2.15)	(3.06)
Edited volumes (ln)	1.36^{**}	1.29	1.42^{**}	1.35^{**}	1.29	1.38^{**}
	(3.11)	(1.41)	(2.89)	(3.08)	(1.41)	(2.68)
Book chapters (ln)	1.10	1.26	1.05	1.10	1.29	1.04
	(1.05)	(1.50)	(0.40)	(1.03)	(1.63)	(0.35)
Gray literature (ln)	0.89^{+}	0.92	0.86^{*}	0.90^{+}	0.92	0.86^{*}
	(-1.84)	(-0.70)	(-2.23)	(-1.80)	(-0.69)	(-2.30)
Female	1.46^{**}			1.48^{***}		
	(3.21)			(3.44)		
Prestige graduation	0.63^{***}	0.72	0.57^{***}	0.63^{***}	0.71^{+}	0.58^{***}
	(-3.73)	(-1.62)	(-3.41)	(-3.68)	(-1.65)	(-3.32)
Prestige doctorate	1.18	1.25	1.06	1.20	1.33	1.08
	(1.23)	(1.12)	(0.32)	(1.41)	(1.42)	(0.44)
Prestige habilitation	1.38^{*}	1.46	1.40^{+}	1.36^{+}	1.40	1.41^{+}
	(2.06)	(1.48)	(1.80)	(1.93)	(1.27)	(1.81)
Awards (ln)	1.24	1.43^{+}	1.04	1.23	1.45^{+}	1.04
	(1.60)	(1.69)	(0.22)	(1.55)	(1.79)	(0.20)
Months abroad (ln)	1.13^{**}	1.14^{*}	1.16^{**}	1.12^{**}	1.15^{*}	1.16^{**}
	(3.14)	(2.16)	(2.93)	(3.13)	(2.26)	(2.91)
Studied abroad	0.89	1.05	0.76	0.90	1.05	0.77
	(-0.96)	(0.26)	(-1.63)	(-0.86)	(0.27)	(-1.50)
Doctorate abroad	1.50^{*}	2.28^{**}	1.08	1.49^{*}	2.35^{**}	1.07
	(2.39)	(3.02)	(0.32)	(2.36)	(3.21)	(0.30)
International publications	1.14^{+}	1.02	1.14	1.13^{+}	1.03	1.14
(ln)	(1.86)	(0.20)	(1.44)	(1.82)	(0.25)	(1.41)
Mobility (ln)	2.45^{***}	2.56^{***}	2.47^{***}	2.49^{***}	2.53^{***}	2.50^{***}
	(8.71)	(5.65)	(7.12)	(8.81)	(5.56)	(7.16)
Interim professor (ln)	1.21	1.07	1.25	1.24^{+}	1.09	1.29^{+}
	(1.55)	(0.32)	(1.49)	(1.83)	(0.41)	(1.68)
Department size (ln)	1.07	0.92	1.21^{+}	1.08	0.92	1.22^{+}
	(0.74)	(-0.55)	(1.85)	(0.86)	(-0.56)	(1.91)
Co-authors (ln)	1.11^{+}	1.19^{+}	1.10	1.12^{+}	1.20^{*}	1.11
	(1.75)	(1.88)	(1.15)	(1.85)	(1.99)	(1.21)
With children				1.33^{*}	1.17	1.40^{*}
(ref. childless)				(2.18)	(0.73)	(2.04)
W/o child info				1.30^{+}	1.46^{+}	1.24
(ref. childless)				(1.82)	(1.74)	(1.13)
Incomplete	2.06^{***}	2.42^{**}	1.96^{***}	2.11^{***}	2.60^{***}	1.96^{***}
	(4.88)	(3.28)	(4.06)	(5.19)	(3.64)	(4.12)
Open positions (ln)	0.83^{+}	0.72^{*}	0.89	0.83^{+}	0.72^{*}	0.90
	(-1.76)	(-2.03)	(-0.87)	(-1.80)	(-2.00)	(-0.84)

Table 4. Continued.

Years since habilitation	1.48***	2.00***	1.33***	1.47***	1.98***	1.32***
	(5.55)	(5.82)	(3.71)	(5.46)	(5.72)	(3.66)
Years since habilitation	0.97***	0.94***	0.97**	0.97***	0.94***	0.98**
(sq.)	(-4.22)	(-3.94)	(-3.04)	(-4.20)	(-3.91)	(-3.04)
Years since assistant prof	2.28***	2.71***	2.26***	2.25***	2.69***	2.26***
(ln)	(7.85)	(7.08)	(5.82)	(7.74)	(7.20)	(5.74)
Pseudo r²	0.13	0.17	0.14	0.13	0.17	0.14
Log-likelihood	-2643.51	-854.01	-1450.23	-2640.13	-852.25	-1447.84
Degrees of freedom	24	23	23	26	25	25
Chi²	702.52	356.59	453.51	731.01	383.27	463.17
AIC	5335.03	1754.02	2946.45	5332.27	1754.50	2945.67
BIC	5546.92	1933.63	3139.23	5561.82	1949.73	3155.21
Number of events (tenure)	486	191	295	486	191	295
N (persons)	2,290	1,063	1,230	2,290	1,063	1,230
N (persons-publications)	50,457	18,197	32,260	50,457	18,197	32,260

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

According to our first hypothesis, the female advantage effect should be substantially lower than in the original study. As can be seen in Model 1, this assumption does not seem to hold. In the original study, women had a 41% higher chance of getting tenure than men; this effect now increases to 46%, all else being equal. The female advantage even increases up to 48% when controlling for parenthood in Model 4. This also contradicts our second hypothesis, which assumes that the female advantage should decrease if we control for parenthood as one main dropout factor for women.

Although a selective group of particularly low-productive women left academia disproportionately, the effects of publishing on becoming a professor remain similar compared to 2013 (see Model 1). In line with the results of the original study, SSCI/SCIE publications are more beneficial for men. The effect for men has increased slightly in magnitude compared to 2013; for women, it has decreased in magnitude (but remains significant). This may reflect the consequences of women leaving with particularly few SSCI/SCIE publications so that the stronger effect of SSCI/SCIE publications in the original study may be overestimated. The number of books now has an equal effect for women and men. Still, publishing edited volumes is more advantageous for men, both of which are minor differences from the original 2013 results. Moreover, non-SSCI/SCIE articles now significantly increase the chance of getting tenure by around 20%, while this effect was insignificant in the original study.

Interestingly, the enormous impact of scholarly awards on a woman's chance of obtaining tenure in the original study (the strongest predictor for women) now decreases (only significant at the 10% level in Model 2), although the effect is still more advantageous for women. This finding may reflect the fact that the new data has a lower selection bias for women.

Academics who obtained their habilitation at a university of excellence have a 38% higher chance of obtaining tenure (Model 1), an effect which is now more beneficial than in 2013 (particularly for men). Having graduated from such a university reduces the chance of getting tenure, a trend which is also visible in the original study.

Although of the same substantive magnitude (also among women and men), none of the variables measuring transnational capital were statistically significant in the 2013 data. In Model 1 of the current study, months spent abroad and having a doctorate from abroad significantly increase the chance of obtaining tenure. The overall beneficial effect of having a doctorate abroad is due to the subsample of women: Women who earn their doctorate abroad have a 2.28 higher chance of getting tenure, while we do not find a significantly higher chance among men.

Consistent with the 2013 data, mobility, i.e., the number of different institutions an academic is linked to over their career is still a main predictor for getting tenure. In the current study, the effect becomes stronger (both among women and men, see Models 1 to 3). The effect of the number of co-authors also becomes slightly higher, especially for women, but it is barely significant.

Having children is positively associated with the chance for tenure (Model 4). The effect seems to be driven by the strong children effect among men (Model 6). This may indicate that children do not harm men's career prospects and reflect the descriptive results of the subgroup of male leavers having fewer children than male stayers. Interestingly, women who refused to participate in the email survey on whether they have children are actually associated with a 46% higher chance of getting tenure than childless women.

To sum up, this analysis on who gets tenure in sociology barely contradicts the results of Lutter and Schröder's (2016) study. Inconsistent with our first hypothesis, however, we do not find a reduced female advantage effect. To the contrary, the female advantage regarding the chance of getting tenured even increases. The effect further increases when we control for parenthood, contrary to what we expect with the second hypothesis.

1.5.4 Additional analyses to test the robustness of the female advantage

Table 5 presents a set of regression models that include all independent variables (Model 4 in Table 4) to test the robustness of the results by including additional covariates that were not part of the original study. We add the number of research grants acquired by the DFG in Model 1 of Table 5. If women have more DFG grants than men, this might explain their advantage. However, doing so even increases the female advantage in getting tenure. This means that with the same level of research grants, women have a 47% higher chance of getting tenure, which is similar to our general results. Therefore, research grants do not explain why women are advantaged in getting tenure.

Model 2 adds the years in which sociologists entered academia in 10-year cohorts to disentangle possible cohort effects of our retrospective data collection. This indicates whether specific cohorts of academics were more likely to get tenure than others, showing whether our results reflect academic structures of the past. The results show that the models remain robust; this means that our results do not depend on some cohorts of academics who collectively have a higher chance of getting tenure.

In Model 3, we exclude observation years of sociologists that spent more than 15 years in academia without being (ordinarily) tenured as professors.[29] It is possible that these scientists have one of the rare permanent positions in academia, such as tenured lecturers (*Lehrkräfte für besondere Aufgaben*). We do not know this ultimately. It is possible, however, that these people are not in the "risk set" of becoming a full professor anymore or never have been on this track. We also exclude scientists whose first appointment was at a university of applied sciences (*(Fach-)Hochschule*), which applies to 17

[29] Scientists have to be permanently employed after 12 years in academia due to the German fixed-term law, so that we assume scientists who work in academia longer than 15 years have other permanent positions that professorships. We opt for 15 years instead of 12 years because of parental leaves, when the period is extended by law.

professors, of whom 10 (59%) are females. Interestingly, the female advantage effect now decreases substantially but remains positively significant at a rate of 36% advantage for women over men, all else being equal.

Model 4 restricts the sample to academics appointed as W2 professors (tenured associate professors). That means we dropped 53 out of the 486 professors in our data, who directly got a W3 professorship (tenured full professor). Of course, this is only possible if the respective information is given in the CV. Among the 433 W2 professors, 39% are female. The 53 academics we excluded directly obtained a W3 professorship (full professor), of whom 18 (34%) are female. Because more men are directly appointed to W3 professorships, this could explain women's higher chance of initially becoming W2 professors. As can be seen in Model 4, however, dropping W3 professorships does not explain the higher chance for women, as the female advantage is not reduced. To the contrary, a woman's chance of directly becoming a W2 professor is 50% higher.

Finally, Models 5 to 7 restrict the sample to only PhD holders (Model 5), habilitation holders or (W1) assistant professorships (Model 6), and (W2/W3) tenured professorships (Model 7). However, only when restricting the sample to tenured professors did women's higher chance of becoming professors decrease to 30%, without reducing the female advantage overall. This means that women still have an advantage among those who actually become tenured professors, but it is not as high as in the overall sample.

Table 5. Cox regression models on getting tenure for robustness tests (including waves 2013, 2016, 2019).

	(1) DFG funding	(2) Entry cohorts	(3) Other academic positions	(4) Drop W3 profs	(5) PhD	(6) Habil/ assist prof	(7) Tenured Professors
Female	1.47***	1.47***	1.36**	1.50***	1.46***	1.52***	1.30*
	(3.41)	(3.38)	(2.68)	(3.33)	(3.32)	(3.35)	(2.42)
DFG funding	1.40***	1.39***	1.28***	1.45***	1.41***	1.40***	1.02
	(5.50)	(5.35)	(4.21)	(5.35)	(5.69)	(5.15)	(0.36)
before 1990 *(ref.)*							
1990-1999		1.02	1.15	1.01	1.02	0.99	2.04***
		(0.11)	(0.89)	(0.07)	(0.13)	(-0.03)	(4.73)
2000-2009		1.07	1.19	0.99	1.11	1.20	3.91***
		(0.39)	(0.95)	(-0.03)	(0.64)	(0.96)	(6.93)
after 2009		1.33	1.55	1.24	1.65+	2.10*	24.09***
		(0.92)	(1.38)	(0.68)	(1.67)	(1.97)	(11.11)
Pseudo r²	0.13	0.13	0.14	0.13	0.13	0.12	0.10
Log-likelihood	-2625.41	-2624.97	-2438.58	-2319.24	-2613.54	-1839.41	-2270.48
Degrees of freedom	27	30	30	30	30	30	30
Chi²	803.37	813.38	795.11	739.56	807.91	608.36	763.69
AIC	5304.81	5309.94	4937.16	4698.48	5287.09	3738.82	4600.95
BIC	5543.19	5574.81	5200.01	4961.87	5549.13	3983.40	4839.00
Number of events (tenure)	486	486	469	433	486	377	486
N (persons)	2,290	2,290	2,260	2,237	1,591	579	487
N (persons-publications)	50,457	50,457	47,173	48,027	45,922	25,662	20,636

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*
Note: Controlling for all independent variables used in Model 4 of Table 4 (but not shown here). For the full models, see Appendix A3.

Whereas we use two separate models for women and men in Table 4, we additionally test whether determinants for becoming a sociology professor differ *between* women and men by calculating interaction terms (see Appendix Table A4). Scientific resources that are rewarded higher or "count more" when women achieve them could explain why women have a higher chance of becoming a sociology professor with fewer publications. For instance, Lutter, Habicht and Schröder (2022) show that SSCI/SCIE articles are more beneficial for women to become psychology professors. However, according to Table A4, none of the determinants used in our models significantly differ statistically between women and men, except for the detrimental effect of SSCI/SCIE publications for women at $p < 0.1$. By adding interaction terms of females, the conditional female advantage still holds. This means that women do not have a higher chance of getting tenured because every publication, award etc. counts more for them than for men.

1.6 Conclusions

In this study, we examine the chance of becoming a sociology professor in Germany. We replicate the study of Lutter and Schröder (2016) that only used data until the year 2013. We base our analysis on their original dataset, update their data, and add two follow-up waves from the years 2016 and 2019. We hypothesize that the original study design could be biased by neglecting academia's gendered leaky pipeline. We assume that retrospective data collected at one point in time (as it is the case of the original study) could produce a selection bias if academic productivity, gender and the propensity to drop out of academia are correlated, that is, if less productive women are more likely to drop out of academia. Indeed, our descriptive results suggest this to be the case, as female dropouts have below-average publication rates and have children more often than male dropouts or academic stayers.

Based on these assumptions, we expect that the female advantage effect of the original study may be overestimated. However, our results show that the leaky pipeline cannot explain a women's higher chance to become a sociology professor, nor can having children. Further robustness tests that incorporated research grants, cohort effects, other academic positions, higher-tier professorships, or different career stages also cannot sufficiently explain the female advantage effect. We therefore cannot support both of our hypotheses. We conclude that selection bias is not a relevant explanation for the female advantage effect. What does this mean for the current state of research?

Our study supports the leaky pipeline, showing that women are more likely to leave academia (Blickenstaff 2005; Hancock et al. 2013; Joecks et al. 2014; Leemann et al. 2009; Leemann et al. 2010; Pell 1996). Unlike much of the preceding literature, we can show that this mainly happens at the pre-doc stage, while men leave more often at the post-doc stage. Our data also indicates that female and male sociologists are less productive when they leave academia compared to their remaining counterparts. Although − and in line with our study − it is often reported that women publish less than men (e.g., Cole and Zuckerman 1984; Schubert and Engelage 2011; Schucan Bird 2011), the systematic opting out of lower-productive women seems not to reduce a women's higher chance of becoming sociology professors eventually. At the time they obtain tenured, women publish less on average, which is why we hypothesized that they write fewer but higher quality papers. However, interaction effects that measure whether publishing is especially crucial for women show the opposite: Although SSCI/SCIE articles significantly increase the chance of tenure, our results show a significantly stronger correlation for men, suggesting that the higher quality of their publications cannot explain the female advantage.

In addition, we find that a higher number of children is associated with leaving academia for women (but not for men). It is not surprising that women who have children leave academia due to family responsibilities (e.g., Ginther and Kahn 2009; Mason et al. 2013; Preston 2004). Also, it is not surprising that children are less of a hurdle to male careers in academia (Mason et al. 2013:28, 35; Schubert and Engelage 2010; Wolfinger, Mason and Goulden 2009:1611). It seems likely, however, that mothers have to suffer earlier in the career pipeline from the double burden of child-rearing, while those women who remain in academia may be more confident in handling both (Fox 2005; Joecks et al. 2014; Kleven et al. 2019; Lutter and Schröder 2020). Rather than concluding that mothers have a lesser chance of getting tenure at the time of hiring, our data suggests that mothers have an insignificantly and fathers a significantly higher chance of getting tenure.

As noted above, we find gender-specific dropout rates for women only at the pre-doc stage, while men tend to leave academia rather at the post-doc stage. Silander, Haake and Lindberg (2013:184–85) draw a similar conclusion for the Swedish social sciences: although more women leave academia initially, "the relationship is reversed after 10 years when more men than women in the social sciences have left academia." In this case, selectivity issues would be of a lesser problem for studies that rely on one wave only or sample-specific cohorts of academics, who have already obtained their doctorate or habilitation. While future research should consider the critical question of who opts out of academia, at this point, we simply emphasize that a systematically biased group of academic dropouts is not the key to explaining women's higher chance of becoming a sociology professor with the same characteristics as men. Incorporating the leaky pipeline in our study design and adding information on children does not reduce the clear female advantage in becoming a sociology professor in German academia.

Although research grants increase the chance of getting tenure in related fields, such as political science (Schröder, Lutter and Habicht 2021), they cannot explain why women have a higher chance of getting tenure, net of other influences. Studies show that women in German academia submit research proposals as often as men but receive less grant funding than their male colleagues (Allmendinger and Hinz 2002).[30] According to our analyses, female professors acquire slightly more research grants than male professors when getting tenure (see descriptives in Table A1.2 and A1.3). However, we cannot conclude that research grants differentially affect a woman's chance of becoming professors. That our results differ from previous ones may be due to our more recent data. While Allmendinger and Hinz used data from 1993 to 1999, our dataset extends to 2019. According to Allmendinger and Hinz, however, women's applications are particularly concentrated in specific sub-disciplines (gender studies). Our study is limited in that we cannot filter out sub-disciplines or consider disparities in funding volume. Women's specializations can also play a role beyond research grants: Women in sociology may have a higher chance of being appointed to gender studies chairs (see also Jungbauer-Gans and Gross 2013:86). Due to multiple data collection points, we cannot test this retrospectively, but the original study suggests that accounting for gender studies chairs does not alter the female advantage effect (Lutter and Schröder 2016:1007).

We actually find women's higher chance of becoming professor is reduced to 30% (compared to 46% of the full sample) when restricting the sample to those who eventually became tenured professors. But why can the strongly positive female effect partially be explained by excluding academics without getting tenured yet? This may lie in the compositional structure of the professor sample, not including early-stage sociologists (especially younger cohorts). Assuming the female advantage relates to affirmative actions within the academic labor market that increasingly took place since the last two decades, and the overall share of females in academia has simultaneously increased, the reduced female advantage may be due to "older" academic cohorts.

[30] But recent research on grants in the Netherlands suggests that women are positively discriminated (Bol, Vaan and Van de Rijt 2022).

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Chapter 5: Do mothers get lost at the post-doc stage? Event history analysis of academic psychologists in Germany[31]

1.1 Abstract

Women in academia are typically outnumbered by men, which is metaphorically known as "the leaky pipeline." This study contributes by showing a motherhood penalty in the career pipeline at the post-doctoral stage—that is, during the German Habilitation. The study shows what determines being awarded a habilitation and whether these differ between women and men as well as mothers and fathers, respectively. To this end, the author uses event history analysis to examine retrospective career trajectories of academic psychologists in 2019. Using a dataset of virtually all psychologists in German academia, the study examines gender differences in parenting, productivity gaps, mobility, university tracks, and years in academia (the "worker explanation"). The study also takes into account discrimination strands so that women's performance is less valued (the "discrimination explanation"). The key results are that mothers do not tend to accumulate less scientific capital overall, and that SSCI/SCIE articles are positively associated with the habilitation risk for women and mothers. However, mothers are penalized as the risk of habilitation decreases by 46%, accounting for career signals and publication records.

1.2 Introduction

At the European level, the proportion of women completing their PhD is meanwhile equal to men (and growing at a much faster rate), raising the total share of women in academia to one-third in 2018 (Directorate-General for Research and Innovation / European Commission 2021:24–30, 96-98). The lower overall share of women can be largely explained by the underrepresentation of women in higher academic positions. The "leaky pipeline" in academia was first mentioned in the 1980s: the higher the

[31] This work is currently prepared for resubmission.

career level (from doctoral and post-doctoral positions to professorships), the lower the proportion of women (Alper and Gibbons 1993; Berryman 1983). This phenomenon is especially visible within psychology in German academia. In the last 20 years about 70%− 80% of psychology students were female, but in 2018, only about 40% were female psychology professors (Statistisches Bundesamt 2019a:452; Statistisches Bundesamt 2019b:108).

Ideally, scientists leave academia because only the most talented are promoted. Thus, a (forced) leaving of academia is only justified when it is not related to ascribed characteristics such as gender (Merton 1973 [1942]). Nevertheless, the reasons for a leaking pipeline are not yet clear. Although the leaky pipeline occurs as a universal phenomenon across different academic fields, more pipeline leakage prevails in academic disciplines with a high proportion of women, such as the social sciences and psychology (Ceci et al. 2014:75; Schubert and Engelage 2011:434). Other studies extend this by emphasizing that the finding is reversed after ten years in the social sciences in Sweden, when more men than women exit academia (Silander, Haake and Lindberg 2013). When gender-specific exit rates cannot explain the lower share of women in higher positions, however, the phenomenon of the leaky pipeline again becomes puzzling. This can become even more detrimental when scientists face double burdens to combine work and family responsibilities or experience discrimination among their careers.

For this reason, I examine who advances along the career pipeline to identify determinants that can cause gender-specific career paths. To do so, I use two mechanisms to explore the gender gap in academia: First, academic preferences may vary according to gender in response to competitive careers—the "worker explanation." This becomes particularly apparent when women are faced with balancing work and family, which is often identified as a "motherhood penalty" that hinders women from advancing in their career (Correll, Benard and Paik 2007; Xie and Shauman 2003). Second, the "discrimination explanation" prevents women from succeeding in academia through biased outcome evaluation (Moss-Racusin et al. 2012; Steinpreis, Anders and Ritzke 1999). Hypothesizing gender-specific career tracks in higher education, I observe entire careers from PhD students (pre-docs) and PhD holders (post-docs) to the last career stage for highly qualified researchers headed for professorships—that is, the German *Habilitation*. For this purpose, I use a unique large-scale dataset of virtually all academic psychologists in Germany collected in 2019. Because psychology exhibits compositional attributes of the social sciences and humanities (balanced gender ratios) but is characterized by internal merit systems related to the natural sciences (e.g., focus on spreading findings internationally, peer-reviewed publishing culture), the results of this study are somewhat paradigmatic and may be transferable to other research fields, thus enabling a discussion connected to both. For this reason, this study aims at a broader understanding of barriers to (female) post-docs in higher education.

1.3 German academia: The habilitation as post-doctoral qualification

To analyze the academic career tracks of academic psychologists, I refer to three basic career stages in Germany: (a) doctoral stage, (b) post-doctoral stage, and (c) the established researcher stage, such as tenured professorships which are usually the only permanent positions in German academia (with around 15%).[32] To reach the scarce professorships in Germany, scientists have to obtain a mandatory PhD thesis within the first stage, followed by a second thesis (the so-called "Habilitation"). What makes the career stages prior to professorships particularly stressful and precarious in Germany is that academic positions within the first two stages are usually temporary positions with a limit of 12 years in total (due to the German fixed-term law in academia). I focus on scientists' second academic stage in German psychology that traditionally leads to the habilitation (*venia legendi*), which is still the most frequent path followed to qualify for tenured professorships. A few exceptions to this traditional path make it possible to skip the habilitation: a high number of publications comparable to a habilitation thesis, a PhD as sufficient qualification for professorships at a university of applied sciences,[33] or the newly introduced (in 2002) junior professorships in Germany (for the proportions from each group, see Statistisches Bundesamt 2020:330). In other countries, scientists receive permanent positions earlier (e.g., in France with around 80% permanent positions)[34] or positions that are supposed to lead to tenured

[32] See https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/Tabellen/personal-gruppen.html [retrieved February 09, 2022].
[33] Universities of applied sciences are a special kind of German university that focus on applied sciences in practice and teaching and have less of a focus on research.
[34] See e.g., Kreckel and Zimmermann 2014:115; https://www.enseignementsup-recherche.gouv.fr/fr/personnels-enseignants-non-permanents-50036 [retrieved February 01, 2022].

professorships eventually (e.g., the tenure-track positions in the US: assistant professorships)[35] and thus signals career prospects at an earlier career stage. In turn, scientists in Germany face longer periods of job insecurity, which correlates with life and family decisions. Due to the structural peculiarities of German higher education, I focus on the habilitation as a post-doctoral qualification indicating a pivotal point where scientists are forced to leave academia or alternatively find a permanent position to survive in academia. In the next section, I introduce gender differences in work-related and discrimination mechanisms that may interfere with obtaining a habilitation.

1.4 The "worker explanation:" Gender differences in academia in

1.4.1 Parenting

The fact that scientists leave academia is not surprising per se; however, it is surprising when significantly more women than men leave academia for reasons unrelated to a lack of skills. Contrary to the career orientation, one commonly discussed reason refers to the balance of family and career, which particularly prevents women from succeeding in academia. According to Gary Becker's family economic approach (Becker 1965; Becker 1985), each partner in a relationship specializes in either work or family. For this reason, women's careers are more often characterized by career breaks, part-time jobs, or fixed-term contracts, usually caused by having children (Kleven, Landais and Søgaard 2019; Ledin et al. 2007:985). These circumstances discourage women from reaching the rare chairs at the end of the academic career pipeline and can drive the perception of academia as an "either-or" decision between career and family (e.g., Ginther and Kahn 2009; Lind 2008).

Data on academics confirm gendered preferences towards family and children. In academic psychology and beyond, men are more likely to have children than women (for an overview, see Caprile et al. 2012:86; for psychology, see Helmreich et al. 1980). The hurdles to reconciling family and career seem to be particularly high in Germany, where fewer female professors have children compared to other EU

[35] The newly introduced junior professorships in Germany in 2002 are comparable to the US assistant professorships, but thus far tend not to be tenure track and thus maintain long periods of insecurity.

countries (Lind 2008:199). Surveys have also shown that a bias against motherhood is prevalent in German academia, which supports the assumption of structural hurdles for mothers (Beaufaÿs and Krais 2005). A bias against motherhood is crucial for the visibility of women in academia, as children are one of the main reasons why women leave academia (Preston 2004; Van Anders 2004).

Parenting, in turn, can affect labor productivity due to lower publication rates resulting from less time on the academic labor market (Becker 1993 [1964]:19). However, the findings remain inconsistent. While some authors argue that having children scarcely depresses the productivity of women (Cole and Zuckerman 1987; Krapf, Ursprung and Zimmermann 2017; Zuckerman 1991), others find that motherhood explains the main productivity gap among parents (Morgan et al. 2021). In turn, Fox (2005) and Joecks, Pull and Backes-Gellner (2014) explain the increased research productivity of mothers by their self-selection as particularly productive candidates who managed to stay in science and handle both research and parenthood. Whereas these studies not consider the social sciences (and psychology), a study of sociologists in Germany has shown that having children actually decreases the publishing productivity for women but argue—in line with previous studies—this is rather due to the performance-driven self-selection among women (Lutter and Schröder 2020). This means that only highly productive women stay in academia, and only highly productive women also decide to start a family. The impact of having children thus becomes prevalent at prior career stages, resulting in career disadvantages.

Family responsibilities also lead to reduced mobility when academics have children. Parents are more likely to be site-bound, which applies especially to women (for Europe, see Ackers 2004; for the US, see Rosenfeld and Jones 1987; Xie and Shauman 2003). However, mobility is an important factor that is positively associated with a psychologist's chance of reaching higher academic positions (Lutter, Habicht and Schröder 2022). International experience is particularly useful in creating new knowledge, the "foreign premium" of which improves labor market benefits in the home country (Altbach 2004; Gerhards and Hans 2013; Musselin 2004:55; Scellato, Franzoni and Stephan 2012).

1.4.2 Universities of excellence

Monetary and personal resources are distributed differently at universities, and this has an impact on the career development of women and men. Gender inequality results when cutting-edge universities recruit particularly male scientists, despite considering individual performances. Studies in the United States have shown that following prestigious university tracks at elite universities only favor men in becoming tenured (Long, Allison and McGinnis 1993). Experimental studies have further shown that women shy away from competition and tended to choose less often prestigious academic tracks (e.g., Buser, Niederle and Oosterbeek 2014; Niederle and Vesterlund 2007). In Germany, however, so-called universities of excellence were introduced only in 2005 to make Germany more internationally competitive as a research location by increasing the universities' resources focus on educational quality that is transferred to their members. Comparable research is missing that considers how universities of excellence impact the progressive careers of male and female scientists at the post-doctoral stage.

1.4.3 Job experience as a post-doc

In academia, the first hurdle on the career ladder is the PhD (doctorate), which is a qualification necessary for completing a habilitation. Filling this position is crucial because although scientists are committed to an academic career, they disqualify themselves for other labor markets. Authors have commonly shown that women take longer to advance along the career pipeline (Long et al. 1993:713; Silander et al. 2013; Valian 1999). In Germany, a more recent study of female post-docs has further found a relationship between over-commitment and strain, which drives women to leave academia (Dorenkamp and Weiß 2018). Scholars have therefore called the post-doctoral stage in Germany "the rush hour of life" (Baader et al. 2017:279) in which they have to make important life decisions, and time and mobility constraints tend to accumulate into disadvantages in later career stages (DiPrete and Eirich 2006).

To sum up the "worker explanation," I hypothesize that mothers face hurdles due to family responsibilities and mobility restrictions. I further expect a beneficial impact of having degrees from universities of excellence, which may apply less likely to women. The early years of the post-doctoral stage increase women's habilitation risk but only to a certain threshold when missing career prospects lower the incentives to progress.

1.5 The "discrimination explanation:" Female devaluation in grants and awards

Aside from gender differences in the work environment, discrimination can lead women to abandon an academic career. Acker (1990) calls universities places of "gendered organization" with hierarchical structures and informal networks that tend to exclude women (Benschop and Brouns 2003; McDonald 2011). However, a subtle discrimination also operates in gendered outcome evaluations that coincide with the Matilda effect in scholarly awards or grants (Rossiter 1993; see also "Matthew effect" in Merton 1968). First, women receive fewer awards because of their under-recognition compared to men. Second, awards winners are more likely to gain further awards in the future—even if other scientists are equally proficient. Studies have found discipline- and status-inconsistent results. Across different fields, women win fewer prizes overall (Lincoln et al. 2012). Whereas authors in Sweden in 1997 mentioned nepotism and sexism in peer review of fellowship applications (Wold and Wennerås 1997), a meta-analysis about ten years later still showed a man's significant higher chance of receiving grants (Bornmann, Mutz and Daniel 2007). More recent research strands show that women in German sociology receive more awards than men and when they do, they lead to a higher chance to get tenured professorships (Lutter & Schröder, 2016). Concerning the "discrimination explanation," I hypothesize a significant influence of awards and grants on habilitation success in German psychology; according to the Matilda effect, however, women's achievement tends to be valued less.

1.6 Data and methods

For this study, I used hand-coded CV and publication records of psychology departments at 72 German universities and two research institutes. A qualified team of six trained student assistants collected these data using university websites from December 2018 to December 2019. I applied several consistency checks to ensure that the data were (intercoder-)reliable and valid (double-blind coding). The dataset includes a total of 2,527 scientists with 37,423 publications, where each publication represents an observation. Because I used retrospective data, this study covers scientific careers from 1980 to 2019.[36] The dataset was complemented by an email survey sent to all scientists in the dataset (response rate of 61%) asking whether psychologists have children and when they were born.

Based on the longitudinal data of scientific careers, I applied semi-parametric Cox regression modeling with Efron's approximation for ties clustered by scientists (Cox 1972; Efron 1977). Scientists in the dataset were part of the "risk set" as soon as they started publishing to be considered as potential candidates for a post-doctoral qualification (i.e., the habilitation). The risk set thus included the observation years for all scientists throughout their careers, but only until either a certain event occurred (habilitation) or the observation period expired, regardless of whether the event might still occur in the future (i.e., so-called right-censored data, Blossfeld, Rohwer and Schneider 2019:44; also Kalbfleisch and Prentice 2011: Type I Censoring). For some cases, I additionally right-censored data when scientists should no longer be considered part of the risk-set because they no longer intend to habilitate—that is, after initial tenured professorships and three years after a junior professorship as one of the few alternatives to the habilitation.[37] I thus used event information on 468 *habilitations* of psychology scientists (295 males and 173 females) as the outcome.

[36] I dropped very few advanced scholars who earned their PhDs before 1980 to avoid biasing the results by outliers, but also to set a homogenous entry cohort as labor market structures have changed.

[37] In the main analyses, I right-censor the years since the first appointment and three years since the junior professorship, if the scientists have *not yet habilitated*. I did so in the first case because once a scientist holds the first tenured professorship, s/he skipped the habilitation by qualifying via an alternative (e.g., outstanding publishing, junior professorship). One alternative is the junior professorship with a special peculiarity because some scientists do both, a habilitation thesis and a junior professorship. To consider this second case, I right-censored cases after three years of holding a junior professorship. I chose three years because the candidate is evaluated after this time, so the junior professorship can be extended to six years—which is usually the case—so the intention to simultaneously habilitate decreases. To ensure these assumptions with robustness checks, I censored the years as soon as someone started a junior professorship, assuming they skipped the habilitation (A5.1). If scientists were still working on a habilitation thesis in addition, I censored data after six years of holding a junior professorship (A5.2); both of the procedures yielded same results.

1.6.1 Variables

As explanatory variables, I first used a dummy variable for *gender*. Because I assumed that children affect scientific careers differently (motherhood penalty), I included *parenthood* separately by gender as a categorical variable (ref. childless men). I could thus compare the habilitation risk due to gender, parenting, or both. The variable is time-dependent, so that mothers and fathers get the value 1 as soon as their first child was born. To ensure that the results are not biased by non-response, I added two more categories of women and men who did not participate in the survey.[38]

By holding parenthood constant, I added the number of *publications* as an observable outcome of scholarly productivity that increases throughout a career. I use a coding scheme that differs between [1] articles ranked in the (Social) Science Citation Index (SSCI/SCIE); [2] other articles; [3] monographs; [4] edited volumes; [5] book chapters; and [6] gray literature. To account for co-authored work, I weighted each publication by the number of authors *n* using the formula *2/(n+1)*. A single-author articles get a weight of 1, while two-author-publications get the weight of 0.67, and so forth.

For *mobility*, I measured the number of university changes within Germany throughout a scientist's career. I also add the number of *months* a researcher *spent abroad* and a time-constant dummy variable for being awarded a *PhD from abroad*. I only recorded months spent abroad when the country is neither where the scientists graduated nor Germany, irrespective of their origin country.

The next model added the share of degrees from *universities of excellence* in Germany calculated by the number of degrees in total. If someone completed his or her highest study degree at a university of excellence, he or she received the value 1; if they were then awarded a PhD at a non-excellence university, they received the value 0.5. Additionally, I considered job experience through the *years since the PhD* (with a minimum of 0 for scientists who did not yet have a PhD). Because I assumed increasing years would be advantageous only up to a certain threshold, I additionally measured the years since the

[38] Non-responses were equally distributed across gender. I additionally conducted three different robustness checks to account for potential survey nonresponse bias; an additional dummy variable that accounts for missing information, a complete record analysis, and multiple imputation (see Appendix Table A8).

PhD by a squared term. I refer to these variables in the analysis as "human capital," attributable to education and work experience (Becker 1993 [1964]).

I also added the number of non-monetary *awards* as well as the number of research grants through *research funding* of the German Research Foundation (DFG) as the main research funding institution in Germany to promote scientific research.

I used log transformation $log_e(X+1)$ for all continuous explanatory variables to normalize their distribution. I therefore compressed to account for lower numbers (e.g., the first publication) and de-compressed higher amounts (e.g., the tenth publication). I thus assumed that the first accumulated scientific resources are the most valuable for an academic career. All regression models used the transformed indices.

Finally, I added two control variables: I used a dummy variable to control for *selected publication* lists, when senior scientists only published their recent or best publications.[39] I additionally added four categories of entry *cohorts* when scientists started their careers (1980–1989, 1990–1999, 2000–2009 (ref.), and 2010–2019).

1.7 Results

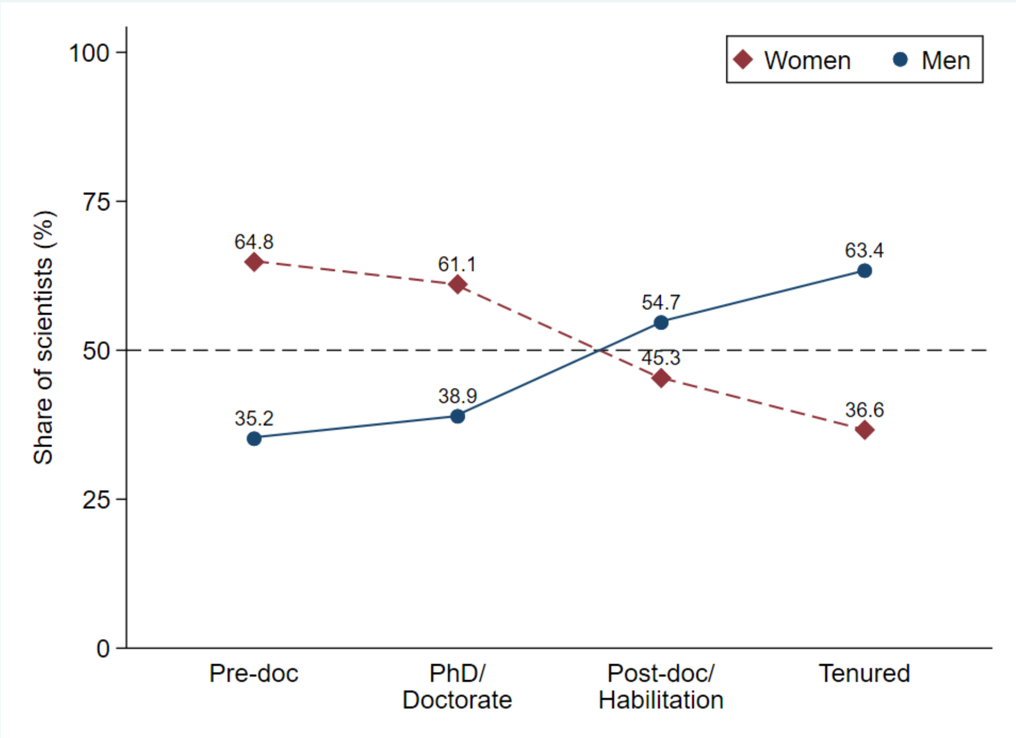
1.7.1 Descriptive results: Who gets lost in the career pipeline?

Figure 1 shows the proportion of scientists at different career stages along the career pipeline in 2019. According to the leaky pipeline hypothesis, more women tend to leave academia whereas the proportion of male scientists increases, which yields a "scissors diagram." The proportion of female graduates is almost 65%, while the gender ratio is reversed at higher career stages. According to Figure 1, the period between PhD and habilitation seems to be especially challenging because of the starkest decrease of women. As Figure 1 is only a snapshot of 2019, we cannot disentangle whether this is due to compositional shifts in the past or a growing leaky pipeline throughout the academic career pathway,

[39] Of the incomplete publications listed (around 7% of all scientists), about 44% were attributed to female scientists, so the distribution is not skewed by gender.

but considering only the cohorts after 2000 still show the strongest decline of female scientists between PhD and habilitation (see Appendix B1).

Figure 1. "Scissors-diagram:" Scientists at different career levels in 2019, separately for gender.



$N_{pre\text{-}doc}$=748; N_{PhD}=1,015; $N_{habilitation}$=86; $N_{tenured}$=554.

Table 1 provides descriptive statistics for all variables used in this study. Values are based on scientists in the year of the habilitation. Variables are in descending order of their relative differences between women and men.

Table 1. Summary statistics at the year of obtaining a habilitation, separately for males and females.

	obs (Ma)	obs (Fe)	mean (Ma)	mean (Fe)	rel dif (Fe/Ma in %)	abs dif (Fe-Ma)	se	p
Years since PhD	246	149	6.61	7.61	115.13	1	0.29	0
PhD from abroad	246	149	0.07	0.08	114.29	0.01	0.03	0.79
Months abroad	246	149	12.91	13.87	107.44	0.95	2.29	0.68
Excellence university	246	149	0.35	0.37	105.71	0.02	0.04	0.63
Years to habilitation	246	149	10.49	10.95	104.39	0.46	0.39	0.23
Monographs	246	149	0.63	0.64	101.59	0.01	0.09	0.93
Mobility	246	149	1.77	1.77	**100.00**	**0**	0.15	0.98
Number of Children	134	98	1.04	0.93	89.42	-0.11	0.13	0.41
Book chapters	246	149	3.91	3.46	88.49	-0.45	0.45	0.31
Awards	246	149	0.53	0.46	86.79	-0.07	0.11	0.53
SSCI/SCIE articles	246	149	6.67	5.69	85.31	-0.98	0.47	0.04
Research funding	246	149	0.72	0.6	83.33	-0.12	0.11	0.28
Non-SSCI/SCIE articles	246	149	2.77	1.93	69.68	-0.84	0.32	0.01
Gray literature	246	149	2.17	1.19	54.84	-0.97	0.36	0.01
Edited volumes	246	149	0.24	0.11	45.83	-0.12	0.05	0.02

Ma=Male; Fe=Female; only complete cases.

The greatest (positive) difference in women compared to men is in the years since their PhD. Women need around 15% more time to obtain a habilitation—that is, 7.6 years from PhD to habilitation—one year slower than men. Nevertheless, women only need about half a year longer to habilitate over their entire career (on average, about 11 years), which suggests that women either get their PhD faster or publish later as the observation time starts with publishing. In turn, the greatest (negative) difference to men lies in the publication behavior of women. Men serve as editors twice as often as women, while women have overall fewer publications than their male colleagues: around 15% fewer SSCI/SCIE articles and 30% fewer non-SSCI/SCIE articles. The number of monographs and book chapters, however, and other mean values only slightly and statistically insignificantly differ between male and female scientists. Nevertheless, men have one child, on average, while women are less likely to have one child when they obtain a habilitation.

Table 2. Summary statistics at the year of obtaining a habilitation, separately for fathers and mothers.

	obs (Fa)	obs (Mo)	mean (Fa)	mean (Mo)	rel. dif (Mo/Fa in %)	abs. dif (Fa-Mo)	se	p
PhD from abroad	80	56	0.06	0.11	183.33	-0.04	0.05	0.35
Monographs	80	56	0.59	0.85	144.07	-0.26	0.17	0.13
Months abroad	80	56	12.99	16.75	128.95	-3.76	3.89	0.34
Years since PhD	80	56	6.84	8.8	128.65	-1.97	0.48	0
Mobility	80	56	1.46	1.79	122.60	-0.32	0.22	0.15
Book chapters	80	56	4.16	4.98	119.71	-0.82	0.83	0.33
Excellence university	80	56	0.33	0.36	109.09	-0.03	0.07	0.61
Years to habilitation	80	56	11.42	12.42	108.76	-1	0.6	0.1
SSCI/SCIE articles	80	56	6.71	7.1	105.81	-0.4	0.85	0.64
Research funding	80	56	0.61	0.63	103.28	-0.01	0.16	0.94
Awards	80	56	0.61	0.61	**100.00**	**0.01**	0.2	0.98
Number of Children	80	56	1.74	1.63	93.68	0.11	0.12	0.34
Non-SSCI/SCIE articles	80	56	2.73	1.87	68.50	0.86	0.55	0.12
Edited volumes	80	56	0.26	0.11	42.31	0.15	0.09	0.1
Gray literature	80	56	3.16	1.32	41.77	1.84	0.79	0.02

Fa=Father; Mo=Mother; only complete and valid cases.

Table 2 shows the summary statistics separately for mothers and fathers at the time they obtain their habilitation. The years since PhD are again striking in the comparison of mothers and fathers. After obtaining a PhD, mothers take about two years longer to habilitate—that is about 30% longer than fathers take. While we find in Table 1 that women need half a year longer to habilitate, the gap increases after having children such that mothers need around one year longer to habilitate than fathers. Although not statistically significant, nearly twice as many mothers have earned a PhD abroad, while they had about 30% more experience abroad and about 20% more changes within Germany, contrary to what was previously expected from a theoretical perspective restricted to maternal mobility. Overall, mothers accumulate more "scientific capital" evident from their CVs, except for non-SSCI/SCIE articles, edited volumes, and gray literature.

1.7.2 Regression models

In Table 3, Cox regression models successively add gender, children, publications, mobility, human capital, and research awards and grants (Models 1–6) to explore what determines attaining a habilitation. Table 3 shows the hazard ratios (the multiplicative effects of the covariates on the hazard of a habilitation).

Table 3. Cox regression models on obtaining a habilitation.

	(1) Only Gender	(2) Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/ Grants
Female	0.74**					
	(-3.10)					
Childless man				*reference*		
Father		1.53*	1.38+	1.39+	0.99	0.95
		(2.47)	(1.82)	(1.85)	(-0.04)	(-0.29)
Men w/o info		1.18	1.11	1.18	1.00	0.95
		(1.02)	(0.65)	(0.97)	(-0.02)	(-0.29)
Childless woman		0.97	1.21	1.19	0.96	0.94
		(-0.16)	(1.04)	(0.91)	(-0.18)	(-0.27)
Mother		0.82	1.01	0.99	0.62*	0.58**
		(-1.04)	(0.07)	(-0.08)	(-2.28)	(-2.59)
Women w/o info		0.94	1.31	1.38+	0.92	0.94
		(-0.36)	(1.61)	(1.90)	(-0.45)	(-0.32)
SSCI/SCIE articles (ln)			2.59***	2.36***	1.95***	1.77***
			(10.67)	(9.39)	(6.78)	(5.89)
Non-SSCI/SCIE articles (ln)			1.07	1.10	1.21+	1.33**
			(0.71)	(0.94)	(1.88)	(2.83)
Monographs (ln)			1.52**	1.47**	1.31+	1.26
			(2.88)	(2.63)	(1.77)	(1.50)
Edited volumes (ln)			1.16	1.37	1.28	1.33
			(0.63)	(1.48)	(1.13)	(1.33)
Book chapters (ln)			1.40***	1.33**	1.14	1.14
			(3.72)	(3.17)	(1.47)	(1.46)
Gray literature (ln)			0.95	0.92	1.09	1.07
			(-0.66)	(-0.97)	(1.01)	(0.73)
Mobility (ln)				1.89***	1.46***	1.40**
				(6.03)	(3.77)	(3.28)
Months abroad (ln)				1.10**	1.08*	1.06+
				(2.60)	(2.22)	(1.71)
PhD from abroad				0.68+	0.59*	0.65*
				(-1.94)	(-2.46)	(-1.96)
Excellence university					1.96***	1.97***
					(5.13)	(5.19)
Years since PhD					1.76***	1.73***
					(7.48)	(7.32)
Years since PhD (sq.)					0.98***	0.98***
					(-3.81)	(-3.68)
Awards (ln)						1.14
						(0.94)
Research funding (ln)						1.72***
						(4.32)
Only selected publications	2.65***	2.61***	3.02***	2.81***	2.15***	1.94***
	(5.77)	(5.67)	(5.58)	(4.96)	(4.60)	(3.83)
Cohorts *(ref. 2000-2009)*						
1980-1989	1.53**	1.55***	1.67**	1.73***	1.96***	2.29***
	(3.22)	(3.35)	(3.17)	(3.71)	(4.37)	(5.20)
1990-1999	1.71***	1.75***	1.76***	1.56***	1.67***	1.66***
	(4.75)	(4.88)	(4.42)	(3.36)	(3.94)	(3.79)
2010-2019	0.34***	0.34***	0.32***	0.30***	0.42***	0.43***
	(-4.40)	(-4.44)	(-4.69)	(-4.92)	(-3.75)	(-3.59)
Pseudo r^2	0.02	0.02	0.06	0.08	0.13	0.14
Log-likelihood	-2966.37	-2962.31	-2842.32	-2807.85	-2629.46	-2615.03
Degrees of freedom	5	9	15	18	21	23
Chi^2	122.14	124.99	277.13	327.19	859.40	909.34
AIC	5942.74	5942.62	5714.63	5651.71	5300.92	5276.07
BIC	5985.39	6019.39	5842.58	5805.25	5480.06	5472.26
Number of events (habilitation)	468	468	468	468	468	468
N (persons)	2,527	2,527	2,527	2,527	2,527	2,527
N (persons-publications)	37,423	37,423	37,423	37,423	37,423	37,423

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

In Model 1, I used a covariate baseline model including gender and two controls: selected publication lists and entry cohorts of scientists. Because hazards are ensured to be positive and the reference value is 1, a coefficient of 0.74 is associated with a detrimental effect on the hazard of habilitation (women have a habilitation hazard of 74% points of the hazard for men). Simply put, the risk of a habilitation decreases by 26% for women.

Model 2 differs not only between female and male scientists but also by parenthood. Compared to childless men, the habilitation risk decreases for mothers by 18% (non-significant), while the habilitation risk increases for fathers by 53%. Without considering other determinants, the risk of habilitation is positively associated for fathers.

I added scholarly productivity through different types of publications in Model 3. With the additional (log) SSCI/SCIE articles, the habilitation risk increases by 159%. Therefore, SSCI/SCIE articles show the highest impact across different types of publications, followed by monographs and book chapters (52% and 40%). The interpretation of the number of publications (and other logged variables) needs caution here. I added plus 1 to the variables before taking the logarithm (as the natural logarithm is not defined), so a unit increase in the log of publications equals a 5.44 times increase of publications: $(x+1)*e^x$. Non-logged coefficients or using $\log_2(x+1)$ provides a more intuitive interpretation, see Appendix Table A3. An example of the interpretation of non-logged coefficients: The risk of habilitation increases by 3% with each publication, all else being equal.

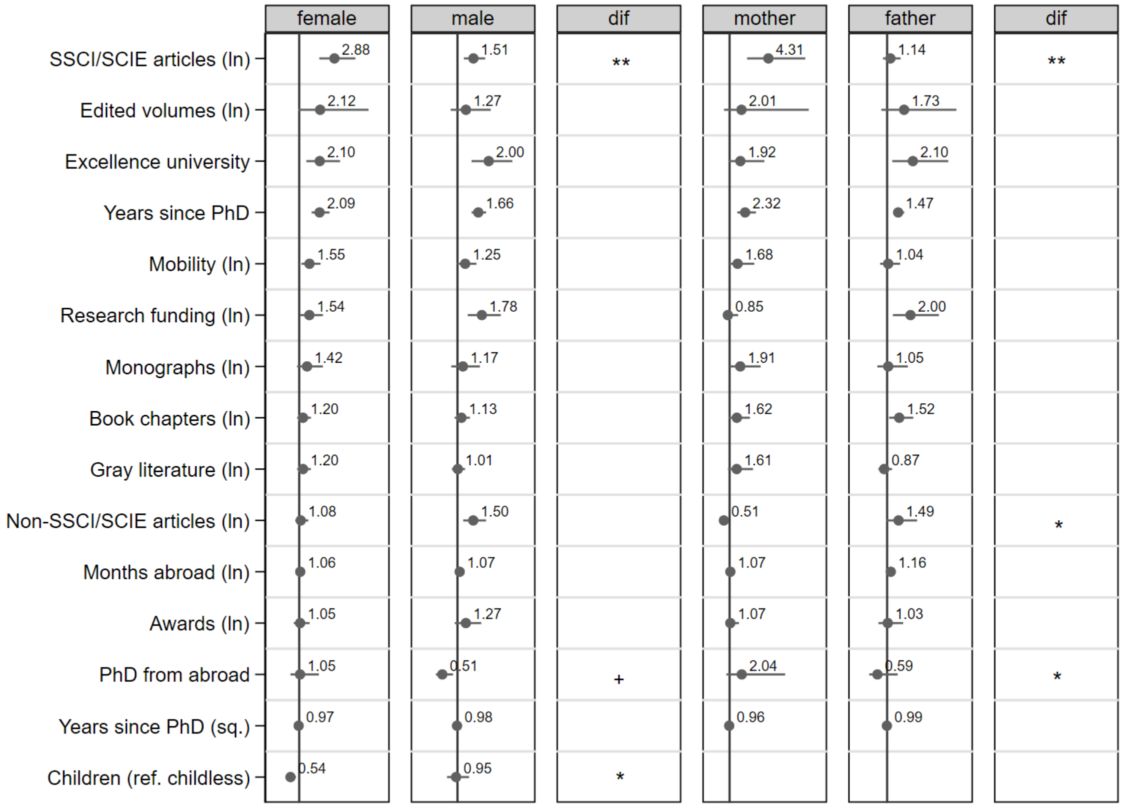
By adding variables that measure mobility in Model 4, the mobility's (log) hazard ratio of 1.89 indicates that—among women and men holding children and publications constant—institutional changes in Germany increase the habilitation risk by around 89%. Mobility is therefore positively associated with the risk of habilitation, which cannot be explained by the variation of children or publications. The months spent abroad increases the habilitation risk by 10%. In turn, having a PhD from abroad decreases the risk by 32%.

Model 5 adds human capital variables. The share of degrees from universities of excellence almost doubles the habilitation risk (by 96%), indicating the important role of German universities of excellence for academic career prospects. In similar magnitude, the years since PhD increases the habilitation risk by 76%. As expected, the risk is subsequently reduced when a squared term that counts for the years since the PhD was added. Early years after the PhD are therefore particularly important to obtain a habilitation but only up to a certain point. Also, the habilitation risk for mothers decreases significantly, by 38%, whereas the habilitation risk for fathers is the same as for childless men. Without adding human capital variables, these associations are spurious. As seen later in the subsample of women and men, the years since PhD are positively associated with habilitation risk, especially for women and mothers, a difference that has likely suppressed the true effect of having children.

This association of the habilitation risk of parents holds true in magnitude when adding scholarly awards and research grants in Model 6. All else being equal, the habilitation risk increases by 72% with additional (log) research funding, while (log) scholarly awards are only slightly and non-significantly associated with a higher habilitation risk.

Finally, I plotted the full model (Model 6 in Table 3) separately by gender and parenthood in Figure 2. Based on these models, I calculated interaction terms conditioned on gender and parenthood and additionally present their significances in Figure 2 (for regression models with interaction terms, see Appendix A6).

Figure 2. Plotted results of Model 6 in Table 3, separately for gender and parenthood (incl. significances of interaction terms).



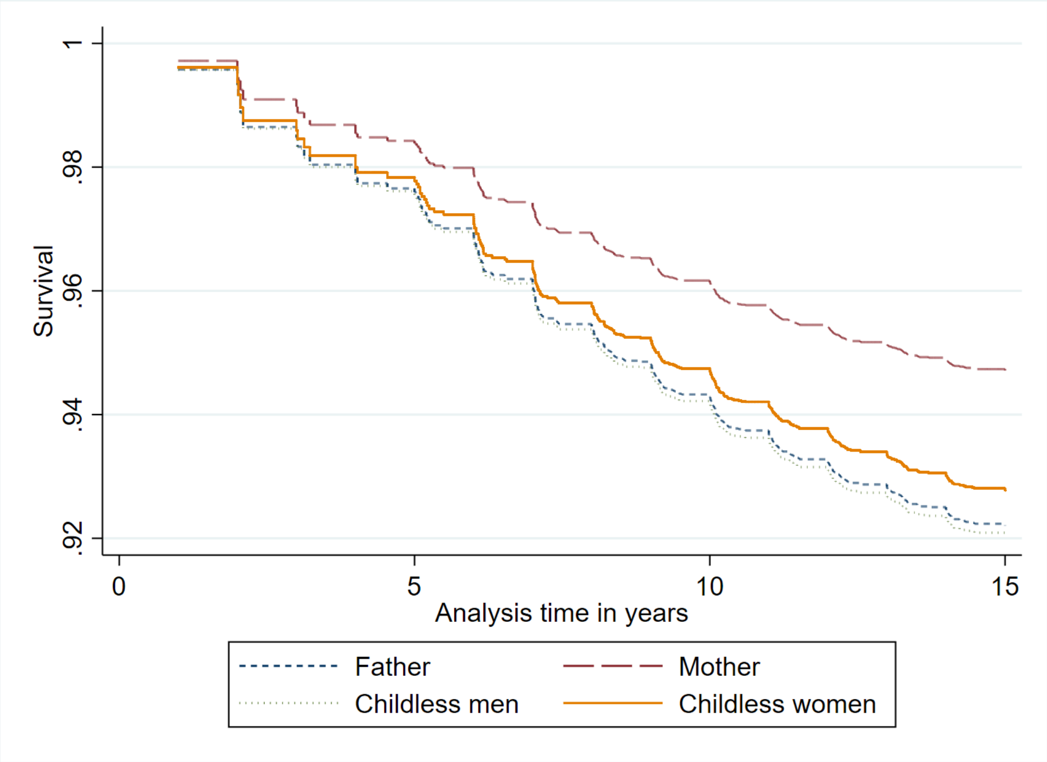
Exponentiated coefficients (hazard ratios); ln = logged values; sq = squared. Control variables (incomplete publications lists and entry cohorts) are included but not shown here.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*. $N_{female/male}$=2,527; $N_{mother/father}$=691.
The significant Wald test of the baseline model (without interaction effects) and the interaction models of gender and SSCI/SCIE articles, non-SSCI/SCIE articles, PhD from abroad, and children indicates that adding the interaction terms improve the model fit.

To take a closer look into gender differences, the positive association of (log) SSCI/SCIE articles and habilitation risk is due to the subsample of women (188% for women and 51% for men). This difference between women and men is statistically significant at p < 0.01 (see also interaction term of Model 2 in Table A6.1), which implies that publishing is a main driver for the increased habilitation risk among women. Similar results can be found for having a PhD from abroad, an effect that is spurious in the full sample due to a detrimental effect among the subsample of men. Also, having children has a detrimental effect for women, with a 46% lower habilitation risk compared to childless women.

The differences in the habilitation risk of mothers and fathers resemble in magnitude and significance levels those of women and men. However, the impact of SSCI/SCIE articles diverge for mothers and fathers. With additional (log) SSCI/SCIE publications, the habilitation risk increases for mothers by 331%, while increasing (log) SSCI/SCIE articles are not associated with the habilitation risk for fathers (correctly, non-significant by 14%). In turn, non-SSCI/SCIE articles increases the habilitation risk of fathers (but not for mothers), which is a significant difference that I could not observe between women and men. However, the impact of having a PhD from abroad becomes more substantial among mothers than fathers (2.04 vs. 0.59).

To illustrate the group differences, I also plotted the survival curves of Model 6 in Table 3 separately for childless women, childless men, mothers, and fathers (see Figure 3). This simplifies the understanding of the habilitation risk of each group—that is, the risk to habilitate depending on the years in academia (observation years). The survival curves show the inverse relationship to hazard ratios: an increased hazard ratio means a positive association, which translates into decreasing survival curves. Based on all psychologists in the dataset, the survival curves show the habilitation risk at each point during a career, accounting for right-censored observations or outflowing data. Consistent with the result of the Cox regressions, it appears that childless men and fathers habilitate "faster" (or at a higher risk) overall, followed by childless women and mothers (controlling for all covariates). The fact that mothers are associated with a reduced habilitation risk is also reflected in the survival curve with the weakest fall.

Figure 3. Model-based survivor functions of female and male parents vs. non-parents (Model 6, Table 3; all covariates held constant).



1.8 Discussion and conclusions

Based on the results of my analysis, I found a so-called "motherhood penalty" within the post-doctoral phase in the field of psychology in Germany. While the *worker explanation* throws light on gender differences that limit women's achievement in the academic labor market, a motherhood penalty cannot be ruled out due to lower productivity or hurdles due to mobility, university affiliation, or job experience. Although women and mothers mostly have fewer resources, their accumulation has a more beneficial effect on labor market progress, and thus sheds light on how merit is rewarded at the post-doctoral stage. While it is not surprising that publications are highly beneficial for academic careers, I also found that mothers do not publish less than men (see Cole and Zuckerman 1987; Krapf et al. 2017; Zuckerman 1991) and further SSCI/SCIE articles are more beneficial for their progress than for fathers. I found positive associations of the risk of habilitation and mobility, universities of excellence, and job experience through the years since the PhD as well. While some of those merits are particularly valuable for women or mothers (SSCI/SCIE articles, PhD from abroad), none can explain why mothers face a lower habilitation risk.

Accordingly, the main reason for a leaky pipeline can be associated with gender differences in family responsibilities, as I actually found lower habilitation risk for *mothers* but not for fathers. I can rule out the possibility that the lower habilitation risk is solely due to gender; rather, having children affects the relationship between gender and habilitation and has a detrimental impact on mothers solely. This result is reflected in the descriptive statistics, as men are more likely to have children on par with others (for an overview, see Caprile et al. 2012). However, I also considered the number of children as a robustness check but the results hardly change (see Appendix A1–A2). This finding is further mirrored by Williams (2004), who argued that women hit the "maternal wall" before they can reach the peak of an academic career. This finding reflects the well-documented hurdles for mothers in German academia (e.g., Beaufaÿs and Krais 2005; Lind 2008).

Besides gender differences in career orientation, gendered organizational structures could also contribute to the leaky pipeline, by *discriminating* against female scientists (coincided as the Matilda effect, see Rossiter 1993). While discrimination is seen as a push factor hindering women from success in academia (Benschop and Brouns 2003; Wold and Wennerås 1997), I did not find evidence of women being less valued for academic awards or grants. In line with more recent research about Austrian universities, Fritsch (2016) did not see women as being victimized by gendered patriarchal organizations; rather, what is traditionally labeled as "discrimination" can be related to the impact of children (Kleven et al. 2019), a finding that this study acknowledges.

But why do female post-docs still face disadvantages when they have children? Taking a closer look at academic spouses suggests a few answers: Female professors tend to have scientist partners (Rusconi and Solga 2010), which is detrimental for "academic mothers" when women in predominantly female disciplines spend more time on child care. Because more female scientists tend to have so-called "dual academic career relationships" —that is, their partner also participates in the academic field—this may further contribute to the findings of a detrimental effect of motherhood (Ceci et al. 2014:120; Solga and

Rusconi 2007). This trend is increasingly visible across Europe, because more women achieve higher educational degrees and prefer an academic partner (Tzanakou 2017), and is therefore of particular interest in psychology, which has a high proportion of women. However, I cannot rule out that having children produces an anticipated effect on family comparability and labor market participation (as suggested by Ceci et al. 2014:120). Only highly productive women may decide a priori to have children (in line with Fox 2005; Joecks et al. 2014)—which is also suggested by the results of this study, as mothers hardly publish less than fathers at the time they obtained a habilitation—while other female scientists cannot overcome the hurdles to combine family and a scientific career, leading to the self-selection of highly productive mothers. Likewise, the burden is especially onerous for post-docs with young children (Mason, Goulden and Wolfinger 2013). It should also be mentioned here that women are more likely to withdraw from doctoral education in Germany, assuming they do not reach the first qualification stage at all (Jaksztat, Neugebauer and Brandt 2021). This mirrors the findings of this study, where women are more likely to leave before obtaining a PhD so the years after the PhD are more positively associated with their habilitation risk. Assuming systematic gender differences in "science dropouts" is also prescient from a methodological perspective on career analyses. Assuming women with children are particularly likely to leave academia at an early career stage, studies that focus on scientists at later career stages may suffer from so-called "survivorship bias" (Elwert and Winship 2014). This would then mean that the results for mothers are underreported and rather conservative.

More recent research strands consider women and the increasing opportunities for non-academic careers in industrial and technical fields in Europe (Etzkowitz et al. 2011; Meulders et al. 2003), but comparable research on academic psychologists and their opportunities in the non-academic labor market in Germany is missing. For (PhD) psychologists, there are certainly still attractive job opportunities outside academia in health care and therapeutic professions, but whether these pathways are gender or parent specific and, in turn, the explanation for unequal opportunities for mothers to habilitate remains unclear. Still, this study suggests that fewer women tend to obtain a habilitation, although it is still the traditional path to qualify for professorships in psychology.

What if they take alternative routes within academia? In Germany, scientists can skip the habilitation but still be considered for a professoriate at a university of applied sciences. In contrast to German universities, gender parity almost prevails (48%) among psychology professorships at universities of applied sciences (Statistisches Bundesamt 2020:118). One reason for gendered preferences may be because universities of applied sciences tend to focus on teaching rather than pure research, thus representing institutionalized faculty roles that are (stereo)typical for women (see e.g., Miller and Chamberlin 2000). This is of interest especially for women with family plans if, instead of a "tenure-track pipeline," they prefer teaching-intensives faculties "in favor of careers they believed were more compatible with their plans" (Ceci et al. 2014:121). This is what Kleven et al. (2019:184) have called a "post-child effect of realized fertility," when women respond to motherhood such that they change their employment conditions to improve balancing work and family, which again leads to a self-selection of women at universities remaining childless.

While focusing on children, the study lacks information about family relationships and the cohabitation of spouses. Although I do not expect this to bias the results as, for example, being married does not hurt women's likelihood of academic success (Ginther and Kahn 2009:182), future research could investigate whether this provides a more detailed explanation on the division of labor in the household, career interruptions, and actual working hours, especially amongst dual-career families. Furthermore, I did not consider other supportive factors such as the role of mentors in academia, which can be crucial, especially for early career scientists to access information and improve tacit knowledge (in grant proposals, e.g., Van der Weijden et al. 2015). Future research should therefore contribute by linking mentorships to the development of early-career scientists and thus examine whether this helps to at least partially explain the gender gap. Not only social capital provided by mentors, but also the pivotal source of colleagues or research collaborations may improve tacit knowledge to support career advancement.

To put it in a nutshell, this study's results do not preclude women in academia from "struggling" earlier in their careers due to having children, thus resulting in accumulated disadvantages at the post-doctoral stage. The post-doctoral phase for women should be specifically tackled to address career tracks outside of academia (loss of mothers in academia) or alternative routes inside academia (teaching faculties). The paucity of "structural underpinning" of the post-doctoral phase in Germany has already been mentioned by Baader et al. (2017:293). Beyond that, it still remains open whether family decisions are individual choices per se or whether "these choices are constrained by biology and/or society" (Ceci and Williams 2011:3161), but closer examination of this is, however, beyond the scope of this study.

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Chapter 6: How human capital, universities of excellence, third party funding, mobility, and gender explain productivity in German political science[40]

1.1 Abstract

Using a unique panel dataset of virtually all German academic political scientists, we show that researchers become much more productive due to the accumulation of human capital and third party funding. We also show, however, that while universities of excellence have more productive researchers, individuals who go there do not become more productive. Finally, we show how women publish only 9% less than men with the same level of prior publication experience but are about 26% less productive over their entire career, as early productivity leads to later productivity so that women increasingly fall behind. These results cannot be explained through the influence of childbearing. Rather, they support the 'theory of limited differences,' which argues that small differences in early productivity accumulate to large differences over entire careers, as early success encourages later success. Apart from generally showing why political scientists generally publish more or less, we specifically identify accumulative advantage as the principal reason why women increasingly fall behind men over the course of their careers.

1.2 Introduction

Why are some scientists more productive? Productivity in science is commonly measured through publications, especially peer-reviewed ones (Gerhards 2002:19–20; Hix 2004; Jungbauer-Gans and Gross 2013:84; Long, Allison and McGinnis 1993:703; Münch 2006:473). But are some researchers innately more productive? Or do successful researchers start with average productivity and then become more and more successful, as small differences in early productivity accumulate to large differences

[40] Habicht, Isabel M., Mark Lutter, and Martin Schröder. 2021. "How Human Capital, Universities of Excellence, Third Party Funding, Mobility and Gender Explain Productivity in German Political Science." *Scientometrics*. doi:10.1007/s11192-021-04175-8. Please cite the original article.

over time (Cole and Singer 1991:286–87; Merton 1968)? Using a unique dataset of virtually all German academic political scientists, we disentangle the two processes and show what high productivity depends on. Prior studies indicate that productivity may depend on one's prior publication experience as well as third party funding; they also suggest that women are only slightly less productive at first but then increasingly fall behind as they accumulate less experience that would lead to further success. Existing studies also show how universities of excellence have more productive researchers but do not increase the productivity of researchers who went there (Habicht, Lutter and Schröder 2021; Lutter and Schröder 2016; Lutter and Schröder 2020). We confirm these results in political science. The following sections show to which theoretical discussions this contributes and why existing studies could not deliver the answers that we provide.

1.3 Theory

1.3.1 Human capital

Researchers may be more productive because they are endowed with more human capital, which consists of individual resources, knowledge, and skills acquired through education and on-the-job training (Becker 1993 [1964]:11). Researchers should therefore be more productive if they have more advanced educational degrees from better institutions. However, the human capital approach has been considered too simplistic (see the summary in Marginson 2019). In academia, one complication is that a form of "on-the-job training" exists in the form of publishing: the more one has already published, the more practice one has in publishing, which in turn makes it easier to publish even more in the future. In this sense, Bourdieu (2004:61–62) argues that accumulated scientific successes "are the materialization both of the gains won in earlier phases of the game and weapons capable of being used in the subsequent rounds."

Publications are thus not only an *output of* past human capital but also an *input to* further human capital (see Becker 1993 [1964]:98; Bourdieu 2004:55). We call this human capital rather than scientific capital, as it is strongly linked to a specific person. The self-reinforcing mechanism behind this process is known as the "Matthew Effect," where early success leads to later success (Merton 1968:58). An alternative name for this accumulation of success is the "accumulative advantage" hypothesis, which argues that small initial differences lead to large productivity differences over time (Allison and Stewart 1974:597–98; Merton 1968). Allison and Stewart (1974:596) argue for an alternative possibility, namely that "there are substantial, predetermined differences among scientists in their ability and motivation to do creative scientific research." If this is correct, then some researchers should be more productive even at the beginning of their careers, regardless of their prior experience. They would be "naturally" endowed with more human capital, irrespective of what they have accumulated over time. However, if the opposite "accumulative advantage" hypothesis is correct, then productivity mainly results from prior experience, so that it differs little between researchers with the same prior experience.

To test which is the case, we show which types of experience make researchers more or less productive and whether productivity differences mainly exist because of different levels of research experience, which would fit an accumulative advantage process, or whether differences in productivity exist even at the same level of prior experience. But what counts as productivity-increasing experience in the first place? Existing studies not only find that previous publications are a strong predictor of future publications (Lee 2019:1500; Lindahl, Colliander and Danell 2020:326). They also argue that the duration and quality of one's education, third party funding, and gender impact productivity.

1.3.2 Duration, quality, and social capital of one's education

As mentioned, productivity may depend on the accumulation rather than the mere initial presence of human capital. One way to measure the accumulation of human capital, apart from prior publications, are career steps. Academics may publish more with each successive career step, such as getting a PhD and finally a tenured professorship. In other words, the more advanced a researcher is, the more human capital she or he may accumulate, which allows for more publications. However, it is unclear whether productivity simply increases with career steps or first increases and then decreases, for example, because researchers publish a lot while trying to get a tenured professorship while falling behind their prior publication trajectory as soon as they have tenure (Cole 1979:976–77).

It is not only unclear whether the quantity but also whether the alleged quality of one's prior education increases productivity. Some German universities have recently been named "universities of excellence" by the so-called "German Universities Excellence Initiative." These universities are supposed to provide "outstanding conditions for cutting-edge research" and exceptional "assistance to support its young scholars in their research" (DFG 2013:12, 34). However, whether so-called universities of excellence indeed help researchers to be more productive is unclear, as "[b]ibliometric analyses with the aim of measuring the direct effects of the German Excellence Initiative have not been carried out so far" (Möller, Schmidt and Hornbostel 2016:2219).

Effects from other countries also give no clear guidance. While some suggest that the prestige of one's department hardly explains a scholar's productivity sufficiently (García-Suaza, Otero and Winkelmann 2020:446), others ask about the causality behind such "determinants of productivity: Is it due to intrinsic abilities or to a departmental effect?" (Carayol and Matt 2006:60). Cross-sectional data cannot disentangle whether researchers at some universities publish more due to their intrinsic ability or due to an actual departmental effect, where a researcher actually becomes more productive after having been at a reputable department, irrespective of her or his prior productivity (Long 1978:889).

Apart from the quantity and quality of one's education, international experience may also increase productivity. Authors such as Kathrin Zippel (2017) argue that women can make up for being discriminated against at their home institution by getting recognition abroad. But while some find that mobility indeed increases productivity (Dubois, Rochet and Schlenker 2014:1687), others find little such effect (Fernández-Zubieta, Geuna and Lawson 2015:109–10). Also, just as with other influences, mobility may be both an input to productivity, as well as an output of productivity, such as when more productive researchers are more likely to be invited to prestigious institutions (Dubois et al. 2014:1671). It is therefore again important to disentangle both effects. This can be done first by measuring the relationship between productivity and international experience. And then, second, by measuring how much of this relationship persists after accounting for prior productivity, with the latter showing whether international experience makes researchers more productive irrespectively of what they have published so far.

Not only can international mobility be an asset, but mobility can generally be helpful by bringing social capital that can be defined as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships" (Bourdieu 1986:21). Like other factors that lead to success, social capital comes from one's prior career, but it can also lead to future productivity. To illustrate this, imagine a researcher who, on the one side, knows others because of past research but then uses these contacts as co-authors to increase his or her future productivity. However, whether this is the case is unclear. While existing studies argue that social capital may increase productivity in sociology (Lutter and Schröder 2020:455) and computer science (Jadidi et al. 2018), it is yet unknown whether this is also the case in other disciplines, such as political science.

1.3.3 Third party funding

Researchers may not only be more productive if they have been more productive in the past and if their education was longer, more prestigious, and more international, but also if more money is invested in them. However, whether third party funding indeed increases publications is unclear (Jansen et al. 2007:130). While some find weak effects (Carayol and Matt 2006:70), others suggest that for a doubling of third party funding, German business departments become 24% more productive (Albers 2015:25). However, even studies that do find effects argue that replications in "different scientific disciplines" are needed, urging to use "panel data that allow for the detection of causal effects" (Albers 2015:30). The main problem is again one of endogeneity (Bolli and Somogyi 2011:138; also see Jansen et al. 2007:137), as cross-sectional studies leave unclear whether researchers who are more productive in the first place acquire more funding or whether funding itself increases publications irrespective of prior productivity (Bolli and Somogyi 2011:146; Hornbostel 2001:536; Jansen et al. 2007:130). Some even fear that funding by the German Research Foundation (*Deutsche Forschungsgemeinschaft* or DFG) is distributed through scientific cartels, monopolies, and oligarchies (Münch 2006:466). In contrast, others claim that this is not the case (Auspurg, Hinz and Güdler 2008:680). Even though such studies disagree on much, they usually agree that productivity can be measured by relating it to publications (Münch

2006:472). One therefore has to show how funding affects the productivity of researchers above and beyond their pre-funding productivity.

1.3.4 Gender

Across scientific disciplines, career stages, and birth cohorts, women publish less than men (Cole and Zuckerman 1987; Jaksztat 2017:357; Leahey 2006:756; Sax et al. 2002:424). The theory of limited differences spells out how cumulative advantage and the Matthew effect may lead to this, arguing that small initial differences accumulate over time to produce large differences over entire careers. For example, suppose only a small share of professors is unwilling to sponsor female students. In that case, this may make little difference at the beginning of careers, as women can switch to other professors. But it stops women from getting a head start, and because small differences in early success accumulate to big differences later on, limited differences early on can make women publish much less over entire careers (Cole and Singer 1991:282–84; Long 1990:1310–11; Xie and Shauman 1998:857–59). But can the female productivity gap really be explained as the result of less accumulated experience? Some suggest that 60% of the gap can be while arguing that about 40% of the female success gap remains, even at similar experience levels (Johnson and Stafford 1974:902). However, such analyses have been found wanting, largely because they do not use longitudinal data that disentangles productivity differences at the same career stage versus productivity differences over entire careers (Strober and Quester 1977). It is therefore necessary to use panel data that first shows overall productivity differences, to then compare these to differences at the same career stage, when prior productivity is held constant.

But why should women accumulate productivity slower than men do in the first place? The most prominent explanation is because they rear children (Mason, Goulden and Wolfinger 2013:29; Rivera 2017:1114). However, while some studies find that children make women less productive, others do not (Cole and Zuckerman 1987:125; compare for the literature review in Hunter and Leahey 2010; Sax et al. 2002:435). We therefore propose to compare, first, how much women publish less overall and, second, how much less they publish with the same level of experience. Controlling this for the effect of children not only shows whether the lower publications of women can be explained through a process of cumulative falling behind but also whether children explain this cumulative falling behind. In the following, we show which data allows us to distinguish these effects.

1.4 Data and methods

1.4.1 Dataset

During 2019, we hand-code all CV and publication data of all 1,455 political scientists with at least one publication. We use each department and faculty website of each German university and the two main social science institutes for basic research in Germany, notably the Max Planck Institute for the Study of Societies and the WZB Berlin Social Science Center. Every researcher's data ends when the coding of our data occurred or with the last publication we can find. For example, when a researcher's last publication was in 2017, our coding of this researcher ends in 2017. This is similar to a panel where some respondents miss the last round of interviews. Our coding strategy provides a unique panel dataset of 18,308 person-years with individual career and publication data of virtually every academic political scientist in Germany. Because we lag all independent variables by one year to avoid simultaneity bias in the regressions, we only use 16,853 person-year observations, from which 5,505 are from women and 11,348 from men. Having a virtually complete sample means that statistically insignificant effects do not result from a low sample size but from actual variation in what explains productivity. Many codings were performed twice to check inter-coder reliability. We also perform extensive consistency checks on the data. For example, we checked in our dataset how much researchers publish annually or how much time passed between their career steps and then re-checked this through their website. We add information on third party funding from the so-called Gepris website of the German Research Foundation (DFG). We then surveyed every researcher about whether they have children and when these were born. The response rate is 64%. All information was then anonymized so that it becomes impossible to retrace which data points belong to which researcher.

Why do we look at political science? The Matthew effect, where early productivity breeds later productivity, is said to be more important in "big science, with its expensive and often centralized equipment needed for research" (Merton 1968:57). That early productivity leads to laboratory equipment, which leads to later productivity, should not be the case in political science. So we focus on this discipline because if we find evidence of a Matthew effect there, it likely also exists elsewhere. Another advantage is that – compared to other fields – political science's gender distribution is not very skewed (905 men and 550 women), so that selectivity should be less of a problem than in other fields. If we look at engineering, for example, there would likely be few female scientists, which means that those who do exist are strongly selected. Contrary to this, political science, with its relatively equal gender representation, should be freer from gender-biased selection than other fields, making it an important case study.

1.4.2 Variables

Our dependent variable is each year's publications in SSCI (Social Sciences Citation Index)[41] journals, as defined by the Web of Science database. We therefore only use articles from journals with a certified peer-review process, even though we replicate our analysis with monographs and non-SSCI articles. We weighed for co-authorship with the formula *2/(number of authors+1)*. This counts single-authored publications as one publication, publications with one co-author as 0.67, with two co-authors as 0.5, and so on. We will, however, replicate our analysis by counterfactually considering every article to be single-authored. We explain each year's current, rather than accumulated publications, as annual articles have to be "re-earned" every year, thereby measuring present rather than past productivity (Xie and Shauman 1998:849). We control past influence on current productivity by controlling for six different types of accumulated past publications: prior SSCI articles, non-SSCI articles, monographs, edited volumes, gray literature, and book chapters. This allows measuring how much a researcher publishes every year, irrespective of her or his productivity so far.

[41] Strictly speaking, some of the publications (6 %) are listed in the SCIE index. However, to simplify, we speak of both SSCI and SCIE publications as SSCI publications, as this is the vast majority of publications we describe.

Our first model shows whether women publish less than men and less than men with similar prior experience. This indicates whether productivity can be explained through gender per se or through less experience in publishing.

Second, to understand what other influences may lead to cumulative advantage, we add career stages, distinguishing having no PhD from being a postdoc and a tenured professor.[42] We measure international experience through months abroad and having a PhD from abroad. We measure opportunities to accumulate social capital by how often a researcher changed to a new institution, the accumulated number of past co-authors, and how often a researcher acted as an interim professor. We measure the alleged quality of one's education by the share of career steps passed at so-called universities of excellence. In doing so, we code every university as a university of excellence that held this title at least once. We then code every researcher who graduated from such a university as having graduated from a university of excellence, regardless of whether the university had the title at that specific point in time. The reasoning behind this is that the prestige of a university should precede the title university of excellence since otherwise, the university could not have gotten the title in the first place.

A third model adds the variable DFG funding, which measures how many projects a researcher had funded by the German Research Foundation. While we would have liked to include how much funding each project received, this is not possible with the Gepris databank, which only lists funded projects but not the funding amount.

Fourth, we account for the presence of children in the household. Existing studies argue that "[s]imply having kids [rather than their number or age] appears to be the deciding factor" (Mason et al. 2013:29). However, to ensure that children's age does not bias our results, we account for this in separate regressions.

[42] In early calculations, we split the group of those with a PhD degree into those who are writing a "habilitation" (a second dissertation, specific to the German system) and who are assistant professors. But results were the same for all categories, so we merged them into one category.

Fifths and sixths, we use separate models for men and women to test whether their productivity is influenced differently by the variables.

We log all publications, as well as months abroad, DFG funding, co-authors, mobility, and interim professorships to account for diminishing returns, as e.g., having been funded by the DFG six versus five times should make less of a difference than having been funded once versus not at all (Jansen et al. 2007:137–38). 13% of researchers have only published "selected publications." We code them with a dummy variable "incomplete," which accounts for their missing publications.

1.4.3 Methods

We first show descriptively who publishes how much. We then use random effects (RE) regressions that are still rather descriptive, as they simply show who publishes how much due to what influence. To come closer to a causal influence, we next use RE models that control for prior productivity. This shows what gets researchers to publish more than a typical publication trajectory in political science. We then use fixed effects (FE) models that not only control for a researcher's publication trajectory so far but also for inert talent, by showing which influences render the same researcher more productive than she or he usually is (Dubois et al. 2014:1672; Joecks, Pull and Backes-Gellner 2014:521). This makes it impossible to compare time-invariant characteristics such as gender, but it shows how much more (or less) researchers publish after different influences, such as having been at a university of excellence, receiving funding, childbirth, etc.

1.5 Results: Who is more productive?

1.5.1 Bivariate and descriptive

First, we correlate our outcome variable bivariately with each explanatory variable and graph the results. Figure 1 gives a first overview of what is related to publishing more annual SSCI publications.

Figure 1. Bivariate correlation to annual SSCI publications.

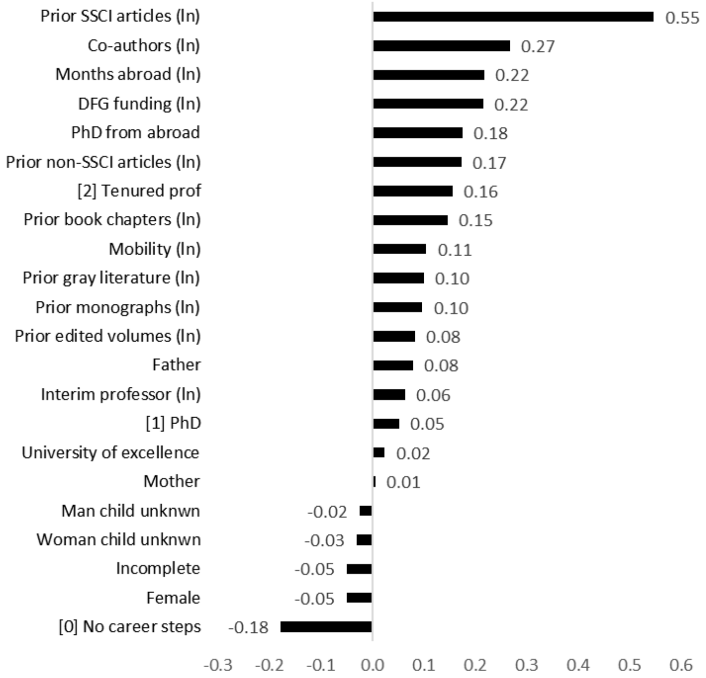


Figure 1 shows how, bivariately, the strongest predictor of current SSCI articles are past accumulated SSCI articles, while, conversely, the strongest predictor of low productivity is not (yet) having a PhD. This is the first evidence of a process of cumulative advantage, as it indicates that those who have published more in the past also publish more currently. Conversely, having little experience depresses publications more than anything else. It is also interesting to note that DFG funding is strongly related to annual publications, while a higher share of degrees from a university of excellence is not.

To test for further evidence of a process of cumulative advantage, Figure 2 shows how current annual publications depend on prior accumulated publications.

Figure 2. How prior SSCI publications are related to current publications.

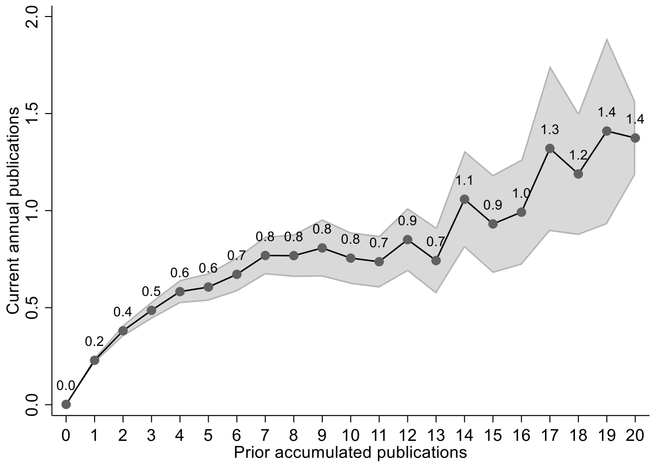


Figure 2 shows that researchers publish more annually (y-axis) if they have already published more in the past (x-axis). For example, researchers who have merely published one article in the past also publish only a fifth of an article annually (or one article every five years). However, researchers who have already published 14 articles in the past publish around one article annually and are thus about five times as productive. There is some evidence for decreasing returns: the more articles one has already published, the less every additional article seems to increase current productivity. Because of these diminishing returns, we log prior publications when using them to explain current productivity.

This is descriptive evidence that political science is marked by accumulative advantage, as early productivity leads to later productivity. Last, Figure 3 shows how this differs for men and women.

Figure 3. Current SSCI publications of men and women at each career stage.

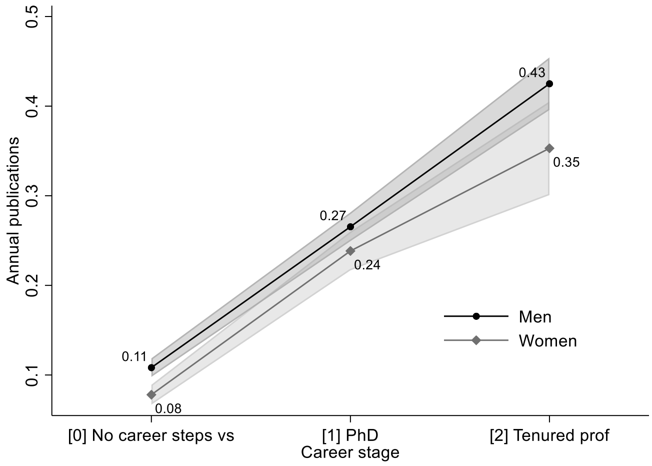


Figure 3 shows how the annual productivity of researchers with a PhD is higher than that of researchers without a PhD and how the productivity of tenured professors is highest. Men publish significantly more early in their careers, while at later career stages, they are not significantly more productive than women at the same career stage. However, while Figure 3 indicates that men at later career stages are not much more productive *annually*, Figure 4 shows how they have significantly more *accumulated* publications at later career stages.

Figure 4. Accumulated SSCI publications of men and women at each career stage.

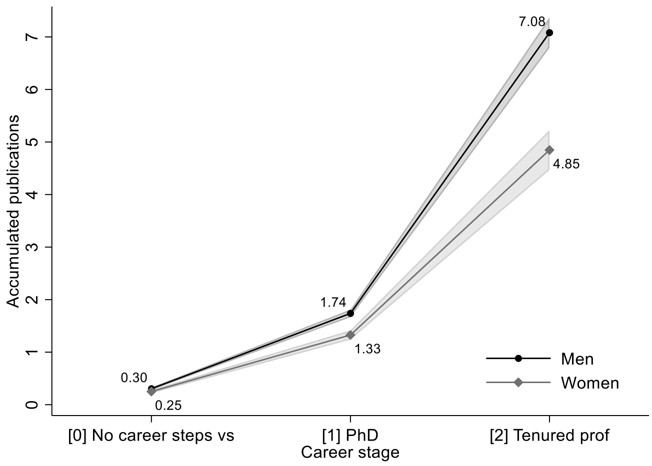


Figure 4 shows how, with each career step, the accumulated publications of men move further away from those of women. Among early-career researchers, men only have 20% (0.30/0.25) more accumulated publications. Male postdocs, in contrast, already have 31% more accumulated publications than women at the same career stage, while tenured professors even have 46% more. Men thus do not publish much more annually, but because they publish a bit more early on and because early success brings later success, they become more and more productive than women. This is exactly what an accumulative advantage process looks like, where researchers become more productive when they have accumulated more experience in the past. The following sections show whether multivariate analyses confirm this and which other influences seem to account for productivity.

1.5.2 Who is more productive? RE models without control for prior productivity

The RE models of Table 1 are still rather descriptive, as they show who is more productive without accounting for prior productivity. They are set up as discussed in the methods section. All regressions are centered around 1, representing the typical number of annual publications in political science (about 0.23). Therefore, all effects are interpretable as follows: The constant of 0.97 in Model 1 shows that after a typical year (keep in mind that the dependent variable is lagged by one year), researchers publish close to what is specific for political science. Researchers with incomplete data publish 28% less, which means that the dummy variable captures the missing data. Substantively, Model 1 shows that women annually publish 26% less than men across researchers and career stages. But how much of this productivity disadvantage can be explained through career stages and other prior experience?

Table 1. RE, Who publishes more SSCI articles?

	(1) Productivity	(2) Education	(3) Money	(4) Child	(5) Women	(6) Men
Female mc	-0.26**	-0.20**	-0.19**	-0.26**		
	(-3.21)	(-2.77)	(-2.66)	(-2.88)		
[0] No career steps vs						
[1] PhD mc		0.49***	0.49***	0.51***	0.47***	0.53***
		(8.37)	(8.43)	(8.90)	(5.31)	(7.19)
[2] Tenured prof mc		0.29**	0.17+	0.19+	0.23	0.17
		(2.98)	(1.74)	(1.95)	(1.30)	(1.47)
Months abroad (ln) mc		0.16***	0.15***	0.15***	0.22***	0.12***
		(6.72)	(6.63)	(6.55)	(5.71)	(4.30)
PhD from abroad mc		1.06***	1.06***	1.07***	0.68***	1.27***
		(7.22)	(7.26)	(7.29)	(3.76)	(6.18)
Mobility (ln) mc		0.12*	0.11*	0.11*	0.11	0.10
		(2.14)	(2.04)	(2.08)	(1.20)	(1.50)
Co-authors (ln) mc		0.22***	0.20***	0.20***	0.16***	0.22***
		(7.37)	(6.84)	(6.65)	(3.40)	(5.52)
Interim professor (ln) mc		-0.33***	-0.36***	-0.35***	-0.13	-0.43***
		(-3.51)	(-3.81)	(-3.75)	(-0.72)	(-3.93)
University of excellence mc		0.19*	0.17*	0.17*	0.09	0.19*
		(2.36)	(2.21)	(2.13)	(0.66)	(2.06)
DFG funding (ln) mc			0.40***	0.40***	0.32	0.45***
			(3.58)	(3.61)	(1.52)	(3.46)
Mother *(ref. childless)*				-0.15	-0.15	0.00
				(-1.27)	(-1.10)	(.)
Father *(ref. childless)*				-0.07	0.00	-0.05
				(-0.64)	(.)	(-0.48)
Woman child unknown				-0.01	-0.01	0.00
(ref. childless)				(-0.07)	(-0.10)	(.)
Man child unknown				-0.24*	0.00	-0.23*
(ref. childless)				(-2.57)	(.)	(-2.39)
Incomplete mc	-0.28*	-0.31**	-0.32**	-0.31**	-0.10	-0.40**
	(-2.28)	(-2.69)	(-2.87)	(-2.75)	(-0.64)	(-2.59)
Constant	0.97***	1.06***	1.06***	1.15***	0.97***	1.22***
	(24.01)	(26.82)	(27.24)	(19.69)	(9.74)	(16.82)
r^2 within	0.00	0.03	0.03	0.03	0.04	0.03
r^2 between	0.01	0.21	0.22	0.23	0.20	0.23
r^2 overall	0.01	0.10	0.11	0.11	0.09	0.12
Observations	16853	16853	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*; ln = logged values; mc = mean-centered.

Model 2 shows that women at the same career stage, with the same social capital and prior education, still publish 20% less annually than men do. It also shows that researchers with a PhD publish 49% more than those without a PhD, while tenured professors publish 29% more. Those who spent twice as much time abroad are 16% more productive, and those with a PhD from a foreign university are 106% (about twice) as productive than what is typical for political science. Researchers who moved more often are 12% more productive. Having had more co-authors comes with 22% higher productivity while having been an interim professor comes with 33% less productivity. Researchers who had all of their career stages at a university of excellence are 19% more productive than those who had none of their career stages at a university of excellence.

Model 3 shows that researchers who have been funded by the DFG twice as often are 40% more productive. However, third party funding does not strongly change the influence of any other variable except that being a tenured professor becomes a lesser influence, suggesting that tenured professors publish more because they have DFG funding more often.

Model 4 adds the children variables, showing that children neither significantly explain who publishes more nor explain away the prior results. This means that the influence of career stages, international experience, social capital, elite status of one's university, and third party funding are not mediated through the influence of having children. Because the men who have not responded to our question about children are especially unproductive, we use a dummy variable to capture a possible non-response bias. The r^2-between and r^2-within variation shows that all variables together explain 20% of the variation *between* the productivity of researchers, but only 4% of productivity differences *within* the career of each researcher. The variables therefore explain much better who is more productive than someone else, rather than who is more productive than she or he usually is.

Model 5 and 6 run separate regressions for men and women. They show fairly similar effects for both, except that men seem to profit twice as much as women from having a foreign PhD, having been at universities of excellence and receiving DFG funding, while at the same time being punished more when having acted as an interim professor.

1.5.3 Who is more productive than what is typical? RE models controlling for prior productivity

The following models are the same as before, except that they control for prior accumulated publications. They therefore illustrate not who publishes more, as the prior regressions do, but who publishes more than an average publication trajectory in political science would lead one to expect. Or in other words, the models show who publishes more than what would be expected for a given level of prior experience.

Table 2. RE, Who publishes more than an average publication trajectory?

	(1) Productivity	(2) Education	(3) Money	(4) Child	(5) Women	(6) Men
Prior SSCI articles (ln) mc	1.14***	0.94***	0.90***	0.91***	1.31***	0.74***
	(17.78)	(14.15)	(13.57)	(13.58)	(8.47)	(10.65)
Prior monographs (ln) mc	-0.02	-0.06	-0.07	-0.07	0.32*	-0.18**
	(-0.42)	(-0.99)	(-1.14)	(-1.08)	(2.05)	(-2.87)
Prior book chapters (ln) mc	-0.07+	-0.16***	-0.16***	-0.16***	-0.06	-0.18***
	(-1.96)	(-4.19)	(-4.16)	(-4.01)	(-0.87)	(-3.90)
Prior non-SSCI articles (ln) mc	0.17***	0.14***	0.14***	0.14***	0.11	0.15**
	(4.14)	(3.37)	(3.38)	(3.36)	(1.59)	(2.81)
Prior edited volumes (ln) mc	-0.36***	-0.33***	-0.35***	-0.34***	-0.37***	-0.34***
	(-6.49)	(-5.60)	(-5.83)	(-5.74)	(-3.40)	(-4.63)
Prior gray literature (ln) mc	-0.08*	-0.14***	-0.14***	-0.13***	-0.14*	-0.13**
	(-2.24)	(-3.75)	(-3.73)	(-3.72)	(-2.24)	(-2.97)
Female mc	-0.09	-0.13*	-0.13*	-0.19*		
	(-1.50)	(-2.22)	(-2.18)	(-2.26)		
[0] No career steps vs						
[1] PhD mc		0.39***	0.40***	0.42***	0.18+	0.50***
		(6.70)	(6.83)	(7.34)	(1.81)	(6.77)
[2] Tenured prof mc		0.11	0.06	0.09	-0.33+	0.20
		(1.04)	(0.57)	(0.85)	(-1.77)	(1.64)
Months abroad (ln) mc		0.09***	0.09***	0.09***	0.13***	0.07**
		(5.00)	(5.12)	(5.02)	(5.41)	(2.93)
PhD from abroad mc		0.58***	0.59***	0.59***	0.17	0.80***
		(5.03)	(5.11)	(5.13)	(1.12)	(5.04)
Mobility (ln) mc		0.09*	0.09*	0.09*	0.02	0.12*
		(2.19)	(2.13)	(2.17)	(0.29)	(2.19)
Co-authors (ln) mc		0.22***	0.22***	0.22***	0.09+	0.27***
		(7.49)	(7.40)	(7.34)	(1.73)	(7.37)
Interim professor (ln) mc		-0.31**	-0.32***	-0.31***	-0.37*	-0.31**
		(-3.26)	(-3.36)	(-3.34)	(-2.03)	(-2.81)
University of excellence mc		0.11+	0.10+	0.10+	0.04	0.13+
		(1.85)	(1.76)	(1.67)	(0.42)	(1.82)
DFG funding (ln) mc			0.23*	0.23*	0.04	0.32**
			(2.37)	(2.39)	(0.20)	(2.91)
Mother *(ref. childless)*				-0.19+	-0.29*	
				(-1.84)	(-2.27)	
Father *(ref. childless)*				-0.13		-0.10
				(-1.48)		(-1.03)
Woman child unknown				-0.02	-0.09	
(ref. childless)				(-0.21)	(-0.88)	
Man child unknown				-0.19*		-0.17*
(ref. childless)				(-2.56)		(-2.18)
Incomplete mc	-0.19*	-0.25**	-0.26***	-0.25**	-0.01	-0.33**
	(-2.52)	(-3.29)	(-3.40)	(-3.18)	(-0.07)	(-3.21)
Constant	1.03***	1.02***	1.02***	1.12***	1.09***	1.16***
	(34.81)	(35.24)	(35.33)	(22.86)	(11.18)	(19.41)
r^2 within	0.01	0.02	0.02	0.02	0.02	0.02
r^2 between	0.53	0.51	0.51	0.51	0.56	0.49
r^2 overall	0.19	0.20	0.20	0.20	0.20	0.21
Observations	16853	16853	16853	16853	5505	11348

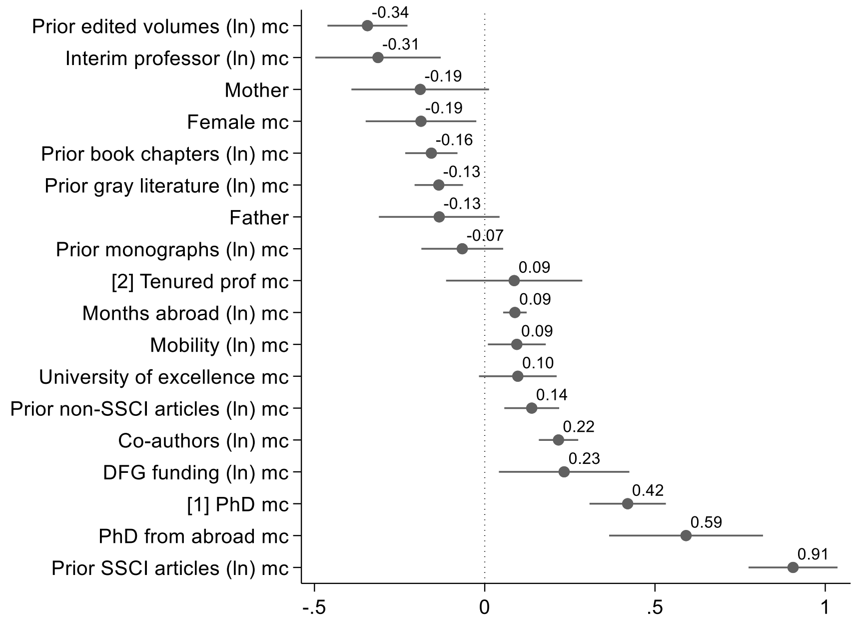
t statistics in parentheses; + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ln = logged values; mc = mean-centered.

Model 1 shows how prior accumulated SSCI articles predict current publications significantly and substantially. Researchers who published twice as many SSCI articles in the past also publish 114% more articles in the present (plus 17% for prior non-SSCI articles). This means that having been a highly productive author of articles in the past predicts being a highly productive author of articles in the present. However, having published twice as many book chapters, edited volumes, or gray literature in the past actually comes with *lower* current SSCI article productivity. This can be interpreted as two separate publishing cultures in political science. Those who publish articles do not publish books and vice versa. Most interestingly, however, the female effect is only 9% and insignificant after controlling for prior productivity. This stands in stark contrast to the very significant 26% productivity gap that Model 1 in Table 1 documented when prior productivity is not controlled for. This means that women only publish 9% and insignificantly less than men when they have the same prior experience in publishing. However, women publish 26% less overall. Most of the lower female productivity can therefore be explained through a cumulative falling behind, rather than through lower productivity irrespective of prior experience.

Model 2 additionally shows that after having a PhD, researchers publish 39% above a typical publication trajectory in political science. Scientists fall back on a typical publication trajectory (where past publications explain current publications) when they have a tenured professorship, however. The positive effect of career stages is weaker than in Table 1's RE models, which does not control prior productivity. This means that while researchers publish more with each successive career stage (Table 1), most of this is not due to career stages per se but due to publication experience with advanced career stages. Model 2 also shows that researchers with more months abroad, a PhD from abroad, more mobility, and more co-authors publish more than a typical income trajectory suggests, while having been an interim professor is again negatively related to productivity, and having all degrees from a university of excellence means researchers publish 11% above a typical publication trajectory. With minus 13%, the female effect is slightly more negative and significant here. This means that women are hardly less productive because they are stuck at lower career stages, have less social capital, international experience, or have been to universities of excellence. Instead, women are mostly less productive because they have published less in the past, depriving them of precious experience, which hinders their publications in the future (compare Models 2 of Table 2 and of Table 1).

Model 3 shows that DFG grants come with 23% higher productivity. That the effect is almost twice as strong in the RE models that do not control for prior productivity means that DFG-funding comes with an increase of articles of nearly 40% (Model 3 in Table 1), which increases the productivity of researchers 23% above what is to be expected for a given level of prior publication experience. Model 4 introduces parenthood into the regressions. Because it is the most comprehensive model, Figure 5 visualizes its relevant effect sizes.

Figure 5. Model 4 of Table 2 (RE after control for prior productivity) with all effects.



Net of all other variables, mothers publish 19 and fathers 13% less than a typical long-term publication trajectory in political science would lead one to expect. Irrespective of whether they have children, women publish 19% less than men do. Since this effect is stronger in this model, which controls for children, we cannot explain the lower female productivity through children. Overall, prior productivity is again the strongest predictor of current productivity, followed by a PhD from abroad, having a PhD (and thus being at the postdoc career stage), followed by DFG funding. All variables together explain an impressive 51% of time-invariant productivity differences *between* researchers' careers, but only 2% of the variation of productivity *within* the career of each researcher. Thus, the model explains much better who constantly publishes more than others, rather than when a researcher publishes more than she or he usually does.

Model 5 runs regressions for women and Model 6 for men only, showing how their productivity is related to different influences. It illustrates how prior productivity is a stronger predictor of future productivity for women than for men. Women who have published twice as many SSCI articles in the past publish 131% more articles currently, while for men, the influence of past on current productivity is only 74%. Women who have published more monographs in the past publish 32 more SSCI articles currently. In contrast, men who published more monographs in the past publish 18% fewer SSCI articles presently. The data again shows that with increasing career stages, men increasingly outpublish women. After having a PhD, men publish 50% more, compared to women's 18%. When women are tenured professors, they even publish 33% less than what is a typical political science publication trajectory, while tenured male professors exceed an average trajectory by 20% (albeit statistically insignificantly). While months abroad seem to help women twice as much as men, a PhD from abroad is much more related to higher publications for men. A manual inspection of the data shows that this is because men have PhDs from more prestigious foreign institutions. Mobility, in turn, is much more related to publications for men, so is having more co-authors, while being an interim professor is similarly detrimental for both. Men with diplomas from a university of excellence publish 13% above a typical trajectory, while women who have been at universities of excellence do not publish significantly more. And while men who have received DFG funding publish 32% more, women do not publish more after being funded by the DFG. Last, we now see that mothers are less productive than childless women, while fathers are not significantly less productive than childless men.

Generally, the random-effects models of Table 1, which do not control for prior productivity, yield similar but stronger results than the random effects models that do control for prior productivity of Table 2, which we have just discussed. This means that whatever helps researchers publish more than a typical publication trajectory in political science, it also generally helps them be more productive. However, while the models show who is more productive than others, they cannot show why a researcher publishes more or less than she or he normally does. This is what the following fixed effects models show.

1.5.4 When is a researcher more productive than usual? FE models controlling for prior productivity

In the following, we explain current publications through changes within the career of individual researchers (Table 3). Thus, we do not show who publishes more than others, but under which conditions an individual researcher publishes more than she or he usually does.

Model 1 shows that within the career of each researcher, prior performance predicts future performance less than in the previous random-effects models. This means that the effects of prior on current productivity are largely due to a between or population effect: Researchers who published twice as much as others in the past also publish twice as much as others currently (Model 1 in Table 2). But the same researcher only publishes 12% more SSCI articles currently when having published twice as many articles in the past. Differences in research productivity are therefore largely differences between researchers rather than productivity differences within the careers of each individual researcher.

Table 3. FE, Who is more productive than what would be expected based on publications so far?

	(1) Productivity	(2) Education	(3) Money	(4) Child	(5) Women	(6) Men
Prior SSCI articles (ln)	0.12	-0.02	-0.07	-0.08	0.05	-0.14^{+}
mc	(1.57)	(-0.26)	(-0.99)	(-1.01)	(0.31)	(-1.68)
Prior monographs (ln)	0.07	-0.14^{+}	-0.15^{+}	-0.15^{+}	0.11	-0.21^{*}
mc	(0.81)	(-1.66)	(-1.82)	(-1.84)	(0.61)	(-2.15)
Prior book chapters (ln)	0.08	-0.08	-0.08	-0.08	-0.04	-0.09
mc	(1.52)	(-1.50)	(-1.49)	(-1.48)	(-0.36)	(-1.42)
Prior non-SSCI articles	0.41^{***}	0.31^{***}	0.31^{***}	0.31^{***}	0.34^{***}	0.30^{***}
(ln) mc	(6.45)	(4.85)	(4.83)	(4.83)	(3.38)	(3.59)
Prior edited volumes	-0.39^{***}	-0.31^{***}	-0.34^{***}	-0.34^{***}	-0.28^{*}	-0.36^{***}
(ln) mc	(-5.20)	(-3.83)	(-4.18)	(-4.18)	(-2.16)	(-3.54)
Prior gray literature (ln) mc	0.05	-0.08	-0.07	-0.08	-0.13	-0.06
	(1.06)	(-1.41)	(-1.38)	(-1.40)	(-1.36)	(-0.92)
[0] No career steps vs						
[1] PhD mc		0.52^{***}	0.54^{***}	0.54^{***}	0.36^{**}	0.60^{***}
		(7.50)	(7.79)	(7.93)	(3.16)	(6.87)
[2] Tenured prof mc		0.35^{**}	0.30^{**}	0.30^{**}	0.06	0.36^{*}
		(3.04)	(2.59)	(2.59)	(0.31)	(2.53)
Months abroad (ln) mc		0.16^{***}	0.16^{***}	0.16^{***}	0.22^{**}	0.15^{***}
		(4.39)	(4.39)	(4.37)	(3.05)	(3.54)
Mobility (ln) mc		0.20^{*}	0.21^{*}	0.21^{*}	0.25	0.18^{+}
		(2.46)	(2.51)	(2.51)	(1.50)	(1.91)
Co-authors (ln) mc		0.24^{***}	0.24^{***}	0.24^{***}	0.12	0.29^{***}
		(4.74)	(4.64)	(4.58)	(1.59)	(4.03)
Interim professor (ln) mc		-0.22^{*}	-0.23^{*}	-0.23^{*}	-0.04	-0.31^{**}
		(-2.22)	(-2.32)	(-2.32)	(-0.19)	(-2.63)
University of excellence mc		0.05	0.02	0.03	0.44	-0.12
		(0.24)	(0.11)	(0.13)	(1.11)	(-0.51)
DFG funding (ln) mc			0.33^{**}	0.33^{**}	0.04	0.43^{**}
			(2.86)	(2.87)	(0.17)	(3.27)
Mother				-0.05	-0.06	
				(-0.41)	(-0.44)	
Father				0.04		0.05
				(0.32)		(0.41)
Incomplete mc	-1.41	-1.22	-1.22	-1.20	0.02	-1.33
	(-1.45)	(-1.28)	(-1.32)	(-1.31)	(0.05)	(-1.30)
Constant	1.00^{***}	1.00^{***}	1.00^{***}	1.00^{***}	0.90^{***}	1.08^{***}
	(4.41e+08)	(3.46e+08)	(3.52e+08)	(37.66)	(17.23)	(30.97)
r^2 within	0.02	0.04	0.04	0.04	0.04	0.04
r^2 between	0.03	0.11	0.10	0.10	0.15	0.09
r^2 overall	0.03	0.07	0.07	0.07	0.07	0.07
Observations	16853	16853	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ln = logged values; mc = mean-centered.

Model 2 shows that the same researcher publishes 52% more as a postdoc and 35% more as a tenured professor, compared to what would be expected based on her or his personal publication trajectory. This means that reaching higher career stages seems to have a positive effect on productivity, which cannot be reduced to the higher publication experience that comes with later career stages. Every doubling of months abroad increases the productivity of the same researcher by 16%, general mobility by 20%, co-authors by 24%, and having been an interim professor more often decreases the publications of the same researcher by 22%. Strikingly, getting a larger share of degrees from so-called universities of excellence does not help the same researcher to exceed her or his publication trajectory. That the effect has been positive in the RE models but not here in the FE models, shows that universities of excellence attract more productive researchers, but do not make the same researcher more productive than her or his prior experience, career stage, international experience, and mobility suggest anyways.

Model 3 shows that the same researcher publishes 33% above her or his typical publication trajectory after being funded by the DFG twice as often. Comparing this to the previous RE models shows that funding not only goes to more productive researchers but that it also makes the same researcher more productive than she or he would have been without funding. Note how this is different from the effects of universities of excellence: yes, more productive researchers have been disproportionally at universities of excellence, but no, the same researcher is not more productive after being there. Thus, while any effect of universities of excellence seems to be due to a population effect (more productive researchers are at universities of excellence), the effect of DFG funding appears to be an actual effect on the publications of researchers (DFG funding increases the publications of the same researcher).

Model 4 shows that neither becoming a mother nor a father significantly changes the publication trajectory of the same researcher. Contrasting this to the preceding models suggests a dominant between effect: Those who have been a mother or father all along are a less productive group, relative to what would be expected for their career stage, international experience, social capital, and funding. But the same researcher does not publish significantly less than would be expected after having children. Separate between-effects regressions (not shown here) confirm this: Mothers, as a group, publish 39% less than what is typical in political science for a given level of prior experience, career stages, and DFG funding. Differently from this, fathers as a group (irrespective of whether or not a researcher is yet a father) do not publish significantly less than the group of childless men. It is, therefore, not *becoming* a mother that makes a researcher less productive. Instead, the group of mothers is less productive than the group of childless women, irrespectively of the influence of childbirth on the career of the same researcher. In other words, those women who eventually have children are less productive regardless of whether they currently have a child, but a productive woman does not lose her productivity after having a child. This suggests a selection effect of less productive women into motherhood rather than a causal effect of childbirth on the productivity of the same woman.

Models 5 and 6 calculate separate FE models for men and women but hardly deviate from the conclusions that the prior RE models suggest. They again show that the same man increases his publications much more with each career step than the same woman does. However, a typical woman profits more from months abroad. The same man also profits about three times as much from past co-authors but is punished much more when doing interim professorships. Strikingly, the same man publishes 43% above his long-run publication trajectory after being funded by the DFG twice as often, while the same woman does not publish more after receiving DFG funding.

1.5.5 Robustness tests

1.5.5.1 Different coding of universities of excellence

We code the influence of being at a university of excellence through the share of degrees a researcher has obtained from every university that was a university of excellence at least once. However, it is possible that only some career stages at universities of excellence increase productivity. Therefore, we separately estimate the effect of having a PhD from a university of excellence, having been there as an assistant professor, or having gotten tenure there. After adjusting for prior productivity, we find that those who have a PhD from a university of excellence publish 20% more than those who have a PhD that is not from a university of excellence. They publish 29% more than their own publication trajectory would suggest when they have been at a university of excellence, rather than having gotten their PhD from another university. However, we find that those who have a habilitation from a university of excellence publish less than others and less than they would have without such a habilitation. In addition, being a tenured professor at a university of excellence neither lets researchers publish more than other tenured professors nor does it let them publish more than they would have if they had been employed by another university (see Appendix heading "Different coding of universities of excellence," Table A1 for RE and A2 for FE models).

1.5.5.2 Monographs rather than SSCI articles

In separate regressions, we check whether our results hold when defining productivity as the publication of monographs rather than SSCI articles (see Appendix heading: "Monographs rather than SSCI articles," Tables A3 to A5). Some covariates, such as "months abroad" or "PhD abroad" may reflect socialization that leads to publishing more SSCI-articles rather than other productivity measures. Therefore, we use separate models that explain the publication of monographs as well as non-SSCI-articles (next section). The RE regressions that explain book publications in the Appendix confirm the cumulative falling behind of women. The first regression, which does not control prior publications, shows that women publish 31% fewer monographs than men overall, almost the same as their productivity disadvantage for SSCI articles. Accounting for all covariates only reduces the female disadvantage to 25%. Because political scientists write fewer books than SSCI articles, we have fewer cases to work with, so other variables are insignificant, except that having a PhD comes with more monographs while having a PhD from abroad comes with fewer.

The RE regressions that do control for prior productivity show that, given the same prior publication experience, women publish only 19% fewer books (rather than 31% fewer over their entire career). This means that women publish 19% fewer books each year with the same experience level. Still, this accumulates to a 31% lower annual productivity over their career as early experience in publishing leads to later productivity. The other noteworthy results are that having been at universities of excellence is unrelated to the production of monographs, and DFG funding actually decreases monographs by 19% below what would be expected for a given level of experience. Again, children do not seem to influence book production strongly, so we cannot conclude that women author fewer monographs because they have children. Rather, they are less productive because they fall behind as they publish fewer monographs early in their careers.

Last, the FE regressions show that the same researcher tends to stop writing books when having done so in the past, which can be interpreted as an effect of "having one's book written." In other words, when researchers have written a book in the past, they may stop doing so in the future and only recommence publishing books when their last book has been out for a while.

Not many variables strongly predict book publications, which is an important result in itself, insofar as having been to universities of excellence, DFG funding, and having children do not depress or increase book publications of an individual researcher above or below what is typical for him or her. Therefore, these results support the main conclusions that we can draw when using SSCI articles as a measure of productivity.

1.5.5.3 Non-SSCI articles

We then repeat all calculations using non-SSCI rather than SSCI articles (see Appendix heading: "Non-SSCI rather than SSCI articles," Tables A6 to A8). This again confirms our main conclusions. Women publish 31% fewer non-SSCI articles than men, which only reduces to 28% less after including all controls. However, accounting for prior productivity reduces the female disadvantage to a mere 17%. While having written more non-SSCI articles in the past strongly predicts current non-SSCI publications when contrasting different researchers, the opposite is true within the career of each researcher. Thus, researchers who have written more non-SSCI articles in the past than others also publish more in the future. But the same researcher tends to write fewer non-SSCI articles when having done so more in the past. Not many other variables strongly influence the publication of non-SSCI articles, neither when comparing different researchers nor when comparing within the career of the same researcher over time. Thus, looking at non-SSCI articles again confirms that women publish less because they start publishing less early in their careers, which leads to a large disadvantage over time. Not much else (including children) explains why women (or men) publish fewer non-SSCI articles or, for that matter, why researchers generally publish non-SSCI articles.

1.5.5.4 Actually taking care of children rather than having them

While we generally find that children do not strongly influence publications, it is possible that taking care of them, rather than just having them, is what strongly influences publications (Jaksztat 2017:349). We have asked our respondents who mostly takes care of children in their relationships. Respondents could answer on a scale ranging from "much less responsible" over "about equal" to "much more responsible." While we do find that women claim childcare responsibility more often (mean = 2.6 vs. 1.3 for men), we surprisingly do not find that this strongly influences the results. There is no clear effect of taking care of children on publications, neither for men nor women. At the same time, a negative female effect remains, even after controlling for who takes care of children (see heading "Taking account of the intensity of childcare," Table A9 in the Appendix).

1.5.5.5 Age of children

Some claim that children do not generally depress the productivity of women but that only young children do (Kyvik 1990:157; Kyvik and Teigen 1996:68–69). We therefore test whether children of different ages depress productivity differently. Our results show that women whose children are one year old indeed publish less than comparable men. However, the effect does not exist for any other age of children, and it disappears after including controls. At the same time, women with 17-year old children publish more than men, and women generally publish less than men. While not all of these effects are significant, we conclude that children do not systematically depress female productivity; except directly after childbirth, which is not enough of an impact to explain why women generally publish less (see heading "Taking account of child age," Table A10 in the Appendix).

1.5.5.6 Counting every publication as single-authored

Finally, it is possible that how we adjusted for co-authorship biases our data. We therefore count every article as single-authored, as e.g., Google Scholar does. However, our conclusions also hold under this condition. Namely, while researchers publish 0.37 articles annually (when counting every article as single-authored), women publish 0.07 fewer articles annually (about 20%). This effect is somewhat reduced by accounting for prior experience. Being a postdoc, having spent more months abroad or having a PhD from abroad, as well as more mobility, co-authors, and DFG funding all increase publications, while having been an interim professor has a negative effect. Universities of excellence attract slightly more productive researchers but do not make the same researcher more productive while being a parent has no effect. Being a tenured professor has no impact while becoming a tenured professor increases productivity within the career of the same researcher. This latter effect might mean that tenured professors increasingly publish with others (since no effect existed when we discounted co-authored publications). For these results, see heading "Counting every article as single-authored," Table A11 in the Appendix.

1.6 Discussion

We now show what our results imply for the open theoretical questions discussed in the introduction. We also compare our findings to another discipline, sociology, and discuss implications for policy that tries to promote female careers as well as the implication of our results for the success of third party funding. Last, we discuss implications for how individual researchers can have a successful career.

1.6.1 Human capital

Existing studies suggest that prior productivity is a good predictor of future productivity (Lee 2019:1500; Lindahl et al. 2020:326). We can confirm this as researchers who published twice as many SSCI articles in the past also currently publish twice as many articles (Model 1 of Table 2). Thus, when comparing researchers, past productivity is an almost perfect predictor of current productivity: those who were more productive in the past are also more productive than others in the future. However, within the career of each researcher, having published twice as many SSCI articles in the past does not lead to publishing more in the future. This means that while early productivity is a good predictor of later productivity when comparing different researchers within the career of the same researcher, more publications in the past do not consequently lead to more publications in the future. Fittingly, we also do not find that the same researcher becomes ever-more productive with career stages (similarly, see Jadidi et al. 2018:1750011--7). Instead, productivity seems to increase until tenure and then decline slightly, relative to one's time as a postdoc (while staying above the level one had as a PhD student).

That productivity falls with tenure relative to one's time as a postdoc may be because tenured professors have more duties that keep them from publishing or because tenure itself decreases the incentive to publish.

1.6.2 Duration, quality, and social capital of one's education

It is much discussed whether grouping universities into regular universities on the one side and "universities of excellence" on the other bears any semblance to actual productivity differences. We find that researchers from universities of excellence publish at most 19% more than others and at most 11% more than an average publication trajectory would suggest. Importantly, however, the same researcher is not more productive after having a higher share of her or his degrees from a university of excellence. An exception to this is found in our robustness tests, which show that universities of excellence produce more productive postdocs but not more productive tenured professors. Overall, we find what Carayol and Matt (2006:60) call an "intrinsic ability" effect, where some departments have more "intrinsically able" researchers than others. But except for postdocs, we cannot find what Carayol and Matt call a "departmental effect," which would mean the same researcher becomes more productive after being at an elite department. This contradicts classical findings from the US, which show that better departments do increase a scholar's productivity (Long 1978:902). However, it fits with Merton's (1968:62) idea that "centers of demonstrated scientific excellence are allocated far larger resources for investigation than centers which have yet to make their mark. In turn, their prestige attracts a disproportionate share of the up-and-coming graduate students." It also fits studies arguing that allocating "subsidies to some departments appears to be useless: it may attract the more active researchers to the richer departments, but does not increase their output when taking into account authors fixed effects" (Dubois et al. 2014:1687; in support of this view, see García-Suaza et al. 2020:446; in contrast, see Möller et al. 2016:2235). One possibility why the excellence initiative has not succeeded in creating productivity-promoting universities is that it is not funded well enough to make much of a difference. Its current annual budget of 533 million euros is split over more than 11 universities, constituting less than 1% of

Germany's public university expenditure and a mere tenth of Harvard's budget alone.[43] Therefore, identifying more productive universities, rather than actually generating a productivity-enhancing environment, may be all that one can demand from the excellence initiative.

1.6.3 Third party funding

Some claim that DFG funding is unrelated to productivity (Münch 2006:474). Others contradict that DFG funding is correlated to research excellence while leaving unclear whether it helps those who have been more productive in the first place or indeed increases the productivity of researchers, irrespective of their prior achievements (Auspurg et al. 2008; Hornbostel 2001:536; Jansen et al. 2007).

We can give a clear answer to this debate. Our data shows that when a researcher has been funded by the DFG twice as often, his or her publications increase 33% above what is typical for this researcher, holding all other influences constant (Model 4 of Table 3).[44] Note that this is similar to other studies, which find that a doubling of DFG funding increases the productivity of business faculties by 24% (Albers 2015:25). But while these studies cannot tell which way the causality runs, we can show that productive researchers do not simply get more funding in the first place, but that the same researcher indeed publishes more after getting funded, irrespective of her or his prior productivity.

While this confirms fears that universities of excellence do not produce more productive researchers, it contradicts complaints that individual DFG funding is ineffective (see Münch 2006:477–78). However, note that this is only true for SSCI articles. We do not find that DFG funding gets the same researcher to publish more monographs or non-SSCI articles (nor is it related to publishing more monographs or non-SSCI articles when comparing researchers). Note that while a typical male researcher publishes 43% more articles than he usually does after receiving DFG funding, a female researcher does not

[43] https://www.dfg.de/en/service/press/press_releases/2019/press_release_no_34/index.html; https://www.destatis.de/DE/Presse/Pressemitteilungen/2020/04/PD20_143_213.html; Harvard University financial report fiscal year 2019, page 6: https://finance.harvard.edu/files/fad/files/fy19_financial_overview.pdf [retrieved November 17, 2021].

[44] We only counted the number of grants; it would be fruitful for future research to examine the actual funding that was received per grant.

significantly increase her publications after receiving funding. This, as well as other results, supports the theory of limited differences to explain why women are less productive than men.

1.6.4 Gender and children

The theory of limited differences posits that at each level of experience, women are only marginally less productive than men, but suggests that these limited differences accumulate over time, as past productivity facilitates future productivity (Cole and Singer 1991:282–84). Our results are compatible with this theory. We find that women are only 9% less productive than men at the same level of prior publication experience but 26% less productive overall (Model 1 of Tables 1 and 2). This suggests that about two-thirds of the female disadvantage stems from a process of cumulative disadvantage, while only about one-third exists regardless of prior experience.

Xie and Shauman (1998:864) argue that the female productivity puzzle is actually not a puzzle, as the lower female productivity can be explained through less access to career stages (also see Jadidi et al. 2018:1750011--7). At first sight, our results support their argument, insofar as accounting for career stages somewhat reduces the female productivity gap from 26 to 20% (Model 1 and 2 of Table 1). However, Models 1 and 2 of Table 2 show that what drives the influence of career stages is actually the publication experience that comes with career stages, rather than career stages per se. In other words, women do not publish less because they do not get to advanced career stages but because they have less experience with publishing early in their career. While this reduces the female productivity disadvantage from 26 to about 9%, we cannot explain away the remaining effect through children, different from what others suggest (Mason et al. 2013:29), but again similar to what the theory of limited differences postulates (Cole and Singer 1991:288). We suggest that existing research may have confused population- / between-differences with intra-individual / within-differences because we do find that mothers as a group are less productive, while we do not see that having children makes the same researcher less productive.

Different from what others find, we can show that the circumstance that women publish less is hardly mitigated through dissimilar access to career stages, international experience, social capital, quality of one's university or third party funding (Jadidi et al. 2018:1750011--19; Jaksztat 2017:357). Quite the opposite: while a man who gets third-party funding exceeds his average publication trajectory very significantly, a woman who gets funded by the DFG is no more productive than she would have been in the absence of funding (Models 5 and 6 of Table 3). This is disconcerting for anyone who wants women to succeed in academia because it seems that whatever increases productivity helps men more than women. The same is the case for career stages. If men make it to higher career stages, they turn these into publications more than women do. This would imply that helping women reach higher career stages would not help them be more productive, while men who get to higher career stages do increase their productivity more than women do. One exception is experience abroad, which consistently influences women's productivity about twice as much as men. This confirms Kathrin Zippel's (2017) argument that women, even more than men, may be able to make up for disadvantages at home by accumulating prestige or experience abroad. Giving women more opportunities to spend time abroad may be a good way to help them become similarly productive as men.

1.6.5 Comparison to sociology

Lutter and Schröder (2016, also see 2020) conducted a similar study in German sociology. We are thus able to show which findings can be generalized to both disciplines. Most importantly, Lutter and Schröder also find that female sociologists publish 31% less before including controls (contrasting the effect size and constant of Model 1 in Table 2). Again, while women are more negatively affected by childbirth than men, the effect of children hardly explains their generally lower productivity (Model 2), and neither do career stages (Model 3). However, female sociologists publish only 20% less after adjusting for prior publications together with other covariates (Model 4). Like political science, it seems as if women mainly publish less because they have less experience with publishing early on, not because they have children. Similar to political science, Lutter and Schröder (2020) also find that: 1) researchers become more productive after a PhD and then less productive after a professorship, 2) having published more SSCI articles in the past strongly predicts publishing more SSCI articles in the future when comparing researchers, but not within the career of each researcher, 3) DFG grants increase productivity, more for men than for women, though the effect is statistically insignificantly for both (Table 2 and 3). Lutter and Schröder also show that the productivity of women who were more successful in the first place suffer less from children than women who were less successful in the first place (Figure 1), which again suggests that fewer early successes, rather than childbirth, explain why women publish less in the long run. Thus, many of the effects we show for political science are similarly found in sociology and therefore exist across disciplines.

1.6.6 Policy implications

Our results indicate that to make women succeed in academia, it is crucial to get them to publish early on, as this publication experience, rather than e.g., access to formal career stages or DFG funding, explains later productivity and thus a large part of the female productivity gap. This puts those in a difficult position who want to support female academics because it is easier to create preferential access of women to career stages or to DFG funding (both of which do not seem to have a large effect, however), rather than making women publish more (which does have a strong effect, but which women have to do themselves). Overall, the results suggest that what stands most in the way of women succeeding in academia is their initially slightly lower productivity, which becomes larger and larger as early publication experience leads to later productivity. Thus, any program that boosts female productivity early on or gets women to have more international experience is probably more helpful in making female academics more productive than funding, preferential access to postdocs, or professorships.

Other policy implications are that there is clearly an effect of DFG funding on the production of SSCI articles. However, the German Research Council might want to consider whether it is a problem that researchers do not publish more monographs or non-SSCI articles after receiving DFG funding. Also, for those interested in making the German excellence initiative a success, it is important to note that this is not yet the case in political science. Note that our results are exploratory in this regard, however, as we do not know how much funding political science departments have received. We had to count every university as a university of excellence that received this title at least once.

1.6.7 Implications for the careers of individual researchers

Our results can also guide researchers who aspire to be productive or wonder whether they will be. The results suggest that researchers who publish more than others early on can expect this to endure. If, however, one recognizes that others initially publish more than oneself, then this is unlikely to change, and it is doubtful that one will catch up, as productivity differences between researchers increase over time. Therefore, it seems essential to publish a lot early on to gauge one's potential. Early publications appear to lead to later publications, differentiating researchers that become more and more productive over time from researchers that fall further and further behind. Since this tends to disadvantage women, they need to get a head start to avoid falling into the trap of accumulative disadvantage. While this may sound fatalistic for late-career researchers with few publications, the main takeaway for early-career researchers, especially women, is optimistic. If they manage to publish a lot early in their career, they can expect their success to continue. If young researchers find they lag behind their colleagues, however, they should consider that the data suggests that this is unlikely to change.

While early publications seem a powerful predictor for later productivity, many other influences appear fairly unimportant. Notably, visiting universities of excellence seems a worthless effort, whose appeal may result from an ecological fallacy: Comparing publications may give the correct impression that researchers from universities of excellence are more productive than others. However, this is a selection, not a departmental effect, in that more productive researchers select into elite departments, yet these departments fail to make researchers more productive. Similarly, parents and especially mothers may seem like a less productive group but the data suggests that individual researchers need not worry that having children will lower their productivity below what has been typical for themselves before they had children. Again, a different impression probably results from an ecological fallacy: confusing differences between groups versus differences within individual careers. One aspect that has a strong influence is getting DFG funding, which seems to increase future productivity, especially for men. In contrast, international experience seems to increase productivity, especially for women.

Note, however, that these results are for political science only. While they are strikingly similar to sociology, it stands to be seen if they are found in other disciplines. Note that these results remain only correlational, so it would be interesting to see which effects hold when they are administered as an intervention.

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Chapter 7: Human capital, research funding, and gender: Determinants of research productivity in German psychology

1.1 Abstract

Because research productivity can be seen as both an input and an output of scientific endowment, we disentangle this relationship by using fixed- and random effects analyses on panel data of CV and publication records of practically all German academic psychologists. We find that the strongest predictor of high productivity, measured as the publication of peer-reviewed articles, is prior experience in publishing. How much a researcher has published in the past strongly predicts their future publications. Contrary to this, career stages, having been at high-status universities, third party funding, or having children, all have less of an independent effect. We also find that while female psychologists publish 42% less than men, they only publish 15% less when having the same prior experience in publishing. That women publish less than men is therefore to some part due to their more limited prior publication experience, rather than their gender per se. This study therefore supports the theory of cumulative advantage, which argues that early success breeds later success.

1.2 Introduction

Few scholars disagree with Robert Merton's (1973 [1942]:270) claim that "[t]he institutional goal of science is the extension of certified knowledge." Many concur that extending certified knowledge is best achieved by publishing peer-reviewed journal articles, which gauge a scientist's productivity (Duffy et al. 2011:210; Helmreich et al. 1980:896; Joy 2006:346; Mayer and Rathmann 2018:1664; Zou, Tsui and Peterson 2018:1294). Yet, it remains unclear why some scientists are more productive in the first place. Do they possess something akin to a "sacred spark" (Allison and Stewart 1974:596)? Or does everyone start with relatively similar productivity, but then small initial differences cumulate to larger advantages over entire careers (for a review, seeDiPrete and Eirich 2006)? This study uses data from almost all academic psychologists at German universities to examine what correlates with high research productivity, measured in terms of peer-reviewed journal articles reported in the (Social) Science Citation Index.

Our results suggest that researchers indeed become much more productive with prior publication experience and research funding; as a result, women increasingly fall behind, as they accumulate publications at a lower rate early on; they therefore have less experience to build on, which cumulates to an ever-increasing disadvantage. Our results also suggest that academics from high-status universities ("excellence universities" according to the German system) have a higher research output overall. These universities seem to attract academics with higher levels of research output, but working there does not seem to increase productivity per se.

1.3 Theory: What could explain productivity?

1.3.1 Human capital

Academics differ in their human capital investments, which could explain differences in their research output. Human capital is the sum of knowledge, experience, and skills learned throughout a career (Becker 1993 [1964]:11). Researchers with more advanced educational degrees should therefore be more productive. Apart from this certified knowledge, on-the-job training also exists in academia: whoever has published more in the past has accumulated more publication experience and should therefore have increased skills to publish comparably more in the future.

This brings an endogeneity problem, however, as research productivity is not merely an output but also an input to further publications. This is often called the "Matthew Effect" (Merton 1968:58), also known as "cumulative advantage" (Allison and Stewart 1974:597f.; for a review of the literature, see DiPrete and Eirich 2006). Both concepts suggest that early success breeds later success. The opposite is the "sacred spark" hypothesis, which argues that there are inevitable differences between academics in their talent and drive to develop innovative research ideas (Allison and Stewart 1974:596). The sacred spark hypothesis suggests that some researchers have higher rates of research output regardless of their prior experience. In contrast, the cumulative advantage assumption sees research output as a function of a researcher's accumulated publication history, suggesting that academics with higher past productivity are also more productive currently.

We examine both approaches by analyzing what types of (observable) academic credentials correlate with higher productivity. Specifically, we examine whether differences in research output exist because of differences in past productivity or unrelated to prior experience. Existing studies argue that prior productivity indeed predicts current productivity (Lindahl, Colliander and Danell 2020). However, as the following sections argue, educational environment and research funding may also influence research output. Moreover, there might be differences with regard to gender, as women often face the burden of caring for children during crucial career stages. We go through each influence, in turn, to show what we can contribute to the study of each.

1.3.2 Educational environment

So far, it is largely unclear whether academics become more productive with successive career steps or whether additional career steps eventually come with decreased productivity, for example, because researchers become less creative or less ambitious after getting a tenured professorship (Cole 1979:976f.; Duffy et al. 2011:218; Mayer and Rathmann 2018:1666f.)

Research output may be a function of its educational and institutional environment. For instance, researchers at a high-status university may have better access to resources, training, research-oriented peers, or mentors. Due to these incentives, the so-called "German Universities Excellence Initiative" has given some institutions in Germany the title "universities of excellence." These now pride themselves with "outstanding conditions for cutting-edge research" as well as excellent conditions to "support young scholars" (DFG 2013:12, 34). However, whether this is true remains undecided, as there are no specific bibliometric studies of the German Excellence Initiative (Möller, Schmidt and Hornbostel 2016:2219).

Some studies suggest that more prestigious departments indeed make for more productive scholars (García-Suaza, Otero and Winkelmann 2020:446). Similarly, Toutkoushian et al. (2003:141) argue that an institution's publication output is "highly correlated with the level of research expenditures and revenues at the institution." However, prior studies rely on cross-sectional data, therefore leaving unclear whether an effect might exist because individuals become more productive by going somewhere or whether some institutions attract those who are more productive in the first place (Carayol and Matt 2006:60; Long 1978:889). Others are even skeptical that the effect exists at all (Duffy et al. 2011:209).

Similarly, experience in international academia may also be a source for research productivity. Studies find mixed results on this. Fernández-Zubieta, Geuna and Lawson (2015) do not support such an effect; however, Dubois, Rochet and Schlenker (2014:1687) suggest positive effects. Problematically, mobility may again both be endogenous to research productivity, as research-active academics may have better access to high-status institutions abroad, precisely due to their higher productivity (Dubois et al. 2014:1671). To disentangle this, one needs first to measure the relationship between research output and mobility and then test whether the relationship holds even after controlling for prior productivity.

1.3.3 Research funding

Research funding like grants should increase research output, serving as a (re)source. However, whether or not grants actually increase research output is debated (Mayer and Rathmann 2018:1670). Some authors suggest that there is little evidence (Carayol and Matt 2006:70), some find more substantial evidence (Albers 2015:25). Studies therefore demand replications in "different scientific disciplines" and suggest using longitudinal datasets for a better assessment of causality (Albers 2015:30). This also could address the issue of reverse causality, which may be at play here as well, as funding may not only result in but also result from publications (Bolli and Somogyi 2011:138). To find out whether research grants enhance output, it is reasonable first to test whether more productive researchers acquire more funding in the first place, and then test whether a relationship between funding and output persists even after controlling for past output (Jansen et al. 2007:130).

1.3.4 Gender and parenting

Studies generally find that women have lower rates of research output than their male counterparts (Duffy et al. 2011:209; Elsevier 2015; Leahey 2006:756; Mayer and Rathmann 2018:1665). This may be due to a gendered tendency of cumulative advantage. The theory of cumulative advantages suggests that minor initial advantages cumulate to substantial gaps across an entire career. If men start with small advantages compared to women, this might accumulate drastic gender differences over time. For example, Helmreich et al. (1980:903) argue that women tend to start their careers with PhDs from less prestigious institutions. This makes little difference early on but prevents them from getting a head start, which in turn makes career advancement more difficult for them so that women lag further and further behind (Cikara, Rudman and Fiske 2012:281). Johnson and Stafford (1974:902) argue that this cumulative falling behind explains 60% of the gender productivity gap, while 40% still remains unexplained for equally experienced male and female scientists. However, previous research with cross-sectional data cannot distinguish whether poor publication performance is due to less prior experience or is still independent as an outcome (Mayer and Rathmann 2018:1679).

Childrearing is the most prominent explanation for why women accumulate success more slowly (Joy 2006:362; Lutter and Schröder 2020; Mason, Wolfinger and Goulden 2013). However, the results are again not precise. Research suggests that parental duties decrease female productivity; other research does not suggest this (for an overview, see Lutter and Schröder 2020). To understand whether women are inherently less productive or cumulatively fall behind, we test whether they publish less than men independently of experience, or whether their fewer publications are rather due to less experience. We further test whether parenthood explains a slower cumulation of productivity.

1.4 Data and methods

In 2019, six research assistants worked 19 hours weekly to code all CV and publication data from the websites of each of the 72 German universities with a psychology department and two research institutes. This provides us with a virtually complete career dataset of German academic psychologists. We only include data from researchers who have at least one publication and received their PhD after

1980. We thus obtain a longitudinal dataset covering retrospective "publication trajectories" of scientists starting with the (year of) first publication. The dataset contains a total of 2,529 individuals nested in 25,868 researcher-years. We lag all predictors by minus one year, thus avoiding bias from time overlap between the dependent and independent variables. The final dataset reduces to 23,339 researcher-years containing 1,191 women (985 men) in 10,528 female (12,811 male) researcher-years. In addition to the website data, we add data from the German Research Foundation (the "DFG") to code information on each individual's research funding. We also conduct a survey via email to assess the number of researchers' children and when they were born. The response to this survey is 55% for men and 65% for women. All information was then anonymized, so that data cannot be traced back to individual researchers.

The field of psychology is more than just a case study: First, psychology represents other social sciences as the gender representation is fairly equal; actually, they start with a higher percentage of female graduates. Selectivity should thus not bias our results by gender. Second, psychology is guided by academic standards otherwise established in the natural sciences, e.g., international research visibility in flagship journals. If we find a cumulative advantage in enhancing productivity in psychology, the results should also be relevant to fields with similar publishing cultures.

1.4.1 Variables

For descriptive information of all used variables, see Tables A1-A3 in the Appendix. As for the dependent variable, we calculate a scientist's number of yearly publications in peer-reviewed journals listed in the Social Science (SSCI) or Science Citation Index Expanded (SCIE). We adjust this measure of productivity for co-authorship by using the weight *2/(# of authors+1)*. This way, each two-author publication counts as a 0.67 individual contribution, every three-author publication as a 0.5 contribution, etc.[45]

[45] We also calculated co-author adjusted publications by the formula (1/# of authors) introduced by Lindsey 1980 and Price 1981, see Appendix E. Additionally, we count each publication regardless of the number of co-authors (i.e., we count each publication as a single-author publication, see Appendix D). Both procedures yield fairly equal

Existing studies show that journal articles are highly correlated to other types of productivity in psychology (Duffy et al. 2011:220), so that "it is very unlikely that the overall picture of the distribution of individual research performance changes completely when using different bibliometric databases" (Diem and Wolter 2013:106). We therefore assume that journal articles are a good indicator of general research productivity. Not all academics post their full publication lists online, however. Some senior scientists do so by only reporting their top publications. If we found only "selected publications" on their website, we tag such researchers with a dummy variable (which we include as a control in the regression models to account for this missing data).[46]

We control for six sorts of accumulated prior research output (each variable is coauthor-adjusted, see above): the number of 1) prior SSCI/SCIE journal articles, 2) monographs, 3) book chapters, 4) non-SSCI/SCIE journal articles, 5) edited volumes, 6) and other literature (gray literature such as reports, working papers, literature reviews). While Perry et al. (2000) use a productivity index based on seven items (e.g., articles, reports, book reviews, chapters in edited books), we add each publication type as a single variable to distinguish prior publication productivity according to different types of published work. We add the constant 1 to all of these variables and then log all publications, as well as other continuous independent variables, to account for diminishing returns; for example, publishing a sixths article increases research output by 20%, while publishing the first article by 100%.

A "female" dummy controls for gender; two dummies control for whether the person is a post-doc and has obtained a doctoral degree (including assistant/junior professors) or whether the person has obtained a tenured professorship (reference category is "pre-docs").[47]

We measure international experience by 1) having obtained the doctoral degree from an institution outside of Germany and 2) the number of months spend abroad. We measure the number of months by counting information given on university websites. If a website does not show the exact dates, but

results, as the coefficients differ only slightly across models. We also weighted each SSCI/SCIE article by the journal’s impact factor, which also did not change results substantially (see Appendix F).

[46] Incomplete publications lists are fairly equal distributed across gender (around 5% of women and 9% of men, see Appendix H), so we do not assume that our results are biased by gender-specific reporting.

[47] We also consider different career lengths, see Table G in the Appendix.

typically, e.g., "spring term" or "2008/09," then we assume five months for a semester and ten months for an academic year.

We operationalize the quality of academic education with the proportion of career steps obtained at high-status universities. We calculate an institution as high-status if it ever got the official title as "university of excellence."

We measure research funding by the number of grants an academic received from the DFG. The DFG is Germany's largest funding agency. We obtained funding information through a manual name search in the public DFG data file, which lists all PIs with their funded projects (access at https://gepris.dfg.de/).[48]

Data from our email survey count whether researchers have children. We separate this information by gender and control for being a mother or father. The variables thus cover time-varying coefficients that get the value 1 in the year a scientist's first child was born. For all non-respondents, we control for the "status of children unknown" separately for both genders. For robustness checks, however, we also conduct a complete record analysis (with information of only survey participants) as well as a multiple imputation analysis (for these robustness checks, see Appendix B). The tests show that our procedure is suitable, but we nonetheless discuss how results differ in the discussion.

In the following, we begin with a descriptive overview of the correlates of an individual's research output. We then present the results of random-effects (RE) models, which control for prior publications. These models can be conceived as rather descriptive, as their interpretation is not related to the within-dimension of individual careers. That is, we do not look at changes within individual career trajectories but explore career trajectories between different scientists. In the last step, therefore, we use fixed-effects regressions (FE) that control for prior productivity, as well as other time-varying confounders, to account for differences within each career.

[48] The DFG does not provide information on the financial amount of the grants on its platform.

1.5 Results: What determines research output?

1.5.1 Descriptive results

Figure 1 presents the results by showing the bivariate correlation between the number of SSCI/SCIE publications and each explanatory variable.

Figure 1. Correlation between the number of SSCI/SCIE publications and all explanatory variables.

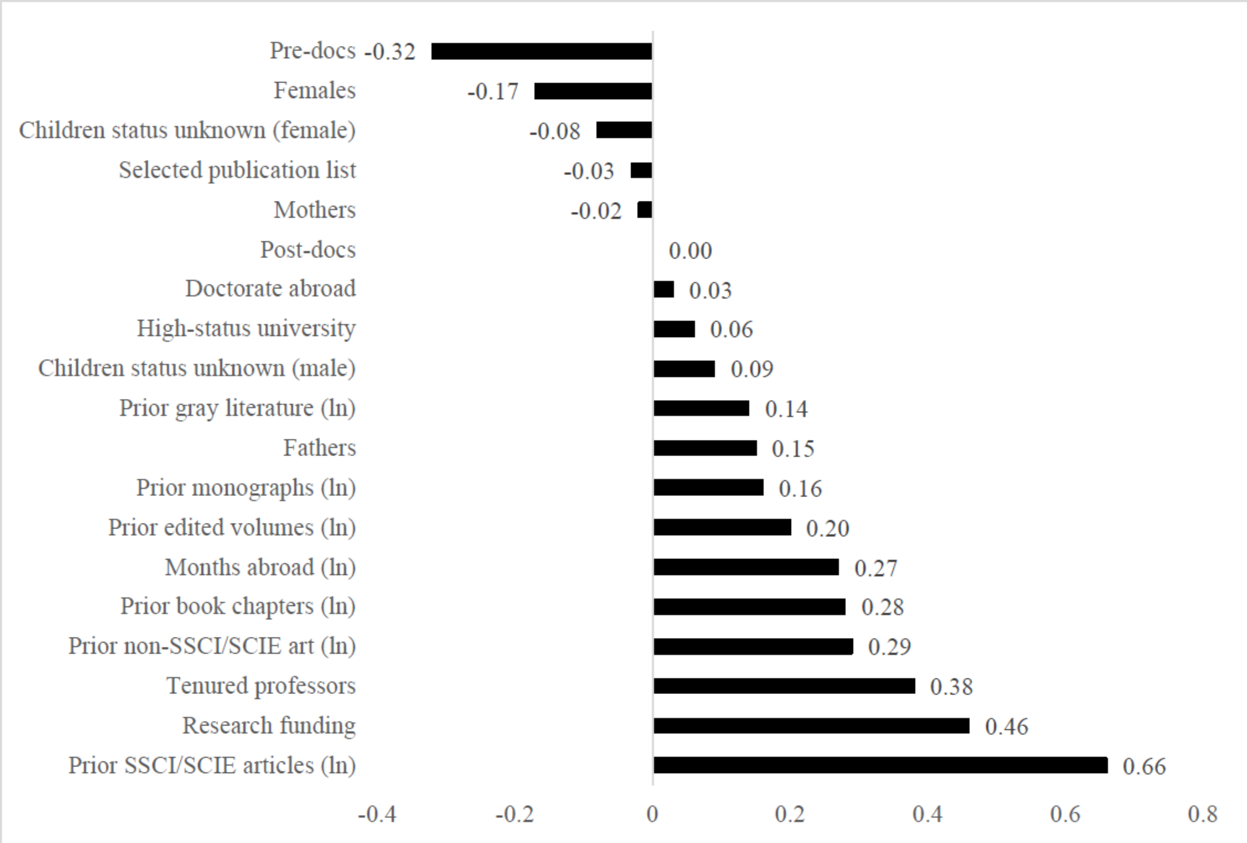


Figure 1 indicates that the number of yearly SSCI/SCIE articles is most strongly related to how many articles a researcher has published in the past. Research funding has the second strongest relationship with annual publication output; third comes being a tenured professor. Conversely, the strongest negative relationship with low productivity is being a doctoral student.

This indicates a possible process of cumulative advantage. The results suggest that researchers publish more when they have published more in the past or accumulated more of other types of experience. It is likely that more publications lead to better pools of co-authors and other resources, which are all likely to increase future publication success. However, interestingly, being part of a high-status university has a very weak relationship to SSCI/SCIE publications. Being a woman is negatively related to productivity, while being a father is positive. Men who did not answer our questions about children are slightly more productive, while non-responding women are less productive. That past productivity strongly determines current productivity is illustrated by Figure 2, which displays how current research output is related to past output.

Figure 2. Relationship between current yearly SSCI/SCIE publication numbers and past publications.

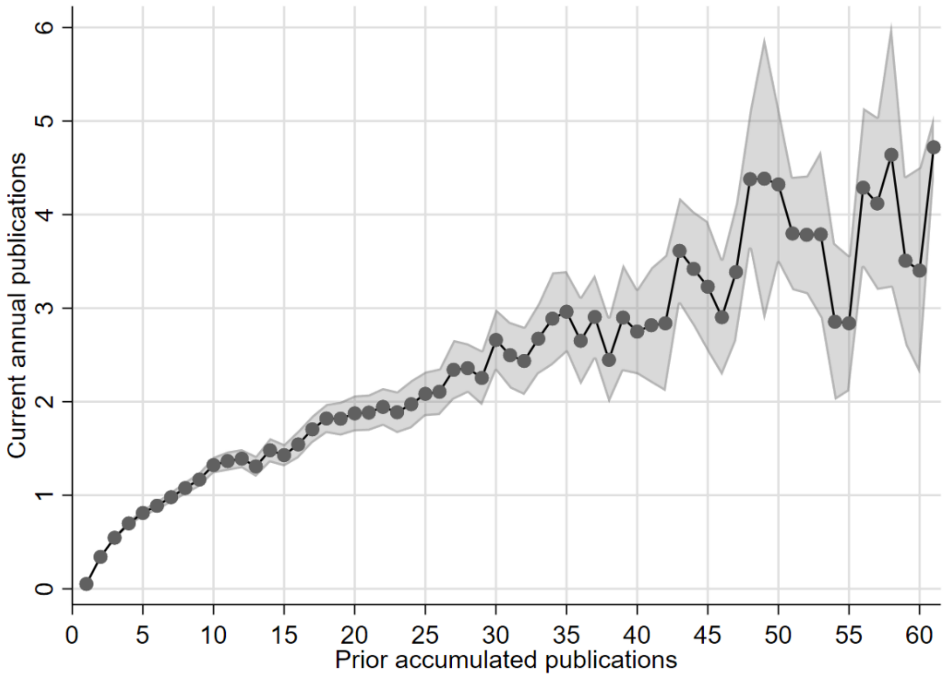
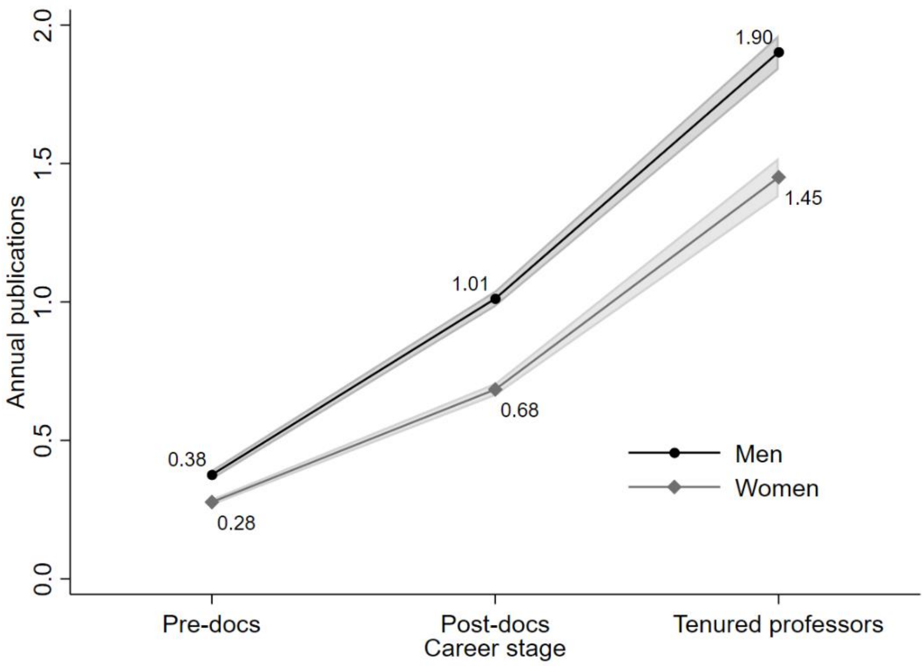


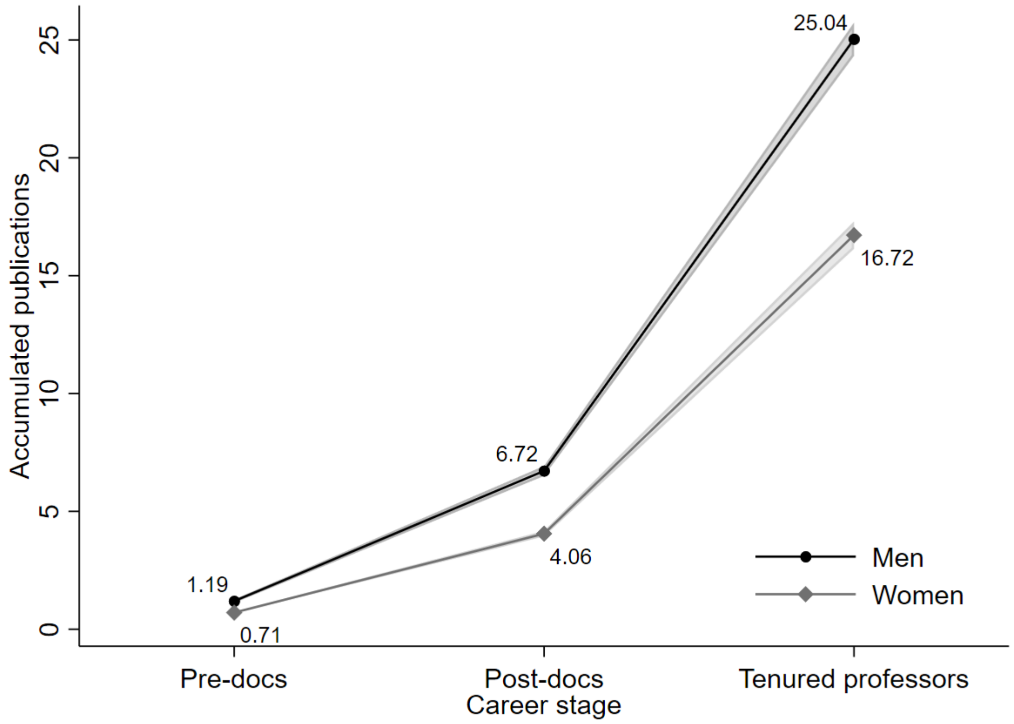
Figure 2 shows that researchers with more accumulated publications also publish more currently. For example, psychologists who have accumulated seven journal articles publish about one additional annual paper. In contrast, academics who have published a total of 22 papers already publish about two more articles each year. As researchers become more and more experienced, their annual productivity therefore seems to increase. Figure 3 displays differences for male and female psychologists by plotting how much both publish annually at each career step.

Figure 3. Annual number of SSCI/SCIE journal articles, by gender and career status.



As can be seen, post-docs publish more than pre-docs, while tenured professors publish the most. Male psychologists show a significantly higher publication rate than women at each career stage: 35% more without a PhD (0.38 vs. 0.28 publications), 49% higher as post-docs, and 31% higher as tenured professors. While Figure 3 shows annual differences, Figure 4 displays gender differences in accumulated publications.

Figure 4. Cumulated number of SSCI/SCIE journal articles, by gender and career status.



As can be seen, male pre-docs have published 67% more than their female counterparts (1.19 vs. 0.71 publications), post-docs 65% more, and tenured professors 49% more than females at the same career stage. In terms of accumulated publications, men especially seem to outpace women. But what, apart from gender, prior publications, and career stages, explains how much researchers publish? Which effects persist after considering that career stages and publication experience tend to come together? The following sections use multivariate analyses to answer these questions, thereby showing what accounts for high productivity.

1.5.2 Random-effects models

We present RE models on research productivity, first without (Table 1) and then with (Table 2) controls for prior productivity. This two-step approach allows us to show, first, who is publishing more in the first place, and second, who continues to publish more based on what would be assumed given previous productivity. We have centered all predictors around 1, which therefore counts as the per-person average of papers published in psychology (exactly: .86). This means that, for example, the constant of .86 of

Table 1 Model 1 indicates that after an average year, male researchers with full publication records publish 86% of what is typical in psychology. The next coefficient in Model 1 shows that researchers with a selected publication list publish about 10% less. The dummy variable captures missing publications. The female dummy of Model 1 suggests that female psychologists publish about 42% less annually than men, not controlling for career steps and all other predictors.

Table 1. Random-effects models with yearly SSCI/SCIE publications, without controlling for prior publications.

	(1) Baseline	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Females	-0.42***	-0.31***	-0.26***	-0.26***		
	(-10.59)	(-9.31)	(-8.04)	(-5.10)		
Pre-docs				*reference*		
Post-docs		0.52***	0.40***	0.42***	0.37***	0.46***
		(21.79)	(16.71)	(16.99)	(12.66)	(12.01)
Tenured professors		1.24***	0.64***	0.67***	0.76***	0.65***
		(18.82)	(9.49)	(9.52)	(7.79)	(6.96)
Months abroad (ln)		0.14***	0.12***	0.12***	0.08***	0.14***
		(8.75)	(7.35)	(7.37)	(5.04)	(5.51)
Doctorate abroad		-0.10	0.02	0.02	0.12+	-0.05
		(-1.60)	(0.35)	(0.38)	(1.91)	(-0.49)
High-status university		0.11**	0.09**	0.10**	0.12**	0.09
		(2.77)	(2.62)	(2.76)	(2.91)	(1.32)
Research funding (ln)			0.69***	0.69***	0.53***	0.75***
			(11.87)	(12.09)	(6.62)	(10.29)
Mothers				-0.20***	-0.14**	
				(-4.25)	(-3.11)	
Fathers				-0.01		-0.03
				(-0.11)		(-0.35)
Children status unknown (female)				-0.05	-0.04	
				(-1.34)	(-1.10)	
Children status unknown (male)				-0.13*		-0.14*
				(-2.17)		(-2.40)
Selected publication list	-0.10	-0.42***	-0.42***	-0.43***	-0.21*	-0.55***
	(-1.38)	(-6.12)	(-6.42)	(-6.57)	(-2.47)	(-6.00)
Constant	0.86***	0.99***	1.00***	1.06***	0.89***	1.19***
	(41.52)	(45.78)	(48.19)	(31.11)	(27.29)	(21.99)
r^2 within	0.00	0.12	0.16	0.16	0.11	0.19
r^2 between	0.06	0.33	0.38	0.39	0.36	0.36
r^2 overall	0.03	0.21	0.26	0.27	0.22	0.26
Researchers	2176	2176	2176	2176	1191	985
Researcher-years	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

Model 2 adds career characteristics and controls for pre-doc-, post-doc-, and professor-status. It also measures experience at high-status universities and in international contexts. Including these factors lowers the productivity gap of women from 42 to 31%. Thus, one reason why women publish less is that they do not reach advanced career stages, where – as the results show – academics publish more. Notably, post-docs put out 52% more, and tenured professors 124% more SSCI/SCIE publications each year, compared to researchers without a PhD. Those who spent more (log) months outside of Germany publish 14% more articles than what is typical. Since we use logged variables, Table C in the Appendix shows regression models with non-log coefficients. Corresponding to a linear increase of one month abroad, scientists publish 1% more articles than they are expected to on average. Those with a doctoral degree from abroad show no significant difference. Researchers who have their educational degrees from high-status universities are 11% more productive than those who have not been to a university of excellence.

Model 3 includes research funding and suggests that psychologists with more (log) grants are about 69% more productive. However, including research grants does not alter the effects of other variables substantially, except decreasing the effect of being a tenured professor. This implies that tenured professors partially publish at higher rates because they have acquired more grant money. Contrary, being a woman, having more international experience, or being at a high-status university is unaffected by controlling for research grants.

Model 4 accounts for parental status. It shows that mothers publish 20% less, while fathers are not less productive. Controlling for parental status does not affect the negative female term, which means that while mothers indeed publish significantly less, this does not explain why childless women also publish less. The non-respondent controls are non-significant for women. But males of whom we do not know whether they are parents publish 13% less. Possibly because less productive males feel a stigma that results in non-response.

Finally, Models 5 and 6 compare effects for men and women separately. Importantly, they show that women seem to profit more than men from getting a doctoral degree outside of Germany, and they show that women profit slightly more from having been at a high-status university.

Table 2 replicates Table 1 but includes past research output in all models. The interpretation of the coefficients is still in comparison to the yearly average research output in psychology, as in Table 1, but relative to an individual's prior productivity. The models thus show whether confounding variables only increase publications because they themselves are related to prior publications or because they have an independent influence.

Model 1 indicates that the number of past (log) SSCI/SCIE publications determine actual publications substantially. Academics who put out more (log) SSCI/SCIE papers in the past publish 80% more papers currently, relative to what is typical for psychology. For each article published more in the past (non-logged result), scientists publish 6% more articles currently. This means that those who were highly productive in the past are also highly productive presently. The number of prior monographs or book chapters lowers current journal publications, while other types of past publications are not significantly related. Females publish 15% less, even at the same level of past publishing involvement. Comparing this to the 42% of Model 1 in Table 1 (which is due to a lack of publishing experience), Table 2 shows that women still publish 15% less when they have as much experience in publishing as men. Thus, about two-thirds of the lower female research productivity can be traced back to a process of cumulative disadvantage: women, compared to men, publish less because they fall behind due to lower prior involvement in publishing. Only one-third of the lower female productivity seems due to women having less productivity independently of past involvement.

Table 2. Random-effects models with yearly SSCI/SCIE publications, controlling for prior publications.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles (ln)	0.80***	0.81***	0.74***	0.74***	0.63***	0.71***
	(28.20)	(27.08)	(22.16)	(22.14)	(14.89)	(14.83)
Prior monographs (ln)	-0.14*	-0.11^{+}	-0.11^{+}	-0.11^{+}	-0.04	-0.15^{+}
	(-2.15)	(-1.73)	(-1.79)	(-1.76)	(-0.59)	(-1.75)
Prior book chapters (ln)	-0.06^{+}	-0.06	-0.06^{+}	-0.05	-0.03	-0.07
	(-1.86)	(-1.62)	(-1.79)	(-1.57)	(-0.73)	(-1.41)
Prior non-SSCI/SCIE	-0.04	-0.04	-0.00	0.01	-0.03	0.04
articles (ln)	(-1.03)	(-0.90)	(-0.12)	(0.13)	(-0.73)	(0.69)
Prior edited volumes (ln)	0.03	0.00	-0.01	-0.02	0.01	-0.04
	(0.35)	(0.05)	(-0.10)	(-0.31)	(0.09)	(-0.37)
Prior gray literature (ln)	-0.03	-0.03	-0.03	-0.02	-0.01	-0.02
	(-0.81)	(-0.71)	(-0.81)	(-0.69)	(-0.39)	(-0.50)
Females	-0.15***	-0.15***	-0.14***	-0.19***		
	(-5.15)	(-5.09)	(-4.85)	(-3.69)		
Pre-docs				*reference*		
Post-docs		-0.18***	-0.17***	-0.14***	-0.07*	-0.06
		(-5.12)	(-5.18)	(-4.34)	(-2.19)	(-1.53)
Tenured professors		-0.17*	-0.30***	-0.27***	-0.08	-0.24**
		(-2.35)	(-3.90)	(-3.44)	(-0.88)	(-2.69)
Months abroad (ln)		0.06***	0.06***	0.06***	0.04**	0.06**
		(4.25)	(4.29)	(4.32)	(2.67)	(3.16)
Doctorate abroad		-0.11^{+}	-0.06	-0.06	0.03	-0.11
		(-1.93)	(-0.96)	(-1.06)	(0.60)	(-1.26)
High-status university		0.11**	0.11**	0.12**	0.11**	0.09^{+}
		(2.93)	(2.92)	(3.09)	(2.61)	(1.87)
Research funding (ln)			0.29***	0.30***	0.19*	0.36***
			(4.46)	(4.68)	(2.24)	(4.41)
Mothers				-0.27***	-0.23***	
				(-5.68)	(-4.79)	
Fathers				-0.20*		-0.21**
				(-2.38)		(-2.76)
Children status				-0.07^{+}	-0.06^{+}	
unknown (female)				(-1.85)	(-1.79)	
Children status				-0.22***		-0.22***
unknown (male)				(-3.38)		(-4.00)
Selected publication list	-0.22***	-0.19***	-0.22***	-0.21***	-0.05	-0.28***
	(-3.83)	(-3.34)	(-3.95)	(-3.91)	(-0.63)	(-4.27)
Constant	1.00***	1.00***	1.00***	1.13***	0.99***	1.22***
	(57.64)	(59.14)	(59.90)	(31.39)	(30.00)	(24.26)
r^2 within	0.17	0.17	0.18	0.18	0.13	0.21
r^2 between	0.64	0.65	0.65	0.65	0.61	0.65
r^2 overall	0.37	0.37	0.38	0.38	0.33	0.39
Researchers	2176	2176	2176	2176	1191	985
Researcher-years	23339	23339	23339	23339	10528	12811

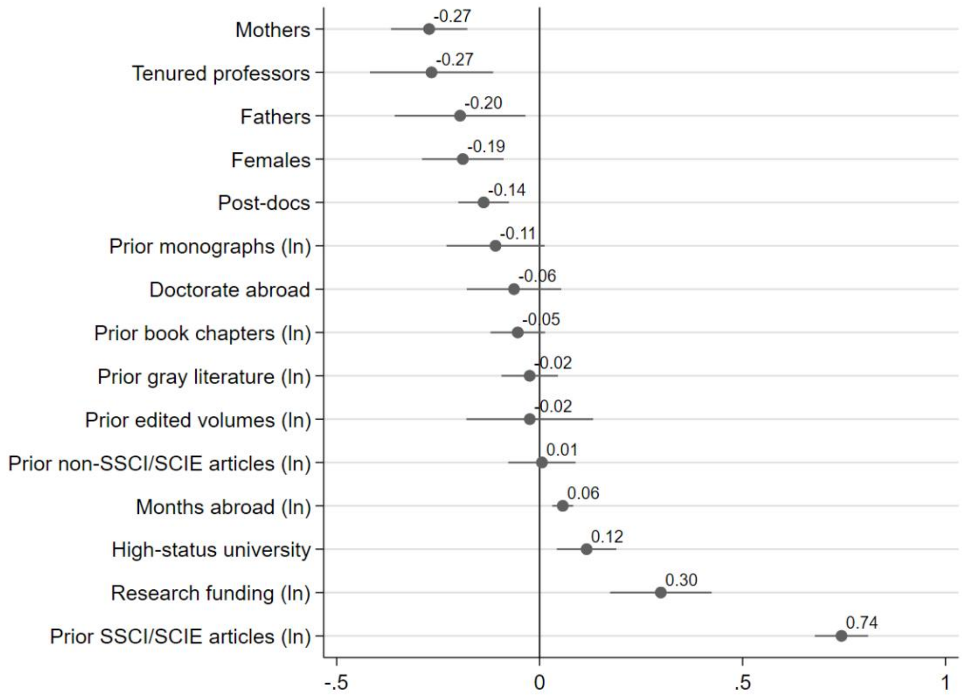
t statistics in parentheses. Variables mean-centered, sd=1

*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Model 2 suggests that post-docs and tenured professors respectively publish 18 and 17% below of what is to be expected from an average linear output trajectory in psychology. Comparing this to the stronger effects of career stages in Table 1 indicates that psychologists publish more at later career stages because they have more experience with publications during these later career stages, rather than publishing more because they have reached higher career stages per se. The positive effect of career stages on publications therefore seems to be largely an epiphenomenon of the publishing skills that come with later career advancement. The model also shows that irrespective of their publication experience, those who have spent more months abroad publish more, and those with a foreign PhD publish less than a typical publication trajectory suggests. Also, those who have all of their degrees from a high-status university publish 11% more than would be expected based on their career stages and prior publication trajectories.

Model 3 adds research funding to the model. Researchers with more (log) funding publish 29% more than otherwise similar researchers. Excluding their prior publication record, funded scientists are almost 70% more productive (Model 3 in Table 1); this effect is reduced to 29% when past publication involvement is considered, so there remains still a net positive effect on current publications. Generally, the inclusion of grants in the model does not alter the effects of other variables, except for the negative effect of being a tenured professor, which decreases from minus 17 to minus 30%. This again indicates that if tenured professors are more productive, this is largely due to their higher third party funding rather than an effect of tenure itself. Model 4 adds parent status. As this is the full covariate model, Figure 5 visualizes all its coefficients.

Figure 5. Visualized effects of Model 4 in Table 2.



Controlling all other factors, women publish 19% less than men, however, mothers publish 27% and fathers 20% below an average publication trajectory. Research funding and having been at a high-status university do not genuinely predict current productivity as prior productivity does, which is thus by far the strongest and most significant indicator. Model 4 in Table 2 also shows that all variables together explain 65% of productivity differences *between* and 18% of productivity-variation *within* the careers of researchers.

Models 5 and 6 display the full model separately for women and men. But it does not indicate that men and women are very differently influenced by the same variables, except that men publish fewer SSCI/SCIE articles after having published more (log) monographs or after having tenure.

1.5.3 Fixed-effects models

Table 3 displays fixed-effects models on yearly SSCI/SCIE publications, controlling for accumulated (log) publications. This means the coefficients are related to the publication level of a researcher's own trajectory, showing whether an academic publishes more or less than his or her own average level. This makes the models the most causal ones if one tries to understand what influences productivity.

Model 1 indicates that prior (log) SSCI/SCIE articles predict present SSCI/SCIE output very well. That the effect is lower than in the RE models of Table 2 (.55 vs. .8) suggests that the effect partially stems from a between- or population-effect. In other words, with every log increase in the number of past SSCI/SCIE publications, the current publication level increases by 80%; this is partially because they are 55% more productive than when they had less experience. Note that FE models cannot include a female effect or any other time-invariant variables.

The second column in Model 2 reveals that academics do not publish more than their own average publication trajectory when they are a post-doc or a tenured professor. This again implies that reaching higher career stages per se does not influence productivity. Instead, once one has reached these career stages, publications simply follow the trajectory one has established for oneself until then. However, having spent more (log) months abroad increases research output by 4% above what has so far been typical for a person. Interestingly, spending time at high-status universities does not increase an academic's average output level. The effect is positive in the random-effects approach, which suggests that high-status universities probably have more productive researchers overall, but going there does not increase an individual's research productivity.

The third model in Table 3 implies that psychologists publish 44% above their own expected publication level with each log increase in DFG-funded projects. The random-effects showed a weaker outcome, indicating that grants are not simply awarded to more productive academics but instead will make them more productive than they would otherwise have been. This is exactly the opposite of the effect of high-status universities, which comprise more research-active psychologists, but do not affect an individual's productivity.

Table 3. Fixed-effects models with yearly SSCI/SCIE publications, controlling for prior publications.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles (ln)	0.55***	0.53***	0.38***	0.39***	0.35***	0.42***
	(17.32)	(14.95)	(9.11)	(9.33)	(6.49)	(6.82)
Prior monographs (ln)	-0.07	-0.07	-0.07	-0.07	0.07	-0.15
	(-0.90)	(-0.92)	(-0.90)	(-0.92)	(0.89)	(-1.45)
Prior book chapters (ln)	0.06	0.06	0.05	0.05	0.13**	0.01
	(1.49)	(1.43)	(1.15)	(1.39)	(2.69)	(0.23)
Prior non-SSCI/SCIE articles (ln)	-0.02	-0.02	0.03	0.03	-0.03	0.08
	(-0.42)	(-0.34)	(0.49)	(0.62)	(-0.51)	(1.10)
Prior edited volumes (ln)	0.05	0.06	0.01	-0.01	0.06	-0.03
	(0.49)	(0.56)	(0.09)	(-0.07)	(0.50)	(-0.26)
Prior gray literature (ln)	-0.02	-0.02	-0.03	-0.03	-0.09+	0.00
	(-0.49)	(-0.53)	(-0.59)	(-0.68)	(-1.69)	(0.01)
Pre-docs				*reference*		
Post-docs		0.00	0.06+	0.08**	0.06+	0.10*
		(0.10)	(1.86)	(2.62)	(1.74)	(2.08)
Tenured professors		0.00	-0.07	-0.05	-0.05	-0.04
		(0.01)	(-1.17)	(-0.82)	(-0.60)	(-0.50)
Months abroad (ln)		0.04*	0.05*	0.05*	0.04	0.06*
		(2.10)	(2.40)	(2.45)	(1.33)	(1.99)
High-status university		-0.02	0.01	0.01	0.09	-0.02
		(-0.16)	(0.11)	(0.09)	(0.75)	(-0.14)
Research funding (ln)			0.44***	0.43***	0.27***	0.49***
			(6.80)	(6.79)	(3.55)	(5.78)
Mothers				-0.33***	-0.25***	
				(-6.01)	(-4.47)	
Fathers				-0.05		-0.10
				(-0.58)		(-1.15)
Constant	1.00***	1.00***	1.00***	1.04***	0.93***	1.11***
	(1.08e+09)	(7.55e+08)	(7.52e+08)	(74.68)	(42.68)	(53.49)
r^2 within	0.17	0.17	0.19	0.19	0.14	0.21
r^2 between	0.62	0.62	0.59	0.59	0.52	0.58
r^2 overall	0.35	0.35	0.35	0.36	0.29	0.36
Researchers	2176	2176	2176	2176	1191	985
Researcher-years	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

The fourth column again suggests that being a parent significantly decreases women's publications, but not of men. Compared to the random-effects models, both mothers and fathers are a less productive group of researchers overall (holding other influences constant). According to the FE model, however, the same woman becomes less productive after having a child, while the same man does not. This is evidence of a causal effect: becoming a parent has a strong influence on women, but not on men (FE models), while both male and female parents are similarly unproductive as a group (RE models).

The last two models estimate the fixed-effects regressions separately for males and females. The results again suggest that when male psychologists have children, they publish only insignificantly less than before. When women have children, however, they do publish significantly less than before. Note also that men seem to publish twice after receiving research funding relative to women.

1.5.4 Sensitivity tests

1.5.4.1 Alternative definition of high-status university measure

We measured the effect of exposure to high-status universities by the share of degrees a psychologist acquired from universities that held the title "university of excellence" at least once. We acknowledge that this measure is not perfect in measuring the "real" impact of status. For instance, the influence might be different if an academic did a doctorate or an assistant professorship at such a university. We disentangled this and indeed found that having a doctorate from a university of excellence makes the same researcher about 15% more productive (males 23%, females 4%), while having an assistant professorship or tenure at a university of excellence has no effect. It seems from this analysis that the doctoral education is more beneficial than other career steps at a higher-status university, probably also because these universities often have large and international doctoral programs (so-called "Graduiertenkollegs").

1.5.4.2 Oaxaca-Blinder decomposition

Our Models 1-4 in Table 1-3 assume that variables have the same influence on men and women (with the exception of children). This is why we used Models 5 and 6 in each Table to understand how variables influence men and women differently, which, however, makes it impossible to compare men and women in one model. A three-fold Oaxaca-Blinder decomposition (Blinder 1973; Oaxaca 1973) shows a) how much more men publish (group differences), b) whether this is due to different attributes, or c) due to the same attributes influencing men differently (interactions). A decomposition with our most comprehensive model (Model 4 in Table 2) shows that while men publish 1.11 articles annually, women publish 0.67. Of the 0.44 articles that men publish more annually, 0.27 are accounted for because men have attributes that favor productivity. Almost the only attribute that counts in explaining current productivity is prior experience in publishing SSCI/SCIE articles. If variables had the same influence on women compared to men, the gap would shrink by another meager 0.04 articles, leaving an unexplained difference of 0.13. This means that almost two-thirds of why women publish less than men can be attributed to women having less experience in publishing SSCI/SCIE articles early on, which decreases their later productivity. In comparison, all other effects are minor.

1.6 Discussion

Prior research shows that human capital, measured through past research output, seems to be a reliable indicator for later output (more ambiguously, see Joy 2006:361; Lee 2019:1500). This study confirms that past output is a good predictor of later output in German psychology because psychologists who published more (log) SSCI/SCIE papers in the past also publish about 80% more presently (RE-Model 1 in Table 2). We can therefore explain 55% of a researcher's current SSCI/SCIE articles from his or her past individual productivity, as measured by (log) SSCI/SCIE articles (FE-Model 1 in Table 3). While it seems at first sight that researchers become more productive with career stages, we could show that this effect is not independently associated with career stages but rather with past publication experience. Horta and Santos (2016:46) characterize this finding as "real scientific dynamics" because early publishing is the main predictor of future productivity. Thus, informal "on-the-job training" through publications increases future publications, rather than formal educational stages such as a PhD or an assistant professorship.

In Germany, it has been much discussed whether singling out "universities of excellence" from others makes sense. Regarding a scientist's educational environment, we find that academics at high-status universities indeed put out 9 to 12% more SSCI/SCIE journal articles (RE-models). However, the fixed effects models show that this is not because these universities make the same researcher more productive, but probably because prolific academics are more likely to join these places. This phenomenon is explained by Carayol and Matt (2006:60) in that some universities attract researchers with more intrinsic ability. In addition to an "intrinsic ability" effect, these universities lack a "departmental effect" that additionally boosts a researcher's productivity through a university's supportive environment. This also supports the findings from previous studies of US psychology that elite universities hire scholars who built eminence already, rather than providing a climate to do so (Joy 2006). Another possibility also alluded to by previous research is that "once the basic elements of a true research university […] are in place, additional trappings make relatively little difference" (Joy 2006:361). From that perspective, other German universities might be relatively well-endowed, so that the difference to high-status universities is not that large.

Our findings with regard to input effects through research grants suggest that research funding increases publications by 43% above what is expected for a given scholar (Model 4 of Table 3). This is a relatively high effect size compared to other studies (Albers 2015:25). While it is challenging to disentangle the direction of causality, our results indicate that research-prolific academics do not necessarily get more grants but that academics indeed publish at higher rates after getting grant money, independent of past research output.

Regarding the effects of gender and children, our results emphasize a gendered case of cumulative advantage. We find differences in research output between men and women (at the same level of experience), which then accumulate to larger differences overall (when not controlling experience). Notably, our results show that women have about 42% fewer SSCI/SCIE publications overall (Table 1, Model 1), but only 14% when controlling for prior publications, experience, and research funding (Table 2, Model 3). Therefore, two-third of the gender gap in research output can be traced back to mechanisms of cumulative disadvantage, while one-third is left unexplained. Thus, we do find initial differences between men and women, but these are amplified and become very large. We also find that women particularly publish about 25% fewer SSCI/SCIE articles once they have a child (FE-model), while for fathers, we find about 20% fewer current publications only in the RE-models. Note that here we imputed missing information on scientists' children due to non-response using multiple imputation modeling (see Appendix B). This reduces the effect of motherhood by up to 20% in both the RE- and FE-models, i.e., the effect is still robust but smaller in magnitude, while the effect size for fathers did not change. While we contribute to the existing literature with a negative effect of having children, especially for mothers, other studies find that especially younger children enhance research productivity; however, many studies have inconsistent findings (for an overview, see Stack 2004:913). In our study, the net mother effect on fewer current publications is not related to prior research productivity, high-status universities, or research grants, so prior publication experience still most genuinely predicts recent publication productivity.

Other studies find that female psychologists catch up with men at later career stages but caution that this may be due to a cohort effect, which cross-sectional studies cannot control for (Duffy et al. 2011:220). Indeed, our results contradict that women catch up at later career stages. Yet others argue that the gender gap in research output may result from a leaky pipeline, women dropping out early on (Helmreich et al. 1980:903; Xie and Shauman 1998:864). Others similarly suggest that men publish more because of their higher career age and that women catch up at later career stages (Joy 2006:362). Contrary to what others suggest, we do not find that access to career stages is a strongly moderating variable. It is true that controlling for seniority indeed decreases the gender gap from 42 to 31% (Table 1, Models 1-2). However, controlling for past publication experience decreases the productivity gap to 15%, and adding career stages has no additional effect on reducing the female productivity gap after publication experience is accounted for (Models 1 and 2 of Table 2). This means that at first sight, women may seem less productive because they have not reached higher career stages. But what really stands behind higher productivity at more advanced levels is the experience in publishing that researchers accrue while getting to senior career levels. In other words, our findings suggest that women do not publish less because they do not reach senior career levels, have less access to research funding, or have children, but because they publish less early on.

If our documented effects are taken as a guide for individual researchers, then they imply that early productivity can be seen as a gauge for overall potential. If psychologists find that they publish a lot early on, they can – on average – expect this to continue into the future, as the relationship between early and late productivity is very strong. If, however, one publishes little at the beginning of a career, then our data conversely imply that this low productivity is likely to stay. Researchers therefore seem welladvised to take their early productivity as a gauge for their overall capacity when thinking about an academic career.

At the same time, efforts such as visiting high-status universities or getting a doctorate abroad seem fairly useless in trying to increase one's productivity, while spending time abroad or acquiring third party funding may have a bit more of an influence. If researchers have a different impression, this may be because they conflate between-individual and within-individual effects. For example, the German universities of excellence attract more productive psychologists, but – according to our data – do not make researchers more productive who go there.

However, these results only apply to psychology and are correlational in nature. Future research has to show whether they can be found in other disciplines as well and whether a causal effect exists when using intervention studies.

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Chapter 8: Who drops out of academia? Gender differences in the field of German sociology since 2013

1.1 Abstract

While the metaphor of a "leaky pipeline" is often used to describe the continual loss of women at various career stages in academia, surprisingly, less empirical evidence on academic drop outs exists. This paper addresses this deficiency by employing an innovative panel design that tracks almost all sociologists in Germany on their way along the career pipeline. By applying Cox regression models to retrospective career histories, the study examines gender differences in sociologists who have dropped out of academia since 2013. The descriptive results show that women tend to leave academia during the pre-doc stage, whereas men tend to leave academia at the post-doc stage. The key findings are that women with the same amount of scientific capital as men, but not mothers, have a 43% higher risk of dropping out of academia. Plotting the results separately for gender shows that publishing (particularly edited volumes) is associated with a lower dropout risk of leaving academia among men, whereas holding a PhD, international experience, and scholarly awards diminish a woman's risk of leaving academia.

1.2 Introduction

There is broad consensus behind the idea that proportionally more women drop out of academic careers before getting tenured. This is often metaphorically described as a leaky career pipeline for women (Ceci, Williams and Barnett 2009; Goulden, Frasch and Mason 2009; Long 2001). Although scholars commonly agree on this state of affairs, they offer different reasons for the gradual loss of women in academia. These include difficulties of reconciling family and academic career, productivity gaps, or an adverse academic environment on the whole. Studies reflect this by showing that female academics in Germany have fewer children than men (for sociology, see Lutter and Schröder 2020:447; Rusconi and Solga 2011:18), that women express lower career ambitions (Berweger and Keller 2005; Evers and Sieverding 2015), that they are excluded from "old boy" networks that offer labor market benefits

(McDonald 2011), and that their work is less rewarded than men's (Cohen and Huffman 2003; Lincoln et al. 2012; Rossiter 1993). However, more recent research has shown fewer disadvantages for women in academia (Mason, Goulden and Wolfinger 2013:43; Schubert and Engelage 2011; Silander, Haake and Lindberg 2013:185). Do older studies therefore merely offer a snapshot of the past?

I address these inconsistent results by focusing on female sociologists in German academia to examine whether and why they face detrimental barriers along their career paths. Research on this so-called leaky pipeline is scant and subject to limitations. For example, it mainly focuses on scientists *within* academia, thus raising the question of how we might account for former scientists who are now working *outside* academia? To address this methodological challenge, few studies have used qualitative case studies (for interviews within STEMM fields, see Christian et al. 2021) or treat career intentions as a proxy for potential leavers (Dorenkamp and Weiß 2018; Evers and Sieverding 2015). One extensive study tracked the scientific careers of Japanese PhDs over 20 years until they exited academe, but left out the social sciences (Geuna and Shibayama 2015). Examining academic careers in Germany, Jaksztat, Neugebauer and Brandt (2021) analyzed withdrawals from doctoral education but only up to completion of the doctorate (PhD). To my knowledge, no comparable longitudinal research on academic leavers across successive career stages (pre-doc and post-doc) exists in Germany.

Beyond addressing this research gap, why have I chosen to focus on academics in Germany? One important reason is that the German academic labor market is especially challenging and precarious. Academics are faced with a scarcity of permanent positions, a situation that has resulted in highly competitive career tracks. This has become even more pronounced as career tracks are further restricted by German fixed-term law (*Wissenschaftszeitvertragsgesetz*). This law states that academics may hold temporary contracts for a maximum of 12 years, after which point they have to secure one of the rare permanent positions (usually professoriates) or leave academia altogether. Time restrictions within the pre- and post-doc stage in Germany are thus an additional hurdle to career advancement that forces some scientists to leave.

To answer the question of who is leaving academia and to what factors this can be attributed, I use an innovative longitudinal study design. What makes this research stand apart from prior studies is that I consider almost all sociologists at German universities along their entire career paths. For this purpose, I have assembled a three-wave longitudinal dataset (data collections in 2013, 2016, and 2019) to observe and explore (retrospective) graduation cohorts while focusing on those who *actually* left their career path since 2013 for reasons other than retirement.

I expect the results in sociology to be more conservative in nature, which offers an integrative starting point for further research within other scientific fields. Sociology is an academic field with fairly equal numbers of women and men and thus "provide[s] subsample sizes large enough to obtain a high level of statistical power for examining gender differences" (Leahey 2006:760). This means that the results of this study can likely be transferred to sciences with disproportionate gender ratios and that potentially have a more adverse environment toward women and mothers (Ceci et al. 2014:121; Mason et al. 2013:48–49).

The results of my own study show that women with the same amount of scientific capital as men, but not mothers, have a 43% higher risk of dropping out of academia. The descriptive statistics further show that women are more likely to leave academia at the pre-doctoral stage, whereas men tend to leave at the post-doctoral stage. Furthermore, plotting the results separately for women and men shows that for women, international experience, holding a PhD (especially at a German university of excellence), and scholarly awards prevent them from leaving academia to a substantial degree. Among men, not only having a PhD from abroad but especially publishing (as editors) is associated with a lower risk of leaving academia.

1.3 Theoretical and empirical considerations: Why do women leave academia?

1.3.1 Gendered preferences towards family considerations

Individual choices may shape a career trajectory in which favoring family considerations becomes one of the main reasons why women leave academia (for an overview, see Ceci et al. 2014:124; Leemann, Keck and Boes 2010a). In this regard, marriage and childbirth are among the most prominent reasons for the leaking pipeline of women (Goulden, Mason and Frasch 2011). A similar double burden also affects men, but not equally for traditional reasons; that is to say, women end up assuming the main responsibilities for childcare and reconciling work and family life, which forces them to work outside their standard working hours (Monroe et al. 2008:231). Women thus face higher levels of conflicting demands when attempting to balance work and family concerns (Fox, Fonseca and Bao 2011). Consequently, mothers perceive their CVs—and thus their academic capital—to be less competitive than non-mothers (Gallardo 2021). It is worth noting that some studies did not find disparities between the working hours of female and male social scientists once they have children (Ceci et al. 2014:109). Nevertheless, women, especially mothers, are significantly more likely to leave academia (Goulden et al. 2009; Jaksztat et al. 2021; Mason, Wolfinger and Goulden 2013). Other researchers have found that this may be true only up to a certain point in academic careers because children do not appear to affect promotion in higher academic positions (Perna 2005; Schubert and Engelage 2011).

1.3.2 Time scarcity within career stages

As academia is a highly competitive labor market, women may leave academia because of their lower career aspirations (Berweger and Keller 2005), which are governed by a "culture of scarcity" (Krais 2002:411). Time limits mandated by German fixed-term law requires scientists to earn their doctorate (PhD) and post-doctoral qualifications (called *habilitation* in Germany) within 12 years in order to eventually become tenured. As can be seen in the study by Hillmert (2003), who studied the social structure of sociologists in Germany, this practice might prove particularly challenging for women. The author shows that, although female and male sociologists are the same age when they graduate, women are two to four years older than men when they ultimately obtain their PhD, habilitation, or first tenured appointment, which suggests that they take longer to advance in their career. The author also shows that women get tenured more quickly in more recent cohorts, however (see also Lutter and Schröder 2016:1005). Still, an overall picture emerges in which female social sociologists are overrepresented at the beginning of their studies but underrepresented among professors at the end of their careers (e.g., Lutter and Schröder 2016:1002; for German federal statistics in 2019, see Statistisches Bundesamt 2021:459). Once they have progressed to a certain stage, however, it appears that they do not experience disadvantages in the hiring process as professors (Auspurg, Hinz and Schneck 2017; Jungbauer-Gans and Gross 2013; Lutter and Schröder 2016) or when they earning a habilitation (Schubert and Engelage 2011). Although previous studies do offer some clear findings like these for academics within their respective career pipelines, complementary research on intra-individual career trajectories of academic leavers is lacking.

1.3.3 Social closure in prestigious universities and academic networks

In addition to family considerations and time scarcity within career stages, another reason why women might leave academia stems from social-closure mechanisms. Social closure as a form of discrimination refers to scarce resources to which only certain groups have access. This could be the case for women in academia with respect to prestigious universities or (international) social networks, the exclusion from which would reduce their career prospects and increase their likelihood of leaving academia (Leemann, Dubach and Boes 2010b; Sheltzer and Smith 2014). Social-closure processes can be traced through Bourdieu's theory on social reproduction of elites within academe (e.g., Bourdieu and Passeron 1990 [1977]). In the life sciences, for example, the social exclusion of women from elite male faculties is one reason for their attrition from the career pipeline (Sheltzer and Smith 2014). Bielby et al. (2014:752) reported similar findings for elite colleges and universities where fewer women were represented, which was, however, not a result of their lower application rates. Moreover, Miller, Glick and Cardinal (2005) have shown that the social exclusion of women from prestigious universities has major long-term effects, thus resulting in what Merton calls "accumulated disadvantages" (1988:615). This is a crucial aspect, as universities seek to attract graduates from cutting-edge universities for their own doctoral and post-doctoral programs, at least within sociology in the United States (Burris 2004). When women are denied the advantage of prestigious universities, this can further lead to their opting out of academia over the long term. However, as these studies deal with elite faculties within the US, it is unclear whether gendered social-closure mechanisms do occur and reasonably explain Germany's leaking career pipeline, where the *Exzellenzinitiative* (Excellence Initiative) for universities was only launched as recently as 2005.

Social closure is not only evident within elite universities but also in academic networks (Leemann et al. 2010b:300–01; McDonald 2011). Studies on Swiss scientists have shown that females have equal social network sizes to men, but their networks are more homophilic (Leemann et al. 2010b). Others have found that women have social networks that are less dense but not smaller overall (Barthauer, Spurk and Kauffeld 2016). In keeping with these findings, women are more likely to be segregated from internal prestige networks (Caplow and McGee 1958) that can not only be a powerful source of information, reward, and support, but the lack of which can lead women to abandon their PhDs and subsequently leave academia completely (Spies and Schute 1999).

1.3.4 Gender differences in publishing, scholarly awards, and research grants

A fourth strand of research concerns gender differences in career performance. It is well documented that women publish less than men (e.g., Cole and Zuckerman 1984; Long 1992; Schubert and Engelage 2011; Schucan Bird 2011). Also, women's performance might be devalued (Long and Fox 1995; Magnusson 2008; Ochsenfeld 2014) in such a way that "publication measures favor men" (Ceci et al. 2014:102). Does this then constitute another hurdle for women in academia? Given that publications are crucial to success in academia, researchers have suggested that this is indeed a feasible explanation for the disproportionate rate of female attrition (Long, Allison and McGinnis 1993; Warren 2019).

Likewise, the devaluing of women's contributions to their field also occurs in grant funding (for an overview, see Ceci et al. 2014:112–15) and scholarly awards (Lincoln et al. 2012). When women have less access to accolades and prizes or their efforts are less valued, this is called a "Matilda effect" (Lincoln et al. 2012; Rossiter 1993), which results in cumulative disadvantages. This is similar to the Matthew effect (Merton 1968; Merton 1988) but especially applies to women.

1.4 Data and Methods

1.4.1 Study design and methods

A research team captured data on almost all sociologists in German universities at three points in time (2013, 2016, and 2019). In 2013, student assistants first collected sociologists' CV information and publication lists via German university websites that provided details on their sociological departments. They considered sociologists with at least one publication and who obtained their PhD after 1980 to set a common entry point. In 2016, they added newly graduated academics and updated publication and CV information on all academics in the dataset (under the same coding instructions). They additionally marked all academics from the original 2013 dataset who have since left academia. We assume academics have opted out when they are no longer visible at any university or research institute online in Germany or abroad. We repeated this procedure in the most recent wave in 2019.

These procedures make it possible to use retrospective data from sociologists' CVs and publication records to track the entire career pipeline of academics from 1980 to 2019. Conducting a supplemental e-mail survey after each year of data collection (i.e., in 2014 and 2019) that asked academics about their parental status has allowed me to add information about children for 69% of all sociologists in the 'risk set,' i.e., both academic remainers and future leavers.

I have used event history analysis to run a set of multivariate Cox regression models (Allison 2014; Cox 1972) to deal with so-called right-censored data; that is to say, results are not biased if the event (academic exit) occurs after the end of the observation period in 2019. In addition to the data being finite by design, the observation period also ends when sociologists leave academia (as the outcome), retire, or pass away. However, I also right-censor additional cases of sociologists who I expect will not leave academia after a certain point. These are sociologists at the time they became tenured or adjunct professors.[49] By considering academic leavers and right-censored cases, I analyze the career paths of 263 academic leavers out of a total of 2,193 sociologists and 47,547 publication years.

1.4.1.1 Independent variables

Besides using a dummy variable for gender (*female*), I further add a time-varying categorical variable for parents (0 = childless (*ref.*); 1 = with children) and those who did not participate in the survey to control for a potential non-response bias (2 = w/o child info).

I further count the *years since earning the PhD* (0 = no PhD yet). It is likely that some graduate students do not genuinely aspire to a scientific career in the long run, so they leave before obtaining their doctorate, respectively.

To measure whether the benefits of prestigious universities prevent academics from leaving academia, I add a dummy variable for having a *PhD from a university of excellence* in Germany.[50] Similarly, I add variables to measure (international) academic networks from which women may be excluded. I include a dummy variable for having a *PhD from abroad* and count the number of *international publications* and *months spent abroad*. For networks within Germany, I measure the number of moves to another university or research institute (*mobility*), *interim professorships*, and *co-authors*.

[49] As a robustness check, I also identify "inactive" sociologists as those who have not published in the last four years (last publication before 2016) and label them as "academic leavers" (see Model 5 in Table A3). A period of inactivity in ongoing publication records could anticipate an intent to leave academia; however, the results hardly change, although the impact of gender does decrease slightly. I further assume there are a few permanent positions other than professorships, such as *Lehrkräfte für besondere Aufgaben* or *Akademische Oberräte*, that allow academics to remain in academia. Those occupying these positions should therefore not be further considered as part of the risk set of potential dropouts. For this reason, I right-censor observations after 15 years if academics have not been appointed professor by then, assuming that they have another permanent position (see Model 6 in Table A3). I use 15 years instead of 12 years owing to the German law on fixed-term contracts in academia, which permits extending the period because of parental leave. Nevertheless, the results hardly change.

[50] Up to 2017, fourteen German universities honored for their institutional strategies ("*Zukunftskonzepte*") had been labeled as universities of excellence: Rheinisch-Westfälische Technische Hochschule Aachen, Freie Universität Berlin, Humboldt-Universität zu Berlin, Universität Bremen, Technische Universität Dresden, Albert-Ludwigs-Universität Freiburg, Georg-August-Universität Göttingen, Ruprecht-Karls-Universität Heidelberg, Karlsruher Institut für Technologie (KIT), Universität zu Köln, Universität Konstanz, Technische Universität München, Ludwig-Maximilians-Universität München, and Eberhard Karls Universität Tübingen. See also https://www.dfg.de/en/research_funding/excellence_strategy/index.html [retrieved December 23, 2021).

I then measure an academic's performance by first considering the number of *publications* at each point in time. I distinguish between six types of publications: (1) the number of articles in the Web of Science ranking by the Social Science Citation Index (SSCI) and Science Citation Index Expanded (SCIE); (2) articles in non-SSCI/SCIE journals; (3) monographs; (4) edited volumes; (5) book chapters; (6) and gray literature, such as working papers, reports, or newspaper articles.[51] In this way, I examine whether publication performance has a differential impact on men and women and their risk of leaving academia. For the same reason, I also add the number of *academic awards* from academics' CVs and the number of *DFG funding* grants they acquired. To count the number of research grants from the DFG, I use the website of the German Research Foundation (*Deutsche Forschungsgesellschaft; DFG*),[52] which is the largest and most prominent research foundation in Germany.

Finally, I add a control variable for *only selected publications*. Senior academics occasionally publish only a selection of their top publications, which I account for by using a dummy variable to avoid biasing the results. Owing to the retrospective study design, I cannot differentiate between entry cohorts in each year of data collection. I therefore add academics' *entry cohorts* in ten-year intervals as control variables (i.e., 1980–1989 *(ref. category)*, 1990–1999, 2000–2009, after 2009). In addition to cohort effects, period effects are also allowed to influence the results (since I only record withdrawals since 2013, for example). In additional analyses, I control for these potential confounders (see Appendix Table A3, Models 1–4). The core results remain robust.

I use the natural logarithm on all continuous variables to normalize their distribution.[53] To account for marginal returns of, for example, publications, I assume that the accumulation of (dis)advantages in scientific capital[54] does not increase linearly (see Appendix A2 for non-logged results).

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[51] To account for co-author-adjusted publications, I weight each publication by the number of authors *n* by using the formula: 2/(*n*+1).
[52] https://gepris.dfg.de/gepris/ [retrieved December 29, 2021].
[53] Since the natural logarithm of 0 is not defined, I added + 1 before logarithmizing the values of the variables.
[54] In line with Bourdieu (1975:25), I use "scientific capital" as an umbrella term for all independent variables except children.

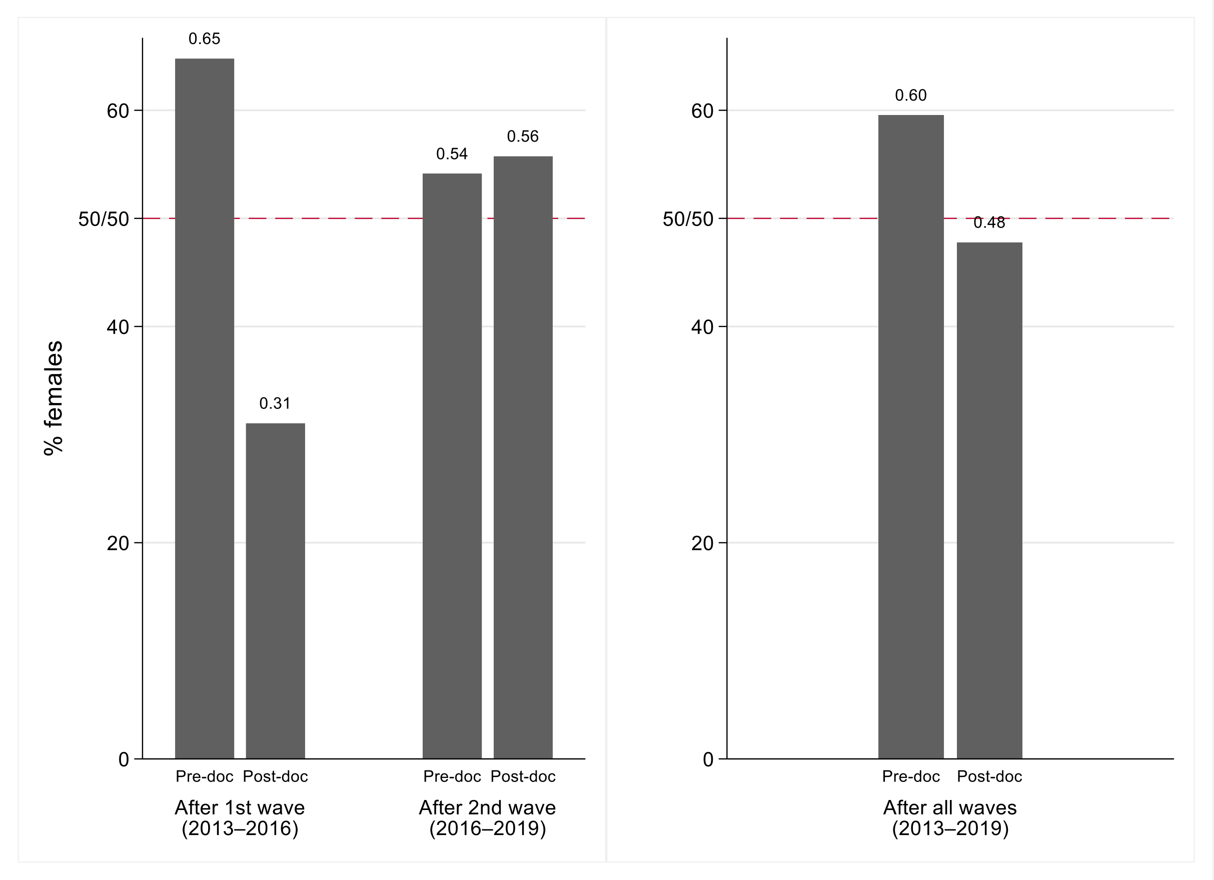
1.5 Results

1.5.1 Descriptive results

Figure 1 shows the share of sociologists who left academia since 2013 by gender and career stage. Since 2013, 263 sociologists left academia (56% females) in total. Within both periods (i.e., 2013–2016 and 2016–2019), one can identify a clear gender-specific trend at the pre-doc stage in which more female sociologists left academia than males (60% after both waves). Moreover, men are more likely to leave academia at the post-doc stage (69% after the first wave; 52% after both waves).

As a preliminary finding, the pre-doc stage seems to play an essential role for women. Here one can assume that academics who have obtained their PhD (as the first qualification for later professorships) also intend to have a long-term career in academia, whereas those who leave academia earlier—something that applies more often to women—may not genuinely pursue an academic career.

Figure 1. Academic leavers by gender and career stage.



After first wave: $N_{pre\text{-}doc}$=88 (N_{female}=57, N_{male}=31). $N_{post\text{-}doc}$=29 (N_{female}=9, N_{male}=20).
After second wave: $N_{pre\text{-}doc}$=85 (N_{female}=46, N_{male}=39), $N_{post\text{-}doc}$=61 (N_{female}=34, N_{male}=27).

While I have focused thus far exclusively on sociologists who have left academia, I now compare them with sociologists who are still in academia to see if their characteristics differ.

1.5.2 Academic leavers versus remainers

Table 1 shows descriptive statistics for both academic leavers and comparable remainers in sociology since 2013. Whereas leavers withdraw from a scientific career on average after six years, which is precisely the time required by German law on fixed terms for a doctoral degree, I fix the remainers' scientific capital to a minimum of six years to compare both groups at an equal point in their careers. In turn, this means I do not use data from sociologists who have been in academia for less than six years at the time of data collection, which reduces the sample size in Table 1 (and Table 2, respectively). For a full summary of statistics on the remainers, see Appendix Table A4.2.

As the data presented in Table 1 indicate, leavers publish significantly less than those who stay in academia. For example, they publish only about half of the number of SSCI/SCIE articles (.75 vs. .42) and non-SSCI/SCIE articles (1.41 vs. .71). In what might be a striking finding, after six years in academia, 40% of both remainers and leavers are parents.

Also after six years in academia, remainers have more international experience: My data shows that they have spent more than twice as many months abroad. Almost 50% of the remainers completed their PhD after about six years, whereas only 26% of leavers did a PhD at all. Of those who completed their PhD within the first six years, 6% of the remainers did a PhD abroad (compared to only 1% of the leavers) and 14% of the remainers did a PhD at a German university of excellence (compared to only 6% of the leavers).

Leavers are five times less likely to receive scholarly awards than remainers (.19 vs. .04) and did not receive more than two awards in total. Likewise, leavers were six times less likely to acquire DFG funding and did not have more than one successful research proposal in total.

Table 1. Summary statistics of leavers (L) at time of exit vs. remainers (R) at equivalent years.

	Remainer	Mean(R)	Leaver	Mean(L)	Min(L)	Max(L)	Dif	p_value
Female	1,241	.44	241	.54	0	1	–.1	*
Years to exit	1,241	7	241	6.16	1	34.52	.83	***
SSCI/SCIE articles	1,241	.75	241	.42	0	6	.34	***
Non-SSCI articles	1,241	1.41	241	.71	0	7.33	.7	***
Monographs	1,241	.59	241	.47	0	9.67	.12	*
Edited volumes	1,241	.2	241	.12	0	2.9	.07	*
Book chapters	1,241	2.35	241	2.09	0	20.97	.26	
Gray literature	1,241	1.81	241	1.84	0	28.33	–.03	
Parents	910	.38	123	.36	0	1	.02	
No. of children	910	.56	123	.57	0	3	–.01	
International publications	1,241	2.06	241	1.72	0	47	.34	
Months abroad	1,241	8.56	241	3.69	0	80	4.87	***
PhD	1,241	.49	241	.26	0	1	.23	***
PhD from abroad	1,241	.06	241	.01	0	1	.05	***
PhD from university of excellence	1,241	.14	241	.06	0	1	.08	***
Habilitation	1,241	.01	241	.01	0	1	0	
Junior professor	1,241	.02	241	0	0	1	.01	
Awards	1,241	.19	241	.04	0	2	.15	***
DFG funding	1,241	.06	241	.01	0	1	.04	*
Mobility	1,241	1.32	241	1.2	0	6	.12	
Interim professor	1,241	.05	241	.03	0	2	.02	
Co-authors	1,241	7.67	241	7.39	0	114	.28	

Note: Only cases with complete publication lists included. *+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*
To compare results, only academic remainers who have been in academia for at least 6.2 years (= average exit year) are included.

Table 2 complements these findings by showing results of remainers and leavers separately for men and women. However, the same pattern from Table 1 holds true even when looking at group differences between women and men. This means that female and male leavers publish less than their colleagues who remain (incidentally, female leavers also publish less in English), spend fewer months abroad, are less likely to obtain a PhD (either at a German university of excellence or a university abroad), and acquire fewer scholarly awards. Although female and male leavers secure fewer DFG grants, the difference is only significant between female leavers and female remainers (at p < .1). At the same time, changes in university (mobility) seem to be a meaningful indicator of a male academic career since male leavers are significantly less likely (or willing) to move to another university.

Table 2. Summary statistics of leavers at time of exit vs. remainers at equivalent years by gender.

	Male				t-test	Female				t-test
	Leaver		Remainer		L_m vs.	Leaver		Remainer		L_f vs.
	N	Mean	N	Mean	S_m	N	Mean	N	Mean	S_f
Years to exit	111	6.73	683	7.31	*	130	5.68	585	6.38	***
SSCI/SCIE articles	111	.49	683	.92	***	130	.36	585	.58	*
Non-SSCI articles	111	.69	683	1.72	***	130	.72	585	1.15	***
Monographs	111	.54	683	.69	+	130	.42	585	.48	
Edited volumes	111	.09	683	.24	*	130	.15	585	.16	
Book chapters	111	2.42	683	2.68		130	1.8	585	1.98	
Gray literature	111	2.25	683	2.04		130	1.49	585	1.61	
Parents	52	.35	491	.39		71	.37	441	.34	
No. of children	52	.52	491	.59		71	.61	441	.48	
International publications	111	2.22	683	2.15		130	1.29	585	1.97	*
Months abroad	111	3.09	683	7.35	*	130	4.2	585	9.57	***
PhD	111	.32	683	.5	***	130	.22	585	.41	***
PhD from abroad	111	.01	683	.05	*	130	.02	585	.07	*
PhD from university of excellence	111	.08	683	.15	+	130	.05	585	.11	*
Habilitation	111	.02	683	.02		130	0	585	.01	
Junior professor	111	0	683	.01		130	.01	585	.02	
Awards	111	.05	683	.18	*	130	.03	585	.19	***
DFG funding	111	.02	683	.05		130	.01	585	.05	+
Mobility	111	1	683	1.28	*	130	1.38	585	1.32	
Interim professor	111	.04	683	.05		130	.02	585	.05	
Co-authors	111	6.94	683	8.74		130	7.78	585	6.9	

Note: Only cases with complete publication lists included. + *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*.
To compare results, only male remainers who have been in academia for at least 6.7 years (= average exit year) are included (for female remainers: 5.7 years).

Although these preliminary findings provide evidence of group differences between leavers and remainers among women and men at comparable years, Cox regression modeling will provide more in-depth results by considering an academic's entire career pipeline.

1.5.3 Cox regression analysis

As part of this study, I run two series of Cox regression models. First, I add all variables covering scientific capital and children to the baseline control model and run each model separately for women and men (Table 3). I proceed stepwise to cover the strands of the theory presented in the introduction. Second, I conduct interaction terms of gender and each variable to measure which factors differentially affect the risk of women opting out of academe (Figure 2).

In Table 3, all coefficients above 1 indicate those factors that increase the risk of dropping out of an academic career in sociology; values below 1 are factors that reduce the risk. Model 1 shows that women have a 33% higher risk of leaving academia if no further determinants are considered.

Model 2 shows that having children per se does not increase one's risk of leaving academia. Moreover, the risk of leaving academia doubles for those sociologists about whom information on children is lacking. However, this should be interpreted with caution: Academics with intentions of leaving their career might be unwilling to share any personal information about children. It is also likely that the missing data comes down to the fact that I was no longer able to reach individuals at their official e-mail address who would soon be leaving their science career (as they were unavailable or their official e-mail account was already inactive). However, they had already been contacted in earlier waves, which is why this should not bias the findings.

Table 3. Cox regression models on dropouts.

	(1) Gender	(2) Children	(3) Career stage	(4) Univ. of excellence and academic networks	(5) Publications	(6) Awards and grants	(7) Only women	(8) Only men
Female	1.33*	1.39**	1.41**	1.48**	1.42**	1.43**		
	(2.29)	(2.63)	(2.69)	(3.10)	(2.70)	(2.79)		
With children		0.90	1.03	0.99	0.97	0.97	1.06	0.92
(*ref. childless*)		(–0.57)	(0.16)	(–0.06)	(–0.15)	(–0.14)	(0.23)	(–0.27)
W/o child info		2.39***	2.41***	2.26***	2.25***	2.27***	2.36***	2.17***
(*ref. childless*)		(6.20)	(6.25)	(5.73)	(5.68)	(5.73)	(4.48)	(3.45)
Years since PhD			0.55***	0.70***	0.73**	0.74*	0.61**	0.90
(ln)			(–5.85)	(–3.46)	(–2.64)	(–2.54)	(–2.73)	(–0.69)
PhD from				0.55**	0.56**	0.55**	0.51*	0.63
University of excellence				(–3.03)	(–2.92)	(–2.94)	(–2.43)	(–1.53)
PhD from abroad				0.16***	0.17***	0.19**	0.18*	0.20*
				(–3.52)	(–3.43)	(–3.25)	(–2.29)	(–2.21)
International				0.91	1.02	1.02	0.87	1.30
publications (ln)				(–0.84)	(0.18)	(0.19)	(–0.90)	(1.38)
Months abroad (ln)				0.85**	0.85**	0.86**	0.82**	0.91
				(–2.82)	(–2.77)	(–2.64)	(–2.61)	(–1.04)
Mobility (ln)				0.92	0.97	0.95	1.12	0.80
				(-0.69)	(–0.21)	(-0.38)	(0.63)	(–1.17)
Interim professor				0.57	0.73	0.78	0.80	0.76
(ln)				(–1.26)	(–0.68)	(–0.57)	(–0.39)	(–0.45)
Co-authors (ln)				0.84*	0.92	0.92	0.97	0.84
				(–2.29)	(–1.12)	(–1.17)	(–0.33)	(–1.48)
SSCI/SCIE articles					0.75	0.83	1.03	0.61^{+}
(ln)					(–1.62)	(–1.04)	(0.12)	(–1.65)
Non-SSCI articles					0.55***	0.56***	0.59**	0.50**
(ln)					(–4.36)	(–4.30)	(–2.76)	(–3.26)
Monographs (ln)					1.16	1.18	1.36	1.12
					(0.75)	(0.84)	(1.13)	(0.39)
Edited volumes					0.55*	0.55*	1.24	0.21***
(ln)					(–-2.15)	(–2.11)	(0.57)	(–3.30)
Book chapters (ln)					0.90	0.91	0.81	0.94
					(–0.90)	(-0.86)	(–1.41)	(–0.31)
Gray literature (ln)					0.97	0.98	0.95	1.04
					(–0.24)	(-0.14)	(–0.31)	(0.24)
Awards (ln)						0.34**	0.23*	0.44
						(–2.66)	(–2.24)	(–1.49)
DFG funding (ln)						0.62	1.12	0.28
						(–1.06)	(0.21)	(–1.35)
Only selected	0.80	0.79	0.92	1.00	1.00	0.99	1.47	0.65
publications	(–1.01)	(–1.07)	(–0.34)	(0.01)	(–0.00)	(–0.05)	(1.44)	(–0.92)
Entry cohorts								
(ref. 1980–1989)								
1990–1999	2.21	2.03	2.07	2.21	1.80	1.84	2.44	0.67
	(1.46)	(1.31)	(1.28)	(1.35)	(0.99)	(1.02)	(1.05)	(–0.45)
2000–2009	17.22***	16.86***	16.69***	20.39***	17.37***	18.20***	17.71**	14.72***
	(5.41)	(5.53)	(5.25)	(5.30)	(5.04)	(5.12)	(3.13)	(4.67)
After 2009	55.12***	53.13***	51.38***	64.30***	55.63***	59.03***	51.61***	56.39***
	(7.47)	(7.60)	(7.20)	(7.12)	(6.91)	(7.00)	(4.16)	(6.77)
Pseudo r^2	0.06	0.07	0.08	0.10	0.11	0.11	0.11	0.15
Log likelihood	–1780.84	–1754.75	–1736.13	–1704.63	–1686.68	–1680.55	–832.45	–654.27
Degrees of freedom	5	7	8	15	21	23	22	22
Chi^2	181.78	239.30	247.48	277.56	318.84	321.92	167.60	191.18
AIC	3571.67	3523.50	3488.27	3439.27	3415.35	3407.09	1708.91	1352.55
BIC	3615.52	3584.88	3558.42	3570.81	3599.51	3608.79	1879.99	1535.30
Number of events (exits)	263	263	263	263	263	263	146	117
N (individuals)	2,193	2,193	2,193	2,193	2,193	2,193	1,029	1,167
N (individuals: publications)	47,547	47,547	47,547	47,547	47,547	47,547	17,614	29,933

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

Model 3 adds the (log) years in academia since earning a PhD. With each additional year after sociologists obtain their PhD, the dropout risk decreases by 45% compared to not yet having a PhD. Achieving the doctoral degree as the first stage of qualifying for professorships thus prevents sociologists from leaving academia.

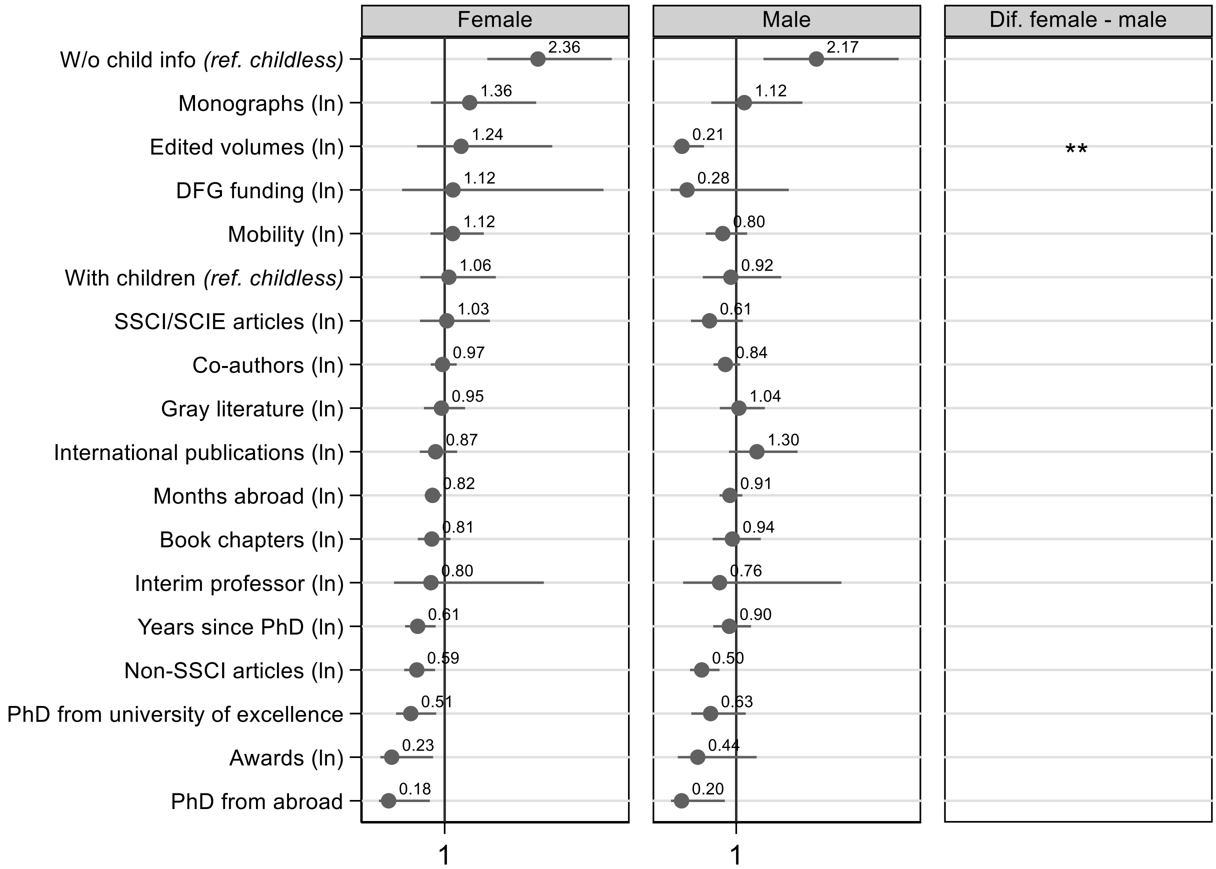
By adding universities of excellence in Model 4, one can observe that having a PhD from such a university actually reduces the risk of dropping out of an academic career by 45%. When measuring international experience, one finds that having a PhD from abroad minimizes the risk of dropping out by 84% and the (log) numbers of months spent abroad also reduce the same risk by 15%. The results for academic networks within Germany are less striking since only the number of (log) co-authors decreases the risk of leaving academia (by 16%).

Model 5 adds publications. Among the various types of publications, the number of (log) non-SSCI/SCIE articles and edited volumes is the best indicator of career dropout and reduces the risk of leaving academia by 45%.

In the full model (Model 6), I also include scholarly awards and DFG research grants next to other independent variables. The number of (log) scholarly awards correlates with sociologists being less likely to leave academia as the risk of dropping out is reduced by 66%.

Note that, across all models, the female coefficient remains robust, with women having an about 40% higher risk of dropping out of an academic career in sociology when controlling for other factors such as having children, the career stage, a PhD from a university of excellence, (international) academic networks, publications, and scholarly awards and research grants. This means that women with the same characteristics as men still have a higher risk of leaving academia. For that reason, I have plotted Model 7 and Model 8 of Table 3 to visualize the effects for each gender and to discuss the results in more detail (see Figure 2, coefficients for women in descending order). To test whether coefficients differ significantly between men and women, I additionally test each variable with an interaction of the female dummy variable (see Appendix A1). I also add interaction effects at the 10% significance level in Figure 2 to simplify the comparison of the results between genders.

Figure 2. Visualization of scientific capital and children on dropout risk by gender (cf. Model 7 and Model 8 in Table 3).



Note: Exponentiated coefficients (hazard ratios) in decreasing order among women; ln = logged values. *+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

What prevents women from opting out of academia? According to Figure 2, a pattern becomes visible when accounting for international experience (e.g., PhD from abroad, (log) months spent abroad), the number of years since earning the PhD (especially at a German university of excellence), and (log) scholarly awards. These appear to be the most significant factors in women remaining in academia. In addition, each (log) non-SSCI article reduces woman's risk of leaving academia by 41%. Having children, in turn, has no substantial impact when compared to childless sociologists. However, sociologists who did not provide any information on having children are twice as likely to drop out of their academic career. As already noted, this should nevertheless be interpreted with caution.

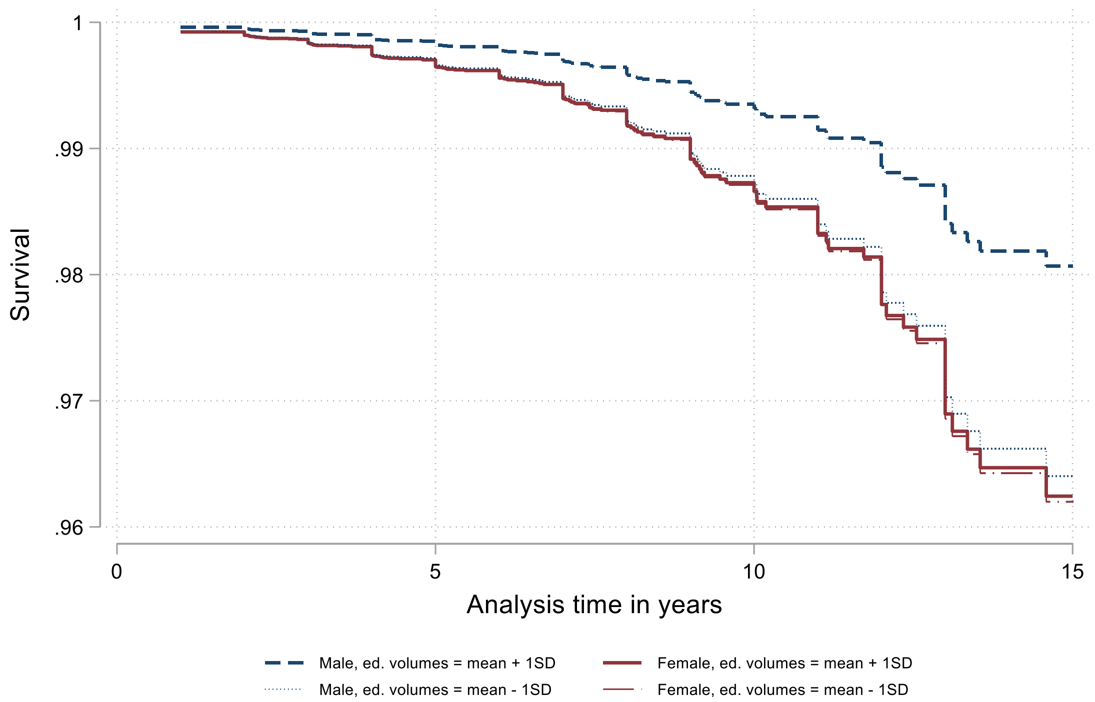
Scientific capital has a different impact on women's risk of leaving academia compared to men's. Besides (log) non-SSCI/SCIE articles, the number of (log) SSCI/SCIE articles and (log) edited volumes also indicates a lower risk of career attrition among male sociologists. Compared to women, publishing is a much stronger indicator of whether or not a man will leave his academic career. In line with women, however, having a PhD from abroad decreases the men's risk of leaving by 80%.

To uncover more detailed dynamics among female and male sociologists, I am interested in what effects differ significantly *between* men and women that might indicate a gender bias that is particularly detrimental to women's academic careers. According to the third column in Figure 2 and Table A1, one sees this impact only within editorships. Whereas (log) editorships correlate with a reduction in men's risk of leaving academia by around 80%, the influence is the other way around for women. As shown in Table A1 (Model 13) in the Appendix, female editors have an almost fourfold higher risk of dropping out of academia than male editors.

1.5.4 Editorships work differently for women

Figure 3 shows survival curves of the rate of remaining in academia for men and women with an especially large and small number of editorships (plus and minus one standard deviation of the mean). What is noteworthy is that these polarized numbers of edited volumes do not appear to make much of a difference to the risk of women leaving academia. At the same time, it makes a great deal of a difference compared to men. Within the subsample of male sociologists, higher numbers of edited volumes reduces their risk of exiting academia by around 80% (Figure 2), which one can observe in the diverging curves in Figure 3. Therefore, a significant amount of editorships appears to lower the risk of men dropping out of academia—a gender-specific effect that does not seem to apply to women.

Figure 3. Survival curve of remaining in academia by amount of edited volumes and gender (± 1 SD).



Note: SD = standard deviation; all values fixed at their means.

1.5.5 Women have an overall higher risk of leaving academia

In drawing inferences from all the exogenous variables of scientific capital and childbearing (Model 6, Table 3), I find that women face an up to 1.4-fold higher risk of leaving academia than men. This relationship is also shown in Figure 5 when all independent variables are included. However, the same pattern is also evident in Figure 4, in which none of the independent variables are accounted for. This means that even if scientific capital and children are factors that can mitigate the risk of attrition, a divergence remains that disfavors women (as seen in both curves). In light of the fact that scientific capital and parenthood do not contribute significantly to an increased risk of leaving academia, we must look for explanations in other factors that I will discuss in the next section.

Figure 4. Kaplan−Meier w/o covariates.

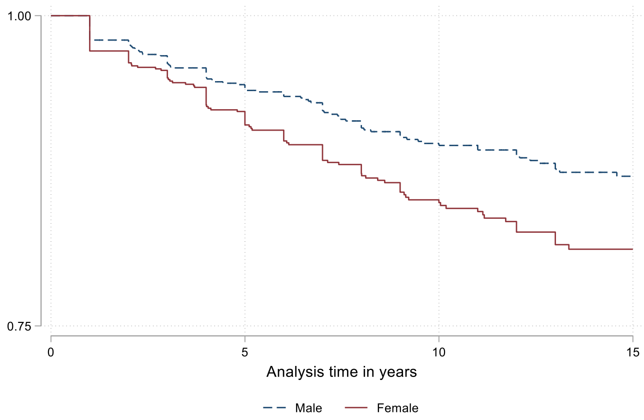
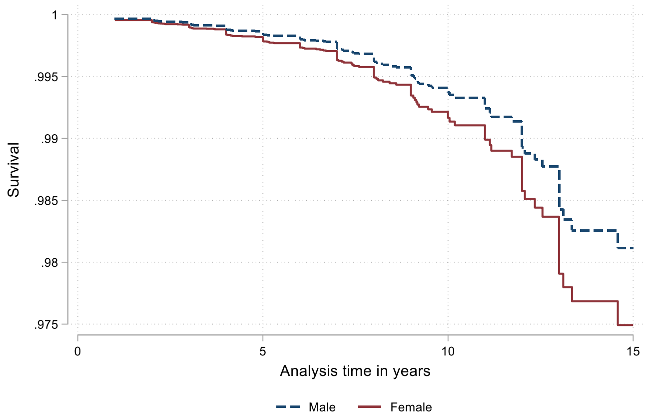


Figure 5. Survival curve w/ covariates.



1.6 Discussion

I compiled a large-scale longitudinal dataset of almost all sociologists in Germany by collecting their CV information and publication records in three waves (2013, 2016, and 2019). I tracked sociologists that left academia since 2013 in an effort to quantify which factors increase or decrease their risk of leaving academic careers, with a particular focus on the "leaky pipeline" that has been used to describe women's career trajectories. I began by conceptualizing factors that have a detrimental effect on women: I gathered information on their parental status through an e-mail survey and sought to quantify their scientific capital on the basis of their CVs posted on university websites. Broadly speaking, the results of these findings indicate that women have a higher overall risk of leaving academia than men, a discrepancy that cannot be attributed to differences in either their accumulated scientific capital or their having children, as I will now outline in the following.

I would expect that having children is highly correlated with a higher opt-out risk for women in academia (in line with, e.g., Ceci et al. 2014:124, Leemann et al. 2010a, Goulden et al. 2011, Jaksztat et al. 2021). However, the results of my study show that even though women are indeed more likely to leave academia, this does not come down to motherhood per se. Among the subsamples of women and men, mothers do have a slightly higher risk of leaving academia, whereas the risk for fathers is slightly reduced. These associations correspond to the reasons that mothers and fathers report for leaving academia and the disparate difficulties that they experience within academe (e.g., Ceci et al. 2014:124; Mason et al. 2013:35; Minello, Martucci and Manzo 2021). One might recall here that the descriptive findings likewise show that female leavers are more likely to have children than male leavers, and when they do, they have more children on average. But why, then, do we not find clearly adverse effects for mothers? One reason might be women anticipating rather than experiencing motherhood: Studies emphasize that only highly productive women in academia decide to have children, whereas others do not (Fox 2005; Joecks, Pull and Backes-Gellner 2014). If this is true, then it seems reasonable that having children would not correlate with such findings when the subgroup of mothers is biased by particularly outstanding female academics. However, since I control for scientific productivity—as measured by publications—this holds true only to a limited extent.

Women are more likely to leave academia at the pre-doc stage, a trend that has also been shown by another study for Germany (Jaksztat et al. 2021). The authors attribute this finding potentially to "a strong dependence on a single (mostly male) supervisor and a high degree of career uncertainty" (Jaksztat et al. 2021:951). However, in Germany, these structural hurdles exist not only in the pre-doc phase but persist throughout the post-doc phase as well (e.g., temporary contracts, hierarchical dependencies on tenured professors who are immediate supervisors). If the authors' explanation for a higher risk of female attrition is true, then we should find similar results at the post-doc stage as well. But since such findings are lacking in this study, it might be possible that women on the whole do not genuinely aspire to an academic career at all, which is why they might self-select at earlier career stages. This pattern is reflected in their lower overall career aspirations and competitiveness (August and Waltman 2004; Berweger and Keller 2005; Main, Prenovitz and Ehrenberg 2019). The fact that women are more likely to leave academia at the pre-doc stage but men tend to leave academia at the post-doc stage has also been reported in studies on the social sciences in Sweden (Silander et al. 2013:184–85). The results therefore suggest that a woman "surviving" long enough to earn her PhD and beyond is a good indicator that she will remain in academia for the long term.

Are women excluded from prestigious universities, thus causing them to leave academia? Although some have argued that this is the case for other countries (Bielby et al. 2014; Sheltzer and Smith 2014), I do not come to similar conclusions for female sociologists in Germany. Beyond gender differences, however, I clearly see a reproduction of elites in academia (Bourdieu and Passeron 1990 [1977]) given that sociologists from German universities of excellence have a lower dropout risk on the whole. The same can be said for international networks. Having a PhD from abroad (which is very rare among German sociologists) is an almost perfect predictor that an individual will remain in an academic career in science. Why is this so? It is probably because PhD graduates see "foreign experience as a personal strategy" (Musselin 2004:55, 69) to improve their labor market opportunities in their home country, which means that it can be seen as an expression of (long-term) strategic career planning and investment through beneficial networks. This finding is particularly true for women and runs contrary to gender-based social closure in international academic networks or as a result of "old boys" network (Leemann et al. 2010b; McDonald 2011). Interestingly, international experience plays a crucial role in women remaining in academia, whereas national mobility tends to increase their risk of leaving. There is a peculiarity in the German academic system that might provide an explanation for this: While international mobility is usually optional, national mobility is also internally enforced. Owing to the nationally mandated time restrictions and internal bans on later academic positions[55], scientists in German academia need to remain flexible and mobile. Women in particular perceive mobility pressures in Germany as barriers (e.g., Lind 2008:200), which might contribute to their increased attrition from academia.

How do publications, research grants, and awards each affect women differently and their risk of leaving academia? At equivalent years into their academic careers, female and male leavers published on average less than those who stayed in academia (as was also found by Schubert and Engelage 2011). Consequently, the publishing patterns of remainers versus leavers would seem to adhere to the academic principle of "selecting the best": The results show that, when using publishing as a metric of productivity, less productive sociologists in particular leave academia before obtaining their PhD. These are reasonable findings if we assume that those who are less productive in the first place are more likely

[55] By German law, professors may not be appointed at the same university at which they obtained their postdoctoral qualification (ban on in-house appointments).

to leave academia, whereas productivity itself is a fair predictor of who will become tenured in the long run (Long et al. 1993; Lutter and Schröder 2016; Warren 2019). In addition to men publishing more and the fact that "publication measures favor men" (Ceci et al. 2014:102), a high number of publications (especially in edited volumes) also appears to correlate with their remaining in academia, an association that does not seem to hold true for women. Importantly, the role of editors goes beyond disseminating knowledge. Editors as "gatekeepers" not only have the power to "make the final determination of what shall enter this or that archive of science" (Merton 1973 [1942]:522) but also exercise control and power indirectly through integrative network structures (see also Husu 2004). However, it is an open question as to why this only applies to men, given that, according to this study, women are equally likely to serve as editors. And though publishing is associated with a reduction in academic career attrition among the subsample of men, I also find similar results for research grants but not for academic awards (contrary to what has been hypothesized as the Matilda effect; see Lincoln et al. 2012; Rossiter 1993). Award counts correlate with women remaining in academia during the earlier career stages and increase their chance of getting tenured (Lutter and Schröder 2016), thereby producing cumulative advantages throughout the course of an academic career. In light of my findings that show broad gendered performance patterns in publications, research grants, and scholarly awards, I agree with Miller and Roksa (2019:131) that "universities are gendered organizations in which work, prestige, and rewards are conferred unequally on women and men." I would even add that this also drives the gender-specific dropout risk in academe.

This study provides gender-specific findings on individual factors that increase or decrease one's risk of leaving an academic career in Germany, with the larger takeaway being that female sociologists on the whole face a higher risk of doing so even when they have the same scientific capital than men. However, there must be other explanations as to why women might be more inclined to leave academia, especially at the pre-doc stage. The fact that there is no empirical evidence of a bias against hiring women (Ceci et al. 2014:101) suggests that the reason why women leave academia might come down to additional adverse circumstances that drive individual decisions, probably a "combination of individual and institutional factors" (Main et al. 2019:1330). But gender discrimination can also occur in other exclusionary mechanisms that this study cannot capture, even if other researchers might stress that these are more likely to be reflective of past conditions than current ones (Ceci et al. 2014:76; Schubert and Engelage 2011:452; Silander et al. 2013:185). Another limitation of this study is that I am unable to incorporate other factors that can affect individual workloads. For example, women might spend more time on teaching and service activities to keep the university going, which is a labor-intensive form of productivity that is often not formally recognized or rewarded (Bird, Litt and Wang 2004:199; Valian 2005:205; Winslow 2010). Assuming these responsibilities that are not adequately rewarded could very well tip the workload balance away from a scientist's research productivity (Winslow 2010), thereby creating yet another set of reasons why women would be more likely to leave academia. This is difficult to measure, however, as the teaching load in Germany is in some ways pre-structured according to the career stages.

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Appendix Chapter 2

Descriptive data

Table A1. Descriptive data for all researchers.

Variable	Mean	Std. Dev.	Min	Max
Female	0.38	0.49	0	1
SSCI journal articles	1.73	2.89	0	26.67
Non-SSCI journal articles	3.37	5.4	0	79.47
Monographs, reputable	0.61	0.98	0	18
Monographs, regular	0.61	1.35	0	28
Edited volumes	0.85	1.66	0	13.57
Book chapters	7.09	10.39	0	88.33
Gray literature	6.18	12.76	0	242
Years since habilitation	1.04	3.06	0	30
Years since junior prof	0.48	1.73	0	15
University of excellence	0.29	0.39	0	1
Months abroad	17.04	28.81	0	235
Graduated abroad	0.16	0.37	0	1
PhD abroad	0.11	0.32	0	1
International publications	7.1	9.9	0	69
Awards	0.26	0.71	0	7
DFG funding	0.17	0.54	0	6
Mobility	1.92	1.82	0	10
Interim professor	0.45	0.99	0	10
Co-authors	14.43	23.03	0	294
Incomplete	0.13	0.33	0	1
Childless	0.32	0.47	0	1
Parent	0.32	0.47	0	1
No child info	0.36	0.48	0	1

Data from 1,453 individuals and 36,875 observations.

Our dataset contains 1,453 individuals, among which 38% are female. An average researcher in our dataset has 1.73 SSCI publications, 3.37 non-SSCI articles, 0.61 monographs from reputable publishers and 0.61 monographs from other publishing houses, 0.85 edited volumes, and about 6 pieces of gray literature (all co-author adjusted). Only a few researchers have got a habilitation or a junior professorship, so the average time spent after each are only 1.04 resp. 0.48 years. 29% of all career steps in our dataset took place in a university that held the status "university of excellence" at least once. Researchers spent an average of 17 months abroad, 16% graduated abroad, and 11% received their PhD from abroad. Researchers have an average of 7 non-German publications, received 0.26 awards, and

17% received DFG funding once or more. They have changed place almost twice, and acted as an interim-professor 0.45 times. They have 14.4 co-authors, and publication lists are incomplete for 13%. Finally, 32% are childless at the time of the survey, 32% have at least one child, and data on children is missing for the remaining 36%.

Additional regressions

Table A2. Replication with non-logged values.

	(4) Full model	(5) Children	(6) Women	(7) Men
Female	1.23			
	(1.52)			
SSCI journal articles	1.09***	1.09***	1.12*	1.09***
	(4.37)	(4.19)	(2.31)	(4.02)
Monographs, reputable	1.05	1.04	1.10	1.04
	(0.81)	(0.73)	(0.66)	(0.49)
Monographs, regular	0.92	0.93	1.15	0.88*
	(-1.46)	(-1.40)	(0.82)	(-2.12)
Non-SSCI journal articles	1.01	1.01	1.03	1.01
	(1.03)	(0.81)	(0.85)	(1.12)
Edited volumes	1.05	1.05	0.90	1.08
	(1.06)	(1.09)	(-0.90)	(1.61)
Book chapters	1.03***	1.03***	1.04+	1.02**
	(3.43)	(3.35)	(1.87)	(2.85)
Gray literature	1.00	1.00	1.02	1.00
	(0.62)	(0.57)	(0.93)	(0.45)
Years since habilitation	1.66***	1.66***	1.55**	1.82***
	(7.55)	(7.52)	(3.11)	(7.65)
Years since habilitation²	0.96***	0.96***	0.96*	0.96***
	(-5.20)	(-5.18)	(-2.57)	(-5.03)
Years since ass prof	1.50***	1.50***	0.97	1.84***
	(5.39)	(5.53)	(-0.17)	(7.46)
Years since junior prof²	0.97**	0.97***	1.01	0.95***
	(-3.25)	(-3.38)	(0.57)	(-4.99)
International publications	1.01	1.01	1.01	1.01
	(1.22)	(1.20)	(0.27)	(1.18)
Months abroad	1.00	1.00	1.00	1.00
	(1.20)	(1.30)	(0.87)	(1.06)
Graduated abroad	1.04	1.06	1.07	1.03
	(0.18)	(0.27)	(0.16)	(0.14)
PhD abroad	1.43	1.43	1.13	1.90*
	(1.60)	(1.63)	(0.28)	(2.35)
University of excellence	0.64**	0.62**	0.60+	0.66*
	(-2.75)	(-2.91)	(-1.71)	(-2.05)
Awards	1.41***	1.42***	1.59***	1.37***
	(5.11)	(5.19)	(3.49)	(4.09)
DFG funding	1.26*	1.28**	1.42	1.31**
	(2.47)	(2.77)	(1.30)	(2.97)
Mobility	1.27***	1.27***	1.26***	1.29***
	(6.97)	(7.09)	(3.76)	(5.93)
Interim professor	0.99	0.99	1.17	0.93
	(-0.22)	(-0.12)	(1.40)	(-0.83)
Co-authors	1.00	1.00	1.00	1.00
	(0.89)	(0.92)	(-0.59)	(1.25)
Childless man		1.00		1.00
		(.)		(.)
Childless Woman		1.16	1.00	
		(0.59)	(.)	
Father		1.20		1.24
		(1.01)		(1.17)
Mother		1.21	1.08	
		(0.74)	(0.27)	
W/o child info man		0.95		0.97
		(-0.25)		(-0.18)
W/o child info woman		1.54+	1.16	
		(1.91)	(0.48)	
Before 2002	1.44*	1.46**	1.10	1.68**
	(2.50)	(2.67)	(0.27)	(3.20)
Incomplete	1.96***	1.93***	2.21*	1.95***
	(4.02)	(3.89)	(2.12)	(3.30)
r²	.12	.12	.14	.15
Individuals tenured	356	356	109	247
Individuals total	1453	1453	550	903
Observations	35578	35578	10203	25375

Notes: Exponentiated coefficients; t statistics in parentheses; cluster-robust standard errors;
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3. Different effects on women vs men.

	(1) Women interaction	
Female	0.75	(-0.59)
SSCI journal articles (ln)	1.62***	(4.13)
Female # SSCI journal articles (ln)	1.15	(0.58)
Monographs, reputable (ln)	1.02	(0.11)
Female # Monographs, reputable (ln)	1.03	(0.08)
Monographs, regular (ln)	0.72*	(-2.19)
Female # Monographs, regular (ln)	1.99*	(1.96)
Non-SSCI journal articles (ln)	1.13	(1.12)
Female # Non-SSCI journal articles (ln)	0.95	(-0.26)
Edited volumes (ln)	1.33+	(1.80)
Female # Edited volumes (ln)	0.58	(-1.54)
Book chapters (ln)	1.19	(1.39)
Female # Book chapters (ln)	1.77*	(2.17)
Gray literature (ln)	1.04	(0.46)
Female # Gray literature (ln)	1.08	(0.46)
Years since habilitation	1.69***	(6.74)
Female # Years since habilitation	0.88	(-0.77)
Years since habilitation²	0.96***	(-4.67)
Female # Years since habilitation²	1.00	(0.14)
Years since ass prof	1.78***	(6.73)
Female # Years since ass prof	0.59**	(-2.69)
Years since junior prof²	0.96***	(-4.35)
Female # Years since junior prof²	1.05*	(2.45)
International publications (ln)	1.06	(0.52)
Female # International publications (ln)	0.88	(-0.59)
Months abroad (ln)	1.09	(1.56)
Female # Months abroad (ln)	1.01	(0.06)
Graduated abroad	1.01	(0.03)
Female # Graduated abroad	1.10	(0.20)
PhD abroad	2.09**	(3.22)
Female # PhD abroad	0.61	(-1.01)
University of excellence	0.55**	(-2.94)
Female # University of excellence	0.99	(-0.02)
Awards (ln)	1.77**	(3.08)
Female # Awards (ln)	1.26	(0.69)
DFG funding (ln)	1.76***	(3.43)
Female # DFG funding (ln)	0.92	(-0.19)
Mobility (ln)	2.46***	(6.09)
Female # Mobility (ln)	1.00	(-0.02)
Interim professor (ln)	1.03	(0.20)
Female # Interim professor (ln)	1.49	(1.31)
Co-authors (ln)	1.11	(1.10)
Female # Co-authors (ln)	0.89	(-0.70)
with children	1.34	(1.60)
w/o child info	0.98	(-0.10)
Female # with children	0.82	(-0.60)
Female # w/o child info	1.24	(0.59)
Before 2002	1.63**	(2.83)
Female # Before 2002	0.71	(-0.90)
Incomplete	2.34***	(3.80)
Female # Incomplete	1.03	(0.06)
r²	.15	
Individuals tenured	356	
Individuals total	1453	
Observations	35578	

Notes: Exponentiated coefficients; t statistics in parentheses; cluster-robust standard errors;
$^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*

Table A4. Robustness tests.

	(1) Impact factor	(2) Incomplete dropped	(3) Post 2002	(4) Only professors	(5) Univ of excellence	(6) Nr children
Female	1.17	1.25	1.15	1.11	1.23	
	(1.06)	(1.45)	(0.95)	(0.77)	(1.41)	
SSCI journal articles (ln) # journal impact	1.66***					
	(4.26)					
SSCI journal articles (ln)		1.77***	1.79***	1.22*	1.81***	1.65***
		(5.25)	(5.20)	(2.05)	(5.07)	(5.01)
Monographs, reputable (ln)	1.13	1.10	1.19	0.87	1.07	1.02
	(0.84)	(0.66)	(1.19)	(-1.07)	(0.45)	(0.17)
Monographs, regular (ln)	1.01	1.02	0.83	0.95	0.96	0.90
	(0.10)	(0.12)	(-1.25)	(-0.36)	(-0.29)	(-0.83)
Non-SSCI journal articles (ln)	1.17	1.12	1.06	1.05	1.04	1.09
	(1.59)	(1.10)	(0.55)	(0.55)	(0.38)	(0.94)
Edited volumes (ln)	1.14	1.12	1.38*	0.91	1.32^{+}	1.22
	(0.91)	(0.80)	(2.25)	(-0.82)	(1.92)	(1.47)
Book chapters (ln)	1.54***	1.46**	1.30*	1.15	1.22^{+}	1.36**
	(3.35)	(2.93)	(2.05)	(1.33)	(1.66)	(2.81)
Gray literature (ln)	1.07	1.08	1.12	1.03	1.07	1.05
	(0.87)	(0.96)	(1.46)	(0.48)	(0.92)	(0.69)
Years since habilitation	1.68***	1.67***	1.38***	1.36***	1.60***	1.57***
	(5.96)	(5.92)	(4.78)	(4.37)	(5.97)	(6.72)
Years since habilitation²	0.95***	0.95***	0.97***	0.98*	0.96***	0.97***
	(-4.77)	(-4.65)	(-3.87)	(-2.15)	(-4.20)	(-4.72)
Years since ass prof	1.33***	1.38***	1.45***	1.31***	1.41***	1.48***
	(3.40)	(3.89)	(4.74)	(4.14)	(4.01)	(5.21)
Years since junior prof²	0.99	0.98*	0.97**	0.99*	0.98*	0.97**
	(-1.64)	(-2.04)	(-2.93)	(-1.96)	(-2.05)	(-3.15)
International publications (ln)	1.04	0.97	0.97	1.18*	0.99	1.05
	(0.44)	(-0.32)	(-0.27)	(1.99)	(-0.15)	(0.59)
Months abroad (ln)	1.04	1.04	1.09^{+}	1.08^{+}	1.06	1.08^{+}
	(0.84)	(0.73)	(1.70)	(1.81)	(1.22)	(1.70)
Graduated abroad	1.15	1.14	1.05	1.06	1.15	1.02
	(0.58)	(0.54)	(0.22)	(0.25)	(0.59)	(0.10)
PhD abroad	1.82*	1.87*	1.39	0.97	1.71*	1.68*
	(2.41)	(2.52)	(1.43)	(-0.13)	(2.27)	(2.53)
Awards (ln)	1.80***	1.82***	1.89***	2.17***	1.80***	1.86***
	(3.47)	(3.63)	(4.10)	(6.68)	(3.74)	(4.18)
DFG funding (ln)	1.37^{+}	1.34^{+}	1.51*	1.13	1.56**	1.70***
	(1.89)	(1.77)	(2.46)	(0.96)	(2.70)	(3.56)
University of excellence	0.61**	0.59**	0.53***	0.53***		0.57***
	(-2.82)	(-2.95)	(-3.44)	(-3.67)		(-3.38)
Studied: university of excellence					1.10	
					(0.54)	
PhD: university of excellence					0.83	
					(-1.04)	
Habil: university of excellence					0.84	
					(-0.94)	
Mobility (ln)	2.22***	2.24***	2.20***	2.22***	2.10***	2.40***
	(6.09)	(6.15)	(6.06)	(6.37)	(5.86)	(7.37)
Interim professor (ln)	1.12	1.08	1.22	0.92	1.12	1.20
	(0.76)	(0.54)	(1.41)	(-0.72)	(0.84)	(1.41)
Co-authors (ln)	1.05	1.08	1.07	1.14^{+}	1.10	1.06
	(0.57)	(0.94)	(0.79)	(1.74)	(1.16)	(0.74)
Incomplete			2.16***	1.75*	1.80**	2.32***
			(3.83)	(2.43)	(2.76)	(4.42)
Before 2002	1.19	1.16		0.60***	1.36^{+}	1.37*
	(1.04)	(0.86)		(-3.39)	(1.82)	(2.10)
1 Child						1.19
						(0.74)
2 Children						1.69*
						(2.57)
3 Children						0.84
						(-0.48)
4 Children						0.22
						(-1.14)
5 Children						0.00
						(.)
6 Children						0.00
						(.)
7 Children						0.00
						(.)
W/o child info						0.99
						(-0.06)
Female						1.16
						(0.55)
Female # 1 Child						1.04
						(0.11)

Table A4. Continued.

Female # 2 Children						0.44^{+}
						(-1.86)
Female # 3 Children						4.06*
						(2.57)
Female # 4 Children						0.00
						(.)
Female # 6 Children						0.67
						(.)
Female # W/o child info						1.45
						(1.12)
r^2	.13	.14	.14	.094	.13	.14
Individuals tenured	299	299	288	356	313	356
Individuals total	1270	1270	1381	356	1308	1453
Observations	32726	32726	26308	14103	31342	35578

Notes: Exponentiated coefficients; t statistics in parentheses; cluster-robust standard errors;
$^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*

Table A5. Replication with exits to possibly permanent positions.

	(1) Gender	(2) Publications	(3) Signaling	(4) Social capital	(5) Children	(6) Women	(7) Men
Female	0.91	1.21	1.36*	1.17			
	(-0.76)	(1.58)	(2.29)	(1.11)			
SSCI journal articles (ln)		2.11***	1.71***	1.67***	1.66***	1.87**	1.61***
		(9.11)	(5.61)	(5.02)	(4.96)	(2.90)	(4.17)
Monographs, reputable (ln)		1.53**	1.24	1.08	1.06	1.01	1.09
		(2.90)	(1.53)	(0.58)	(0.42)	(0.04)	(0.52)
Monographs, regular (ln)		1.02	0.92	0.94	0.93	1.56	0.74*
		(0.12)	(-0.61)	(-0.48)	(-0.57)	(1.44)	(-2.02)
Non-SSCI journal articles (ln)		1.18^{+}	1.16	1.07	1.06	1.01	1.15
		(1.95)	(1.63)	(0.76)	(0.63)	(0.03)	(1.28)
Edited volumes (ln)		1.34*	1.22	1.20	1.22	0.81	1.37^{+}
		(2.41)	(1.57)	(1.39)	(1.47)	(-0.66)	(1.95)
Book chapters (ln)		1.20^{+}	1.34**	1.33*	1.33*	1.61*	1.26^{+}
		(1.80)	(2.63)	(2.49)	(2.56)	(2.05)	(1.78)
Gray literature (ln)		1.09	1.06	1.10	1.10	1.05	1.10
		(1.33)	(0.92)	(1.34)	(1.30)	(0.36)	(1.10)
Years since habilitation			1.59***	1.50***	1.50***	1.58**	1.61***
			(7.02)	(5.65)	(5.79)	(3.13)	(6.03)
Years since habilitation²			0.97***	0.97***	0.97***	0.96*	0.97***
			(-4.12)	(-3.33)	(-3.43)	(-2.35)	(-3.45)
Years since ass prof			1.48***	1.43***	1.45***	0.96	1.75***
			(5.52)	(4.63)	(4.98)	(-0.20)	(6.77)
Years since junior prof²			0.98**	0.98*	0.98**	1.01	0.96***
			(-3.17)	(-2.55)	(-2.80)	(0.78)	(-4.08)
International publications (ln)			1.00	1.01	1.01	0.97	1.03
			(-0.03)	(0.10)	(0.09)	(-0.15)	(0.26)
Months abroad (ln)			1.09*	1.06	1.06	1.10	1.05
			(1.99)	(1.22)	(1.31)	(1.07)	(0.87)
Graduated abroad			0.87	1.06	1.11	1.01	1.14
			(-0.67)	(0.29)	(0.49)	(0.02)	(0.55)
PhD abroad			1.50*	1.73*	1.75**	1.18	2.47***
			(2.11)	(2.56)	(2.71)	(0.40)	(3.87)
University of excellence			0.68*	0.61**	0.58**	0.58^{+}	0.61*
			(-2.44)	(-3.03)	(-3.27)	(-1.85)	(-2.46)
Awards (ln)			1.86***	1.74***	1.74***	2.29**	1.56*
			(4.10)	(3.61)	(3.66)	(3.04)	(2.32)
DFG funding (ln)			1.85***	1.54**	1.63**	1.94^{+}	1.67***
			(4.02)	(2.75)	(3.21)	(1.65)	(3.31)
Mobility (ln)				2.30***	2.34***	2.07**	2.71***
				(6.93)	(7.11)	(3.15)	(6.66)
Interim professor (ln)				1.12	1.12	1.30	1.04
				(0.84)	(0.88)	(1.06)	(0.23)
Co-authors (ln)				1.06	1.07	0.98	1.09
				(0.69)	(0.79)	(-0.13)	(0.95)
Childless # Female=0 *(ref.)*							
Childless # Female=1					1.21		
					(0.73)		
With children # Female=0					1.42^{+}		1.44*
					(1.85)		(1.99)
With children # Female=1					1.15	0.93	
					(0.56)	(-0.24)	
W/o child info # Female=0					1.01		1.00
					(0.07)		(-0.01)
W/o child info # Female=1					1.74*	1.18	
					(2.41)	(0.53)	
Before 2002	0.71**	0.82	1.15	1.19	1.23	1.08	1.37^{+}
	(-2.58)	(-1.31)	(0.96)	(1.10)	(1.34)	(0.21)	(1.78)
Incomplete	1.46*	2.31***	2.22***	2.28***	2.28***	2.43*	2.66***
	(2.35)	(4.06)	(3.98)	(4.15)	(4.27)	(2.21)	(4.34)
r²	.0031	.06	.11	.13	.13	.15	.17
Individuals tenured	356	356	356	356	356	109	247
Individuals total	1450	1450	1450	1450	1450	549	901
Observations	33210	33210	33210	33210	33210	9685	23525

Notes: Exponentiated coefficients; t statistics in parentheses; cluster-robust standard errors;
$^{+}$ *p < 0.1,* * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001*

Table A6. Reputable and regular/undecided publishers.

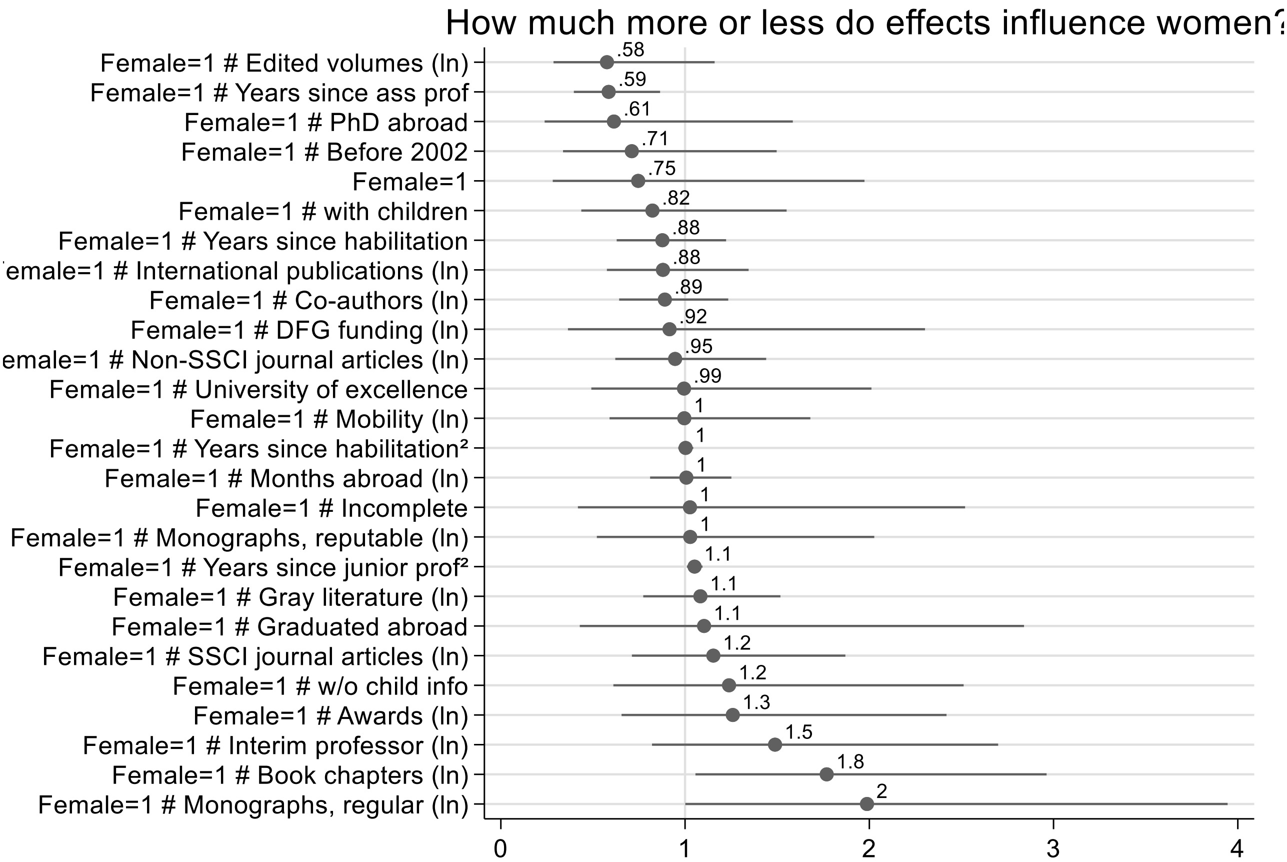
Agreed on high reputation:	Agreed on regular reputation or not agreed:
Amsterdam University Press (AUP)	AFES-Press
Barbara Budrich	AV Akademikerverlag
C. H. Beck	Academia
Cambridge University Press	Agenda
Campus Verlag	Akademie Verlag
Cornell University Press	Akademische Verlagsgemeinschaft München
DVA	Akademischer Verlag
Deutsche Verlagsanstalt	Anchor Academic Publishing
Dietz Verlag	Anna Blume
Duncker & Humblot	Argument Verlag
Edition Sigma	Armand Colin
Edward Elgar Publishing	Arnold-Bergstraesser-Institut
Elsevier	Ashgate Publishing
Kluwer Academic	Ateliers - Henry Douger
Leske + Budrich	Aufbau-Verlag
MIT Press	Avebury
Manchester University Press (MUP)	BBJ Consult
Nomos Verlag	BIS-Verlag
Oxford University Press (OUP)	Barrister & Principal
Palgrave Macmillan	Bautz Verlag
Princeton University Press	Berlin University Press
Routledge	Berlin-Verlag Spitz
Rowohlt Verlag	Berliner Debatte Wissenschaftsverlag
SAGE Publishing	Berliner Wissenschafts-Verlag
Springer	Bibliotheka Edizioni
Springer Gabler	Bier'sche Verlagsanstalt
Springer VS (Verlag für Sozialwissenschaften)	Bildungsverlag EINS
Suhrkamp Verlag	Birkhäuser Basel
Taylor & Francis	Books on Demand (BoD)
University of Chicago Press	Bouvier-Verlag
University of Minnesota Press	Brasilienkunde Verlag
University of Toronto Press	Breitenbach
W. Bertelsmann Verlag	Brill | Nijhof Digital Publishing
Westdeutscher Verlag	De Gruyter
dtv Verlagsgesellschaft	Deutscher Instituts-Verlag
edition sigma	Deutscher Universitäts-Verlag
	Dietrich
	Diplomica Verlag
	Drewipunkt GmbH
	Droste Verlag
	EDUSC
	ENFORCER Pülz
	Econ
	Economica Verlag
	Edinburgh University Press
	Edition Paideia
	Edition Passagen/Böhlau Verlag
	Edition Temmen
	Editora Unimonte
	Editora Unimontes
	Elgar Verlag
	Ergon-Verlag
	Erich Schmidt Verlag
	Europa Union Verlag
	European Consortium for Political Research (ECPR)
	Europäische Verlagsgesellschaft
	FAU University Press
	Financial Times Energy Publishing
	Fontamara
	Franz Steiner Verlag
	GIGA Verlag
	GRIN Verlag
	Gabriele Schäfer Verlag
	Gordon+Breach Verlag Fakultas
	Gower
	Haag und Herchen Verlag
	Hamburger Edition
	Hampp Verlag
	Hart Publishing

Agreed on high reputation:	**Agreed on regular reputation or not agreed:**
	Haupt
	Haymarket
	Herder Verlag
	Hugendubel-Verlag
	Humanitas Verlag
	I.B. Tauris
	ISP Verlag
	Ibidem-Verlag
	Innsbruck University Press
	J.B. Metzler
	JAI Press
	Junius Verlag
	K. G. Saur
	Kassel University Press (KUP)
	"Kein Verlag"
	KiWi-Taschenbuch
	Klartext Verlag
	Klaus Schwarz Verlag
	Klett Perthes Verlag
	Klett-Cotta
	Klinkhardt
	Knowledge World Publishers (KW Publishers)
	Kohlhammer Verlag
	Konkret Literatur Verlag
	Königshausen & Neumann
	Kösel-Verlag
	LAIKA-Verlag
	LZT Verlag
	La Tribu Ediciones
	Lambertus
	Lamuv Verlag
	Le Cavalier Bleu
	Leiden University Press
	Leipziger Universitätsverlag
	Lexikus
	Lexington Books
	Links-Verlag
	Lit Verlag
	Logos Verlag
	Longman Publisher
	Louisoder Verlag
	Luchterhand
	Lukas Verlag
	Lynne Rienner Publishers
	Löcker Verlag
	Madbuli
	Mandelbaum Verlag
	Mannheim University Press
	Mantis Verlag
	Marix Verlag
	Martin Meidenbauer Verlag
	Matthias-Grünewald-Verlag
	Metropol-Verlag
	Metropolis
	Minerva Press
	Modern Humanities Research Association (MHRA)
	Mohr Siebeck Verlag
	Müller + Bass
	NWB Verlag
	New Academic Press
	Nueva Trilce
	Oekom-Verlag
	Oldenbourg Verlag
	Olms
	Olzog
	Optimus Verlag
	Orell Füssli
	PLUTO PR
	Pahl-Rugenstein
	Parerga-Verlag
	Passagen Verlag

Agreed on high reputation:	Agreed on regular reputation or not agreed:
	Paulo Freire Verlag
	Paulusverlag
	Peter-Lang-Verlagsgruppe
	Pfaffenweiler
	Philosophie im Elfenbeinturm
	Physica-Verlag
	Pinter Publishers
	Piper Verlag
	Potsdam University Press
	Pro Universitate Verlag
	Prolog
	Quorum Verlag
	Reclam Verlag
	Redline Verlag
	Resch-Verlag
	Rheinland-Verlag
	Richard Boorberg Verlag
	Riva
	Rosspen
	Rotbuch Verlag
	Rotpunktverlag
	Rowman & Littlefield International-Verlag
	Scoventa Verlag
	Seismo
	Sense Publishers
	Service Fachverlag
	Siedler
	Sigmaringen
	Societäts-Verlag
	"Sonstiges"
	Sosyal Arastirmalar Vakfi
	Stark
	Straube Verlag
	Synchron
	Südwestdeutscher Verlag
	TVV Verlag
	Tectum Verlag
	Tectum Wissenschaftsverlag
	Temple University Press
	Textem Verlag
	Trade Focus Verlag
	Truppendienst
	Tuduv Studie
	UTB
	UVK Verlagsgesellschaft
	Ullstein
	United States Institute of Peace Nior & Pressler
	Verlag Julius Klinkhardt
	Verlag Karl Alber
	Verlag Matthes & Seitz Berlin
	Verlag Schulz-Kirchner
	Verlag Soziale Hilfe
	Verlag Vögel
	Verlag Westfälisches Dampfboot
	Verlag Wissenschaft und Politik
	RTS-Verlag
	Wagenbach
	Wallstein Verlag
	Waxmann Verlag
	Wehrhahn Verlag
	Westfälisches Dampfboot
	Wilhelm Fink Verlag
	Winkler Verlag
	Wissenschaftliche Buchgesellschaft
	Wissenschaftlicher Verlag Berlin
	Wissenschaftlicher Verlag Trier
	Wissenschaftsverlag Rothe
	Wochenschau Verlag
	World Scientific Publishing
	XS-Verlag
	ZEI Verlag

Agreed on high reputation:	**Agreed on regular reputation or not agreed:**
	Zed Books
	ars una
	b_books
	edition fatal
	edition-tranvia
	epodium
	l'Harmattan
	res publica Wissenschaftsverlag
	transcript Verlag
	transfer verlag
	utzverlag
	Éditions Klincksieck
	ça-ira-Verlag

Figure B1. Visualization of how effect on women are different than on men.



Appendix Chapter 3

Table A1. Cox regressions with different log-specifications, robustness checks and replications of the full sample (Model 6 in Table 3), separately for women and men.

	(1) Non-logged variables	(2) Main model (*ln)	(3) *Log (1.1)[1]	(4) *Log (1.5)[2]	(5) *Log (2)[3]	(6) Censored Data (*ln)[4]	(7) Listwise Deletion (*ln)[5]	(8) Only complete data (*ln)	(9) Coder	(10) Publications (w/o co-author adjustment)	(10) Only Women	(11) Only Men
Female	1.07	1.11	1.11	1.11	1.11	1.15	1.09	1.04	1.05	1.07	1.00	1.00
	(0.66)	(1.00)	(1.00)	(1.00)	(1.00)	(1.33)	(0.80)	(0.38)	(0.43)	(0.63)	(.)	(.)
Children	1.28^{+}	1.22	1.22	1.22	1.22	1.11	1.27^{+}	1.00	1.26^{+}	1.23	0.92	1.36^{+}
(ref. childless)	(1.79)	(1.49)	(1.49)	(1.49)	(1.49)	(0.84)	(1.71)	(-0.02)	(1.70)	(1.55)	(-0.35)	(1.81)
W/o child info	1.01	1.09	1.09	1.09	1.09	1.02	1.08	0.86	1.10	1.07	1.28	0.99
(ref. childless)	(0.07)	(0.63)	(0.63)	(0.63)	(0.63)	(0.13)	(0.52)	(-1.06)	(0.68)	(0.52)	(1.11)	(-0.04)
SSCI/SCIE	1.04^{***}	2.28^{***}	1.08^{***}	1.40^{***}	1.77^{***}	2.12^{***}	2.13^{***}	2.18^{***}	2.28^{***}	2.39^{***}	3.19^{***}	1.84^{***}
articles (*)	(4.25)	(7.26)	(7.26)	(7.26)	(7.26)	(6.76)	(6.48)	(7.03)	(7.29)	(7.04)	(6.12)	(4.82)
Non-SSCI/SCIE	1.02	1.07	1.01	1.03	1.05	1.08	1.05	1.08	1.14	1.11	1.10	1.07
articles (*)	(0.93)	(0.76)	(0.76)	(0.76)	(0.76)	(0.84)	(0.56)	(0.83)	(1.43)	(1.34)	(0.63)	(0.65)
Monographs (*)	0.91	0.98	1.00	0.99	0.99	0.98	0.96	1.13	0.93	1.05	1.09	1.06
	(-1.31)	(-0.12)	(-0.12)	(-0.12)	(-0.12)	(-0.11)	(-0.29)	(0.88)	(-0.49)	(0.36)	(0.35)	(0.35)
Edited volumes (*)	1.09	1.29	1.02	1.11	1.19	1.32	1.22	1.13	1.38^{+}	1.33^{*}	1.19	1.31
	(0.98)	(1.33)	(1.33)	(1.33)	(1.33)	(1.50)	(1.02)	(0.68)	(1.68)	(2.05)	(0.51)	(1.35)
Book chapters (*)	1.05^{***}	1.47^{***}	1.04^{***}	1.17^{***}	1.31^{***}	1.43^{***}	1.48^{***}	1.40^{***}	1.46^{***}	1.42^{***}	1.91^{***}	1.34^{**}
	(3.95)	(4.45)	(4.45)	(4.45)	(4.45)	(4.08)	(4.32)	(3.78)	(4.34)	(4.56)	(4.39)	(2.87)
Gray literature (*)	1.01	1.15^{+}	1.01^{+}	1.06^{+}	1.10^{+}	1.12	1.20^{*}	1.09	1.11	1.16^{*}	1.05	1.12
	(1.17)	(1.93)	(1.93)	(1.93)	(1.93)	(1.57)	(2.38)	(1.15)	(1.34)	(2.31)	(0.34)	(1.34)
Years since	1.46^{***}	1.36^{***}	1.36^{***}	1.36^{***}	1.36^{***}	1.33^{***}	1.43^{***}	1.58^{***}	1.36^{***}	1.38^{***}	1.44^{***}	1.31^{***}
habilitation	(5.57)	(5.00)	(5.00)	(5.00)	(5.00)	(6.19)	(4.79)	(7.31)	(5.33)	(5.10)	(3.89)	(3.47)
Years since	0.97^{***}	0.98^{**}	0.98^{**}	0.98^{**}	0.98^{**}	0.99^{**}	0.98^{*}	0.96^{***}	0.98^{**}	0.98^{**}	0.99	0.99^{*}
habilitation (sq.)	(-3.38)	(-2.74)	(-2.74)	(-2.74)	(-2.74)	(-2.90)	(-2.54)	(-5.85)	(-2.75)	(-2.83)	(-1.48)	(-2.01)
Years since junior	1.41^{***}	1.30^{***}	1.30^{***}	1.30^{***}	1.30^{***}	1.26^{***}	1.30^{***}	1.29^{***}	1.29^{***}	1.31^{***}	1.30^{***}	1.27^{**}
professor	(6.60)	(5.30)	(5.30)	(5.30)	(5.30)	(4.54)	(5.16)	(3.83)	(5.06)	(5.40)	(3.50)	(2.82)
Years since junior	0.98^{***}	0.99^{**}	0.99^{**}	0.99^{**}	0.99^{**}	0.99^{+}	0.99^{**}	0.98^{*}	0.99^{**}	0.99^{**}	0.99^{*}	0.99
professor (sq.)	(-4.20)	(-3.21)	(-3.21)	(-3.21)	(-3.21)	(-1.91)	(-3.07)	(-2.16)	(-3.13)	(-3.23)	(-2.35)	(-0.99)
Months abroad (*)	1.01^{**}	1.13^{***}	1.01^{***}	1.05^{***}	1.09^{***}	1.14^{***}	1.13^{**}	1.12^{**}	1.14^{***}	1.13^{***}	1.23^{***}	1.09^{+}
	(2.78)	(3.32)	(3.32)	(3.32)	(3.32)	(3.64)	(3.20)	(3.12)	(3.51)	(3.31)	(3.55)	(1.93)
PhD from abroad	0.92	1.19	1.19	1.19	1.19	1.04	1.25	1.27	1.31	1.22	1.81^{+}	1.08
(Dummy)	(-0.38)	(0.86)	(0.86)	(0.86)	(0.86)	(0.16)	(1.07)	(1.12)	(1.47)	(1.03)	(1.79)	(0.30)
University of	0.89	0.83	0.83	0.83	0.83	0.78	0.80	0.86	0.80	0.83	0.76	0.94
excellence	(-0.79)	(-1.19)	(-1.19)	(-1.19)	(-1.19)	(-1.63)	(-1.38)	(-0.94)	(-1.42)	(-1.22)	(-1.11)	(-0.31)
Awards (*)	1.06	1.07	1.01	1.03	1.05	1.08	1.13	1.12	1.05	1.06	0.93	1.15
	(1.11)	(0.64)	(0.64)	(0.64)	(0.64)	(0.72)	(1.05)	(1.08)	(0.49)	(0.48)	(-0.35)	(1.02)
Research grants (*)	1.24^{***}	1.61^{***}	1.05^{***}	1.21^{***}	1.39^{***}	1.52^{***}	1.54^{***}	1.50^{***}	1.56^{***}	1.56^{***}	1.72^{**}	1.49^{**}
	(5.25)	(4.73)	(4.73)	(4.73)	(4.73)	(4.45)	(3.96)	(4.07)	(4.46)	(4.40)	(3.19)	(3.16)

Table A1. Continued.

	(1) Non-logged variables	(2) Main model (*ln)	(3) *Log (1.1)[1]	(4) *Log (1.5)[2]	(5) *Log (2)[3]	(6) Censored Data (*ln)[4]	(7) Listwise Deletion (*ln)[5]	(8) Only complete data (*ln)	(9) Coder	(10) Publications (w/o co-author adjustment)	(10) Only Women	(11) Only Men
Mobility (*)	1.41***	3.28***	1.12***	1.62***	2.28***	3.30***	3.34***	3.02***	3.58***	3.29***	3.61***	3.31***
	(10.39)	(10.87)	(10.87)	(10.87)	(10.87)	(11.02)	(10.56)	(9.52)	(11.63)	(10.83)	(6.79)	(8.79)
Interim professor (*)	1.03	1.18	1.02	1.07	1.12	1.18	1.14	1.16	1.27^{+}	1.20	0.85	1.40^{+}
	(0.42)	(1.13)	(1.13)	(1.13)	(1.13)	(1.14)	(0.88)	(1.02)	(1.72)	(1.29)	(-0.66)	(1.90)
Co-authors (*)	1.00	1.07	1.01	1.03	1.05	1.14^{+}	1.13	1.09	1.08	0.82^{+}	0.99	1.23*
	(1.04)	(0.89)	(0.89)	(0.89)	(0.89)	(1.70)	(1.45)	(1.11)	(0.98)	(-1.86)	(-0.10)	(2.04)
Incomplete	2.32***	2.94***	2.94***	2.94***	2.94***	2.85***	2.75***	1.00	2.72***	2.72***	3.66***	2.35***
	(4.95)	(6.21)	(6.21)	(6.21)	(6.21)	(5.90)	(5.37)	(.)	(5.50)	(5.68)	(4.79)	(3.86)
Entry cohorts after 2009	0.45***	0.44***	0.44***	0.44***	0.44***	0.44***	0.46**	0.34**	0.44***	0.44***	0.35**	0.58^{+}
	(-3.32)	(-3.49)	(-3.49)	(-3.49)	(-3.49)	(-3.51)	(-3.16)	(-2.71)	(-3.47)	(-3.49)	(-3.02)	(-1.75)
Coder1									1.00			
									(.)			
Coder2									1.38			
									(0.86)			
Coder3									0.13***			
									(-3.79)			
Coder4									0.96			
									(-0.17)			
Coder5									1.02			
									(0.12)			
Coder6									2.76^{+}			
									(1.71)			
Coder7									0.60			
									(-1.28)			
Coder8									1.13			
									(0.63)			
Coder9									1.19			
									(0.80)			
Coder10									1.18			
									(0.76)			
Pseudo R2	0.12	0.14	0.14	0.14	0.14	0.15	0.15	0.14	0.15	0.14	0.21	0.14
Log-likelihood	-3067.71	-2988.57	-2988.57	-2988.57	-2988.57	-2933.30	-2596.45	-2481.15	-2969.32	-2995.83	-891.72	-1709.82
Degrees of freedom	23	23	23	23	23	23	23	22	32	23	22	22
Chi2	624.18	745.47	745.47	745.47	745.47	873.96	685.77	585.77	830.91	701.12	451.54	417.83
AIC	6181.43	6023.14	6023.14	6023.14	6023.14	5912.60	5238.91	5006.30	6002.65	6037.67	1827.44	3463.63
BIC	6381.71	6223.42	6223.42	6223.42	6223.42	6112.06	5436.41	5196.77	6281.30	6237.95	2000.00	3643.18
Number of events (tenure)	554	554	554	554	554	554	494	471	554	554	203	351
N (persons)	2,528	2,528	2,528	2,528	2,528	2,522	2,280	2,358	2,528	2,528	1,421	1,107
N (persons-publications)	44,711	44,711	44,711	44,711	44,711	43,135	39,618	42,521	44,711	44,711	18,834	25,877
Data (%)	100.00	100.00	100.00	100.00	100.00	96.48	88.61	95.10	100.00	100.00	42.12	57.88

Exponentiated coefficients (hazard ratios); t statistics in parentheses; sq. = squared. *+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*
[1] With a 10% increase in publications. [2] With a 50% increase in publications. [3] With a 100% increase (doubling) in publications. [4] Censors all publications after 15 years in academia if the person is not yet appointed.
[5] Drops missing data in CVs (listwise deletion). [6]Drops scientists with incomplete publication lists ("Incomplete").

Table A2. Career stages of academic psychologists, separately by gender.

Career stage	Gender		
	Male	Female	Total
Pre-doc	294	531	825
	35.64	64.36	100.00
	26.56	37.37	32.63
Post-doc	395	620	1015
	38.92	61.08	100.00
	35.68	43.63	40.15
Habilitation / junior professor (W1)	67	65	132
	50.76	49.24	100.00
	6.05	4.57	5.22
Associate or full professor (W2 / W3)	351	205	556
	63.13	36.87	100.00
	31.71	14.43	21.99
Total	1107	1421	2528
	43.79	56.21	100.00
	100.00	100.00	100.00

Note: First row has *frequencies*; second row has *row percentages* and third row has *column percentages.*

Table A3.1. Tabulation incomplete publication lists, separately by gender.

	Publication lists		
Gender	Full	Incomplete	Total
Male	300	51	351
	85.47	14.53	100.00
	63.69	61.45	63.36
Female	171	32	203
	84.24	15.76	100.00
	36.31	38.55	36.64
Total	471	83	554
	85.02	14.98	100.00
	100.00	100.00	100.00

Note: First row has *frequencies*; second row has *row percentages* and third row has *column percentages.*

Table A3.2. Summary statistics (t test) for incomplete publications lists at initial appointment, separately by gender.

	Male	Female	Mean(M)	Mean(F)	dif	St_Err	t_value	p_value
Incomplete pub lists	351	203	.15	.16	-.01	.03	-.4	.7

Table A4. Cox regression models on hazards of becoming a tenured professor, including a dummy variable after 2008 to consider affirmative actions in Germany "Professorinnenprogramm."

	(1) Post 2008	(2) Professors	(3) Female professors	(4) Male professors
Female	1.13	1.21^{+}		
	(1.14)	(1.81)		
Children	1.22	1.26^{+}	0.90	1.44^{*}
(ref. childless)	(1.45)	(1.87)	(-0.49)	(2.30)
W/o child info	1.08	1.12	1.22	1.15
(ref. childless)	(0.54)	(0.90)	(0.95)	(0.86)
SSCI/SCIE journal articles (ln)	2.28^{***}	1.51^{***}	1.54^{*}	1.49^{***}
	(7.25)	(4.17)	(2.28)	(3.49)
Non-SSCI/SCIE articles (ln)	1.06	0.99	1.05	0.98
	(0.69)	(-0.17)	(0.31)	(-0.24)
Monographs (ln)	0.97	0.84	0.82	0.81
	(-0.18)	(-1.35)	(-0.86)	(-1.38)
Edited volumes (ln)	1.29	1.21	1.15	1.28
	(1.36)	(1.08)	(0.50)	(1.24)
Book chapters (ln)	1.45^{***}	1.29^{**}	1.79^{***}	1.19^{+}
	(4.30)	(3.19)	(4.21)	(1.73)
Gray literature (ln)	1.14^{+}	1.08	0.99	1.06
	(1.79)	(1.18)	(-0.11)	(0.72)
Years since habilitation	1.36^{***}	1.28^{***}	1.31^{***}	1.27^{***}
	(4.97)	(6.50)	(4.15)	(4.97)
Years since habilitation (sq.)	0.98^{**}	0.99^{***}	0.99^{*}	0.99^{***}
	(-2.70)	(-4.53)	(-2.09)	(-3.93)
Years since junior professor	1.30^{***}	1.11^{*}	1.12^{+}	0.96
	(5.35)	(2.19)	(1.77)	(-0.38)
Years since junior professor (sq.)	0.99^{**}	1.00	1.00	1.02^{+}
	(-3.27)	(0.29)	(0.23)	(1.95)
Months abroad (ln)	1.13^{**}	1.06^{+}	1.07	1.04
	(3.25)	(1.96)	(1.36)	(0.85)
PhD from abroad (Dummy)	1.19	1.23	2.63^{**}	0.99
	(0.88)	(0.92)	(2.65)	(-0.03)
University of excellence	0.82	0.64^{**}	0.47^{**}	0.68^{*}
	(-1.27)	(-2.99)	(-3.20)	(-2.00)
Awards (ln)	1.08	1.14	1.04	1.25^{+}
	(0.67)	(1.35)	(0.20)	(1.78)
Research grants (ln)	1.61^{***}	1.27^{**}	1.31^{+}	1.25^{+}
	(4.77)	(2.66)	(1.78)	(1.95)
Mobility (ln)	3.30^{***}	2.91^{***}	4.16^{***}	2.80^{***}
	(10.98)	(9.58)	(7.46)	(7.19)
Interim professor (ln)	1.19	0.92	0.63^{+}	1.10
	(1.19)	(-0.60)	(-1.95)	(0.58)
Co-authors (ln)	1.10	1.17^{*}	1.24^{*}	1.21^{*}
	(1.13)	(2.18)	(1.96)	(2.07)
Post2008	*0.89*	$\mathit{1.67}^{***}$	$\mathit{2.15}^{***}$	$\mathit{1.58}^{***}$
	(-1.03)	*(4.73)*	*(3.97)*	*(3.40)*
Incomplete	2.89^{***}	1.91^{***}	2.08^{*}	1.80^{**}
	(6.11)	(3.66)	(2.48)	(2.83)
Entry cohorts after 2009	0.46^{**}	3.21^{***}	2.45^{*}	3.23^{**}
	(-3.13)	(3.94)	(2.01)	(2.91)
Pseudo r²	0.14	0.10	0.15	0.11
Log-likelihood	-2987.94	-2652.05	-750.21	-1525.65
Degrees of freedom	24	24	23	23
Chi²	786.60	687.25	365.89	388.62
AIC	6023.87	5352.10	1546.42	3097.30
BIC	6232.86	5541.68	1701.13	3270.46
Number of events (tenure)	554	554	203	351
N (persons)	2,528	556	205	351
N (persons-publications)	44,711	19,914	6,165	13,749

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Table A5. Cox regression models on initial professorships (already obtained a PhD).

	(1) Main model	(2) Professors	(3) Female professors	(4) Male professors
Female	1.11	1.32**		
	(0.98)	(2.67)		
Children	1.21	1.22	0.87	1.41*
(ref. childless)	(1.44)	(1.61)	(-0.68)	(2.16)
W/o child info	1.09	1.07	1.12	1.09
(ref. childless)	(0.64)	(0.57)	(0.55)	(0.52)
SSCI/SCIE journal articles (ln)	2.26***	1.55***	1.66*	1.55***
	(7.23)	(4.52)	(2.55)	(3.89)
Non-SSCI/SCIE articles (ln)	1.06	0.97	1.07	0.94
	(0.69)	(-0.44)	(0.44)	(-0.73)
Monographs (ln)	0.98	0.84	0.79	0.84
	(-0.12)	(-1.35)	(-1.01)	(-1.21)
Edited volumes (ln)	1.29	1.23	1.15	1.29
	(1.35)	(1.21)	(0.46)	(1.35)
Book chapters (ln)	1.47***	1.24**	1.61***	1.17+
	(4.45)	(2.77)	(3.44)	(1.67)
Gray literature (ln)	1.15+	1.04	0.93	1.02
	(1.89)	(0.62)	(-0.71)	(0.29)
Years since habilitation	1.36***	1.28***	1.31***	1.26***
	(4.96)	(6.39)	(3.91)	(4.87)
Years since habilitation (sq.)	0.98**	0.99***	0.99*	0.99***
	(-2.75)	(-4.34)	(-2.01)	(-3.83)
Years since junior professor	1.30***	1.13**	1.17*	0.98
	(5.28)	(2.65)	(2.49)	(-0.19)
Years since junior professor (sq.)	0.99**	1.00	1.00	1.02+
	(-3.24)	(-0.25)	(-0.29)	(1.73)
Months abroad (ln)	1.13***	1.06+	1.09	1.03
	(3.36)	(1.84)	(1.57)	(0.65)
PhD from abroad (Dummy)	1.14	1.21	2.57**	1.00
	(0.69)	(0.87)	(2.58)	(0.01)
University of excellence	0.83	0.60**	0.48**	0.63*
	(-1.25)	(-3.29)	(-3.04)	(-2.34)
Awards (ln)	1.06	1.14	0.96	1.29*
	(0.56)	(1.38)	(-0.24)	(2.05)
Research grants (ln)	1.60***	1.30**	1.28	1.28*
	(4.71)	(2.92)	(1.59)	(2.14)
Mobility (ln)	3.22***	3.09***	4.20***	2.97***
	(10.77)	(10.10)	(7.59)	(7.74)
Interim professor (ln)	1.18	0.98	0.69	1.15
	(1.16)	(-0.18)	(-1.58)	(0.88)
Co-authors (ln)	1.08	1.29***	1.44***	1.30**
	(0.93)	(3.67)	(3.35)	(2.87)
Incomplete	2.85***	1.83**	2.12*	1.66*
	(6.15)	(3.25)	(2.51)	(2.25)
Entry cohorts after 2009	0.56**	4.41***	4.20***	4.28***
	(-2.61)	(5.13)	(3.61)	(3.52)
Pseudo r²	0.14	0.10	0.14	0.10
Log-likelihood	-2978.08	-2663.81	-757.75	-1531.77
Degrees of freedom	23	23	22	22
Chi²	716.74	692.36	416.98	385.20
AIC	6002.16	5373.62	1559.49	3107.55
BIC	6200.53	5555.30	1707.48	3273.18
Number of events (tenure)	554	554	203	351
N (persons)	1,703	556	205	351
N (persons-publications)	41,158	19,914	6,165	13,749

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A6.1. Summary statistics (t tests) of SSCI/SCIE-articles at initial appointment, separately for research grants.

	W/o funding	Funding	Mean (w/o funding)	Mean (funding)	dif	St_Err	t_value	p_value
SSCI/SCIE-articles by research grants	263	291	8.14	10.72	-2.58	.65	-4	0
SSCI/SCIE-articles by research grants (only women)	94	109	6.52	9.06	-2.54	.8	-3.2	0
SSCI/SCIE-articles by research grants (only men)	169	182	9.05	11.72	-2.67	.9	-3	0

Some predictors may reasonably correlate, such as SSCI/SCIE articles and research grants. To test whether SSCI/SCIE articles and research grants works differently for women and men (that in turn may bias the main effects in getting tenured), we conducted t-tests on this. We do not find correlations between SSCI/SCIE articles and research grants for only women, so that we do not assume gender-specific differences on pre-outcome variables.

Same applies for SSCI/SCIE articles and social capital (mobility (A6.2) or interim professorships (A6.3)), where we do not find significant correlations.

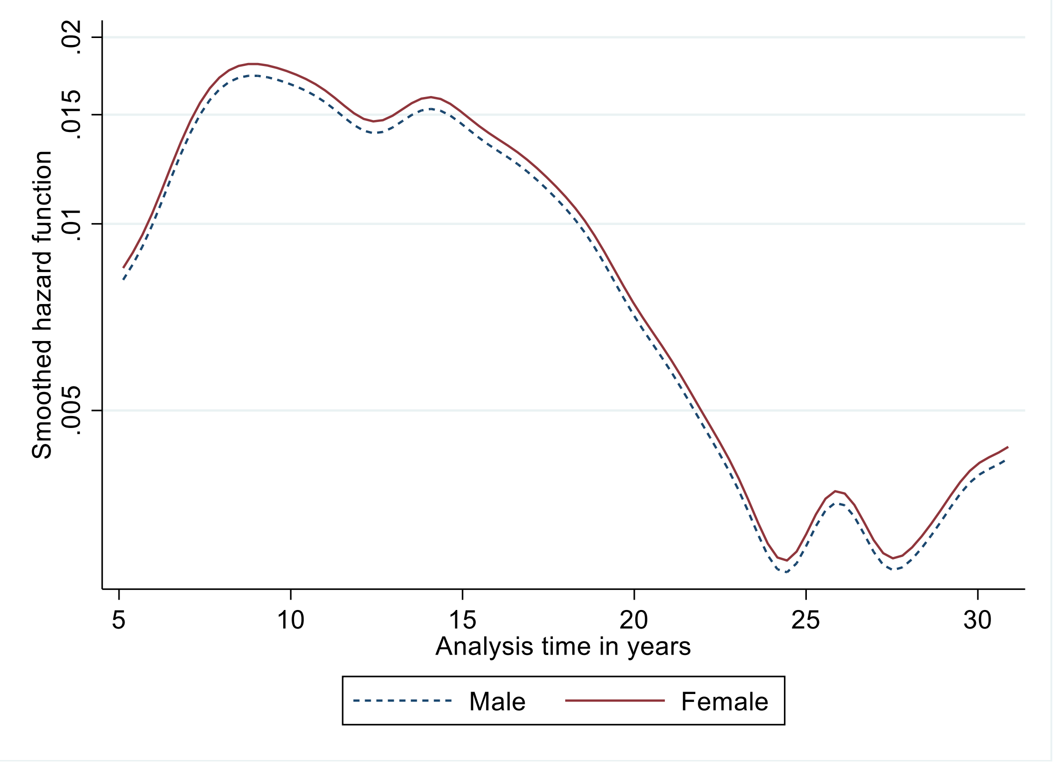
Table A6.2. Summary statistics (t tests) of SSCI/SCIE-articles at initial appointment, separately for mobility (dichotomous, groups divided at the mean).

	Mobility < Ø	Mobility ≥ Ø	Mean (M < Ø)	Mean (M ≥ Ø)	dif	St_Err	t_value	p_value
SSCI/SCIE-articles by mobility	255	216	10.87	10.11	.76	.71	1.05	.28
SSCI/SCIE-articles by mobility (only women)	93	78	9.09	8.46	.63	.88	.7	.47
SSCI/SCIE-articles by mobility (only men)	162	138	11.89	11.04	.85	.98	.85	.39

Table A6.3. Summary statistics (t tests) of SSCI/SCIE-articles at initial appointment, separately for interim professorships.

	W/o interim	Interim profs	Mean (w/o interim)	Mean (interim)	dif	St_Err	t_value	p_value
SSCI/SCIE-articles by interim professorships	294	177	10.94	9.83	1.11	.73	1.5	.13
SSCI/SCIE-articles by interim professorships (only women)	110	61	9.25	8	1.26	.91	1.4	.17
SSCI/SCIE-articles by interim professorships (only men)	184	116	11.95	10.79	1.16	1	1.15	.25

Figure B1. Hazard function: female versus male psychologists.



Note: The hazard function shows scientists who have not yet become professors, but the probability of experiencing the event (all other variables are held at their means).

Table A7. Cox regressions on hazards of becoming a tenured professor, interaction effects on gender (test of female devaluation theory).

	(1) Female × Children	(2) Female × SSCI/SCIE publications	(3) Female × Non-SSCI/SCIE publications	(4) Female × Monographs	(5) Female × Edited volumes	(6) Female × Book chapters	(7) Female × Gray literature	(8) Female × Habilitation
Female	1.36*	0.63^{+}	1.00	1.10	1.09	0.96	1.22	0.96
	(2.31)	(-1.92)	(-0.03)	(0.77)	(0.80)	(-0.23)	(1.42)	(-0.32)
Children	1.49*	1.19	1.21	1.22	1.22	1.20	1.23	1.25
(ref. children)	(2.41)	(1.28)	(1.44)	(1.49)	(1.47)	(1.36)	(1.52)	(1.64)
W/o child info	1.13	1.08	1.09	1.09	1.09	1.09	1.09	1.13
(ref. children)	(0.91)	(0.54)	(0.64)	(0.63)	(0.64)	(0.66)	(0.61)	(0.86)
SSCI/SCIE journal articles	2.27***	2.11***	2.31***	2.29***	2.29***	2.30***	2.27***	2.31***
(ln)	(7.18)	(6.23)	(7.39)	(7.39)	(7.30)	(7.37)	(7.24)	(7.44)
Non-SSCI/SCIE articles	1.06	1.07	1.03	1.07	1.08	1.08	1.07	1.07
(ln)	(0.67)	(0.76)	(0.29)	(0.76)	(0.80)	(0.88)	(0.70)	(0.79)
Monographs (ln)	1.00	0.98	0.97	0.97	0.98	0.96	1.00	0.98
	(-0.02)	(-0.11)	(-0.22)	(-0.16)	(-0.15)	(-0.27)	(-0.01)	(-0.12)
Edited volumes (ln)	1.29	1.31	1.30	1.29	1.25	1.28	1.29	1.25
	(1.36)	(1.46)	(1.39)	(1.34)	(1.06)	(1.33)	(1.34)	(1.19)
Book chapters (ln)	1.49***	1.48***	1.48***	1.47***	1.47***	1.41***	1.47***	1.48***
	(4.63)	(4.60)	(4.53)	(4.45)	(4.45)	(3.52)	(4.44)	(4.58)
Gray literature (ln)	1.15^{+}	1.15^{+}	1.16^{+}	1.15^{+}	1.15^{+}	1.15^{+}	1.20*	1.15^{+}
	(1.86)	(1.94)	(1.95)	(1.93)	(1.93)	(1.94)	(2.14)	(1.89)
Years since habilitation	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***	1.33***
	(4.96)	(5.01)	(5.00)	(5.00)	(4.97)	(5.00)	(5.05)	(4.40)
Years since habilitation	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**	0.98*
(sq.)	(-2.69)	(-2.76)	(-2.74)	(-2.75)	(-2.73)	(-2.75)	(-2.75)	(-2.54)
Years since junior	1.31***	1.28***	1.30***	1.30***	1.30***	1.29***	1.31***	1.30***
professor	(5.56)	(4.84)	(5.22)	(5.34)	(5.31)	(5.10)	(5.28)	(5.35)
Years since junior	0.99***	0.99**	0.99**	0.99**	0.99**	0.99**	0.99**	0.99**
professor (sq.)	(-3.43)	(-2.78)	(-3.10)	(-3.23)	(-3.21)	(-3.01)	(-3.23)	(-3.24)
Months abroad (ln)	1.13***	1.13***	1.13***	1.13***	1.13***	1.13**	1.13***	1.13***
	(3.35)	(3.43)	(3.35)	(3.32)	(3.32)	(3.26)	(3.40)	(3.48)
PhD from abroad	1.17	1.18	1.18	1.19	1.19	1.18	1.18	1.19
(Dummy)	(0.78)	(0.82)	(0.85)	(0.86)	(0.86)	(0.85)	(0.84)	(0.88)
University of excellence	0.82	0.83	0.83	0.83	0.83	0.82	0.83	0.83
	(-1.25)	(-1.20)	(-1.21)	(-1.19)	(-1.23)	(-1.26)	(-1.17)	(-1.24)
Awards (ln)	1.10	1.06	1.07	1.07	1.08	1.06	1.07	1.08
	(0.82)	(0.56)	(0.63)	(0.65)	(0.68)	(0.55)	(0.61)	(0.72)
Research grants (ln)	1.60***	1.61***	1.60***	1.61***	1.61***	1.60***	1.61***	1.62***
	(4.72)	(4.72)	(4.68)	(4.72)	(4.76)	(4.68)	(4.73)	(4.89)
Mobility (ln)	3.29***	3.28***	3.27***	3.28***	3.28***	3.29***	3.28***	3.31***
	(10.86)	(10.87)	(10.86)	(10.87)	(10.87)	(10.94)	(10.84)	(10.92)
Interim professor (ln)	1.18	1.17	1.17	1.17	1.17	1.17	1.17	1.13
	(1.14)	(1.07)	(1.11)	(1.12)	(1.12)	(1.11)	(1.08)	(0.84)
Co-authors (ln)	1.08	1.07	1.07	1.07	1.07	1.08	1.08	1.07
	(0.89)	(0.85)	(0.87)	(0.90)	(0.89)	(0.93)	(0.91)	(0.80)
Incomplete	2.82***	2.95***	2.97***	2.95***	2.95***	2.99***	2.92***	2.88***
	(5.80)	(6.27)	(6.34)	(6.31)	(6.22)	(6.44)	(6.13)	(6.10)
Entry cohorts after 2009	0.43***	0.46**	0.44***	0.44***	0.44***	0.45***	0.43***	0.45***
	(-3.60)	(-3.27)	(-3.42)	(-3.48)	(-3.49)	(-3.41)	(-3.51)	(-3.42)
Female × Children	0.62*							
	(-2.12)							
Female × SSCI/SCIE journal articles (ln)		1.34*						
		(2.43)						
Female × Non-SSCI/SCIE			1.13					
articles (ln)			(0.95)					
Female × Monographs (ln)				1.03				
				(0.12)				
Female × Edited volumes					1.13			
(ln)					(0.37)			
Female × Book chapters						1.13		
(ln)						(1.08)		
Female × Gray literature							0.87	
(ln)							(-1.02)	
Female × Years since								1.07^{+}
habilitation								(1.94)
Pseudo R²	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Log-likelihood	-2985.46	-2985.02	-2988.02	-2988.56	-2988.46	-2987.82	-2987.92	-2986.00
Degrees of freedom	24	24	24	24	24	24	24	24
Chi²	739.77	792.32	771.45	753.04	757.16	748.92	740.34	746.93
AIC	6018.92	6018.05	6024.04	6025.11	6024.93	6023.63	6023.84	6019.99
BIC	6227.91	6227.04	6233.03	6234.10	6233.92	6232.62	6232.83	6228.98
Number of events (tenure)	554	554	554	554	554	554	554	554
N (persons)	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528
N (persons-publications)	44,711	44,711	44,711	44,711	44,711	44,711	44,711	44,711

Table A7. Continued.

	(9) Female × Junior professor	(10) Female × Months abroad	(11) Female × PhD from abroad	(12) Female × University of excellence	(13) Female × Awards	(14) Female × Research grants	(15) Female × Mobility	(16) Female × Interim professor	(17) Female × Co-authors
Female	1.12	0.89	1.07	1.21	1.15	0.98	1.14	1.19	1.09
	(0.99)	(-0.75)	(0.58)	(1.44)	(1.14)	(-0.16)	(0.57)	(1.41)	(0.26)
Children	1.22	1.21	1.23	1.21	1.23	1.23	1.22	1.21	1.22
(ref. childless)	(1.50)	(1.42)	(1.52)	(1.45)	(1.52)	(1.52)	(1.49)	(1.42)	(1.49)
W/o child info	1.09	1.08	1.08	1.08	1.09	1.09	1.09	1.08	1.09
(ref. childless)	(0.64)	(0.55)	(0.59)	(0.58)	(0.65)	(0.64)	(0.63)	(0.53)	(0.63)
SSCI/SCIE journal	2.28***	2.26***	2.27***	2.27***	2.29***	2.26***	2.28***	2.27***	2.28***
articles (ln)	(7.26)	(7.15)	(7.21)	(7.21)	(7.30)	(7.21)	(7.27)	(7.25)	(7.24)
Non-SSCI/SCIE	1.07	1.08	1.07	1.07	1.07	1.06	1.07	1.07	1.07
articles (ln)	(0.76)	(0.89)	(0.78)	(0.73)	(0.76)	(0.67)	(0.76)	(0.75)	(0.76)
Monographs (ln)	0.98	0.97	0.98	0.98	0.98	0.99	0.98	0.99	0.98
	(-0.12)	(-0.20)	(-0.15)	(-0.12)	(-0.14)	(-0.09)	(-0.12)	(-0.06)	(-0.12)
Edited volumes (ln)	1.28	1.31	1.30	1.30	1.27	1.30	1.29	1.28	1.29
	(1.33)	(1.47)	(1.40)	(1.40)	(1.28)	(1.41)	(1.34)	(1.32)	(1.34)
Book chapters (ln)	1.47***	1.45***	1.47***	1.47***	1.48***	1.46***	1.47***	1.47***	1.47***
	(4.48)	(4.28)	(4.44)	(4.46)	(4.52)	(4.39)	(4.45)	(4.42)	(4.44)
Gray literature (ln)	1.15^{+}	1.15^{+}	1.16^{+}	1.15^{+}	1.15^{+}	1.15^{+}	1.15^{+}	1.15^{+}	1.15^{+}
	(1.93)	(1.88)	(1.95)	(1.90)	(1.90)	(1.93)	(1.92)	(1.82)	(1.94)
Years since	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***	1.36***
habilitation	(4.99)	(5.09)	(5.01)	(4.98)	(4.99)	(5.01)	(5.00)	(4.99)	(4.98)
Years since	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**	0.98**
habilitation (sq.)	(-2.74)	(-2.79)	(-2.74)	(-2.72)	(-2.73)	(-2.73)	(-2.74)	(-2.73)	(-2.74)
Years since junior	1.30***	1.30***	1.30***	1.30***	1.30***	1.30***	1.30***	1.30***	1.30***
professor	(5.48)	(5.25)	(5.26)	(5.33)	(5.38)	(5.36)	(5.30)	(5.30)	(5.29)
Years since junior	0.99**	0.99**	0.99**	0.99**	0.99**	0.99***	0.99**	0.99**	0.99**
professor (sq.)	(-2.93)	(-3.27)	(-3.16)	(-3.16)	(-3.12)	(-3.41)	(-3.21)	(-3.11)	(-3.20)
Months abroad	1.13***	1.08^{+}	1.13***	1.13***	1.13***	1.13***	1.13***	1.13**	1.13***
(ln)	(3.32)	(1.70)	(3.34)	(3.31)	(3.31)	(3.32)	(3.32)	(3.27)	(3.32)
PhD from abroad	1.19	1.20	1.00	1.20	1.19	1.19	1.19	1.19	1.19
(Dummy)	(0.86)	(0.92)	(0.01)	(0.92)	(0.87)	(0.88)	(0.86)	(0.86)	(0.86)
University of	0.83	0.83	0.83	0.94	0.83	0.83	0.83	0.84	0.83
excellence	(-1.18)	(-1.20)	(-1.18)	(-0.30)	(-1.19)	(-1.18)	(-1.18)	(-1.11)	(-1.20)
Awards (ln)	1.08	1.07	1.07	1.07	1.11	1.08	1.07	1.08	1.07
	(0.66)	(0.61)	(0.57)	(0.64)	(0.74)	(0.69)	(0.64)	(0.67)	(0.64)
Research grants (ln)	1.61***	1.61***	1.61***	1.61***	1.60***	1.49***	1.61***	1.61***	1.61***
	(4.73)	(4.80)	(4.74)	(4.72)	(4.70)	(3.33)	(4.73)	(4.73)	(4.75)
Mobility (ln)	3.28***	3.27***	3.30***	3.30***	3.28***	3.29***	3.30***	3.26***	3.28***
	(10.87)	(10.97)	(10.89)	(10.78)	(10.85)	(10.86)	(8.76)	(10.83)	(10.87)
Interim professor (ln)	1.18	1.19	1.18	1.19	1.18	1.17	1.18	1.29	1.18
	(1.13)	(1.21)	(1.15)	(1.21)	(1.15)	(1.10)	(1.14)	(1.45)	(1.13)
Co-authors (ln)	1.08	1.09	1.08	1.08	1.07	1.08	1.08	1.08	1.07
	(0.90)	(1.06)	(0.95)	(0.95)	(0.88)	(0.94)	(0.90)	(0.99)	(0.76)
Incomplete	2.95***	3.00***	2.98***	2.91***	2.93***	2.87***	2.95***	2.95***	2.94***
	(6.21)	(6.23)	(6.22)	(6.11)	(6.15)	(6.06)	(6.20)	(6.18)	(6.21)
Entry cohorts after	0.44***	0.44***	0.43***	0.44***	0.44***	0.44***	0.44***	0.43***	0.44***
2009	(-3.49)	(-3.52)	(-3.54)	(-3.49)	(-3.49)	(-3.46)	(-3.49)	(-3.53)	(-3.47)
Female × Years since junior	0.99								
professorship	(-0.14)								
Female × Months		1.13*							
abroad (ln)		(1.96)							
Female × PhD from			1.71						
abroad (Dummy)			(1.54)						
Female × University				0.74					
of excellence				(-1.00)					
Female × Awards					0.91				
(ln)					(-0.47)				
Female × Research						1.26			
grants (ln)						(1.37)			
Female × Mobility							0.98		
(ln)							(-0.11)		
Female × Interim								0.81	
professor (ln)								(-0.87)	
Female × Co-authors									1.01
(ln)									(0.08)
Pseudo r²	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Log-likelihood	-2988.56	-2986.14	-2987.12	-2987.86	-2988.43	-2987.46	-2988.56	-2987.99	-2988.56
Degrees of freedom	24	24	24	24	24	24	24	24	24
Chi²	752.74	766.72	756.07	736.89	740.82	764.38	750.02	740.62	751.40
AIC	6025.11	6020.29	6022.25	6023.72	6024.85	6022.92	6025.12	6023.98	6025.13
BIC	6234.10	6229.28	6231.24	6232.71	6233.84	6231.91	6234.11	6232.97	6234.12
Number of events (tenure)	554	554	554	554	554	554	554	554	554
N (persons)	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528
N (persons-publications)	44,711	44,711	44,711	44,711	44,711	44,711	44,711	44,711	44,711

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Appendix Chapter 4

The study design: Differences between data collection points

We adjusted the data across the data collection points. The reason for this is due to the "dynamic structures" of CVs. While updating CV information in 2016 and 2019, some CVs are more or less comprehensive than in 2013. Therefore the overall results are robust, but coefficients differ marginally. Additionally, we started collecting data not only for sociology departments but started to disentangle between sociologists and political scientists in 2019. While we previously included few political scientists at social science institutes in the origin study design, we made a clearer distinction between sociologists and political scientists in 2019, so that case numbers slightly differ.

Instead of measuring only articles of journals ranked in the Web of Science Social Science Citation Index (SSCI), we extend this category by those ranked in the Science Citation Index Expanded (SCIE). Although the latter is not ideal-typical for the social sciences but rather the natural sciences (and therefore only takes into account 4% of the amount of articles within the Web of Science), it should not be neglected.

Lutter and Schröder (2016:1003) operationalized symbolic capital by the faculty's prestige, with which scientists have been during their career, provided by the German Council of Science and Humanities in 2005. With the new study design in 2019, we use another operationalization. In 2005, the Excellence Initiative was introduced in Germany to increase competitiveness and international visibility in German research so that certain universities were ranked as "excellence" and got financial support. In the replication of the study and the new analyses, we use this university status to generate variables for "prestige graduation," "prestige doctorate," and "prestige habilitation."

Instead of coding only "*Juniorprofessuren*" introduced in Germany in 2002, we also coded adequate assistant professorships according to the US academe.

Table A1.1. Summary statistics (including waves 2013, 2016, 2019) at time of first appointment.

	N	Mean	SD	Min	Max	p25	Median	p75
Time to professorship	396	15.4	4.84	3.97	33.31	12.06	14.98	18.4
SSCI/SCIE articles	396	4.43	4.24	0	28.67	1.15	3.42	6.33
Non-SSCI/SCIE articles	396	7.25	7.18	0	79.8	2.83	5.12	10
Books	396	2.43	1.99	0	22.5	1	2	3
Edited volumes	396	1.67	1.94	0	14.97	0	1.07	2.59
Book chapters	396	15.89	12.03	0	112.7	7.5	13.33	20.88
Gray literature	396	7.69	9.78	0	68	1	4.64	9.73
Female	396	.4	.49	0	1	0	0	1
Prestige graduation	396	.31	.46	0	1	0	0	1
Prestige doctorate	396	.3	.46	0	1	0	0	1
Prestige habilitation	396	.19	.39	0	1	0	0	0
Awards	396	.39	.96	0	9	0	0	0
Months abroad	396	21.94	34.07	0	216	0	10	26
Studied abroad	396	.27	.44	0	1	0	0	1
Doctorate abroad	396	.13	.34	0	1	0	0	0
International publications	396	11.1	12.89	0	75	2	7	16
Mobility	396	3.25	1.77	0	10	2	3	4
Interim professor	396	.83	1.04	0	7	0	1	1
Department size	396	10.87	8.99	1	37	5	8	13
Co-authors	396	31.96	32.94	0	205	11.5	23	38.5
Habilitation	396	.64	.48	0	1	0	1	1
Years since habilitation	396	2.02	2.63	0	17	0	1	3
Assistant professor	396	.17	.38	0	1	0	0	0
Years since assistant professor	396	.78	1.92	0	12	0	0	0
Childless	396	.26	.44	0	1	0	0	1
With children	396	.48	.5	0	1	0	0	1
W/o child info	396	.26	.44	0	1	0	0	1
DFG funding	396	.56	.84	0	4	0	0	1
Entry cohort before 1990	396	.29	.45	0	1	0	0	1
Entry cohort 1990-1999	396	.4	.49	0	1	0	0	1
Entry cohort 2000-2009	396	.29	.45	0	1	0	0	1
Entry cohort after 2009	396	.03	.16	0	1	0	0	0

Table A1.2. Only men: Summary statistics (including waves 2013, 2016, 2019) at time of first appointment.

	N	Mean	SD	Min	Max	p25	Median	p75
Time to professorship	239	15.65	4.77	3.97	33.31	12.61	15.66	18.47
SSCI/SCIE articles	239	5.09	4.65	0	28.67	1.67	4	7.33
Non-SSCI/SCIE articles	239	8.46	8.13	0	79.8	3.4	6.83	11.29
Books	239	2.76	2.26	0	22.5	1	2.33	3.65
Edited volumes	239	1.75	1.88	0	11	.4	1.17	2.9
Book chapters	239	17.23	11.7	0	55.33	7.83	15.83	23
Gray literature	239	8.77	10.77	0	68	1.67	5.33	11
Prestige graduation	239	.31	.47	0	1	0	0	1
Prestige doctorate	239	.3	.46	0	1	0	0	1
Prestige habilitation	239	.24	.43	0	1	0	0	0
Awards	239	.35	1.01	0	9	0	0	0
Months abroad	239	19.9	30.53	0	180	0	10	26
Studied abroad	239	.23	.42	0	1	0	0	0
Doctorate abroad	239	.11	.32	0	1	0	0	0
International publications	239	11.3	13.07	0	73	2	7	15
Mobility	239	3.28	1.78	0	10	2	3	4
Interim professor	239	.85	1.02	0	5	0	1	1
Department size	239	11.01	9.21	1	37	5	8	13
Co-authors	239	34.34	33.03	0	205	14	25	42
Habilitation	239	.7	.46	0	1	0	1	1
Years since habilitation	239	2.46	2.85	0	17	0	2	4
Assistant professor	239	.12	.32	0	1	0	0	0
Years since assistant professor	239	.52	1.57	0	8	0	0	0
Childless	239	.22	.42	0	1	0	0	0
With children	239	.52	.5	0	1	0	1	1
W/o child info	239	.26	.44	0	1	0	0	1
DFG funding	239	.53	.85	0	4	0	0	1
Entry cohort before 1990	239	.35	.48	0	1	0	0	1
Entry cohort 1990-1999	239	.4	.49	0	1	0	0	1
Entry cohort 2000-2009	239	.24	.43	0	1	0	0	0
Entry cohort after 2009	239	.02	.13	0	1	0	0	0

Table A1.3. Only women: Summary statistics (including waves 2013, 2016, 2019) at time of first appointment.

	N	Mean	SD	Min	Max	p25	Median	p75
Time to professorship	157	15.01	4.94	4	29.7	11.9	14.76	18
SSCI/SCIE articles	157	3.43	3.31	0	22.16	1	2.95	5.17
Non-SSCI/SCIE articles	157	5.41	4.91	0	30.5	2.2	4	7.33
Books	157	1.94	1.36	0	10.57	1	1.67	2.67
Edited volumes	157	1.55	2.03	0	14.97	0	1	2.33
Book chapters	157	13.85	12.27	0	112.7	6.5	11	17.33
Gray literature	157	6.04	7.78	0	55	1	4	7.83
Prestige graduation	157	.31	.46	0	1	0	0	1
Prestige doctorate	157	.29	.46	0	1	0	0	1
Prestige habilitation	157	.11	.32	0	1	0	0	0
Awards	157	.45	.87	0	5	0	0	1
Months abroad	157	25.06	38.75	0	216	0	11	26
Studied abroad	157	.32	.47	0	1	0	0	1
Doctorate abroad	157	.16	.37	0	1	0	0	0
International publications	157	10.8	12.65	0	75	2	7	16
Mobility	157	3.2	1.76	0	9	2	3	4
Interim professor	157	.81	1.07	0	7	0	0	1
Department size	157	10.66	8.66	1	37	5	8	13
Co-authors	157	28.34	32.59	0	197	9	19	32
Habilitation	157	.54	.5	0	1	0	1	1
Years since habilitation	157	1.35	2.09	0	10	0	0	2
Assistant professor	157	.25	.43	0	1	0	0	0
Years since assistant professor	157	1.17	2.31	0	12	0	0	0
Childless	157	.31	.46	0	1	0	0	1
With children	157	.43	.5	0	1	0	0	1
W/o child info	157	.25	.44	0	1	0	0	1
DFG funding	157	.61	.82	0	4	0	0	1
Entry cohort before 1990	157	.19	.39	0	1	0	0	0
Entry cohort 1990-1999	157	.41	.49	0	1	0	0	1
Entry cohort 2000-2009	157	.36	.48	0	1	0	0	1
Entry cohort after 2009	157	.04	.19	0	1	0	0	0

Table A2. Hierarchical cox regression models on getting tenure (including waves 2013, 2016, 2019).

	(1) Controls	(2) Publications	(3) Gender	(4) Symbolic capital	(5) Transnational capital	(6) Social capital
SSCI/SCIE journal articles (ln)		1.96***	2.00***	1.94***	1.75***	1.67***
		(9.40)	(9.26)	(8.64)	(6.79)	(6.16)
Non-SSCI/SCIE articles (ln)		1.10	1.13	1.14+	1.15+	1.20*
		(1.23)	(1.56)	(1.77)	(1.92)	(2.38)
Books (ln)		1.51***	1.59***	1.55***	1.64***	1.63***
		(3.57)	(3.83)	(3.60)	(4.19)	(4.20)
Edited volumes (ln)		1.40***	1.41***	1.44***	1.38***	1.36**
		(3.44)	(3.45)	(3.65)	(3.42)	(3.11)
Book chapters (ln)		1.26**	1.25**	1.26**	1.32**	1.10
		(2.84)	(2.71)	(2.81)	(3.23)	(1.05)
Gray literature (ln)		0.90+	0.91	0.92	0.89+	0.89+
		(-1.77)	(-1.49)	(-1.44)	(-1.87)	(-1.84)
Female			1.54***	1.54***	1.50***	1.46**
			(3.68)	(3.74)	(3.65)	(3.21)
Prestige graduation				0.70**	0.69**	0.63***
				(-2.80)	(-2.99)	(-3.73)
Prestige doctorate				1.13	1.17	1.18
				(0.93)	(1.21)	(1.23)
Prestige habilitation				1.24	1.24	1.38*
				(1.40)	(1.46)	(2.06)
Awards (ln)				1.29+	1.25+	1.24
				(1.82)	(1.66)	(1.60)
Months abroad (ln)					1.19***	1.13**
					(5.04)	(3.14)
Studied abroad					0.87	0.89
					(-1.13)	(-0.96)
Doctorate abroad					1.26	1.50*
					(1.50)	(2.39)
International publications (ln)					1.10	1.14+
					(1.50)	(1.86)
Mobility (ln)						2.45***
						(8.71)
Interim professor (ln)						1.21
						(1.55)
Department size (ln)						1.07
						(0.74)
Co-authors (ln)						1.11+
						(1.75)
Incomplete	1.66***	2.21***	2.34***	2.31***	2.27***	2.06***
	(3.74)	(5.59)	(5.59)	(5.51)	(5.83)	(4.88)
Open positions (ln)	0.87	0.95	0.92	0.93	0.88	0.83+
	(-1.44)	(-0.45)	(-0.76)	(-0.66)	(-1.17)	(-1.76)
Years since habilitation	1.90***	1.53***	1.56***	1.54***	1.54***	1.48***
	(8.47)	(5.95)	(6.13)	(6.07)	(6.38)	(5.55)
Years since habilitation (sq.)	0.95***	0.96***	0.96***	0.97***	0.97***	0.97***
	(-5.16)	(-4.11)	(-4.18)	(-4.18)	(-4.34)	(-4.22)
Years since assistant prof (ln)	3.41***	2.51***	2.39***	2.34***	2.22***	2.28***
	(13.15)	(8.72)	(7.88)	(7.33)	(7.29)	(7.85)
Pseudo r²	0.06	0.10	0.10	0.10	0.11	0.13
Log-likelihood	-2839.35	-2737.12	-2728.05	-2720.38	-2694.70	-2643.51
Degrees of freedom	5	11	12	16	20	24
Chi²	280.79	422.22	410.07	454.43	618.78	702.52
AIC	5688.70	5496.24	5480.11	5472.77	5429.41	5335.03
BIC	5732.85	5593.36	5586.06	5614.03	5605.99	5546.92
Number of events (tenure)	486	486	486	486	486	486
N (persons)	2,290	2,290	2,290	2,290	2,290	2,290
N (persons-publications)	50,457	50,457	50,457	50,457	50,457	50,457

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A3. Cox regression models on getting tenure, including all independent variables and additional robustness tests (including waves 2013, 2016, 2019).

	(1) DFG funding	(2a) Entry cohorts	(2b) Post 2013[1]	(3) Other academic positions	(4) Drop W3 profs	(5) PhD	(6) Habil/ assist prof	(7) Tenured Professors
Female	1.47***	1.47***	1.49***	1.36**	1.50***	1.46***	1.52***	1.30*
	(3.41)	(3.38)	(3.48)	(2.68)	(3.33)	(3.32)	(3.35)	(2.42)
DFG funding	1.40***	1.39***	1.40***	1.28***	1.45***	1.41***	1.40***	1.02
	(5.50)	(5.35)	(5.52)	(4.21)	(5.35)	(5.69)	(5.15)	(0.36)
Entry cohorts								
(ref. before 1990)								
1990-1999		1.02		1.15	1.01	1.02	0.99	2.04***
		(0.11)		(0.89)	(0.07)	(0.13)	(-0.03)	(4.73)
2000-2009		1.07		1.19	0.99	1.11	1.20	3.91***
		(0.39)		(0.95)	(-0.03)	(0.64)	(0.96)	(6.93)
after 2009		1.33		1.55	1.24	1.65^{+}	2.10*	24.09***
		(0.92)		(1.38)	(0.68)	(1.67)	(1.97)	(11.11)
Post 2013			0.71**					
			(-3.06)					
SSCI/SCIE journal	1.61***	1.63***	1.55***	1.55***	1.58***	1.63***	1.41***	1.29***
articles (ln)	(5.82)	(5.79)	(5.24)	(5.04)	(5.14)	(5.88)	(3.81)	(3.31)
Non-SSCI/SCIE	1.25**	1.25**	1.27**	1.23**	1.27**	1.26**	1.25**	1.12
articles (ln)	(2.98)	(2.93)	(3.12)	(2.70)	(3.01)	(3.05)	(2.64)	(1.48)
Books (ln)	1.55***	1.56***	1.51***	1.51**	1.56***	1.51***	1.28^{+}	1.32*
	(3.82)	(3.78)	(3.58)	(3.23)	(3.64)	(3.50)	(1.90)	(2.26)
Edited volumes (ln)	1.35**	1.35**	1.34**	1.30*	1.32**	1.39***	1.33**	1.29*
	(3.06)	(3.06)	(3.04)	(2.57)	(2.63)	(3.34)	(2.59)	(2.57)
Book chapters (ln)	1.05	1.06	1.02	1.04	1.06	1.05	1.10	0.91
	(0.54)	(0.63)	(0.17)	(0.43)	(0.59)	(0.55)	(0.92)	(-1.13)
Gray literature (ln)	0.90^{+}	0.90^{+}	0.90^{+}	0.86*	0.92	0.90^{+}	0.91	0.95
	(-1.75)	(-1.77)	(-1.73)	(-2.49)	(-1.34)	(-1.87)	(-1.52)	(-0.90)
Prestige graduation	0.63***	0.63***	0.65***	0.67***	0.62***	0.64***	0.63***	0.87
	(-3.70)	(-3.71)	(-3.53)	(-3.31)	(-3.59)	(-3.62)	(-3.47)	(-1.15)
Prestige doctorate	1.14	1.14	1.17	1.25^{+}	1.07	1.10	1.04	1.12
	(1.06)	(1.03)	(1.23)	(1.79)	(0.49)	(0.79)	(0.24)	(0.93)
Prestige habilitation	1.37*	1.38*	1.31^{+}	1.56**	1.35^{+}	1.41*	1.37^{+}	1.44**
	(1.99)	(2.04)	(1.74)	(2.81)	(1.80)	(2.17)	(1.94)	(2.83)
Awards (ln)	1.23	1.21	1.27^{+}	1.20	1.23	1.20	1.22	1.06
	(1.58)	(1.47)	(1.78)	(1.34)	(1.39)	(1.40)	(1.38)	(0.51)
Months abroad (ln)	1.13**	1.13**	1.12**	1.13**	1.13**	1.13**	1.15**	1.01
	(3.28)	(3.26)	(2.92)	(3.10)	(2.85)	(3.20)	(3.13)	(0.29)
Studied abroad	0.89	0.89	0.92	0.92	0.89	0.88	0.78^{+}	1.14
	(-0.92)	(-0.96)	(-0.69)	(-0.72)	(-0.87)	(-1.01)	(-1.77)	(1.18)
Doctorate abroad	1.49*	1.49*	1.47*	1.33^{+}	1.48*	1.43*	1.12	1.20
	(2.35)	(2.35)	(2.24)	(1.67)	(2.23)	(2.15)	(0.59)	(1.13)
International	1.10	1.09	1.15*	1.21*	1.11	1.08	1.04	1.15^{+}
publications (ln)	(1.43)	(1.25)	(2.01)	(2.47)	(1.35)	(1.05)	(0.50)	(1.91)
Mobility (ln)	2.53***	2.52***	2.58***	2.39***	2.51***	2.45***	2.49***	2.07***
	(8.99)	(8.98)	(9.14)	(8.24)	(8.47)	(8.75)	(7.81)	(6.94)
Interim professor	1.22	1.21	1.23^{+}	1.28^{+}	1.21	1.18	1.02	1.20
(ln)	(1.63)	(1.61)	(1.71)	(1.92)	(1.50)	(1.39)	(0.12)	(1.53)
Department size (ln)	1.08	1.08	1.07	1.06	1.08	1.07	1.01	1.10
	(0.84)	(0.84)	(0.79)	(0.61)	(0.85)	(0.77)	(0.11)	(1.16)
Co-authors (ln)	1.11^{+}	1.11^{+}	1.14*	1.13^{+}	1.08	1.10	1.05	1.11^{+}
	(1.80)	(1.70)	(2.17)	(1.87)	(1.29)	(1.63)	(0.67)	(1.71)
With children	1.30*	1.29*	1.32*	1.26^{+}	1.31^{+}	1.26^{+}	1.27^{+}	1.04
(ref. childless)	(2.00)	(1.99)	(2.16)	(1.78)	(1.93)	(1.83)	(1.66)	(0.31)
W/o child info	1.32^{+}	1.32^{+}	1.37*	1.40*	1.37*	1.34*	1.33^{+}	1.20
(ref. childless)	(1.95)	(1.95)	(2.18)	(2.34)	(2.10)	(2.06)	(1.77)	(1.38)
Incomplete	2.01***	2.01***	2.03***	2.27***	2.01***	2.04***	1.96***	2.18***
	(4.85)	(4.89)	(4.82)	(5.87)	(4.73)	(5.05)	(4.06)	(5.51)
Open positions (ln)	0.78*	0.77*	0.78*	0.77*	0.79*	0.77*	0.71**	0.66***
	(-2.43)	(-2.33)	(-2.29)	(-2.20)	(-1.98)	(-2.32)	(-2.83)	(-3.74)
Years since	1.44***	1.44***	1.42***	1.41***	1.46***	1.43***	1.54***	1.32***
habilitation	(5.41)	(5.39)	(5.29)	(7.20)	(5.14)	(5.36)	(5.54)	(6.53)
Years since	0.97***	0.97***	0.97***	0.98***	0.97***	0.97***	0.96***	0.98***
habilitation (sq.)	(-4.28)	(-4.26)	(-4.24)	(-5.68)	(-3.95)	(-4.27)	(-4.34)	(-5.55)
Years since	2.19***	2.18***	2.27***	2.20***	2.15***	2.15***	2.31***	1.62***
assistant prof (ln)	(7.76)	(7.71)	(8.25)	(7.57)	(6.96)	(7.70)	(7.62)	(5.29)

Table A3. Continued.

Pseudo r²	0.13	0.13	0.13	0.14	0.13	0.13	0.12	0.10
Log-likelihood	-2625.41	-2624.97	-2620.36	-2438.58	-2319.24	-2613.54	-1839.41	-2270.48
Degrees of freedom	27	30	28	30	30	30	30	30
Chi²	803.37	813.38	812.27	795.11	739.56	807.91	608.36	763.69
AIC	5304.81	5309.94	5296.73	4937.16	4698.48	5287.09	3738.82	4600.95
BIC	5543.19	5574.81	5543.93	5200.01	4961.87	5549.13	3983.40	4839.00
Number of events (tenure)	486	486	486	469	433	486	377	486
N (persons)	2,290	2,290	2,290	2,260	2,237	1,591	579	487
N (persons-publications)	50,457	50,457	50,457	47,173	48,027	45,922	25,662	20,636

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*
[1] Alternate to entry cohorts.

Table A4. Cox regression models on getting tenured (including waves 2013, 2016, 2019), including interaction terms with women (models 1-11).

	(1) Female × SSCI/SCIE publications	(2) Female × Non-SSCI/SCIE publications	(3) Female × Books	(4) Female × Edited volumes	(5) Female × Book chapters	(6) Female × Gray literature	(7) Female × Prestige graduation	(8) Female × Prestige doctorate	(9) Female × Prestige habilitation	(10) Female × Awards	(11) Female × Months abroad
Female	1.94***	1.21	1.20	1.42*	1.23	1.34^{+}	1.39*	1.36*	1.40**	1.46**	1.42*
	(3.73)	(0.90)	(0.80)	(2.32)	(0.83)	(1.67)	(2.49)	(2.31)	(2.82)	(2.95)	(2.05)
SSCI/SCIE journal	1.78***	1.63***	1.63***	1.63***	1.63***	1.63***	1.63***	1.62***	1.64***	1.63***	1.63***
articles (ln)	(5.96)	(5.78)	(5.80)	(5.78)	(5.78)	(5.80)	(5.81)	(5.73)	(5.87)	(5.79)	(5.79)
Non-SSCI/SCIE	1.23**	1.20*	1.26**	1.25**	1.25**	1.25**	1.24**	1.25**	1.25**	1.25**	1.25**
articles (ln)	(2.75)	(2.13)	(3.01)	(2.92)	(2.96)	(2.94)	(2.88)	(2.98)	(2.95)	(2.94)	(2.92)
Books (ln)	1.56***	1.57***	1.46**	1.57***	1.56***	1.56***	1.56***	1.54***	1.55***	1.56***	1.56***
	(3.81)	(3.82)	(2.90)	(3.80)	(3.78)	(3.76)	(3.81)	(3.71)	(3.75)	(3.78)	(3.80)
Edited volumes (ln)	1.36**	1.34**	1.36**	1.33*	1.35**	1.35**	1.35**	1.36**	1.35**	1.35**	1.35**
	(3.10)	(2.95)	(3.14)	(2.47)	(3.02)	(3.04)	(3.06)	(3.12)	(3.04)	(3.06)	(3.06)
Book chapters (ln)	1.06	1.06	1.05	1.06	1.03	1.06	1.06	1.06	1.06	1.06	1.06
	(0.64)	(0.68)	(0.55)	(0.62)	(0.29)	(0.60)	(0.67)	(0.64)	(0.63)	(0.63)	(0.63)
Gray literature (ln)	0.89^{+}	0.90^{+}	0.90^{+}	0.90^{+}	0.90^{+}	0.88^{+}	0.90^{+}	0.90^{+}	0.90^{+}	0.90^{+}	0.90^{+}
	(-1.87)	(-1.75)	(-1.80)	(-1.76)	(-1.75)	(-1.95)	(-1.76)	(-1.74)	(-1.68)	(-1.77)	(-1.77)
Prestige graduation	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***	0.59***	0.63***	0.62***	0.63***	0.63***
	(-3.77)	(-3.74)	(-3.69)	(-3.71)	(-3.69)	(-3.72)	(-3.40)	(-3.73)	(-3.78)	(-3.69)	(-3.71)
Prestige doctorate	1.14	1.15	1.13	1.14	1.15	1.14	1.14	1.03	1.14	1.14	1.14
	(1.05)	(1.09)	(0.97)	(1.05)	(1.08)	(1.06)	(1.07)	(0.19)	(1.02)	(1.02)	(1.04)
Prestige habilitation	1.37^{+}	1.38*	1.39*	1.38*	1.38*	1.39*	1.39*	1.40*	1.28	1.38*	1.38*
	(1.95)	(2.05)	(2.06)	(2.04)	(2.05)	(2.06)	(2.08)	(2.14)	(1.38)	(2.01)	(2.04)
Awards (ln)	1.20	1.22	1.20	1.21	1.21	1.21	1.21	1.20	1.19	1.19	1.21
	(1.40)	(1.55)	(1.43)	(1.48)	(1.50)	(1.46)	(1.49)	(1.40)	(1.29)	(1.05)	(1.47)
Months abroad (ln)	1.14***	1.14**	1.14***	1.13**	1.13**	1.14**	1.13**	1.14***	1.14***	1.13**	1.13**
	(3.36)	(3.27)	(3.33)	(3.26)	(3.27)	(3.28)	(3.25)	(3.30)	(3.30)	(3.26)	(2.63)
Studied abroad	0.87	0.89	0.88	0.89	0.89	0.88	0.88	0.88	0.88	0.89	0.89
	(-1.10)	(-0.96)	(-0.99)	(-0.95)	(-0.95)	(-1.03)	(-1.00)	(-1.02)	(-1.07)	(-0.96)	(-0.93)
Doctorate abroad	1.48*	1.46*	1.48*	1.49*	1.49*	1.47*	1.49*	1.48*	1.51*	1.49*	1.49*
	(2.36)	(2.23)	(2.31)	(2.36)	(2.35)	(2.28)	(2.37)	(2.34)	(2.43)	(2.36)	(2.35)
International	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
publications (ln)	(1.17)	(1.17)	(1.19)	(1.22)	(1.20)	(1.19)	(1.23)	(1.22)	(1.13)	(1.24)	(1.24)
Mobility (ln)	2.50***	2.51***	2.52***	2.52***	2.53***	2.53***	2.52***	2.51***	2.54***	2.52***	2.51***
	(8.96)	(8.93)	(9.01)	(8.96)	(8.97)	(9.03)	(8.99)	(8.93)	(9.06)	(8.98)	(8.88)
Interim professor	1.23^{+}	1.20	1.20	1.21	1.20	1.21	1.21	1.22	1.21	1.22	1.21
(ln)	(1.70)	(1.49)	(1.49)	(1.60)	(1.50)	(1.58)	(1.56)	(1.63)	(1.59)	(1.62)	(1.61)
Department size (ln)	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.07
	(0.87)	(0.91)	(0.88)	(0.84)	(0.85)	(0.89)	(0.85)	(0.89)	(0.89)	(0.83)	(0.82)
Co-authors (ln)	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}	1.11^{+}
	(1.77)	(1.70)	(1.73)	(1.70)	(1.72)	(1.68)	(1.68)	(1.77)	(1.70)	(1.69)	(1.66)
With children (ref.	1.29*	1.31*	1.31*	1.30*	1.30*	1.30*	1.29*	1.29*	1.29^{+}	1.29*	1.29*
childless)	(2.00)	(2.06)	(2.07)	(2.02)	(2.05)	(2.04)	(1.99)	(1.98)	(1.95)	(1.99)	(1.99)
W/o children (ref.	1.32^{+}	1.32^{+}	1.32*	1.32^{+}	1.33*	1.32^{+}	1.32^{+}	1.32*	1.31^{+}	1.32^{+}	1.32*
childless)	(1.96)	(1.95)	(1.97)	(1.95)	(1.97)	(1.94)	(1.93)	(1.96)	(1.92)	(1.95)	(1.96)
DFG funding	1.39***	1.40***	1.40***	1.39***	1.39***	1.39***	1.39***	1.40***	1.40***	1.39***	1.40***
	(5.32)	(5.45)	(5.42)	(5.34)	(5.37)	(5.37)	(5.33)	(5.40)	(5.49)	(5.30)	(5.36)
Entry cohorts (ref. before 1990											
>1991-1999	1.02	1.02	1.00	1.02	1.02	1.03	1.02	1.02	1.00	1.02	1.02
	(0.16)	(0.15)	(0.03)	(0.14)	(0.13)	(0.17)	(0.16)	(0.11)	(0.03)	(0.11)	(0.13)
2000-2009	1.07	1.08	1.06	1.07	1.07	1.07	1.08	1.07	1.07	1.07	1.07
	(0.39)	(0.43)	(0.36)	(0.42)	(0.41)	(0.42)	(0.44)	(0.40)	(0.39)	(0.39)	(0.41)

Table A4. Continued (models 1-11).

after 2009	1.34	1.36	1.34	1.34	1.35	1.34	1.34	1.35	1.34	1.33	1.33
	(0.96)	(0.99)	(0.96)	(0.95)	(0.97)	(0.95)	(0.95)	(0.98)	(0.95)	(0.92)	(0.93)
Incomplete	2.01***	1.99***	2.00***	2.01***	2.00***	2.00***	2.03***	2.03***	2.01***	2.01***	2.01***
	(4.98)	(4.77)	(4.79)	(4.90)	(4.80)	(4.83)	(5.02)	(5.00)	(4.93)	(4.91)	(4.89)
Open positions (ln)	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*
	(-2.37)	(-2.30)	(-2.31)	(-2.33)	(-2.33)	(-2.33)	(-2.29)	(-2.29)	(-2.33)	(-2.33)	(-2.33)
Years since habil	1.43***	1.45***	1.44***	1.44***	1.45***	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***
	(5.34)	(5.47)	(5.43)	(5.40)	(5.46)	(5.43)	(5.41)	(5.39)	(5.44)	(5.39)	(5.40)
Years since habil (sq.)	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***
	(-4.24)	(-4.32)	(-4.28)	(-4.25)	(-4.30)	(-4.27)	(-4.28)	(-4.28)	(-4.31)	(-4.25)	(-4.26)
Years since assistant prof (ln)	2.23***	2.19***	2.19***	2.18***	2.18***	2.18***	2.20***	2.21***	2.21***	2.18***	2.18***
	(7.99)	(7.69)	(7.88)	(7.67)	(7.68)	(7.67)	(7.93)	(7.98)	(7.94)	(7.70)	(7.70)
Female × SSCI/SCIE journal articles (ln)	0.79^{+}										
	(-1.83)										
Female × Non-SSCI/SCIE articles (ln)		1.13									
		(1.04)									
Female × Books (ln)			1.24								
			(1.03)								
Female × Edited volumes (ln)				1.05							
				(0.28)							
Female × Book chapters (ln)					1.08						
					(0.71)						
Female × Gray literature (ln)						1.07					
						(0.56)					
Female × Prestige graduation							1.21				
							(0.82)				
Female × Prestige doctorate								1.28			
								(1.11)			
Female × Prestige habilitation									1.37		
									(1.08)		
Female × Awards (ln)										1.04	
										(0.15)	
Female × Months abroad (ln)											1.02
											(0.26)
Pseudo r²	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Log-likelihood	-2623.09	-2624.36	-2624.37	-2624.93	-2624.69	-2624.76	-2624.56	-2624.29	-2624.32	-2624.96	-2624.94
Degrees of freedom	31	31	31	31	31	31	31	31	31	31	31
Chi²	823.07	813.18	823.45	817.77	813.80	814.56	820.27	816.03	829.56	815.32	815.33
AIC	5308.17	5310.72	5310.74	5311.85	5311.38	5311.51	5311.13	5310.58	5310.64	5311.92	5311.87
BIC	5581.87	5584.42	5584.44	5585.55	5585.07	5585.21	5584.82	5584.27	5584.34	5585.61	5585.57
Number of events (habilitation)	486	486	486	486	486	486	486	486	486	486	486
N (persons)	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290
N (persons-publications)	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Table A4. Cox regression models on getting tenured (including waves 2013, 2016, 2019), including interaction terms with women (models 12-21).

	(12) Female × Studied abroad	(13) Female × Doctorate abroad	(14) Female × International publications	(15) Female × Mobility	(16) Female × Interim professorships	(17) Female × Department size	(18) Female × Co-authors	(19) Female × Children	(20) Female × DFG funding	(21) Female × Entry cohorts
Female	1.41**	1.41**	1.82**	1.51	1.45**	1.94	1.61+	1.42	1.42**	1.41
	(2.69)	(2.76)	(3.08)	(1.54)	(2.83)	(1.59)	(1.90)	(1.60)	(2.77)	(1.29)
SSCI/SCIE journal articles (ln)	1.63***	1.63***	1.62***	1.63***	1.63***	1.62***	1.63***	1.63***	1.63***	1.63***
	(5.81)	(5.79)	(5.75)	(5.79)	(5.79)	(5.75)	(5.79)	(5.81)	(5.79)	(5.76)
Non-SSCI/SCIE articles (ln)	1.25**	1.24**	1.25**	1.25**	1.25**	1.24**	1.25**	1.25**	1.25**	1.25**
	(2.95)	(2.80)	(2.90)	(2.94)	(2.93)	(2.89)	(2.91)	(2.90)	(2.96)	(2.92)
Books (ln)	1.56***	1.56***	1.55***	1.56***	1.56***	1.56***	1.56***	1.56***	1.56***	1.55***
	(3.78)	(3.79)	(3.76)	(3.78)	(3.78)	(3.76)	(3.79)	(3.79)	(3.78)	(3.72)
Edited volumes (ln)	1.35**	1.35**	1.36**	1.35**	1.35**	1.36**	1.35**	1.34**	1.35**	1.35**
	(3.08)	(3.04)	(3.11)	(3.06)	(3.06)	(3.12)	(3.06)	(2.98)	(3.03)	(3.09)
Book chapters (ln)	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.06
	(0.63)	(0.65)	(0.63)	(0.62)	(0.60)	(0.63)	(0.61)	(0.68)	(0.59)	(0.63)
Gray literature (ln)	0.90+	0.90+	0.90+	0.90+	0.90+	0.90+	0.90+	0.90+	0.90+	0.90+
	(-1.86)	(-1.82)	(-1.75)	(-1.77)	(-1.76)	(-1.79)	(-1.77)	(-1.80)	(-1.76)	(-1.76)
Prestige graduation	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***	0.63***
	(-3.72)	(-3.66)	(-3.72)	(-3.72)	(-3.70)	(-3.66)	(-3.69)	(-3.74)	(-3.72)	(-3.68)
Prestige doctorate	1.14	1.13	1.13	1.14	1.14	1.14	1.13	1.15	1.14	1.14
	(1.03)	(0.97)	(0.95)	(1.03)	(1.03)	(1.00)	(0.99)	(1.07)	(1.04)	(1.03)
Prestige habilitation	1.37*	1.40*	1.40*	1.38*	1.38*	1.38*	1.39*	1.39*	1.39*	1.38*
	(1.97)	(2.09)	(2.09)	(2.04)	(2.05)	(2.01)	(2.05)	(2.05)	(2.06)	(2.01)
Awards (ln)	1.21	1.21	1.21	1.21	1.21	1.22	1.21	1.21	1.20	1.21
	(1.48)	(1.48)	(1.49)	(1.46)	(1.49)	(1.54)	(1.47)	(1.49)	(1.41)	(1.46)
Months abroad (ln)	1.14***	1.13**	1.14***	1.13**	1.13**	1.13**	1.14**	1.13**	1.14**	1.13**
	(3.34)	(3.28)	(3.31)	(3.25)	(3.28)	(3.27)	(3.26)	(3.29)	(3.28)	(3.26)
Studied abroad	0.83	0.89	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.89
	(-1.20)	(-0.91)	(-1.02)	(-0.97)	(-0.97)	(-0.95)	(-0.97)	(-0.99)	(-0.96)	(-0.96)
Doctorate abroad	1.49*	1.30	1.48*	1.49*	1.48*	1.48*	1.48*	1.50*	1.49*	1.49*
	(2.36)	(1.24)	(2.34)	(2.35)	(2.35)	(2.32)	(2.35)	(2.42)	(2.37)	(2.37)
International publications (ln)	1.09	1.10	1.15+	1.10	1.09	1.10	1.09	1.10	1.09	1.09
	(1.24)	(1.27)	(1.69)	(1.25)	(1.22)	(1.28)	(1.24)	(1.26)	(1.23)	(1.24)
Mobility (ln)	2.52***	2.50***	2.51***	2.54***	2.52***	2.52***	2.51***	2.51***	2.52***	2.51***
	(9.04)	(8.91)	(8.99)	(7.41)	(8.97)	(8.98)	(8.96)	(8.89)	(8.96)	(8.86)
Interim professor (ln)	1.21	1.21	1.23+	1.21	1.20	1.22+	1.22	1.21	1.21	1.22
	(1.59)	(1.56)	(1.72)	(1.62)	(1.29)	(1.65)	(1.64)	(1.59)	(1.60)	(1.63)
Department size (ln)	1.07	1.08	1.08	1.08	1.08	1.13	1.08	1.08	1.08	1.08
	(0.82)	(0.83)	(0.89)	(0.85)	(0.84)	(1.24)	(0.84)	(0.84)	(0.85)	(0.85)
Co-authors (ln)	1.11+	1.11+	1.11+	1.11+	1.11+	1.11+	1.12	1.11+	1.11+	1.11+
	(1.71)	(1.67)	(1.73)	(1.69)	(1.70)	(1.68)	(1.63)	(1.69)	(1.69)	(1.69)
With children (ref. childless)	1.29*	1.29+	1.30*	1.29*	1.30*	1.29*	1.29*	1.30	1.30*	1.29*
	(1.99)	(1.94)	(2.04)	(1.98)	(2.00)	(1.98)	(1.99)	(1.62)	(2.02)	(1.99)
W/o children (ref. childless)	1.32+	1.33*	1.32*	1.32+	1.32*	1.31+	1.32*	1.23	1.33*	1.32+
	(1.94)	(1.99)	(1.96)	(1.96)	(1.97)	(1.91)	(1.96)	(1.13)	(1.98)	(1.95)
DFG funding	1.40***	1.40***	1.39***	1.40***	1.39***	1.39***	1.40***	1.39***	1.37***	1.39***
	(5.36)	(5.42)	(5.29)	(5.37)	(5.33)	(5.30)	(5.35)	(5.34)	(3.89)	(5.35)
Entry cohorts *(ref. before 1990)*										
1991-1999	1.02	1.03	1.01	1.02	1.02	1.02	1.02	1.01	1.02	1.00
	(0.13)	(0.18)	(0.05)	(0.12)	(0.13)	(0.11)	(0.11)	(0.09)	(0.14)	(0.00)
2000-2009	1.07	1.08	1.06	1.07	1.07	1.06	1.07	1.07	1.07	1.05
	(0.40)	(0.45)	(0.36)	(0.39)	(0.41)	(0.37)	(0.38)	(0.39)	(0.41)	(0.26)
after 2009	1.33	1.32	1.32	1.33	1.33	1.33	1.33	1.33	1.34	1.39
	(0.93)	(0.90)	(0.91)	(0.92)	(0.93)	(0.93)	(0.92)	(0.92)	(0.95)	(0.84)
Incomplete	2.01***	2.01***	2.05***	2.01***	2.01***	2.03***	2.02***	2.02***	2.02***	2.01***
	(4.85)	(4.90)	(5.05)	(4.89)	(4.89)	(4.96)	(4.94)	(4.97)	(4.91)	(4.96)
Open positions (ln)	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*	0.77*
	(-2.36)	(-2.33)	(-2.37)	(-2.33)	(-2.32)	(-2.31)	(-2.33)	(-2.30)	(-2.30)	(-2.31)
Years since habil	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***	1.44***
	(5.38)	(5.42)	(5.36)	(5.37)	(5.37)	(5.40)	(5.38)	(5.37)	(5.38)	(5.42)
Years since habil (sq.)	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***	0.97***
	(-4.23)	(-4.28)	(-4.24)	(-4.26)	(-4.25)	(-4.27)	(-4.25)	(-4.25)	(-4.24)	(-4.27)
Years since assistant prof (ln)	2.17***	2.19***	2.21***	2.18***	2.19***	2.18***	2.18***	2.19***	2.18***	2.18***
	(7.67)	(7.66)	(7.94)	(7.75)	(7.71)	(7.63)	(7.72)	(7.75)	(7.70)	(7.69)
Female × Studies abroad	1.17									
	(0.67)									
Female × Doctorate abroad		1.33								
		(0.95)								
Female × International publications (ln)			0.89							
			(-1.28)							
Female × Mobility (ln)				0.98						
				(-0.12)						
Female × Interim professor (ln)					1.03					
					(0.16)					
Female × Department size						0.88				
						(-0.69)				

Table A4. Continued (models 12-21).

Female × Co-authors (ln)							0.97 (-0.38)			
Female × With children								0.97 (-0.13)		
Female × W/o children								1.21 (0.65)		
Female × DFG funding									1.06 (0.51)	
Female × Entry cohorts *(ref. before 1990)*										
1990-1999										1.06 (0.17)
2000-2009										1.06 (0.18)
after 2009										0.94 (-0.12)
Pseudo r²	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Log-likelihood	-2624.71	-2624.43	-2624.09	-2624.96	-2624.95	-2624.61	-2624.89	-2624.50	-2624.85	-2624.92
Degrees of freedom	31	31	31	31	31	31	31	32	31	33
Chi²	818.11	817.27	813.34	812.73	819.39	813.00	812.93	816.63	824.89	825.32
AIC	5311.43	5310.85	5310.19	5311.93	5311.91	5311.23	5311.79	5312.99	5311.71	5315.84
BIC	5585.12	5584.55	5583.88	5585.62	5585.60	5584.92	5585.48	5595.51	5585.40	5607.20
Number of events (habilitation)	486	486	486	486	486	486	486	486	486	486
N (persons)	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290	2,290
N (persons-publications)	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457	50,457

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Appendix Chapter 5

Table A1. Cox regression models on obtaining a habilitation (incl. number of children).

	(1) Only Gender	(2) Gender# Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/ Grants	(7) Only Female	(8) Only Male
Female	0.74**							
	(-3.10)							
Childless man					*reference*			
Father+1		1.46^{+}	1.24	1.28	1.05	1.07		
		(1.92)	(0.98)	(1.12)	(0.22)	(0.31)		
Father+2		1.55*	1.43	1.41	0.98	0.87		
		(2.08)	(1.60)	(1.40)	(-0.06)	(-0.56)		
Father+3/4		1.67	1.69	1.88^{+}	0.88	0.92		
		(1.37)	(1.42)	(1.84)	(-0.42)	(-0.25)		
Men w/o info		1.18	1.11	1.18	1.00	0.95		
		(1.03)	(0.66)	(0.98)	(-0.03)	(-0.30)		
Childless woman		0.97	1.22	1.19	0.96	0.95		
		(-0.16)	(1.06)	(0.93)	(-0.18)	(-0.25)		
Mother+1		0.78	0.86	0.81	0.50**	0.48**		
		(-1.11)	(-0.70)	(-0.92)	(-2.62)	(-2.78)		
Mother+2		0.89	1.20	1.20	0.76	0.70		
		(-0.51)	(0.83)	(0.84)	(-1.15)	(-1.49)		
Mother+3/4		0.69	1.11	1.16	0.62	0.60		
		(-0.60)	(0.18)	(0.25)	(-0.76)	(-0.81)		
Women w/o info		0.94	1.32	1.39^{+}	0.92	0.94		
		(-0.36)	(1.64)	(1.93)	(-0.45)	(-0.32)		
[0] Childless							*reference*	
[1] 1 Child							0.45**	1.04
							(-2.84)	(0.18)
[2] 2 Children							0.63^{+}	0.91
							(-1.83)	(-0.42)
[3] 3-4 Children							0.51	0.89
							(-1.00)	(-0.37)
[4] w/o info							0.86	0.94
							(-0.74)	(-0.34)
SSCI/SCIE articles (ln)			2.60***	2.37***	1.95***	1.77***	2.89***	1.50***
			(10.74)	(9.47)	(6.77)	(5.88)	(6.38)	(3.56)
Non-SSCI/SCIE articles (ln)			1.07	1.10	1.21^{+}	1.33**	1.08	1.50***
			(0.70)	(0.92)	(1.90)	(2.83)	(0.48)	(3.31)
Monographs (ln)			1.51**	1.46**	1.31^{+}	1.26	1.44	1.17
			(2.83)	(2.61)	(1.80)	(1.52)	(1.57)	(0.80)
Edited volumes (ln)			1.15	1.37	1.29	1.36	2.10^{+}	1.28
			(0.58)	(1.45)	(1.17)	(1.42)	(1.81)	(1.01)
Book chapters (ln)			1.41***	1.34**	1.14	1.14	1.21	1.12
			(3.78)	(3.22)	(1.50)	(1.48)	(1.25)	(1.07)
Gray literature (ln)			0.95	0.93	1.08	1.06	1.20	1.01
			(-0.58)	(-0.90)	(0.90)	(0.67)	(1.20)	(0.09)
Mobility (ln)				1.90***	1.48***	1.41***	1.57**	1.26^{+}
				(6.07)	(3.84)	(3.38)	(2.74)	(1.75)
Months abroad (ln)				1.10**	1.08*	1.06^{+}	1.06	1.07
				(2.66)	(2.19)	(1.74)	(0.97)	(1.54)
PhD from abroad				0.68^{+}	0.59*	0.66^{+}	1.06	0.52*
				(-1.93)	(-2.44)	(-1.93)	(0.16)	(-2.53)
Excellence university					1.98***	1.98***	2.13***	2.00***
					(5.17)	(5.19)	(3.58)	(4.18)
Years since PhD					1.76***	1.73***	2.06***	1.67***
					(7.47)	(7.38)	(6.15)	(7.19)
Years since PhD (sq.)					0.98***	0.98***	0.97***	0.98***
					(-3.80)	(-3.71)	(-3.72)	(-3.51)
Awards (ln)						1.14	1.04	1.27
						(0.96)	(0.19)	(1.40)
Research funding (ln)						1.73***	1.52*	1.79***
						(4.39)	(2.13)	(3.89)
Only selected publications	2.65***	2.61***	3.05***	2.83***	2.16***	1.96***	2.92***	1.75**
	(5.77)	(5.64)	(5.67)	(5.02)	(4.61)	(3.94)	(4.37)	(2.76)

Table A1. Continued.

Cohorts *(ref. 2000-2009)*								
1980-1989	1.53**	1.56***	1.69**	1.76***	1.98***	2.31***	2.24**	2.34***
	(3.22)	(3.36)	(3.28)	(3.83)	(4.43)	(5.30)	(2.69)	(4.65)
1990-1999	1.71***	1.75***	1.78***	1.58***	1.67***	1.66***	2.10***	1.50*
	(4.75)	(4.87)	(4.49)	(3.44)	(3.94)	(3.81)	(3.74)	(2.27)
2010-2019	0.34***	0.34***	0.32***	0.30***	0.42***	0.43***	0.32**	0.58+
	(-4.40)	(-4.44)	(-4.66)	(-4.88)	(-3.75)	(-3.59)	(-3.10)	(-1.84)
Pseudo r²	0.02	0.02	0.06	0.08	0.13	0.14	0.19	0.14
Log-likelihood	-2966.37	-2962.04	-2841.08	-2806.13	-2628.15	-2613.64	-799.53	-1486.83
Degrees of freedom	5	13	19	22	25	27	22	22
Chi²	122.14	125.28	283.65	336.79	876.01	936.25	493.77	596.26
AIC	5942.74	5950.08	5720.16	5656.26	5306.30	5281.27	1643.05	3017.66
BIC	5985.39	6060.97	5882.23	5843.92	5519.55	5511.59	1812.58	3192.62
Number of events (habilitation)	468	468	468	468	468	468	173	295
N (persons)	2,527	2,527	2,527	2,527	2,527	2,527	1,419	1,108
N (persons-publications)	37,423	37,423	37,423	37,423	37,423	37,423	16,413	21,010

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A2. Cox regression models on obtaining a habilitation (children as categorical variable).

	(1) Only Gender	(2) Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/ Grants	(7) Only Female	(8) Only male
Female	0.74**	0.73**	1.02	1.01	0.82+	0.83		
	(-3.10)	(-3.14)	(0.23)	(0.06)	(-1.81)	(-1.64)		
[0] Childless		*reference*						
[1] 1 Child		1.13	0.97	0.96	0.77	0.76	0.45**	1.04
		(0.80)	(-0.20)	(-0.24)	(-1.53)	(-1.59)	(-2.84)	(0.18)
[2] 2 Children		1.26	1.23	1.23	0.90	0.82	0.63+	0.91
		(1.42)	(1.24)	(1.17)	(-0.61)	(-1.16)	(-1.83)	(-0.42)
[3] 3-4 Children		1.29	1.42	1.56	0.78	0.82	0.51	0.89
		(0.80)	(1.12)	(1.50)	(-0.86)	(-0.71)	(-1.00)	(-0.37)
[4] w/o info		1.08	1.09	1.15	0.97	0.95	0.86	0.94
		(0.61)	(0.66)	(1.13)	(-0.25)	(-0.36)	(-0.74)	(-0.34)
SSCI/SCIE articles (ln)			2.62***	2.39***	1.96***	1.79***	2.89***	1.50***
			(10.91)	(9.56)	(6.82)	(5.94)	(6.38)	(3.56)
Non-SSCI/SCIE articles (ln)			1.07	1.09	1.22+	1.33**	1.08	1.50***
			(0.67)	(0.88)	(1.93)	(2.80)	(0.48)	(3.31)
Monographs (ln)			1.53**	1.47**	1.30+	1.25	1.44	1.17
			(2.94)	(2.63)	(1.74)	(1.44)	(1.57)	(0.80)
Edited volumes (ln)			1.17	1.37	1.27	1.33	2.10+	1.28
			(0.64)	(1.45)	(1.09)	(1.32)	(1.81)	(1.01)
Book chapters (ln)			1.39***	1.32**	1.13	1.12	1.21	1.12
			(3.58)	(3.00)	(1.33)	(1.26)	(1.25)	(1.07)
Gray literature (ln)			0.97	0.95	1.10	1.08	1.20	1.01
			(-0.33)	(-0.65)	(1.10)	(0.88)	(1.20)	(0.09)
Mobility (ln)				1.89***	1.47***	1.41***	1.57**	1.26+
				(5.97)	(3.80)	(3.35)	(2.74)	(1.75)
Months abroad (ln)				1.10**	1.08*	1.06	1.06	1.07
				(2.69)	(2.09)	(1.60)	(0.97)	(1.54)
PhD from abroad				0.66*	0.59*	0.65*	1.06	0.52*
				(-2.02)	(-2.50)	(-2.00)	(0.16)	(-2.53)
Excellence university					2.00***	2.00***	2.13***	2.00***
					(5.28)	(5.26)	(3.58)	(4.18)
Years since PhD					1.76***	1.74***	2.06***	1.67***
					(7.45)	(7.33)	(6.15)	(7.19)
Years since PhD (sq.)					0.98***	0.98***	0.97***	0.98***
					(-3.81)	(-3.70)	(-3.72)	(-3.51)
Awards (ln)						1.15	1.04	1.27
						(1.02)	(0.19)	(1.40)
Research funding (ln)						1.69***	1.52*	1.79***
						(4.20)	(2.13)	(3.89)
Only selected publications	2.65***	2.61***	3.11***	2.90***	2.19***	1.99***	2.92***	1.75**
	(5.77)	(5.68)	(5.81)	(5.18)	(4.76)	(4.06)	(4.37)	(2.76)
Cohorts *(ref. 2000-2009)*								
1980-1989	1.53**	1.56***	1.69**	1.75***	1.96***	2.27***	2.24**	2.34***
	(3.22)	(3.35)	(3.26)	(3.76)	(4.34)	(5.17)	(2.69)	(4.65)
1990-1999	1.71***	1.73***	1.76***	1.57***	1.67***	1.66***	2.10***	1.50*
	(4.75)	(4.83)	(4.45)	(3.41)	(3.93)	(3.77)	(3.74)	(2.27)
2010-2019	0.34***	0.34***	0.33***	0.31***	0.42***	0.43***	0.32**	0.58+
	(-4.40)	(-4.34)	(-4.58)	(-4.81)	(-3.71)	(-3.56)	(-3.10)	(-1.84)
Pseudo r²	0.34***	0.34***	0.33***	0.31***	0.42***	0.43***	0.32**	0.58+
Log-likelihood	(-4.40)	(-4.34)	(-4.58)	(-4.81)	(-3.71)	(-3.56)	(-3.10)	(-1.84)
Degrees of freedom	0.02	0.02	0.06	0.07	0.13	0.14	0.19	0.14
Chi²	-2966.37	-2965.03	-2843.63	-2809.11	-2630.90	-2617.31	-799.53	-1486.83
AIC	5	9	15	18	21	23	22	22
BIC	122.14	122.28	289.35	328.68	880.45	932.41	493.77	596.26
Number of events (habilitation)	5942.74	5948.05	5717.27	5654.22	5303.81	5280.61	1643.05	3017.66
N (persons)	5985.39	6024.82	5845.22	5807.77	5482.94	5476.80	1812.58	3192.62
N (persons-publications)	468	468	468	468	468	468	173	295

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A3. Cox regression models with different log-specifications and cohorts.

	(1) Non-logged variables	(2) *Log (1.5)[1]	(3) *Log (2)[1]	(4) Impact Factor[3] (*ln)	(5) Complete cases (*ln)	(6) PhD cohort (*ln)	(7) Habilitation cohort (*ln)	(8) Female habils (*ln)	(9) Male habils (*ln)
Childless man		*reference*							
Father	0.88	0.95	0.95	0.95	0.98	0.95	1.26		
	(-0.65)	(-0.29)	(-0.29)	(-0.26)	(-0.10)	(-0.29)	(1.41)		
Men w/o info	0.92	0.95	0.95	0.95	0.90	0.95	1.25		
	(-0.46)	(-0.29)	(-0.29)	(-0.29)	(-0.58)	(-0.28)	(1.45)		
Childless woman	0.82	0.94	0.94	0.94	0.91	0.95	1.33		
	(-0.97)	(-0.27)	(-0.27)	(-0.28)	(-0.43)	(-0.26)	(1.54)		
Mother	0.52**	0.58**	0.58**	0.58**	0.66*	0.58**	0.64*		
	(-3.18)	(-2.59)	(-2.59)	(-2.60)	(-2.16)	(-2.60)	(-2.17)		
Women w/o info	0.78	0.94	0.94	0.94	0.96	0.95	0.90		
	(-1.32)	(-0.32)	(-0.32)	(-0.31)	(-0.19)	(-0.30)	(-0.59)		
[0] Childless								*reference*	
[1] Children								0.47**	1.22
								(-3.16)	(1.28)
[2] Unknwn								0.65*	1.17
								0.47**	1.22
SSCI/SCIE articles (*)	1.03**	1.26***	1.49***	1.78***	1.84***	1.77***	1.81***	1.76***	1.84***
	(2.70)	(5.89)	(5.89)	(5.89)	(6.04)	(5.88)	(5.89)	(3.37)	(5.05)
Non-SSCI/SCIE articles (*)	1.06**	1.12**	1.22**	1.32**	1.25*	1.33**	1.13	1.23	1.11
	(2.63)	(2.83)	(2.83)	(2.77)	(2.20)	(2.83)	(1.17)	(1.19)	(0.88)
Monographs (*)	1.11	1.10	1.17	1.25	1.32*	1.26	1.03	0.99	1.06
	(1.55)	(1.50)	(1.50)	(1.45)	(2.00)	(1.51)	(0.18)	(-0.02)	(0.35)
Edited volumes (*)	1.02	1.12	1.22	1.32	1.25	1.33	2.03***	2.97**	1.91**
	(0.21)	(1.33)	(1.33)	(1.30)	(1.01)	(1.34)	(3.56)	(3.04)	(2.97)
Book chapters (*)	1.03+	1.06	1.10	1.14	1.13	1.15	1.06	1.17	1.08
	(1.90)	(1.46)	(1.46)	(1.46)	(1.44)	(1.50)	(0.69)	(0.97)	(0.73)
Gray literature (*)	0.99	1.03	1.05	1.07	1.02	1.06	1.02	1.32+	0.90
	(-0.52)	(0.73)	(0.73)	(0.72)	(0.27)	(0.69)	(0.23)	(1.87)	(-1.05)
Mobility (*)	1.14***	1.15**	1.26**	1.40***	1.46***	1.39**	1.22+	1.08	1.19
	(3.64)	(3.28)	(3.28)	(3.30)	(3.52)	(3.25)	(1.89)	(0.44)	(1.35)
Months abroad (*)	1.00	1.03+	1.04+	1.06+	1.05	1.06+	1.07+	1.11+	1.06
	(0.11)	(1.71)	(1.71)	(1.73)	(1.36)	(1.70)	(1.85)	(1.88)	(1.41)
PhD from abroad	0.73	0.65*	0.65*	0.65*	0.79	0.65*	0.68*	0.63	0.61*
	(-1.48)	(-1.96)	(-1.96)	(-1.96)	(-1.08)	(-2.02)	(-1.98)	(-1.26)	(-2.15)
Excellence university	2.10***	1.97***	1.97***	1.97***	2.00***	1.96***	1.31*	1.14	1.35+
	(5.91)	(5.19)	(5.19)	(5.19)	(5.16)	(5.18)	(1.98)	(0.61)	(1.78)
Years since PhD	1.79***	1.73***	1.73***	1.73***	2.20***	1.70***	1.62***	1.83***	1.59***
	(7.67)	(7.32)	(7.32)	(7.41)	(8.46)	(7.31)	(10.50)	(6.01)	(10.43)
Years since PhD (sq.)	0.98***	0.98***	0.98***	0.98***	0.96***	0.98***	0.99***	0.98***	0.99***
	(-3.97)	(-3.68)	(-3.68)	(-3.70)	(-6.67)	(-3.70)	(-6.08)	(-4.13)	(-6.59)
Awards (*)	1.08	1.05	1.09	1.15	1.26+	1.13	1.20	1.08	1.24
	(1.11)	(0.94)	(0.94)	(1.00)	(1.84)	(0.91)	(1.46)	(0.34)	(1.44)
Research funding (*)	1.27***	1.24***	1.45***	1.72***	1.65***	1.72***	1.30*	1.03	1.44**
	(4.17)	(4.32)	(4.32)	(4.36)	(3.91)	(4.37)	(2.53)	(0.19)	(2.76)
Only selected publications	1.80***	1.94***	1.94***	1.93***	1.00	1.92***	1.64**	2.60***	1.38
	(3.53)	(3.83)	(3.83)	(3.83)	(.)	(3.82)	(3.03)	(3.77)	(1.56)
Cohorts *(ref. 2000-2009)*									
1980-1989	2.11***	2.29***	2.29***	2.23***	2.57***	2.27***	0.55***	0.29***	0.70*
	(4.99)	(5.20)	(5.20)	(5.00)	(5.96)	(5.20)	(-3.92)	(-4.10)	(-1.98)
1990-1999	1.58***	1.66***	1.66***	1.65***	1.87***	1.66***	0.61***	0.42***	0.71*
	(3.57)	(3.79)	(3.79)	(3.70)	(4.49)	(3.79)	(-3.95)	(-4.17)	(-2.10)
2010-2019	0.44***	0.43***	0.43***	0.43***	0.28***	0.49**	2.17***	2.31+	2.35**
	(-3.45)	(-3.59)	(-3.59)	(-3.55)	(-3.68)	(-3.06)	(3.41)	(1.86)	(3.11)
Impact (std)[1]				0.94					
				(-0.96)					

Table A3. Continued.

Pseudo r²	0.12	0.14	0.14	0.14	0.12	0.13	0.12	0.14	0.13
Log-likelihood	-2656.42	-2615.03	-2615.03	-2614.53	-2188.29	-2610.35	-2140.76	-617.88	-1209.21
Degrees of freedom	23	23	23	24	22	23	23	20	20
Chi²	875.53	909.34	909.34	918.04	397.43	820.45	732.79	373.07	488.66
AIC	5358.85	5276.07	5276.07	5277.06	4420.57	5266.69	4327.52	1275.77	2458.42
BIC	5555.04	5472.26	5472.26	5481.78	4607.12	5460.59	4494.89	1399.05	2595.99
Number of events (habilitation)	468	468	468	468	395	468	468	173	295
N (persons)	2,527	2,527	2,527	2,527	2,357	1,702	469	173	296
N (persons-publications)	37,423	37,423	37,423	37,423	35,578	33,870	10,688	3,513	7,175

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged variables; sq. = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*
[1] With a 50% increase in publications.
[2] With a 100% increase (doubling) in publications.
[3] SSCI/SCIE-articles weighted by journal impact factors from the Journal Citation Reports (JCR) of Clarivate Analytics; impact factors previously standardized.

Table A4.1. Summary statistics of continuous and discrete data of scientists (only complete cases).

	All scientists				*Only habilitation cohort*			
	M	SD	MIN	MAX	M	SD	MIN	MAX
Women	0.57	0.50	0.00	1.00	0.38	0.49	0.00	1.00
Analysis time	7.70	5.45	1.00	39.68	10.66	3.71	1.00	27.08
SSCI/SCIE articles	3.90	5.20	0.00	84.00	6.64	4.65	0.00	30.12
Non-SSCI/SCIE articles	1.00	2.18	0.00	37.97	2.12	2.93	0.00	22.00
Monographs	0.26	0.66	0.00	9.50	0.63	0.89	0.00	6.03
Edited volumes	0.08	0.53	0.00	15.33	0.19	0.51	0.00	3.90
Book chapters	1.71	3.69	0.00	85.42	3.74	4.31	0.00	23.50
Gray literature	1.08	4.60	0.00	174.17	1.80	3.48	0.00	31.64
Mobility	1.22	1.32	0.00	8.00	1.77	1.44	0.00	8.00
Months abroad	10.76	22.06	0.00	186.00	13.27	22.03	0.00	156.00
PhD from abroad	0.09	0.28	0.00	1.00	0.08	0.27	0.00	1.00
Excellence university	0.26	0.39	0.00	1.00	0.36	0.38	0.00	1.00
Years since PhD	3.68	4.51	0.00	37.00	6.99	2.80	0.00	20.00
PhD (Dummy)	0.66	0.48	0.00	1.00	1.00	0.00	1.00	1.00
Awards	0.34	0.92	0.00	10.00	0.51	1.06	0.00	7.00
Research funding	0.27	0.72	0.00	9.00	0.67	1.04	0.00	5.00
No Children [0]	0.35	0.48	0.00	1.00	0.24	0.43	0.00	1.00
Children [1]	0.12	0.33	0.00	1.00	0.14	0.35	0.00	1.00
Children [2]	0.12	0.33	0.00	1.00	0.18	0.38	0.00	1.00
Children [3-4]	0.02	0.15	0.00	1.00	0.03	0.16	0.00	1.00
Children [survey non-response]	0.38	0.49	0.00	1.00	0.41	0.49	0.00	1.00
Junior professors (Dummy)	0.05	0.23	0.00	1.00	0.10	0.30	0.00	1.00
Habilitation (Dummy)	0.17	0.37	0.00	1.00	1.00	0.00	1.00	1.00
Career start 1980-1989	0.05	0.22	0.00	1.00	0.24	0.43	0.00	1.00
1990-1999	0.10	0.30	0.00	1.00	0.37	0.48	0.00	1.00
2000-2009	0.26	0.44	0.00	1.00	0.37	0.48	0.00	1.00
2010-2019	0.58	0.49	0.00	1.00	0.02	0.15	0.00	1.00
N	2357				395			

Table A4.2. Summary statistics of subgroups used in the analyses at the year of obtaining a habilitation (only complete cases).

	(1) Mother				(2) Childless woman				(3) Nonresponse woman				(4) Father				(5) Childless man				(6) Nonresponse man			
	M	SD	MIN	MAX	M	SD	MIN	MAX	M	SD	MIN	MAX	M	SD	MIN	MAX	M	SD	MIN	MAX	M	SD	MIN	MAX
Gender	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Analysis time	12.42	3.59	5.03	22.15	9.06	3.36	3.23	19.15	10.89	4.17	2.00	20.03	11.42	3.33	5.09	21.65	9.78	3.24	3.00	17.24	10.16	3.75	1.00	27.08
SSCI/SCIE articles	7.10	4.87	0.50	21.44	4.65	3.01	0.00	12.21	5.90	3.80	0.50	14.86	6.71	4.91	0.00	30.12	8.41	5.52	0.00	28.77	6.59	4.50	0.00	28.13
Non-SSCI/SCIE articles	1.87	2.62	0.00	14.17	1.66	2.17	0.00	10.67	1.32	1.83	0.00	8.57	2.73	3.50	0.00	22.00	2.26	3.12	0.00	14.87	2.27	3.13	0.00	20.30
Monographs	0.86	1.19	0.00	6.03	0.51	0.71	0.00	2.33	0.51	0.71	0.00	3.00	0.60	0.82	0.00	4.30	0.69	0.93	0.00	4.33	0.63	0.88	0.00	4.17
Edited volumes	0.11	0.28	0.00	1.33	0.03	0.14	0.00	0.67	0.19	0.50	0.00	2.67	0.26	0.66	0.00	3.90	0.25	0.48	0.00	1.67	0.21	0.56	0.00	3.58
Book chapters	4.98	5.31	0.00	23.50	2.59	2.85	0.00	10.72	2.51	3.02	0.00	12.67	4.16	4.38	0.00	21.83	3.09	3.43	0.00	14.02	4.14	4.82	0.00	20.00
Gray literature	1.32	2.08	0.00	11.77	1.48	2.59	0.00	11.83	0.82	1.21	0.00	5.70	3.16	5.65	0.00	31.64	1.49	2.43	0.00	10.00	1.78	3.19	0.00	18.30
Mobility	1.79	1.41	0.00	6.00	1.79	1.41	0.00	5.00	1.75	1.40	0.00	6.00	1.46	1.17	0.00	5.00	1.96	1.80	0.00	8.00	1.89	1.45	0.00	8.00
Months abroad	16.75	21.71	0.00	96.00	12.50	19.91	0.00	84.00	11.82	17.25	0.00	56.00	12.99	22.72	0.00	96.00	17.85	32.29	0.00	156.00	10.48	17.82	0.00	90.00
PhD from abroad	0.11	0.31	0.00	1.00	0.07	0.26	0.00	1.00	0.06	0.24	0.00	1.00	0.06	0.24	0.00	1.00	0.11	0.32	0.00	1.00	0.06	0.24	0.00	1.00
Excellence university	0.36	0.38	0.00	1.00	0.39	0.40	0.00	1.00	0.38	0.39	0.00	1.00	0.33	0.39	0.00	1.00	0.31	0.36	0.00	1.00	0.39	0.38	0.00	1.00
Years since PhD	8.80	3.16	3.00	20.00	6.21	2.20	2.00	12.00	7.45	3.00	0.00	14.00	6.84	2.42	0.00	14.00	6.35	2.23	2.00	12.00	6.58	2.83	0.00	20.00
PhD (Dummy)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00
Awards	0.61	1.04	0.00	4.00	0.29	0.77	0.00	3.00	0.45	0.78	0.00	4.00	0.61	1.26	0.00	7.00	0.69	1.43	0.00	7.00	0.40	0.90	0.00	5.00
Research funding	0.63	0.86	0.00	4.00	0.50	0.77	0.00	3.00	0.65	1.04	0.00	4.00	0.61	0.92	0.00	5.00	0.78	1.16	0.00	4.00	0.76	1.22	0.00	5.00
Co-authors	67.38	78.33	2.00	472.00	44.55	50.59	1.00	279.00	49.61	44.24	0.00	174.00	62.23	47.09	3.00	212.00	65.96	73.24	3.00	411.00	47.38	42.58	0.00	236.00
Interim professor	0.25	0.48	0.00	2.00	0.31	0.64	0.00	3.00	0.20	0.40	0.00	1.00	0.25	0.52	0.00	2.00	0.28	0.45	0.00	1.00	0.25	0.59	0.00	4.00
No Children [0]	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
Children [1]	0.43	0.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.49	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Children [2]	0.52	0.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Children [3-4]	0.05	0.23	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.28	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Children [survey non-response]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00
Junior professors (Dummy)	0.14	0.35	0.00	1.00	0.12	0.33	0.00	1.00	0.10	0.30	0.00	1.00	0.07	0.27	0.00	1.00	0.09	0.29	0.00	1.00	0.08	0.27	0.00	1.00
Cohorts 1980-1989	0.16	0.37	0.00	1.00	0.12	0.33	0.00	1.00	0.14	0.35	0.00	1.00	0.30	0.46	0.00	1.00	0.15	0.36	0.00	1.00	0.38	0.49	0.00	1.00
Cohorts 1990-1999	0.41	0.50	0.00	1.00	0.36	0.48	0.00	1.00	0.39	0.49	0.00	1.00	0.34	0.48	0.00	1.00	0.44	0.50	0.00	1.00	0.32	0.47	0.00	1.00
Cohorts 2000-2009	0.43	0.50	0.00	1.00	0.50	0.51	0.00	1.00	0.41	0.50	0.00	1.00	0.35	0.48	0.00	1.00	0.41	0.50	0.00	1.00	0.27	0.44	0.00	1.00
Cohorts 2010-2019	0.00	0.00	0.00	0.00	0.02	0.15	0.00	1.00	0.06	0.24	0.00	1.00	0.01	0.11	0.00	1.00	0.00	0.00	0.00	0.00	0.04	0.19	0.00	1.00
N	56				42				51				80				54				112			

Table A5.1. Cox regression models on obtaining a habilitation (right-censored as soon as holding a junior professorship).

	(1) Only Gender	(2) Gender# Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/ Grants	(7) Only Female	(8) Only Male
Female	0.75**							
	(-2.96)							
Childless man				*reference*				
Father		1.55*	1.38+	1.40+	1.01	0.95		
		(2.54)	(1.83)	(1.86)	(0.03)	(-0.25)		
Men w/o info		1.18	1.12	1.19	1.01	0.95		
		(1.03)	(0.68)	(1.02)	(0.03)	(-0.26)		
Childless woman		0.98	1.25	1.22	1.00	0.98		
		(-0.09)	(1.18)	(1.05)	(-0.01)	(-0.10)		
Mother		0.84	1.05	1.03	0.65*	0.61*		
		(-0.95)	(0.27)	(0.13)	(-2.04)	(-2.37)		
Women w/o info		0.95	1.36+	1.42*	0.94	0.97		
		(-0.27)	(1.82)	(2.08)	(-0.31)	(-0.18)		
[0] Childless							*reference*	
[1] Children							0.52**	0.96
							(-3.04)	(-0.21)
[2] Unknwn							0.82	0.94
							(-0.96)	(-0.34)
SSCI/SCIE articles (ln)			2.63***	2.40***	1.98***	1.79***	2.97***	1.52***
			(10.80)	(9.53)	(6.87)	(5.95)	(6.53)	(3.63)
Non-SSCI/SCIE articles (ln)			1.05	1.07	1.19+	1.32**	1.01	1.51***
			(0.48)	(0.72)	(1.72)	(2.69)	(0.08)	(3.34)
Monographs (ln)			1.53**	1.48**	1.31+	1.25	1.51+	1.14
			(2.90)	(2.66)	(1.76)	(1.45)	(1.73)	(0.70)
Edited volumes (ln)			1.14	1.36	1.27	1.32	2.19+	1.26
			(0.56)	(1.45)	(1.09)	(1.28)	(1.94)	(0.93)
Book chapters (ln)			1.42***	1.34**	1.15	1.15	1.20	1.13
			(3.79)	(3.19)	(1.51)	(1.51)	(1.20)	(1.12)
Gray literature (ln)			0.97	0.94	1.11	1.08	1.35*	1.00
			(-0.39)	(-0.74)	(1.17)	(0.89)	(2.01)	(0.02)
Mobility (ln)				1.92***	1.49***	1.43***	1.62**	1.26+
				(6.17)	(3.96)	(3.48)	(2.94)	(1.79)
Months abroad (ln)				1.10**	1.09*	1.07+	1.06	1.07
				(2.64)	(2.31)	(1.80)	(0.94)	(1.60)
PhD from abroad				0.69+	0.59*	0.66+	1.09	0.51**
				(-1.86)	(-2.44)	(-1.92)	(0.26)	(-2.59)
Excellence university					1.90***	1.91***	2.01***	1.95***
					(4.86)	(4.93)	(3.30)	(4.07)
Years since PhD					1.76***	1.73***	2.08***	1.66***
					(7.34)	(7.17)	(6.30)	(7.00)
Years since PhD (sq.)					0.98***	0.98***	0.97***	0.98***
					(-3.75)	(-3.61)	(-3.85)	(-3.40)
Awards (ln)						1.15	1.08	1.28
						(0.96)	(0.36)	(1.46)
Research funding (ln)						1.74***	1.65*	1.79***
						(4.43)	(2.55)	(3.89)
Only selected publications	2.67***	2.63***	3.06***	2.82***	2.16***	1.92***	2.88***	1.72**
	(5.78)	(5.67)	(5.56)	(4.90)	(4.54)	(3.70)	(4.19)	(2.66)
Cohorts *(ref. 2000-2009)*								
1980-1989	1.48**	1.50**	1.61**	1.65***	1.88***	2.20***	2.24**	2.24***
	(2.95)	(3.09)	(2.93)	(3.39)	(4.07)	(4.93)	(2.66)	(4.38)
1990-1999	1.67***	1.71***	1.71***	1.50**	1.61***	1.60***	2.08***	1.44*
	(4.53)	(4.68)	(4.14)	(3.02)	(3.61)	(3.45)	(3.66)	(2.03)
2010-2019	0.34***	0.33***	0.31***	0.30***	0.41***	0.42***	0.33**	0.55+
	(-4.44)	(-4.49)	(-4.77)	(-5.02)	(-3.83)	(-3.64)	(-3.00)	(-1.96)
Pseudo r²	0.02	0.02	0.06	0.08	0.13	0.14	0.20	0.14
Log-likelihood	-2954.78	-2950.51	-2827.51	-2791.69	-2615.51	-2600.21	-789.48	-1480.60
Degrees of freedom	5	9	15	18	21	23	20	20
Chi²	118.18	121.28	275.39	326.85	854.48	905.88	495.91	594.27
AIC	5919.57	5919.02	5685.02	5619.38	5273.01	5246.43	1618.97	3001.20
BIC	5962.08	5995.54	5812.54	5772.41	5451.55	5441.97	1772.40	3159.79
Number of events (habil)	468	468	468	468	468	468	173	295
N (persons)	2,526	2,526	2,526	2,526	2,526	2,526	1,419	1,107
N (persons-publications)	36,380	36,380	36,380	36,380	36,380	36,380	15,862	20,518

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A5.2. Cox regression models on obtaining a habilitation (right-censored after 6 years of holding a junior professorship).

	(1) Only Gender	(2) Gender# Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/ Grants	(7) Only Female	(8) Only Male
Female	0.73**							
	(-3.17)							
Childless man				*reference*				
Father		1.50*	1.37+	1.38+	0.97	0.93		
		(2.38)	(1.78)	(1.81)	(-0.14)	(-0.35)		
Men w/o info		1.18	1.12	1.18	0.99	0.95		
		(1.03)	(0.68)	(1.00)	(-0.03)	(-0.28)		
Childless woman		0.96	1.19	1.17	0.93	0.91		
		(-0.21)	(0.94)	(0.81)	(-0.32)	(-0.43)		
Mother		0.82	0.99	0.96	0.60*	0.57**		
		(-1.09)	(-0.04)	(-0.20)	(-2.42)	(-2.71)		
Women w/o info		0.93	1.27	1.35+	0.89	0.91		
		(-0.44)	(1.42)	(1.77)	(-0.59)	(-0.49)		
[0] Childless							*reference*	
[1] Children							0.55**	0.94
							(-2.75)	(-0.34)
[2] w/o info							0.86	0.95
							(-0.71)	(-0.32)
SSCI/SCIE articles (ln)			2.53***	2.32***	1.92***	1.76***	2.78***	1.49***
			(10.56)	(9.28)	(6.69)	(5.85)	(6.13)	(3.53)
Non-SSCI/SCIE articles (ln)			1.09	1.12	1.23*	1.34**	1.13	1.51***
			(0.91)	(1.13)	(2.05)	(2.94)	(0.78)	(3.36)
Monographs (ln)			1.53**	1.48**	1.32+	1.29+	1.42	1.20
			(2.97)	(2.73)	(1.87)	(1.65)	(1.49)	(0.94)
Edited volumes (ln)			1.17	1.37	1.27	1.31	1.87	1.28
			(0.67)	(1.48)	(1.11)	(1.26)	(1.61)	(0.99)
Book chapters (ln)			1.38***	1.32**	1.12	1.12	1.15	1.12
			(3.61)	(3.05)	(1.31)	(1.26)	(0.89)	(1.04)
Gray literature (ln)			0.94	0.92	1.09	1.07	1.16	1.01
			(-0.73)	(-1.03)	(1.00)	(0.77)	(0.96)	(0.14)
Mobility (ln)				1.88***	1.45***	1.38**	1.54**	1.24+
				(5.95)	(3.66)	(3.15)	(2.61)	(1.66)
Months abroad (ln)				1.09*	1.08*	1.06	1.06	1.06
				(2.44)	(2.05)	(1.55)	(1.02)	(1.41)
PhD from abroad				0.68+	0.60*	0.65+	1.02	0.52*
				(-1.94)	(-2.41)	(-1.96)	(0.05)	(-2.48)
Excellence university					2.03***	2.04***	2.21***	2.06***
					(5.41)	(5.47)	(3.70)	(4.41)
Years since PhD					1.76***	1.73***	2.07***	1.66***
					(7.58)	(7.46)	(6.40)	(7.29)
Years since PhD (sq.)					0.98***	0.98***	0.97***	0.98***
					(-3.84)	(-3.74)	(-3.88)	(-3.55)
Awards (ln)						1.13	1.03	1.27
						(0.91)	(0.13)	(1.42)
Research funding (ln)						1.65***	1.41+	1.75***
						(4.00)	(1.79)	(3.70)
Only selected publications	2.65***	2.62***	3.05***	2.84***	2.17***	1.98***	2.99***	1.76**
	(5.79)	(5.71)	(5.67)	(5.06)	(4.68)	(4.02)	(4.49)	(2.81)
Cohorts *(ref. 2000-2009)*								
1980-1989	1.56***	1.59***	1.70***	1.77***	2.03***	2.36***	2.32**	2.38***
	(3.39)	(3.51)	(3.32)	(3.90)	(4.61)	(5.43)	(2.84)	(4.72)
1990-1999	1.73***	1.76***	1.80***	1.61***	1.73***	1.73***	2.19***	1.54*
	(4.86)	(4.96)	(4.62)	(3.60)	(4.21)	(4.13)	(3.97)	(2.45)
2010-2019	0.34***	0.34***	0.32***	0.31***	0.43***	0.43***	0.31**	0.58+
	(-4.36)	(-4.41)	(-4.61)	(-4.83)	(-3.69)	(-3.54)	(-3.13)	(-1.81)
Pseudo r²	0.02	0.02	0.06	0.07	0.13	0.14	0.18	0.14
Log-likelihood	-2973.14	-2969.39	-2852.85	-2819.67	-2641.49	-2629.02	-809.71	-1492.95
Degrees of freedom	5	9	15	18	21	23	20	20
Chi²	125.16	127.68	277.94	325.82	860.65	906.30	456.59	596.40
AIC	5956.27	5956.78	5735.71	5675.35	5324.98	5304.05	1659.43	3025.89
BIC	5999.00	6033.68	5863.88	5829.15	5504.42	5500.58	1813.94	3185.16
Number of events (habil)	468	468	468	468	468	468	173	295
N (persons)	2,527	2,527	2,527	2,527	2,527	2,527	1,419	1,108
N (persons-publications)	37,972	37,972	37,972	37,972	37,972	37,972	16,740	21,232

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A6.1. Stratified cox regression models on obtaining a habilitation (different interaction terms by gender).

	(1) Female × Children	(2) Female × SSCI/SCIE publications	(3) Female × Non-SSCI/SCIE publications	(4) Female × Monographs	(5) Female × Edited volumes	(6) Female × Book chapters	(7) Female × Gray literature	(8) Female × Mobility	(9) Female × Months abroad	(10) Female × PhD from abroad	(11) Female × Universities of excellence	(12) Female × Years since PhD	(13) Female × Awards	(14) Female × Research funding	(15) Female × Cohorts
[1] Children	**0.95**	0.77^{+}	0.77^{+}	0.77^{+}	0.76^{+}	0.77^{+}	0.77^{+}	0.77^{+}	0.76^{+}	0.76^{+}	0.76^{+}	0.76^{+}	0.76^{+}	0.76^{+}	0.76^{+}
(ref. chidless)	**(-0.26)**	(-1.86)	(-1.86)	(-1.88)	(-1.91)	(-1.87)	(-1.86)	(-1.88)	(-1.92)	(-1.96)	(-1.89)	(-1.88)	(-1.90)	(-1.89)	(-1.96)
[2] Unknwn	**0.97**	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.94	0.93	0.94	0.94	0.94	0.95	0.94
(ref. chidless)	**(-0.15)**	(-0.45)	(-0.47)	(-0.43)	(-0.44)	(-0.43)	(-0.43)	(-0.43)	(-0.45)	(-0.53)	(-0.43)	(-0.43)	(-0.44)	(-0.40)	(-0.46)
SSCI/SCIE articles (ln)	1.83***	**1.60*****	1.83***	1.84***	1.85***	1.84***	1.84***	1.83***	1.83***	1.83***	1.84***	1.84***	1.84***	1.83***	1.84***
	(6.23)	**(4.13)**	(6.14)	(6.23)	(6.32)	(6.20)	(6.26)	(6.20)	(6.21)	(6.22)	(6.25)	(6.24)	(6.25)	(6.11)	(6.22)
Non-SSCI/SCIE	1.32**	1.31**	**1.40****	1.32**	1.32**	1.31**	1.32**	1.31**	1.33**	1.32**	1.31**	1.31**	1.31**	1.31**	1.32**
articles (ln)	(2.73)	(2.70)	**(2.81)**	(2.74)	(2.77)	(2.72)	(2.74)	(2.68)	(2.80)	(2.77)	(2.71)	(2.71)	(2.71)	(2.71)	(2.76)
Monographs (ln)	1.23	1.22	1.23	**1.24**	1.23	1.22	1.22	1.21	1.22	1.21	1.22	1.22	1.22	1.22	1.19
	(1.36)	(1.32)	(1.37)	**(1.08)**	(1.32)	(1.30)	(1.28)	(1.23)	(1.28)	(1.22)	(1.26)	(1.28)	(1.26)	(1.26)	(1.10)
Edited volumes (ln)	1.40	1.39	1.35	1.39	**1.28**	1.39	1.41	1.40	1.39	1.39	1.39	1.39	1.40	1.40	1.39
	(1.56)	(1.54)	(1.37)	(1.52)	**(1.00)**	(1.53)	(1.61)	(1.57)	(1.52)	(1.53)	(1.54)	(1.52)	(1.57)	(1.57)	(1.51)
Book chapters (ln)	1.15	1.13	1.12	1.12	1.12	**1.13**	1.12	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.13
	(1.55)	(1.34)	(1.29)	(1.28)	(1.23)	**(1.14)**	(1.28)	(1.18)	(1.21)	(1.26)	(1.27)	(1.26)	(1.26)	(1.23)	(1.32)
Gray literature (ln)	1.09	1.10	1.08	1.10	1.12	1.10	**1.08**	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10
	(0.95)	(1.12)	(0.92)	(1.10)	(1.23)	(1.08)	**(0.68)**	(1.18)	(1.04)	(1.05)	(1.10)	(1.11)	(1.09)	(1.06)	(1.03)
Mobility (ln)	1.36**	1.36**	1.38**	1.37**	1.36**	1.37**	1.36**	**1.23**	1.37**	1.37**	1.36**	1.37**	1.36**	1.37**	1.38**
	(2.97)	(3.02)	(3.12)	(3.05)	(3.01)	(3.05)	(3.05)	**(1.62)**	(3.10)	(3.06)	(3.04)	(3.06)	(3.06)	(3.08)	(3.14)
Months abroad (ln)	1.06^{+}	1.06	1.06	1.06	1.06	1.06	1.06	1.06^{+}	**1.04**	1.06^{+}	1.06	1.06	1.06^{+}	1.06	1.06^{+}
	(1.77)	(1.56)	(1.55)	(1.63)	(1.63)	(1.63)	(1.61)	(1.67)	**(0.82)**	(1.65)	(1.63)	(1.63)	(1.65)	(1.61)	(1.67)
PhD from abroad	0.64*	0.64*	0.64*	0.64*	0.64*	0.63*	0.63*	0.62*	0.64*	**0.53***	0.63*	0.63*	0.63*	0.64*	0.62*
	(-2.09)	(-2.10)	(-2.11)	(-2.11)	(-2.12)	(-2.13)	(-2.15)	(-2.18)	(-2.07)	**(-2.55)**	(-2.14)	(-2.14)	(-2.16)	(-2.13)	(-2.21)
Excellence university	1.96***	1.98***	1.98***	1.99***	2.00***	1.99***	1.99***	2.01***	1.99***	2.00***	**2.06*****	1.99***	1.99***	1.99***	1.99***
	(5.19)	(5.24)	(5.22)	(5.29)	(5.30)	(5.30)	(5.32)	(5.42)	(5.26)	(5.35)	**(4.26)**	(5.31)	(5.32)	(5.30)	(5.29)
Years since PhD	1.75***	1.76***	1.76***	1.76***	1.76***	1.76***	1.76***	1.77***	1.76***	1.76***	1.76***	**1.76*****	1.76***	1.76***	1.76***
	(6.91)	(7.04)	(7.00)	(6.96)	(6.91)	(6.96)	(7.03)	(7.03)	(7.01)	(6.96)	(6.97)	**(7.25)**	(7.00)	(7.03)	(7.00)
Years since PhD (sq.)	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***
	(-3.52)	(-3.59)	(-3.56)	(-3.55)	(-3.52)	(-3.55)	(-3.59)	(-3.57)	(-3.58)	(-3.55)	(-3.56)	(-3.47)	(-3.57)	(-3.58)	(-3.57)
Awards (ln)	1.15	1.17	1.17	1.16	1.15	1.16	1.16	1.18	1.16	1.16	1.16	1.16	**1.20**	1.18	1.18
	(1.00)	(1.14)	(1.14)	(1.10)	(1.03)	(1.11)	(1.12)	(1.24)	(1.09)	(1.10)	(1.12)	(1.11)	**(1.05)**	(1.23)	(1.22)
Research funding (ln)	1.74***	1.68***	1.72***	1.71***	1.72***	1.71***	1.71***	1.70***	1.71***	1.72***	1.71***	1.71***	1.70***	**1.62****	1.71***
	(4.51)	(4.29)	(4.46)	(4.35)	(4.45)	(4.38)	(4.39)	(4.36)	(4.43)	(4.42)	(4.38)	(4.37)	(4.37)	**(3.24)**	(4.44)
Only selected	1.99***	2.04***	2.04***	2.04***	2.05***	2.05***	2.04***	2.05***	2.07***	2.07***	2.04***	2.04***	2.03***	2.04***	2.06***
publication	(4.05)	(4.36)	(4.29)	(4.31)	(4.30)	(4.31)	(4.30)	(4.37)	(4.39)	(4.34)	(4.28)	(4.29)	(4.28)	(4.32)	(4.40)
Cohorts *(ref. 2000-2009)*															
1980-1989	2.27***	2.34***	2.24***	2.26***	2.25***	2.26***	2.27***	2.26***	2.26***	2.27***	2.26***	2.26***	2.26***	2.26***	**2.35*****
	(5.24)	(5.40)	(5.14)	(5.19)	(5.14)	(5.21)	(5.23)	(5.19)	(5.20)	(5.19)	(5.20)	(5.18)	(5.19)	(5.20)	**(4.64)**
1990-1999	1.63***	1.69***	1.62***	1.63***	1.62***	1.62***	1.63***	1.64***	1.63***	1.61***	1.62***	1.62***	1.62***	1.63***	**1.48***
	(3.64)	(3.90)	(3.59)	(3.60)	(3.60)	(3.61)	(3.62)	(3.69)	(3.68)	(3.55)	(3.61)	(3.62)	(3.60)	(3.64)	**(2.22)**
2010-2019	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	0.43***	**0.57**$^{+}$
	(-3.53)	(-3.53)	(-3.53)	(-3.53)	(-3.52)	(-3.53)	(-3.52)	(-3.55)	(-3.54)	(-3.56)	(-3.53)	(-3.54)	(-3.53)	(-3.52)	**(-1.81)**
Female × [1] Children	*0.58**														
	(-1.96)														
Female × [2] Unknwn	*0.96*														
	(-0.14)														
Female × SSCI/SCIE articles (ln)		*1.58***													
		(2.63)													
Female × Non-SSCI/SCIE articles (ln)			*0.84*												
			(-1.00)												

Table A6.1. Continued.

Female × Monographs (ln)				*0.97*											
				(-0.12)											
Female × Edited volumes (ln)					*1.44*										
					(0.80)										
Female × Book chapters (ln)						*0.98*									
						(-0.10)									
Female × Gray literature (ln)							*1.09*								
							(0.48)								
Female × Mobility (ln)								*1.31*							
								(1.36)							
Female × Months abroad (ln)									*1.06*						
									(0.92)						
Female × PhD from abroad										*1.86+*					
										(1.68)					
Female × Excellence university											*0.92*				
											(-0.32)				
Female × Years since PhD												*1.00*			
												(0.10)			
Female × Awards (ln)													*0.92*		
													(-0.35)		
Female × Research funding (ln)														*1.17*	
														(0.72)	
Cohorts *(ref. 2000-2009)*															
1980-1989															*0.86*
															(-0.49)
1990-1999															*1.30*
															(1.04)
2010-2019															*0.53*
															(-1.37)
Pseudo r^2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Log-likelihood	-2304.97	-2303.78	-2307.35	-2307.99	-2307.61	-2307.99	-2307.87	-2306.91	-2307.49	-2306.73	-2307.95	-2308.00	-2307.92	-2307.68	-2305.72
Degrees of freedom	22	21	21	21	21	21	21	21	21	21	21	21	21	21	23
Chi²	880.32	897.88	902.93	883.06	884.69	887.37	889.90	905.73	882.63	878.59	887.15	898.58	882.71	921.03	947.72
AIC	4653.93	4649.55	4656.71	4657.98	4657.22	4657.99	4657.73	4655.83	4656.98	4655.47	4657.90	4657.99	4657.83	4657.37	4657.43
BIC	4841.59	4828.68	4835.84	4837.11	4836.36	4837.12	4836.87	4834.96	4836.11	4834.60	4837.03	4837.12	4836.96	4836.50	4853.62
Number of events (habilitation)	468	468	468	468	468	468	468	468	468	468	468	468	468	468	468
N (persons)	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527	2,527
N (persons-publications)	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423	37,423

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Note: Bold values are main effects of covariates conditioned on gender (=men), while italic values indicate interaction terms (=women). Estimating stratified models with gender interactions for all covariates (and multiplying main and interacting effects) and allowing the baseline hazard function to differ for gender is equivalent to fitting separate cox proportional hazard models for women and men (A7, Model 1 and 2).

Table A6.2. Stratified cox regression models on obtaining a habilitation (different interaction terms by parents).

	(1) Mother × SSCI/SCIE publications	(2) Mother × Non-SSCI/SCIE publications	(3) Mother × Monographs	(4) Mother × Edited volumes	(5) Mother × Book chapters	(6) Mother × Gray literature	(7) Mother × Mobility	(8) Mother × Months abroad	(9) Mother × PhD from abroad	(10) Mother × Universities of excellence	(11) Mother × Years since PhD	(12) Mother × Awards	(13) Mother × Research funding	(14) Mother × Cohorts
SSCI/SCIE	**1.34**$^{+}$	1.60**	1.66***	1.66***	1.65***	1.67***	1.65***	1.63**	1.63***	1.65***	1.66***	1.67***	1.68***	1.65***
articles (ln)	**(1.80)**	(3.17)	(3.48)	(3.45)	(3.39)	(3.47)	(3.35)	(3.28)	(3.33)	(3.38)	(3.47)	(3.51)	(3.40)	(3.41)
Non-SSCI/SCIE	1.01	**1.20**	1.00	1.00	1.00	1.01	1.00	1.01	0.99	1.00	1.01	1.00	1.00	1.00
articles (ln)	(0.06)	**(0.87)**	(0.00)	(-0.01)	(0.02)	(0.05)	(-0.02)	(0.03)	(-0.08)	(-0.03)	(0.05)	(-0.01)	(0.00)	(-0.00)
Monographs (ln)	1.25	1.28	**1.39**	1.23	1.28	1.22	1.21	1.24	1.22	1.23	1.24	1.26	1.24	1.24
	(0.99)	(1.11)	**(1.20)**	(0.91)	(1.08)	(0.88)	(0.82)	(0.94)	(0.88)	(0.90)	(0.97)	(1.01)	(0.95)	(0.96)
Edited volumes	1.57	1.52	1.53	**1.54**	1.55	1.61	1.55	1.54	1.64	1.56	1.58	1.50	1.52	1.54
(ln)	(1.32)	(1.15)	(1.19)	**(1.02)**	(1.25)	(1.32)	(1.21)	(1.19)	(1.37)	(1.25)	(1.29)	(1.11)	(1.16)	(1.21)
Book chapters	1.51**	1.56**	1.55**	1.53**	**1.64****	1.54**	1.52**	1.51**	1.55**	1.53**	1.52**	1.53**	1.53**	1.55**
(ln)	(2.88)	(3.01)	(2.95)	(2.86)	**(2.92)**	(2.93)	(2.78)	(2.82)	(3.01)	(2.89)	(2.86)	(2.87)	(2.90)	(2.95)
Gray literature	1.14	1.10	1.15	1.17	1.14	**1.08**	1.17	1.15	1.13	1.16	1.16	1.16	1.17	1.14
(ln)	(1.00)	(0.72)	(1.07)	(1.11)	(0.96)	**(0.53)**	(1.17)	(1.05)	(0.88)	(1.15)	(1.09)	(1.15)	(1.16)	(1.01)
Mobility (ln)	1.19	1.30	1.26	1.22	1.25	1.22	**1.17**	1.24	1.25	1.22	1.20	1.22	1.21	1.21
	(1.07)	(1.57)	(1.37)	(1.22)	(1.35)	(1.22)	**(0.77)**	(1.30)	(1.32)	(1.21)	(1.09)	(1.22)	(1.16)	(1.16)
Months abroad	1.12^{+}	1.14*	1.14*	1.14*	1.14*	1.14*	1.14*	**1.09**	1.15*	1.14*	1.14*	1.14*	1.14*	1.14*
(ln)	(1.86)	(2.20)	(2.28)	(2.28)	(2.34)	(2.30)	(2.28)	**(1.27)**	(2.44)	(2.32)	(2.34)	(2.24)	(2.36)	(2.28)
PhD from abroad	1.03	1.06	1.03	1.01	1.02	0.97	1.02	1.06	**0.62**	1.01	0.98	1.04	1.00	1.02
	(0.08)	(0.16)	(0.10)	(0.04)	(0.04)	(-0.07)	(0.05)	(0.16)	**(-1.05)**	(0.02)	(-0.06)	(0.10)	(0.00)	(0.06)
Excellence	1.87**	1.76**	1.79**	1.81**	1.83**	1.80**	1.83**	1.77**	1.85**	**1.89***	1.82**	1.78**	1.81**	1.83**
university	(2.86)	(2.62)	(2.72)	(2.80)	(2.83)	(2.75)	(2.79)	(2.66)	(2.89)	**(2.41)**	(2.83)	(2.71)	(2.80)	(2.83)
Years since PhD	1.52**	1.51**	1.51**	1.51**	1.51**	1.51***	1.52**	1.51**	1.52**	1.52**	**1.53*****	1.51**	1.52**	1.54**
	(2.82)	(3.21)	(3.16)	(3.07)	(3.10)	(3.32)	(3.08)	(3.09)	(3.12)	(3.10)	**(3.77)**	(3.10)	(3.12)	(3.22)
Years since PhD	0.99	0.99	0.99	0.99	0.99	0.99^{+}	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99^{+}
(sq.)	(-1.37)	(-1.61)	(-1.58)	(-1.54)	(-1.54)	(-1.67)	(-1.54)	(-1.54)	(-1.56)	(-1.55)	(-1.64)	(-1.55)	(-1.57)	(-1.69)
Awards (ln)	1.03	1.00	0.98	1.00	0.99	1.00	1.01	1.00	1.01	1.01	1.00	**0.93**	0.99	0.99
	(0.14)	(-0.02)	(-0.10)	(0.01)	(-0.03)	(0.00)	(0.05)	(0.02)	(0.06)	(0.03)	(0.00)	**(-0.28)**	(-0.05)	(-0.08)
Research funding	1.46^{+}	1.59*	1.56*	1.52*	1.55*	1.54*	1.52*	1.53*	1.57*	1.53*	1.53*	1.54*	**1.62***	1.56*
(ln)	(1.81)	(2.27)	(2.15)	(2.03)	(2.14)	(2.12)	(2.03)	(2.06)	(2.20)	(2.06)	(2.09)	(2.10)	**(2.09)**	(2.19)
Only selected	1.24	1.16	1.15	1.17	1.17	1.16	1.18	1.20	1.18	1.16	1.16	1.19	1.15	1.16
publications	(0.74)	(0.51)	(0.47)	(0.52)	(0.52)	(0.49)	(0.55)	(0.61)	(0.55)	(0.48)	(0.49)	(0.57)	(0.47)	(0.49)
Cohorts *(ref. 2000-2009)*														
1980-1989	3.05***	2.89***	2.94***	2.87***	2.94***	2.94***	2.87***	2.96***	3.08***	2.90***	2.91***	2.88***	2.89***	**3.18*****
	(4.47)	(4.27)	(4.38)	(4.22)	(4.32)	(4.21)	(4.21)	(4.34)	(4.48)	(4.22)	(4.24)	(4.25)	(4.22)	**(3.96)**
1990-1999	1.92**	1.79**	1.83**	1.81**	1.85**	1.84**	1.82**	1.82**	1.81**	1.81**	1.83**	1.84**	1.83**	**2.04***
	(2.97)	(2.65)	(2.74)	(2.67)	(2.76)	(2.73)	(2.67)	(2.68)	(2.62)	(2.66)	(2.71)	(2.79)	(2.72)	**(2.56)**
2010-2019	0.50	0.50	0.49	0.49	0.50	0.50	0.49	0.49	0.49	0.49	0.47^{+}	0.50	0.50	**0.85**
	(-1.52)	(-1.53)	(-1.55)	(-1.57)	(-1.52)	(-1.52)	(-1.56)	(-1.58)	(-1.56)	(-1.55)	(-1.65)	(-1.55)	(-1.55)	**(-0.35)**
Mother × SSCI/SCIE	*2.22***													
articles (ln)	*(3.16)*													
Mother × Non-SSCI/SCIE		*0.56**												
articles (ln)		*(-2.05)*												
Mother ×			*0.73*											
Monographs (ln)			*(-0.74)*											

Table A6.2. Continued.

Mother × Edited volumes (ln)				*1.01*										
				(0.02)										
Mother × Book chapters (ln)					*0.81*									
					(-0.84)									
Mother × Gray literature (ln)						*1.30*								
						(0.96)								
Mother × Mobility (ln)							*1.14*							
							(0.38)							
Mother × Months abroad (ln)								*1.12*						
								(1.00)						
Mother × PhD from abroad									*3.45**					
									(2.00)					
Mother × Excellence university										*0.89*				
										(-0.27)				
Mother × Years since PhD											*0.94*			
											(-1.11)			
Mother × Awards (ln)												*1.20*		
												(0.50)		
Mother × Research funding (ln)													*0.83*	
													(-0.50)	
Cohorts *(ref. 2000-2009)*														
1980-1989														*0.75*
														(-0.63)
1990-1999														*0.74*
														(-0.72)
2010-2019														*0.00****
														(-81.11)
Pseudo r²	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Log-likelihood	-597.67	-600.49	-602.28	-602.59	-602.14	-602.11	-602.52	-602.04	-600.78	-602.56	-601.90	-602.44	-602.46	-600.09
Degrees of freedom	19	19	19	19	19	19	19	19	19	19	19	19	19	21
Chi²	238.06	228.81	224.49	219.70	226.52	223.77	219.94	221.05	214.28	223.96	220.68	218.83	218.33	22451.14
AIC	1233.34	1238.98	1242.56	1243.19	1242.27	1242.22	1243.03	1242.08	1239.55	1243.12	1241.81	1242.88	1242.92	1242.18
BIC	1369.60	1375.24	1378.82	1379.45	1378.53	1378.48	1379.29	1378.34	1375.82	1379.38	1378.07	1379.14	1379.18	1392.78
Number of events (habilitation)	158	158	158	158	158	158	158	158	158	158	158	158	158	158
N (persons)	691	691	691	691	691	691	691	691	691	691	691	691	691	691
N (persons-publications)	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq. = squared.

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Note: Bold values are main effects of covariates conditioned on parents (=fathers), while italic values indicate interaction terms (=mothers). Estimating stratified models with parent interactions for all covariates (and multiplying main and interacting effects) and allowing the baseline hazard function to differ for parents is equivalent to fitting separate cox proportional hazard models for mothers and fathers (A7, Model 3 and 4).

Table A7. Cox regression models on obtaining a habilitation, separately for gender and parents.

	(1) Only Female	(2) Only Male	(3) Only Mothers	(4) Only Fathers
[1] Children	0.54**	0.95		
(ref. childless)	(-2.86)	(-0.25)		
[2] Unknwn	0.86	0.94		
(ref. childless)	(-0.74)	(-0.33)		
SSCI/SCIE articles (ln)	2.88***	1.51***	4.31***	1.14
	(6.31)	(3.60)	(5.22)	(0.78)
Non-SSCI/SCIE articles (ln)	1.08	1.50***	0.51*	1.49+
	(0.50)	(3.32)	(-2.28)	(1.82)
Monographs (ln)	1.42	1.17	1.91+	1.05
	(1.47)	(0.82)	(1.96)	(0.15)
Edited volumes (ln)	2.12+	1.27	2.01	1.73
	(1.85)	(0.97)	(1.02)	(1.29)
Book chapters (ln)	1.20	1.13	1.62+	1.52*
	(1.22)	(1.09)	(1.80)	(2.46)
Gray literature (ln)	1.20	1.01	1.61	0.87
	(1.22)	(0.10)	(1.49)	(-0.82)
Mobility (ln)	1.55**	1.25+	1.68+	1.04
	(2.68)	(1.70)	(1.66)	(0.21)
Months abroad (ln)	1.06	1.07	1.07	1.16*
	(0.93)	(1.56)	(0.65)	(1.98)
PhD from abroad	1.05	0.51*	2.04	0.59
	(0.13)	(-2.55)	(1.35)	(-1.16)
Excellence university	2.10***	2.00***	1.92+	2.10**
	(3.48)	(4.22)	(1.76)	(2.68)
Years since PhD	2.09***	1.66***	2.32***	1.47***
	(6.37)	(7.19)	(4.93)	(4.69)
Years since PhD (sq.)	0.97***	0.98***	0.96***	0.99*
	(-3.90)	(-3.50)	(-4.07)	(-2.28)
Awards (ln)	1.05	1.27	1.07	1.03
	(0.24)	(1.41)	(0.24)	(0.11)
Research funding (ln)	1.54*	1.78***	0.85	2.00**
	(2.21)	(3.85)	(-0.45)	(2.87)
Only selected publications	2.87***	1.73**	0.82	1.25
	(4.30)	(2.72)	(-0.32)	(0.66)
Cohorts *(ref. 2000-2009)*				
1980-1989	2.20**	2.34***	5.05**	3.17***
	(2.63)	(4.62)	(3.22)	(3.83)
1990-1999	2.09***	1.50*	2.22*	2.10**
	(3.68)	(2.29)	(2.49)	(2.74)
2010-2019	0.32**	0.57+	0.00***	0.81
	(-3.11)	(-1.85)	(-93.11)	(-0.38)
Pseudo r²	0.19	0.14	0.21	0.15
Log-likelihood	-800.23	-1487.04	-201.76	-379.60
Degrees of freedom	20	20	18	18
Chi²	470.21	597.67	12246.32	187.58
AIC	1640.46	3014.09	439.52	795.21
BIC	1794.58	3173.14	553.21	914.33
Number of events (habilitation)	173	295	58	100
N (persons)	1,419	1,108	382	309
N (persons-publications)	16,413	21,010	4,090	5,531

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A8. Robustness checks for non-response bias on children (survey-participation).

	(1) Children-nonresponse as category	(2) Complete records	(3) Multiple imputation[1]
Childless men		*reference*	
Father	0.95	1.00	0.86
	(-0.29)	(-0.02)	(-0.87)
Men w/o info	0.95		
	(-0.29)		
Childless women	0.94	1.01	0.94
	(-0.27)	(0.04)	(-0.36)
Mother	0.58**	0.57*	0.63*
	(-2.59)	(-2.43)	(-2.44)
Women w/o info	0.94		
	(-0.32)		
SSCI/SCIE articles (ln)	1.77***	1.73***	1.78***
	(5.89)	(4.28)	(5.92)
Non-SSCI/SCIE articles (ln)	1.33**	1.26	1.32**
	(2.83)	(1.64)	(2.73)
Monographs (ln)	1.26	1.23	1.24
	(1.50)	(1.05)	(1.37)
Edited volumes (ln)	1.33	1.49	1.35
	(1.33)	(1.32)	(1.38)
Book chapters (ln)	1.14	1.24+	1.13
	(1.46)	(1.81)	(1.30)
Gray literature (ln)	1.07	1.13	1.08
	(0.73)	(1.13)	(0.85)
Mobility (ln)	1.40**	1.20	1.39**
	(3.28)	(1.33)	(3.21)
Months abroad (ln)	1.06+	1.09+	1.06
	(1.71)	(1.80)	(1.56)
PhD from abroad	0.65*	0.82	0.64*
	(-1.96)	(-0.69)	(-2.02)
Excellence university	1.97***	1.92***	2.00***
	(5.19)	(3.89)	(5.31)
Years since PhD	1.73***	1.70***	1.75***
	(7.32)	(4.59)	(7.44)
Years since PhD (sq.)	0.98***	0.98*	0.98***
	(-3.68)	(-2.09)	(-3.73)
Awards (ln)	1.14	1.02	1.13
	(0.94)	(0.12)	(0.88)
Research funding (ln)	1.72***	1.67**	1.71***
	(4.32)	(3.11)	(4.29)
Only selected publications	1.94***	1.76*	2.00***
	(3.83)	(2.29)	(4.00)
Cohorts *(ref. 2000-2009)*			
1980-1989	2.29***	2.20***	2.31***
	(5.20)	(3.58)	(5.37)
1990-1999	1.66***	1.71**	1.65***
	(3.79)	(3.09)	(3.72)
2010-2019	0.43***	0.27***	0.43***
	(-3.59)	(-3.54)	(-3.61)
Pseudo r²	0.14	0.14	0.14
Log-likelihood	-2615.03	-1359.85	-2615.26
Degrees of freedom	23	21	21
Chi²	909.34	508.86	906.69
AIC	5276.07	2761.69	5266.79
BIC	5472.26	2930.91	5445.92
Number of events (habilitation)	468	268	468
N (persons)	2,527	1,544	2,527
N (persons-publications)	37,423	23,347	37,423

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*
[1] Model fits statistic computed over imputed data with $M_{imputation}$=25.

I used three different methods to control for missing data on child responses from scientists to ensure that the data were not biased due to non-response in the survey.

In Model 1, I added a dummy variable to account for those who did not participate in the survey. In Model 2, I performed a complete records analysis with only scientists who participated in the survey. This also reduces model power, since we omit missing information and thus the number of cases. In Model 3, I used multiple imputations to run regression analyses on imputed data with $M_{imputation}$=25.

For the main analyses in the paper, I chose to include a dummy variable to control for survey dropouts. This procedure is appropriate, since the results of the other methods are fairly similar, as I showed with robustness checks of the complete records analysis and the models with multiple imputation.

Table A9. Cox regression models on obtaining a habilitation, different adjustments for co-authored publications.

	(1) Main Model 6 (Table 2), co-author adjusted pubs	(2) Pubs *not* adjusted for co-authors	(3) Pubs *not* adjusted for co-authors, incl. # co-authors
Childless men	1.00	1.00	1.00
	(.)	(.)	(.)
Father	0.95	0.91	0.94
	(-0.29)	(-0.47)	(-0.31)
Men w/o info	0.95	0.93	0.93
	(-0.29)	(-0.42)	(-0.44)
Childless women	0.94	0.90	0.92
	(-0.27)	(-0.48)	(-0.41)
Mother	0.58^{**}	0.55^{**}	0.56^{**}
	(-2.59)	(-2.85)	(-2.82)
Women w/o info	0.94	0.89	0.89
	(-0.32)	(-0.62)	(-0.62)
SSCI/SCIE articles (ln)	1.77^{***}	1.57^{***}	1.85^{***}
	(5.89)	(5.54)	(5.56)
Non-SSCI/SCIE articles (ln)	1.33^{**}	1.28^{**}	1.32^{**}
	(2.83)	(2.97)	(3.27)
Monographs (ln)	1.26	1.23	1.23
	(1.50)	(1.57)	(1.59)
Edited volumes (ln)	1.33	1.36^{*}	1.39^{*}
	(1.33)	(2.01)	(2.12)
Book chapters (ln)	1.14	1.09	1.14^{+}
	(1.46)	(1.13)	(1.65)
Gray literature (ln)	1.07	1.01	1.05
	(0.73)	(0.13)	(0.56)
Mobility (ln)	1.40^{**}	1.41^{***}	1.42^{***}
	(3.28)	(3.40)	(3.43)
Months abroad (ln)	1.06^{+}	1.06^{+}	1.06^{+}
	(1.71)	(1.71)	(1.68)
PhD from abroad	0.65^{*}	0.66^{*}	0.66^{+}
	(-1.96)	(-1.97)	(-1.94)
Excellence university	1.97^{***}	1.95^{***}	1.97^{***}
	(5.19)	(5.10)	(5.27)
Years since PhD	1.73^{***}	1.75^{***}	1.74^{***}
	(7.32)	(7.46)	(7.24)
Years since PhD (sq.)	0.98^{***}	0.98^{***}	0.98^{***}
	(-3.68)	(-3.78)	(-3.66)
Awards (ln)	1.14	1.11	1.14
	(0.94)	(0.77)	(0.97)
Research funding (ln)	1.72^{***}	1.67^{***}	1.71^{***}
	(4.32)	(4.08)	(4.29)
Co-authors (ln)			0.79^{*}
			(-2.42)
Only selected publications	1.94^{***}	1.81^{**}	1.81^{***}
	(3.83)	(3.28)	(3.35)
Cohorts *(ref. 2000-2009)*			
1980-1989	2.29^{***}	2.64^{***}	2.33^{***}
	(5.20)	(6.16)	(5.08)
1990-1999	1.66^{***}	1.77^{***}	1.65^{***}
	(3.79)	(4.19)	(3.55)
2010-2019	0.43^{***}	0.43^{***}	0.43^{***}
	(-3.59)	(-3.63)	(-3.58)
Pseudo r²	0.14	0.14	0.14
Log-likelihood	-2615.03	-2622.31	-2618.76
Degrees of freedom	23	23	24
Chi²	909.34	867.44	875.83
AIC	5276.07	5290.61	5285.52
BIC	5472.26	5486.80	5490.24
Number of events (habilitation)	468	468	468
N (persons)	2,527	2,527	2,527
N (persons-publications)	37,423	37,423	37,423

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A10.1. Cox regression models on obtaining a habilitation (Table 3), only women.

	(1) Only Gender	(2) Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/Grants
Female	1.00					
	(.)					
Female=1 # [0] Childless		1.16	1.17	1.06	1.20	1.17
		(0.71)	(0.75)	(0.30)	(0.86)	(0.74)
Female=1 # [1] Children		0.85	0.73	0.66*	0.66*	0.63*
		(-0.89)	(-1.63)	(-2.08)	(-2.06)	(-2.30)
Female=1 # [2] Unknwn		1.00	1.00	1.00	1.00	1.00
		(.)	(.)	(.)	(.)	(.)
SSCI/SCIE articles (ln)			4.52***	4.15***	3.19***	2.88***
			(10.33)	(9.20)	(7.25)	(6.31)
Non-SSCI/SCIE articles (ln)			0.93	0.94	1.02	1.08
			(-0.46)	(-0.36)	(0.10)	(0.50)
Monographs (ln)			1.69*	1.54*	1.49+	1.42
			(2.47)	(1.97)	(1.73)	(1.47)
Edited volumes (ln)			1.55	1.69	1.80	2.12+
			(1.12)	(1.38)	(1.44)	(1.85)
Book chapters (ln)			1.49**	1.37*	1.23	1.20
			(2.75)	(2.09)	(1.40)	(1.22)
Gray literature (ln)			0.98	0.98	1.21	1.20
			(-0.12)	(-0.12)	(1.31)	(1.22)
Mobility (ln)				1.89***	1.59**	1.55**
				(3.62)	(2.80)	(2.68)
Months abroad (ln)				1.09	1.07	1.06
				(1.47)	(1.11)	(0.93)
PhD from abroad				0.69	0.91	1.05
				(-1.08)	(-0.28)	(0.13)
Excellence university					2.07***	2.10***
					(3.44)	(3.48)
Years since PhD					2.14***	2.09***
					(6.72)	(6.37)
Years since PhD (sq.)					0.97***	0.97***
					(-4.13)	(-3.90)
Awards (ln)						1.05
						(0.24)
Research funding (ln)						1.54*
						(2.21)
Only selected publications	3.58***	3.72***	4.76***	4.44***	3.11***	2.87***
	(4.22)	(4.35)	(5.59)	(5.22)	(4.65)	(4.30)
Cohorts *(ref. 2000-2009)*						
1980-1989	1.57+	1.53+	2.28**	2.28**	2.01*	2.20**
	(1.95)	(1.83)	(3.24)	(3.21)	(2.34)	(2.63)
1990-1999	1.69**	1.67**	1.93***	1.98***	2.11***	2.09***
	(2.85)	(2.78)	(3.40)	(3.57)	(3.73)	(3.68)
2010-2019	0.25***	0.24***	0.24***	0.23***	0.31**	0.32**
	(-3.63)	(-3.68)	(-3.72)	(-3.80)	(-3.17)	(-3.11)
Pseudo r²	0.03	0.03	0.10	0.12	0.19	0.19
Log-likelihood	-956.82	-955.66	-883.88	-872.34	-802.86	-800.23
Degrees of freedom	4	6	12	15	18	20
Chi²	49.82	53.54	215.89	209.32	441.38	470.21
AIC	1921.64	1923.33	1791.76	1774.68	1641.73	1640.46
BIC	1952.46	1969.56	1884.23	1890.26	1780.43	1794.58
Number of events (habilitation)	173	173	173	173	173	173
N (persons)	1,419	1,419	1,419	1,419	1,419	1,419
N (persons-publications)	16,413	16,413	16,413	16,413	16,413	16,413

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A10.2. Cox regression models on obtaining a habilitation (Table 3), only men.

	(1) Only Gender	(2) Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/Grants
Female	1.00					
	(.)					
Female=0 # [0] Childless		0.82	0.83	0.80	1.00	1.06
		(-1.29)	(-1.19)	(-1.38)	(0.01)	(0.33)
Female=0 # [1] Children		1.30^{+}	1.25	1.21	1.02	1.01
		(1.84)	(1.43)	(1.20)	(0.14)	(0.07)
Female=0 # [2] Unknwn		1.00	1.00	1.00	1.00	1.00
		(.)	(.)	(.)	(.)	(.)
SSCI/SCIE articles (ln)			2.17^{***}	1.98^{***}	1.66^{***}	1.51^{***}
			(7.21)	(6.24)	(4.28)	(3.60)
Non-SSCI/SCIE articles (ln)			1.17	1.19	1.34^{*}	1.50^{***}
			(1.26)	(1.40)	(2.38)	(3.32)
Monographs (ln)			1.47^{*}	1.41^{+}	1.19	1.17
			(2.10)	(1.89)	(0.91)	(0.82)
Edited volumes (ln)			1.15	1.34	1.26	1.27
			(0.52)	(1.20)	(0.92)	(0.97)
Book chapters (ln)			1.36^{**}	1.33^{**}	1.13	1.13
			(2.82)	(2.60)	(1.12)	(1.09)
Gray literature (ln)			0.93	0.89	1.04	1.01
			(-0.72)	(-1.13)	(0.36)	(0.10)
Mobility (ln)				1.86^{***}	1.33^{*}	1.25^{+}
				(4.87)	(2.22)	(1.70)
Months abroad (ln)				1.11^{*}	1.10^{*}	1.07
				(2.37)	(2.07)	(1.56)
PhD from abroad				0.63^{+}	0.47^{**}	0.51^{*}
				(-1.88)	(-2.90)	(-2.55)
Excellence university					1.98^{***}	2.00^{***}
					(4.10)	(4.22)
Years since PhD					1.68^{***}	1.66^{***}
					(7.01)	(7.19)
Years since PhD (sq.)					0.98^{***}	0.98^{***}
					(-3.42)	(-3.50)
Awards (ln)						1.27
						(1.41)
Research funding (ln)						1.78^{***}
						(3.85)
Only selected publications	2.34^{***}	2.28^{***}	2.66^{***}	2.49^{***}	1.95^{***}	1.73^{**}
	(4.26)	(4.14)	(4.24)	(3.79)	(3.45)	(2.72)
Cohorts *(ref. 2000-2009)*						
1980-1989	1.54^{**}	1.59^{**}	1.55^{*}	1.60^{**}	1.96^{***}	2.34^{***}
	(2.80)	(3.00)	(2.38)	(2.74)	(3.75)	(4.62)
1990-1999	1.68^{***}	1.75^{***}	1.72^{***}	1.46^{*}	1.53^{*}	1.50^{*}
	(3.56)	(3.76)	(3.34)	(2.22)	(2.48)	(2.29)
2010-2019	0.45^{*}	0.46^{*}	0.45^{*}	0.43^{**}	0.55^{*}	0.57^{+}
	(-2.53)	(-2.49)	(-2.57)	(-2.74)	(-2.00)	(-1.85)
Pseudo r^2	0.02	0.02	0.06	0.07	0.13	0.14
Log-likelihood	-1698.90	-1694.81	-1631.45	-1609.62	-1499.69	-1487.04
Degrees of freedom	4	6	12	15	18	20
Chi^2	50.65	54.73	151.03	189.35	559.51	597.67
AIC	3405.79	3401.62	3286.90	3249.24	3035.39	3014.09
BIC	3437.60	3449.33	3382.33	3368.53	3178.54	3173.14
Number of events (habilitation)	295	295	295	295	295	295
N (persons)	1,108	1,108	1,108	1,108	1,108	1,108
N (persons-publications)	21,010	21,010	21,010	21,010	21,010	21,010

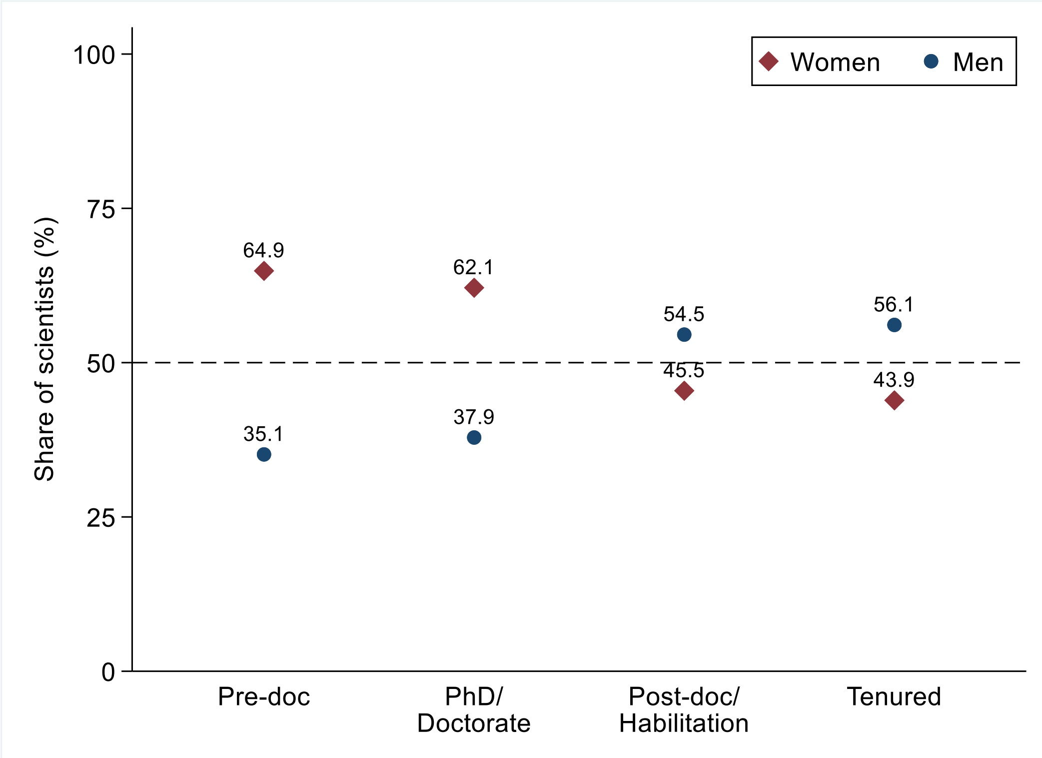
Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Table A11. Cox regression models on obtaining a habilitation with different specification of universities of excellence (two time-constant dummy variables).

	(1) Only Gender	(2) Children	(3) Publications	(4) Mobility	(5) Human capital	(6) Awards/Grants
Female	0.74**					
	(-3.10)					
Childless man				*reference*		
Father		1.53*	1.38+	1.39+	0.99	0.95
		(2.47)	(1.82)	(1.85)	(-0.08)	(-0.25)
Men w/o info		1.18	1.11	1.18	0.99	0.95
		(1.02)	(0.65)	(0.97)	(-0.04)	(-0.26)
Childless woman		0.97	1.21	1.19	0.96	0.95
		(-0.16)	(1.04)	(0.91)	(-0.18)	(-0.22)
Mother		0.82	1.01	0.99	0.61*	0.59*
		(-1.04)	(0.07)	(-0.08)	(-2.37)	(-2.57)
Women w/o info		0.94	1.31	1.38+	0.92	0.95
		(-0.36)	(1.61)	(1.90)	(-0.45)	(-0.27)
SSCI/SCIE articles (ln)			2.59***	2.36***	1.95***	1.77***
			(10.67)	(9.39)	(6.79)	(5.86)
Non-SSCI/SCIE articles (ln)			1.07	1.10	1.21^{+}	1.33**
			(0.71)	(0.94)	(1.86)	(2.80)
Monographs (ln)			1.52**	1.47**	1.29^{+}	1.27
			(2.88)	(2.63)	(1.72)	(1.55)
Edited volumes (ln)			1.16	1.37	1.29	1.33
			(0.63)	(1.48)	(1.19)	(1.32)
Book chapters (ln)			1.40***	1.33**	1.15	1.15
			(3.72)	(3.17)	(1.57)	(1.51)
Gray literature (ln)			0.95	0.92	1.09	1.07
			(-0.66)	(-0.97)	(0.98)	(0.74)
Mobility (ln)				1.89***	1.45***	1.39**
				(6.03)	(3.70)	(3.23)
Months abroad (ln)				1.10**	1.09*	1.07^{+}
				(2.60)	(2.31)	(1.77)
PhD from abroad				0.68^{+}	0.59*	0.65*
				(-1.94)	(-2.50)	(-2.01)
Graduation university of excellence					1.29^{+}	1.41*
					(1.89)	(2.57)
PhD university of excellence					1.43**	1.33*
					(2.71)	(2.17)
Years since PhD					1.75***	1.73***
					(7.43)	(7.28)
Years since PhD (sq.)					0.98***	0.98***
					(-3.78)	(-3.65)
Awards (ln)						1.15
						(0.99)
Research funding (ln)						1.73***
						(4.47)
Only selected publications	2.65***	2.61***	3.02***	2.81***	2.14***	1.94***
	(5.77)	(5.67)	(5.58)	(4.96)	(4.56)	(3.85)
Cohorts						
(ref. 2000-2009)						
1980-1989	1.53**	1.55***	1.67**	1.73***	1.97***	2.29***
	(3.22)	(3.35)	(3.17)	(3.71)	(4.35)	(5.21)
1990-1999	1.71***	1.75***	1.76***	1.56***	1.66***	1.65***
	(4.75)	(4.88)	(4.42)	(3.36)	(3.87)	(3.74)
2010-2019	0.34***	0.34***	0.32***	0.30***	0.42***	0.43***
	(-4.40)	(-4.44)	(-4.69)	(-4.92)	(-3.72)	(-3.57)
Pseudo r²	0.02	0.02	0.06	0.08	0.13	0.14
Log-likelihood	-2966.37	-2962.31	-2842.32	-2807.85	-2631.51	-2616.85
Degrees of freedom	5	9	15	18	22	24
Chi²	122.14	124.99	277.13	327.19	849.75	900.03
AIC	5942.74	5942.62	5714.63	5651.71	5307.02	5281.70
BIC	5985.39	6019.39	5842.58	5805.25	5494.68	5486.42
Number of events (habilitation)	468	468	468	468	468	468
N (persons)	2,527	2,527	2,527	2,527	2,527	2,527
N (persons-publications)	37,423	37,423	37,423	37,423	37,423	37,423

Exponentiated coefficients (hazard ratios); t statistics in parentheses; ln = logged values; sq = squared.
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.*

Figure B1. "Scissors-diagram:" Scientists at different career levels in 2019 (only cohorts after 2000), separately by gender.



N= 2,133. Academics can choose between the traditional habilitation path and the newly introduced (in 2002) junior professorships as an alternate to qualify for tenured professorships.

Appendix Chapter 6

Different coding of universities of excellence

Table A1. RE, Different coding of universities of excellence.

	(1) Education	(2) Money	(3) Child	(4) Women	(5) Men
Prior SSCI articles (ln) mc	0.90***	0.87***	0.87***	1.21***	0.73***
	(13.36)	(12.69)	(12.63)	(7.50)	(9.78)
Prior monographs (ln) mc	-0.08	-0.08	-0.07	0.24	-0.15*
	(-1.20)	(-1.29)	(-1.16)	(1.38)	(-2.16)
Prior book chapters (ln) mc	-0.18***	-0.18***	-0.17***	-0.12	-0.20***
	(-4.47)	(-4.46)	(-4.35)	(-1.58)	(-4.15)
Prior non-SSCI articles (ln) mc	0.15***	0.15***	0.15***	0.11	0.16**
	(3.45)	(3.46)	(3.41)	(1.58)	(2.87)
Prior edited volumes (ln) mc	-0.34***	-0.36***	-0.35***	-0.31**	-0.35***
	(-5.43)	(-5.67)	(-5.61)	(-2.72)	(-4.59)
Prior gray literature (ln) mc	-0.13***	-0.13***	-0.13***	-0.07	-0.14**
	(-3.52)	(-3.50)	(-3.50)	(-1.52)	(-3.05)
Female mc	-0.15*	-0.14*	-0.17*		
	(-2.45)	(-2.40)	(-2.03)		
[0] No career steps mc					
[1] PhD mc	0.34***	0.34***	0.37***	0.22+	0.40***
	(5.19)	(5.27)	(5.76)	(1.71)	(5.12)
[2] Tenured prof mc	0.10	0.06	0.09	-0.36	0.19
	(0.86)	(0.49)	(0.75)	(-1.41)	(1.41)
Months abroad (ln) mc	0.09***	0.09***	0.09***	0.13***	0.07**
	(4.95)	(5.01)	(4.93)	(5.41)	(3.15)
PhD from abroad mc	0.60***	0.61***	0.62***	0.19	0.82***
	(4.98)	(5.09)	(5.17)	(1.26)	(4.91)
Mobility (ln) mc	0.11*	0.11*	0.11*	0.01	0.14*
	(2.37)	(2.35)	(2.38)	(0.17)	(2.47)
Co-authors (ln) mc	0.23***	0.23***	0.23***	0.09	0.29***
	(7.53)	(7.44)	(7.33)	(1.60)	(7.55)
Interim professor (ln) mc	-0.26**	-0.27**	-0.27**	-0.22	-0.30**
	(-2.72)	(-2.82)	(-2.79)	(-1.26)	(-2.63)
DFG funding (ln) mc		0.26*	0.26*	0.02	0.36**
		(2.53)	(2.51)	(0.12)	(3.18)
Mother (ref. childless)			-0.20+	-0.26+	
			(-1.84)	(-1.91)	
Father (ref. childless)			-0.12		-0.08
			(-1.31)		(-0.82)
Woman child unknown (ref. childless)			-0.10	-0.15	
			(-0.99)	(-1.47)	
Man child unknown (ref. childless)			-0.20*		-0.18*
			(-2.57)		(-2.16)
Incomplete mc	-0.26**	-0.27***	-0.27**	-0.01	-0.38***
	(-3.19)	(-3.32)	(-3.17)	(-0.10)	(-3.44)
PhD uni of excellence	0.20*	0.21*	0.21*	0.07	0.30*
	(2.12)	(2.20)	(2.21)	(0.41)	(2.44)
Habil uni of excellence	-0.18	-0.21	-0.19	-0.24	-0.22
	(-1.22)	(-1.39)	(-1.32)	(-1.09)	(-1.16)
Prof uni of excellence	0.05	-0.03	-0.02	0.93	-0.32
	(0.21)	(-0.13)	(-0.11)	(1.54)	(-1.38)
Constant	0.99***	0.99***	1.09***	1.07***	1.12***
	(27.83)	(28.09)	(20.25)	(12.52)	(16.20)
r^2 within	0.02	0.03	0.03	0.02	0.03
r^2 between	0.50	0.50	0.50	0.53	0.48
r^2 overall	0.20	0.20	0.20	0.19	0.20
Observations	15947	15947	15947	5128	10819

t statistics in parentheses; $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ln = logged values; mc = mean-centered

Table A2. FE, Different coding of universities of excellence.

	(1) Education	(2) Money	(3) Child	(4) Women	(5) Men
Prior SSCI articles (ln) mc	-0.01	-0.07	-0.07	0.05	-0.11
	(-0.13)	(-0.86)	(-0.89)	(0.28)	(-1.34)
Prior monographs (ln) mc	-0.15^{+}	-0.16^{+}	-0.16^{+}	0.01	-0.19^{+}
	(-1.77)	(-1.87)	(-1.89)	(0.03)	(-1.89)
Prior book chapters (ln) mc	-0.11^{+}	-0.11^{+}	-0.11^{+}	-0.05	-0.13^{*}
	(-1.94)	(-1.95)	(-1.93)	(-0.46)	(-2.00)
Prior non-SSCI articles (ln) mc	0.33^{***}	0.33^{***}	0.33^{***}	0.41^{***}	0.31^{***}
	(4.93)	(4.92)	(4.91)	(3.68)	(3.63)
Prior edited volumes (ln) mc	-0.32^{***}	-0.35^{***}	-0.35^{***}	-0.29^{+}	-0.36^{***}
	(-3.73)	(-4.09)	(-4.09)	(-1.90)	(-3.41)
Prior gray literature (ln) mc	-0.06	-0.06	-0.06	-0.12	-0.05
	(-1.12)	(-1.09)	(-1.11)	(-1.15)	(-0.71)
[0] No career steps mc vs					
[1] PhD mc	0.44^{***}	0.46^{***}	0.46^{***}	0.38^{**}	0.47^{***}
	(5.57)	(5.78)	(5.81)	(2.94)	(4.65)
[2] Tenured prof mc	0.33^{*}	0.29^{*}	0.29^{*}	0.02	0.34^{*}
	(2.56)	(2.24)	(2.25)	(0.07)	(2.16)
Months abroad (ln) mc	0.17^{***}	0.16^{***}	0.16^{***}	0.20^{**}	0.16^{***}
	(4.61)	(4.57)	(4.56)	(2.77)	(3.96)
Mobility (ln) mc	0.20^{*}	0.21^{*}	0.21^{*}	0.22	0.19^{+}
	(2.31)	(2.40)	(2.41)	(1.31)	(1.92)
Co-authors (ln) mc	0.25^{***}	0.24^{***}	0.24^{***}	0.09	0.30^{***}
	(4.55)	(4.45)	(4.41)	(1.08)	(4.08)
Interim professor (ln) mc	-0.19^{+}	-0.20^{*}	-0.20^{*}	0.03	-0.30^{*}
	(-1.89)	(-1.98)	(-1.98)	(0.13)	(-2.53)
DFG funding (ln) mc		0.35^{**}	0.35^{**}	0.08	0.46^{***}
		(3.00)	(3.01)	(0.35)	(3.48)
Mother			-0.06	-0.06	
			(-0.46)	(-0.41)	
Father			0.04		0.06
			(0.34)		(0.46)
Incomplete mc	-1.24	-1.26	-1.24	0.69^{***}	-1.42
	(-1.22)	(-1.28)	(-1.27)	(4.77)	(-1.40)
PhD uni of excellence	0.29^{*}	0.29^{*}	0.29^{*}	0.13	0.39^{*}
	(2.15)	(2.17)	(2.17)	(0.60)	(2.29)
Habil uni of excellence	-0.24	-0.27	-0.27	-0.23	-0.29
	(-1.46)	(-1.64)	(-1.62)	(-1.07)	(-1.38)
Prof uni of excellence	0.05	-0.05	-0.06	0.91^{+}	-0.40
	(0.18)	(-0.21)	(-0.22)	(1.70)	(-1.47)
Constant	0.94^{***}	0.94^{***}	0.94^{***}	0.87^{***}	1.02^{***}
	(27.40)	(27.66)	(20.72)	(13.75)	(18.82)
r^2 within	0.04	0.04	0.04	0.05	0.04
r^2 between	0.11	0.11	0.11	0.12	0.10
r^2 overall	0.07	0.07	0.07	0.07	0.08
Observations	15947	15947	15947	5128	10819

t statistics in parentheses, $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*;
ln = logged values; mc = mean-centered

Monographs rather than SSCI articles

Table A3. RE models explaining book publications without accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Female mc	-0.31***	-0.25***		
	(-5.07)	(-3.68)		
[0] No career steps mc vs				
[1] PhD mc		0.23***	0.13	0.30***
		(3.54)	(1.25)	(3.69)
[2] Tenured prof mc		0.21	0.09	0.29
		(1.43)	(0.49)	(1.54)
Months abroad (ln) mc		0.02	-0.01	0.03
		(1.15)	(-0.22)	(1.38)
PhD from abroad mc		-0.33***	-0.19	-0.41***
		(-3.86)	(-1.52)	(-3.65)
Mobility (ln) mc		0.14+	0.01	0.21*
		(1.94)	(0.20)	(2.02)
Co-authors (ln) mc		0.00	0.05	-0.02
		(0.12)	(1.52)	(-0.40)
Interim professor (ln) mc		0.14	0.03	0.17
		(0.93)	(0.26)	(0.85)
University of excellence mc		-0.04	-0.05	-0.03
		(-0.55)	(-0.64)	(-0.31)
DFG funding (ln) mc		-0.12	-0.14	-0.15
		(-1.08)	(-1.05)	(-1.06)
Mother *(ref. childless)*		-0.00	0.05	
		(-0.01)	(0.48)	
Father *(ref. childless)*		0.05		-0.00
		(0.56)		(-0.01)
Woman child unknown		0.14	0.15+	
(ref. childless)		(1.61)	(1.79)	
Man child unknown		0.17+		0.13
(ref. childless)		(1.79)		(1.51)
Incomplete mc	0.14	0.12	0.06	0.13
	(1.07)	(0.94)	(0.48)	(0.77)
Constant	1.00***	0.93***	0.73***	1.04***
	(28.37)	(22.58)	(14.57)	(18.32)
r^2 within	0.00	0.00	0.00	0.00
r^2 between	0.01	0.07	0.04	0.12
r^2 overall	0.00	0.01	0.00	0.01
Observations	16853	16853	5505	11348

t statistics in parentheses; + *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*;
ln = logged values; mc = mean-centered

Table A4. RE models explaining book publications while accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Prior SSCI articles (ln) mc	-0.12*	0.03	0.07	0.01
	(-2.14)	(0.43)	(0.98)	(0.15)
Prior monographs (ln) mc	0.50***	0.52***	0.20	0.61**
	(3.47)	(3.45)	(1.38)	(3.27)
Prior book chapters (ln) mc	-0.05	0.01	0.13^{+}	-0.04
	(-0.78)	(0.18)	(1.74)	(-0.54)
Prior non-SSCI articles (ln) mc	0.20***	0.21***	0.10^{+}	0.26***
	(3.61)	(3.56)	(1.76)	(3.45)
Prior edited volumes (ln) mc	-0.09	-0.01	-0.04	0.00
	(-1.00)	(-0.06)	(-0.35)	(0.02)
Prior gray literature (ln) mc	0.03	0.05	-0.05	0.07
	(0.74)	(1.00)	(-0.95)	(1.35)
Female mc	-0.19***	-0.16*		
	(-4.40)	(-2.48)		
[0] No career steps mc vs				
[1] PhD mc		-0.12	-0.04	-0.12
		(-1.35)	(-0.31)	(-1.05)
[2] Tenured prof mc		-0.39*	-0.27	-0.37
		(-2.06)	(-1.23)	(-1.59)
Months abroad (ln) mc		0.01	-0.02	0.01
		(0.32)	(-0.59)	(0.62)
PhD from abroad mc		-0.13	-0.15	-0.12
		(-1.57)	(-1.29)	(-1.09)
Mobility (ln) mc		0.07	-0.01	0.12
		(1.13)	(-0.07)	(1.31)
Co-authors (ln) mc		-0.10*	-0.02	-0.13*
		(-2.40)	(-0.45)	(-2.35)
Interim professor (ln) mc		-0.03	-0.08	-0.01
		(-0.23)	(-0.64)	(-0.05)
University of excellence mc		-0.01	-0.05	0.02
		(-0.13)	(-0.63)	(0.20)
DFG funding (ln) mc		-0.19*	-0.19	-0.22*
		(-2.14)	(-1.48)	(-2.03)
Mother *(ref. childless)*		-0.03	0.00	
		(-0.35)	(0.04)	
Father *(ref. childless)*		-0.01		-0.05
		(-0.13)		(-0.59)
Woman child unknown		0.08	0.12	
(ref. childless)		(0.98)	(1.53)	
Man child unknown		0.12		0.09
(ref. childless)		(1.51)		(1.19)
Incomplete mc	0.13	0.18	0.11	0.19
	(1.21)	(1.62)	(0.98)	(1.27)
Constant	1.00***	0.97***	0.79***	1.03***
	(34.13)	(25.17)	(15.49)	(21.11)
r^2 within	0.01	0.00	0.00	0.00
r^2 between	0.30	0.29	0.19	0.37
r^2 overall	0.02	0.02	0.01	0.03
Observations	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;
ln = logged values; mc = mean-centered

Table A5. FE models explaining book publications while accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Prior SSCI articles (ln) mc	-0.04	-0.08	-0.02	-0.11
	(-0.50)	(-0.90)	(-0.18)	(-1.02)
Prior monographs (ln) mc	-2.11***	-2.23***	-2.98***	-2.04***
	(-8.68)	(-8.42)	(-9.17)	(-6.24)
Prior book chapters (ln) mc	0.50***	0.42***	0.42**	0.42***
	(6.17)	(4.99)	(2.87)	(4.20)
Prior non-SSCI articles (ln) mc	0.31***	0.26**	0.23	0.27*
	(3.67)	(2.93)	(1.59)	(2.51)
Prior edited volumes (ln) mc	-0.07	-0.01	0.03	-0.03
	(-0.68)	(-0.05)	(0.16)	(-0.22)
Prior gray literature (ln) mc	0.22***	0.17*	0.04	0.20*
	(3.42)	(2.24)	(0.33)	(2.21)
[0] No career steps mc vs				
[1] PhD mc		0.26*	0.59**	0.17
		(2.06)	(3.15)	(1.11)
[2] Tenured prof mc		0.06	0.62+	-0.10
		(0.30)	(1.96)	(-0.40)
Months abroad (ln) mc		0.08+	-0.05	0.13*
		(1.69)	(-0.71)	(2.17)
PhD from abroad mc		0.00	0.00	0.00
		(.)	(.)	(.)
Mobility (ln) mc		0.30**	0.41*	0.30*
		(2.65)	(2.45)	(2.14)
Co-authors (ln) mc		0.06	0.11	0.06
		(1.05)	(1.28)	(0.76)
Interim professor (ln) mc		-0.03	-0.11	-0.05
		(-0.19)	(-0.52)	(-0.27)
University of excellence mc		0.21	-0.16	0.32
		(0.77)	(-0.43)	(0.90)
DFG funding (ln) mc		-0.07	0.14	-0.13
		(-0.56)	(0.61)	(-0.87)
Mother		-0.28+	-0.20	
		(-1.76)	(-1.12)	
Father		-0.03		-0.10
		(-0.28)		(-0.80)
Incomplete mc	-1.52	-1.43	-0.66***	-1.59
	(-1.24)	(-1.17)	(-3.81)	(-1.19)
Constant	1.00***	1.03***	0.57***	1.22***
	(2.47e+08)	(37.59)	(9.49)	(28.64)
r^2 within	0.04	0.04	0.07	0.04
r^2 between	0.13	0.14	0.19	0.11
r^2 overall	0.00	0.01	0.00	0.00
Observations	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;
ln = logged values; mc = mean-centered

Non-SSCI rather than SSCI articles

Table A6. RE models explaining non-SSCI articles without accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Female mc	-0.31***	-0.28***		
	(-5.84)	(-4.15)		
[0] No career steps mc vs				
[1] PhD mc		0.42***	0.37***	0.45***
		(7.97)	(5.01)	(6.37)
[2] Tenured prof mc		0.24**	0.19	0.26*
		(2.64)	(1.60)	(2.19)
Months abroad (ln) mc		0.07***	0.11***	0.07**
		(4.12)	(4.82)	(2.84)
PhD from abroad mc		-0.17*	-0.06	-0.26**
		(-2.28)	(-0.52)	(-2.59)
Mobility (ln) mc		0.18***	0.12+	0.22**
		(3.43)	(1.90)	(3.13)
Co-authors (ln) mc		0.04+	-0.01	0.06*
		(1.79)	(-0.23)	(2.01)
Interim professor (ln) mc		0.00	0.20	-0.08
		(0.05)	(1.56)	(-0.91)
University of excellence mc		-0.06	-0.09	-0.04
		(-1.06)	(-1.29)	(-0.54)
DFG funding (ln) mc		-0.03	0.02	-0.05
		(-0.30)	(0.14)	(-0.47)
Mother *(ref. childless)*		-0.06	0.00	
		(-0.73)	(0.05)	
Father *(ref. childless)*		0.03		-0.00
		(0.31)		(-0.06)
Woman child unknown		0.03	0.05	
(ref. childless)		(0.40)	(0.60)	
Man child unknown		-0.03		-0.03
(ref. childless)		(-0.40)		(-0.41)
Incomplete mc	-0.27**	-0.30***	-0.24**	-0.34**
	(-3.21)	(-3.47)	(-2.73)	(-2.80)
Constant	0.91***	0.97***	0.77***	1.07***
	(31.36)	(23.47)	(15.38)	(19.02)
r^2 within	0.00	0.02	0.02	0.02
r^2 between	0.02	0.09	0.10	0.07
r^2 overall	0.01	0.04	0.05	0.03
Observations	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*;
ln = logged values; mc = mean-centered

Table A7. RE models explaining non-SSCI articles while accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Prior SSCI articles (ln) mc	-0.07^{*}	-0.01	-0.01	-0.04
	(-2.09)	(-0.17)	(-0.19)	(-0.74)
Prior monographs (ln) mc	0.05	0.04	0.17^{*}	-0.02
	(0.89)	(0.70)	(2.31)	(-0.23)
Prior book chapters (ln) mc	-0.16^{***}	-0.12^{***}	-0.03	-0.13^{**}
	(-4.59)	(-3.47)	(-0.52)	(-2.95)
Prior non-SSCI articles (ln) mc	0.80^{***}	0.79^{***}	0.56^{***}	0.76^{***}
	(12.27)	(11.72)	(10.18)	(8.95)
Prior edited volumes (ln) mc	-0.11^{*}	-0.03	-0.10	-0.01
	(-2.11)	(-0.44)	(-1.12)	(-0.13)
Prior gray literature (ln) mc	0.06^{*}	0.07^{*}	0.00	0.09^{*}
	(2.05)	(2.20)	(0.05)	(2.37)
Female mc	-0.17^{***}	-0.17^{**}		
	(-4.31)	(-3.18)		
[0] No career steps mc vs				
[1] PhD mc		0.10^{+}	0.11	0.18^{**}
		(1.91)	(1.46)	(2.65)
[2] Tenured prof mc		-0.17^{+}	-0.25^{+}	-0.04
		(-1.71)	(-1.93)	(-0.29)
Months abroad (ln) mc		0.02	0.09^{***}	0.01
		(1.55)	(4.83)	(0.57)
PhD from abroad mc		-0.05	0.00	-0.06
		(-0.82)	(0.04)	(-0.83)
Mobility (ln) mc		0.01	0.03	0.05
		(0.30)	(0.52)	(0.87)
Co-authors (ln) mc		-0.07^{*}	-0.09^{*}	-0.06^{+}
		(-2.35)	(-2.54)	(-1.71)
Interim professor (ln) mc		-0.07	0.10	-0.14
		(-0.91)	(0.78)	(-1.62)
University of excellence mc		0.01	-0.07	0.05
		(0.18)	(-1.12)	(0.79)
DFG funding (ln) mc		-0.09	0.00	-0.10
		(-0.98)	(0.02)	(-0.98)
Mother *(ref. childless)*		-0.03	-0.01	
		(-0.40)	(-0.16)	
Father *(ref. childless)*		-0.03		-0.06
		(-0.48)		(-0.79)
Woman child unknown		-0.07	-0.04	
(ref. childless)		(-1.14)	(-0.59)	
Man child unknown		-0.07		-0.08
(ref. childless)		(-1.02)		(-1.09)
Incomplete mc	-0.12	-0.11	-0.16^{*}	-0.14
	(-1.60)	(-1.49)	(-2.36)	(-1.37)
Constant	1.00^{***}	1.04^{***}	0.89^{***}	1.11^{***}
	(42.38)	(29.03)	(18.65)	(23.55)
r^2 within	0.00	0.00	0.00	0.01
r^2 between	0.47	0.46	0.46	0.44
r^2 overall	0.12	0.13	0.10	0.13
Observations	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ *p < 0.1,* * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001;*
ln = logged values; mc = mean-centered.

Table A8. FE models explaining non-SSCI articles while accounting for prior publications.

	(1) Productivity	(2) Child	(3) Women	(4) Men
Prior SSCI articles (ln) mc	-0.01	-0.03	-0.12	-0.02
	(-0.14)	(-0.49)	(-1.06)	(-0.24)
Prior monographs (ln) mc	0.26^{**}	0.12	0.16	0.10
	(2.65)	(1.15)	(0.94)	(0.79)
Prior book chapters (ln) mc	0.10^{+}	0.04	0.08	0.02
	(1.79)	(0.77)	(0.88)	(0.31)
Prior non-SSCI articles (ln) mc	-0.24^{***}	-0.30^{***}	-0.44^{***}	-0.25^{**}
	(-3.50)	(-4.41)	(-4.54)	(-2.84)
Prior edited volumes (ln) mc	-0.12	0.02	0.02	0.02
	(-1.55)	(0.23)	(0.16)	(0.27)
Prior gray literature (ln) mc	0.24^{***}	0.19^{**}	0.15	0.20^{*}
	(3.76)	(2.91)	(1.64)	(2.53)
[0] No career steps mc vs				
[1] PhD mc		0.37^{***}	0.36^{**}	0.38^{***}
		(5.03)	(2.91)	(4.24)
[2] Tenured prof mc		0.06	0.08	0.07
		(0.54)	(0.43)	(0.52)
Months abroad (ln) mc		0.15^{***}	0.13^{*}	0.16^{***}
		(4.23)	(1.97)	(3.94)
Mobility (ln) mc		0.27^{**}	0.18	0.31^{**}
		(3.12)	(1.34)	(2.90)
Co-authors (ln) mc		-0.04	-0.02	-0.04
		(-0.88)	(-0.26)	(-0.77)
Interim professor (ln) mc		-0.07	0.22	-0.18^{+}
		(-0.76)	(1.26)	(-1.66)
University of excellence mc		-0.32^{+}	-0.25	-0.34
		(-1.71)	(-0.84)	(-1.44)
DFG funding (ln) mc		-0.02	0.06	-0.04
		(-0.19)	(0.31)	(-0.31)
Mother		-0.03	0.04	
		(-0.20)	(0.32)	
Father		0.05		0.01
		(0.48)		(0.13)
Incomplete mc	-1.14^{*}	-1.16^{*}	-1.91^{***}	-1.08^{+}
	(-2.01)	(-2.30)	(-8.23)	(-1.91)
Constant	1.00^{***}	0.99^{***}	0.72^{***}	1.11^{***}
	(4.55e+08)	(42.41)	(18.90)	(35.75)
r^2 within	0.01	0.02	0.03	0.02
r^2 between	0.00	0.00	0.00	0.00
r^2 overall	0.01	0.00	0.00	0.00
Observations	16853	16853	5505	11348

t statistics in parentheses; $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*;
ln = logged values; mc = mean-centered

Taking account of the intensity of childcare

Table A9. RE models explaining SSCI articles with the intensity of childcare.

	(1) W/o controls		(2) W/ controls	
Prior SSCI articles (ln) mc			0.88***	(13.34)
Prior monographs (ln) mc			-0.06	(-0.94)
Prior book chapters (ln) mc			-0.17***	(-4.22)
Prior non-SSCI articles (ln) mc			0.14***	(3.43)
Prior edited volumes (ln) mc			-0.33***	(-5.57)
Prior gray literature (ln) mc			-0.13***	(-3.61)
[0] No career steps mc vs				
[1] PhD mc			0.40***	(6.93)
[2] Tenured prof mc			0.07	(0.72)
Months abroad (ln) mc			0.09***	(5.05)
PhD from abroad mc			0.60***	(5.07)
Mobility (ln) mc			0.09*	(2.15)
Co-authors (ln) mc			0.21***	(7.05)
Interim professor (ln) mc			-0.30***	(-3.33)
University of excellence mc			0.08	(1.45)
DFG funding (ln) mc			0.24*	(2.51)
Incomplete mc	-0.25*	(-2.04)	-0.25**	(-3.19)
Female	-0.30	(-0.87)	-0.25	(-1.05)
[0] much less responsible vs				
[1] somewhat less responsible	-0.73	(-1.63)	-0.34	(-0.95)
[2] about equal	-0.33	(-0.87)	-0.08	(-0.31)
[3] somewhat more responsible	0.10	(0.35)	0.34	(1.54)
[4] much more responsible	-0.15	(-0.55)	0.18	(0.88)
[99] not answered	-0.71***	(-3.41)	-0.17	(-1.03)
Female # [1] somewhat less responsible	0.79	(1.00)	0.91	(1.38)
Female # [2] about equal	-0.12	(-0.23)	0.02	(0.06)
Female # [3] somewhat more responsible	-0.52	(-1.19)	-0.34	(-1.12)
Female # [4] much more responsible	-0.15	(-0.29)	-0.08	(-0.26)
Female # [99] not answered	0.18	(0.49)	0.21	(0.87)
Constant	1.56***	(7.84)	1.13***	(7.11)
r² within	0.00		0.02	
r² between	0.04		0.51	
r² overall	0.02		0.21	
Observations	16853		16853	

t statistics in parentheses; $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*;
ln = logged values; mc = mean-centered

Taking account of child age

Table A10. RE models explaining SSCI articles with age of the youngest child.

	(1)		(2)	
	W/o_controls		W/ controls	
Prior SSCI articles (ln) mc			0.53***	(5.37)
Prior monographs (ln) mc			-0.13	(-1.01)
Prior book chapters (ln) mc			-0.22*	(-2.51)
Prior non-SSCI articles (ln) mc			0.12	(1.23)
Prior edited volumes (ln) mc			-0.13	(-1.05)
Prior gray literature (ln) mc			-0.13*	(-2.08)
[0] No career steps mc vs				
[1] PhD mc			0.73***	(4.51)
[2] Tenured prof mc			0.55*	(2.46)
Months abroad (ln) mc			0.01	(0.26)
PhD from abroad mc			1.03**	(3.27)
Mobility (ln) mc			0.06	(0.52)
Co-authors (ln) mc			0.32***	(4.75)
Interim professor (ln) mc			-0.17	(-1.13)
University of excellence mc			0.17	(1.10)
DFG funding (ln) mc			0.38*	(2.26)
Incomplete mc	-0.69***	(-3.52)	-0.52**	(-3.20)
Female	-0.32	(-1.01)	-0.22	(-0.76)
Age youngest child: 0 vs				
Age youngest child: 1	0.02	(0.09)	-0.10	(-0.47)
Age youngest child: 2	0.16	(0.68)	0.02	(0.08)
Age youngest child: 3	-0.19	(-0.89)	-0.39+	(-1.88)
Age youngest child: 4	0.16	(0.60)	-0.10	(-0.38)
Age youngest child: 5	-0.02	(-0.08)	-0.29	(-1.25)
Age youngest child: 6	0.08	(0.36)	-0.25	(-1.12)
Age youngest child: 7	0.03	(0.09)	-0.32	(-1.16)
Age youngest child: 8	-0.18	(-0.60)	-0.55+	(-1.90)
Age youngest child: 9	0.22	(0.80)	-0.14	(-0.55)
Age youngest child: 10	0.17	(0.64)	-0.23	(-0.87)
Age youngest child: 11	0.14	(0.57)	-0.28	(-1.13)
Age youngest child: 12	0.47+	(1.65)	0.00	(0.00)
Age youngest child: 13	0.27	(1.00)	-0.24	(-0.90)
Age youngest child: 14	-0.02	(-0.09)	-0.57*	(-2.06)
Age youngest child: 15	0.60	(1.61)	0.05	(0.14)
Age youngest child: 16	0.10	(0.28)	-0.48	(-1.26)
Age youngest child: 17	-0.15	(-0.59)	-0.74**	(-2.71)
Age youngest child: 18	-0.01	(-0.04)	-0.68*	(-2.58)
Female # Age youngest child: 1	-0.58+	(-1.74)	-0.55	(-1.61)
Female # Age youngest child: 2	-0.40	(-1.12)	-0.38	(-1.03)
Female # Age youngest child: 3	0.05	(0.13)	0.13	(0.35)
Female # Age youngest child: 4	0.14	(0.34)	0.19	(0.45)
Female # Age youngest child: 5	-0.23	(-0.56)	-0.21	(-0.51)
Female # Age youngest child: 6	0.03	(0.08)	0.04	(0.10)
Female # Age youngest child: 7	-0.03	(-0.07)	-0.00	(-0.00)
Female # Age youngest child: 8	0.23	(0.51)	0.32	(0.72)
Female # Age youngest child: 9	-0.04	(-0.07)	-0.06	(-0.10)
Female # Age youngest child: 10	-0.05	(-0.12)	-0.12	(-0.28)
Female # Age youngest child: 11	0.20	(0.34)	0.12	(0.21)
Female # Age youngest child: 12	-0.71	(-1.62)	-0.76+	(-1.78)
Female # Age youngest child: 13	-0.58	(-1.36)	-0.62	(-1.43)
Female # Age youngest child: 14	0.26	(0.55)	0.22	(0.49)
Female # Age youngest child: 15	-0.19	(-0.26)	-0.27	(-0.39)
Female # Age youngest child: 16	0.43	(0.64)	0.32	(0.46)
Female # Age youngest child: 17	1.53**	(2.60)	1.40**	(2.71)
Female # Age youngest child: 18	0.05	(0.11)	-0.05	(-0.12)
Constant	1.49***	(8.44)	1.26***	(8.48)
r^2 within	0.01		0.01	
r^2 between	0.01		0.37	
r^2 overall	0.02		0.21	
Observations	3468		3468	

t statistics in parentheses; $^{+}$ *p < 0.1*, * *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*; ln = logged values; mc = mean-centered

Counting every article as single-authored

Table A11. RE and FE models explaining single-authored SSCI articles.

	(1) RE		(2) RE (prior pubs)		(3) FE (prior pubs)	
Female mc	-0.07^{*}	(-2.46)	-0.06^{*}	(-2.06)	0.00	(.)
Prior SSCI articles (ln) mc			0.26^{***}	(11.55)	0.03	(1.44)
Prior monographs (ln) mc			-0.03^{+}	(-1.70)	-0.06^{*}	(-2.18)
Prior book chapters (ln) mc			-0.06^{***}	(-5.06)	-0.04^{**}	(-2.62)
Prior non-SSCI articles (ln) mc			0.04^{**}	(2.95)	0.09^{***}	(4.79)
Prior edited volumes (ln) mc			-0.12^{***}	(-5.83)	-0.11^{***}	(-4.07)
Prior gray literature (ln) mc			-0.05^{***}	(-3.92)	-0.03	(-1.56)
[0] No career steps mc vs						
[1] PhD mc	0.13^{***}	(7.40)	0.12^{***}	(6.57)	0.15^{***}	(6.93)
[2] Tenured prof mc	0.05	(1.51)	0.04	(1.33)	0.09^{**}	(2.58)
Months abroad (ln) mc	0.04^{***}	(5.42)	0.02^{***}	(4.16)	0.04^{***}	(3.47)
PhD from abroad mc	0.37^{***}	(7.62)	0.23^{***}	(5.84)	0.00	(.)
Mobility (ln) mc	0.03^{+}	(1.74)	0.04^{**}	(2.67)	0.06^{*}	(2.21)
Co-authors (ln) mc	0.08^{***}	(7.63)	0.10^{***}	(10.05)	0.09^{***}	(5.69)
Interim professor (ln) mc	-0.11^{***}	(-3.61)	-0.09^{**}	(-2.73)	-0.06^{*}	(-2.05)
University of excellence mc	0.05^{+}	(1.83)	0.03	(1.35)	-0.00	(-0.04)
DFG funding (ln) mc	0.19^{***}	(4.59)	0.13^{***}	(3.79)	0.16^{***}	(4.21)
Mother	-0.04	(-1.04)	-0.05	(-1.55)	-0.01	(-0.21)
Father	-0.00	(-0.08)	-0.02	(-0.73)	0.03	(0.76)
Woman child unknown	-0.03	(-0.74)	-0.03	(-0.86)		
Man child unknown	-0.08^{**}	(-2.69)	-0.06^{*}	(-2.48)		
Incomplete mc	-0.11^{**}	(-3.16)	-0.10^{***}	(-3.97)	-0.30	(-1.25)
Constant	0.37^{***}	(18.83)	0.35^{***}	(21.09)	0.31^{***}	(36.71)
r^2 within	0.04		0.04		0.05	
r^2 between	0.24		0.48		0.21	
r^2 overall	0.13		0.23		0.13	
Observations	16853		16853		16853	

t statistics in parentheses; $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ln = logged values; mc = mean-centered

Appendix Chapter 7

Table A1. Summary statistics and t-test of accumulated variables for pre-doctorates, separately for females and males.

	Obs(m)	Obs(f)	Mean(m)	Mean(f)	dif	se	p-value
SSCI/SCIE articles	351	625	1.26	.8	.46	.11	0
Monographs	351	625	.08	.06	.01	.03	.64
Book chapters	351	625	.53	.44	.09	.12	.45
Non-SSCIE/SCIE articles	351	625	.35	.31	.03	.05	.55
Edited volumes	351	625	0	.01	-.01	.01	.27
Gray literature	351	625	.5	.32	.18	.08	.03
Months abroad	351	625	5.7	5.74	-.04	.87	.96
Doctorate abroad	351	625	.02	.01	.01	.01	.16
High-status university	351	625	.26	.24	.02	.03	.51
Research funding	351	625	.02	.01	.01	.01	.4
Mothers	351	625	0	.14	-.14	.02	0
Fathers	351	625	.09	0	.09	.01	0
Children status unknown (female)	351	625	0	.37	-.37	.03	0
Children status unknown (male)	351	625	.48	0	.48	.02	0

Table A2. Summary statistics and t-test of accumulated variables for post-doctorates, separately for females and males.

	Obs(m)	Obs(f)	Mean(m)	Mean(f)	dif	se	p-value
SSCI/SCIE articles	369	559	7.33	4.62	2.72	.43	0
Monographs	369	559	.36	.29	.06	.06	.3
Book chapters	369	559	2.51	1.91	.6	.29	.04
Non-SSCIE/SCIE articles	369	559	1.49	1.13	.36	.17	.04
Edited volumes	369	559	.16	.06	.1	.04	.03
Gray literature	369	559	1.99	1.02	.97	.43	.03
Months abroad	369	559	12.15	12.15	0	1.62	1
Doctorate abroad	369	559	.17	.14	.02	.02	.32
High-status university	369	559	.21	.25	-.04	.02	.09
Research funding	369	559	.54	.27	.27	.06	0
Mothers	369	559	0	.39	-.39	.03	0
Fathers	369	559	.36	0	.36	.02	0
Children status unknown (female)	369	559	0	.32	-.32	.02	0
Children status unknown (male)	369	559	.41	0	.41	.02	0

Table A3. Summary statistics and t-test of accumulated variables for tenured professors, separately for females and males.

	Obs(m)	Obs(f)	Mean(m)	Mean(f)	dif	se	p-value
SSCI/SCIE articles	292	161	35.65	23.55	12.1	2.32	0
Monographs	292	161	1.63	1.46	.17	.26	.51
Book chapters	292	161	16.73	13.18	3.55	1.91	.06
Non-SSCIE/SCIE articles	292	161	7.53	5.73	1.79	.84	.03
Edited volumes	292	161	1.5	.85	.65	.26	.01
Gray literature	292	161	5.57	3.28	2.3	.91	.01
Months abroad	292	161	27.71	25.15	2.56	3.96	.52
Doctorate abroad	292	161	.1	.11	-.01	.03	.68
High-status university	292	161	.28	.3	-.02	.03	.51
Research funding	292	161	4	2.7	1.3	.42	0
Mothers	292	161	0	.53	-.53	.03	0
Fathers	292	161	.47	0	.47	.04	0
Children status unknown (female)	292	161	0	.3	-.3	.03	0
Children status unknown (male)	292	161	.43	0	.43	.04	0

Table B. Robustness checks for non-response bias on children (survey-participation).

	Re-Model [Table 3, Model 4]			FE-Model [Table 3, Model 4]		
	(1) Children-non-response as category	(2) Complete records	(3) Multiple imputation[1]	(4) Children-non-response as category	(5) Complete records	(6) Multiple imputation[1]
Prior SSCI/SCIE articles (ln)	0.74***	0.78***	0.75***	0.39***	0.42***	0.39***
	(22.14)	(15.87)	(21.93)	(9.33)	(7.15)	(9.23)
Prior monographs (ln)	-0.11+	-0.13	-0.12+	-0.07	-0.04	-0.07
	(-1.76)	(-1.62)	(-1.89)	(-0.92)	(-0.41)	(-0.94)
Prior book chapters (ln)	-0.05	-0.07+	-0.05	0.05	0.07	0.05
	(-1.57)	(-1.89)	(-1.59)	(1.39)	(1.48)	(1.33)
Prior non-SSCI/SCIE articles (ln)	0.01	0.00	0.00	0.03	-0.05	0.03
	(0.13)	(0.02)	(0.12)	(0.62)	(-0.76)	(0.59)
Prior edited volumes (ln)	-0.02	0.02	-0.02	-0.01	0.03	-0.00
	(-0.31)	(0.22)	(-0.24)	(-0.07)	(0.24)	(-0.02)
Prior gray literature (ln)	-0.02	0.00	-0.02	-0.03	0.00	-0.03
	(-0.69)	(0.10)	(-0.54)	(-0.68)	(0.02)	(-0.63)
Females	-0.19***	-0.18***	-0.13***			
	(-3.69)	(-3.82)	(-3.81)			
Post-docs	-0.14***	-0.11**	-0.13***	0.08**	0.12**	0.08**
	(-4.34)	(-2.83)	(-3.98)	(2.62)	(3.09)	(2.64)
Tenured professors	-0.27***	-0.30**	-0.25**	-0.05	-0.06	-0.05
	(-3.44)	(-2.97)	(-3.14)	(-0.82)	(-0.67)	(-0.75)
Months abroad (ln)	0.06***	0.05**	0.06***	0.05*	0.04+	0.05*
	(4.32)	(2.99)	(4.36)	(2.45)	(1.66)	(2.46)
Doctorate abroad	-0.06	-0.14+	-0.08			
	(-1.06)	(-1.83)	(-1.33)			
High-status university	0.12**	0.14**	0.11**	0.01	0.14	0.02
	(3.09)	(2.89)	(3.03)	(0.09)	(0.86)	(0.15)
Research funding (ln)	0.30***	0.25**	0.30***	0.43***	0.40***	0.44***
	(4.68)	(2.77)	(4.65)	(6.79)	(4.60)	(6.83)
Mother	-0.27***	-0.29***	-0.21***	-0.33***	-0.34***	-0.19***
	(-5.68)	(-5.79)	(-5.56)	(-6.01)	(-5.60)	(-4.83)
Father	-0.20*	-0.22*	-0.17**	-0.05	-0.06	-0.04
	(-2.38)	(-2.50)	(-2.99)	(-0.58)	(-0.75)	(-0.90)
Children status unknown (female)	-0.07+					
	(-1.85)					
Children status unknown (male)	-0.22***					
	(-3.38)					
Selected publication list	-0.21***	-0.17*	-0.20***			
	(-3.91)	(-2.26)	(-3.66)			
Constant	1.13***	1.14***	1.08***	1.04***	1.09***	1.04***
	(31.39)	(27.72)	(38.81)	(74.68)	(40.62)	(68.26)
r^2 within	0.18	0.17	0.18	0.19	0.18	0.19
r^2 between	0.65	0.63	0.65	0.59	0.56	0.59
r^2 overall	0.38	0.37	0.38	0.36	0.34	0.36
Researcher	2176	1344	2176	2176	1344	2176
Researcher-years	23339	13693	23339	23339	13693	23339

t statistics in parentheses. Variables mean-centered, sd=1

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

[1] Model fits statistic computed over imputed data with $M_{imputation}$=25.

We used three different methods to control for missing data on child responses from scientists to ensure that our data were not biased due to non-response in the survey.

First, we added a dummy variable to account for those who did not participate in the survey (Model 1, 4), according to the main regression analysis of Model 4 in Table 3 and Table 4 in the paper. Second, we performed a complete records analysis with only valid cases (Model 2, 5). However, this also reduces model power because we omit missing information and thus the number of cases. Third, we used multiple imputations to run regression analyses on imputed data with $M_{imputation}$=25 (Model 3,6).

Finally, for our main analyses in the paper, we chose to include a dummy variable that controlled for survey dropouts. This procedure is appropriate since the results of the other methods are fairly similar, as we showed with robustness checks of the complete records analysis and the models with multiple imputations. In the multiple imputation methods, however, the negative effects of mothers on their productivity are somewhat weaker considering all confounding variables, especially in the FE model.

Table C. Random- and fixed-effects models on yearly SSCI/SCIE publications, non-logged variables.

	(1) RE without prior pubs	(2) RE with prior pubs	(3) FE with prior pubs	(4) FE with prior pubs (females)	(5) FE with prior pubs (males)
SSCI/SCIE		0.06***	0.02***	0.03***	0.02***
articles		(11.37)	(5.44)	(5.75)	(4.01)
Monographs		-0.03^{+}	-0.02	0.04	-0.04
		(-1.70)	(-0.62)	(0.83)	(-1.36)
Book chapters		0.00	0.02**	0.03***	0.02*
		(0.40)	(2.90)	(3.82)	(2.24)
Non-SSCI/		-0.01^{+}	-0.01	-0.02	-0.00
SCIE articles		(-1.65)	(-0.79)	(-1.38)	(-0.24)
Edited volumes		-0.03	-0.06^{+}	-0.01	-0.07^{+}
		(-1.19)	(-1.94)	(-0.43)	(-1.65)
Gray literature		-0.01**	-0.01*	-0.03**	-0.01^{+}
		(-2.77)	(-2.13)	(-2.86)	(-1.72)
Females	-0.25***	-0.23***			
	(-4.85)	(-4.69)			
Pre-docs			*reference*		
Post-docs	0.49***	0.36***	0.39***	0.28***	0.48***
	(19.79)	(15.45)	(15.37)	(9.94)	(12.22)
Tenured	0.79***	0.34***	0.43***	0.22**	0.53***
professors	(12.10)	(4.77)	(6.91)	(2.60)	(6.61)
Months abroad	0.01***	0.00***	0.01***	0.01**	0.01***
	(6.43)	(3.70)	(4.64)	(3.23)	(3.46)
Doctorate	-0.09	-0.04			
abroad	(-1.48)	(-0.92)			
High-status	0.11**	0.11**	0.13	0.16	0.10
university	(3.09)	(3.29)	(1.23)	(1.33)	(0.63)
Research	0.19***	0.03	0.08***	0.04^{+}	0.09***
funding	(11.07)	(1.30)	(3.88)	(1.95)	(3.43)
Mothers	-0.16***	-0.16***	-0.16**	-0.13*	
	(-3.42)	(-3.79)	(-3.10)	(-2.55)	
Fathers	0.04	-0.16*	0.12		0.08
	(0.52)	(-2.30)	(1.48)		(1.00)
Children status	-0.06	-0.06			
unknown (female)	(-1.57)	(-1.58)			
Children status	-0.11^{+}	-0.20***			
unknown (male)	(-1.81)	(-3.56)			
Selected	-0.41***	-0.20***			
publication list	(-6.46)	(-3.88)			
Constant	1.05***	1.10***	1.00***	0.90***	1.09***
	(30.23)	(35.15)	(76.11)	(43.41)	(51.29)
r^2 within	0.16	0.17	0.18	0.14	0.20
r^2 between	0.39	0.68	0.51	0.48	0.49
r^2 overall	0.27	0.39	0.34	0.29	0.34
Researchers	2176	2176	2176	1191	985
Researcher-years	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1

*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table D1. Random-effects models on yearly SSCI/SCIE publications *(without co-author adjusted publications)*, controlling for prior publication activity.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles (ln)	0.59***	0.59***	0.52***	0.53***	0.45***	0.53***
	(28.60)	(27.97)	(23.05)	(23.08)	(15.27)	(15.59)
Prior monographs (ln)	-0.08	-0.06	-0.06	-0.06	-0.02	-0.09
	(-1.47)	(-1.17)	(-1.15)	(-1.16)	(-0.31)	(-1.25)
Prior book chapters (ln)	-0.03	-0.03	-0.04	-0.03	-0.02	-0.04
	(-1.00)	(-1.08)	(-1.38)	(-1.13)	(-0.56)	(-1.02)
Prior non-SSCI/SCIE articles (ln)	0.01	0.01	0.04	0.05	0.01	0.06
	(0.33)	(0.42)	(1.21)	(1.48)	(0.19)	(1.43)
Prior edited volumes (ln)	0.03	0.00	-0.02	-0.03	0.02	-0.04
	(0.51)	(0.02)	(-0.26)	(-0.41)	(0.20)	(-0.50)
Prior gray literature (ln)	-0.01	-0.01	-0.01	-0.01	0.01	-0.01
	(-0.40)	(-0.23)	(-0.43)	(-0.27)	(0.20)	(-0.29)
Females	-0.18***	-0.19***	-0.18***	-0.22***		
	(-6.57)	(-6.61)	(-6.24)	(-4.29)		
Post-docs		-0.14***	-0.12***	-0.09***	-0.06+	-0.05
(ref. pre-docs)		(-4.41)	(-4.30)	(-3.33)	(-1.75)	(-1.22)
Tenured professors		-0.03	-0.18**	-0.15*	0.05	-0.18*
(ref. pre-docs)		(-0.54)	(-2.66)	(-2.08)	(0.61)	(-2.05)
Months abroad (ln)		0.06***	0.06***	0.06***	0.04**	0.07***
		(4.56)	(4.55)	(4.60)	(3.02)	(3.31)
Doctorate abroad		-0.10+	-0.04	-0.05	0.05	-0.10
		(-1.84)	(-0.72)	(-0.86)	(0.89)	(-1.14)
High-status university		0.08*	0.08*	0.09**	0.11*	0.07
		(2.42)	(2.42)	(2.58)	(2.45)	(1.37)
Research funding (ln)			0.34***	0.35***	0.23**	0.40***
			(5.49)	(5.66)	(2.82)	(5.02)
Mothers				-0.29***	-0.23***	
				(-6.39)	(-4.75)	
Fathers				-0.20*		-0.21**
				(-2.55)		(-2.81)
Children status unknown (female)				-0.07*	-0.06	
				(-2.00)	(-1.60)	
Children status unknown (male)				-0.20**		-0.21***
				(-3.28)		(-3.78)
Selected publication list	-0.19***	-0.20***	-0.23***	-0.22***	-0.07	-0.29***
	(-3.64)	(-3.68)	(-4.39)	(-4.39)	(-0.96)	(-4.49)
Constant	1.00***	1.00***	1.00***	1.13***	0.97***	1.23***
	(55.60)	(57.30)	(58.14)	(32.07)	(29.20)	(24.03)
r^2 within	0.17	0.17	0.18	0.18	0.13	0.21
r^2 between	0.59	0.60	0.61	0.61	0.58	0.62
r^2 overall	0.35	0.36	0.37	0.37	0.32	0.38
Researcher	2176	2176	2176	2176	1191	985
Observations	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1
*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

Table D2. Fixed-effects models on yearly SSCI/SCIE publications *(without co-author adjusted publications)*, controlling for prior publication activity.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles	0.44^{***}	0.42^{***}	0.30^{***}	0.31^{***}	0.26^{***}	0.34^{***}
(ln)	(17.40)	(15.13)	(9.43)	(9.72)	(6.56)	(7.23)
Prior monographs (ln)	-0.03	-0.03	-0.02	-0.03	0.08	-0.09
	(-0.39)	(-0.39)	(-0.36)	(-0.41)	(1.09)	(-1.00)
Prior book chapters (ln)	0.05	0.04	0.03	0.04	0.09^{*}	0.01
	(1.30)	(1.09)	(0.94)	(1.20)	(2.22)	(0.26)
Prior non-SSCI/SCIE	-0.00	0.00	0.03	0.04	0.01	0.06
articles (ln)	(-0.01)	(0.03)	(0.81)	(0.97)	(0.17)	(1.10)
Prior edited volumes (ln)	0.06	0.06	0.01	-0.00	0.05	-0.03
	(0.77)	(0.70)	(0.14)	(-0.01)	(0.56)	(-0.29)
Prior gray literature (ln)	-0.01	-0.01	-0.01	-0.02	-0.07^{+}	0.01
	(-0.24)	(-0.19)	(-0.37)	(-0.42)	(-1.72)	(0.26)
Post-docs		-0.02	0.04	0.06^{+}	0.05	0.07
(ref. pre-docs)		(-0.54)	(1.21)	(1.88)	(1.37)	(1.45)
Tenured professors		0.03	-0.07	-0.04	-0.03	-0.05
(ref. pre-docs)		(0.45)	(-1.08)	(-0.74)	(-0.30)	(-0.65)
Months abroad (ln)		0.05^{*}	0.06^{**}	0.06^{**}	0.05	0.06^{*}
		(2.53)	(2.66)	(2.70)	(1.58)	(2.13)
High-status university		-0.03	0.00	0.00	0.09	-0.03
		(-0.24)	(0.04)	(0.00)	(0.76)	(-0.21)
Research funding (ln)			0.46^{***}	0.45^{***}	0.29^{***}	0.50^{***}
			(7.15)	(7.13)	(3.84)	(5.99)
Mothers				-0.34^{***}	-0.26^{***}	
				(-6.27)	(-4.50)	
Fathers				-0.05		-0.10
				(-0.58)		(-1.23)
Constant	1.00^{***}	1.00^{***}	1.00^{***}	1.05^{***}	0.92^{***}	1.12^{***}
	(1.01e+09)	(7.28e+08)	(7.59e+08)	(74.29)	(44.44)	(53.14)
r^2 within	0.17	0.17	0.19	0.19	0.14	0.21
r^2 between	0.58	0.59	0.57	0.57	0.51	0.57
r^2 overall	0.34	0.34	0.34	0.35	0.29	0.35
Researcher	2176	2176	2176	2176	1191	985
Observations	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1

*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table E1. Random-effects models on yearly SSCI/SCIE publications *weighted by (1/# of authors)*, controlling for prior publication activity.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles (ln)	0.90***	0.90***	0.82***	0.83***	0.71***	0.78***
	(27.52)	(25.83)	(20.84)	(20.86)	(14.37)	(14.07)
Prior monographs (ln)	-0.17*	-0.14*	-0.14*	-0.14*	-0.06	-0.19*
	(-2.47)	(-2.10)	(-2.19)	(-2.15)	(-0.87)	(-2.04)
Prior book chapters (ln)	-0.07+	-0.07+	-0.07+	-0.06	-0.03	-0.08
	(-1.91)	(-1.69)	(-1.83)	(-1.61)	(-0.81)	(-1.44)
Prior non-SSCI/SCIE articles (ln)	-0.08+	-0.07	-0.04	-0.02	-0.06	0.02
	(-1.76)	(-1.56)	(-0.76)	(-0.53)	(-1.12)	(0.27)
Prior edited volumes (ln)	0.03	0.01	-0.01	-0.03	0.00	-0.04
	(0.29)	(0.08)	(-0.07)	(-0.29)	(0.03)	(-0.36)
Prior gray literature (ln)	-0.04	-0.04	-0.04	-0.03	-0.03	-0.03
	(-0.96)	(-0.91)	(-0.98)	(-0.88)	(-0.65)	(-0.58)
Females	-0.14***	-0.14***	-0.13***	-0.18***		
	(-4.66)	(-4.81)	(-4.59)	(-3.60)		
Post-docs		-0.14***	-0.13***	-0.10**	-0.04	-0.03
(ref. pre-docs)		(-4.02)	(-4.10)	(-3.26)	(-1.37)	(-0.84)
Tenured professors		-0.16*	-0.29***	-0.25**	-0.09	-0.22*
(ref. pre-docs)		(-2.16)	(-3.71)	(-3.28)	(-1.04)	(-2.48)
Months abroad (ln)		0.06***	0.06***	0.06***	0.04*	0.06**
		(4.22)	(4.27)	(4.28)	(2.53)	(3.23)
Doctorate abroad		-0.11+	-0.06	-0.06	0.03	-0.11
		(-1.95)	(-1.00)	(-1.08)	(0.55)	(-1.27)
High-status university		0.12**	0.11**	0.12**	0.11**	0.09*
		(3.04)	(3.03)	(3.21)	(2.68)	(1.98)
Research funding (ln)			0.29***	0.29***	0.18*	0.35***
			(4.35)	(4.56)	(2.11)	(4.33)
Mothers				-0.26***	-0.22***	
				(-5.50)	(-4.72)	
Fathers				-0.19*		-0.20**
				(-2.28)		(-2.63)
Children status unknown (female)				-0.07+	-0.06+	
				(-1.89)	(-1.87)	
Children status unknown (male)				-0.22***		-0.22***
				(-3.42)		(-4.02)
Selected publication list	-0.23***	-0.19**	-0.22***	-0.21***	-0.05	-0.28***
	(-3.79)	(-3.27)	(-3.87)	(-3.82)	(-0.60)	(-4.26)
Constant	1.00***	1.00***	1.00***	1.12***	0.99***	1.22***
	(57.76)	(59.14)	(59.94)	(31.45)	(30.17)	(24.36)
r^2 within	0.17	0.17	0.18	0.18	0.13	0.20
r^2 between	0.65	0.65	0.66	0.66	0.62	0.66
r^2 overall	0.37	0.37	0.38	0.38	0.33	0.39
Researcher	2176	2176	2176	2176	1191	985
Observations	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

Table E2. Fixed-effects models on yearly SSCI/SCIE publications weighted by (*1/# of authors*), controlling for prior publication activity.

	(1) Productivity	(2) Career	(3) Funding	(4) Parenting	(5) Women only	(6) Men only
Prior SSCI/SCIE articles	0.61^{***}	0.58^{***}	0.42^{***}	0.43^{***}	0.39^{***}	0.45^{***}
(ln)	(17.10)	(14.60)	(8.81)	(9.00)	(6.33)	(6.56)
Prior monographs (ln)	-0.09	-0.10	-0.10	-0.10	0.06	-0.19^{+}
	(-1.13)	(-1.24)	(-1.21)	(-1.22)	(0.70)	(-1.67)
Prior book chapters (ln)	0.07^{+}	0.07	0.05	0.06	0.15^{**}	0.02
	(1.65)	(1.63)	(1.31)	(1.53)	(2.93)	(0.26)
Prior non-SSCI/SCIE	-0.03	-0.03	0.02	0.03	-0.06	0.08
articles (ln)	(-0.59)	(-0.49)	(0.35)	(0.47)	(-0.78)	(1.07)
Prior edited volumes (ln)	0.03	0.05	-0.00	-0.02	0.05	-0.04
	(0.25)	(0.42)	(-0.03)	(-0.19)	(0.38)	(-0.32)
Prior gray literature (ln)	-0.02	-0.03	-0.03	-0.03	-0.08	-0.00
	(-0.45)	(-0.60)	(-0.61)	(-0.70)	(-1.46)	(-0.07)
Post-docs		0.03	0.08^{**}	0.10^{***}	0.08^{*}	0.13^{**}
(ref. pre-docs)		(0.94)	(2.64)	(3.47)	(2.27)	(2.72)
Tenured professors		0.01	-0.05	-0.03	-0.05	-0.01
(ref. pre-docs)		(0.23)	(-0.91)	(-0.53)	(-0.56)	(-0.18)
Months abroad (ln)		0.04^{*}	0.05^{*}	0.05^{*}	0.04	0.06^{*}
		(2.06)	(2.40)	(2.46)	(1.27)	(2.05)
High-status university		-0.01	0.02	0.01	0.09	-0.02
		(-0.11)	(0.15)	(0.13)	(0.74)	(-0.10)
Research funding (ln)			0.44^{***}	0.43^{***}	0.26^{***}	0.49^{***}
			(6.75)	(6.75)	(3.48)	(5.79)
Mothers				-0.32^{***}	-0.25^{***}	
				(-5.79)	(-4.39)	
Fathers				-0.04		-0.09
				(-0.50)		(-1.03)
Constant	1.00^{***}	1.00^{***}	1.00^{***}	1.04^{***}	0.94^{***}	1.10^{***}
	(9.92e+08)	(7.78e+08)	(7.84e+08)	(74.63)	(41.83)	(53.35)
r^2 within	0.17	0.17	0.18	0.19	0.14	0.21
r^2 between	0.62	0.62	0.59	0.58	0.52	0.58
r^2 overall	0.35	0.35	0.35	0.35	0.29	0.36
Researcher	2176	2176	2176	2176	1191	985
Observations	23339	23339	23339	23339	10528	12811

t statistics in parentheses. Variables mean-centered, sd=1

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

Table F. RE and FE models on yearly SSCI/SCIE publications *weighted by the journal's impact factor*, controlling for prior publication activity.

	(1) RE (Table 2 Model 4)	(2) FE (Table 3, Model 4)
Prior SSCI/SCIE articles (ln), weighted by impact factor	0.72***	0.40***
	(20.68)	(12.92)
Prior monographs (ln)	-0.07	-0.05
	(-1.15)	(-0.77)
Prior book chapters (ln)	0.06+	0.10**
	(1.72)	(2.97)
Prior non-SSCI/SCIE articles (ln)	0.22***	0.14**
	(5.22)	(2.95)
Prior edited volumes (ln)	-0.09	-0.05
	(-1.12)	(-0.54)
Prior gray literature (ln)	-0.02	-0.01
	(-0.47)	(-0.35)
Females	-0.22***	
	(-4.38)	
Post-docs	0.13***	0.18***
(ref. pre-docs)	(4.91)	(6.30)
Tenured professors	0.27***	0.15*
(ref. pre-docs)	(3.67)	(2.50)
Months abroad (ln)	0.07***	0.07***
	(5.46)	(3.59)
Doctorate abroad	-0.06	
	(-1.00)	
High-status university	0.10*	0.05
	(2.46)	(0.53)
Research funding (ln)	0.33***	0.43***
	(5.79)	(8.24)
Mothers	-0.18***	-0.23***
	(-4.24)	(-4.68)
Fathers	-0.12	0.03
	(-1.43)	(0.44)
Children status unknown (female)	-0.05	
	(-1.56)	
Children status unknown (male)	-0.12*	
	(-2.01)	
Selected publication list	-0.23***	
	(-4.87)	
Constant	1.08***	1.02***
	(32.38)	(79.93)
r^2 within	0.20	0.21
r^2 between	0.64	0.59
r^2 overall	0.39	0.37
Researcher	2176	2176
Observations	23339	23339

t statistics in parentheses. Variables mean-centered, sd=1

*+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Table G. RE and FE models on yearly SSCI/SCIE publications, considering scientists' career lengths by years since PhD.

	(1) RE (w/o prior pub)	(2) RE (w/ prior pubs)	(3) FE (w/ prior pubs)
Prior SSCI/SCIE articles (ln)		0.78***	0.46***
		(22.00)	(10.28)
Prior monographs (ln)		-0.08	-0.03
		(-1.33)	(-0.35)
Prior book chapters (ln)		-0.02	0.10*
		(-0.64)	(2.38)
Prior non-SSCI/SCIE articles (ln)		0.03	0.06
		(0.73)	(1.24)
Prior edited volumes (ln)		0.02	0.04
		(0.24)	(0.38)
Prior gray literature (ln)		-0.02	-0.02
		(-0.69)	(-0.55)
Females	-0.26***	-0.17***	
	(-5.10)	(-3.42)	
Post-docs	0.40***	-0.03	0.06*
(ref. pre-docs)	(13.67)	(-0.81)	(2.09)
Tenured professors	0.63***	0.00	-0.01
(ref. pre-docs)	(7.82)	(0.04)	(-0.12)
Months abroad (ln)	0.12***	0.05***	0.05*
	(7.37)	(4.18)	(2.53)
Doctorate abroad	0.02	-0.04	
	(0.36)	(-0.62)	
High-status university	0.10**	0.11**	0.01
	(2.80)	(3.06)	(0.06)
Research funding (ln)	0.68***	0.37***	0.50***
	(11.02)	(5.77)	(7.47)
Mothers	-0.21***	-0.25***	-0.31***
	(-4.29)	(-5.16)	(-5.66)
Fathers	-0.02	-0.17*	-0.06
	(-0.21)	(-2.15)	(-0.77)
Children status unknown (female)	-0.05	-0.05	
	(-1.39)	(-1.40)	
Children status unknown (male)	-0.13*	-0.18**	
	(-2.26)	(-2.97)	
Selected publication list	-0.43***	-0.13*	
	(-6.64)	(-2.35)	
Years since PhD (ln)	0.00	-0.03***	-0.03***
	(0.90)	(-6.55)	(-4.98)
Constant	1.04***	1.31***	1.21***
	(24.82)	(26.54)	(32.77)
r^2 within	0.16	0.18	0.19
r^2 between	0.38	0.66	0.61
r^2 overall	0.27	0.39	0.37
Researcher	2176	2176	2176
Observations	23339	23339	23339

t statistics in parentheses. Variables mean-centered, sd=1

*+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001*

In our main analyses, we use a dichotomous variable for career stages (pre-docs, post-docs, tenured professors). We do so to disentangle who publishes more or less at which career stage (RE) and whether this can be explained by the individual productivity of each scientist (FE). In Table G, we add the variable "years since PHD" to capture different career lengths, however.

Considering prior publishing experience in the main analyses (Model 4, Table 2), post-docs and tenured professors publish less than pre-docs. When adding a career lengths variable (Model 2, Table G), we no longer find a net impact of career stages. This finding is reasonable because higher career stages highly correlate with career lengths. Accordingly, research productivity declines by 3% each year since the PhD compared to what would be expected annually, irrespective of the career stage. Therefore, we only use the variable career lengths as an additional robustness check but omit it in the main analysis.

Table H. Tabulation incomplete publication lists, separately by gender.

	Publication lists		
Gender	Full	Incomplete	Total
Male	1012	96	1108
	91.34	**8.66**	100.00
	42.94	55.81	43.81
Female	1345	76	1421
	94.65	**5.35**	100.00
	57.06	44.19	56.19
Total	2357	172	2529
	93.20	6.80	100.00
	100.00	100.00	100.00

First row has *frequencies*; second row has *row percentages* and third row has *column percentages*

Appendix Chapter 8

Table A1. Cox regression models on exits, interaction effects on gender.

	(1) Female × children	(2) Female × years PhD	(3) Female × PhD from German u. of excellence	(4) Female × PhD from abroad	(5) Female × international pubs	(6) Female × months abroad	(7) Female × mobility	(8) Female × interim professor	(9) Female × Co-authors	(10) Female × SSCI/SCIE publications	(11) Female × non-SSCI/SCIE publications	(12) Female × monographs	(13) Female × edited volumes	(14) Female × book chapters	(15) Female × gray literature	(16) Female × awards	(17) Female × DFG funding
Female	1.39	1.49**	1.47**	1.45**	1.60**	1.55**	1.19	1.42**	1.21	1.38*	1.33^{+}	1.37*	1.28^{+}	1.44*	1.48*	1.47**	1.40**
	(1.49)	(2.70)	(2.84)	(2.82)	(2.85)	(2.94)	(0.89)	(2.70)	(0.91)	(2.17)	(1.79)	(2.12)	(1.87)	(2.03)	(2.12)	(2.88)	(2.58)
with children	0.91	0.98	0.98	0.98	0.99	0.97	0.98	0.97	0.96	0.97	0.98	0.97	0.98	0.97	0.98	0.97	0.97
(ref. childless)	(–0.32)	(–0.13)	(–0.13)	(–0.13)	(–0.07)	(–0.15)	(–0.12)	(–0.14)	(–0.20)	(–0.15)	(–0.12)	(–0.14)	(–0.09)	(–0.14)	(–0.13)	(–0.14)	(–0.17)
w/o child info	2.24***	2.27***	2.28***	2.27***	2.28***	2.26***	2.28***	2.27***	2.26***	2.27***	2.27***	2.27***	2.28***	2.27***	2.27***	2.27***	2.28***
(ref. childless)	(3.79)	(5.72)	(5.74)	(5.73)	(5.75)	(5.70)	(5.74)	(5.73)	(5.70)	(5.73)	(5.73)	(5.71)	(5.76)	(5.72)	(5.73)	(5.74)	(5.74)
Years since PhD (ln)	0.74*	0.77^{+}	0.74*	0.74*	0.75*	0.74*	0.74**	0.74*	0.74**	0.74*	0.73**	0.74*	0.74**	0.74*	0.74*	0.74*	0.74*
	(–2.53)	(–1.86)	(–2.57)	(–2.54)	(–2.43)	(–2.56)	(–2.59)	(–2.55)	(–2.58)	(–2.55)	(–2.60)	(–2.54)	(–2.58)	(–2.54)	(–2.53)	(–2.57)	(–2.53)
PhD from university of	0.55**	0.55**	0.63	0.55**	0.56**	0.56**	0.56**	0.55**	0.56**	0.55**	0.55**	0.55**	0.56**	0.55**	0.55**	0.55**	0.55**
excellence	(-2.94)	(-2.95)	(-1.58)	(-2.94)	(-2.92)	(-2.92)	(-2.91)	(-2.94)	(-2.90)	(-2.95)	(-2.93)	(-2.95)	(-2.84)	(-2.94)	(-2.92)	(-2.96)	(-2.94)
PhD from abroad	0.19**	0.19**	0.19**	0.25^{+}	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**	0.19**
	(–3.26)	(–3.25)	(–3.26)	(–1.96)	(–3.22)	(–3.26)	(–3.22)	(–3.25)	(–3.24)	(–3.26)	(–3.25)	(–3.24)	(–3.25)	(–3.25)	(–3.25)	(–3.25)	(–3.24)
International	1.02	1.03	1.03	1.02	1.13	1.02	1.02	1.02	1.02	1.03	1.02	1.02	1.03	1.02	1.02	1.02	1.02
publications (ln)	(0.18)	(0.24)	(0.21)	(0.20)	(0.79)	(0.14)	(0.19)	(0.18)	(0.20)	(0.21)	(0.18)	(0.17)	(0.25)	(0.19)	(0.20)	(0.20)	(0.16)
Months abroad (ln)	0.86**	0.86**	0.86**	0.86**	0.86**	0.92	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**	0.86**
	(–2.63)	(–2.65)	(–2.63)	(–2.65)	(–2.64)	(–0.94)	(–2.68)	(–2.64)	(–2.67)	(–2.65)	(–2.63)	(–2.62)	(–2.65)	(–2.64)	(–2.63)	(–2.64)	(–2.66)
Mobility (ln)	0.95	0.96	0.95	0.95	0.95	0.95	0.81	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
	(–0.38)	(–0.36)	(–0.39)	(–0.39)	(–0.37)	(–0.37)	(–1.20)	(–0.38)	(–0.39)	(–0.39)	(–0.39)	(–0.39)	(–0.44)	(–0.38)	(–0.37)	(–0.39)	(–0.39)
Interim professor (ln)	0.78	0.78	0.78	0.78	0.78	0.78	0.79	0.68	0.79	0.79	0.78	0.79	0.75	0.78	0.78	0.78	0.77
	(–0.57)	(–0.57)	(–0.57)	(–0.57)	(–0.57)	(–0.58)	(–0.55)	(–0.69)	(–0.55)	(–0.55)	(–0.56)	(–0.55)	(–0.66)	(–0.57)	(–0.56)	(–0.57)	(–0.60)
Co-authors (ln)	0.92	0.91	0.91	0.92	0.91	0.92	0.92	0.92	0.86	0.91	0.92	0.92	0.92	0.92	0.91	0.91	0.92
	(–1.17)	(–1.20)	(–1.20)	(–1.18)	(–1.19)	(–1.14)	(–1.14)	(–1.16)	(–1.60)	(–1.19)	(–1.13)	(–1.15)	(–1.10)	(–1.17)	(–1.17)	(–1.19)	(–1.18)
SSCI/SCIE articles	0.83	0.82	0.83	0.83	0.81	0.83	0.83	0.83	0.83	0.76	0.83	0.83	0.82	0.83	0.83	0.83	0.84
(ln)	(–1.03)	(–1.08)	(–1.03)	(–1.03)	(–1.15)	(–1.05)	(–1.00)	(–1.02)	(–1.01)	(–1.14)	(–1.02)	(–0.98)	(–1.09)	(–1.04)	(–1.05)	(–1.03)	(–0.95)
Non-SSCI articles	0.56***	0.56***	0.56***	0.56***	0.56***	0.56***	0.56***	0.56***	0.56***	0.55***	0.50***	0.55***	0.55***	0.56***	0.56***	0.56***	0.55***
(ln)	(–4.29)	(–4.30)	(–4.30)	(–4.31)	(–4.35)	(–4.31)	(–4.28)	(–4.30)	(–4.27)	(–4.27)	(–3.74)	(–4.27)	(–4.27)	(–4.30)	(–4.31)	(–4.29)	(–4.30)
Monographs (ln)	1.18	1.18	1.18	1.18	1.16	1.17	1.19	1.18	1.19	1.19	1.18	1.08	1.23	1.18	1.17	1.18	1.19
	(0.85)	(0.83)	(0.86)	(0.83)	(0.76)	(0.81)	(0.88)	(0.86)	(0.89)	(0.87)	(0.86)	(0.31)	(1.05)	(0.84)	(0.80)	(0.84)	(0.88)
Edited volumes (ln)	0.56*	0.55*	0.55*	0.56*	0.55*	0.56*	0.55*	0.55*	0.56*	0.55*	0.55*	0.56*	0.25**	0.55*	0.55*	0.56*	0.55*
	(–2.09)	(–2.13)	(–2.13)	(–2.11)	(–2.14)	(–2.11)	(–2.11)	(–2.12)	(–2.08)	(–2.13)	(–2.13)	(–2.05)	(–3.05)	(–2.11)	(–2.11)	(–2.09)	(–2.12)
Book chapters (ln)	0.91	0.91	0.91	0.91	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.91	0.91	0.91	0.91
	(–0.85)	(–0.88)	(–0.87)	(–0.85)	(–0.90)	(–0.85)	(–0.87)	(–0.86)	(–0.84)	(–0.83)	(–0.84)	(–0.81)	(–0.96)	(–0.65)	(–0.86)	(–0.82)	(–0.88)
Gray literature (ln)	0.99	0.98	0.99	0.98	0.98	0.99	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.98	1.01	0.98	0.98
	(–0.14)	(–0.18)	(–0.11)	(–0.15)	(–0.16)	(–0.07)	(–0.16)	(–0.15)	(–0.08)	(–0.13)	(–0.11)	(–0.08)	(–0.05)	(–0.14)	(0.06)	(–0.17)	(–0.15)
Awards (ln)	0.34**	0.34**	0.34**	0.34**	0.34**	0.34**	0.34**	0.34**	0.34**	0.33**	0.33**	0.34**	0.32**	0.34**	0.34**	0.48	0.33**
	(–2.66)	(–2.65)	(–2.67)	(–2.66)	(–2.64)	(–2.66)	(–2.65)	(–2.67)	(–2.66)	(–2.67)	(–2.66)	(–2.67)	(–2.72)	(–2.64)	(–2.66)	(–1.40)	(–2.69)
DFG funding (ln)	0.62	0.63	0.62	0.62	0.63	0.63	0.62	0.62	0.61	0.63	0.62	0.63	0.58	0.63	0.63	0.63	0.28
	(–1.07)	(–1.07)	(–1.07)	(–1.07)	(–1.05)	(–1.06)	(–1.05)	(–1.06)	(–1.09)	(–1.04)	(–1.08)	(–1.05)	(–1.19)	(–1.06)	(–1.04)	(–1.06)	(–1.40)
Only selected	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	1.02	0.99	0.99	0.99	0.99
publications	(–0.05)	(–0.05)	(–0.03)	(–0.05)	(–0.04)	(–0.06)	(0.01)	(–0.05)	(–0.03)	(–0.05)	(–0.04)	(–0.02)	(0.07)	(–0.05)	(–0.06)	(–0.06)	(–0.03)
Entry cohorts																	
(ref. 1980–1989)																	
1990–1999	1.84	1.88	1.84	1.83	1.82	1.81	1.79	1.83	1.82	1.83	1.81	1.77	1.73	1.84	1.85	1.84	1.81
	(1.02)	(1.06)	(1.02)	(1.01)	(1.00)	(0.99)	(0.98)	(1.02)	(1.00)	(1.01)	(0.99)	(0.95)	(0.93)	(1.02)	(1.03)	(1.02)	(0.99)
2000–2009	18.13***	18.63***	18.29***	18.14***	18.16***	18.14***	17.47***	18.11***	18.15***	18.09***	17.91***	17.64***	17.38***	18.21***	18.29***	18.18***	17.88***
	(5.12)	(5.22)	(5.15)	(5.12)	(5.14)	(5.11)	(5.07)	(5.14)	(5.11)	(5.10)	(5.11)	(5.08)	(5.15)	(5.12)	(5.13)	(5.11)	(5.08)
After 2009	58.78***	60.33***	59.19***	58.92***	58.83***	59.07***	56.93***	58.70***	58.95***	58.61***	58.13***	57.13***	57.11***	59.03***	59.27***	58.79***	58.12***
	(7.00)	(7.10)	(7.03)	(7.00)	(7.02)	(6.99)	(6.98)	(7.02)	(6.98)	(6.97)	(6.99)	(5.08)	(7.08)	(7.00)	(7.01)	(6.97)	(6.97)

Table A1. Cox regression.

Female × children	1.12																
	(0.30)																
Female × w/o child info	1.03																
	(0.09)																
Female × years since PhD (ln)		0.92															
		(–0.51)															
Female × PhD from university of excellence			0.79														
			(–0.61)														
Female × PhD from abroad				0.61													
				(–0.48)													
Female × international publications (ln)					0.83												
					(–1.05)												
Female × months abroad (ln)						0.89											
						(–1.03)											
Female × mobility (ln)							1.34										
							(1.25)										
Female × interim professor (ln)								1.29									
								(0.32)									
Female × co-authors (ln)									1.13								
									(1.05)								
Female × SSCI/SCIE articles (ln)										1.18							
										(0.58)							
Female × non-SSCI articles (ln)											1.21						
											(0.84)						
Female × monographs (ln)												1.17					
												(0.54)					
Female × edited volumes (ln)													3.85**				
													(2.59)				
Female × book chapters (ln)														0.99			
														(–0.05)			
Female × gray literature (ln)															0.95		
															(–0.26)		
Female × awards (ln)																0.51	
																(–0.83)	
Female × DFG funding (ln)																	3.70
																	(1.24)
Pseudo r²	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Log likelihood	–1680.50	–1680.40	–1680.36	–1680.43	–1679.94	–1679.97	–1679.74	–1680.49	–1679.98	–1680.37	–1680.19	–1680.39	–1677.30	–1680.54	–1680.51	–1680.16	–1679.74
Degrees of freedom	25	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Chi²	321.82	323.94	324.55	323.40	322.25	326.78	321.60	324.64	322.78	322.69	318.18	320.44	319.59	322.11	324.37	324.53	323.41
AIC	3411.00	3408.80	3408.72	3408.86	3407.88	3407.93	3407.48	3408.99	3407.95	3408.74	3408.39	3408.78	3402.60	3409.09	3409.01	3408.32	3407.48
BIC	3630.24	3619.27	3619.19	3619.33	3618.35	3618.40	3617.95	3619.46	3618.42	3619.21	3618.86	3619.25	3613.07	3619.56	3619.48	3618.78	3617.95
Number of events (exits)	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263
N (individuals)	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193	2,193
N (individuals: publications)	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547	47,547

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

Table A2. Cox regression models on dropouts (non-logged coefficients).

	(1) Gender	(2) Children	(3) Career stage	(4) Academic network	(5) Publications	(6) Awards and grants	(7) Only women	(8) Only men
Female	1.33*	1.39**	1.39**	1.44**	1.39*	1.41**		
	(2.29)	(2.63)	(2.60)	(2.86)	(2.54)	(2.63)		
With children		0.90	0.98	0.94	0.94	0.94	1.03	0.93
(ref. childless)		(–0.57)	(–0.12)	(–0.33)	(–0.34)	(–0.31)	(0.12)	(–0.25)
W/o child info		2.39***	2.40***	2.29***	2.28***	2.30***	2.39***	2.17***
(ref. childless)		(6.20)	(6.24)	(5.90)	(5.81)	(5.85)	(4.51)	(3.54)
Years since			0.90**	0.95+	0.96+	0.96	0.92+	0.99
PhD			(–3.24)	(–1.91)	(–1.69)	(–1.52)	(–1.84)	(–0.35)
PhD from				0.50***	0.51***	0.51***	0.47**	0.60
university of excellence				(–3.48)	(–3.32)	(–3.31)	(–2.73)	(–1.64)
PhD from				0.14***	0.15***	0.17***	0.18*	0.16**
abroad				(–4.03)	(–4.06)	(–3.92)	(–2.46)	(–3.15)
International				0.99	1.01	1.01	0.95	1.06*
publications				(–0.51)	(0.26)	(0.43)	(–1.24)	(2.34)
Months abroad				0.99	0.99	0.99	0.99	1.00
				(–1.06)	(–0.92)	(–0.87)	(–1.27)	(0.34)
Mobility				0.93	0.96	0.96	1.02	0.87
				(–1.31)	(–0.72)	(–0.82)	(0.34)	(–1.50)
Interim				0.71	0.85	0.89	0.98	0.79
professor				(–1.12)	(–0.57)	(–0.43)	(–0.07)	(–0.55)
Co-authors				0.99	1.00	1.00	1.01	0.98+
				(–1.55)	(–0.47)	(–0.59)	(1.21)	(–1.68)
SSCI/SCIE					0.87+	0.92	0.99	0.84
articles					(–1.86)	(–1.23)	(–0.06)	(–1.43)
Non-SSCI					0.80***	0.81***	0.81**	0.80*
articles					(–3.66)	(–3.64)	(–2.83)	(–2.33)
Monographs					1.01	1.01	1.02	1.03
					(0.14)	(0.13)	(0.19)	(0.23)
Edited					0.67*	0.67*	1.06	0.33**
volumes					(–2.27)	(–2.30)	(0.29)	(–3.08)
Book chapters					0.99	0.99	0.95	1.00
					(–0.49)	(–0.47)	(–1.30)	(0.00)
Gray literature					1.02	1.02	1.02	1.03
					(1.43)	(1.40)	(0.66)	(1.54)
Awards						0.52*	0.42+	0.60
						(–2.44)	(–1.84)	(–1.51)
DFG funding						0.65	0.92	0.40
						(–1.54)	(–0.24)	(–1.37)
Only selected	0.80	0.79	0.90	0.96	0.97	0.95	1.38	0.62
publications	(–1.01)	(–1.07)	(–0.47)	(–0.18)	(–0.14)	(–0.21)	(1.19)	(–1.08)
Entry cohorts								
(ref. 1980–1989)								
1990–1999	2.21	2.03	2.08	2.17	1.81	1.90	2.26	0.85
	(1.46)	(1.31)	(1.31)	(1.37)	(1.03)	(1.11)	(1.08)	(–0.18)
2000–2009	17.22***	16.86***	16.95***	19.07***	15.45***	16.85***	14.33**	18.04***
	(5.41)	(5.53)	(5.32)	(5.34)	(5.07)	(5.23)	(3.26)	(4.78)
After 2009	55.12***	53.13***	52.49***	57.88***	47.54***	52.24***	38.38***	67.57***
	(7.47)	(7.60)	(7.30)	(7.16)	(6.94)	(7.11)	(4.32)	(6.72)
Pseudo r²	0.06	0.07	0.08	0.09	0.10	0.11	0.10	0.15
Log likelihood	–1780.84	–1754.75	–1744.71	–1714.75	–1694.51	–1687.60	–839.18	–653.13
Degrees of freedom	5	7	8	15	21	23	22	22
Chi²	181.78	239.30	234.14	272.69	311.33	313.09	177.51	197.64
AIC	3571.67	3523.50	3505.42	3459.50	3431.02	3421.19	1722.36	1350.26
BIC	3615.52	3584.88	3575.58	3591.04	3615.18	3622.89	1893.44	1533.01
Number of events (exits)	263	263	263	263	263	263	146	117
N (individuals)	2,193	2,193	2,193	2,193	2,193	2,193	1,029	1,167
N (individuals: publications)	47,547	47,547	47,547	47,547	47,547	47,547	17,614	29,933

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

Table A3. Cox regression models on dropouts (robustness checks).

	(1) Full model (only cohorts)	(2) Period (post 2013)	(3) Data collection	(4) Cohorts + period effects	(5) Inactive sociologists	(6) After 15y w/o being tenured
Female	1.43**	1.52**	1.58***	1.43**	1.36**	1.44**
	(2.79)	(3.23)	(3.51)	(2.77)	(2.72)	(2.80)
With children	0.97	1.02	1.10	0.98	0.92	0.96
(ref. childless)	(–0.14)	(0.10)	(0.49)	(–0.11)	(–0.53)	(–0.20)
W/o child info	2.27***	2.24***	2.41***	2.29***	1.82***	2.29***
(ref. childless)	(5.73)	(5.64)	(5.98)	(5.75)	(4.84)	(5.79)
Years since PhD (ln)	0.74*	0.73**	0.70**	0.74*	0.80*	0.77*
	(–2.54)	(–2.80)	(–3.24)	(–2.54)	(–2.12)	(–2.14)
PhD from university	0.55**	0.48***	0.40***	0.55**	0.52***	0.57**
of excellence	(–2.94)	(–3.71)	(–4.68)	(–2.98)	(–3.66)	(–2.81)
PhD from abroad	0.19**	0.16***	0.13***	0.19**	0.37**	0.19**
	(–3.25)	(–3.62)	(–4.02)	(–3.26)	(–3.16)	(–3.23)
International	1.02	1.19	1.36*	1.03	1.05	1.01
publications (ln)	(0.19)	(1.52)	(2.57)	(0.21)	(0.41)	(0.10)
Months abroad (ln)	0.86**	0.88*	0.91+	0.86**	0.90*	0.86**
	(–2.64)	(–2.33)	(–1.80)	(–2.61)	(–2.20)	(–2.64)
Mobility (ln)	0.95	0.95	1.00	0.96	0.87	0.95
	(–0.38)	(–0.42)	(–0.04)	(–0.36)	(–1.27)	(–0.37)
Interim professor (ln)	0.78	0.84	0.88	0.78	0.75	0.80
	(–0.57)	(–0.41)	(–0.32)	(–0.57)	(–0.75)	(–0.53)
Co-authors (ln)	0.92	0.97	1.03	0.92	0.92	0.93
	(–1.17)	(–0.43)	(0.42)	(–1.15)	(–1.25)	(–1.02)
SSCI/SCIE articles	0.83	0.76	0.69*	0.82	0.79	0.81
(ln)	(–1.04)	(–1.63)	(–2.25)	(–1.06)	(–1.45)	(–1.16)
Non-SSCI articles	0.56***	0.55***	0.54***	0.56***	0.59***	0.56***
(ln)	(–4.30)	(–4.43)	(–4.69)	(–4.30)	(–4.48)	(–4.31)
Monographs (ln)	1.18	1.05	0.91	1.18	1.07	1.14
	(0.84)	(0.24)	(–0.50)	(0.83)	(0.42)	(0.69)
Edited volumes (ln)	0.55*	0.52*	0.46**	0.55*	0.82	0.53*
	(–2.11)	(–2.35)	(–2.77)	(–2.13)	(–0.78)	(–2.20)
Book chapters (ln)	0.91	0.96	0.95	0.90	0.91	0.92
	(–0.86)	(–0.36)	(–0.49)	(–0.89)	(–0.92)	(–0.77)
Gray literature (ln)	0.98	1.00	0.96	0.98	0.99	0.99
	(–0.14)	(–0.00)	(–0.38)	(–0.18)	(–0.08)	(–0.10)
Awards (ln)	0.34**	0.37*	0.41*	0.34**	0.38**	0.33**
	(–2.66)	(–2.40)	(–2.17)	(–2.66)	(–2.91)	(–2.68)
DFG funding (ln)	0.62	0.71	0.68	0.62	0.86	0.60
	(–1.06)	(–0.81)	(–0.94)	(–1.07)	(–0.42)	(–1.15)
Only selected	0.99	0.86	0.77	0.98	0.72	0.97
publications	(–0.05)	(–0.66)	(–1.16)	(–0.07)	(–1.44)	(–0.14)
Cohorts						
After 2013		2.99***		0.86		
		(7.82)		(–0.76)		
Entry cohorts						
(ref. 1980–1989)						
1990–1999	1.84			1.97	3.48*	1.98
	(1.02)			(1.11)	(2.31)	(1.06)
2000–2009	18.20***			20.86***	20.84***	19.83***
	(5.12)			(4.96)	(5.71)	(4.96)
After 2009	59.03***			74.30***	69.12***	64.36***
	(7.00)			(6.28)	(7.80)	(6.72)
Year of data collection						
2016			0.81			
(ref. 2013)			(–0.70)			
2019			1.02			
(ref. 2013)			(0.11)			
Pseudo r^2	0.11	0.08	0.06	0.11	0.09	0.11
Log likelihood	–1680.55	–1738.35	–1771.77	–1680.18	–2218.94	–1678.05
Degrees of freedom	23	21	22	24	23	23
Chi^2	321.92	288.13	173.55	326.55	347.75	316.99
AIC	3407.09	3518.70	3587.55	3408.36	4483.88	3402.11
BIC	3608.79	3702.86	3780.47	3618.83	4685.57	3603.52
Number of events (exits)	263	263	263	263	340	263
N (individuals)	2,193	2,193	2,193	2,193	2,193	2,193
N (individuals: publications)	47,547	47,547	47,547	47,547	47,547	46,958

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

Table A4.1. Summary statistics of leavers (only complete publication lists).

	N	Mean	SD	Min	Max	p25	Median	p75
Female	241	.54	.5	0	1	0	1	1
Years to exit	241	6.16	5.28	1	34.52	2.08	5	8.11
SSCI/SCIE articles	241	.42	1.01	0	6	0	0	.4
Non-SSCI articles	241	.71	1.18	0	7.33	0	0	1
Monographs	241	.48	.95	0	9.67	0	0	1
Edited volumes	241	.12	.37	0	2.9	0	0	0
Book chapters	241	2.09	3.12	0	20.97	0	1	2.67
Gray literature	241	1.84	3.45	0	28.33	0	.8	2
Parents	123	.36	.48	0	1	0	0	1
No. of children	123	.57	.87	0	3	0	0	1
International publications	241	1.72	4.23	0	47	0	0	2
Months abroad	241	3.69	9.85	0	80	0	0	1
PhD	137	.66	.48	0	1	0	1	1
PhD from abroad	241	.01	.11	0	1	0	0	0
PhD from university of excellence	241	.1	.3	0	1	0	0	0
Habilitation	241	.01	.11	0	1	0	0	0
Junior professor	92	.01	.1	0	1	0	0	0
Awards	241	.04	.22	0	2	0	0	0
DFG funding	241	.01	.11	0	1	0	0	0
Mobility	241	1.2	1.24	0	6	0	1	2
Interim professor	241	.03	.19	0	2	0	0	0
Co-authors	241	7.39	13.42	0	114	1	3	8

Table A4.2. Summary statistics of remainers (only complete publication lists).

	N	Mean	SD	Min	Max	p25	Median	p75
Female	1,690	.46	.5	0	1	0	0	1
Years to exit	1,690	11	6.76	1	40	6	10.01	14.98
SSCI/SCIE articles	1,690	2.06	3.14	0	31.68	0	1	2.97
Non-SSCI articles	1,690	3.48	4.93	0	38.67	.5	1.7	4.33
Monographs	1,690	1.21	1.56	0	22.5	0	1	2
Edited volumes	1,690	.76	1.46	0	15.4	0	0	1
Book chapters	1,690	7.68	10.06	0	113.7	1	4	10.67
Gray literature	1,690	4.21	7.24	0	87.87	.5	2	5
Parents	1,213	.5	.5	0	1	0	1	1
No. of children	1,213	.82	.99	0	6	0	0	2
International publications	1,690	6.16	9.39	0	92	0	3	8
Months abroad	1,690	11.7	23.93	0	240	0	0	12
PhD	1,547	.77	.42	0	1	1	1	1
PhD from abroad	1,690	.09	.29	0	1	0	0	0
PhD from university of excellence	1,690	.21	.4	0	1	0	0	0
Habilitation	1,603	.21	.41	0	1	0	0	0
Junior professor	1,177	.09	.29	0	1	0	0	0
Awards	1,690	.27	.74	0	10	0	0	0
DFG funding	1,690	.23	.6	0	5	0	0	0
Mobility	1,690	1.99	1.75	0	11	1	2	3
Interim professor	1,690	.32	.79	0	8	0	0	0
Co-authors	1,690	20.86	29.48	0	390	4	12	26

Appendix Online Survey

Philipps Universität Marburg

BERGISCHE UNIVERSITÄT WUPPERTAL

archivhabicht → base01 17.02.2022, 18:46

Seite 01

1. Wieviele Kinder haben Sie?
Inklusive biologischer Kinder und adoptierter Kinder.

[Bitte auswählen]

Seite 02
jump1

2. In welchem Jahr ist Ihr Kind geboren?
[YYYY]

Seite 03
jump2

3. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 04
jump3

4. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 05
jump4

5. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 06
jump6

6. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 07
jump7

7. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 08
jump8

8. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 09
jump9

9. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 10
jump10

10. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 11
jump5

11. In welchen Jahren sind Ihre Kinder geboren?
[YYYY]

Seite 12

12. Leben in Ihrem Haushalt Kinder unter 18 Jahren?

[Bitte auswählen]

Seite 13
jump11

13. Bitte denken Sie an eine reguläre Woche im Jahr.

Im Verhältnis zu Ihrer aktuellen Partnerin bzw. Ihrem aktuellen Partner: Wie groß ist – vergleichsweise – Ihr Anteil an der Kinderbetreuung der Kinder, die in Ihrem Haushalt leben?

Wesentlich geringer	Etwas geringer	Ungefähr geichverteilt	Etwas größer	Wesentlich größer	Ich bin alleine für die Kinder-betreuung verantwortlich	Trifft nicht zu
○	○	○	○	○	○	○

Seite 14
jump16

14. Die Situation um SARS-CoV-2 hat die gesamte Gesellschaften vor Herausforderungen gestellt – so auch uns Wissenschaftlerinnen und Wissenschaftler. Aus diesem Grund interessiert uns, welche Einschränkungen insbesondere in der Wissenschaft seit dem ersten Lockdown in Deutschland auftraten.

Geben Sie deshalb bitte an, welche Bereiche Ihnen als WissenschaftlerIn die Arbeit erschwert hat.

- ☐ Mehr Betreuungswaufwand durch Kinder (als vor der Krise)
- ☐ Zugang zu Probanden/Laboren
- ☐ Die Umstellung auf digitale Lehre (Arbeitsaufwand, Qualität, ...)
- ☐ Umstellung auf digitale Konferenzen / Kolloquien / Besprechungen oä.
- ☐ Sonstiges ______

- ☐ Mich hat die Corona-Pandemie nicht eingeschränkt.

Seite 15
jump15

15. Die Situation um SARS-CoV-2 hat die gesamte Gesellschaften vor Herausforderungen gestellt – so auch uns Wissenschaftlerinnen und Wissenschaftler. Aus diesem Grund interessiert uns, welche Einschränkungen insbesondere in der Wissenschaft seit dem ersten Lockdown in Deutschland auftraten.

Geben Sie deshalb bitte an, welche Bereiche Ihnen als WissenschaftlerIn die Arbeit erschwert hat.

- ☐ Zugang zu Probanden/Laboren
- ☐ Die Umstellung auf digitale Lehre (Arbeitsaufwand, Qualität, ...)
- ☐ Umstellung auf digitale Konferenzen / Kolloquien / Besprechungen oä.
- ☐ Sonstiges ______

- ☐ Mich hat die Corona-Pandemie nicht eingeschränkt.

Seite 16
jump17

16. Bitte geben Sie Ihr Geburtsjahr an.
[YYYY]

Letzte Seite

Vielen Dank für Ihre Teilnahme!

Falls Sie an unserer Forschung weiterhin interessiert sind und über Forschungsergebnisse informiert werden möchten, können Sie gerne unsere Mailingliste abonnieren:
Senden Sie dazu bitte eine E-Mail an **sympa@lists.uni-marburg.de** und geben Sie in der Betreffzeile ein:
"subscribe academic_careers Vorname Name".
Lassen Sie den Nachrichtentext leer. Sie werden anschließend noch aufgefordert, Ihre Abonnementanfrage zu bestätigen, damit Ihre E-Mail Adresse nicht unwissentlich hinzugefügt werden kann.

Isabel M. Habicht, M.A., Philipps-Universität Marburg | Bergische Universität Wuppertal – 2019