

The Emergence of the Organizational Academic Profession: Vertical differentiation of German universities and the research-teaching nexus

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Abstract. Within the vertically differentiated German university system, the Humboldtian ideal of the unity of research and teaching can no longer be taken for granted. We argue that the organizational academic profession actively pursues the erosion of the unity of research and teaching in their social partnership with the state, trading autonomy for proof of efficient public research and/or teaching services. The results of the 2018 *Academic Profession in Knowledge Societies* study show that the evolution of research policy at large universities and *Excellence Universities* in Germany has led to a focus on journal publication outputs and increasing third-party funding. Academics at *Excellence* and large universities have a strong preference for research over teaching. In spite of a lower teaching workload, academics at *Excellence Universities* teach more in bachelor courses compared to academics at large universities. Especially small universities are at risk of becoming teaching-oriented universities.

Keywords: academic profession, *excellence initiative*, Germany, higher education policy, research-teaching nexus, university, vertical differentiation

1. Introduction

In the research literature, it is argued that the research-teaching nexus is strongly connected to the national tradition in a higher education system and the ideas about or normative background of research and teaching held by the academic profession (e.g., Arimoto, 2015; Geschwind & Broström, 2014; Leisyte et al., 2009; Shin, 2011). For Germany, the national tradition is the research-based university and the functionally differentiated higher education system with different types of higher

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education institutions (HEI), such as Universities of Applied Sciences (UAS), and the norms of research and teaching are very much based on Humboldtian ideals (e.g., Ash, 2006; Gottlieb & Keith, 1997; Teichler, 2014). According to Teichler (2014), the Humboldtian ideals (unity of research and teaching; research and teaching in solitude and freedom; the university as the community of teachers and learners) are challenged by governmental reforms of higher education that seek to limit the power of the academic profession (e.g., academic self-government), to steer academic work by evaluation (e.g., teaching evaluation; see Wilkesmann & Schmid, 2012) and performance-based measures (e.g., number of research grants and publication output; see: Gerhards, 2014; Weingart, 2005) as well as linking outputs to remuneration for professors (the so-called W-remuneration scheme; see Klenke, 2012) and defining the terms of employment and formal career patterns for early-career academics (Wissenschaftszeitvertragsgesetz, 2016). The performance-based reorganizing or evolution of the organization of German higher education is primarily driven by incentive schemes addressing both the level of individual academics (Gläser & Laudel, 2016, 2019) and the level of universities, for example with the German *Excellence Initiative* for universities (e.g., DFG, 2013; Kehm, 2013; Münch, 2010). The *Excellence Initiative* pursues the explicit goal of vertical differentiation through strengthening university autonomy and leadership (IECE, 2016). In addition, the research focus of German universities is strengthened via the “special path” (*Sonderweg*; Gerhards, 2014) and emphasis on third-party funding – strengthening the ambivalence of classical academic recognition and performance measurement (Flink & Simon, 2014).

Of course, the governance-driven bifurcation of research and of teaching valuation is not new, neither in Germany nor elsewhere (e.g., Cummings & Teichler, 2015; Musselin, 2013a, b). For example, already in the early 1960s, Ben-David (1972, p.112) diagnosed for the US that “[t]he basis for the unity of teaching and research has been weakened by the rapid rise of university research that has little or no connection with teaching, and by the rapidly growing imbalance between the rewards for research and those for teaching.” Similar to Ben-David, Clark (1987) and Finkelstein (2014) consider the research-teaching nexus to be a balancing act for the academic profession, which depends very much on the type of university (e.g., public or private, community or four-year colleges).

For Germany, Teichler (2014, p.70) reports an increasing preference for research over teaching for both full university professors and junior and non-professorial academics, and a converse shift towards stronger teaching preferences for UAS academics between the 1992 *Carnegie Study* and the 2007 *Changing Academic Profession Study*. According to Jakob and Teichler (2011, p.13), the research and teaching preference trends originate in a) a functional and not holistic view of the academic profession, and the strong policy focus on b) the managerial organizing of universities (including financing) and c) the competition-based vertical differentiation between universities, which has been especially pushed by the *Excellence Initiative* for universities. The follow-up to these findings, the 2018 *Academic Professions in Knowledge Societies* study (APIKS 2018), was

sampled to take a closer look at the differences and the stratification among universities (Enders, 2016). We address the differentiation between universities observed by Enders (2016) with the research question: What is the impact of vertical differentiation of universities on academic staff's preference for teaching and research (with a focus on the research and teaching nexus)?

To answer the research question, this article will consider the evolution of higher education and science policy affecting research and teaching from 1990 (German unification) until 2018, and investigate policy evolution from the perspective of profession theory (Goode, 1957; Oevermann, 2005; Parsons, 1968; Stichweh, 1994). We argue theoretically that the weakening or decline of the professional vocation of individual academics gives rise to the organizational academic profession. Building on Mintzberg's (1983) ideas of professional bureaucracies and profession organizations, and inspired by Larson (1977), the idea and norms of the organizational academic profession merge the ideas and norms of the academic profession with those of public services and of corporate capitalism (see also Freidson, 2001; Postiglione & Jung, 2015; Scott, 2005; Schimank, 2005; Stephan, 1996; Slaughter & Rhoades, 2004).

Our detailed theorization of the organizational academic profession follows the next section, which gives a brief overview of the German university sector and describes the evolution of governance affecting research and teaching. After the theory-based formulation of the hypotheses to empirically test the rise of the organizational academic profession, the data, methods and results are presented. Descriptive findings about academics' research and teaching work and their preferences are presented for three moments in time (1992, 2007 and 2018), followed by a multivariate analysis and a discussion of the results.

2. Brief overview of German universities

The German higher education research system is primarily a system of public HEIs. Private HEIs account only for 7% of students. The system is traditionally horizontally differentiated across the following main types: universities (n = 112); pedagogical universities, theological universities, arts universities, UASs (n = 217); and public administration colleges. Furthermore, special profiles exist, namely *Technical Universities* (n = 18) and nowadays the so-called *Excellence Universities* (n = 11). In particular, the political initiative to create *Excellence Universities* aims to increase the vertical differentiation of the higher education system in Germany (IECE, 2016, p.5-6). In studying vertical differentiation and its impact on the research-teaching nexus, we will concentrate on universities only, with a special focus on *Technical* and *Excellence Universities*.

About 12%¹ of the academics whose main employment is at a university are full professors (ranks C4/W3 and C3/W2) and 88% are junior and non-professorial academics (e.g. junior

¹ This ratio is quite different at UASs where full professors are the majority, which raises the total average from 12 to 19%.

professors (W1) and research associates) (GFSO, 2018a, p.36). Thus, when analyzing the research-teaching nexus and organizational change, it is not sufficient to focus only on professors because an important share of research and teaching is done by junior and non-professorial academics.

3. The organizational academic profession and the evolution of research and teaching policy in Germany

Contrary to traditional professions theory (Goode, 1957; Oevermann, 2005; Parsons, 1968; Stichweh, 1994), Larson (1977) defines the rise of organizational professions as the merging of and continuing boundary work of three ideological and bureaucratic organizations: the state, corporate capitalism, and the university. Theoretically it has to be kept in mind that organization and profession are not exclusive but complementary categories (Blau, 1994; Ritzer, 1975; Weber, 1978): “In a bureaucratized world, professions can no longer be interpreted as inherently antibureaucratic. Both professions and bureaucracy belong to the same historical matrix: They consolidate in the early 20th century as distinct but nevertheless complementary modes of work organization” (Larson, 1977, p.199). For organizing work, Schudson (1980, p.223) points to clearly delineating between professionalism (based on autonomy and specific esoteric knowledge) and profession (based on the ideas and norms of a specific professional group). For the study of the research-teaching nexus, the ideas and norms of the academic profession are expressed by the Humboldtian ideal of the unity of research and teaching.

In the late 20th century, the *Zeitgeist* polity of the knowledge economy (EC, 2007; Godin, 2006; Jakobi, 2007; OECD, 1996; Välimaa & Hoffman, 2008), understood as the economy of the knowledge society, in the guise of *New Public Management* (Musselin, 2013a, b; Power, 1997, 2004; Schimank, 2005, 2010) pushed the ideology of corporate capitalism to merge with the ideas and norms of public services and those of the academic profession. Adapting Larson (1977), we consider the organizational academic profession to be the creation of the late 20th century *Zeitgeist* polity of the knowledge economy. In the knowledge economy, the binding of the academic profession to the organization of the university is pursued in the social partnership between the state and the academic oligarchy by a) a functional and not holistic view of the academic profession and the strong policy focus on b) the managerial organizing of universities (including financing) and c) the competition-based differentiation between universities (Jakob & Teichler, 2011; see also Postiglione & Jung, 2015). Accordingly, universities as professional bureaucracies focus more on specific work processes and high - quality academic work, which in turn weakens academics’ autonomy and trust in their work as described by Mintzberg (1983). Especially the research-focused push of the *Excellence Initiative* for universities results in growing differences, i.e., vertical differentiation between universities (IECE, 2016; Enders, 2016).

In the self-governed and self-managed organization of the university, the organizational academic profession remains the “key profession” (Perkin, 1969), which is supported by higher education professionals, also referred to as administrators, in organizing the university (Schneijderberg & Merkator, 2012). In academic self-government of universities and the university services of research and teaching (and research- and teaching-based knowledge and technology transfer), the organizational academic professional becomes bound to the efficiency doctrine of corporate capitalism:

“The extension of the notion of efficiency to organizations which produce only services or fictitious commodities maximizes the ideological implications. The extension discloses, first of all, an analogy of factory and society which symbolizes the bringing of the whole social order under the imperative creed of limitless economic growth. [...]. Above all, the attempt to measure efficiency in the production of services or fictitious commodities implies a necessary reduction of quality to quantity.” (Larson, 1977, p.142-143)

As a result of becoming the organizational academic profession, the efficiency notion gradually found its way into the traditional role-bundle (e.g., roles of gate keeper, leader, researcher, and teacher) and identity of the academic profession in Germany and elsewhere (see also Enders, 2001; Henkel, 2005; Kogan & Teichler, 2007; Macfarlane, 2010; Mulkay, 1976).

In Germany, (senior) academics' leadership role and state-granted academic self-governance create a special terrain for the rise of the organizational academic profession. The constitutive role of the state for professions is described as providing protection of a specific status and working domain as well as recognition and certification of professional activities (Freidson, 2001; McClelland, 1990; Waaijer, 2015). On the “continuum of professional-state relations” (Scott, 2005, p.127) the academic profession is represented in the social partnership (*Sozialpartnerschaft*) (Stichweh, 1994) in higher education and science governance by its professional and organizational associations, such as the *German Rectors' Conference*. Roughly speaking, the social partnership between the academic profession and the state can be described as the state guaranteeing a common legal basis and funding, and the academic profession being responsible for the execution of research, teaching and related knowledge and technology transfer and quality assurance. Prime examples for the social partnership are the German Research Foundation (DFG – *Deutsche Forschungsgemeinschaft*), where academics distribute tax revenue in the form of research grants, and the political entity of the German Council of Science and Humanities (*Wissenschaftsrat*), which advises on higher education and science policy (Bartz, 2006). Accordingly, the organizational academic profession is an active contributor (Schimank, 2010) and not a completely powerless victim of the evolution of research and teaching policy, which is summarized in the following sections.

3.1 Evolution of research policy

In Germany, the evolution of research-related policy began in the mid-1990s – driven by the *New Public Management* doctrine of governance (Enders, 2016; Hüther & Krücken, 2018). In contrast to states with a systematic research evaluation system, such as Australia and the United Kingdom (e.g., Butler, 2010; de Rijcke et al., 2016; Whitley, 2007, 2010), German research governance for all universities is designed as a bonus and an incentive system and not as a control system (Flink & Simon, 2014; Frölich, 2008; Weingart, 2001). For example, the German focus on performance-based evaluations for external grants (Gerhards, 2014) has led to more competition for research grants (e.g., from the DFG and from industry). In general, *Technical Universities* and large comprehensive universities benefit most (GFSO, 2018b; Schneiderberg, 2020). Another example for the bonus and incentive system is the push of bibliometric indicators by the *Excellence Initiative* (e.g., IECE, 2016; Kehm, 2013; Münch, 2010) – which is governed by the German Research Foundation and the Council of Science and Humanities – and by the national and international ranking ambitions of universities (Hazelkorn, 2015).

Accordingly, the use of research indicators for university governance varies considerably between universities (Biester & Fink, 2015; Gläser & Laudel, 2019). A university's autonomy in how to make use of outcome and output agreements can also be observed in its application of the professorial W-remuneration, which is a national remuneration scheme introduced in 2005 (Klenke, 2012; Preißler, 2016)². Variation in the use of performance indicators originates in the strong position of academics in academic self-governance, legally secured by the professorial majority in all university governing bodies, such as the academic senate (German Constitutional Court, 1973).

3.2 Evolution of teaching policy

In contrast to research, the basic parameters for teaching, measured in hours of teaching obligation per term, did not change between 1992 and 2018. Full university professors have a teaching workload of either eight (e.g., Hesse, 2009) or nine hours per term (e.g., Baden-Wuerttemberg, 2018), and the academic year has two terms. The teaching obligation of early-career academics (incl. assistant professors) is four hours per term, with the exception of those with an extra high teaching load of eight hours per term.

Compared to research, the governance of teaching is (even) less sophisticated in Germany. The major instruments for teaching governance are agreements between professors and their university, for example about number of supervised bachelor, master and PhD theses, and students' evaluations

² For a detailed overview of HEI regulations concerning W-remuneration see: https://www.hochschulverband.de/index.php?id=w-besoldung#_ (last accessed: 26.06.2019).

of teaching, which is part of the W-remuneration, and teaching awards (Wilkesmann & Schmid, 2012). With regard to academic freedom in teaching, quality assurance for teaching addresses the organizational level of the university and not the individual level of academic professionals, for example by accreditation (introduced in 1998; Schneijderberg & Steinhardt, 2019) or third-party funding for teaching, for example through the *Qualitätspakt Lehre / Hochschulpakt* (higher education / teaching quality pact introduced in 2011; BMBF, 2016).

Of course, what has changed are the study program structures of bachelor, master, and PhD programs introduced with the Bologna Process, which replaced the German *Diplom* and *Magister Artium* study programs. Prior to the Bologna Process, PhD programs were operated primarily under the auspices of the DFG (Schneijderberg & Teichler, 2018).

3.3 *The German organizational academic profession and the research-teaching nexus in 2018*

The above described evolution in research and in teaching policies suggests an ongoing trend toward more differentiation among universities, i.e., organizational academic professionals' research and teaching. Normatively, more balanced research and teaching preferences and workloads of academics would be an indication for the Humboldtian ideal of the unity of research and teaching. Conversely, the increasing research orientation of university academics would mean a weakening of the Humboldtian ideal of the unity of research and teaching. In addition, the expected policy-induced increase in the research orientation links with the research-based reputation-gain mechanisms in academia (Bourdieu, 1975; Cole, 1983; Schubert et al., 2017; Weingart, 2005).

To achieve a more differentiated picture of the research-teaching nexus, the APIKS 2018 study was designed to analyze the organizational (universities) and the individual (academics) level. Based on the research question of whether the German higher education system is becoming organizationally more stratified and more differentiated (e.g., according to status and size), as suggested by the evolution of research and teaching policies (see also Enders, 2016; Schneijderberg, 2020), hypothesis 1 (H1) assumes a stronger research orientation of academics

- a) in large universities compared to medium-sized and small universities (H1a),
- b) in *Excellence Universities* compared to academics in non-*Excellence* universities (H1b), and
- c) in *Technical Universities* compared to academics in comprehensive universities (H1c).

4. Data and methods

4.1 Data

We use the German data from three international surveys: *The Carnegie Foundation* study from 1992 (from now on “Carnegie 1992”), the CAP study from 2007/2008 (*Changing Academic Profession*, “CAP 2007”), and the APIKS³ study from 2018 (*Academic Profession in Knowledge Societies*, “APIKS 2018”). The studies are comparable over time as they are organized as follow-up projects. The three studies draw cross-sectional representative samples of academics at these points in time. Thus, they are not a panel study.

The questionnaire targets academics working at a university or a UAS in Germany. Academics are questioned about their careers and working conditions, focusing on the following topics: research, teaching and learning, governance, transfer activities (Enders & Teichler, 1995a, b; Altbach, 1996; Jacob & Teichler, 2011; Teichler et al., 2013). We restrict our analysis to academics (full professors, junior and non-professorial academics) from universities only for two reasons. First, case numbers are too low for UASs; but foremost, the process of vertical differentiation is politically more pronounced and pushed for universities.

For the descriptive overview showing changes over time, we compare data from all three studies (1992, 2007 and 2018)⁴. For this comparison we exclude only the discipline “medicine” because these academics are often also engaged in hospital duties and their research role is not clear. We therefore use the almost complete datasets of Carnegie 1992, CAP 2007 and APIKS 2018 to ensure comparability with other international reports that mainly use the full samples (Enders & Teichler, 1995b). To investigate our hypotheses 1a-c, which analyzes the actual degree of differentiation in 2018 in more depth, we use the 2018 dataset (see Tables 3 and 4 in appendix) after applying some restrictions. Most important, we again exclude the discipline of medicine. Further, we exclude outliers concerning workload per week (see also Bentley & Kyvik, 2012).

4.2 Variables

4.2.1 Dependent Variables

The main dependent variables to measure research orientation are research preference, workload (research, teaching) and publication output. Research preference was measured on a 4-point scale. In the multivariate analysis it is compressed to a binary variable (0 = teaching orientation, 1 =

³ The APIKS data will be available for other scientists from mid-2021. The APIKS scientific-use file will be hosted at *GESIS – Leibniz Institut für Sozialwissenschaften*.

⁴ We focus on APIKS 2018. Further information about the datasets in Carnegie and CAP can be found for example in Enders and Teichler (1995a) and Jacob and Teichler (2011).

research orientation; “Regarding your own preferences, do your interests lie primarily in teaching or research?”). Workload is based on self-reports from the questionnaire, we use the workload of a typical week when classes are in session, both for teaching and research workload (“Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?”).

Publications are also measured as self-reported (“How many of the following scholarly contributions have you completed in the past three years?”). We use three indicators that represent the variation in publication patterns over time and disciplines as dependent variables: authored books, chapters in books, and scientific journal articles.⁵ Finally, we compare whether the respondent’s institutional affiliation has changed over time. Traditionally, especially in Germany, affiliation toward the scientific community of the discipline was quite strong and the organizational affiliation to the university rather weak (“Please indicate the degree to which each of the following affiliations is important to you” on a five-point Likert scale from 1 not all important to 5 very important for three items: “My academic discipline/field; My department (at this institution); My institution”).

For examining hypotheses 1a-c as part of an in-depth analysis of today’s academic system, we use two additional dependent variables: the share of funding from third parties and the share of time spent teaching in master and PhD classes. Third-party funding is measured as the sum (in percentage) of different types of third-party funding (“In the current (or previous) academic year, which percentage of the funding for your research came from...?”). Share of teaching in bachelor, master or PhD classes is measured as the sum (in percentage) of time spent on both types (“Please indicate the proportion of your teaching-related activities (preparation of instructional materials and lesson plans, classroom instruction, advising students, reading and evaluating student work, curriculum development, etc.).”).

4.2.2 Independent variables

The main explanatory variables are the organizational characteristics of the respondent’s university: employed at a university with so-called *Excellence* status, size of university, and employed at a *Technical University*. University size is measured by the number of professors: small (up to 200 professors), medium (201-400 professors), and large universities (401 professors and more) (all *Excellence Universities* apart from Konstanz are large universities). Since all *Excellence Universities* in the sample are large universities, we combine status and size into one variable with four categories: *Excellence*, large (but not *Excellence*), medium size, small. We control for academic discipline according to the *Frascati manual* (OECD, 2015).

⁵ The descriptive overview has to combine book chapters and scientific journals as only the current APIKS survey distinguishes between these types of publications.

4.3 Analysis

Depending on the outcome of interest, we use either logistic regression models or linear regression models. We clustered standard errors on the university level, taking into account that persons at the same university are influenced by the same environment and thus observations are not independent from one another. The dependent variable research preference (vs. teaching preference) is measured as a binary variable and therefore logistic regression is appropriate (Best & Wolf, 2010). All other dependent variables (workload, funding source, publication output, and teaching) are measured with metric variables and therefore linear regressions are used (Wolf & Best, 2010). The abovementioned variables representing university type (*Excellence* and size, *Technical*) serve as explanatory variables. When analyzing the *Excellence* status and size variable, we run one analysis with “*Excellence*” as reference category, and one analysis with “large but not *Excellence*” to see how academics from *Excellence Universities* differ from the others and how academics from large universities differ from those at *Excellence Universities* on the one hand and from those at smaller universities on the other hand.

5. Results

5.1 Descriptive results: Trends concerning research and teaching 1992-2018

The descriptive results of changes over time in the research orientation of full professors and junior and non-professorial academics at universities are presented in Table 1. In 2018, especially full professors but also junior and non-professorial academics show a higher research orientation than in 1992 (for the former, from 7 to 15% “primarily in research”, row “research preference”). Furthermore, we analyze the research orientation in terms of workload (i.e. how much time they actually spend on teaching or research during the semester, row “workload classes in session”). The data show that the teaching workload decreases for both groups over time (from 23.1 hours to 18 hours). Interestingly, the research workload also decreases slightly over time (from 15.7 to 14.1 hours). Thus, the personal preference toward research has increased but not the actual workload. *Nota bene*: time spent on other activities did not increase either. Overall working time decreased, which has been found among academics in other countries as well (Bentley & Kyvik, 2012).

Additionally, it is important to analyze whether not only preferences and activities but also research output has changed (not in table). The evolution of publication output is especially striking between 1992 and 2007. The number of books published decreases slightly and, in contrast, the number of book chapters/articles increases (on average, full professors published 9 articles in 1992 and 14 articles in 2007 and also 2018). Thus output seems to have peaked in 2007.

Table 1. Descriptive overview: Changes in research and teaching over time

	Full professors			Junior and non-professional academics		
	1992	2007	2018	1992	2007	2018
Research preference a)						
Primarily in teaching		5%	3%	4%	5%	6%
In both, but leaning toward teaching		30%	23%	18%	22%	18%
In both, but leaning toward research		58%	64%	64%	45%	42%
Primarily in research		7%	10%	15%	28%	35%
Workload (Hours) b)						
Teaching	23.1	44%	20.3	38%	18	38%
Research	15.7	30%	16.8	31%	14.1	30%
Service/Transfer	2.4	5%	3.7	7%	2.5	5%
Administration	8.5	16%	8.5	16%	8.6	18%
Other	2.9	6%	4.4	8%	4.3	9%
Total	52.6	100%	53.7	100%	47.5	100%
Workload (Hours)						
Teaching	9.1	19%	7.9	17%	6.6	16%
Research	26.6	57%	24.7	53%	22.2	52%
Service/Transfer	2.6	6%	3.8	8%	2.9	7%
Administration	5.3	11%	5.4	12%	6.2	15%
Other	3.3	7%	4.7	10%	4.5	11%
Total	46.9	100%	46.5	100%	42.4	100%
Institutional affiliation c)						
My academic discipline/field	*	4.6	4.6		4.4	4.4
My department (at this institution)		3.4	3.5		3.4	3.4
My institution		3.3	3.3		3.2	3.1

a) "Regarding your own preferences, do your interests lie primarily in teaching or research?" (Answers provided as single choice)

b) "Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?" (Answers provided in hours, calculated in percentage by the authors)

c) "Please indicate the degree to which each of the following affiliations is important to you" (five-point Likert scale: 1 not at all important to 5 very important)

*Measured on a 4-point scale, different in 2007 and 2018, therefore not reported.

In sum, we can say that we can partly observe a change toward a greater research orientation, especially (*at least*) as an ideal, because the preference for research has become stronger over time. However, output increased between 1992 and 2007 and then stays stable. Furthermore, workload as a quantitative investment has decreased over time. Thus, we can assume that academics now interpret their roles differently: they see themselves more in the role of researchers and not as researcher-teachers according to the Humboldtian ideal still valid 25 years ago. However, their daily workload decreases to that of a more normal working life (see also Jacob & Teichler, 2011, p.24) even though full professors still work on average more than 40h per week.

5.2 Vertical differentiation of universities in Germany

Pursuant to the research question of whether a differentiation between universities is visible with regard to academics' research orientation in 2018, we analyze the relationship between organizational characteristics and different variables describing research orientation. We further investigate different types of research output (each indicator contains three related outcomes): funding source, publication output, share of research-based teaching. To analyze the variable "status and size of universities" in depth, we present two tables with a different reference category in each. In the first table, "Excellence status" is the reference (Table 2a), and in the second table "large (but not Excellence)" is the reference (Table 2b).

5.2.1 Research orientation

We see that academics' research preference (vs. teaching preference) is lower both at large (Table 2a; $b = -0.150$, $p < 0.001$) and small universities (Table 2a; $b = -0.639$, $p < 0.001$) compared to *Excellence Universities*. We do not find a significant correlation between a preference for research and *Technical Universities*. Furthermore, academics at small universities have a lower research preference than academics at large universities (Table 2b; $b = -0.490$, $p < 0.001$). The teaching workload of academics at small, medium, and large universities (in this order) is higher than that of academics at *Excellence Universities* (Table 2a; column "teaching workload"); and greater at *Technical Universities* ($b = 0.945$, $p < 0.05$). With regard to research workload, we find a negative relation for *Technical Universities* ($b = -2.146$, $p < 0.01$). Furthermore, academics at small universities have a lower research workload than those at *Excellence Universities* (Table 2a; $b = -3.372$, $p < 0.01$) as well as a lower research workload than academics at large universities (Table 2b; $b = 2.785$, $p < 0.01$).

5.2.2 Funding sources

Compared to academics at *Excellence Universities*, academics at large, medium and small universities have a higher share of funding from their own institution and a lower share of third-party funding from national research funding agencies (Table 2a; “funding source”). Academics at small universities have a higher share (Table 2b; $b = 7.364$, $p < 0.05$) of funding from their own institution and a lower share from other funding sources (Table 2b; $b = -3.012$, $p < 0.01$) compared to academics from large universities. Academics at *Technical Universities* have a lower share of funding from national research funding agencies.

5.2.3 Publication output

Academics at large, medium and small universities publish a lower number of journal articles (Table 2a; $b = -0.480$, $p < 0.05$; large vs. Excellence) compared to those at *Excellence Universities*. We find no significant correlation for academics at *Technical Universities*. Academics from medium-sized and small universities publish fewer journal articles than their counterparts from large universities (Table 2b; column “journal articles”).

5.2.4 Teaching

Regarding teaching, we see that academics at small universities have a higher share of bachelor teaching and a lower share of PhD teaching compared to academics at *Excellence Universities* (Table 2a; column teaching). However, academics at *Excellence Universities* have a higher share of bachelor and a lower share of master lessons than academics at large universities (Table 2b; column “teaching”). This is counter to our expectations. Academics at *Technical Universities* have a higher share of master lessons.

5.2.5 Summary of results

Our analysis shows an emerging differentiation of universities made visible via the research-teaching nexus. In sum, we can observe a more research pronounced orientation at *Excellence Universities*. Academics at these universities prefer research over teaching more than their counterparts and they teach less – however, academics at *Excellence Universities* report a higher share of teaching bachelor courses compared to their colleagues at large universities. Academics at *Excellence Universities* are funded by prestigious national research funding agencies. They publish journals articles rather than books. Similarly, academics from large universities have a pronounced research orientation: they prefer research, have a high research workload and they get a high share of third-party funding. They publish in journals; they teach less in bachelor courses but more in PhD education and training than their counterparts from small universities. Teaching workload increases the less *Excellence* stured and the smaller the university is. Thus, hypotheses 1a and 1b can be confirmed. Academics from *Excellence* and large universities have a stronger research orientation compared to their

Table 2a. Research and teaching 2018 (Excellence status as reference category)

Position (Ref. Cat: Professor)	Research orientation ^{a)}			Funding source ^{c)}			Publication output ^{d)}			Teaching ^{e)}		
	Research preference	Teaching Workload	Research workload	Own institution	National research Foundation	Other source	Authoried Books	Book chapters	Journal articles	Bachelor	Master	PhD
Research assistant	-0.356** (-2.58)	-7.482*** (-17.24)	6.026*** (9.65)	3.183 (1.35)	-6.704*** (-4.86)	3.522* (2.60)	-0.321*** (-6.37)	-2.546*** (-19.03)	-6.973*** (-9.56)	13.88*** (9.16)	-2.376 (-1.51)	-12.22*** (-14.10)
Technical Uni	-0.0949 (-0.66)	0.945 (2.35)	-2.146** (-3.83)	4.537 (1.36)	-6.750** (-3.53)	2.213 (1.36)	0.00165 (0.25)	0.0722 (0.93)	-0.170 (-0.63)	-1.720 (-1.42)	3.504** (3.56)	-2.197 (-1.73)
Small	-0.639*** (-5.17)	3.634** (3.18)	-3.372** (-3.96)	13.47*** (4.90)	-9.457** (-4.34)	-4.008** (-4.30)	0.0928 (2.11)	0.103 (0.48)	-1.372** (-4.34)	3.831* (2.46)	2.257 (1.16)	-4.386*** (-5.00)
Medium	-0.310 (-1.80)	2.058*** (4.70)	-1.461 (-1.83)	10.32*** (5.39)	-8.366*** (-6.11)	-1.958* (-2.37)	0.00906 (0.29)	0.144 (0.91)	-1.392*** (-6.91)	0.187 (0.12)	2.965* (2.78)	-3.422** (-3.13)
Large	-0.150*** (-12.70)	1.360*** (48.48)	-0.587 (-1.32)	6.102*** (6.35)	-5.105*** (-24.11)	-0.997 (-1.29)	0.0311*** (11.75)	0.0182 (0.34)	-0.480* (-2.38)	-2.940** (-3.35)	2.829*** (11.03)	0.0939 (0.10)
Engineering	-0.0483 (-0.18)	-1.126 (-1.46)	-2.659** (-4.32)	-15.97** (-3.28)	-1.074 (-0.25)	17.05*** (12.51)	0.0974*** (6.36)	0.320** (3.56)	-2.515*** (-6.24)	-4.972*** (-6.66)	9.331*** (4.54)	-5.966*** (-5.71)
Social sciences	-0.632*** (-8.11)	2.308*** (5.29)	-4.501*** (-8.00)	15.00*** (6.84)	-16.33*** (-7.58)	1.327 (0.65)	0.225*** (8.49)	1.663*** (17.02)	-3.188*** (-9.35)	6.524* (2.62)	0.757 (0.38)	-8.102*** (-10.24)
Humanities	-1.025*** (-7.35)	4.933*** (13.31)	-5.685*** (-8.30)	22.84*** (13.67)	-16.73*** (-9.39)	-6.113* (-2.63)	0.303*** (9.87)	2.941*** (14.21)	-4.736*** (-10.60)	15.63*** (7.14)	-7.096** (-3.73)	-8.792*** (-9.08)
Constant	2.153*** (19.38)	14.67*** (41.24)	18.73*** (31.04)	28.33*** (16.56)	47.85*** (38.13)	23.82*** (15.05)	0.365*** (10.19)	2.578*** (20.79)	13.21*** (17.45)	36.30*** (18.97)	37.13*** (19.60)	24.75*** (23.68)
N	3547	3547	3547	3278	3278	3278	3246	3246	3246	3014	3014	3014

***p < .001, **p < .01, *p < .05; logistic or linear regressions with clustered standard errors; reported are coefficients and t-scores in parentheses;

a) "Regarding your own preferences, do your interests lie primarily in teaching or research?" (Answers provided as single choice; originally 4-point scale recoded into binary variable "teaching 0 vs research 1")

b) "Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?" (Answers provided in hours)

c) "In the current (or previous) academic year, what percentage of the funding for your research came from [funding source]?"

d) "How many of the following scholarly contributions have you completed in the past three years?"

e) "Please indicate the proportion of your teaching related activities."

Table 2b. Research and teaching 2018 (large (but not Excellence) university as reference category)

Position (Ref. Cat: Professor)	Research orientation ^(a,b)			Funding source ^(c)			Publication output ^(d)				Teaching ^(e)		
	Research preference	Teaching Workload	Research workload	Own institution	National Foundation	Other source	Autorehd Books	Book chapters	Journal articles	Bachelor	Master	PhD	
Research assistant	-0.356** (-2.58)	-7.482*** (-17.24)	6.026*** (9.65)	3.183 (1.35)	-6.704*** (-4.86)	3.522* (2.60)	-0.321*** (-6.37)	-2.546*** (-19.03)	-6.973*** (-9.56)	13.88*** (9.16)	-2.376 (-1.51)	-12.22*** (-14.10)	
Technical Uni	-0.0949 (-0.66)	0.945* (2.35)	-2.146** (-3.83)	4.537 (1.36)	-6.750** (-3.53)	2.213 (1.36)	0.00165 (0.25)	0.0722 (0.93)	-0.170 (-0.63)	-1.720 (-1.42)	3.504** (3.56)	-2.197 (-1.73)	
Medium	-0.160 (-0.91)	0.699 (1.60)	-0.874 (-1.28)	4.222 (2.14)	-3.261* (-2.44)	-0.961 (-0.95)	-0.0220 (-0.70)	0.126 (0.72)	-0.913* (-2.71)	3.127 (2.08)	0.137 (0.13)	-3.516** (-4.06)	
Small	-0.490*** (-3.94)	2.274 (2.00)	-2.785** (-3.66)	7.364* (2.58)	-4.352 (-1.97)	-3.012** (-3.12)	0.0617 (1.37)	0.0852 (0.38)	-0.893* (-2.33)	6.771** (3.82)	-0.571 (-0.29)	-4.480*** (-5.70)	
Excellence	0.150*** (12.70)	-1.360*** (-48.48)	0.587 (1.32)	-6.102*** (-6.35)	5.105*** (24.11)	0.997 (1.29)	-0.0311*** (-11.75)	-0.0182 (-0.34)	0.480* (2.38)	2.940** (3.35)	-2.829*** (-11.03)	-0.0939 (-0.10)	
Engineering	-0.0483 (-0.18)	-1.126 (-1.46)	-2.659** (-4.32)	-15.97** (-3.28)	-1.074 (-0.25)	17.05*** (12.51)	0.0974*** (6.36)	0.320** (3.56)	-2.515*** (-6.24)	-4.972*** (-6.66)	9.331*** (4.54)	-5.966*** (-5.71)	
Social sciences	-0.632*** (-8.11)	2.308*** (5.29)	-4.501*** (-8.00)	15.00*** (6.84)	-16.33*** (-7.58)	1.327 (0.65)	0.225*** (8.49)	1.663*** (17.02)	-3.188*** (-9.35)	6.524* (2.62)	0.757 (0.38)	-8.102*** (-10.24)	
Humanities	-1.025*** (-7.35)	4.933*** (13.31)	-5.685*** (-8.30)	22.84*** (13.67)	-16.73*** (-9.39)	-6.113* (-2.63)	0.303*** (9.87)	2.941*** (14.21)	-4.736*** (-10.60)	15.63*** (7.14)	-7.096** (-3.73)	-8.792*** (-9.08)	
Constant	2.003*** (16.85)	16.03*** (44.39)	18.15*** (31.24)	34.43*** (19.05)	42.74*** (33.90)	22.83*** (13.60)	0.396*** (10.92)	2.596*** (17.76)	12.73*** (14.95)	33.36*** (20.73)	39.96*** (20.93)	24.85*** (28.02)	
N		3547	3547	3547	3278	3278	3246	3246	3246	3014	3014	3014	

***p < .001, **p < .01, *p < .05; logistic or linear regressions with clustered standard errors; reported are coefficients and t-scores in parentheses;

a) "Regarding your own preferences, do your interests lie primarily in teaching or research?" (Answers provided as single choice; originally 4-point scale recoded into binary variable "teaching 0 vs research 1")

b) "Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?" (Answers provided in hours)

c) "In the current (or previous) academic year, what percentage of the funding for your research came from [funding source]?"

d) "How many of the following scholarly contributions have you completed in the past three years?"

e) "Please indicate the proportion of your teaching related activities."

counterparts. However, for *Technical Universities*, we do not find a very specific profile. Therefore, hypothesis 1c cannot be accepted as we do not find evidence for a higher research orientation of academics at *Technical Universities*.

Finally, we can explore how institutional loyalty has changed. Do we find the changed profiles there? We see that institutional loyalty in Germany is mainly formed as loyalty to the scientific community and much less to the university, and this has not changed much over time (see Table 1). In 2018, we only see the minor difference that academics at *Excellence Universities* are slightly more loyal to their organization (full professors have an average value of 3.5 (compared to 3.3), and junior and non-professorial academics of 3.1 (compared to 3) for the question “*Please indicate the degree to which each of the following affiliations is important to you*” on a five-point Likert scale: 1 = not all important to 5 = very important). The coming decades will have to show whether or not the differentiated profiles are also accompanied by new forms of academics’ organizational loyalty.

6. Discussion of results

The above results point to a vertical differentiation between German universities originating in the loosening of the research-teaching nexus. It is difficult to pinpoint the origin(s) of the somehow parallel evolution of research and teaching policies and of the research and teaching attitudes and behavior of academics. According to Schimank (2010), higher education and science policy just reflects the stable but steady evolution of academics’ research and teaching attitudes and behavior, for example expressed in more research output in peer-reviewed journal articles and fewer book publications, and also in indicators for governance and management use. A less opportunistic and more active role of the state would imply that policy reforms from the millennium onward affect academics’ attitudes and behavior to increase compliance with more governance-led vertical differentiation of universities, which is an explicit goal of the *Excellence Initiative* (IECE, 2016).

Accepting our ignorance of causality, we interpret the intertwined evolution of research and teaching policies, and academics’ attitudes and behavior as the drivers for the creation of the organizational academic profession in Germany. Inspired by Larson (1977), the organizational academic profession was theoretically defined above as a merger of the ideologies and norms of the academic profession, of corporate capitalism and public services provision in the German knowledge economy. We are neither claiming that the academic profession has made a full transition to becoming the organizational academic profession nor that the loyalty of academics toward their discipline is decreasing, which is used as a proxy for their loyalty to the academic profession. However, loyalty toward the university is increasing, especially for academics at *Excellence Universities*. Academics working at *Excellence Universities* benefit from the reputation of the

university, i.e., the organization adds to the individual reputation of academics in the vertically differentiated organizational academic profession.

The empirical results of the APIKS 2018 study point to the emergence of the organizational academic profession. First, the Humboldtian ideal of the unity of research and teaching expressed in the research-teaching nexus was ideally valid for academics in all German universities. The descriptive results (see Table 1) are interpreted as a loosening of the research-teaching nexus. Between 1992 and 2018, academics' (both full professors, and junior and non-professorial academics) preference for research increases and their teaching preference decreases. Of course, research preference is highly differentiated according to disciplines. Nevertheless, the Humboldtian ideal of the unity of research and teaching is weakening and can no longer be taken for granted, especially at *Excellence Universities*.⁶

Second, in contrast to the strengthening of the research preference, the amount of time spent on research and the research output of academics did not increase in the last decade. The significant changes in publication output can be observed between 1992 and 2007. But now in the APIKS 2018 in-depth analysis we see a different research behavior (e.g., publication patterns and types of funding) depending on the size and status of universities. Academics at *Excellence Universities* and also at large universities are more research-oriented than their counterparts at medium-sized and small universities. They prefer research over teaching, have a high share of third-party funding and a higher share of journal articles. Results for *Excellence Universities* are supported by a study conducted by Schubert et al. (2017), who used data from the German Federal Statistical Office and bibliometric data.

Third, the size of the university and the status as an *Excellence University* are the independent variables affecting the academic work of research (measured by publications and research funding) and teaching (measured by teaching in bachelor and master programs, and PhD education and training). The change in academics' attitudes and behavior, i.e., the rise of the organizational academic profession, fosters the vertical differentiation among academics. The results are interpreted as the creation of subgroups within the organizational academic profession:

- a) academics at *Excellence Universities* and primarily large universities,
- b) academics in large comprehensive universities with more than 401 full professorships, and
- c) academics at medium-sized (201-400 full professorships) and small comprehensive universities (up to 200 full professorships).

The lack of significant observations for the independent variable *Technical University* is interpreted to mean that *Technical Universities* are no different to any other university when looking at the research-teaching nexus. Accordingly, the research-teaching nexus is neither affected by the publication output nor the proportions of academics' time spent on bachelor and master teaching, and

⁶ To ensure comparability of the three surveys, in the four-point Likert scale the Humboldtian ideal middle category of both research and teaching is missing, which is unfortunate for the German case.

PhD education and training. In addition, the observation implies that the research-teaching nexus at *Technical Universities* is not affected by their privileged access to third-party funding from business and industry (see also Schneijderberg, 2020).

7. Research outlook

The international expert commission for the evaluation of the *Excellence Initiative* (IECE, 2016, p.19) concludes in a very satisfied manner that the *Excellence Initiative* has achieved one outcome for sure: “to bury once and for all the illusion of all German universities being equal” (authors’ translation). Based on the current efforts of higher education policy, supported by the academic management oligarchy and a considerable group among academics, there seems no need for a crystal ball to predict at least three outcomes from the vertical differentiation process in the German higher education sector:

1. Globally competitive research universities: The research-teaching nexus and, therefore, also the Humboldtian ideal of the unity of research and teaching is unraveling. The primacy of research prevails and teaching becomes less of a preference and more of a time-consuming task for full professors. Full professors are pushed to and push themselves to excel in efficient and measurable research, i.e., they produce publication output in indexed journals and acquire third-party funding. Of course, a reputation based on previous research work and the “Matthew Effect” (Merton, 1968; see also Bol et al., 2018) supports the success of full professors in globally competitive universities. Full professors teach less in bachelor and more in master programs, but focus on PhD education and training. With few exceptions, globally competitive research universities are large universities with more than 401 full professorships, which account on average for only 12% of academics at large universities (GFSO, 2018a).⁷
2. German / Humboldt ideal universities: The traditionally research-intensive German university valuing the unity of research and teaching is primarily either medium (201-400 full professors) or small in size (less than 200 full professors). The research-teaching nexus is common practice in bachelor and master teaching, and PhD education and training.
3. Teaching-oriented universities: Especially small universities (less than 200 full professors) but also medium-sized universities are in danger of becoming more teaching-oriented and less research-intensive universities. The breach of the Humboldt ideal – which was

⁷ About 3,000 junior and non-professorial academics constitute the remaining 88% of academics at a large university.

considered as the strength of the German university model for more than two centuries – results in more (bachelor) teaching and less research workload for academics.⁸

When studying vertical differentiation in the German university system, future research could also consider self-selection effects among academics. It can be assumed that academics striving for global recognition by satisfying publication and third-party funding metrics aim for professorships at the first class, highly ranked universities. In addition, the emergence of the organizational academic profession could also be studied by researching academic reproduction as socialization effects. For example, to achieve a positive evaluation for promotion to a full professorship early-career academics in tenure-track professorships have to produce academic output (e.g., number of publications), be successful in acquiring third-party funding and comply with certain organizationally defined criteria. In addition, for the so-called junior professorships with a fixed-term contract of five to six years as well as for pre- and post-doctoral academics, the socialization effect would posit that being socialized in a specific university segment and, therefore, becoming acquainted with the segment's a) research primacy, b) exercise of the unity of research and c) teaching or teaching orientation would create (closed shop) career tracks within the organizational academic profession. For future academics the vertical differentiation in the university sector would mean a combination of the “German survival model” with the “French protective pyramid model” (Enders & Musselin, 2008). Such an outcome would increase ideological differences about research, teaching and its (measurable) outcomes within the organizational academic profession in Germany.

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References

- Altbach, P.G. (Ed.) (1996). *The International Academic Profession: Portraits of Fourteen Countries*. Princeton: Carnegie Foundation for the Advancement of Teaching.
- Arimoto, A. (2015). The Teaching and Research Nexus from an International Perspective. In W.K. Cummings, & U. Teichler (Eds.), *The Relevance of Academic Work in Comparative Perspective* (pp. 91-106). Cham: Springer.

⁸ The “academic drift” (Neave, 1979) of UASs becoming more research oriented would have to be considered in future research too.

- Ash, M.G. (2006). Bachelor of What, Master of Whom? The Humboldt Myth and Historical Transformations of Higher Education in German-Speaking Europe and the US. *European Journal of Education*, 41(2), 245-267.
- Baden-Wuerttemberg (2018 [2005]). *Gesetz über die Hochschulen in Baden-Württemberg*. 13 March 2018 (GBl. p. 85). Stuttgart.
- Bartz, O. (2006): *Wissenschaftsrat und Hochschulplanung. Leitbildwandel und Planungsprozesse in der Bundesrepublik Deutschland zwischen 1957 und 1975*. Dissertation University of Cologne. <https://kups.ub.uni-koeln.de/1879/> (last accessed: 15.06.2019).
- Ben-David, J. (1972). *American Higher Education: Directions old and new*. New York: McGraw Hill.
- Bentley, P.J., & Kyvik, S. (2012). Academic work from a comparative perspective: a survey of faculty working time across 13 countries. *Higher Education*, 63(4), 529-547.
- Best, H., & Wolf, C. (2010). Lineare Regressionsanalyse. In C. Wolf, & H. Best (eds.), *Handbuch der sozialwissenschaftlichen Datenanalyse* (pp. 607-638). VS Verlag.
- Biester, C., & Flink, T. (2015). The elusive effectiveness of performance measurement in science: insights from a German university. In I.M. Welp, J. Wollersheim, S. Ringelhan, & M. Osterloh (Eds), *Incentives and Performance: Governance of Research Organizations* (pp. 397-412). Cham: Springer.
- Blau, P. (1994). *The organization of academic work*. New Brunswick: Transaction Press.
- BMBF – Bundesministerium für Bildung und Forschung (2016). *Evaluation des Bund-Länder-Programms für bessere Studienbedingungen und mehr Qualität in der Lehre (Qualitätspakt Lehre) Abschlussbericht über die 1. Förderphase 2011-2016*. Berlin & Mainz. https://www.bmbf.de/files/Abschlussbericht_Evaluation_QPL_erste_F%e3%b6rderperiode_barrrierefrei.pdf (last accessed: 26.06.2019).
- Bol, T., de Vaan, M., & van de Rijdt, A. (2018). The Matthew effect in science funding. *Proceedings of the National Academy of Sciences*, 115(19), 4887-4890.
- Bourdieu, P. (1975). The Specificity of the Scientific Field and the Social Conditions of the Progress of Reason. *Social Science Information*, 14, 19-47.
- Butler, L. (2010). *Impacts of Performance-based Research Funding Systems: A Review of the Concerns and the Evidence*. Paris: OECD.
- Clark, B.R. (1987). *The Academic Life: Small Worlds. Different Worlds*. Princeton: Carnegie Foundation.
- Cole, S. (1983). The Hierarchy of the Sciences? *American Journal of Sociology*, 89, 111-139.
- Cummings, W.K., & Teichler, U. (Eds.) (2015). *The Relevance of Academic Work in Comparative Perspective*. Cham: Springer
- de Rijcke, S., Wouters, P.F., Rushforth, A.D., Franssen, T.P., & Hammarfelt, B. (2016). Evaluation practices and effects of indicator use – a literature review. *Research Evaluation*, 25(2), 161-169.
- DFG – Deutsche Forschungsgemeinschaft (2013). *Excellence Initiative at a Glance*. Berlin.

- Enders, J. (2001). A chair system in transition: Appointments, promotions, and gate-keeping in German higher education. *Higher Education*, 41, 3-25.
- Enders, J. (2016). Differenzierung im deutschen Hochschulsystem. In D. Simon, & A. Knie (Eds.), *Handbuch Wissenschaftspolitik* (pp. 503-516). Wiesbaden: Springer.
- Enders, J., & Musselin, C. (2008). Back to the Future? The Academic Professions in the 21st Century. In OECD (Ed.), *Higher Education to 2030. Volume 1: Demography* (pp. 125-150). Paris: OECD.
- Enders, J., & Teichler, U. (1995a). *Der Hochschullehrerberuf im internationalen Vergleich. Ergebnisse einer Befragung über die wissenschaftliche Profession*. Bonn: Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie.
- Enders, J., & Teichler, U. (1995b). *Berufsbild der Lehrenden und Forschenden an Hochschulen. Ergebnisse einer Befragung des wissenschaftlichen Personals an westdeutschen Hochschulen*. Bonn: Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie.
- EC – European Commission (2007). *Taking European knowledge society seriously. Report of the Expert Group on Science and Governance to the Science, Economy and Society*. Luxembourg: Office for Official Publications of the European Communities.
- Finkelstein, M. (2014). The Balance between Research and Teaching in the Work Life of American Academics. In J.C. Shin, A. Arimoto, W.K. Cummings, & U. Teichler (Eds.), *Teaching and Research in Contemporary Higher Education* (pp. 299-318). Dordrecht: Springer.
- Flink, T., & Simon, D. (2014). Erfolg in der Wissenschaft: Von der Ambivalenz klassischer Anerkennung und neuer Leistungsmessung. In D. Hänzi, H. Matthies, & D. Simon (Eds.), *Erfolg: Konstellationen und Paradoxien einer gesellschaftlichen Leitorientierung* (pp. 123–144). Baden-Baden: Nomos.
- Freidson, E. (2001). *Professionalization, the third Logic*. Chicago: University of Chicago Press.
- Frølich, N. (2008). *The Politics of Steering by Numbers: Debating Performance-based Funding in Europe*. Rapport 3/2008/. Oslo: NIFU STEP.
- Gerhards, J. (2013). *Der deutsche Sonderweg in der Messung von Forschungsleistungen. Wissenschaftspolitik im Dialog (7/2013)*. Berlin: BBAW.
- German Constitutional Court (Bundesverfassungsgericht) (1973). Professorenmehrheit. Beschluss vom 29. Mai 1973 (1 BvR 424/71 und 325/72). Karlsruhe. <http://www.servat.unibe.ch/dfr/bv035079.html> (last accessed: 14.7.2019).
- Geschwind, L., & Broström, A. (2014). Managing the teaching-research nexus: ideals and practice in research-oriented universities, *Higher Education Research & Development*, DOI: 10.1080/07294360.2014.934332.
- GFSO – German Federal Statistical Office (2018a). *Bildung und Kultur. Personal an Hochschulen 2017* (Fachserie 11 Reihe 4.4). Wiesbaden.

- GFSSO – German Federal Statistical Office (2018b). *Drittmittel nach Hochschule 2007 und 2014* (H201 Sonderauswertung). Wiesbaden.
- Gläser, J., & Laudel, G. (2016): Governing Science. How Science Policy Shapes Research Content. *European Journal of Sociology*, 57(1), 117-168.
- Gläser J., & Laudel, G. (2019). Die Unterkomplexität hochschulpolitischer Innovationen. In C. Schubert & I. Schulz-Schaeffer (eds.), *Berliner Schlüssel zur Techniksoziologie* (pp. 179-204). Wiesbaden: Springer.
- Godin, B. (2006). The Knowledge-Based Economy. Conceptual Framework or Buzzword? *Journal of Technology Transfer*, 31(1), 17-30.
- Goode, W.J. (1957). Community within a community: The professions. *American Sociological Review*, 22, 194-200.
- Gottlieb, E.E., & Keith, B. (1997). The academic research-teaching nexus in eight advanced-industrialized countries. *Higher Education*, 34, 397-420.
- Hazelkorn, E. (2015). *Rankings and the Reshaping of Higher Education. The Battle for World-Class Excellence* (2nd ed.). Basingstoke: Palgrave Macmillan.
- Henkel, M. (2005). Academic Identity and Autonomy in a Changing Policy Environment. *Higher Education*, 49(1-2), 155-176.
- Hesse (2009). *Hessisches Hochschulgesetz*. Vom 14. Dezember 2009 (GVBl.IS.666), zuletzt geändert durch Artikel 2 des Gesetzes vom 18. Dezember 2017 (GVBl.S.482). Retrieved July 02, 2019, from http://www.lexsoft.de/cgi-bin/lexsoft/justizportal_nrw.cgi?xid=3917776,1
- Hesse (2016). *Voraussetzungen und Rahmenbedingungen der Verleihung eines Promotionsrechts an hessische Hochschulen für angewandte Wissenschaften*. Retrieved June 26, 2019 from https://wissenschaft.hessen.de/sites/default/files/media/hmwk/20160318_voraussetzungen_promotionsrecht_hess_haw.pdf
- Hüther, O., & Krücken, G. (2018). *Higher education in Germany - recent developments in an international perspective*. Cham: Springer.
- IECE – International Expert Commission for the Evaluation of the Excellence Initiative (2016). Retrieved May 07, 2019 from *Endbericht (final report)*. <http://www.gwk-bonn.de/fileadmin/Papers/Imboden-Bericht-2016.pdf>
- Jacob, A.K., & Teichler, U. (2011). *Der Wandel des Hochschullehrerberufs im internationalen Vergleich: Ergebnisse einer Befragung in den Jahren 2007/08*. Bonn & Berlin: Bundesministerium für Bildung und Forschung.
- Jakobi, A.P. (2007). The Knowledge Society and Global Dynamics in Education Politics. *European Educational Research Journal*, 6(1), 39-51.
- Kehm, B. (2013). To be or not to be: The impacts of the excellence-initiative on the German system of higher education. In J.C. Shin, & B.M. Kehm (Eds.), *Institutionalization of world-class university in global competition* (pp. 81–97). Dordrecht: Springer.

- Klenke, D. (2012). Die Einführung der W-Besoldung: Ihre Entstehung aus zeitgeschichtlicher Perspektive. *Forschung & Lehre, 19*(3), 190-193.
- Kogan, M., & Teichler, U. (2007). Key Challenges to the Academic Profession and its Interface with Management: Some Introductory Thoughts. In M. Kogan & U. Teichler (Eds.), *Key Challenges to the Academic Profession* (pp. 9-15). Kassel: INCHER-Kassel.
- Larson, M.S. (1977). *The rise of professionalism: A sociological analysis*. Berkeley: University of California Press.
- Leisyte, L., Enders, J., & de Boer, H. (2009). The balance between teaching and research in Dutch and English universities in the context of university governance reforms. *Higher Education, 58*, 619-635.
- Macfarlane, B. (2010). Professors as Intellectual Leaders: Formation, Identity and Role. *Studies in Higher Education, 36*(1), 47-73.
- McClelland, C.E. (1990). Escape from Freedom? Reflections on German Professionalization, 1870-1933. In R. Torstendahl, & M. Burrage (Eds.), *The Formation of Professions: Knowledge, State and Strategy* (pp. 97-113). London: Sage.
- Merton, R.K. (1968). The Matthew Effect in Science: The reward and communication systems of science are considered. *Science, 159*, 56-63.
- Mintzberg, H. (1983). *Structure in Fives: Designing Effective Organizations*. Englewood Cliffs: Prentice Hall.
- Mulkay, M. (1976). The mediating role of the scientific elite. *Social Studies of Science, 6*, 445-470.
- Münch, R. (2011). *Akademischer Kapitalismus. Zur politischen Ökonomie der Hochschulreform*. Berlin: Suhrkamp.
- Musselin, C. (2013a). How Peer Review Empowers the Academic Profession and University Managers. Changes in Relationships between the State, Universities and the Professoriate. *Research Policy, 42*, 1165-1173.
- Musselin, C. (2013b). Redefinition of the relationships between academics and their university. *Higher Education, 65*, 25-37.
- Neave, G. (1979). Academic drift: Some views from Europe. *Studies in Higher Education, 4*(2), 143-159.
- OECD – Organisation for Economic Co-operation and Development (1996). *The knowledge-based economy*. Paris: OECD.
- OECD (2015). *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development. The Measurement of Scientific, Technological and Innovation Activities*. Paris: OECD.
- Overmann, U. (2005). Wissenschaft als Beruf. Die Professionalisierung wissenschaftlichen Handelns und die gegenwärtige Universitätsentwicklung. *die hochschule, 1*, 15-51.
- Perkin, H. (1969). *Key Profession: A History of A.U.T.* London: Routledge.

- Power, M. (1997). *The Audit Society: Rituals of Verification*. Oxford: Oxford Univ. Press.
- Power M. (2004). Counting, control and calculation: reflections on measuring and management. *Human Relations*, 57, 765-783.
- Preißler, U. (2016). Die W-Besoldung in 17 Variationen. *Forschung und Lehre*, 4, 316-319.
- Parsons, T. (1968). Professions. In E. Shils (Ed.), *International Encyclopedia of the Social Sciences*, 12 (pp. 536-547). New York: The Free Press.
- Postiglione, G.A., & Jung, J. (2015). Congeniality and Research Productivity in State-Professional-Market Driven Systems of Mass Higher Education. In W.K. Cummings, & U. Teichler (Eds.), *The Relevance of Academic Work in Comparative Perspective* (pp. 107-120). Cham: Springer.
- Ritzer, G. (1975). Professionalization, bureaucratization and rationalization: The views of Max Weber. *Social Forces*, 53(4), 627-634.
- Schimank, U. (2005). 'New Public Management' and the Academic Profession: Reflections on the German Situation. *Minerva*, 43(4), 361-376.
- Schimank, U. (2010). Reputation statt Wahrheit: Verdrängt der Nebencode den Code? *Soziale Systeme*, 16(2), 233-242.
- Schneijderberg, C. (2020; forthcoming). On Justification of Technical Universities in Germany: Evolution of the Civic-Industrial Order on the Education and Research Markets. In L. Geschwind, A. Brostöm, & K. Larsen (Eds.), *Technical Universities. Past, Present and Future* (chapter 8). Dordrecht: Springer.
- Schneijderberg, C., & Merkator, N. (2012). Higher Education Professionals: a Literature Review. In B.M. Kehm, & U. Teichler (Eds.), *The Academic Profession in Europe – New Tasks and New Challenges* (pp 53-92). Dordrecht: Springer.
- Schneijderberg, C., & I. Steinhardt. (2019). Accreditation of X Qualities Instead of Quality X: A Normative Analysis of Criteria of the German Higher Education Accreditation Regime. *Higher Education Policy*, DOI: 10.1057/s41307-018-0111-y.
- Schneijderberg, C., & Teichler, U. (2018). Doctoral Education, Training and Work in Germany. In J.C. Shin, B.M. Kehm, & G. Jones (Eds.), *Doctoral Training for Knowledge Society* (pp. 13-34). Dordrecht: Springer.
- Schubert, T, Frietsch, R., & Rothengatter, O. (2017). *An analysis of the Excellence Initiative and its effects on the funded universities* (Studien zum deutschen Innovationssystem Nr. 11-2017). Karlsruhe: Fraunhofer Institute for Systems and Innovation Research ISI.
- Schudson, M. (1980). Review Article. A discussion of Magali Sarfatti Larson's *The Rise of Professionalism: A Sociological Analysis*. *Theory and Society*, 9(1), 215-229,
- Scott, W.R. (2005). Evolving Professions: An Institutional Field Approach. In T. Klatetzki, & V. Tacke (Eds.), *Organisation und Profession* (pp. 119-142). Wiesbaden: VS Verlag,
- Shin, J.C. (2011). Teaching and research nexuses across faculty career stage, ability and affiliated discipline in a South Korean research university. *Studies in Higher Education*, 36(4), 485-503.

- Slaughter, S., & Rhoades, G. (2004). *Academic capitalism and the new economy. Markets, state, and higher education*. Baltimore: Johns Hopkins Univ. Press.
- Stephan, P.E. (1996). The Economics of Science. *Journal of Economic Literature*, 34(3), 1199-1235.
- Stichweh, R. (1994). *Wissenschaft, Universität, Profession*. Frankfurt a. M.: Suhrkamp.
- Teichler, U. (2014). Teaching and Research in Germany. The Notion of University Professors. In J.C. Shin, A. Arimoto, W.K. Cummings, & U. Teichler (Eds.), *Teaching and Research in Contemporary Higher Education* (pp. 61-78). Dordrecht: Springer.
- Teichler, U., Arimoto, A., & Cummings, W.K. (2013). *The Changing Academic Profession. Major Findings of a Comparative Survey*. Dordrecht: Springer.
- UNESCO (2005). *Towards knowledge societies*. Paris: Unesco Publishing.
- Välilmaa, J., & Hoffman, D. (2008). Knowledge Society Discourse and Higher Education. *Higher Education*, 56(3), 265-285.
- Waaijer, C.J.F. (2015). The Coming of Age of the Academic Career: Differentiation and Professionalization of German Academic Positions from the 19th Century to the Present. *Minerva*, 53, 43-67.
- Weber, M. (1978). *Economy and society. Vol. 2*. Berkeley: University of California Press.
- Weingart, P. (2001). *Die Stunde der Wahrheit? Zum Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft* (4th edition). Weilerswist: Velbrück.
- Weingart, P. (2005). Impact of bibliometrics upon the science system: Inadvertent consequences? *Scientometrics*, 62(1), 117-131.
- Wissenschaftszeitvertragsgesetz (2016). Gesetz über befristete Arbeitsverträge in der Wissenschaft. (BGBl. I S. 442). Berlin.
- Whitley, R. (2007). Changing Governance of the Public Sciences. In R. Whitley, & J. Gläser (Eds.), *The Changing Governance of the Sciences* (pp. 3-27). Dordrecht: Springer.
- Whitley, R. (2010). Introduction: Reconfiguring the Public Sciences: The Impact of Governance Changes on Authority and Innovation in Public Science Systems. In R. Whitley, J. Gläser & Engwall, L. (Eds.), *Reconfiguring knowledge production. Changing authority relationships in the sciences and their consequences for intellectual innovation* (pp. 3-57). Oxford: Oxford University Press.
- Wilkesmann, U., & Schmid, C.J. (2012). The impacts of new governance on teaching at German universities. Findings from a national survey in Germany. *Higher Education*, 63, 33-52.

Appendix

Table 3. University employment

Variable	Sample
Position	%
Full Professor	17.2
Junior and non-professorial academics	82.8
Excellence status and size	
<i>Excellent</i> (and large)	30.2
Large (but not <i>Excellence University</i>)	35.7
Medium (but not <i>Excellence University</i>)	22.4
Small (but not <i>Excellence University</i>)	11.7
Technical University	
Yes	28.4
No	71.6
Discipline	
Natural sciences	39.8
Engineering	17.7
Social sciences	25.1
Humanities	17.5
Volume of employment	
Full-time	67.1
Part-time	32.9
Type of contract	
Permanently employed (tenured)	18.2
Continuously employed	8.4
Fixed-term employment with permanent/continuous employment prospects	3.2
Fixed-term employment without permanent/continuous employment prospects	70.3
Gender	
Male	62.9
Female	37.1
Years in position	
Up to 6 years	54.2
7 to 12 years	25.2
More than 12 years	20.7
<i>Total</i>	3547

Table 4. Preferences, workload and outputs of academics at German universities

	Mean	Std. Dev.	Min	Max	Total
Research preference (vs. teaching preference)	0.8	0.42	0	1	3547
Workload					
Teaching	11.4	9.63	0	72	3547
Research	19.6	12.78	0	90	3547
Service/Transfer	2.4	4.88	0	50	3547
Administration	3.9	5.22	0	40	3547
Funding source					
Own institution	42.9	42.32	0	100	3278
National research funding agencies	28.6	38.12	0	100	3278
Other funding	28.5	38.36	0	100	3278
Publication output					
Authored books	0.3	0.64	0	10	3246
Book chapters	1.6	2.97	0	35	3246
Scientific journal articles	4.8	8.28	0	200	3246
Teaching activities					
Bachelor	50.2	31.58	0	100	3014
Master	38.6	28.58	0	100	3014
PhD	8.3	16.41	0	100	3014