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Fixed-term employment and leaving intention

An analysis of junior academics across Europe**

Abstract: The academic career systems in Europe differ significantly. While in tenure systems, permanent positions can be obtained shortly after the doctorate, in up-or-out systems, most researchers remain in fixed-term employment until they become professors. Therefore, the article focuses on how the type of contract affects the intention of post-doctoral researchers to leave academia in different countries, using theoretical labor market concepts as well as the social-cognitive approach. Findings based on EUROAC data from ten European countries show that more researchers in up-or-down systems intend to leave academia than in tenure systems. This applies to both temporary and permanent researchers. Still, the duration of work contract – especially temporary employment without prospects of permanent employment – is a significant predictor for leaving academia even after controlling for other factors. In contrast, job satisfaction plays an important role in both groups for the remain. In addition, the number of publications only has a significant influence in tenure systems and does not play a role in the up-or-out systems. It is also only in tenure systems that women with children show a lower leaving intention – whereas in Germany for example, the compatibility of an academic career with a family is discussed as a problem area.

Keywords: Employment system; fixed-term employment; early career researchers; intention to leave; international comparison

Befristung und Ausstiegsintention

Der wissenschaftliche Nachwuchs in Europa

Zusammenfassung: Die akademischen Karrierestrukturen in Europa sind sehr unterschiedlich. In Tenure-Systemen können Wissenschaftler/innen nach der Promotion unbefristete Stellen erhalten, in Rauf-oder-raus-Systemen verbleiben die meisten Wissenschaftler/innen bis zur Professur in befristeten Arbeitsverhältnissen. Daher konzentriert sich dieser Beitrag auf die Frage, wie sich die Vertragsart auf

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die Absicht promovierter Wissenschaftler/innen in verschiedenen Ländern auswirkt, die Wissenschaft zu verlassen. Dazu werden arbeitsmarkttheoretische Überlegungen sowie der sozial-kognitive Ansatz zugrunde gelegt. Die Ergebnisse, die auf den EUROAC-Daten aus zehn europäischen Ländern basieren, zeigen, dass Wissenschaftler/innen in Rauf-oder-raus-Systemen häufiger beabsichtigen, die Wissenschaft zu verlassen als diejenigen in Tenure-Systemen. Dies gilt sowohl für befristet als auch für dauerhaft beschäftigte Wissenschaftler/innen. Die Vertragsdauer – insbesondere die befristete Beschäftigung ohne Verstetigungsperspektiven im Vergleich zur Dauerbeschäftigung – ist auch nach Kontrolle durch weitere Faktoren ein signifikanter Prädiktor für das Verlassen von Universitäten. Im Gegensatz dazu trägt in beiden Gruppen Arbeitszufriedenheit zum Verbleib in der Wissenschaft bei. Die Publikationsstärke hat nur in den Tenure-Systemen einen signifikanten Einfluss und spielt in den Rauf-oder-raus-Systemen interesseranterweise keine Rolle. Ebenfalls nur in den Tenure-Systemen zeigen Frauen mit Kindern eine geringere Ausstiegssicht – dabei wird grade in Deutschland die Vereinbarkeit einer wissenschaftlichen Karriere mit Familie als ein Problemfeld diskutiert.

Stichworte: Karrieresystem; Befristung; wissenschaftlicher Nachwuchs; Ausstiegssicht; internationaler Vergleich

1 Introduction

The decline in career prospects for early career researchers (ECR) is a general phenomenon that all higher education systems in Europe have been confronted with over the last two decades (Jones/Finkelstein 2019; Shin et al. 2014). Increasing numbers of PhD holders and falling rates of permanent employment predestine that many ECRs leave academia, be it voluntarily or through lack of opportunity (McAlpine/Emmioglu 2014). In the first few years after obtaining a doctorate, between 15 percent (Portugal) and 79 percent (Austria) of ECRs leave academia (Auriol 2013; Höhle 2016: 177) and in Germany, only one in ten doctorate holders becomes a professor (Konsortium 2013). Therefore, research into the reasons for leaving academia and the role of contracts is of high interest for higher education policy, university governance and the quality of academic research.

When examining academic careers, it should be noted how tremendously the academic career systems within Europe differ from country to country (Finkelstein/Jones 2019; Teichler/Höhle 2013). On the one hand, tenure systems offer a permanent position shortly after completion of the doctorate; with a permanent position, staying in academia is guaranteed for the ECRs. Up-or-out systems, on the other hand, keep researchers in temporary contracts right up to the level of professorship (Kreckel 2008). There, the ECRs, who are often into their forties, remain unsure whether they will manage to secure one of the few permanent positions. According to Metz-Göckel et al. (2016), temporary ECRs in Germany have very little chance

of ever finding a permanent position in academia. For them, employment insecurity is a key reason for leaving academia (Zhou/Volkwein 2004; McAlpine/Emmioglu 2014).

As most studies about intention to leave academia are based on only one employment system, the existing research leaves a gap regarding the interplay between different employment systems. Since it is generally assumed that the intention to leave academia depends on the employment system, the question becomes: Does it vary across different systems? Therefore, the paper focuses on how the type of contract affects the intention of young researchers in different career systems to leave academia. Does the type of contract have the same effect on intention to leave academia in systems with early employment stability as it does in up-or-out systems? Bluedorn (1982) and Flöther (2017) have shown that intention to leave is a reliable indicator of actual exit.

In addition to uncertain prospects, several additional factors for leaving academia are highlighted in the literature on academic careers. The most frequently-discussed drivers include the lack of integration into the scientific community and lack of job satisfaction (e.g., Metz-Göckel et al. 2016; Padilla-González/Galaz-Fontes 2015; Jakstät et al. 2017; Schröder et al. 2021; Jungbauer-Gans/Gross 2013; Kahlert 2013). According to Broadbent et al. (2013), temporary positions in academia often differ from permanent in terms of institutional resources, influence in the department, and social integration. Therefore, the employment contract is modeled as mediated by the predictors of integration into the institution and the scientific community, and job satisfaction. The study focuses on the questions:

- Does the intention to leave academia differ depending on the career system?
- Does the intention to leave academia depend on the early career researchers' employment contracts?
- Can other reasons, namely integration into the institution and the scientific community, along with job satisfaction, explain the effect of the type of contract on the intention to leave academia?

Hypotheses are developed with the help of different theoretical perspectives from e.g., labor market theory, social-cognitive theory, and organizational psychology. Since the division into tenure and up-and-out systems does not well describe all ten chosen career systems, I introduce the categorization into early and late permanent employment systems that serves as a framework for the empirical investigation. Subsequently, the role of employment contract for the intention to leave academia is analyzed in multivariate analyses.

2 Theoretical frame and literature review

Although the intention to leave academia is very personal and is influenced by individual factors, it occurs in a context of career structures *within* academia and

career opportunities *outside* of academia. The individual employment situation, integration into the institution and the scientific community, job satisfaction, belonging to a discipline and the family situation can all influence the intention to leave. In this section, theoretical perspectives for each aspect are presented together with the corresponding literature review. Four hypotheses are derived from this. Although studies on intention to leave academia go back several decades, they are still limited in number. Those available focus on different countries with different career systems; they take different researcher groups into account, and each pursues their own specific question and approach. Therefore, the possibility for a comparison between European countries, and especially regarding the group that falls between PhD and professorship, is limited. Also, not all studies observe the effect of employment contract in their model; however, a few studies do systematically consider the employment contract and some, but not all of these confirm its importance for the decision to leave academia (Metz-Göckel et al. 2016; Padilla-González/Galaz-Fontes 2015; Aarnikoivu et al. 2019).

2.1 *Employment system and opportunity structures*

The decision for or against continuing an academic career takes place in the context of academic career structures and of extramural labor market opportunities. Labor market theory describes the interplay between higher education expansion, which leads to an increase in doctorates, and the demand for knowledge-intensive workers in all sectors (Schubert/Engelage 2006; Hadjar/Becker 2006). In the countries where the number of doctorate holders is growing, it exceeds the demand in academia, and the doctorate holders are striving for the extramural labor market. There, they increase the supply of highly qualified workers. The tertiary labor market incorporates them, reacts with increasing knowledge-intensity in all sectors and with an increase in the number of entrance qualifications. This leads to a higher demand for academics on the non-academic labor market. According to Schubert/Engelage (2006) and Hadjar/Becker (2006), the dynamics between the educational structures and the labor market exert both pull and push factors on academics.

Pull factors motivate ECRs to enter the non-university labor market and can be described as opportunity structures for finding adequate employment outside of academia. On labor markets with a developed knowledge economy, more private firms conduct research or apply academic knowledge than in less developed economies. Therefore, knowledge economies offer better opportunities for graduates than can be found in less-developed markets (Stehr 2001; Drucker 1968; Bell 1973). Also, by shaping it, high numbers of graduates and doctorate holders contribute to the knowledge intensity of the non-university labor market over time. Therefore, national contexts can be categorized according to the knowledge intensity of the labor market.

Push factors motivate ECRs to withdraw from academia. The national university employment systems provide more- or less-selective environments for ECRs and thus, determine the chances of permanent employment at university. A certain number of researchers compete for a certain number of permanent positions. In less selective systems, the chance of permanent employment is higher because the ratio between PhD holders and permanent positions is more balanced than in more selective systems. In more selective systems, however, a greater number of PhD holders compete for fewer permanent positions. This leads to the expectation that the intention to leave academia differs between systems with long periods of temporary employment and systems with early permanent employment.¹

Tracer studies about PhD holders show that both PhD rates and the proportion of PhD holders working outside of academia vary widely across countries (Auriol et al. 2013). Konsortium (2013: 291) analyzes postdoctoral researchers in Germany shortly after completion of their doctorates and shows that not all of them naturally aspire to an academic career, but that over 30 percent aspire to a career outside of the university and 43 percent are open to both sectors. The motivation to leave research depends heavily on the alternative offers on the non-university labor market and on the academic discipline (see also Vogel/Hinz 2004). Waajer (2017) states that for PhD graduates in the Netherlands, the perception of job prospects is relevant to the sector of their job search. Overall, they assess the prospects in academia to be significantly worse than those outside academia. Reasons that still motivate them to stay in academia include are the intellectual challenge, the independence, the opportunity for personal development and the opportunity to contribute to society. However, not every highly developed economy offers attractive positions for postdocs, especially for those interested in research. In Germany, only some of those PhD holders who work outside university conduct research and development (Flöther 2017; Konsortium 2017: 186f) or can apply scientific methods (Konsortium 2013). According to a qualitative study from the UK and Switzerland, half of the PhD graduates interviewed find it difficult to make a start in the non-academic labor market, they have problems understanding the organizational culture and their own function inside the organizational structure (Sakni et al. 2022). An international study examining whether there is a correlation between the PhD rate, temporary employment contracts at universities, economic status in a country and the proportion of PhD holders outside of academia (Höhle 2016; 2019) tentatively confirms a correlation; the research intensity, the proportion of PhD holders and the percentage of PhD holders working outside of academia increases with a higher economic status, but the percentage of permanently-employed academics decreases.

1 Long temporary employment is found e.g., in habilitation systems in the Humboldtian model (e.g., Germany, Austria, Switzerland), early permanent employment is found in tenure systems of the Newmanian model (e.g., UK, Ireland, Netherlands).

Hypothesis 1: ECRs in systems with late employment stability (“LatePECs”, see next paragraph) show a significantly higher rate of intention to leave academia than ECRs in systems with earlier employment stability (“EarlyPECs”).

2.2 Fixed-term Employment and Intention to Leave

According to the tournament theory of Lazear/Rosen (1981), a tournament is a reward system in which reward differences between employees are not based on their individual outcomes, but only on relative differences between individuals. In academia, this situation occurs when a certain number of positions (or, e.g., journal articles, funded projects, etc.) are distributed among a random number of competitors, where even good applicants are likely to miss out (Burk et al. 2016). According to Lent et al., career decisions are made based on a set of beliefs: “Social-cognitive theory suggests that people act both on their assessment of what they can do and on their beliefs about the likely effects of different actions” (Lent et al. 1994, pg. 84). According to this, the interests of the individuals and their career goals are moderated on the one hand by their expectations of self-efficacy (“can I do this?”) and on the other hand by their expectations of results (“if I do this, what will happen?”). In the academic environment, where there is limited access to permanent positions, ECRs attempt to assess their chances of staying in the system (or pursuing a career in the system that suits their goals). Since they know the academic field, they can assess their own strengths and weaknesses relatively well and compare them with those of other ECRs. They are also likely to be able to estimate what further investment is needed to reach their goals and find working conditions with which they are comfortable (e.g., a permanent contract). With this in mind, ECRs can reasonably assess their chances of winning the tournament. The end of a temporary contract represents a critical moment when ECRs can again choose either to compete in the tournament or potentially leave academia. Each transition from one contract to the next can involve a smaller or larger effort (e.g., applying for a job, writing a project application) and can be accompanied by changes (e.g., of university, department, team, or research topic). Especially in a situation of precarious employment, the transition can provoke a fundamental reappraisal of the academic career as a goal (Lent et al. 1994). Considering the prospects for remaining in the system or possible other alternatives, the decision to be an academic may be reconsidered. Therefore, a contractual transition can act as a recalibration of career goals. It can lead to self-selection by those ECRs who consider their own ability to be too poor to achieve the desired position, those who are (or have become) generally dissatisfied in their academic work, and those who expect a different professional situation, e.g., regarding employment stability, investments, and opportunities for self-realization (Best et al. 2016). On the other hand, for researchers with permanent employment, leaving a secure position at the university is a major loss of security and thus a decision that requires a higher motivation to change than is the case with their colleagues in temporary positions. This motivation would be either to want to leave

the existing status (push-effect) or to want to take an alternative option (pull-effect). With either type of contract, opting for a position outside academia carries some risk, as most ECRs have no work experience outside academia and are therefore unable to assess whether their academic competencies match the requirements.

In empirical studies, the correlation between contract and leaving intention is rarely analyzed in a systematic way, although temporary employment is an often-discussed topic in the (German) literature on academic careers. Metz-Göckel et al. (2016: 75ff) show the important role that the contract plays when leaving academia. They examine mid-level faculty in Germany after they have left academic work at universities. When asked about their reasons for leaving, two-thirds of the formerly temporary academics reported they left because their employment contract was expiring, and 13 percent cited the “Wissenschaftszeitvertragsgesetz”, a national law that limits the possible employment time for ECRs. Another quarter dropped out due to dismissal. The authors also note that women drop out earlier than men but are more likely to stay in higher education, e.g., in higher education management. Aarnikoivu et al. (2019), who studied temporary ECR academics at Finnish universities, found that their intention to leave was most often due to stress related to job-insecurity, dissatisfaction, and a desire for a higher salary. Padilla-González/Galaz-Fontes (2015), on the other hand, conduct a country comparison. They compare 15 countries from four continents from the Changing Academic Profession (CAP) dataset (6 countries from Europe, 3 from North America, 3 from Asia, 1 from South America). In the CAP study, the same questionnaire was used as in the EUROAC study; however, the sample of respondents analyzed includes all academic ranks (including those without doctorates as well as professors) plus lecturers from universities of applied sciences and those without research or teaching activities. They conclude that the employment contract has a significant effect on the leaving intention in only four countries (Finland, Japan, Canada, and the Netherlands).

Hypothesis 2: ECRs with fixed-term contracts intend to leave academia more often than permanently-employed ECRs.

2.3 Intention to leave and contract duration: integration into the scientific community

According to Schein (1971), the organization is structured along boundaries that divide into center and periphery; functional boundaries as well as boundaries of inclusion and exclusion. Employees within an organization can occupy either a more peripheral or a more central position. With the latter, they belong to the inner circle, have access to internal information, and can influence organizational decisions (Schein 1971). The distinction between central and peripheral positions brings with it differences in access to internal information, participation in decision-making, networking, and the assignment of worthwhile tasks. It is assumed

that in highly structured organizations, fixed-term employees are more affected by marginalization than permanent employees. This concept is to be combined with Goffman's (1952) concept of 'cooling out'. The term 'cooling out' describes a gradual loss of professional interest throughout the academic career, followed by disintegration, which can ultimately lead to dropout. Cooling out among researchers is attributed in particular to the disappointment at expectations of recognition not being met, at the lack of integration into social networks and at the lack of support from gatekeepers or supervisors (e.g., Kahlert 2012; Metz-Göckel et al. 2010); it gradually leads to a withdrawal from academic life. Being pushed out of jobs and (institutional and non-institutional) networks can go hand-in-hand with a gradual loss of interest and loss of identification as a researcher. Here I assume that temporarily-employed researchers have a higher risk of falling into peripheral roles and—due to poor integration—of getting into a cooling out process that leads to their exit. Since, according to Laudel/Gläser (2008: 390) academic integration takes place both in the scientific community (especially for research-related activities) and at one's own institution (especially for teaching-related activities), both fields are considered here.

Most empirical studies do not refer directly to the concept of integration, but to various measurable aspects of it. Broadbent/Strachan (2016) and Broadbent et al. (2013) found in their study of ECRs in Australia that fixed-term employees, compared to permanent employees, are clearly disadvantaged in several aspects, e.g., in the development of their own research profile, the formation of networks and cooperation, and in their publication opportunities. Because of the negative impact of precarious employment on academic careers themselves, they argue that temporary workers are part of a 'secondary' university workforce. Höhle (2015b: 1434) examines academics at all career levels in Germany, the Netherlands and Norway and finds that, among other factors, the contractual conditions (permanent contract, full-time employment, and a research-intensive position) correlate significantly with achieving a leading role in research. Jaksztat et al. (2017) examine young academics in Germany before and immediately following completion of their doctorates. They find that perceived support, involvement in scientific networks and involvement in activities in third-party-funded projects strengthen motivation to stay in academic research. For doctoral students who work outside universities, on the other hand, starting an academic career is rather unlikely. However, Schröder et al. (2021) and Jungbauer-Gans/Gross (2013) show that recognized publications increase the chance of a tenured professorship in Germany. Both note that more women are leaving universities, but those who remain have a higher chance of becoming professors than do men. Parasız et al. (2017) found in their study of academics in Turkey that organizational commitment, with its core element, emotional commitment, is a significant determinant for exit intentions. Gender and marital status have no influence in their multivariate model.

Hypothesis 3: The relationship between contract duration and intention to leave academia is fully mediated by the integration into the institution and the scientific community.

2.4 *Intention to leave and contract duration: job satisfaction*

Various types of academic resources (or: academic rewards)—both social and financial—can increase job satisfaction and thus motivate people to stay in academia. Bandura posits that “Some of the most valued rewards of activities are in the satisfaction derived from fulfilling personal standards, rather than in tangible payoffs” (Bandura 1986: 231). Since intrinsic drive plays a special role for the academic profession (Beaufaÿs 2003), satisfaction can arise from academic content, but also, for example, from autonomy within the institution or interaction with students and colleagues, and so forth (Lent et al. 1994: 90). According to Schein’s approach, employees on the periphery of the organization have less easy access to the rewards that can contribute to job satisfaction. They may also have less employee participation, less power within the organization and less access to resources that can be used to increase status (e.g., financial, and personal resources). Furthermore, employees on the periphery may also have less access to the intangible academic rewards such as visibility, interesting assignments, publishing opportunities, networks, and attractive topics. All of this can result in fixed-term employees achieving lower levels of job satisfaction than permanent employees. Therefore, assumedly, fixed-term contracts can lead to low levels of job satisfaction which in turn reduces staying in academia.

In a study on academic job satisfaction in Poland, the authors find that job satisfaction depends, among other factors, on the social significance of the research contents carried out (Szromek/Wolniak 2020). In a study from the Netherlands, the authors examine the effect of fixed-term contracts on the job satisfaction for ECRs (Waajer et al. 2017). They find that fixed-term contracts have a negative effect on job satisfaction, and on job content and work-life satisfaction, especially for employees without prospects for permanence. Goldan et al. (2022) use panel data to confirm the correlation between fixed-term contracts and job satisfaction for doctorate holders in Germany. According to their analysis, the correlation in the academic sector is significantly higher than in the private sector. Castellacci & Viñas-Bardolet (2021) support the result for European countries with data from the MORE2 study. They emphasize that in the multivariate model, the contract type has the largest impact on job satisfaction, especially mid-career. An additional significant factor that contributes to job satisfaction is the perception of good job prospects. In the continental and Scandinavian countries, both the type of contract and the employee’s age have greater impact on job satisfaction than in Anglo Saxon countries or in southern and eastern Europe. In a Dutch study on the dropout of doctoral students, the authors find that respondents value the experience of openness, integrity, trust and freedom, but report being dissatisfied when they experience unhealthy research practices, such as lack of time for research, insufficient sup-

port, insufficient supervision and unethical practices. Those who are dissatisfied with unhealthy research practices are significantly more likely to consider leaving academia (Kis et al. 2022). Most studies on leaving intention focus on a single national system and therefore have limited comparability between countries. The study by Padilla-González/Galaz-Fontes (2015), however, compares 15 countries and concludes that the factors that lead to the intention to leave academia vary so much from country to country that no common pattern can be discerned. In fact, job satisfaction is the only significant common factor that determines leaving intention across all countries.

Hypothesis 4: The relationship between contract duration and intention to leave academia is fully mediated by job satisfaction.

The causal direction of the hypotheses presented is based on an assumption. The opposite direction would also be conceivable, e.g., where an academic is planning to leave academia and therefore neither searches for a permanent contract nor tries to integrate in the scientific community and is satisfied despite having little access to academic rewards. However, it seems most probable that academics planning to leave university would already have done so after completing their doctorates, so they are therefore no longer included in the sample. It is therefore also assumed here that those in the sample intended to remain in academia following completion of their doctorates and that their intention to leave only arose due to the work itself.

3 Data Base, Country Categorization, Measures

3.1 Data Base

The data used for the analysis of the intention to leave were collected in the international study EUROAC “The Academic Profession in Europe: Responses to Societal Challenges”, which was funded by the German Research Foundation.² It was headed by Prof. Dr. Dr. h.c. Ulrich Teichler at the International Center for Higher Education Research (INCHER) in Kassel. In the survey, academics employed at higher education institutions were asked about their careers, their academic activities and views, and also about institutional governance. The EUROAC project, whose results from 10 European countries are analyzed here, was carried out in 2010–2012 as an international collaborative project. The same questionnaire was used in each country. Valid answers were given by 13,828 academics working at universities. The information used here is limited to the responses of ECRs holding a PhD but not yet a professorship and who are active in teaching and/or research; that is, 4,742 valid cases, of which 4,554 also answered the independent variable leaving intention. Case numbers vary from 161 in the Netherlands to 1,575 in

2 For reasons of data protection, the international team decided to share the data only among project members and not publish them as a scientific use file. The Syntax that is written for this text can be downloaded here: <https://doi.org/10.7802/2526>.

Poland (case numbers in the other countries are: Switzerland: 426, Austria: 672, Germany: 500, Portugal: 162, Ireland: 276, United Kingdom: 371, Norway: 299 and Finland: 300). The results are considered to be representative (for detailed methodical information see Teichler/Höhle 2013). Doctoral students are excluded from this analysis, first, because their status varies from student to faculty member by country. Second, the PhD has a dual function: the selection between those who aspire to a career in academia and those who aspire to a position outside of academia usually occurs with the transition to post-doc (Jones/Finkelstein 2019; Kreckel 2008). In an international comparison, the career phase between doctorate and professorship seems to be well suited to studying whether or not to remain in an academic career, since the decision for or against staying is usually made in this phase (cf. IDEA consult 2013). All academics not active in research or teaching are also excluded. As a secondary analysis, the selection of countries and the operationalization of the indicators are based on the availability of data. The selected countries are similar in their characteristic of belonging to first-world OECD countries within the European Research Area, but they show a wide variety of career structures. Therefore, this composition seems suitable for a cross-country analysis of academic careers. When selecting the country cases, only those with a satisfactory number of cases, data quality and number of valid answers in the key questions were selected.

3.2 Categorization of Countries

The career systems differ in their structure. The central-European systems (Germany, Switzerland, Austria) go back to a long tradition of chair systems in which research-intensity, a post-doctoral qualification (habilitation, or: "second book") and the dependence on a professor go together with long phases of fixed-term employment (up-or-out systems). The United Kingdom, Ireland, and the Netherlands, on the other hand, belong to the classic department systems.

There, the intensity of teaching and a higher degree of independence in early career phases go hand-in-hand with early permanent employment (tenure systems). However, the systems in Portugal, Poland, Finland, and Norway, differ in a few features from the British and the German systems. Although the Polish system traditionally follows a chair structure, it is more teaching-oriented and ECRs can achieve permanent employment relatively early in their careers. Portugal, Finland, and Norway formerly used chair systems but later adopted the department structure, which has led in part to a hybridization of both. Nevertheless, research intensity and long employment instability persist (Teichler et al. 2022; Höhle 2015a). Therefore, here I categorize the systems into two groups according to the duration of employment instability. The contract variable in the questionnaire is well suited for this. This variable is measured in five categories (see Table 1).

Table 1: Employment contract by country (percentage)

	Germany	Norway	Austria	Finland	Switzerland	Netherlands	Portugal	Poland	Ireland	United Kingdom	Means, range	Means, range
Tenure	8	12	26	29	16	52	36	17	58	46	18 8–29	42 17–58
Continuous without guarantee	22	4	10	11	13	6	2	42	18	18	12 4–22	17 2–42
Tenure-Track	5	5	8	7	4	14	30	37	19	32	6 4–8	26 14–37
Fixed-term without Prospects	63	75	49	40	66	28	29	4	5	4	59 40–75	14 4–29
Other	2	3	7	14	1	1	3				5 1–14	2 1–3
Total	494	298	650	297	421	161	155	1557	269	361	2160	2503

Source: EUROAC-survey; Question: What is the duration of your current employment contract at your higher education institution?

For a categorization, the five items are summarized into a binary variable with the characteristics permanent employment (tenure & continuous without guarantee) and temporary employment (tenure-track & fixed-term without prospects & other) in a first step. Second, the ECRs are split into two career tiers. A classification according to academic positions is not suitable, since the positions between doctorate and professorship are too heterogeneous from country to country and therefore not comparable (OECD 2013:139–145; Kreckel 2008)³; therefore, the academic positions are not suitable for a cross-national categorization into career levels. For these reasons, the career levels for the ECRs are categorized into postdocs (0 to 6 years after graduation) and upper juniors (6 or more years after graduation), according to the scheme proposed in the Frascati Manual (OECD, 2002), which is reconstructed based on the survey data. Since in most countries, the postdoctoral phase is intended as a probation and selection phase as well as for further qualification for a professorship, fixed-term employment is a legitimized standard. On the other hand, especially in countries with tenure systems, ECRs in the upper junior phase are considered as mature academics and are accepted as peers, and therefore can expect to be continuously employed. In countries in which the qualification and selection processes are continued up to a professorship—especially in countries with chair systems in which the habilitation (or similar assignments) is a further qualification—temporary employment continues into late career phases. Since the differences between the career systems are particularly evident in the stage of the upper junior,

3 The positions in each national system differ and are not comparable.

this career stage serves as the main reference point for distinguishing between systems with early and late permanent employment. Countries where fewer than half (<50 percent) of upper juniors are permanently employed are categorized as Late Permanent Employment Countries (LatePECs), and countries where more than half (>50 percent) of upper juniors are permanent are categorized as Early Permanent Employment Countries (EarlyPECs) (Höhle 2015a; 2019). Table 2 shows that Norway, Switzerland, Austria, Germany, and Finland are categorized as LatePECs and Portugal, the United Kingdom, Poland, Ireland, and the Netherlands are categorized as EarlyPECs. The two columns on the right present the group mean and the range of values for each group of countries. This measure is supplemented by further contextual indicators that support the differentiation of the systems: The PhD rate can be an indicator for selectivity and competition. If the number of doctorates is higher than can be absorbed by universities, there will be an 'overproduction' of doctoral degrees, which can lead to competition at universities and result in a push mechanism. High PhD rates mean more postdocs need to leave the university than when there are low PhD rates. The combination of permanent employment and the PhD rate (with and without international PhDs) is used here as a measure of selectivity and competition.

The table shows that in LatePECs, higher PhD rates are associated with long periods of temporary employment. High PhD rates mean that the staff pyramid at universities has a broad base, where more potential researchers compete for academic positions, i.e., high selectivity prevails. In EarlyPECs, lower PhD rates are associated with early permanent employment. There, the PhD degree is more geared towards the academic labor market.

The wealth of the Western European economies is based (at least to a large extent) on knowledge-based industry for which large numbers of researchers (e.g., PhDs) are trained. They work in academia and also find good employment opportunities on the non-academic labor market. Because research is expensive to conduct, only wealthier economies can afford to invest in the training of large numbers of researchers—they are trained for industry. In contrast, in less knowledge-intensive economies, researchers are mainly trained for academia. The gross domestic product ('Purchase Power Parity': PPP) and the national share of researchers (across academic and non-academic markets) are indicators of the knowledge intensity of the economy (shown in Table 2). Here, LatePECs shows higher proportions of researchers and a higher PPP, with lower proportions of researchers and a lower PPP showing in EarlyPECs. The bivariate correlation between permanent employment of upper juniors and the PPP is significant ($r = -.654$; $p = .04$; 10 cases), implying longer periods of fixed-term employment in wealthier countries. This suggests a loose connection between better non-academic employment structures for academics in LatePECs—which might facilitate exits from academia—and, in contrast, less favorable extramural opportunities in EarlyPECs (particularly in Poland and Portugal), making dropout more difficult. Of course, within each group

of countries, there is a wide range of different values. While Switzerland and Norway have the highest PPP and Poland the lowest PhD ratios, PPP and number of researchers, the boundaries between 'high' and 'low' PhD and PPP are fluid, and in some cases may overlap (e.g., Ireland and Netherlands (both EarlyPECs) have a relatively high PPP despite belonging to EarlyPECs; Ireland and Austria, belonging to EarlyPECs and LatePECs, have the same PhD rate (excluding internationals). However, a trend can clearly be observed that in LatePECs, there are knowledge economies with high numbers of researchers, high PPP, and PhD rates. In contrast, EarlyPECs are characterized by lower PhD rates, fewer researchers, and lower PPP. One study with a similar concept but with 20 countries also confirms this finding (Höhle 2019).

Table 2: Contextual descriptions for LatePECs and EarlyPECs

	LatePECs					EarlyPECs				LatePECs (mean [§] ; range)	EarlyPECs (mean [§] ; range)
	Norway	Switzerland	Austria	Germany	Finland	Portugal	UK	Poland	Ireland	Netherlands	
Permanent empl. postdocs* (%)	10	17	9	5	31	17	62	34	76	25	14; 5–31
Permanent empl. upper juniors* (%)	22	34	44	46	48	66	68	70	76	76	39; 22–48
PhD rate including int.** (%)	1.9	3.2	2.1	2.7	2.5	1.4	2.4	0.5	1.9	1.8	2.5; 1.9–3.2
PhD rate excluding int.** (%)	1.7	1.7	1.6	2.3	2.2	1.3	1.3	0.5	1.6	1.2	1.9; 1.6–2.3
Researchers per Million#	5,576	4,481	4,704	4,472	7,188	4,142	4,055	1,851	3,370	4,303	5,284; 4,472– 7,188
PPP***	54,947	46,430	42,597	40,007	35,617	23,068	37,307	21,214	39,547	41,711	43,920; 35,617 – 54,947

Sources: *EUROAC survey, exact question see paragraph 3.3

**OECD 2014

***International Monetary Fund

#OECD 2016 online data source

§ constructed as mean of country means.

Note: contract was recoded into two categories.⁴

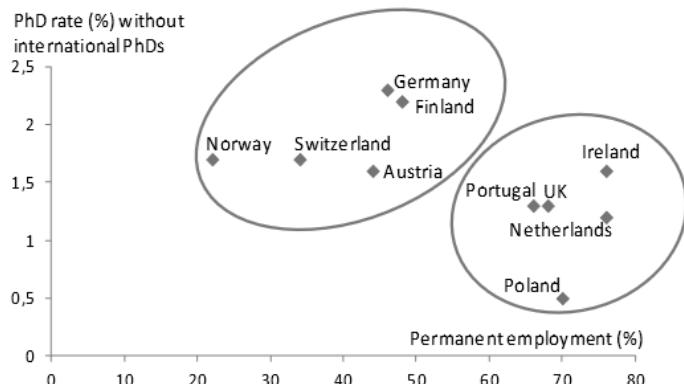
4 Contract categories are summarized:

permanent = tenure + continuous;

temporary = tenure-track + fixed-term + other.

Goastellec/Pekari (2013: 235) demonstrate that most international students leave the European countries following their PhD graduation⁵, and are no longer available on the academic labor market. Thus, Figure 1 demonstrates the combination of permanent employment of upper juniors and PhD rate (excluding international students). The two groups of countries can be identified: LatePECs with lower rates of permanent employment and higher PhD rates, and EarlyPECs with high rates of permanent employment and lower PhD rates.

Figure 1: PhD rate and permanent employment of upper juniors in Europe



Source: EUROAC survey, permanent employment of upper juniors; OECD 2014

Note: contract was recoded into two categories.

In the following, the sample is divided into two groups. Although the sample size is insufficient to conduct a multilevel analysis⁶, its main idea shall still direct the analysis. The theory of multilevel analysis postulates that not only individual characteristics, but also environmental conditions may influence individual decisions (Langer 2009; Pötschke 2014: 1105). Individuals decide based on their perception of opportunities (Lent et al. 1994). Here, career structures (described by contract conditions and competitiveness) and chances on the extramural labor market (Burk et al. 2016) constitute opportunity structures as well as professional boundaries that are assumed to moderate individual career decisions. These form the context in which academics make their decisions about whether or not to remain to remain in academia.

- 5 On the contrary, the rate of foreign PhD graduates who stay for 5–10 years or longer in the USA is much higher (Finn/Pennington 2018).
- 6 Maas and Hox (2004) give a minimum of 30 to 50 cases on level 2 for statistical multilevel analysis. In the case of country comparisons, such high numbers are difficult to reach.

3.3 Dependent Variable Intention to Leave Academia

The question “Within the last five years, have you considered a major change in your job?” is a multiple response question with five possible categories that was binary coded (Yes=1, No=0). The dependent variable of interest here is the answer “To work outside higher education/research institutes”.⁷ Table 3 shows the answers, case numbers, mean values and ranges of the country groups. The proportion of ECRs who considered leaving academia in the last five years varies substantially across systems, from about a quarter (Netherlands) to more than half (Switzerland and United Kingdom).

Analyzing the shares of intention to leave according to the LatePECs and EarlyPECs country classification proposed above, ECRs in EarlyPECs show on average a lower level of intention to leave academia than those in LatePECs (on average 48 percent vs. 34 percent; range of 40–61 percent vs. 27–52 percent), as expected. The results vary within country groups, but only the value for the United Kingdom overlaps with the values for LatePECs. In LatePECs, the ‘risk’ of intending to leave academia is 1.66 times greater than in EarlyPECs ($p = .000$).

Therefore, *hypothesis 1 is supported, which states that ECRs in LatePECs have a significantly higher intention of leaving academia than ECRs EarlyPECs*. Although this is not a proof of causality, this can be read as a description of how contextual factors influence individual behavior. The intention to leave academia is more prominent in an environment of intense competition and uncertainty, surrounded by greater availability of knowledge-intensive extramural job options.

7 The other answering options are (EarlyPECs and LatePECs):

“To a managerial position in your higher education/research institution”, with 12 percent and 18 percent agreement,

“To an academic position in another higher education/research institute within the country”, with 27 percent and 40 percent agreement,

“To an academic position in another country”, with 24 percent and 43 percent agreement,

“No, I have not considered making any major changes in my job”, with 41 percent and 24 percent agreement.

Table 3: Intention to leave academia

		LatePECs					EarlyPECs					LatePECs	EarlyPECs
		Germany	Norway	Austria	Finland	Switzerland	Netherlands	Portugal	Poland	Ireland	UK	Means ⁸ ; range	Means; range
Yes %	40	47.7	43.8	48.1	61.3		27.2	28.4	33.3	33.1	51.8	48 % 40–61 %	34 % 27–52 %
No %	60	52.3	56.2	51.9	38.7		72.8	71.6	66.7	66.9	48.2	52 % 39–60 %	66 % 48–73 %
Total	490	284	612	290	399		157	151	1565	245	361	2075	2479

Source: EUROAC survey

Note: contract was recoded into two categories.

3.4 Independent Variables

Table 4 describes the predicted variable as well as the variables entered in the regression models. The independent variables are contract conditions, two mediation blocks (first, integration into the institution and the scientific community; and second, job satisfaction), as well as two blocks of control variables (institutional and individual demographics). In addition, the significance levels for the correlation with the employment contract and with intention to leave are also shown. Integration into the institution and scientific community is measured with different variables in one block. Affiliation to university and influence in department describe the integration into the institution. Managerial research roles and publications are indices that describe involvement in research activities with peers and structures outside the institution. The application of knowledge to society describes the transfer of research, which is also part of the integration into the scientific community.

The frequencies show that intention to leave academia is higher in LatePECs and the proportion of permanently employed academics is lower. They show that the two items that describe an institutional bond (affiliation and influence) are slightly higher in EarlyPECs than in LatePECs. On the other hand, the two research-oriented items, research management (which describes responsible positions in the scientific community with gatekeeping functions), and number of publications, are somewhat lower. In the EarlyPECs group, the overall satisfaction is slightly lower but the proportion of parenthood is slightly higher than in the LatePECs group.

8 Since case numbers vary by country, means of country groups are calculated as the means of country means. This applies for all means of country groups in this paper.

Table 4: Independent variables

	Frequencies		Correlation with			
	LP [§]	EP [§]	contract		leaving intention	
			LP	EP	LP	EP
<i>Intention to Leave Academia (0=No, 1=Yes,)</i>						
“Within the last 5 years, have you considered a major change in your job?” – “To work outside higher education”	48%	34%	***	***		
<i>Contract* (0=No, 1=Yes)</i>						
Permanently employed (tenured)	18%	42%			***	***
Continuously employed (no guarantee of permanence)	12%	17%			*	n.s.
Fixed-term empl., permanent prospects (tenure-track)	6%	26%			n.s.	***
Fixed-term empl. without permanent employment prospects	59%	14%			***	***
Other	5%	2%			*	n.s.
Part-time employment	24%	12%			***	**
<i>Integration into the Institution and Scientific Community</i>						
Affiliation to univ. (1=Not at all important, 5=Very important)	52% [§]	55% [§]	***	n.s.	***	***
Influence in department (1=Not influential, 4=Very influential)	34% ^{§§}	39% ^{§§}	***	***	***	***
Managerial research roles (index ⁹ ; 0=None, 5=All five) (means)	2.15 [#]	1.95 [#]	***	***	n.s.	n.s.
No. of publications (Score ¹⁰ , log transformed)	2.45 [#]	2.30 [#]	***	**	n.s.	n.s.
Apply knowledge to problems in society (1=Disagree, 5=Agree)	53% [§]	56% [§]	***	n.s.	n.s.	*
<i>Job Satisfaction</i>						
“How would you rate your overall satisfaction with your job?”	62% [§]	56% [§]	***	*	***	***
“If I had it to do over again, I would not become an academic.”	64% [§]	64% [§]	***	**	***	***
<i>Institutional Demographics</i>						
Career Stage (0=No, 1=Yes)						
Postdoc: PhD no longer than 6 years	35%	36%	***	***	*	***
Upper Junior: PhD longer than 6 years, not yet professor	65%	64%	***	***	*	***
Discipline (0=No, 1=Yes)						
Engineering	10%	18%	n.s.	***	**	n.s.
Humanities	23%	21%	*	*	***	**
Social Sciences	14%	16%	n.s.	*	n.s.	n.s.
Sciences	28%	32%	**	*	n.s.	n.s.
Medicine	26%	13%	***	n.s.	n.s.	n.s.

9 The 5 items are: Serving as a peer reviewer e.g., for journals or institutional evaluations; Editing journals or book series; Supervising researchers and team leadership; Writing for grants; Managing research budgets.

10 Score from: Number of ... “Scholarly books you authored or co-authored”; “Scholarly books you edited or co-edited”; “Article published in an academic book or journal”; “Research report/monograph written for a funded project”; “Paper presented at a scholarly conference”; “Professional article written for a newspaper or magazine”

	Frequencies		Correlation with				
			contract		leaving intention		
	LP ^{\$}	EP ^{\$}	LP	EP	LP	EP	
<i>Individual Demographics</i>							
Age in years	40.3	40.6	***	***	***	***	
Gender and child/ren (0=No, 1=Yes)							
Male, with child/ren	29%	30%	***	*	n.s.	*	
Male, no child	31%	22%	n.s.	**	***	*	
Female, with child/ren	17%	28%	n.s.	*	n.s.	**	
Female, no child	23%	20%	***	**	n.s.	*	
Parental education (0=No, 1=Yes)							
Father higher education degree	48%	47%	n.s.	n.s.	n.s.	n.s.	
Mother higher education degree	36%	38%	***	*	n.s.	n.s.	

Note: ^{\$}EP= EarlyPECs, LP=LatePECs; #means; ^{\$}categories 4+5 added; ^{\$\$}categories 3+4 added; one-sided significance

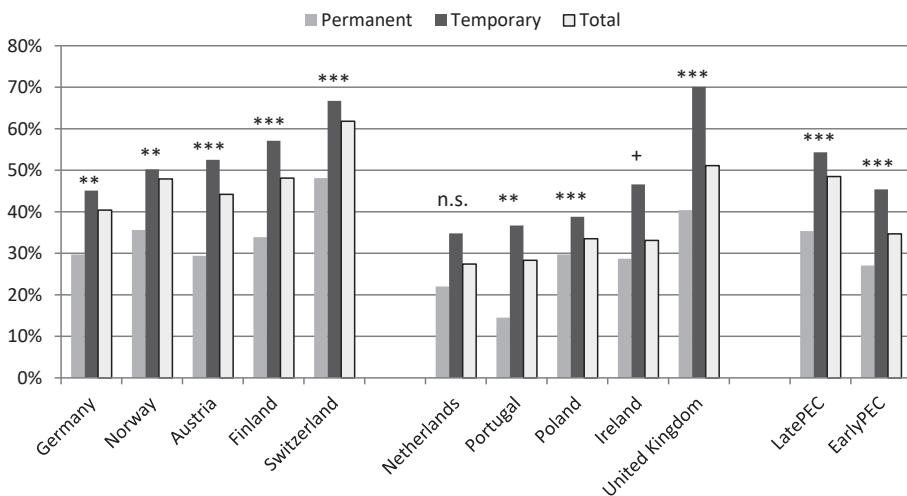
Source: EUROAC-survey

4 Results

4.1 Intention to leave academia and employment contract

Figure 2 displays the intention to leave academia by type of employment contract and the level of significance between the categories temporary and permanent (based on Chi² tests), both for each country and aggregated by group of countries. As expected, temporarily employed academics in all countries surveyed intend to leave academia significantly more often than permanently employed ones. Therefore, *hypothesis 2 is supported*. The type of employment contract correlates with exit intentions both at the level of each individual country and at the level of country groups. The mean difference between the two types of contracts is similar in both country groups (18 and 19 percentage points). In addition, Figure 2 shows that the higher rates of intention to leave in LatePECs are not only due to there being a higher proportion of ERCs in temporary employment, but also to the fact that permanent ECRs in LatePECs show higher levels of intention to leave than those in EarlyPECs.

Figure 2: Intention to leave academia and contract duration in 10 European countries



Source: EUROAC survey;

contract was recoded into two categories.

Note: + p <= 0.10, * p <= 0.05, ** p <= 0.01, *** p <= 0.001.

The results show that the intention to leave academia is more pronounced in an insecure environment; that means in countries with high selectivity and long-term employment instability. While this is not surprising for academics on temporary positions, this finding also applies to permanently-employed academics. The fact that permanently-employed academics in LatePECs intend to leave academia more often than permanently employed ones in EarlyPECs is an interesting finding but needs some explanation. The literature offers conflicting approaches for this.

According to Shin et al. (2014) and Höhle (2016), the career systems that later offer stable employment are at the same time systems with a stronger focus on research, while tenure systems are generally more teaching-oriented. Zhou/Volkwein (2004) find that faculty who are intensively involved in teaching have a lower tendency to leave the department. Therefore, high levels of teaching-orientation within the system could explain the higher remain of both permanent and non-permanent faculty in systems with early employment stability than in systems with later employment stability, which are more research-oriented.

Another possible explanation is a higher exit intention in the latter group of countries, because of a general competitive climate and an acceleration of research (Broadbent/Strachan 2016). Research is increasingly being financed through third-party funding—especially in research-oriented systems—and studies show that both the workload researchers are facing when submitting proposals and the number of

publications required are increasing; many researchers experience this development as a burden (Böhmer et al. 2010). Therefore, the general competitive climate in LatePECs can exert a push effect out of the system even for permanently employed academics (Hadjar/Becker, 2006).

Another possible explanation is that three of the LatePECs are organized as chair systems with a personnel structure characterized by a very narrow top layer, while four of the countries with early permanent employment are organized as department systems with a broader top layer. Therefore, the chance of reaching a leadership position as a professor is much greater in most EarlyPECs countries (Froese 2013). In LatePECs, however, those permanently employed academics aspiring to a professorship face a glass ceiling and may therefore intend to leave academia. On the other hand, higher levels of intention to leave academia in LatePECs countries can also be interpreted as an indication that high academic research qualifications are becoming increasingly attractive on the non-university labor market and have thus increasingly been given a dual function, aiming both at academia as well as at knowledge-intensive occupations outside academia (Konsortium 2013). Since LatePECs are also highly-developed knowledge economies with more knowledge-intensive employment opportunities outside of academia, non-university career prospects can exert a pull-effect to enter private industry or administration (Burk et al. 2016; Hadjar/Becker 2006). Table 1 shows that the labor market in the EarlyPECs group is less knowledge-intensive than that of the LatePECs and thus assumedly induces a weaker pull-effect than the labor market in LatePEC.

4.2 Regression Models

To find out whether the association between the formal contract and ECRs' intention to leave is mediated by integration in the institution and the scientific community, overall job satisfaction, and control variables, hierarchical binary logistic regression analyses are conducted in five consecutive models. To be able to compare the models, the average marginal effects are shown in Table 5 (Behnke 2015; Mood 2009). The question in focus is how the correlates of formal contract change with the stepwise integration of further factors (Baron/Kenny 1986).

As preparation, each model was run including all country cases and the country group dummy (not shown here). Belonging to country groups has been found to have a significant effect in each model, showing that the groups differ.¹¹ For this reason, it seems reasonable to run the models separated by country groups. Since the information presented above (Table 3, Figure 2, Table 4) shows in-group variance, a null model (M0), restricted to country dummies maps the country effect within each country group. Country dummies are also included in each of the following models. In the first model (M1), the criterion variable intention to leave academia is regressed on the predictor contract. In M2 and M3, the two mediator

11 Hence, hypothesis 1 can be supported, as shown in paragraph 4.1.

blocks are then included separately in the equation. In M4, the control variables institutional and individual demographics are added to the predictor, and in M5 the full model is run. The goodness-of-fit of the model is expressed as pseudo-R², which, unlike the R² in OLS regressions, cannot be interpreted directly as explained variance, but describes the relative increment of the effect between the models (Behnke 2015). All models are significant (p=.000).

M0: In-group variation by country

M0 shows a certain degree of ingroup heterogeneity for both country groups. In each group, one or two cases deviate significantly from the reference category: Switzerland for LatePECs and the UK and Portugal for EarlyPECs. Figure 2 shows higher levels of leaving intention in LatePECs.

M1: Employment contract

In both groups of countries, almost all contract types differ significantly from the reference category having a tenured contract. Although 'continuous' employment is usually permanent, it is associated with lower academic ranks than those of tenured academics, which may explain the difference in leaving intention. Working part-time is not significantly associated with the intention to leave academia. Based on these results, *hypothesis 2 can be supported*. Overall, the influence of the formal contract on the intention to leave of the ECRs, under control by country variation, is stronger in the LatePECs group than in EarlyPECs group.

M2: Integration into the institutional and scientific community

Integration into the institution and the scientific community explains part of the impact of the contract on intention to leave, since most values for the employment contract decrease from M1 in both country groups. Since it does not explain the effect of contract fully, *hypothesis 3 must be rejected, even if there is a partially mediating effect*. Still, the effect of contract is stronger than this of institutional and scientific integration in both country groups.

M3: Overall job satisfaction

Overall job satisfaction also reduces the effect of contract on the criterion variable. In addition, there is a mediating effect on contract, but it does not explain contract fully, *so that hypothesis 4 must also be rejected, even if there is a partially mediating effect*. Anyhow, it is an important finding that the influence of job satisfaction on intention to leave is quite strong. In the EarlyPECs group, satisfaction determines intention to leave academia even more strongly than in the LatePECs group.

Since job satisfaction is closely related to the contract conditions (cf. Table 4), Model 3 was also run with one interaction term (fixed-term contract*job satisfaction) and with two interaction terms (fixed-term contract*job satisfaction and fixed-term contract*not become an academic again). Both terms were not signifi-

cant in the models of either group and had almost no impact on pseudo-R². Therefore, the models that include the interaction term(s) are not presented.

M4: Institutional and individual demographics

The two blocks of control variables, institutional and individual demographics, also have a mediating effect on the contract variable. The effect of most items in the contract block also decreases with the inclusion of the control variables. Although the control variables have a mediating effect in both country groups, they are somewhat stronger in the LatePECs group. Academics in the humanities in particular show a significantly lower level of leaving intention compared to those from engineering. Higher age also significantly reduces the probability of intending to leave academia. In both country groups, family status has a significant impact, but in different directions; in EarlyPECs, mothers have a significantly lower level of leaving intention than fathers—in LatePECs, on the other hand, men without children have lower levels of leaving intentions than men with children. While the values in EarlyPECs indicate family friendliness, the values for LatePECs can be read as a contrast to family friendliness.

M5: Full model

The values for the contract variables are greatly decreased in both country groups, suggesting that the effects measured in M1 are partly explained by the additional factors included. Since none of the single factors added in models M2-M4 decreased the coefficients for contract as much as in M5, the stronger effect must be explained by the combination of all three variable blocks. However, the contract variable still has an own effect on intention to leave academia that cannot be explained by the other factors. Therefore, *hypothesis 1 can still be supported* even after controlling for further factors.

Table 5: Hierarchic Binary Logistic Regression: Intention to Leave Academia in EarlyPECs and LatePECs (Average Marginal Effects)*

	M0		M1		M2		M3		M4		M5	
	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC	Late PEC
<i>Contract (reference: tenure)</i>												
Continuous	0.13 ***	0.21 ***	0.12 ***	0.12 ***	0.11 ***	0.17 ***	0.09 **	0.14 **	0.06 *	0.06 *	0.11 *	
Tenure-track	0.14 ***	0.17 **	0.12 ***	0.16 **	0.13 ***	0.16 **	0.09 **	0.05	0.06 *	0.06 *	0.04	
Fixed-term	0.31 ***	0.30 ***	0.27 ***	0.27 ***	0.26 ***	0.24 ***	0.26 ***	0.19 ***	0.17 ***	0.17 ***	0.13 **	
Other	0.35	0.36 ***	0.30	0.32 ***	0.22	0.31 ***	0.36	0.27 ***	0.23	0.20 **		
Part-time (ref.: full-time)	0.00	0.04	0.00	0.03	0.01	0.03	0.07	0.06	0.08	0.05		
<i>Integration</i>												
Affiliation to university	-0.06 ***	-0.04 **							-0.02 **	-0.01		
Influence in department	-0.07 ***	-0.06 ***							-0.04 **	-0.03 *		
Managerial research roles	0.02 **	0.03 *							0.01	0.02 *		
No. of publications	-0.02 *	-0.01							-0.01 *	0.01		
Apply knowledge to society	0.01	0.02							0.02 *	0.03 *		
<i>Satisfaction</i>												
Job satisfaction									-0.09 ***	-0.07 ***		
Become academic again									-0.07 ***	-0.06 ***		
<i>Institutional Demographics</i>												
Stage (ref.: upper junior)									0.00	-0.06 *	0.02	-0.04
Postdoc												
<i>Discipline (ref.: Engineering)</i>												
Humanities									-0.13 ***	-0.17 **	-0.11 ***	-0.17 **
Social Sciences									-0.05	-0.10	-0.04	-0.11 *

		M0	M1	M2	M3	M4	M5
	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC	Late PEC	Early PEC
Sciences						-0.03	-0.05 *
Medicine						-0.06	-0.09 *
<i>Individual Demographics</i>							
Age					-0.03 ***	-0.06 ***	-0.04 ***
<i>Family Type (ref. male/child)</i>							
Male / no child					-0.05	-0.07 *	-0.03
Female / child					-0.10 ***	0.04	-0.10 ***
Female / no child					-0.04	-0.01	0.00
Father tert. ed (ref.: no ed.)					0.00	-0.03	0.00
Mother tert. ed. (ref.: no ed.)					0.02	0.01	0.03
<i>Country Dummies (ref.: PL, AT)</i>							
UK ***	CH ***	UK ***	CH **	UK ***	CH ***	UK ***	CH ***
PT **	PT *	PT *	DE *	PT *	DE *	NL *	FI *
Pseudo R ²	.016	.018	.037	.064	.071	.079	.147
					.125	.059	.093
						.189	.158

*Coding of Intention to leave: 1 = Yes, 0 = No; All variables are coded in the way that positive coefficients are associated with intention to leave, while negative values are associated with staying in academia.

Note: N is kept stable for all models: EarlyPECs=2213; LatePECs=1343.

Significance levels: *** p<.001 ** p<.01 * p<.05.

Source: EUROAC survey.

Both country groups represent different types of employment that offer a different set of opportunities for their employees, resulting in higher or lower levels of intention to leave academia. Although the results partly show similar motives for intention to leave, they also reveal differences between LatePECs and EarlyPECs. Having a contract other than a tenured contract is associated in both country groups with leaving academia, especially when it is a fixed-term contract with no permanent prospects. The effect that the contract shows in M1-M4 can be partly explained by the other factors, but it has an important effect itself, when all other variables are equal (Question 3). Further results are:

- Personal influence in the department significantly supports staying in academia in both country groups. On the contrary, the application of knowledge to society strengthens the intention to leave academia in both groups. The transfer of knowledge may have a bridge-building function to enterprises.
- In the EarlyPECs group, affiliation with the university (which indicates institutional integration), and a higher publication output (which signals integration into the scientific community, but also academic success), both contribute to staying in academia. This is not the case with LatePECs—there academics leave irrespective of their institutional affiliation and their academic success.
- Gatekeeping functions (managerial research roles) as a sign for integration into the institution and the scientific community was expected to motivate remaining in academia. Here, on the other hand, surprisingly, it significantly supports the intention to leave academia in the LatePECs group. A possible explanation could be that these activities may support academics in developing contacts outside academia that facilitate the transition in countries with a knowledge-based economy.

Hypothesis 3 claims that the relationship between contract duration and leaving intention is fully mediated by integration into the institution and the scientific community. While integration does affect leaving intention, it does not fully mediate contract and must therefore be rejected.

- In both groups of countries, overall job satisfaction has a strong effect of retaining academics at university. In EarlyPECs the effect is even stronger than in LatePECs. Possibly, in an environment of potentially secure employment (EarlyPECs) a stronger motive to leave academia, which may be provided by job dissatisfaction, is necessary.

Hypothesis 4 claims that the relationship between contract length and leaving intention is fully mediated by satisfaction. Although satisfaction has an even stronger effect on leaving intention than integration does, it does not fully mediate the contract and is therefore rejected.

- The results show that the academic disciplines also play an important role, although differently in each group. While, compared to engineering, belonging

to humanities reduces the intention to leave in both groups—even more so in LatePECs than in EarlyPECs—there are still differences according to discipline by country group. In LatePECs, it is obvious that the ‘soft’ disciplines show a greater tendency to stay in academia than the ‘hard’ (STEM) disciplines, even if they conduct basic research (e.g., natural sciences) (Hamann 2015; Becher/Trowler 2001).

This finding supports Xu’s (2008) analyses regarding turnover differences across disciplines. In EarlyPECs, ECRs who belong to the academic disciplines conducting basic research (humanities, sciences), have a higher tendency to remain in academia, while those in the applied disciplines (engineering and social sciences) have a tendency to leave. The stronger application focus in the EarlyPECs group can be read as an indication of a less research-based industry. (Medicine as applied discipline does not fit into this scheme.)

Overall, belonging to a discipline in the LatePECs has a stronger effect than in the EarlyPECs, possibly because the non-university labor market in knowledge societies with high PPP is more favorable for STEM disciplines than for the humanities and social sciences (Zhou/Volkwein 2004). In LatePECs, the natural sciences as a disciplinary group with basic research emphasize the knowledge-based research character on the extramural labor market.

- In both country groups, young ECRs are significantly more willing to leave academia, as Padilla-González/Galaz-Fontes (2015) have already pointed out for various groups of academics. Young academics may be the ones who are not (yet) established, who are more open to life decisions and can find attractive jobs outside of academia. Older academics on the other hand, may be the ones who have become more established.
- Being a researcher in EarlyPECs seems to support family life for women; being a mother reduces the intention to leave academia compared to the results for fathers.¹² This contrasts with discussions focusing on the difficult reconciliation of family and academic career in countries with late permanent employment as it is painted in Germany (Metz-Göckel et al. 2009). In LatePECs, there are no differences between different family types.
- The groups are not homogeneous: Portugal differs significantly from the other countries in the group of early permanent employment, while Switzerland and Finland differ in the group of late permanent employment. Further research would be needed to explain these differences.

12 McAlpine/Emmioglu (2014: 1783), on the other hand, are likely to interpret this finding rather as a limitation of the horizon of action that young mothers have to face.

5 Discussion

The international increase of PhD rates, combined with unpredictable employment opportunities at universities, makes it necessary to study the transition from academia and the non-academic labor market (Best et al. 2016). The study confirms the great importance of the type of contract for the intention to exit. The approach pursued here was that individual career decisions take place within a context of career structure and labor market opportunities and can accordingly vary internationally (Cummings 2008). Firstly, the career systems in 10 European countries were divided into two groups and secondly, it was analyzed as to whether the academics differed in their intention to leave academia according to country groups. The proposed characterization into career systems with late permanent employment (Austria, Germany, Switzerland, Norway, and Finland) and systems with early permanent employment (United Kingdom, Portugal, Poland, Netherlands and Ireland) can be used both for further research and for practical measures: Countries with similar characteristics can be compared with each other, or one group of countries can learn from best practice in the other group of countries.

Different theoretical approaches were used to explain the mechanisms of action of career systems, contracts and the mediation through integration and job satisfaction. The analysis yielded empirical evidence for each of the approaches.

The labor market theory allows for a comparison at the system level. It predicts differences in the intention to leave between the two country groups based on the characteristics of the university employment system and of the labor market (Schubert/Engelage 2006; Hadjar/Becker 2006). The results show that early career researchers in four out of five countries with early permanent employment have a lower level of leaving intention than those in countries with late permanent employment. According to the labor market approach, this can be explained by the fact that in these countries, fewer doctorate holders are distributed among relatively more research positions, in particular more permanent positions. As a result, there are better chances of a permanent job in these countries and less selectivity (Höhle 2019), and therefore a lower push effect than in the other group of countries. In addition, the non-university job market offers less knowledge-intensive opportunities for highly qualified people than a knowledge-intensive job market does (pull effect).¹³ The results thus confirm that the combination of push and pull effects contributes to exit intention: Hypothesis 1 can be accepted.

According to social-cognitive theory (Lent et al. 1994), ECRs with fixed-term positions rate their chances of securing an attractive (possibly permanent) position as low or requiring too much effort and therefore decide to leave academia. It is assumed that ECRs in temporary positions intend to leave academia more frequently.

13 This argument is supported by a stronger influence of the variable “Apply Knowledge to Society” in LatePECs.

quently than their colleagues in permanent positions. In fact, in every country in the sample, temporary researchers have a higher level of exit intention than do permanent researchers. The multivariate analyses also show that the employment situation has an effect that is not fully explained by the other factors. Furthermore, it is interesting that both approaches work in combination: The differences according to the type of contract have a greater impact in systems with late employment stability and high doctorate rates than in countries with early employment stability. The result also confirms the earlier study by Metz-Göckel et al. (2016). The employment contract seems to be a better predictor for intention to leave in the group between doctorate and professorship, which is the focus here, than for researchers at all career levels examined by Padilla-González/Galaz-Fontes (2015). Hence H2 can be assumed.

According to Schein (1971), researchers who are employed in a peripheral (temporary) position in the organizational structure have a higher probability of not being well integrated into the institution or the scientific community, experience 'cooling out' (Goffman 1952) and develop leaving intentions. The same applies to job satisfaction (Bandura 1986), which is also assumed to be a mediator here. The results show that the items of the two factors job satisfaction and integration into the institution and scientific community are (at least partially) related in the bivariate analysis to both the employment contract and the intention to leave (cf. Table 4). In the multivariate analysis also, both factor blocks affect the intention to leave. However, the relationship between contract type and intention to leave academia is only partially explained by the two factors. Since it is not entirely mediated by either factor block, both (H3) and (H4) are rejected. Studies that find a connection between the employment contract and integration (Broadbent/Strachan 2016; Broadbent et al. 2013; Höhle 2015b) can be partially confirmed (cf. Tables 4 and 5). Studies in which the authors emphasize the importance of integration on the intention to leave (e.g., Jaksztat et al. 2017; Schröder et al. 2021; Jungbauer-Gans/Gross 2013; Kahlert 2013) are partially confirmed also. Although the items become significant, they have a much smaller effect than might be expected. Study results according to which the employment contract influences job satisfaction (e.g., Waajer et al. 2017; Goldan et al. 2022; Castellacci & Vifás-Bardolet 2021), or those according to which job satisfaction is associated with the intention to leave (Padilla-González /Galaz-Fontes 2015) are also confirmed.

In both country groups, the control variables—both institutional demographics and the socio-demographic variables—also explain to a small extent the effect of the contract on leaving intention. Surprisingly, the effect of integration is moderately pronounced. Academic discipline and age are also important indicators: Academics in the humanities in particular have a significantly lower level of intention to leave than those in engineering, which can be explained by a greater focus on the common good (Hamann 2015; Becher/Trowler 2001) and by lower numbers of market opportunities, the finding of which thus confirms earlier studies (e.g.,

Vogel/Hinz 2004; Flöther 2017). In addition, older researchers show less intention to leave compared to younger researchers—as those who have managed to stay in the system may be more established in their careers than recent PhDs.

However, some factors differ between the two country groups. While job satisfaction was identified as the most important predictor in the group of countries with early permanent employment, the effect of job satisfaction is only as strong as that of the other three main factors in the group of countries with late employment stability. There, the effects of the predictors of employment contract, academic discipline and age seem to be distributed relatively evenly, so that no single main predictor can be identified, but rather only the combination unlocks its effect. The influence of the contractual employment situation is more pronounced than in the group of countries with early employment stability and the influence of job satisfaction is weaker. In view of the low chance of getting a permanent job in the group of countries with late employment stability, the importance of the employment contract on the intention to leave is not surprising but emphasizes the tense situation. Achieving a permanent employment contract is a key factor in career planning in science, especially in this group of countries.

In the group of countries with early permanent employment, job satisfaction is the main predictor, and all other predictors have a significantly lower influence. Overall, the academics in this group of countries show on average a lower overall job satisfaction than the academics in countries with late employment stability (cf. Table 4). The high importance of job satisfaction in this group of countries could be due to the fact that in many countries with tenure systems, the rise of managerial structures endangers academic freedom and autonomy (Padilla-González/Galaz-Fontes 2015; Locke et al. 2011), leading to dissatisfaction, as studies suggest (Bentley et al. 2013). Although management structures are also used in countries with late permanent employment, the higher job satisfaction there may be explained by the fact that temporary employment may act like a filter and dissatisfied researchers select themselves out of the universities (and are no longer in the system).

In addition, some items of the integration block and the individual demographics play a role in the group of countries with early permanent employment and are not—or are only weakly—significant in the other group of countries, and vice versa. In the group of countries with early permanent employment, the sense of belonging to the university, influence in the department and the number of publications are negatively associated with the intention to leave the university; the three items are not—or are only slightly—significant in the other group. In LatePECs, the other main factors mentioned presumably overlay these items, which have a stronger influence on the intention to leave. A possible explanation for the higher importance of the institutional integration (sense of belonging to the institution and the influence in the department) can be the generally higher teaching orientation in the systems with early employment stability, which goes hand in hand with a higher orientation

towards one's own institution. Conversely, one study (Höhle 2015a) shows that in systems that are more research-oriented, orientation towards the scientific community is stronger. It can therefore be expected that strength in publication plays a role there, which is not found in the results and will be discussed further below. Having a managerial gatekeeping function, on the other hand, only has a significant effect in countries with late employment stability. There, these activities may have led to contacts on the non-university labor market that facilitate the transition.

Another difference between the country groups lies in the family types. While there are no effects with regard to family types in the group of countries with late employment stability, the effect in the other group is pronounced. There, mothers are significantly more likely than fathers to stay in academia. Apparently, workplace security is even more of a support for mothers than it is for fathers. In these countries, the academic profession means having a safe workplace that allows for family life. There, being a parent/mother obviously encourages remaining in academia. In the opposite case, a study from Germany suggests that motherhood increases the dropout from academia for mothers (BMBF 2010), for which, however, empirical evidence cannot be found in this study. Still, offering more predictable and stable workplaces could mean better support for both women and families. The findings are relevant and have implications for HR management at universities but are also suitable for being transferred to other career systems with highly qualified occupations.

One of the intentions of employers in higher education systems regarding the excessive use of fixed-term contracts is to assure quality and to stimulate innovation through the selectivity of personnel (Meißner 2016). However, there is no evidence that fixed-term contracts help to compete for the best researchers, or that fixed-term contracts would increase productivity. If permanent employment made researchers 'lazy', the United Kingdom, for example, would not be able to achieve being a scientifically very successful country. Accordingly, in the group of countries with late employment stability, the number of publications—a recognized measure of research ability—does not correlate with the intention to leave academia. This means that research ability does not appear to be a criterion for self-selection into academia, so that high performers and low performers have similar intentions to leave academia.¹⁴ This only applies to LatePECs, while in EarlyPECs the mechanism to support academics with stronger publication capacities seems to work better. This means that universities in LatePECs are not competing for the best minds, but risk losing them, often due to their employment conditions. This perspective is supported by the fact that scholars with leadership roles—signaling institutional and community integration, mid-leadership, and high performance—

¹⁴ In later career stages, however, studies from Germany do show a significant career effect of the number of publications when it comes to reaching professorship. At this point higher publication rates significantly increase the chances of becoming a professor (Jungbauer-Gans/Gross 2013; Plümper/Schimmelpfennig 2007; Schulze et al. 2008; Konsortium 2017).

have even higher intentions to leave the university. Although this finding needs further investigation, it should set alarm bells ringing with workforce planners and university leaders.

The study shows that for countries with late permanent employment, the political goal of providing the knowledge-based industry with a high number of PhD-holding researchers is successfully reached by educating large numbers on fixed-term positions in academia. The German Council of Science and Humanities, the 'Wissenschaftsrat', points out that an academic career would be more attractive if career paths were easier to plan and allowed an earlier decision for or against an academic career (Wissenschaftsrat 2014). The results show that mothers in particular would profit from earlier permanent employment—this might be a realistic contribution to more gender equality and family friendliness. The Science Council (Wissenschaftsrat 2014) also argues that the working conditions in Germany—as a country of late permanent employment—are not competitive either on the extra-mural labor market or on the international academic market. Therefore, such systems may not be able to attract and retain the best researchers. For countries with late permanent employment, the results show that publication capacity is not filtered, which may be read as an indicator for academic quality. The massive use of fixed-term employment does not lead to the selection of the best but rather selects those who have poorer opportunities on the non-university job market, who are satisfied despite the working conditions and who are already on permanent positions. In both types of systems, it is rather the younger researchers who intend to leave the system and from a career perspective this is certainly a good moment. For the universities, however, it would be advantageous if these researchers remain following completion of their doctorates, because this is probably a very productive phase, and it is precisely then that they are lost. In addition, since the academic education of ECRs does not always prepare them well for work outside (Best et al. 2016), a further implication can be drawn: Universities should prepare ECRs early enough for work outside academia. Such preparation should encompass their career planning, the teaching of key skills and the provision of cooperation with possible non-university employers (cf. Wissenschaftsrat 2014).

There are some limitations to the study. Being a secondary analysis, the data selection was limited to the available data, while the questionnaire was not specifically constructed for this particular analysis. Although it seems reasonable that the key question regarding the intention to leave is retrospective, the time span—the last five years—seems to be quite long and it is not certain whether the conditions (contract, satisfaction, integration, etc.) asked about were the same at this point as at the time when the interviewee thought about leaving. As a second methodical limitation, it must be mentioned that the direction of dependency between certain variables may be circular. For example, researchers considering leaving academia may not be as ambitious in finding permanent positions or in integrating as researchers with a clear goal of remaining in academia. However, it is my assumption that the direction of dependency is from the intention to leave to the actual leaving.

tion that postdocs who have decided to remain in academia have decided at one point to pursue an academic career. In addition, the internal country group variation is greater than the variation between groups. The number of countries is still small, and it is not entirely clear to what extent they are representative of all systems with early or late permanent employment. A generalization of career systems with early or late permanent employment must therefore be made cautiously and provisionally. However, there is reason to believe that these results are not random and therefore tentatively generalizable, at least for systems in Europe. Höhle (2019) shows that a greater variety of countries follows the country typology.

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