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Is the dominance of graduates from top-tier universities among tenured faculty driven by prestige or output? Evidence from 50 years of university appointments in Germany

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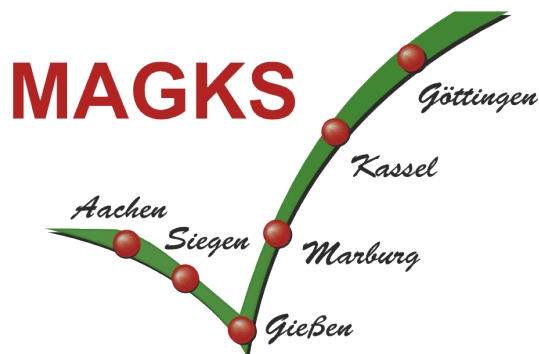
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Is the dominance of graduates from top-tier universities among tenured faculty driven by prestige or output? Evidence from 50 years of university appointments in Germany

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Abstract

Previous research has shown that a large fraction of tenured university faculty in the U.S. and other countries were trained at a small number of highly prestigious universities. The question remains whether this concentration is due to competitive advantages held by candidates from these universities, or whether it merely reflects the larger output of early-career researchers aspiring to faculty positions by these universities. To address this question, we analyze data covering the full population of doctoral graduates in Germany since the 1960s. Similar to studies of the U.S. system of higher education, we observe a strong concentration of professors trained at only a small number of universities, with the top five universities accounting for 17.9% of all appointed university professors. However, we find no evidence indicating that the prestige of the doctoral degree-granting university – proxied by its membership in alliances of top-tier traditional or technical universities, or alternatively by university founding year – systematically affects individuals' odds of being appointed to professorships. Despite increasing stratification tendencies within the German system of higher education, our results also do not indicate that the importance of the degree-granting university for the academic careers of its doctoral graduates has increased over the past 50 years. While doctoral graduates from traditional universities and top-tier technical universities appear to be more likely to secure faculty positions at universities of the same type, this pattern can be attributed to a large share of doctoral graduates returning to their degree-granting university after initial appointments elsewhere.

Keywords: Faculty appointment, university prestige, stratification, academic labor market, professorship, Germany, Habilitation

JEL codes: I24, J24, J40

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1. Introduction

Various prior studies have highlighted the stratification of higher education systems, particularly in the United States (U.S.). These studies indicate pronounced competition and vertical stratification with respect to universities' prestige, with doctoral graduates from less prestigious universities often facing barriers to faculty hiring due to social closure within academic hiring networks (e.g., Burris 2004; Clauset et al., 2015). Using comprehensive data covering the universe of tenured (or tenure-track) faculty in the U.S. from 2011 to 2020, Wapman et al. (2022) find a strikingly concentrated hiring pattern: 13.8% of all faculty earned their doctorates at just five U.S. universities, and 80% were trained at only 20.4% of all universities. Their findings also indicate that 9% of all faculty were employed at their doctorate granting university, while 71% secured positions at universities ranked lower than their alma mater. Similar concentration patterns have been observed in studies of specific disciplines (Clauset et al., 2015), at the department level (FitzGerald et al., 2023), and in other national higher education systems, including South Korea (Kim and Kim, 2015) and South Africa (Cowan and Rossello, 2018).

Although a substantial strand of research has examined factors influencing academic careers (Baruffaldi et al., 2016; Corsini et al., 2022; Cowan and Rossello, 2018; Cruz-Castro and Sanz-Menéndez, 2010; Pezzoni et al., 2012; Ryazanova and Jaskiene, 2022), extant studies have not been able to identify the underlying mechanisms driving the concentration of faculty appointments. Given the observable dominance of doctoral graduates from prestigious universities among newly appointed faculty, it is plausible that the prestige of the degree-granting university plays a central role in academic hiring decisions. However, as we will show below, university prestige may not be the sole or even the primary driver of concentration in faculty appointments. Instead, substantial differences in universities' output of doctoral graduates – particularly those seeking academic careers – may be able to account for the observable patterns. Our empirical analysis suggests that differences in the output of doctoral graduates produced by universities play a decisive role indeed in shaping faculty appointment patterns.

Understanding the mechanisms behind the observable concentration of faculty appointments among graduates of certain doctoral universities is important, as it contributes to a better understanding of competition and stratification in higher education. These mechanisms have far-reaching implications for the career prospects of doctoral graduates seeking professorships. To shed light on these questions, we utilize a unique dataset that links information from several secondary data sources, providing nearly complete coverage of all doctoral graduates of German universities between 1961 and 2015. Unlike many prior studies including the seminal work by Wapman et al. (2022), our starting point is not a sample of tenure-track or tenured faculty drawn at a specific point in time. Instead, we track the entire population of doctoral graduates across more than five decades in all scientific fields except medicine.

Germany, which provides the empirical context for our analysis, is one of the world's largest producers of doctoral graduates (OECD, 2018). It presents a particularly interesting case for analyzing the role of the degree-granting university in securing a professorship, and how this role has changed over the last five decades. While the German system of higher education has followed global trends – such as a substantial expansion in the 1960s and 1970s – it has also experienced unique idiosyncratic shocks including the reunification of East and West Germany in 1990 as well as

developments fostering the stratification within higher education through intensified competition among universities.

German universities only began to emerge as significant organizational entities in the 1990s (see Musselin, 2005; Hasse and Krücken, 2013). Since then, elite university alliances such as TU9 and German U15 have formed (Musselin, 2018), comparable to the Russell Group in the UK or the Group of Eight in Australia (Brankovic 2018). Public policy has reinforced stratification tendencies in the German system of higher education, most notably through the “Exzellenzinitiative”, a competitive funding program that aimed at enhancing the international visibility and competitiveness of selected universities (Schiermeier, 2012; Cremonini et al., 2018).

Our empirical analysis shows that, similar to the U.S. (Wapman et al., 2022), professorship appointments in Germany are dominated by graduates of the most prestigious universities. Before 1980, more than 55% of newly appointed professors had earned their doctorate at U15 universities, a highly selective alliance of research-strong traditional universities. While this share declined after 1999, U15 universities still account for 42% of all new appointments, showing their continued dominance in academic hiring.

Despite this pronounced concentration, our results do not indicate that individual chances of obtaining a professorship are systematically shaped by the prestige of the degree-granting university. Specifically, we find no evidence that doctoral graduates from universities with a longer tradition or from the prestigious U15 or TU9 alliances have a significantly higher probability of securing faculty positions compared to graduates from other universities. While hiring patterns indicate a tendency for universities to appoint graduates from the same prestige group, this tendency is no longer observed to be systematic once appointments to the graduates’ alma mater – often following prior appointment elsewhere – are accounted for.

Moreover, our analysis reveals a substantial long-term decline in the overall probability of securing a professorship in the German system of higher education. This negative trend extends across the entire observational period and affects doctoral graduates from more and less prestigious universities in a similar way.

In sum, our findings indicate that the observed concentration of faculty appointments among doctoral graduates of prestigious universities in Germany is primarily driven by the larger numbers of graduates trained at these universities, rather than preferential hiring practices linked to theories of social closure.

2. Theoretical considerations: prestige- vs. output-driven concentration in faculty appointments

Various studies have documented that tenured faculty disproportionately hold doctorates from more prestigious universities (e.g., Clauset et al., 2015; Kim and Kim, 2015; Cowan and Rossello, 2018; Wapman et al., 2022; FitzGerald et al., 2023). This empirical pattern tends to be taken as evidence of “the importance of departmental prestige for the career prospects of academic professionals” (Burris, 2004, p. 239). In this perspective, concentrated patterns of faculty hirings are linked to the stratification of the system of higher education and mechanisms of social closure.

At the individual level, such stratification would manifest in candidates' uneven chances of securing faculty positions based on the reputation of their doctoral degree-granting university. In particular, social closure would be expected to penalize doctoral graduates from less prestigious universities in securing professorships at more prestigious institutions, where hiring "below status" might entail reputational hazards. Comparing across contexts or times in which university prestige differs in its importance, advantages to candidates from more prestigious universities should be strongest and more pronounced in contexts where university prestige matters most (Baier and Münch, 2013).

Considering the crucial role of reputation-based competitive dynamics in academic research (Merton, 1973; Dasgupta and David, 1994), it seems intuitive that university prestige would be a key determinant of academic careers. However, the concentration of faculty appointments among doctoral graduates from highly prestigious universities does not necessarily imply that prestige directly shapes individual career outcome.

An alternative explanation is that the concentration in appointments is primarily output-driven – reflecting differences in the number of doctoral graduates produced by universities rather than preferential hiring patterns based on organizational prestige. If some universities produce disproportionately more doctoral graduates than others, a concentration in appointments would emerge even if all candidates had equal chances of securing faculty positions, irrespective of the prestige of their degree-granting university. While prestige might still influence the capacity of universities to train doctoral graduates – by attracting more funding, faculty and students – its role in shaping doctorate graduates' career prospects would be quite different.

Empirically disentangling prestige- versus output-driven concentration in faculty appointments requires comprehensive data that capture both faculty appointments and the pool of potential candidates.

First, it is necessary to identify all relevant faculty appointments in the empirical context under investigation. Wapman et al. (2022) accomplished this for 368 U.S. universities from 2011 to 2020 using proprietary data from the Academic Analytics Research Center. Their dataset covers more than 295,000 faculty members of U.S. universities.

Second, and going beyond prior work such as Wapman et al. (2022), one needs to identify the "risk pool" of potential candidates. As a doctoral degree is the prerequisite of a faculty appointment in most western systems of higher education, this includes the population of doctoral graduates in the relevant empirical context. By linking faculty appointment data with comprehensive records of doctoral graduates, one can then estimate the individual probability of securing a professorship, and assess whether this probability systematically differs for doctoral graduates from more or less prestigious universities, as theories of social closure suggest. In addition, such an approach allows for investigating whether doctoral graduates are more likely to be hired by universities with a prestige similar to their own degree-granting university and whether the relevance of prestige is most pronounced in contexts where theories of social closure would predict it to be.

By linking individual-level datasets covering the population of appointments to professorships at German universities up to or in 2024 (N = 31,748) with the population of doctoral graduates from German universities in period 1961 to 2015 (N = 608,989), we have constructed a unique dataset that enables us to examine the competing explanations of prestige- versus output-driven concentration

in faculty hirings. Before presenting this dataset in detail, we first discuss the empirical context of our analysis in the following section.

3. The German system of higher education

Germany provides a compelling case study for examining stratification in higher education, particularly given its historical development. Like other systems of higher education worldwide, Germany has experienced an increasing stratification in higher education, with organizational prestige (Lutter et al., 2022; Münch and Baier, 2012) and individual competition (Musselin, 2018; Buenstorf and Koenig, 2020) being heightened in the face of expanded access and growing demand for academic qualifications (Kwiek, 2019; Akbaritabar et al., 2024). The German university landscape is characterized by the coexistence of long-established¹, prestigious universities, and newer universities founded mainly during the major expansion of higher education in the 1960s and 1970s (Rüegg, 2010). Since the 1990s, the rise of New Public Management has fueled competition among universities, leading to increased differentiation within the German system of higher education. The nationwide output of doctoral graduates has surged in recent decades, resulting in intensified competition for academic positions and research funding at the individual level.

3.1. Historical background

The German system of higher education has traditionally been characterized by a relatively low degree of stratification compared to countries such as the U.S. or the UK. The majority of universities are state-funded and admission typically requires a general school-leaving qualification (*Abitur* or *Fachhochschulreife*). Unlike in many other systems of higher education, tuition fees are broadly limited to amounts of administrative fees, ensuring broad accessibility.

In Germany, there is the constitutional principle of ensuring equal living conditions across all regions. This principle has historically influenced higher educational policies safeguarding a comparable performance of all German universities (Wissenschaftsrat, 1981). Consequently, German universities have not traditionally been subject to the same pronounced prestige-based stratification as observed in other countries, where tuition fees, private funding, and organizational autonomy have contributed to a stronger stratification.

Like many other industrialized countries, Germany experienced a substantial expansion of higher education after World War II. The number of enrolled university students increased from approximately 100,000 in 1950 to about 1 million in 1980, reaching nearly 3 million in recent years (BMBF, 2024). To accommodate the rising number of students, 32 new universities were established in West Germany between 1960 and 1980 alone (Rüegg, 2010), while existing universities also substantially expanded their capacities. A similar trend can be observed in doctoral training: the number of doctoral graduates increased from roughly 20,000 between 1961 and 1965 to more than 80,000 between 2011 and 2015 period (see Figure 1).

[Figure 1 about here]

¹ Germany's oldest university, Heidelberg University, was established in 1386.

Newly founded universities were mainly established outside the traditional university regions, often in peripheral, economically weak or declining locations (Koenig et al., 2017). Despite the policy objective of ensuring the equivalence of all university degrees, postwar universities and their degrees generally hold lower prestige than traditional universities (Blume and Postlep, 2009; Münch and Baier, 2012).

After the reunification of Germany in 1990, the former East German systems of higher education was rapidly assimilated to the standards in western Germany (Hechler and Pasternack, 2014) and the number of eastern German universities was increased to 16. A key aspect of this transition process was the comprehensive evaluation of all faculty and staff members at eastern German universities in terms of their academic quality and their entanglement in the communist regime (Sabel, 1993). A large share of East German university faculty was replaced by new hires, mostly coming from the West.

3.2. Organizational specificities

Starting in the second half of the 1990s, university governance and funding structures in Germany underwent substantial changes. Traditionally, Germany's system of higher education placed less emphasis on university prestige compared to many other countries, with individual researchers' reputation being less strongly tied to organizational affiliation. Universities, as part of the public sector, had limited organizational decision-making authority, and university management was largely caught between state control and a powerful professorate (Krücken and Meier, 2006). However, university governance and funding structures in Germany have changed since the 1990s. German universities have become increasingly autonomous organizations that are more and more involved in actively managing their faculty and staff and have implemented new tools for assessment and reporting (Musselin, 2005; Ryazanova and Jaskiene, 2022). With the introduction of university-level funding contests, acquisition of funding has become an increasingly important task for university managers. This has intensified the competition among and within universities for resources, faculty, students, and prestige (Krücken and Meier, 2006).

Based on these developments, German universities have increasingly become strategic actors adopting competitive behavior (Hasse and Krücken, 2013; Krücken, 2017). One manifestation of this strategic behavior in the competition for university prestige is the formation of exclusive alliances similar to those found in other countries, such as the Russell Group in the UK, the Group of Eight in Australia or the Japanese RU11 (Brankovic, 2018). In 2006, the TU9 alliance was founded by the nine oldest and most prestigious technical universities to coordinate their interests. This was followed in 2012 by the foundation of the U15, an alliance comprising large, established and research-intensive universities (Musselin, 2018; Schneijderberg, 2020).

Germany's established norm of the *Hausberufungsverbot* – the practice to avoid hiring own doctoral graduates for initial faculty positions – shapes the academic labor market. However, after securing their first faculty appointment elsewhere, it is widely accepted when professors return to their degree-granting university. This rule serves to restrict inbreeding within the academic system (Horta, 2022). As a result, universities therefore compete for talent in an external academic labor market (Musselin, 2005; Hüther and Krücken, 2013; Seeber and Mampaey, 2022) unlike other systems with tenure and promotion schemes or systems where the recruiting of researchers socialized in line with the university identity is more common (Jones and Jefferson, 2022). In the German context, university

leaders are restricted in their capacity to promote faculty members internally (Hüther and Krücken, 2013). In line with this, faculty appointments are generally linked to a specific position that predetermines salaries and associated resources. Unlike systems that have formal procedures for the further promotion of appointed professors, German universities traditionally do not have schemes for the internal advancement of professors once they are appointed. As a result, professors can only renegotiate their salaries or the resources linked to their position if they have a competing offer from another university (Musselin 2005).

4. Data and methods

To analyze the concentration of faculty hiring and its underlying mechanisms, we utilize a novel dataset that links faculty data with the entire population of doctoral graduates at German universities from 1961 to 2015. This linkage is based on a unique combination of secondary data sources.

4.1. Data

Our starting point is a nearly complete list of all doctoral graduates from German universities based on the catalog of the German National Library (DNB). In Germany, the publication of the doctoral thesis is a requirement for a doctorate to be awarded. The DNB is entrusted with the task of collecting all German and German-language publications from 1913 onwards, archiving them permanently, cataloguing them bibliographically, and making them available to the public. We obtained, cleaned, and standardized the DNB catalog of doctoral theses for our analysis. To ensure comparability, we excluded all entries related to graduates in medicine, as their degree is predominantly a professional doctorate, with career trajectories largely separated from those in other academic fields. For the period 1961 to 2015, the total number of doctoral graduates thus identified is 608,989.

To identify individuals appointed to tenured faculty positions at German universities, we rely on information from *Kürschners Deutscher Gelehrten-Kalender* (KDG). KDG is a reference work that has been in existence since 1925 and lists biographical data, addresses, research foci, and fields of work of academics in the German-speaking world. We linked all doctoral graduates identified from the DNB catalog with their corresponding entries (if available) in KDG,² which allows us to track their subsequent professorial appointments and employment universities.

The KDG dataset includes a total number of 31,748 of active and emeritus professors, as well as deceased faculty members (with incomplete coverage for East Germany prior to German reunification in 1990). In addition, KDG provides detailed CV information for parts of the listed faculty.

²The linkage of data from DNB dissertation authors to KDG entries was conducted in a multi-stage process. Particularly for older entries in KDG, detailed CV information, including the scientific field, doctoral university, and graduation year was used to serve as linkage variables. In addition, birthdates and/or birthplaces were available for a subset in both KDG and DNB catalog and full texts of doctoral thesis provided online by the DNB. Initially, the two data sources were linked based on first and last names aiming to maximize recall. For entries with double names, all possible name combinations were considered to account for different variations of name formatting. Subsequently, related cases were selected using CV information. Finally, any remaining unlinked professors appointed since 2000 were checked manually by four undergraduate student assistants who, among others, searched online for additional information about the academic career paths of the tenured staff listed in KDG.

Information about the first appointment to a professorship is available for 12,216 individuals from these records.

Prior work indicates that only a subset of all doctoral graduates in Germany pursues an academic career and many transition to positions within industry (Hottenrott and Lawson, 2017; Buenstorf and Heinisch, 2020). To account for the heterogeneity in career aspirations among doctoral graduates, we created a subsample of doctoral graduates most likely to pursue an academic career, which we refer to as the *ProfTrack* subsample. It is based on completing a *Habilitation*, as a formal post-doctoral qualification (Lutter et al., 2022; Koenig, 2024), as well as individual post-graduation publication records. Completing a *Habilitation* is a strong signal of self-selection into the pool of candidates for professorship appointments (e.g., Seeber and Mampaey, 2022). To identify individuals in this category, we use the *Habilitiertenregister deutscher Universitäten* (Theissen et al., 2023), which lists individuals who have completed a *Habilitation*³. Since the *Habilitation* has lost in importance as a prerequisite for faculty appointments in recent decades (Koenig, 2022), we also include individuals in the *ProfTrack* subsample for whom we find publications in Scopus ten or more years after their graduation from doctoral education for the period 2000 to 2015.⁴

4.2. Method and variables

To analyze the probability of obtaining a professorship at a German university, we perform logistic regressions using a binary dependent variable that indicates whether a doctoral graduate was subsequently appointed to a tenured professorship. Our analysis captures doctoral graduates from 1961 to 2015. Our main interest is in examining how the doctoral degree-granting university is linked to the probability of obtaining such an appointment. Control variables include (binary) gender and name origin as a proxy for nationality, which were both assigned algorithmically using *genderrize.io* for gender and *nationaliz.io* for name origin⁵, as well as academic fields.

For our analysis, we use two alternative categorizations of degree-granting universities to account for differences in university prestige. In our first categorization, we differentiate degree-granting universities in western Germany according to whether they were established before or after 1960, when the massive expansion of the German system of higher education started. Universities established before 1960 are often several centuries old. They benefit from prestige bestowed on them for historical accomplishments in the sciences and the humanities, and they are closest to the traditional 19th-century ideal of the “Humboldtian” German university that became a role model for universities around the world (Altbach, 2008). In contrast, post-1960 western universities are the “newcomers” in the German system of higher education. Frequently they were started primarily devoted to teaching and to pursuing reform agendas. In addition, as noted above, many of them are

³ The *ProfTrack* subset is not available for the earliest cohorts (pre-1970) due to limited data on *Habilitation* and the absence of Scopus coverage prior to 1995. For the most recent cohort of doctoral graduates (2011–2015), the *ProfTrack* is defined as either completing a *Habilitation* or remaining publication-active up to 10 years after receiving the doctorate. As a note, those graduating in 2015 cannot yet be fully observed over the entire 10-year period within our current data scope.

⁴ Scopus access was realized via membership in the German bibliometrics competence network (KB).

⁵ Name origin does not provide any information about an individual’s nationality or citizenship. Instead, it reflects the likely linguistic or cultural origin of the name itself. Therefore, the name origin variable should be interpreted solely as an approximation of the name’s background, not as a direct reflection of individual’s national identity.

located outside the traditional centers of academic life; they tend to be smaller and less focused on the hard sciences than their older peers. Degree-granting universities in eastern Germany are considered separately to avoid biases arising from the significantly different practices in awarding doctoral degrees and appointing faculty members under the socialist regime ruling East Germany from World War II to Germany's reunification in 1990.

Our second categorization of degree-granting universities is based on university membership into the exclusive TU9 or U15 alliances.⁶ The TU9 alliance comprise Germany's nine oldest and most prestigious technical universities. These universities have a strong focus on engineering and are known for combining rigorous academic programs with extensive industry collaborations. The U15 alliance consists of fifteen top-tier research-intensive universities in Germany with comprehensive coverage of disciplines including medical schools. In our analysis, we differentiate between individuals who graduated from top-tier technical universities (proxied by TU9 membership), top-tier traditional universities (proxied by U15 membership), and the residual group of all other universities.

In addition to analyzing the full sample of all doctoral graduates listed in the DNB catalog, we also estimate – for the period starting from 1970 – the probability of securing a faculty position for the restricted *ProfTrack* subsample, which captures individuals with academic ambition based on completing a *Habilitation* and/or publishing articles ten or more years after their doctoral graduation.

[Table 1 about here]

Table 1 provides descriptive statistics. A small proportion (5.2%) of the doctoral graduates included in our analysis are listed in KDG as holding a professorship up to or in 2024. Most graduates (84.6%) obtained their doctorate from universities located in western Germany. Within this group, doctoral graduates from universities founded before 1960 account for the biggest share (68.2% of the full sample), while only a minority (16.3% of the full sample) graduated from universities established after 1960. The remaining 15.4% of the sample graduated from universities in eastern Germany.

In the alternative categorization based on membership in the different alliances of top-tier universities, the largest group of doctoral graduates (40.9%) comes from U15 universities, whereas the TU9 account for 23.0% and the remaining universities for 36.1%. There is a notable gender disparity, with males comprising 73.9% and females accounting for 24.0% of the sample. 2.1% of the sample could not be assigned to a gender. Slightly more than half (53.5%) of the doctoral graduates have German names, while 46.1% have foreign names (0.4% missing). Natural sciences account for the largest share (35.8%) of doctoral graduates, followed by social sciences (23.8%), engineering (20.7%), and the humanities (15.6%).⁷ About 6.0% of the sample are included in the *ProfTrack* subsample.

⁶ The members of the TU9 alliance are: RWTH Aachen University, Technical University of Berlin, Technical University of Braunschweig, Technical University of Darmstadt, Dresden University of Technology, Leibniz University Hannover, Karlsruhe Institute of Technology, Technical University of Munich and University of Stuttgart. The members of the U15 alliance are: Free University of Berlin, Humboldt-University Berlin, University of Bonn, Goethe University Frankfurt, University of Freiburg, University of Göttingen, University of Hamburg, Heidelberg University, University of Cologne, Leipzig University, Johannes Gutenberg University Mainz, LMU Munich, University of Münster, University of Tübingen and Julius-Maximilians-Universität Würzburg.

⁷ Less common fields include agriculture/veterinary medicine (6.8%), and sports sciences (0.4%). For approximately 10% of the dissertations, information is available for more than one academic field.

5. Results

5.1 Concentration in faculty appointments

Figure 2 illustrates the pronounced dominance of graduates from specific degree-granting universities among tenured faculty in the German system of higher education. Between 1961 and 2015, the top five degree-granting universities accounted for 17.9% of all appointed professors, while 39.1% of all faculty graduated from just eleven universities. Notably, these eleven universities are all part of the prestigious U15 alliance. The third and fourth quintiles are dominated by prestigious technical universities from the TU9 alliance. In contrast, universities not belonging to these two alliances – which constitute most universities in Germany – are largely concentrated in the bottom two quintiles.

[Figures 2 and 3 and Table 2 about here]

As shown by Figure 3, the concentration in faculty production largely reflects a similarly uneven distribution in the output of doctoral graduates across universities. The first quintile of doctoral graduates originates from just six universities, while 13 universities account for approximately 40% of all graduates. Similar to Figure 2, only universities from U15 and TU9 alliances rank among the top 20 producers of doctoral graduates. This pattern offers a first indication that, as suggested in Section 2, the concentration in faculty production may be linked to differences in the output of doctoral graduates across various degree-granting universities.

Table 2 traces the evolution of concentration in faculty production over the period of our investigation. It shows that the more prestigious universities – as proxied by present-day membership in the U15 and TU9 alliances – have consistently dominated faculty production. However, their dominance has diminished over time. Before 1980, 55.2% of all faculty were trained at U15 universities and 22.3% at TU9 universities. After 1999, these shares declined to 42.3% and 17.1%, respectively. Consequently, the share of doctoral graduates from other universities outside these two exclusive alliances almost doubled from 22.5% before 1980 to 40.6% after 1999.

5.2 Individual probability of being appointed to a professorship

We now examine the link between the prestige of graduates' doctoral degree-granting university and their individual probability of securing a tenured professorship position. As outlined above, we first use university age as a proxy for differences in university prestige, differentiating between universities newly established after 1960 and older ones. Since newly established universities did not immediately produce doctoral graduates entering the academic labor market for tenured faculty, our analysis includes them from 1971 onwards. Appointments at eastern German universities are considered only for the post-reunification period beginning in 1990, while doctoral graduates from eastern German universities are included if they received their doctorate in 1980 or later. This cutoff reflects both data availability and the historical constraints before 1990, which prevented eastern doctoral graduates from competing for positions at western universities.

[Figure 4 about here]

For the full sample of doctoral graduates, Figure 4 (left panel) shows that individuals graduating from universities newly established after 1960 initially had a higher probability of securing a professorship

compared to those from older universities. However, their advantage diminished over the subsequent 15-year period, and appointment probabilities for doctoral graduates from new and old universities converged for the 1986-1990 cohort. Doctoral graduates from East German universities who obtained their degree before German reunification in 1990 had a lower probability of obtaining a professorship. The same holds for the 1991-1995 cohort that graduated in the early transition phase after German reunification. In contrast, we observe no disadvantage of doctoral graduates from eastern universities, or from newly established western universities, in cohorts after 1996.

A striking pattern in Figure 4 is the sharp decline in faculty appointment probabilities for doctoral graduates across all types of degree-granting universities. While early cohorts had appointment rates exceeding 10% this dropped to just 1-2% for the 2011-2015 cohort. To some extent, this decline reflects a censoring issue, as more recent doctoral graduates have had less time to secure professorships. However, this effect is unlikely to fully explain the decreasing appointment probability observed already in the earlier cohorts included in our analysis.⁸ Instead, our findings suggest a long-term decline in doctoral graduates' odds of becoming professors, a trend that has persisted since the expansion of higher education in (West) Germany began in the 1960s.

The right panel of Figure 4 presents the results for the *ProfTrack* subsample, which includes individuals who signaled their academic career aspirations by completing a *Habilitation* or by publishing 10 years after completing their doctorate. The vertical line indicates that beginning with the 1991-1995 cohort, data on completed *Habilitationen* is complemented with publication records (see Section 4.2 for details). Due to the smaller sample size, estimates are less precise. However, point estimates for doctoral graduates from newer and older universities are almost identical, suggesting no systematic prestige-related (dis-)advantages. The results also confirm other findings we obtained for the full sample. The appointment likelihood of doctoral graduates declined for later cohorts irrespective of their graduation university, and for graduates from eastern universities it converged with that of their western peers after 1996. Unlike in the full sample where the decline was more gradual, the steep decrease in appointment probabilities in the *ProfTrack* subsample begins to manifest only after 1995.

Even though these findings do not suggest differences in individual appointment probabilities based on the age of graduation universities, institutional prestige may not only be determined by age and tradition. We therefore turn to our alternative measure of university prestige, which includes doctoral graduates whose degree-granting university is a member of today's top-tier traditional (U15 alliance) or technical universities (TU9 alliance).

Figure 5 presents the results of our analysis of individual appointment probabilities using this alternative measure of university prestige. In the 1960s, doctoral graduates from U15 universities had a higher individual probability of securing a professorship, whereas graduates from TU9 universities are statistically indistinguishable from those of non-top-tier universities ("Other"). Starting with the 1971-75 cohort, differences in individual appointment probabilities between U15 and "Other" universities diminished, with doctoral graduates from both groups having higher appointment probabilities than those from the TU9 alliance.

⁸ The most recent faculty appointments in our analysis are from 2024. Consequently, even individuals who obtained their doctoral degree late in 2015 – the last graduation year included in the analysis – had at least eight years to obtain a professorship.

[Figure 5 about here]

Replicating this analysis for the *ProfTrack* subsample confirms that graduates from the top-tier traditional universities (U15) did not systematically outperform those from less prestigious universities (“Other”). Point estimates indicate that in early cohorts, doctoral graduates from top-tier technical universities (TU9) may have had a slightly higher probability of securing a professorship⁹. This finding indicates that the apparent disadvantage of TU9 doctoral graduates in the full sample may reflect differences in career objectives rather than university prestige. Again, appointment probabilities have declined over time for doctoral graduates of all university types, with a particularly pronounced drop after 1995.

5.3 Individual probability of being appointed to professorships at more or less prestigious universities

So far, our results do not support the conjecture that the prestige of the doctoral degree-granting university systematically influences doctoral graduates’ chances of securing a professorship. However, not all appointments are equally prestigious. To further investigate the role of university prestige, we now analyze individual appointment probabilities separately by the type of appointing university. In doing so, we focus on the categorization of universities according to membership in the U15 and TU9 alliances as a proxy of university prestige.

[Figure 6 about here]

Figure 6 shows appointment probabilities separately by types of appointing universities. As in our previous analyses, the graphs illustrate how appointment probabilities vary between doctoral graduates from different types of degree-granting universities (U15, TU9, Other) and as across cohorts. In each panel, the probability of being appointed to a university of the same type as the degree-granting university serves as our reference. The graphs then show how appointment probabilities differ for candidates who received their doctoral degree from universities of a different type.

Overall, Figure 6 indicates that universities disproportionately appoint doctoral graduates from universities of the same type. Doctoral graduates from U15 and “Other” universities are less likely to secure appointments at TU9 universities than those from TU9 universities (Panel (a)). Doctoral graduates from TU9 and “Other” universities face lower appointment probabilities at U15 universities compared to U15 graduates (Panel (b)). Similarly, doctoral graduates from TU9 and U15 universities are less likely to be appointed at “Other” universities than those who earned their doctorate from such institutions (Panel (c)). Finally, doctoral graduates from “Other” universities are less likely to be appointed at a TU9 or U15 university compared to graduates from these alliances (Panel (d)). This preference for graduates from same-type universities remain relatively stable across cohorts, with only a slight tendency towards attenuation over time.

At first glance, our findings on the disadvantages faced by doctoral graduates from less prestigious universities (“Other”) in securing appointments at TU9 and U15 universities might seem to support

⁹ Statistically significant differences ($p < 0.05$) between TU9 and other universities are observed for the 1976–1985 cohorts (favoring TU9) and the 2001–2010 cohorts (disfavoring TU9)

the notion of social closure, with top-tier universities being reluctant to hire “below status”. However, two patterns challenge this interpretation.

First, appointment disadvantages appear largely independent from the prestige of the degree-granting university. Candidates from U15 universities face nearly the same disadvantage at TU9 universities as those from “Other” universities, and vice versa for TU9 graduates seeking appointments at U15 universities. Similarly, at “Other” universities, candidates from both groups of top-tier universities, TU9 and U15, face lower odds of being appointed. Rather than reflecting stratification and social closure, these findings are more suggestive of a sorting process in which different types of universities produce doctoral graduates best suited for professorships at universities of the same type.

Second, there is no evidence that the disadvantages faced by candidates graduated from “Other” universities have become more pronounced over time, despite the growing emphasis on university-level competition in the German system of higher education.

[Figure 7 about here]

Two additional analyses help us probe further into these issues. First, Figure 7 shows the probability of securing a first appointment at a specific type of university, based on the reduced sample of 12,216 individuals whose first appointments could be retrieved from KDG. While differences exist in the probability of securing a first tenured faculty position at a TU9 or U15 university, these differences are considerably smaller in scale compared to the previous analysis. Moreover, these differences by type of doctoral degree-granting university in the probability of a first appointment at a specific university type diminish over time.

[Figure 8 and 9 about here]

Second, we examine the role of appointments at the degree-granting university itself. While there is, as discussed above, a norm against academic inbreeding in the German system of higher education, return mobility – where faculty secure appointments at their alma mater after an initial position elsewhere – is both common and widely accepted. In Figure 8, we exclude such return cases from the full sample and replicate the analysis presented in Figure 6.

The difference between both graphs is striking. Once appointments at the degree-granting university are excluded, there is little evidence of substantial disadvantages faced by candidates whose degree-granting university differs in type from the hiring university. In panel (d), which shows the disadvantage of candidates from non-top-tier universities (“Other”) when applying for positions at top-tier universities (TU9 or U15), differences in appointment probability never exceed 5 percentage points and are mostly not statistically significantly different from zero. In addition, the other panels of Figure 8 indicate that candidates from “Other” universities do not experience a more pronounced disadvantage than those from TU9 universities. Overall, this suggests that the apparent advantages of “same-type” candidates mostly stem from being hired by their own degree-granting university.

Finally, Figure 9 tracks how the probability of doctoral graduates to obtain professorships at their degree-granting university – which often reflects return mobility rather than academic inbreeding – has evolved over time. Among early cohorts graduating until 1980, more than one-third of all professors at TU9 and U15 universities had obtained their degree at the same university where they were later employed. In contrast, such appointments were far less common at “Other” universities.

Since then, the tendency to hire one's own doctoral graduates declined at both types of top-tier universities. However, with about 25%, this practice is still substantial and significantly more pronounced than at the "Other" universities.

6. Concluding remarks

In this paper, we have analyzed the role of stratification and social closure in the appointment of tenured faculty in Germany. Numerous studies have demonstrated the stratification in various systems of higher education, especially in the United States (e.g., Wapman et al., 2022; Burris, 2004; Clauset et al., 2015). Yet, while substantial research has examined factors influencing academic careers (Baruffaldi et al., 2016; Corsini et al., 2022; Cowan and Rossello, 2018; Cruz-Castro and Sanz-Menéndez, 2010; Pezzoni et al., 2012; Ryazanova and Jaskiene, 2022), the mechanisms driving the concentration of faculty appointments have remained underexplored.

Our analysis based on the entire population of doctoral graduates in Germany between 1961 and 2015 reveals that appointments to professorships are highly concentrated among graduates from a small number of top-tier universities, mirroring patterns observed in other countries. Five universities are responsible for about 17.9% of tenured faculty staff and nearly half (49.2%) of all the appointments go to graduates from 15 highly prestigious universities. However, we find no evidence that holding a doctoral degree from a top-tier university systematically increases an individual's probability of securing a professorship position. Instead, our findings suggest an alternative explanation for the concentration of faculty appointments: the higher output of doctoral graduates at top-tier universities. One fifth of all doctoral graduates in Germany graduated from just six universities, while 13 universities collectively produce nearly 40% of all doctoral degree holders. Differentiating appointments by university types, we do not find systematic evidence that graduates from less prestigious universities are disadvantaged. While our analysis shows that doctoral graduates are primarily appointed by universities similar to their degree-granting university, this often reflects return mobility to the alma mater. Moreover, any observable differences in appointment probabilities across university types have diminished rather than intensified over time, despite increasing organizational competition and a focus on academic excellence in the last decades. Overall, our results challenge the notion that Germany's academic labor market is increasingly characterized by stratification and social closure.

Do the differences in the output of doctoral graduates across universities and university types themselves reflect a stratification process? To some extent, this may be the case. More prestigious universities tend to be bigger and better funded, enabling them to support a larger number of institutionally funded doctoral candidates. Matthew effects (Merton 1968) in the acquisition of project funding – an important source of financial support for doctoral candidates in Germany – may further reinforce these disparities. However, the absence of systematic differences in individual appointment probabilities for more recent cohorts indicates that such structural advantages do not constitute barriers to entry for graduates of less prestigious universities. As a result, concerns about social closure in Germany's academic labor market appear to be overstated.

A possible explanation for the absence of increasing stratification in appointments is that intensified competition among doctoral graduates may have strengthened merit-based selection. As the number of doctoral graduates entering the academic job market has increased, a larger pool of

candidates has emerged. This includes graduates from less prestigious universities, some of whom may outperform candidates from more prestigious schools. This account aligns with research suggesting that competition in academic hiring has become increasingly meritocratic in Germany, as indicated by the leveling of opportunities between graduates from older and newer universities (Lutter and Schröder, 2016). Moreover, increasing competition among universities – driven by reforms such as New Public Management – has intensified the race for talent. As a result, universities are increasingly focused on appointing professors who can enhance their research profile and teaching quality, which may contribute to shifting appointment criteria from institutional background to individual merit (Graber et al., 2008).

What broader implications do these findings have, particularly for the analysis of stratification and closure in the U.S. academic labor market? Most importantly, our findings highlight the need for caution in diagnosing social closure solely based on high levels of concentration in faculty appointments. While social closure may certainly play a role in the patterns observed in the U.S. (Wapman et al., 2022), our findings for Germany show that concentration in faculty hiring alone does not necessarily indicate stratification. Moreover, our analysis shows the importance of comprehensive population data for doctoral graduates and faculty appointments, which enables researchers to trace the academic career outcomes of all individuals who might be appointed to a professorship.

Access to such comprehensive data enabled the above analysis. Some limitations remain, however. A key constraint in studying career outcomes relates to right-censored data. Our data contains all individuals who held a university professorship in 2024, as well as emeritus and deceased professors. This implies that even the most recent doctoral graduates in the data –those who graduated late in 2015 – had a minimum of eight post-graduation years to be observed as holding a professorship. However, individuals from the 2011-2015 cohort may still be appointed to professorships in the future, which would raise the overall appointment likelihood for this group.

A second limitation concerns our indicators of top-tier technical and traditional universities, which is based on present-day membership in the TU9 and U15 alliances. These alliances were founded after 2000 and did not exist over the entire observation period. However, the U15 and TU9 alliances formalized pre-existing differences in professional orientation, reputation and research activity that differentiated their member universities from other German universities. In addition, our empirical results show that differences between university types have persisted throughout the entire observation period, but have tend to diminish for more recent cohorts – precisely when these alliances were formally established.

Finally, while we analyzed the probability of doctoral graduates from German universities to be appointed at a German university, academic labor have become more international in recent decades. To better understand the contexts that shape academic career outcomes in the global academic labor market, future work should adopt an international perspective.

Table 1: Variables and descriptive statistics

VARIABLES	N	Share/ Mean
Professorship listing in 2024		
Yes	31,748	0.052
No	577,241	0.948
Region of doctoral university		
Western Germany	514,872	0.846
Eastern Germany	94,117	0.154
Foundation of university (only those in Western Germany)		
Before 1960	415,588	0.682
After 1960	99,284	0.163
Type of doctoral university		
U15	249,308	0.409
TU9	139,853	0.230
Other	219,828	0.361
Associated gender		
Male	449,999	0.739
Female	146,255	0.240
Associated name origin		
German	325,697	0.535
Foreign	280,949	0.461
Scientific field		
Engineering	125,968	0.207
Humanities	94,954	0.156
Social Sciences	144,618	0.238
Natural Sciences	218,186	0.358
Sports Sciences	2,203	0.004
Agriculture, Veterinary Medicine	41,306	0.068
Year of doctoral graduation / cohorts		
1961:1965	20,066	0.033
1966:1970	29,446	0.048
1971:1975	42,245	0.069
1976:1980	42,586	0.070
1981:1985	46,132	0.076
1986:1990	57,613	0.095
1991:1995	67,100	0.110
1996:2000	72,206	0.119
2001:2005	70,285	0.115
2006:2010	76,169	0.125
2011:2015	85,141	0.140
Academic career aspiration (<i>ProfTrack</i> -Sample)		
Yes	36,730	0.060
No	572,259	0.940

Table 2: Inequality in the production of faculty trained by different groups of universities over cohorts.

Doctoral Graduation Cohort	Other	TU9	U15
<1980	22.48%	22.33%	55.19%
1980 – 1999	34.58%	18.13%	47.29%
>1999	40.62%	17.11%	42.27%

Figure 1: Number of dissertations and probability of securing a professorship over graduation cohorts

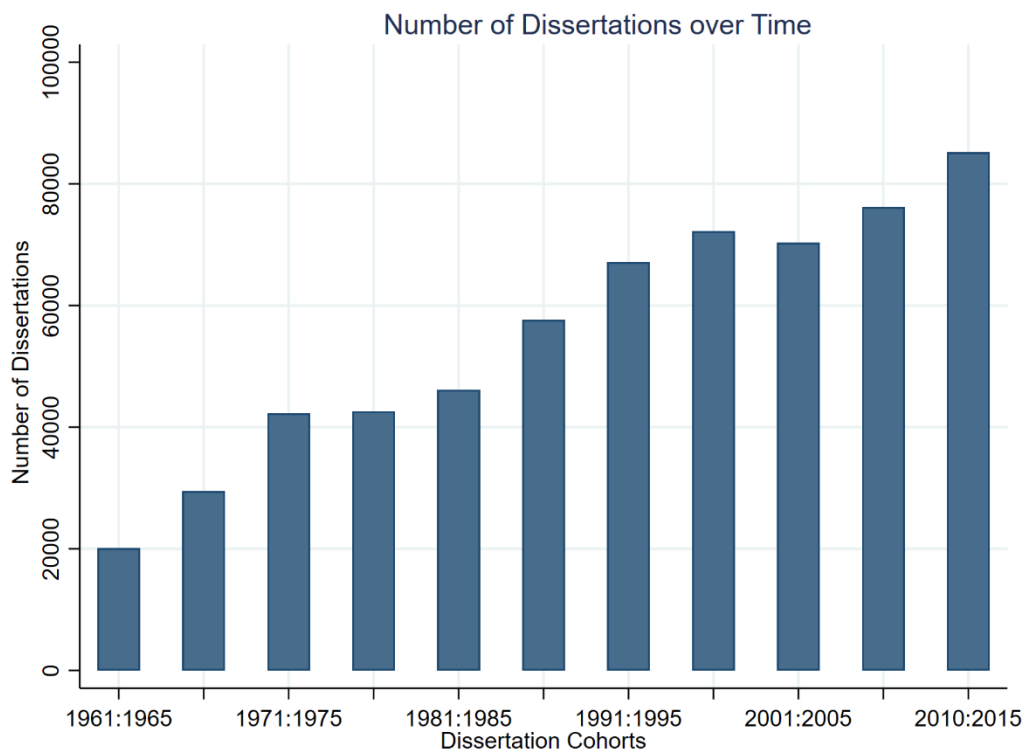
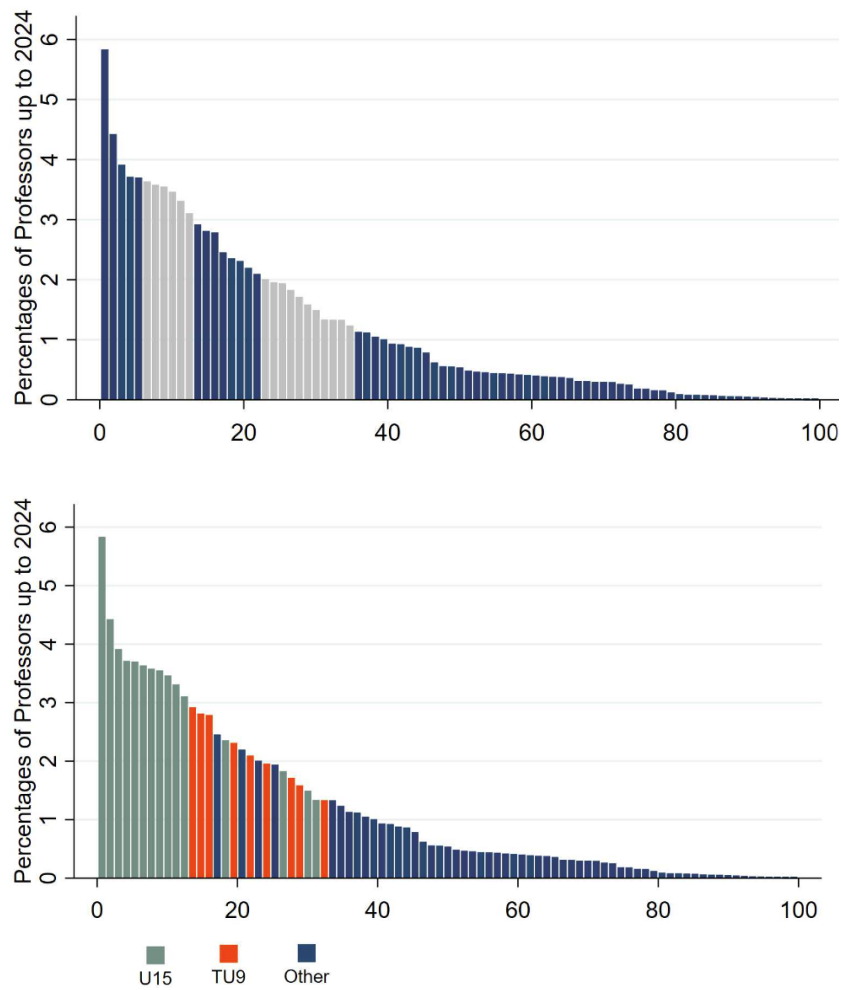
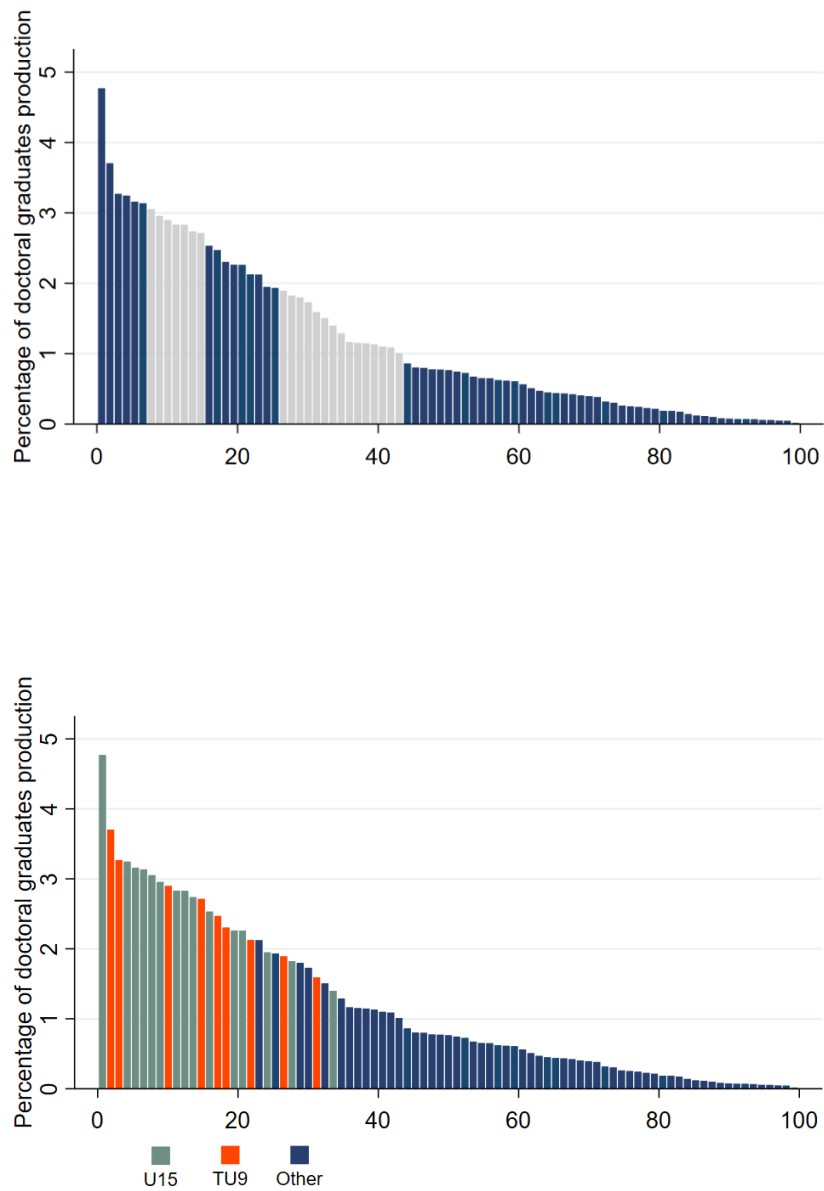


Figure 2: Concentration in professorships by degree-granting universities.



Note: Proportions of professorship produced by German universities between 1961 and 2015, sorted by production rank, with the university producing the most professors having a rank of 1. Quintiles (upper graph) of production are highlighted with alternating colors (grey and blue). Categories of universities (lower graph) are highlighted in grey, red and blue.

Figure 3: Concentration in the production of doctoral graduates by degree-granting universities.



Note: Proportions of doctoral graduates produced by German universities between 1961 and 2015, sorted by production rank, with the university producing the most graduates having a rank of 1. Quintiles (upper graph) of production are highlighted with alternating colors (grey and blue). Categories of universities (lower graph) are highlighted in grey, red and blue.

Figure 4: Probability of securing a professorship by founding date of doctoral university over dissertation cohorts

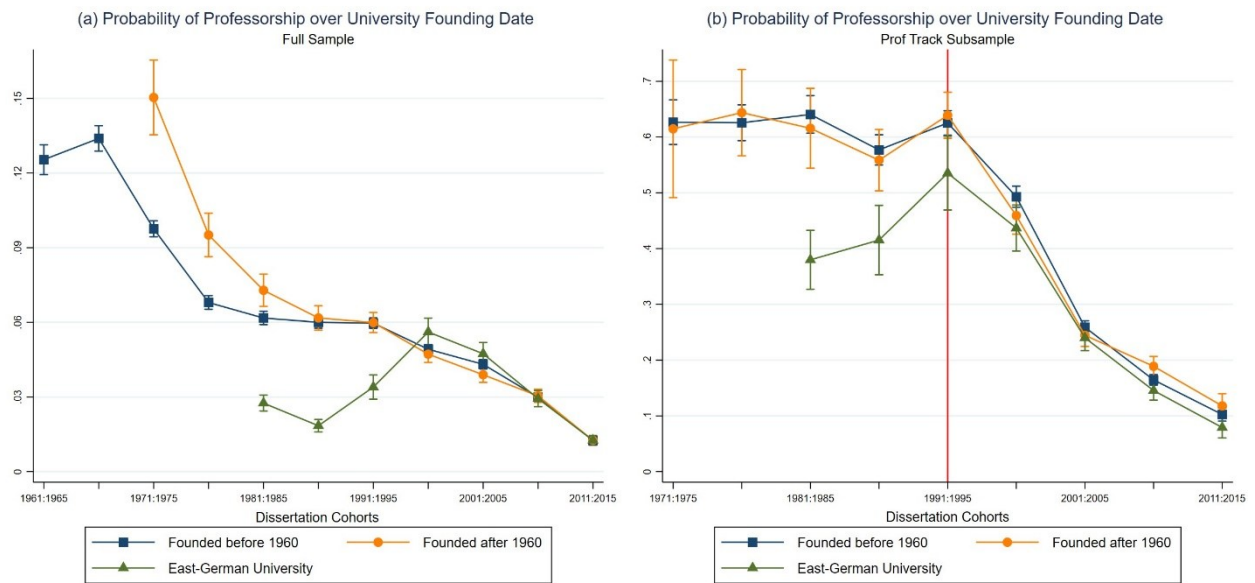


Figure 5: Probability of securing a professorship by prestige of doctoral university over dissertation cohorts

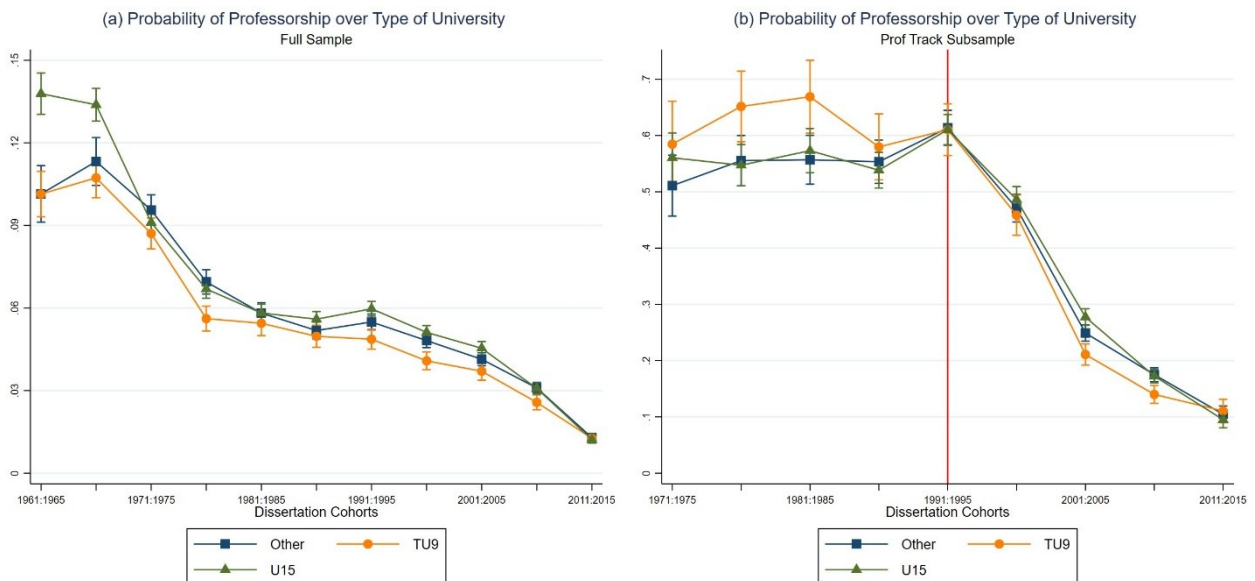


Figure 6: Prestige of doctoral university and faculty placement

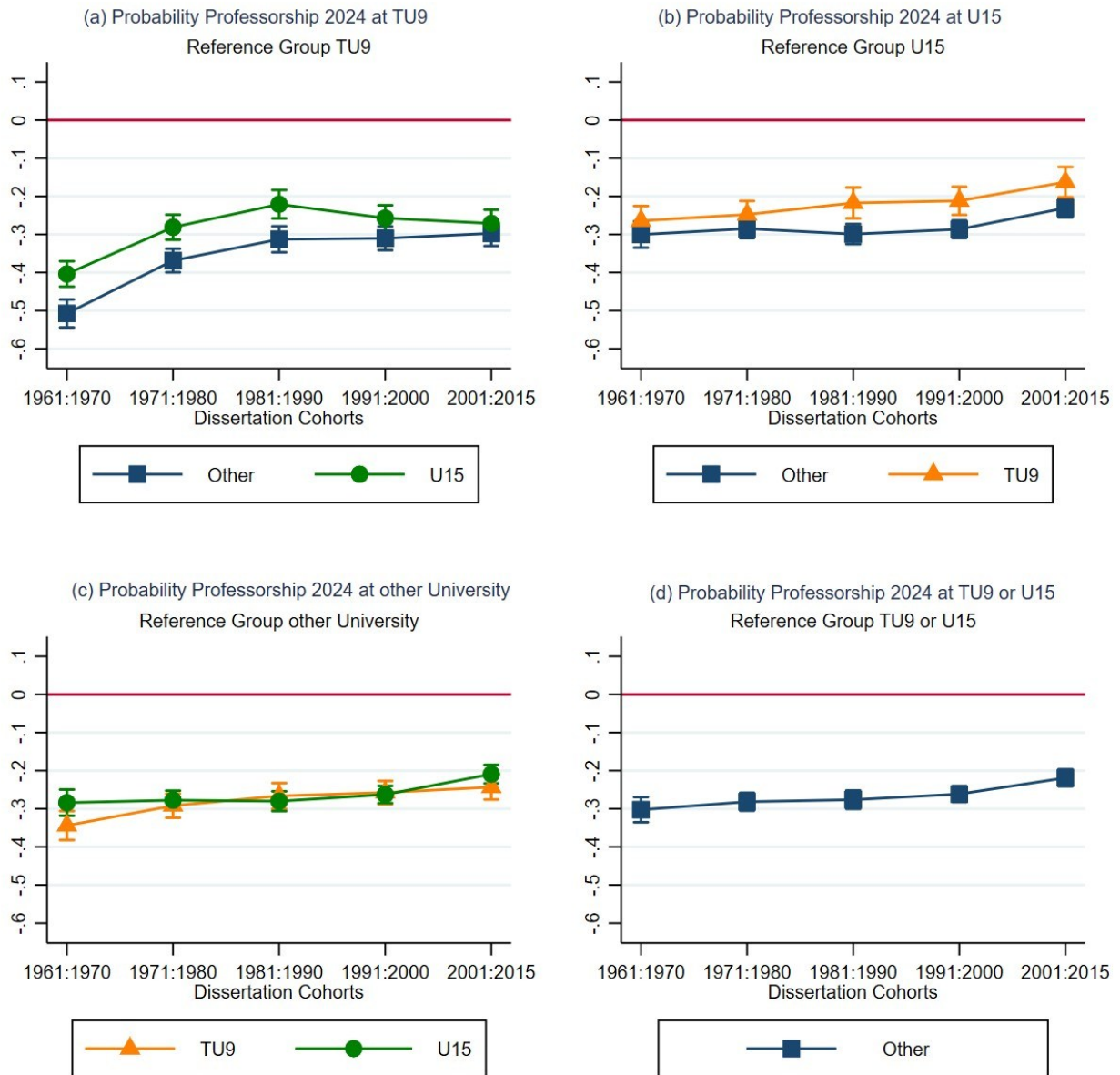


Figure 7: Prestige of doctoral university and first faculty appointment

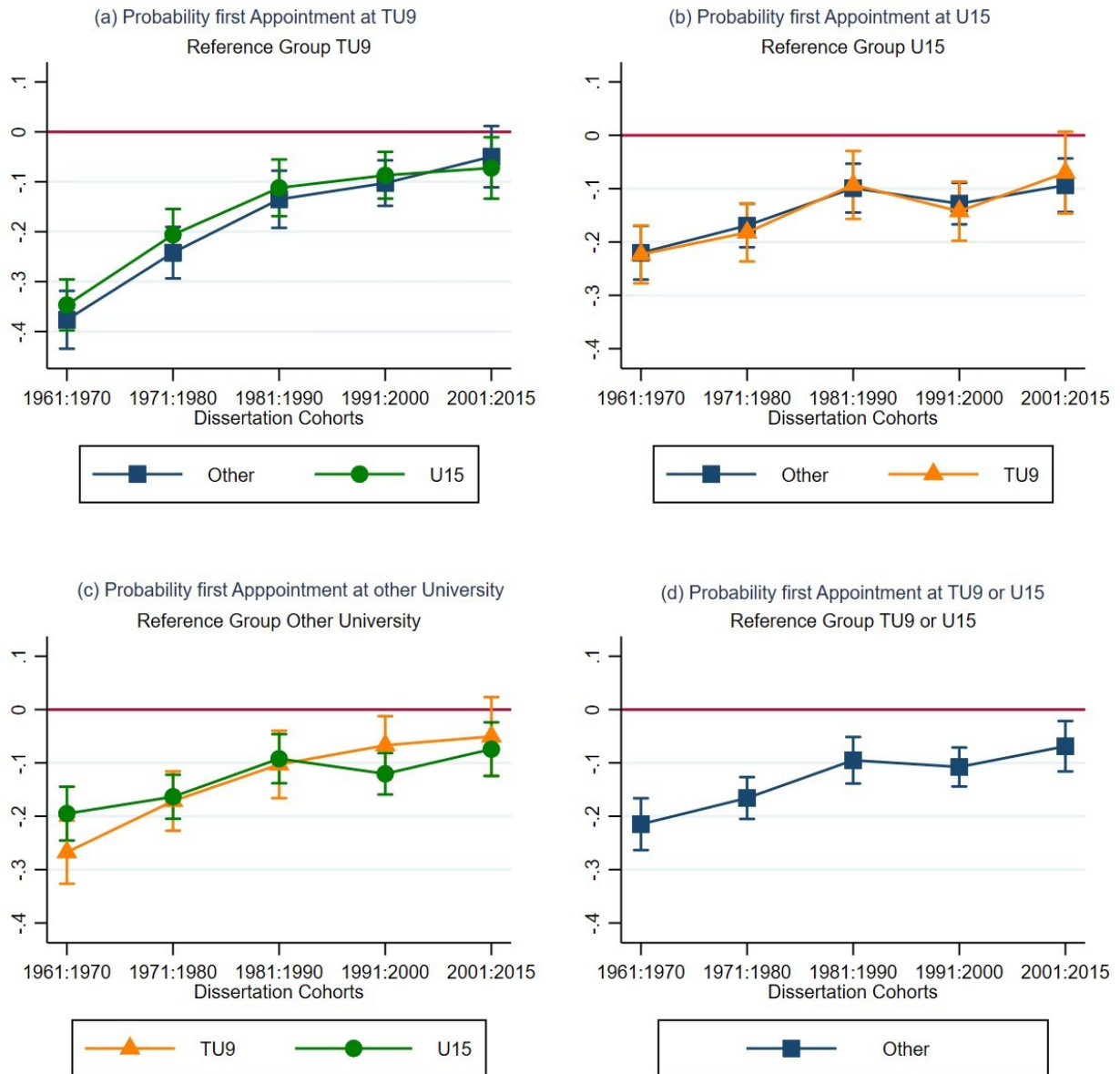


Figure 8: Prestige of doctoral university and faculty appointment (without placement at graduation university)

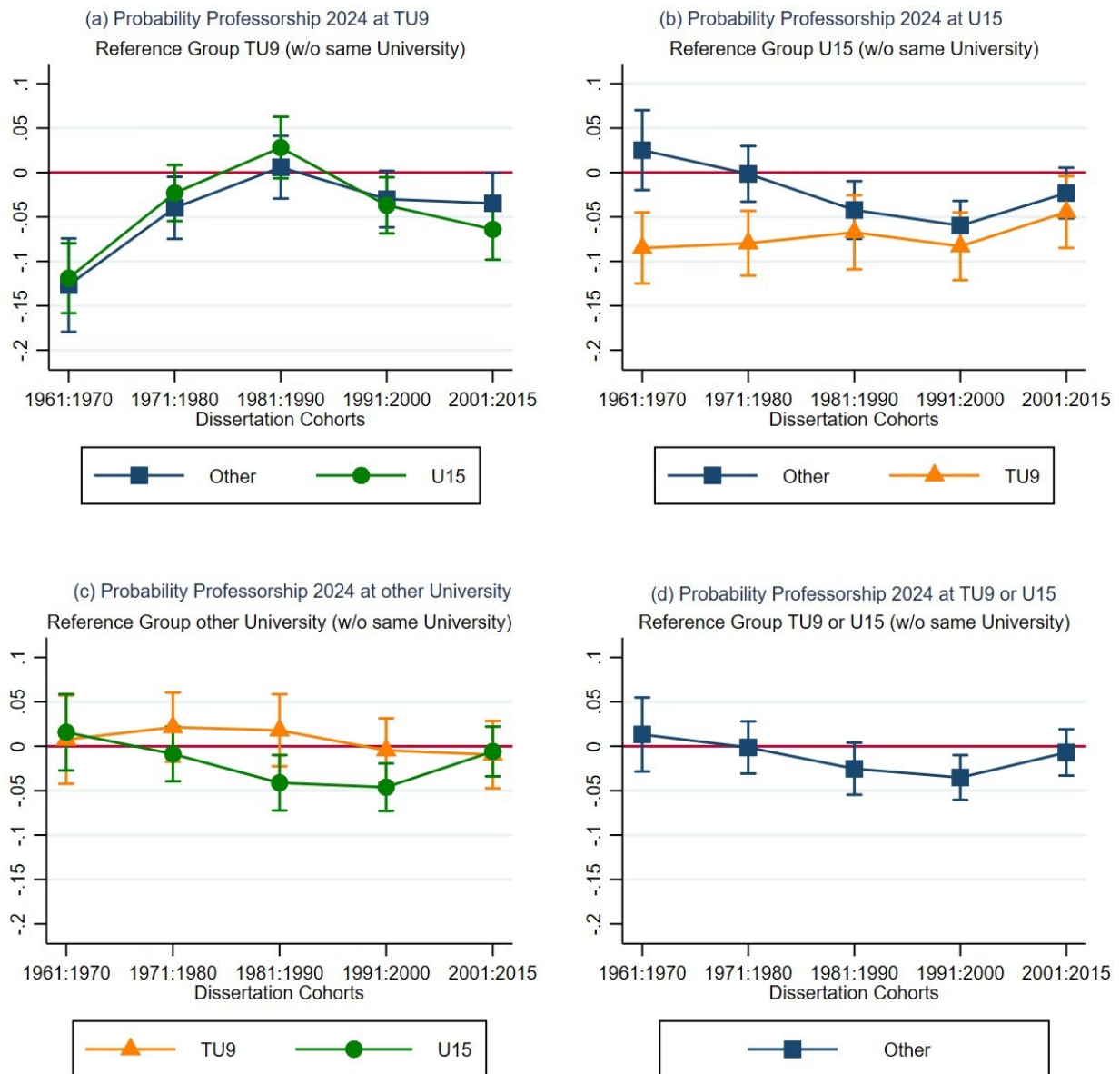
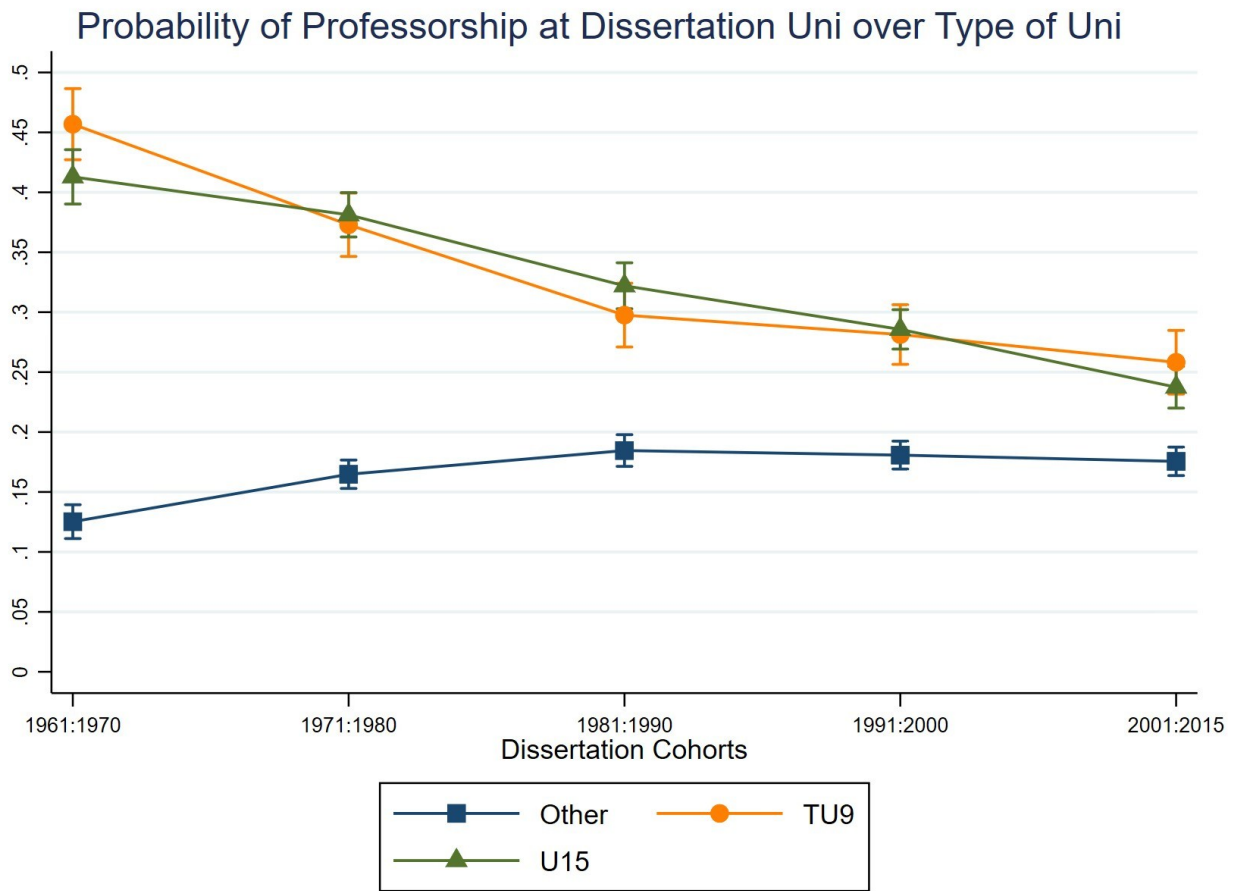


Figure 9: Probability of becoming faculty at the doctoral university (“return mobility”)



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Appendix

Table A1: Estimates for Figure 4

VARIABLES	(1) Coefficient	(2) Margins	(3) Coefficient	(4) Margins
Pre-1960 Universities (Reference)	(Ref)		(Ref)	
Post-1960 Universities	0.183 (0.621)		0.164 (0.130)	
East-German University	-0.446*** (0.0625)		-2.854*** (0.812)	
Cohort 1961-1965 (Reference)	(Ref)		(Ref)	
Cohort 1966-1970	0.0773** (0.0318)		-1.394* (0.782)	
Cohort 1971-1975	-0.287*** (0.0338)		-1.079 (0.767)	
Cohort 1976-1980	-0.687*** (0.0364)		-1.083 (0.765)	
Cohort 1981-1985	-0.792*** (0.0374)		-1.014 (0.765)	
Cohort 1986-1990	-0.822*** (0.0365)		-1.302* (0.764)	
Cohort 1991-1995	-0.828*** (0.0353)		-1.085 (0.763)	
Cohort 1996-2000	-1.035*** (0.0363)		-1.670** (0.763)	
Cohort 2001-2005	-1.174*** (0.0375)		-2.782*** (0.762)	
Cohort 2006-2010	-1.557*** (0.0404)		-3.393*** (0.762)	
Cohort 2011-2015	-2.448*** (0.0508)		-3.964*** (0.764)	
Post-1960 Universities#1961-1965 (Reference)	(Ref)			
Post-1960 Universities#1966-1970	0.127 (0.642)			
Post-1960 Universities#1971-1975	0.320 (0.624)	0.150*** (0.00767)	-0.218 (0.328)	0.615*** (0.0629)
Post-1960 Universities#1976-1980	0.188 (0.623)	0.0951*** (0.00447)	-0.0793 (0.238)	0.644*** (0.0395)
Post-1960 Universities#1981-1985	-0.00277 (0.623)	0.0729*** (0.00331)	-0.278 (0.226)	0.616*** (0.0365)
Post-1960 Universities#1986-1990	-0.152 (0.622)	0.0618*** (0.00249)	-0.245 (0.189)	0.559*** (0.0281)
Post-1960 Universities#1991-1995	-0.179 (0.622)	0.0599*** (0.00206)	-0.0999 (0.171)	0.639*** (0.0211)
Post-1960 Universities#1996-2000	-0.227 (0.622)	0.0472*** (0.00169)	-0.311** (0.156)	0.459*** (0.0170)
Post-1960 Universities#2001-2005	-0.290 (0.622)	0.0389*** (0.00156)	-0.246* (0.147)	0.245*** (0.0102)
Post-1960 Universities#2006-2010	-0.164 (0.623)	0.0305*** (0.00134)	0.0140 (0.149)	0.189*** (0.00901)
Post-1960 Universities#2011-2015	-0.178 (0.626)	0.0126*** (0.000841)	(Ref)	0.118*** (0.0111)
East-German University#1961-1965 (Reference)	(Ref)		(Ref)	
East-German University#1966-1970	-0.427*** (0.0846)		1.478* (0.851)	
East-German University#1971-1975	-0.429*** (0.0837)		1.552* (0.827)	
East-German University#1976-1980	-0.310***		1.552*	

	(0.0912)		(0.825)	
East-German University#1981-1985	-0.404***	0.0275***	1.695**	0.415***
	(0.0905)	(0.00163)	(0.825)	(0.0317)
East-German University#1986-1990	-0.785***	0.0185***	2.144***	0.535***
	(0.0971)	(0.00128)	(0.826)	(0.0338)
East-German University#1991-1995	-0.149	0.0340***	2.454***	0.437***
	(0.100)	(0.00248)	(0.827)	(0.0210)
East-German University#1996-2000	0.587***	0.0561***	2.608***	0.240***
	(0.0853)	(0.00284)	(0.818)	(0.0118)
East-German University#2001-2005	0.546***	0.0474***	2.746***	0.145***
	(0.0842)	(0.00229)	(0.815)	(0.00880)
East-German University#2006-2010	0.426***	0.0293***	2.700***	0.0792***
	(0.0899)	(0.00165)	(0.816)	(0.00959)
East-German University#2011-2015	0.450***	0.0126***	2.561***	0.380***
	(0.110)	(0.000999)	(0.826)	(0.0269)
Pre-1960 Universities#1961-1960		0.125***		
		(0.00305)		
Pre-1960 Universities#1966-1970		0.134***		
		(0.00261)		
Pre-1960 Universities#1971-1975		0.0976***		0.627***
		(0.00163)		(0.0204)
Pre-1960 Universities#1976-1980		0.0680***		0.626***
		(0.00140)		(0.0164)
Pre-1960 Universities#1981-1985		0.0617***		0.641***
		(0.00137)		(0.0172)
Pre-1960 Universities#1986-1990		0.0600***		0.577***
		(0.00122)		(0.0138)
Pre-1960 Universities#1991-1995		0.0597***		0.625***
		(0.00108)		(0.0111)
Pre-1960 Universities#1996-2000		0.0492***		0.493***
		(0.000975)		(0.00968)
Pre-1960 Universities#2001-2005		0.0431***		0.259***
		(0.000968)		(0.00580)
Pre-1960 Universities#2006-2010		0.0299***		0.165***
		(0.000817)		(0.00488)
Pre-1960 Universities#2011-2015		0.0125***		0.103***
		(0.000514)		(0.00606)
Engineering	-0.179***		-0.339***	
	(0.0196)		(0.0414)	
Human sciences	0.846***		0.517***	
	(0.0171)		(0.0411)	
Social sciences	0.123***		0.566***	
	(0.0169)		(0.0386)	
Natural sciences	-0.0110		-0.626***	
	(0.0182)		(0.0396)	
Sport sciences	0.300***		-0.0522	
	(0.0859)		(0.202)	
Other sciences	-0.636***		-0.564***	
	(0.0349)		(0.0712)	
Sex	-0.335***		-0.00551	
	(0.0166)		(0.0332)	
Name origin	-0.158***		-0.179***	
	(0.0125)		(0.0279)	
Constant	-1.770***		2.073***	
	(0.0298)		(0.761)	
Observations	596,222	596,222	36,034	36,034
Controls	YES	YES	YES	YES
Sample	ALL	ALL	ProfTrack	ProfTrack

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2: Estimates for Figure 5

VARIABLES	(1) Coefficient	(2) Margins	(3) Coefficient	(4) Margins
Other Uni (Reference)	(Ref)		(Ref)	
TU9	-0.000384 (0.0725)		0.101 (0.977)	
U15	0.356*** (0.0643)		1.389** (0.626)	
Cohort 1961-1965 (Reference)	(Ref)		(Ref)	
Cohort 1966-1970	0.126* (0.0714)		0.746 (0.589)	
Cohort 1971-1975	-0.0672 (0.0670)		1.365** (0.567)	
Cohort 1976-1980	-0.420*** (0.0684)		1.561*** (0.563)	
Cohort 1981-1985	-0.613*** (0.0683)		1.568*** (0.563)	
Cohort 1986-1990	-0.737*** (0.0672)		1.552*** (0.562)	
Cohort 1991-1995	-0.674*** (0.0657)		1.823*** (0.560)	
Cohort 1996-2000	-0.815*** (0.0657)		1.188** (0.558)	
Cohort 2001-2005	-0.975*** (0.0664)		0.109 (0.557)	
Cohort 2006-2010	-1.278*** (0.0679)		-0.370 (0.557)	
Cohort 2011-2015	-2.174*** (0.0773)		-0.997* (0.561)	
TU9#1961-1965 (Reference)	(Ref)	0.101*** (0.00420)	(Ref)	
TU9#1966-1970	-0.0615 (0.0921)	0.107*** (0.00370)	0.0607 (1.041)	
TU9#1971-1975	-0.104 (0.0877)	0.0871*** (0.00286)	0.226 (1.000)	0.585*** (0.0390)
TU9#1976-1980	-0.230** (0.0918)	0.0562*** (0.00229)	0.339 (0.994)	0.652*** (0.0320)
TU9#1981-1985	-0.0701 (0.0922)	0.0545*** (0.00229)	0.415 (0.995)	0.669*** (0.0331)
TU9#1986-1990	-0.0438 (0.0906)	0.0497*** (0.00205)	0.0165 (0.990)	0.580*** (0.0299)
TU9#1991-1995	-0.129 (0.0874)	0.0487*** (0.00183)	-0.116 (0.985)	0.610*** (0.0234)
TU9#1996-2000	-0.175** (0.0885)	0.0408*** (0.00164)	-0.155 (0.982)	0.458*** (0.0183)
TU9#2001-2005	-0.116 (0.0915)	0.0370*** (0.00166)	-0.333 (0.980)	0.211*** (0.00963)
TU9#2006-2010	-0.192** (0.0973)	0.0257*** (0.00138)	-0.381 (0.981)	0.140*** (0.00808)
TU9#2011-2015	-0.0168 (0.113)	0.0127*** (0.000891)	-0.0363 (0.987)	0.111*** (0.0106)
U15#1961-1965 (Reference)	(Ref)	0.138*** (0.00382)	(Ref)	
U15#1966-1970	-0.161** (0.0811)	0.134*** (0.00304)	-0.867 (0.681)	
U15#1971-1975	-0.411*** (0.0759)	0.0911*** (0.00192)	-1.171* (0.645)	0.560*** (0.0224)
U15#1976-1980	-0.398*** (0.0784)	0.0669*** (0.00172)	-1.425** (0.640)	0.547*** (0.0188)
U15#1981-1985	-0.355*** (0.0790)	0.0582*** (0.00163)	-1.317** (0.640)	0.573*** (0.0201)
U15#1986-1990	-0.275*** (0.0768)	0.0559*** (0.00142)	-1.456** (0.636)	0.538*** (0.0161)

U15#1991-1995	-0.266*** (0.0744)	0.0597*** (0.00136)	-1.403** (0.634)	0.611*** (0.0137)
U15#1996-2000	-0.292*** (0.0749)	0.0511*** (0.00125)	-1.322** (0.631)	0.486*** (0.0119)
U15#2001-2005	-0.259*** (0.0768)	0.0454*** (0.00124)	-1.231* (0.629)	0.277*** (0.00751)
U15#2006-2010	-0.363*** (0.0806)	0.0308*** (0.00103)	-1.407** (0.630)	0.173*** (0.00623)
U15#2011-2015	-0.416*** (0.0974)	0.0122*** (0.000641)	-1.501** (0.638)	0.0951*** (0.00747)
Other#1961-1965		0.101*** (0.00524)		
Other #1966-1970		0.113*** (0.00442)		
Other #1971-1975		0.0956*** (0.00282)	0.511*** (0.0276)	
Other #1976-1980		0.0695*** (0.00227)	0.555*** (0.0227)	
Other #1981-1985		0.0582*** (0.00189)	0.557*** (0.0221)	
Other #1986-1990		0.0518*** (0.00156)	0.553*** (0.0196)	
Other #1991-1995		0.0549*** (0.00147)	0.614*** (0.0158)	
Other #1996-2000		0.0482*** (0.00129)	0.471*** (0.0125)	
Other #2001-2005		0.0414*** (0.00121)	0.249*** (0.00741)	
Other #2006-2010		0.0310*** (0.00101)	0.175*** (0.00624)	
Other #2011-2015		0.0129*** (0.000638)	0.105*** (0.00744)	
Region	-0.563*** (0.0195)		-0.469*** (0.0390)	
Engineering	-0.136*** (0.0206)		-0.316*** (0.0428)	
Human sciences	0.830*** (0.0173)		0.512*** (0.0412)	
Social sciences	0.121*** (0.0169)		0.564*** (0.0385)	
Natural sciences	0.00289 (0.0182)		-0.637*** (0.0396)	
Sport sciences	0.279*** (0.0858)		-0.0331 (0.203)	
Other sciences	-0.658*** (0.0349)		-0.580*** (0.0708)	
Sex	-0.354*** (0.0166)		-0.0189 (0.0332)	
Name origin	-0.156*** (0.0125)		-0.174*** (0.0279)	
Constant	-1.385*** (0.0641)		-0.338 (0.560)	
Observations	596,222	596,222	36,036	36,036
Controls	YES	YES	YES	YES
Sample	ALL	ALL	ProfTrack	ProfTrack

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Estimates for Figure 6

VARIABLES	(1) Margins (dx/dy) TU9	(2) Margins (dx/dy) U15	(3) Margins (dx/dy) Other	(4) Margins (dx/dy) TU9 / U15
Other#1961-1970	-0.376*** (0.0296)	-0.220*** (0.0257)		-0.215*** (0.0248)
Other#1971-1980	-0.242*** (0.0263)	-0.169*** (0.0208)		-0.166*** (0.0200)
Other#1981-1990	-0.135*** (0.0292)	-0.0990*** (0.0234)		-0.0950*** (0.0222)
Other#1991-2000	-0.103*** (0.0232)	-0.128*** (0.0198)		-0.108*** (0.0187)
Other#2001-2015	-0.0497 (0.0313)	-0.0936*** (0.0256)		-0.0688*** (0.0241)
U15#1961-1970	-0.347*** (0.0260)		-0.267*** (0.0302)	
U15#1971-1980	-0.206*** (0.0263)		-0.171*** (0.0284)	
U15#1981-1990	-0.112*** (0.0289)		-0.103*** (0.0322)	
U15#1991-2000	-0.0869*** (0.0239)		-0.0669** (0.0278)	
U15#2001-2015	-0.0723** (0.0314)		-0.0504 (0.0376)	
TU9#1961-1970		-0.223*** (0.0277)	-0.195*** (0.0257)	
TU9#1971-1980		-0.182*** (0.0277)	-0.163*** (0.0210)	
TU9#1981-1990		-0.0931*** (0.0325)	-0.0921*** (0.0234)	
TU9#1991-2000		-0.142*** (0.0283)	-0.120*** (0.0198)	
TU9#2001-2015		-0.0700* (0.0391)	-0.0742*** (0.0257)	
Observations	8,437	10,662	12,158	12,158
Controls	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A4: Estimates for Figure 7

VARIABLES	(1) Margins (dx/dy) TU9	(2) Margins (dx/dy) U15	(3) Margins (dx/dy) Other	(4) Margins (dx/dy) TU9 / U15
Other#1961-1970	-0.508*** (0.0187)	-0.300*** (0.0176)		-0.303*** (0.0168)
Other#1971-1980	-0.369*** (0.0158)	-0.285*** (0.0127)		-0.282*** (0.0120)
Other#1981-1990	-0.313*** (0.0174)	-0.299*** (0.0135)		-0.276*** (0.0123)
Other#1991-2000	-0.310*** (0.0159)	-0.286*** (0.0118)		-0.261*** (0.0108)
Other#2001-2015	-0.297*** (0.0170)	-0.231*** (0.0126)		-0.219*** (0.0114)
U15#1961-1970	-0.404*** (0.0170)		-0.344*** (0.0194)	
U15#1971-1980	-0.281*** (0.0167)		-0.292*** (0.0161)	
U15#1981-1990	-0.221*** (0.0191)		-0.266*** (0.0172)	
U15#1991-2000	-0.257*** (0.0172)		-0.258*** (0.0156)	
U15#2001-2015	-0.271*** (0.0183)		-0.243*** (0.0167)	
TU9#1961-1970		-0.264*** (0.0198)	-0.284*** (0.0175)	
TU9#1971-1980		-0.248*** (0.0182)	-0.278*** (0.0127)	
TU9#1981-1990		-0.217*** (0.0207)	-0.280*** (0.0132)	
TU9#1991-2000		-0.212*** (0.0189)	-0.263*** (0.0116)	
TU9#2001-2015		-0.163*** (0.0202)	-0.209*** (0.0124)	
Observations	23,550	30,253	36,121	36,121
Controls	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A5: Estimates for Figure 8

VARIABLES	(1) Margins (dx/dy)	(2) Margins (dx/dy)	(3) Margins (dx/dy)	(4) Margins (dx/dy)
Base	TU9	U15	Other	TU9 / U15
Other#1961-1970	-0.127*** (0.0268)	0.0252 (0.0229)		0.0132 (0.0213)
Other#1971-1980	-0.0398** (0.0178)	-0.00155 (0.0160)		-0.00138 (0.0150)
Other#1981-1990	0.00594 (0.0180)	-0.0422** (0.0166)		-0.0253* (0.0150)
Other#1991-2000	-0.0299* (0.0162)	-0.0597*** (0.0142)		-0.0352*** (0.0128)
Other#2001-2015	-0.0347** (0.0173)	-0.0231 (0.0146)		-0.00699 (0.0133)
U15#1961-1970	-0.119*** (0.0201)		0.00753 (0.0254)	
U15#1971-1980	-0.0231 (0.0161)		0.0214 (0.0199)	
U15#1981-1990	0.0281 (0.0177)		0.0179 (0.0207)	
U15#1991-2000	-0.0369** (0.0161)		-0.00465 (0.0184)	
U15#2001-2015	-0.0640*** (0.0174)		-0.00950 (0.0193)	
TU9#1961-1970		-0.0849*** (0.0204)	0.0157 (0.0219)	
TU9#1971-1980		-0.0796*** (0.0186)	-0.00865 (0.0157)	
TU9#1981-1990		-0.0673*** (0.0213)	-0.0412*** (0.0159)	
TU9#1991-2000		-0.0831*** (0.0194)	-0.0461*** (0.0137)	
TU9#2001-2015		-0.0445** (0.0206)	-0.00588 (0.0143)	
Observations	18,486	23,232	27,038	27,038
Controls	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1