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Leaving for more or settling for less: Gendered salary trajectories after leaving academia

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ABSTRACT

As the population of PhDs increases, a growing share of researchers find employment outside of academia after doctorate receipt. This attrition is higher among women. While prior studies find that doctoral recipients who work outside academia tend to earn more, some only find these wage premiums for men. Such findings are primarily based on scholars who leave academia immediately after the PhD where wage inequality is often examined over a limited timeframe. We extend on these studies by examining the gendered salary developments among PhDs who have started a career in academia over a period up to 17 years after obtaining doctorate. We use survey data from 4576 individuals who obtained doctorate at universities in the Netherlands, linked to longitudinal Dutch register data on salaries, job characteristics, and family composition. We detail our findings by examining different push and pull factors (i.e. temporary employment, work hours, having a young child, disciplinary background) that explain why men and women's salaries may develop differently following a transition out of academia. Our results show that leaving academia initially increases wages, but slows wage growth over time. We find that women experience stronger immediate wage gains, but slower wage growth after a transition out of academia than men. While leaving academia may offer short-term financial benefits, particularly to women working part-time or on temporary contracts, it may ultimately limit their salary progression by restricting opportunities for promotion.

1. Introduction

The number of doctorates increased in European countries over the last years. Yet, there are hardly enough academic positions to retain these doctoral recipients in academia (OECD, 2021). As such, doctoral recipients increasingly have to find employment outside universities, where PhDs now populate a variety of academic and non-academic positions. In the Netherlands too, a relatively large share of doctoral recipients work in the private sector and outside their field of study (OECD, 2013). Although many graduates find non-university employment, it can be challenging for recent PhDs to find a non-academic job that matches their expertise (Germain-Alamartine et al., 2021; Thor & Van der Mooren, 2020). Doctoral recipients who leave academia can experience a mismatch between skills acquired during the PhD and those required at other jobs (Alfano, Gaeta, et al., 2021; Gaeta et al., 2017; Hayter & Parker, 2019; McAlpine, 2020).

With the expansion of doctorates, the share of women PhDs has also increased (European Commission, 2021). Yet, women do remain underrepresented in the professoriate (European Commission, 2025; LNVH, 2023). Professorial representation among women may be a matter of time, as new cohorts of women progress through the ranks. However, inequitable processes inhibit women's academic career progression: "glass-ceiling" effects slow progression through academic ranks (Aksnes et al., 2024; Alfano et al., 2025), and a "leaky pipeline" causes women to leave academia at higher rates and before they are promoted to senior positions (Alper, 1993; Mulders et al., 2024).

The "leaky pipeline" phenomenon is usually presented as a loss to science and innovation as women's valuable knowledge and perspectives are disproportionally and prematurely lost (e.g. Nielsen et al. 2017; Yang et al. 2022). Yet, a standing question is whether leaving academia is worse for individual (women) scientists on all indicators. One such indicator is salary earned in- and outside academia. In the U.S. and Europe, for instance, PhDs outside academia earn more than those in universities (Agarwal & Ohyama, 2013; Geppert et al., 2024; Goldan, 2021).

These salary consequences to leaving academia may vary between

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men and women. Although women earn less than men in academia, this gender wage gap is even larger among those who transitioned out of academia (Amilon & Persson, 2013; Geppert et al., 2024; Goldan, 2021; Schulze, 2015; Staub et al., 2024; Webber & Canché, 2015). These gaps could be due to devaluation of women PhDs' skills, both in- and outside academia (Kim et al., 2022; Miller et al., 2015; Roos & Gatta, 2009). Alternatively, the circumstances under which men and women transition out of academia may vary. This may result in salient and growing gender wage gaps. Here we focus on these circumstances through *push or pull* factors. Cross-sectional studies have suggested that gender wage gaps among PhDs may relate to gender differences in disciplinary orientation, work hours, and temporary employment (European Commission, 2025; Goldan, 2021; Renzulli et al., 2013). Other research emphasizes gendered effects of parenthood on salaries of academics (Lopes, 2024). It is therefore relevant to examine how PhD discipline, parenthood, contract hours and contract type relate to wages obtained following a transition out of academia, as these factors may shape opportunities to find non-academic employment, and gender differences herein.

We extend prior studies who have described wage trajectories of PhDs using survey data (Alfano, Cicatiello, et al., 2021; Goldan, 2021; Renzulli et al., 2013; Schulze, 2015; Webber & Canché, 2015). Although surveys conducted among doctoral recipients have the advantage of capturing respondents' academic background, the data on salary and career trajectories after the PhD tend to be limited to a few waves within several years of doctorate conferral. Since most PhDs leave the university immediately after doctorate receipt, prior studies describing salary differences between all academically and non-academically employed PhDs disproportionately reflect this group. It is crucial to expand our knowledge on career and salary trajectories of scholars who start a career in academia after their PhD, because disproportionate outflow of women is especially pronounced in the postdoctoral stage (Mulders et al., 2024; Winslow & Davis, 2016). To advance the limited understanding of the impact of leaving academia later in the career, we focus on doctoral recipients whose first job after the PhD is in academia. As such, the research question to our study is: *What is the impact of leaving academia on the salary trajectories of doctoral recipients in the Netherlands, and how does this vary by gender?* To answer this question, we uniquely combine cross-sectional surveys carried out among individuals who obtained doctorate at all universities in the Netherlands between 1990 and 2019, with longitudinal Dutch register data on respondents' wages, job characteristics, and family compositions. The register data allows us to follow the careers of researchers who started their career in academia (N = 4576) up to 17 years after doctorate receipt. This allows us to measure more precisely how salaries develop following a transition out of academia at different moments in one's career. By using register data, we minimize reporting errors which are common in retrospective, self-reported career and salary trajectories, while our surveys do add rich background information on the PhDs – i.e., we use a "best of both worlds" approach by combining surveys with register data in our study.

2. Dutch context

Since 2003, salary scales at all Dutch universities are set using a national collective bargaining agreement. The national collective bargaining agreement is important as it specifies procedures for particular appointments and certain levels. The collective bargaining agreement also sets (broadly phrased) criteria for academic staff promotion so as to ensure transparency and comparability across universities. It also assigns salary scales that pertain to particular levels of employment (say a starting assistant professor (in Dutch: "UD2") starts in Scale 11 whereas a full professor starts in Scale H2). Each of these scales have different levels that usually pertain to yearly salary increases that the collective bargaining agreement also sets until one reaches the end of the scale (i.e., the highest salary in that scale). Each research position is assigned to two specific salary scales, an entry level and a senior level, depending on experience within the position and specific advanced competencies. Salaries increase annually by the standard percentage for the respective scale (sometimes following a positive assessment), until a maximum salary point. Although the collective scales reduce salary flexibility, some room for negotiation remains. Prior work from the U.S. shows an academic gender pay gap in this negotiated salary space (Kim et al., 2024; Roos & Gatta, 2009). Especially the initial positioning in the salary scale is a source of salary inequality, and this can be influenced by subjective valuation of prior experience as well as previous salaries obtained in different sectors (van Engen & Kroon, 2024). Furthermore, bonuses are sometimes used to attract talented researchers from outside the university (LNVH, 2016; Pouwels & Mutsaers, 2023).

All universities studied in this paper (N = 13) are "public universities" that all fall under that same national collective bargaining agreement. These 13 are the largest, full-time research universities in the Netherlands, whereas a 14th (and last) university mostly focuses on part-time adult education that hardly graduates any PhDs (33 in 2024 versus 636 in 2024 for the University of Amsterdam, for instance). Three universities may be considered "special universities" as they have different legal form: Radboud University and Tilburg University are both foundations (Dutch: "stichting," and Free University Amsterdam is an "association" (Dutch: "vereniging"), whereas the other 10 are autonomous public administrative bodies (Dutch: "publiekrechtelijke zelfstandige bestuursorganen"). Hence, for the purposes of analyzing salaries in this paper, the 13 universities are quite comparable in their recruitment and salary setting procedures and all use the same collective bargaining agreement.

Note that PhDs in the Netherlands are fully salaried under the collected bargaining agreement – starting at about the median income level in the Netherlands – with benefits (e.g., paid vacation days, paid parental leave, etc.) for the duration of a PhD where each PhD student falls in the same salary scale and often starts at the same step. As such, there is less necessity for PhD candidates to supplement their salaries during the PhD compared to PhD students in, for instance, the U.S. However, a report on the gender pay gap at Dutch universities revealed that there is a substantial pay gap where women earn less than men *following* the PhD (LNVH, 2016). This is partly explained by differences in the positions that men and women hold (assistant, associate, full professorships), and allocation to the entry and senior level within these positions, yet a difference persists. The report also shows that men are more likely to obtain bonuses (LNVH, 2016).

Although a gender pay gap exists within Dutch universities, we expect greater overall salary variation outside the university as compensation outside academia is more flexible. In the private sector and in multinational companies, in particular, the coverage of collective bargaining agreements is more fragmented, which can substantially increase salary variability (Been & Keune, 2019). The absence of structured pay frameworks can exacerbate gender pay gaps, as women are less likely to negotiate salaries – particularly when negotiation takes place informally (Kugler et al., 2018; Leibbrandt & List, 2015).

3. Theoretical background

3.1. Rational Choice Theory & push and pull factors in transitions out of academia

To understand why scholars leave academia, and how this affects subsequent salary development, we use Rational Choice Theory as a point of departure to contextualize a push and pull framework in sector-to-sector transitions.

Rational Choice Theory (RCT) starts from the premise that individuals act in a goal-directed manner, making choices according to certain preferences (Coleman, 1994). Yet, the extent to which individuals are able to realize their goals depends on behavioral constraints and opportunities (Opp, 2020). In the context of decisions to remain in or leave academia, this implies that academics weigh the

available employment options and choose to apply for a job that best aligns with their preferences. This can depend on the type of work they favor doing, salaries, their current job satisfaction, or (specific) terms of employment. Yet these choices to remain within academia or transition to a different sector are constrained by the availability of positions, labor market competition of other potential employees, and (implicit) biases or even explicit discrimination.

To understand the impact of a transition out of academia on subsequent salary trajectories, we further contextualize transitions that are primarily motivated either by push or by pull factors (Bloch et al., 2015). For the sake of clarity and parsimony, we conceptualize scholars that are *pulled* out of academia as a process of voluntarily self-selection into non-academic employment, because job opportunities outside academia align better with their preferences. By contrast, we conceptualize scholars being *pushed* out of academia as cases where they would *prefer* to remain (i.e., self-select into academic trajectories), but where structural or situational constraints limit their ability to do so. Note that being *pulled out of* academia as a form of "self-selection aligning with preferences" does need an additional assumption of the non-academic job market having no (or not enough) restrictions (i.e., competition) so as to actually allow for such self-selection.

Pull factors are those desirable job characteristics that lead individuals to pursue non-academic jobs. For instance, young professionals can have a "taste for industry", based on the value placed on elements that characterize jobs in the private sector. A greater "taste for industry" is a pull factor which shapes preferences to work outside academia, for instance because they prefer to do more applied research (Agarwal & Ohyama, 2013; Bloch et al., 2015; Roach & Sauermann, 2010). Scholars may also be pulled out of academia when jobs outside the university offer a higher salary, greater job security, or better secondary benefits (Kallio et al., 2024). Job offers from different organizations can also pull scholars out of academia by creating opportunities to capitalize on preferences to work outside academia (White-Lewis et al., 2023).

Specific features of the academic labor market are an important push factor: although many graduates want to remain in academia, they face difficulties securing academic positions (Bloch et al., 2015; Kallio et al., 2024; Parenti et al., 2022). In the Netherlands, 69 % of doctoral recipients end up working outside the universities and university medical centers (Rathenau, 2024). In a competitive academic labor market, those who are evaluated as exhibiting lower academic performance (sometimes defined by difficulties in securing funding, fewer publications, or fewer citations) may be prone to being pushed out. Thus, scarcity of academic positions and strong competition can constrain on scholars' ability to realize their preference of remaining in academia. Negative experiences in a person's current job constitute another class of push factors. These negative experiences can for instance stem from unpleasant work climates, harassment, or a lack of belonging (Gardner, 2012; Spoon et al., 2023). Experiences of exclusion or hostility may operate as constraints that make academic careers less feasible, or they may alter preferences by reducing the attractiveness of academia relative to other employment options.

The circumstances under which scholars transition away from academia (i.e. primarily pulled or pushed) influence salary development. Push and pull mechanisms likely operate simultaneously, possibly even reinforcing one another. For example, limited promotion opportunities (push) may increase the attractiveness of a well-paid industry position (pull), and attractive external offers may sharpen the awareness of the drawbacks of remaining in academic jobs. It is not possible in this study to classify transitions out of academia as explicitly push- or pull-based, nor do we directly model the relative intensity of push and pull mechanisms. Rather, the push and pull framework serves as a heuristic device to derive expectations about patterns in salary trajectories before and after a transition at the aggregate level.

We expect that differences in the extent to which doctoral recipients are pushed or pulled out of academia can translate to differences in earnings, and that variation in the prevalence of push and pull factors are thus reflected in the average earnings trajectories of various groups of doctoral recipients (e.g., men versus women). Scholars who are primarily pulled out of academia likely gain a higher salary and possibly steeper salary growth compared to those who remain. Researchers who experience a relatively stronger push out of academia, in contrast, are expected to have lower salaries and slower salary growth compared to peers who keep working at a university. If there are few push factors influencing a scholar's decision to change jobs, their comfortable employment situation likely prevents them from leaving unless a sufficiently attractive opportunity presents itself. In part, the attractiveness of leaving their current job will depend on the salary that is offered. For instance, scholars with a PhD in computer science often incur a relatively large salary premium when transitioning to a job in the private sector compared to doctoral recipients in other disciplines who make the same transition (Zolas et al., 2015). By contrast, the unfavorable starting point of scholars who are pushed out of academia may lead them to accept lower-paid positions. These scholars are likely under greater time pressure to find employment, and their current employment terms may hinder them from gaining the most beneficial arrangement when bargaining for their new position (Auspurg & Gundert, 2015).

3.2. Salary development after leaving academia

A handful of studies across Europe and the U.S. have documented differences in salaries among doctorate holders employed inside and outside academia, generally showing that doctorate holders tend to earn more when they work outside of academia (Alfano, Cicatiello, et al., 2021; Amilon & Persson, 2013; Geppert et al., 2024; Goldan, 2021; Schulze, 2015; Staub et al., 2024; Webber & Canché, 2015). These findings may be explained by the pull factors underlying the transition out of academia. Specifically, differences in the motivation to work in academia compared to the private and public sector reveal something about wage differences that can be expected between sectors. The primary attractions of employment in academia are elements of the work itself: intellectual challenge and freedom to devise and execute a research agenda (Agarwal & Ohyama, 2013; Goldan et al., 2023a; Li & Horta, 2022; Roach & Sauermann, 2010; Waaijer, 2017). Doctoral graduates who remain employed at a university tend to place a lower importance on salaries and benefits (Agarwal & Ohyama, 2013). By comparison, extrinsic job factors such as salary and job security are mentioned more often as motivations to work in the private sector (Agarwal & Ohyama, 2013; Bloch et al., 2015; Goldan et al., 2023a; Roach & Sauermann, 2010; Waaijer, 2017). In the public sector, greater job security is also a pull factor, in addition to being motivated to solve societal and political issues (Goldan et al., 2023a; Li & Horta, 2022; Waaijer, 2017).

Given that external rewards such as salary and job security are more prominent pull factors for jobs in the private and public sector, we expect that researchers experience a salary increase directly after transitioning out of academia, and their salaries may also grow more strongly in the following years.

H1. *Academics who transition out of academia experience a direct increase in salaries, as well as stronger salary growth after leaving academia*

3.3. Gender differences in salaries after transitioning out of academia

Although pull factors may contribute to overall increases in earnings following a transition, some scholars may disproportionately be pushed out of academia. While men and women have equal preferences for academic versus non-academic employment (Li & Horta, 2022; Roach & Sauermann, 2010), their push and pull factors vary. Men more often indicate that they had been pulled out of their academic jobs, while women were more likely to report being pushed out in the U.S. (Spoon et al., 2023).

A poor workplace climate is an important push factor for women scholars (Martinez et al., 2017; Spoon et al., 2023). Women in academia are especially prone to feeling isolated within their departments, both in terms of being excluded from informal social networks and feeling professionally excluded (Gardner, 2012; Nielsen, 2017). Women also reported professional exclusion through not getting invited to or being ignored in meetings, not getting recognition for scholarly contributions or having them actively discounted, or being denied necessary resources (Bourabain, 2021; Cabay et al., 2018; Gardner, 2012). As such, poor academic workplace climate pushes women into non-academic jobs (Settles et al., 2022). This can in turn contribute to a more time-pressured job search process where women are inclined to "settle for less".

Men are more often pulled out of academia: they tend to view their career prospects more optimistically than women, both within and outside the university (Waaijer et al., 2016). This optimism is also reflected in actual labor market advantages, as men are more likely to receive job offers from outside the university, as well as retention offers from their home institution (Kallio et al., 2024; Martinez et al., 2017; White-Lewis et al., 2025). This suggests that when men transition out of academia, they more often do so voluntarily from a secure employment position, rather than out of necessity.

Accordingly, several studies find evidence for a so-called 'gender wage premium' for men PhDs who work outside academia (Amilon & Persson, 2013; Goldan, 2021; Schulze, 2015). These studies show that the overall gender wage gap among doctoral recipients appears to be primarily driven by men's relative advantage outside academia. Based on this, we expect:

H2. *Women experience smaller direct salary gains and weaker salary growth after transitioning out of academia than men*

3.4. Mechanisms contributing to gendered salary differences

Below, we outline push and pull factors that have gender-specific effects on the transition out of academia. Although we cannot explicitly test mechanisms related to workplace climate and sense of belonging, we do analyze factors which relate to differences in employment prospects between men and women (discipline, work hours, temporary employment) and parental status. This implies that the push and pull variables partly explain gender differences in wage trajectories following a transition, yet some gender differences may remain after accounting for our push and pull factors.

3.4.1. Discipline

Scholars' opportunities to work inside and outside academia may differ by discipline. Those with a PhD in applied fields possess very specific skill sets or competencies that are useful outside research jobs (Haapakorpi, 2017). Engineering and medical sciences in particular tend to be more firmly embedded in the private sector, facilitating a transition out of academia (Haapakorpi, 2017; Hancock, 2023). Furthermore, PhDs in most STEM fields may experience a stronger pull out of academia due to shortages in technically skilled employees on the Dutch labor market (Pedersen, 2014).

Discipline-based pull factors may contribute to gender differences in salaries among scholars who leave academia, because men and women populate different disciplines. Men are overrepresented among PhDs in engineering and technology, and natural sciences degrees (Waaijer et al., 2016). Women are better represented in health and social sciences (Thor & Van der Mooren, 2020). These differences likely influence career trajectories. Those in male-dominated fields have the most optimistic outlook on career prospects and availability of permanent positions outside academia (Waaijer et al., 2016). These patterns are not exclusive to academia, but rather are part of broader patterns of horizontal segregation in the labor market, whereby men and women tend to populate different fields and occupations (Charles & Bradley, 2002). Occupations and fields, such as education and social work, that are typically associated with women tend to be culturally devalued and less-well paid than male-dominated ones, even at similar skill levels (England, 2010; Levanon et al., 2009).

Because men tend to work in disciplines that afford them more opportunities and job offers from outside academia, they likely experience a stronger pull out of academia. This would place them in a stronger position to negotiate a higher starting salary when making the transition, and potentially also increases internal and external job mobility. Therefore, gender differences in disciplinary orientation may help to explain why men experience obtain higher average wages and experience stronger salary growth than women following a transition.

3.4.2. Parental status

An additional factor which can influence the decision to leave academia is work-family conflict. Academics with young children often experience difficulties in fulfilling their care tasks while also maintaining a competitive publication record (Van Engen et al., 2021). Care leave does not eliminate these pressures, as almost half of the researchers who took up care leave in the Netherlands indicate that their duties were not aligned with their work hours during leave (NLA, 2024).

Women may be especially prone to experiencing work-family conflict, as women are more likely to reduce their working hours than men, even when they earn more than their partner (Kühhirt, 2012; Wood et al., 2018). Consequently, working mothers with young children are more likely to report that demands placed on their time and energy at home interfere with their work functioning than working fathers (Notten et al., 2017). Within academia, gendered parenthood norms are manifested in stronger negative career consequences of parenthood in terms of promotion and publication productivity for mothers than for fathers (Habicht, 2023; Lutter & Schröder, 2020; Vinkenburg et al., 2020). Recent evidence further shows that women researchers take parental leave more often and for longer periods, which directly translates into long-term wage penalties for women (Jaksztat et al., 2025). Furthermore, women are significantly more likely to leave academia after their first child than men (Cech & Blair-Loy, 2019). As such, work-family conflict is disproportionately mentioned as a push factor influencing decisions to leave academia among women (Martinez et al., 2017; Spoon et al., 2023), which could depress their salary development when they do leave academia.

3.4.3. Work hours

Scholars' work hours can influence decisions to leave academia in several ways. While part-time contracts are formally available, few positions in academia accommodate these arrangements (Van Engen et al., 2021). Teaching and research tasks often have to be fit into a compressed schedules, while employers' expectations are not adjusted accordingly (Krilić et al., 2018). Researchers who work fewer hours are often inclined to cut into their research time instead of teaching time (English et al., 2025). This reduction inhibits career prospects within academia, as research output tends to be valued more strongly than teaching (Van den Brink & Benschop, 2012). Additionally, part-time scholars report being passed over for leadership positions and facing skepticism about their ambition and commitment to science (Benschop et al., 2013). In short, the incompatibility of part-time work with academia's long hours culture may push part-time scholars out.

Women PhDs in the Netherlands are more likely to work part-time than men (Waaijer et al., 2016). As such, women are more likely to experience being pushed out of academia, while the lack of training and leadership opportunities may also restrict their options for finding jobs outside the university. This stronger push and weaker pull out of academia among scholars who work part-time contributes to lower salaries and slower salary growth after a transition out of academia among women.

3.4.4. Contract type

Finally, those with a temporary contract at a university experience a stronger push to leave. Early academic careers, particularly the post-doctoral phase, are marked by uncertainty through short-term temporary contracts. While temporary employment is traditionally viewed as a bridge to permanent employment, it is common for scholars to have multiple consecutive fixed-term contracts at the start of their academic career (Van der Weijden et al., 2016). Ideally, scholars with temporary contracts develop their portfolio and accumulate skills to obtain permanent positions. In reality, temporary employees are often hired to address short-term labor shortages which limits their time for writing grant proposals or developing necessary skills for permanent employment (Cairns, 2024). Project-based postdocs may therefore struggle to develop a unified research agenda, which can contribute to pushing them out of academia (Herschberg et al., 2018). Temporary contracts may also contribute to pushing scholars out of academia by fostering dissatisfaction, which could lead them to reconsider their options outside academia (Goldan et al., 2023b). At the same time, postdocs may not experience a strong pull into non-academic jobs, as employers often perceive them as lacking necessary non-academic skills (Hayter & Parker, 2019).

Women are more likely to hold temporary contracts than men in academia (European Commission, 2021). As a result, temporary employment may be one of the reasons why women experience a push out of academia, contributing to possible gender differences in post-transition wages.

The push and pull factors described above can explain why women experience lower direct salary gains and slower salary growth following a transition compared to men. Therefore, we expect:

H3. *The inclusion of discipline, parental status, work hours and contract type reduces gender differences in direct salary gains and salary growth following a transition out of academia*

4. Methods

4.1. Data

To study the careers of doctorate holders in OECD countries, Statistics Netherlands conducted a survey among doctoral graduates in the Netherlands. We use this survey, the *gepromoveerdenenquête* (GPE) to derive our sample and collect information on doctoral recipients. The GPE samples individuals who obtained doctorate at all thirteen major research universities in the Netherlands between 1990 and the survey date, who are registered inhabitants of the Netherlands at the moment of the data collection. This survey was conducted in 2014 and 2019 (N = 21,350 unique respondents across both cross-sections). The GPE contains questions on satisfaction with the PhD, current occupation, and demographic characteristics.

Uniquely, we link the GPE to Dutch register data through a unique personal identifier. Specifically, we match it to Dutch tax register data for yearly information on salary, jobs, parent-children linkages, partnerships, and international mobility.[1] Hence, each observation in our compiled database is a person-year. Additionally, we link organization-level information to identify university and non-university jobs. We identify universities as employing organizations based on a unique industry code additionally validated using organization size and location (municipality), Although individuals may hold multiple jobs in a year, we include only the highest-paying position in that year (i.e. the "main job"). Using yearly data on these main jobs, we construct a person-period file to model salary trajectories over time with a multilevel model for change (Singer & Willett, 2003).

Our starting sample contains all individuals who participated in the GPE survey in 2014 *or* 2019, meaning we do not use a panel design, but rather treat both surveys as repeated cross-sections (N = 21,350 distinct individuals). To ensure that we can start tracking careers immediately after doctorate receipt, we retain those researchers with a PhD date in 2006 or later as the salary data start in 2006 (N = 11,201 researchers). 183 respondents were dropped because they could not be matched to job data (i.e. they were never formally employed in the Netherlands after their PhD receipt). As we analyze the effect of leaving academia on wages, we select in our sample those who continued working in Dutch academia after their PhD (N = 4904). To ensure comparability of career trajectories, we further select those PhD recipients who started working in Dutch academia within a year of completing a PhD (N = 4579). After removing three cases with missing values on our dependent and independent variables, the final sample consists of N = 4576 individuals.

4.2. Variables

4.2.1. Log real monthly pay

We use base pay for the month of September of each year from 2006 to 2023, excluding holiday allowances, bonuses, and overtime pay. We correct for inflation, using September 2015 as the reference point. We log-transform as salaries are right-skewed. Our treatment of incomplete salary observations is discussed in detail in Appendix 1. We focus on monthly pay, rather than hourly pay, because differences in work hours constitute part of the reason why salaries differ between men and women, and we investigate the role of work hours as a mediator in our last model (detailed below). We also include analyses with logged hourly wages as the dependent variable in Appendix 7.

4.2.2. Transition out of academia

For each year, we determine whether a person's main job is at a Dutch university. The variable 'transition experienced', is set to '1' in the year of transition and all subsequent years of employment outside the universities. We assess how a transition impacts the wage trajectory's slope by including this variable as a main effect to model a parallel shift in the slope. We also include an interaction with our time variable to model differences in the linear rate of change in wages after a transition out of academia.[2] Additional details on the coding of university and non-university jobs are provided in Appendix 1.

4.2.3. Gender

We use self-identified gender as "women" and "men" from the GPE. Three individuals indicated a different gender across both waves. Before combining individuals across the two survey periods, we removed these individuals from the sample, as this group would be too small to include separately in our analyses.

4.2.4. Additional covariates

We assess whether gender differences in salary development following a transition are reduced after we include PhD discipline, presence of young children, contract hours and temporary contract. 'PhD discipline' is constructed based on reported field of PhD in the GPE. We used the same item from the 2014 and 2019 survey, but the answer categories were extended in 2019. In Appendix 1, we describe the answer categories in both years and how we combine these for our own labelling to harmonize measurements across both cross-sections. For the variable 'child under 5', we use children's birth dates to construct a dummy variable indicating whether a person has a child under 5 years old on September 1st of that year. In the Netherlands, compulsory schooling starts at age 5. Hence, this variable is used to measure the

[1] Names of the datasets: spolisbus, abr, gbakindbus, gbaverbintenispartnerbus, gbaadresbuitenlandbus

[2] We restrict our analyses to the first transition out of academia after doctorate receipt. In other words, we do not include returns to academia from jobs outside academia.

impact of having children who are not yet of school age, as this can be considered as an intensive period of childcare. We include the variable 'log monthly contract hours' by log-transforming the monthly work hours indicated in the tax register data. The binary variable 'temporary contract' is set to '1' when a person has a temporary contract in a given tear, and set to '0' in case of a permanent contract.

To control for shocks in salaries immediately following a transition out of academia, we include the binary variable 'transition year', which is set to '1' *only* in the first year in which an individual's main job is outside the university. This variable differs from 'transition experienced', which is set to '1' in *all* years when an individual was employed outside Dutch universities.

We include the variable 'PhD cohort', measured as the year of doctorate receipt centered on the minimum (i.e. 2006). Those who obtained doctorate in different years will have different starting salaries owing to changes in collective labor agreements, and differences in labor supply and demand.

The GPE includes survey questions about doctoral recipients' satisfaction with several elements of their PhD. We selected 8 out of 12 items, because there was a selective pattern of missingness on the remaining items. The full item list and details on our selection can be found in Appendix 1. For the variable 'PhD satisfaction', we take the average from these eight items. We set this variable to missing if more than four items are not answered. If respondents participated in both survey waves, we took their score from the earlier wave (2014), so that satisfaction is measured closer in time to doctorate completion.

The tax register data used to determine doctoral recipients' wages additionally includes information about the sector of employment (for-profit in the financial sector, for-profit nonfinancial sector, government, and non-profit). We include this as a categorical variable 'sector', combining for-profit jobs in the financial sector and other for-profit jobs in a single category.

To unambiguously measure a transition out of academia, we only include the wages of doctoral recipients' main job in a given year. To account for potential loss of income in one's main job due to having to split one's time over multiple jobs, we include the binary control variable 'other job' specifying whether researchers have another job for each year in our analysis. We also performed a supplementary analysis in which we excluded scholars with a secondary job while employed at the university, to ensure that our results are not driven by this specific group of researchers who already had ties to organizations in different sectors.

We include a variable 'break in Dutch employment' designating the number of months between the start of a person's employment in the current calendar year and the end of employment in the preceding observation for the same individual. For each observation, the start and end dates of the current employment relationship within the year are recorded. In cases of continuous employment, these dates will typically correspond to January 1st and December 31st of the year of interest. A gap between the end date of the previous observation and the start date of the current employment relationship indicates a break in employment in the Netherlands.

Since a break in Dutch employment could mean either domestic unemployment or employment abroad, we include the variable 'period abroad'. This variable measures the number of months spent abroad between the current calendar year and the most recent salary observation for the same person. Together, the variables 'break in Dutch employment' and 'period abroad' help distinguish between individuals who are likely unemployed in the Netherlands and those who are likely employed abroad, which could have different effects on subsequent salary observations.

We also control for doctoral recipients' partnership status and recent changes herein. The dummy variable 'partnered' indicates whether researchers are married or have a registered partnership on September 1st of the year of interest

Descriptive statistics for all included variables are presented in Table 1.

4.3. Modelling Strategy

We model salary change trajectories in time in years since the PhD using the 'lme4' package in R (Bates, 2010). Our time variable is set to 0 in the year after the PhD, meaning the intercept in our model can be interpreted as the start salary in academia directly after the PhD. Preliminary analyses showed that the functional form of the salary growth curves was best captured by including time since the PhD as linear, quadratic, and cubic terms. To assess how salaries develop differently for men and women, we perform the analyses and present results for men and women separately. Additionally, we conduct each of these analyses with a pooled sample including both women and men, where we include interactions between each of the covariates and gender to assess whether the associations differ by gender (this test is indicated by the "Diff." column for each model in Table 2).

In assessing the impact of a transition on salaries, we need to consider that observed effects may be due to the transition itself, as well as underlying selection processes. For instance, observed wage premiums from leaving academia could stem from the transition itself, but it could also be that those who leave the university were already earning more at the university than their peers who remained. To capture more accurately how the transition out of academia affects salaries, we estimate both within- and between-individual effects in our multilevel model for change. For the between-estimators, we compute the mean of our time-varying variables within individuals. For example, taking the mean of the binary variable 'transition experienced'—coded as 1 in all years following a transition out of academia and 0 otherwise—yields the proportion of observations in which that individual did not work in academia. Using this method, we create between-individual transformations for all our time-varying covariates. Thus, we separate the effects of (calculated) time-constant individual attributes, which explain differences in wage trajectories across individuals (between-effects), from the effects of changes in these attributes within individuals over time (within-effects). Given that our hypotheses relate to changes in wages following a transition, we use the within-effect of 'transition experienced' to test our hypotheses, while the between-effect is included to rule out selection effects in who makes the transition.

Our multilevel model includes two levels. At level 1, we model within-individual changes in salary over time. Time-varying predictor variables are included in the level 1 submodel. The level 2 submodel explains differences in salary trajectories between individuals. To explain inter-individual differences in initial salary as rate of change, we include both true time-invariant variables (e.g. PhD discipline, PhD satisfaction), and between-individual transformations of time-varying variables (e.g. the proportion of observations where an individual worked outside of academia). Variance components at level 2 are allowed to covary.

Model 0 includes career age and its higher-order functions – i.e., how wages develop over the career. In Model 1, we add the within and between effects for 'transition experienced'. With the within-effect, we test our hypotheses on direct changes in monthly pay following a transition out of academia, while the between-effect accounts for differences in monthly pay between individuals based on the proportion of observations in which they worked outside academia. We also interact 'transition experienced' with linear time to assess how the linear salary growth rate changes after the transition out of academia. We further inspected whether salary growth rates changed non-linearly following a transition, by interacting 'transition experienced' with t^2 and t^3, but these trajectories differed minimally from our original models. These supplementary analyses are summarized in Appendix 6, where Figures A1 and A2 show that predicted salaries hardly vary between our main and these extended models. All control variables are included from Model 1 onwards. In Model 2, we add the push and pull variables ('PhD discipline', 'child under 5', 'monthly contract hours', 'temporary contract') to analyze whether these can account for gender differences in monthly pay (initial status and rate of change) following the transition out of

Table 1
Descriptive statistics for all variables included in the analyses, separated by gender.

	Women				Men			
	1 %	99 %	Mean	SD	1 %	99 %	Mean	SD
Real monthly pay	1085.08	15324.76	4867.10	2776.15	1441.40	17133.96	5529.32	3187.54
Log real monthly pay	6.99	9.64	8.36	0.52	7.27	9.75	8.48	0.51
Transition year	0.00	1.00	0.05		0.00	1.00	0.05	
Transition experienced	0.00	1.00	0.32		0.00	1.00	0.35	
Time	0.00	16.00	5.91	4.26	0.00	16.00	6.25	4.39
PhD Discipline								
Health sciences	0.00	1.00	0.43		0.00	1.00	0.27	
Social sciences	0.00	1.00	0.31		0.00	1.00	0.23	
Natural sciences and mathematics	0.00	1.00	0.16		0.00	1.00	0.29	
Engineering	0.00	1.00	0.05		0.00	1.00	0.14	
Humanities	0.00	1.00	0.06		0.00	1.00	0.06	
Child under 5	0.00	1.00	0.33		0.00	1.00	0.32	
Log monthly contract hours	3.56	5.29	4.93	0.29	4.13	5.29	5.02	0.22
Temporary contract	0.00	1.00	0.39		0.00	1.00	0.34	
PhD cohort	0.00	12.00	4.51	3.11	0.00	11.00	3.90	2.93
PhD satisfaction	2.12	4.00	3.14	0.38	2.25	4.00	3.22	0.37
Sector								
For-profit	0.00	1.00	0.38		0.00	1.00	0.42	
Government	0.00	1.00	0.48		0.00	1.00	0.48	
Non-profit	0.00	1.00	0.14		0.00	1.00	0.10	
Other job	0.00	1.00	0.06		0.00	1.00	0.06	
Break in Dutch employment	0.00	16.99	0.90	4.83	0.00	16.46	0.84	4.78
Period abroad	0.00	0.00	0.43	6.52	0.00	24.31	0.78	7.97
Partnered	0.00	1.00	0.50		0.00	1.00	0.58	
Time at transition	1.00	14.00	3.97	3.13	1.00	14.00	3.59	3.04
N individuals	2298				2278			
N observations	23903				24883			

Note. Summary statistics are calculated at the level of observations, not individuals.

academia. The model build-up is summarized in Appendix 2. Results of our multivariate analyses are displayed in Table 2.[3]

Our model can be formally described as follows (cf. Singer & Willett, 2003):

Level-1 model:

$$y_{ij} = \pi_{0i} + \pi_{1i} * t + \pi_{2i} * t^2 + \pi_{3i} * t^3 + \varepsilon_{ij},$$

Level-2 models:

$$\pi_{0i} = \gamma_{00} + \gamma_{01}x_1 \ldots + \gamma_{0n}x_n + \zeta_{0i},$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}x_1 + \zeta_{1i},$$

$$\pi_{2i} = \gamma_{20} + \zeta_{2i},$$

$$\pi_{3i} = \gamma_{30} + \zeta_{3i},$$

y_{ij} is our dependent variable (log real monthly pay) and i indexes persons and j measurement occasions. π_{0i} is the intercept of i's true income change trajectory and π_{1i}, π_{2i} and π_{3i} are i's true linear, quadratic and cubic part of the change trajectory. We thus have four level-2 submodels, one for each change trajectory parameter. We assume the stochastic parts (ε_{ij}, ζ_{0i}, ζ_{1i}, ζ_{2i}, ζ_{3i}) are normally distributed around zero and could covary. With $x_{.}$ we denote our covariates. x_1 is the variable indicating a transition out of academia. To facilitate interpretation of our results, we did not include this covariate (or any other variable) in the submodels for the quadratic and cubic part of the change trajectory. The $\gamma_{..}$ parameters are defined as population average effects (e.g. γ_{00} is the population average level-1 intercept and γ_{11} is the difference in the population average of the linear part of the growth rate for people who did and did not transition out of academia).

Covariates that vary within persons over time x_{ij} are decomposed in a time constant between part $\bar{x}_i$ and a time-varying within part $x'_{ij} = x_{ij} - \bar{x}_i$. The impact of time-varying predictors (denoted as 'within-effects' in our tables) were not allowed to vary over individuals or time, with the exception of our within-variable 'transition experienced' (x'_{1ij}).

5. Results

5.1. Who gets paid what?

Fig. 1 depicts box plots for median salaries at different points in time since the PhD, as well as trends in average salaries of men (solid orange line) and women (dotted blue line) across different points in the career. Over time, median salaries as well as the variation in salaries increase. Furthermore, the figure shows that while differences in the salaries of men and women are initially small, from about 8 years after the PhD onward, salary trajectories increasingly diverge in favor of men; women earn about 8700 Euros and men about 10,200 Euros at the end of our observation period.

How does this vary between those who stay in academia, and those who end up leaving? In total, we observe 2318 transitions out of academia. About 51 % of women and 50.4 % of men who initially continued their academic career after their PhD move away from academia eventually. On average, men leave around 3.6 years after doctorate receipt, and women leave after around 4 years. Fig. 2 shows salary trends of men and women based on their career trajectories, contrasting those who work in academia their entire observed career and those who transition out of academia at some point (on average at about 4 years after the PhD). The box plots show the median, 1st, 25th, 75th, and 99th percentile monthly wages at each time point, calculated among the full sample. The figure consistently shows that researchers with a career in academia earn more than same-gender peers who eventually leave, suggesting that there is no clear salary advantage from leaving academia once one started working in academia post-PhD. Within different sites of employment, men consistently earn more than women. Similar to Fig. 1, wages increasingly diverge, as do gender differences in wages. The gender difference in the later years appears to be especially driven by women in non-academic careers, who earn

[3] Extended model results including control variables can be found in Appendix 3.

Table 2
Mixed effects regression on 'log real monthly pay'.

	M0: Only time					M1: Transition variables					M2: Push/Pull factors				
	Men		Women		Diff.	Men		Women		Diff.	Men		Women		Diff.
	B	S.E.	B	S.E.		B	S.E.	B	S.E.		B	S.E.	B	S.E.	
Fixed effects on initial status															
Intercept	**7.970**	0.007	**7.909**	0.007	***	**8.310**	0.058	**7.977**	0.048	***	**3.796**	0.135	**3.889**	0.100	
Time															
t	**0.110**	0.003	**0.096**	0.003	**	**0.053**	0.008	**0.044**	0.009		**-0.199**	0.022	**-0.187**	0.017	
t^2	**-0.006**	0.000	**-0.004**	0.000	*	**-0.004**	0.000	**-0.003**	0.000	*	**-0.004**	0.000	**-0.003**	0.000	*
t^3	**0.000**	0.000	**0.000**	0.000		**0.000**	0.000	**0.000**	0.000		**0.000**	0.000	**0.000**	0.000	
WITHIN-EFFECTS															
Transition experienced (ref: no)															
Yes						**0.101**	0.010	**0.115**	0.012		**0.083**	0.007	**0.113**	0.009	**
BETWEEN-EFFECTS															
Transition experienced (ref: no)															
Yes						**-0.267**	0.019	**-0.199**	0.018	*	**-0.185**	0.014	**-0.159**	0.013	
PhD discipline (ref: Health sciences)															
Social sciences											**-0.188**	0.013	**-0.116**	0.010	***
Natural sciences and mathematics											**-0.264**	0.012	**-0.189**	0.012	***
Engineering											**-0.240**	0.015	**-0.144**	0.020	***
Humanities											**-0.254**	0.020	**-0.199**	0.019	
Child under 5 (ref: none)															
At least 1											**-0.136**	0.016	**-0.089**	0.014	*
Log monthly contract hours											**0.147**	0.026	**0.131**	0.020	
Temporary contract (ref: no)															
Yes											**-0.275**	0.014	**-0.192**	0.014	***
Fixed effects on rate of change															
WITHIN-EFFECTS															
Transition experienced (ref: no)															
Yes						**-0.008**	0.002	**-0.009**	0.002		-0.002	0.001	**-0.007**	0.001	*
BETWEEN-EFFECTS															
Transition experienced (ref: no)															
Yes						**0.013**	0.003	0.006	0.003		**0.006**	0.002	0.003	0.002	
PhD discipline (ref: Health sciences)															
Social sciences											-0.002	0.002	**-0.004**	0.002	
Natural sciences and mathematics											-0.001	0.002	**-0.004**	0.002	
Engineering											-0.004	0.002	-0.001	0.003	
Humanities											-0.001	0.003	0.004	0.003	
Child under 5 (ref: none)															
At least 1											**0.019**	0.002	**0.015**	0.003	
Log monthly contract hours											**0.049**	0.004	**0.046**	0.003	
Temporary contract (ref: no)															
Yes											**0.011**	0.002	**0.009**	0.002	
Controls included	NO					YES					YES				
AIC	-8317		-205			-9874		-1312			-26587		-17575		

Note. Statistically significant estimates (α=.05) of stratified models are displayed in bold. Significance levels in the "Diff" column are denoted as: *p < .05, **p < .01, ***p < .001.

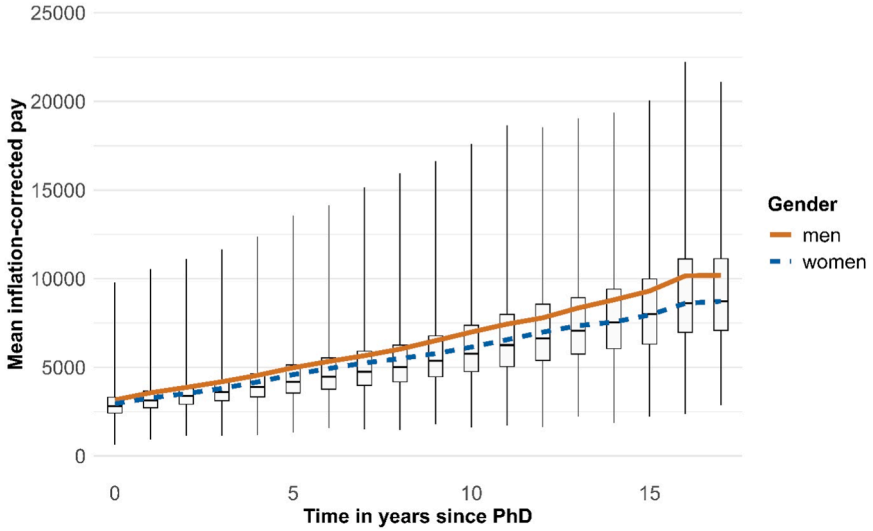

Fig. 1. Average inflation-corrected monthly pay by time in years since PhD and gender.

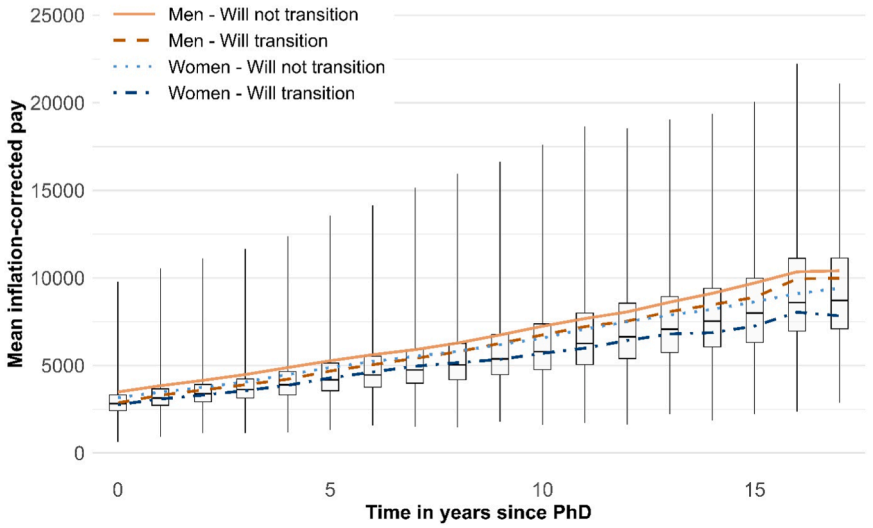

Fig. 2. Average inflation-corrected monthly pay by time in years since PhD, employment in academia or outside academia, and gender.

substantially less than all other groups from about 8 years after the PhD onwards. In contrast to earlier research that documented a wage premium outside academia for men (Goldan, 2021; Schulze, 2015), we seem to find a wage penalty outside academia which is especially strong for women. This could suggest that women are more likely to be pushed out of academia, which might contribute to lower wages after they leave. Women may also have fewer opportunities for career development outside the university, as their wage trajectories are considerably flatter when they pursue a career outside the university.

Table 1 further displays how men and women differ in terms of the key push and pull factors. Women are more likely than men to obtain a PhD in health sciences and social sciences, while men are more likely to have a PhD in natural sciences and mathematics and engineering. Women and men are about equally likely to have a child younger than 5. There are some differences in the employment terms of men and women: women work on average around 12 hours less than men per month and are more likely to be employed on a temporary contract.

5.2. Multivariate results

5.2.1. Salary development

We start by including our time variables in Model 0 and assess how salaries develop after one has started working in academia following the PhD. Men and women have different starting salaries: while men have an average salary of €2893 in the year of PhD graduation, women have an average salary of €2722 in the same year.[4] This gender difference in starting wages is significant, suggesting that the valuation of a PhD degree within universities is not equal for men and women. Men experience significantly stronger linear growth in their monthly salaries than women. Pay growth does slow down over time, as indicated by the negative quadratic term for t, and this decline is stronger for men than women.

5.2.2. Salary development after leaving academia

In Model 1, we add the 'transition experienced' variables to assess how monthly pay changes following a transition out of academia. Our

[4] Calculated as exp(7.970) and exp(7.909).

results show a negative between-effect of 'transition experienced' on initial salaries for both men and women, indicating that individuals who have worked outside academia for a larger part of their career tend to have lower starting salaries. We also assess whether (linear) salary growth differs between those who remain in academia and those who leave. The results indicate that men who spend a greater portion of their career working outside academia experience stronger salary growth over time than men who remain, while for women, salary growth trajectories do not significantly differ based on whether they experience the transition or not. In terms of selection, this suggests that men and women who have lower starting salaries are more likely to leave, and men with stronger growth trajectories are more likely to leave.

Next, we look at the within-effect of 'transition experienced'. Model 1 shows that both men and women experience an initial increase in their salary after they transition out of academia. Specifically, the monthly pay increases with around 10.6 % for men and 12.2 % for women.[5] After a transition out of academia, the salary growth rate also changes. Both men and women experience slower salary growth *after* leaving academia than before the transition, as evidenced by the negative within-effect of 'transition experienced' on the salary change rate in Model 1 for both genders. These results thus lend partial support to hypothesis 1, which posited that a transition out of academia would increase both average salaries and the salary growth rate. Rather, we observe that an initial increase in salary following a transition is mitigated over time due to slower salary growth.

5.2.3. Gender differences in salaries after leaving academia

We also hypothesized that women's salaries would increase less and increase at a slower rate following a transition out of academia than men's salaries. We test this by interacting the within-effects of 'transition experienced' on the initial salary and salary growth rate with gender in the pooled model. The within-effects of experiencing a transition out of academia, both on the initial status and salary growth rates, do not differ significantly between men and women. This suggests that men and women undergo similar changes in salary after leaving academia, and thus we find no evidence supporting hypothesis 2 based on what we observe in Model 1 if we do not include the push and pull indicators.

5.2.4. The role of push and pull factors in wages after the transition

In Model 2, we add push and pull factors influencing a transition out of academia: 'PhD discipline', 'child under 5', 'log monthly contract hours', and 'temporary contract'.[6] With the inclusion of log work hours, the intercepts can now be interpreted as the average starting salary of men and women when they work 1 hour, rendering the interpretation of this value close to that of an hourly wage.[7] After the inclusion of our push and pull variables, the gender difference in the intercept is no longer significant, suggesting similar monthly salaries of men and women at low work hours. Monthly salaries increase at higher (log) work hours, but more strongly so for men. Thus, our results imply that gender wage gaps in favor of men are mostly concentrated among those who work closer to full-time.

Once we include the push and pull factors in the model, two key changes in gendered wage trajectories after the transition out of academia emerge. First, women experience a larger immediate wage increase after the transition than men. Second, while men no longer experience a decrease in wage growth rate after the transition, women's salaries continue to grow slower after a transition out of academia. As a result, the pooled analyses in Model 2 do show significant gender differences in the effects of a transition out of academia: women's salaries increase significantly more immediately after a transition than men's salaries, but women experience slower salary growth after the transition. Put differently, when controlling for the push and pull factors, women's salaries initially increase more than men's following a transition, but as men's salaries grow more quickly following a transition, women's salary advantage following a transition diminishes over time. The coefficients suggest that, on average, it takes 6.3 years before women's advantage over men following a transition turns into a disadvantage. Stepwise analyses reveal that work hours and temporary contracts contribute most to the observed pattern. These results are not consistent with our expectation that gender differences in salary trajectories after the transition are diminished after adding the push and pull factors, and therefore we find no evidence in support of hypothesis 3.

It appears that excluding work hours and temporary employment obscure gender differences in post-transition wage trajectories, because they affect wages and wage growth in ways that partially counteract the direct effect of gender. In other words, work hours and temporary contracts suppress gender differences in wages following the transition. Researchers with fewer work hours and temporary contracts may experience *smaller immediate salary gains* but *higher wage growth rates* after transitioning out of academia. Since women are more likely to hold temporary contracts and work fewer hours, the (positive) gender effect in Model 1 is not observed due to opposing influences. Only when we control for contract type and work hours do significant gender differences emerge, which implies that the direct gender effect runs opposite to the indirect effects of gender through temporary employment and work hours.

The results also show that if men and women have similar work hours and contract status, women experience greater immediate salary gains from the transition out of academia, but their salaries would grow slower after a transition than men's. Men thus face a weaker short-term transition wage premium for temporary contracts and part-time work: having temporary contracts and working fewer hours seems to limit men's immediate entry into well-paid jobs outside academia more than it does for women. However, while controlling for contract hours and temporary contracts does not change women's wage growth rates after the transition, it does increase men's post-transition wage growth rates. This suggests that men's long-term wage growth after leaving academia is more dependent on their employment terms, whereas women's salary growth outside academia appears more constrained than men's regardless of their contract status and contract hours.

5.2.5. Supplementary analyses

While prior studies often find that PhDs who work outside academia earn *more* than their academically employed peers, our results show that wages are consistently lower outside academia and wages grow more slowly after a transition out of academia. To investigate the robustness of our results, we examine how sample selection affects our conclusions. Specifically, we restricted our salary trajectories to five years after PhD receipt, to align with shorter time frames used in previous studies (Alfano, Cicatiello, et al., 2021; Geppert et al., 2024; Goldan, 2021; Schulze, 2015). Within this limited period, we still observe a direct increase in wages following a transition, but wage growth rates no longer decline after a transition.[8] This suggests that if a wage premium exists for PhDs working outside universities, it is most pronounced in the early-career phase. By contrast, researchers at university may experience considerable wage increases in the mid- and late-career phases. Promotions from assistant to associate, or from associate to full professor, are typically accompanied by significant pay raises, as are transitions into management and leadership positions within the university.

[5] Exp(0.101) and exp(0.115)

[6] Because we are interested in explaining differences in salaries between individuals (of different genders), and not changes over time, we show only between-effects in Table 2, but the full results can be found in Appendix 3.

[7] In Appendix 7, we present supplementary analyses where we take logged hourly wages as the dependent variable.

[8] Results can be found in Appendix 4.

Opportunities for transitioning out of academia, as well as subsequent salary trajectories, may further differ systematically between academics who combine university employment with a secondary job outside academia and those who do not. Scholars with a secondary job may be more inclined to transition out of academia because they already have work experience and professional networks outside the university, and they may even be able to increase their work hours at their non-university job. Their professional experience and networks may function as a pull factor in a transition out of academia, and therefore can lead to more favorable salary trajectories after a full transition out of the university. Alternatively, a secondary job outside academia could reflect precarious employment terms within academia, which can push scholars out of academia and hamper their subsequent salary development. In either case, the presence of an "other job" alongside employment in academia raises concerns about endogeneity.

Although the (potentially endogenous) subgroup of scholars with a secondary job is relatively small (6 % of all scholars), we re-estimated our models excluding all individuals with secondary employment. The results largely corroborate our main findings. For both men and women, transitions out of academia remain associated with an initial increase in salaries. The negative within-effect of the transition on subsequently salary *growth* rates remains similar for women, but is no longer statistically significant for men (in Model 1). This suggests that part of the decline in post-transition wage growth observed among men in the main analyses may be driven by scholars who combine academic employment with a secondary job outside the university. For men, a secondary job may thus function as a push factor, as these results seem to suggest that the decreased wage growth after a transition out of academia is driven by this group. The overall pattern of initial post-transition salary changes, and gender differences in salary trajectories, however, remain robust.[9]

6. Discussion

Are transitions out of academia beneficial for salary development? And more so for men or women? This latter question is key, as women earn less than men in academia (Goldan, 2021; Kim et al., 2024; LNVH, 2016; Webber & Canché, 2015), women leave the university at higher rates than men (Agarwal & Ohyama, 2013; Mulders et al., 2024; Spoon et al., 2023), and salaries tend to be higher outside academia. As such, these transitions can potentially close gender gaps in earnings. More pessimistically, however, salary arrangements outside universities could also widen gender pay gaps due to gendered perceptions of who is considered a (good) scientist (Miller et al., 2015). Here, we contribute to studying these patterns by addressing the lack of long-term analyses on the gendered impact of a transition out of academia. We link thousands of PhD holders who started working in Dutch academia to unique, long-term longitudinal register data on wages.

Our findings confirm prior work on gender pay gaps among PhDs (e.g. Goldan, 2021; Kim et al., 2024; Schulze, 2015; Webber & Canché, 2015): women have lower starting salaries, and their salaries grow more slowly than men's salaries. Our descriptive results therefore show a gender pay gap in favor of men that widens with career age. Notably, gender wage gaps in initial salaries persist even after we control for compositional differences including PhD cohort, sector of employment, work hours, disciplinary orientation, parental status, and contract status.

We first examined how salaries evolve when researchers leave the university. Our findings challenge the assumption that non-academic positions offer significantly higher pay. While salaries initially increase following a transition out of academia, we also find those who leave tend to have lower starting salaries. Salary growth also decreases following a transition out of academia, suggesting that those who remain at the university earn more in the long run. While salaries in academia may lag behind industry in the early career, those who advance to associate or full professor incur substantial salary increases (Van Thor & Alejandro Perez, 2020). This is one possible explanation for the discrepancy with prior studies who tend to find 'transition premiums' (Goldan, 2021; Webber & Canché, 2015). Our supplementary analyses show equal salary growth rates before and after leaving academia when restricting the timeframe of our analyses, supporting our intuition. Overeducation and skill mismatch may further contribute to lower wages among PhDs in non-academic roles. As the number of PhDs has grown substantively, the demand for PhDs in the broader labor market has not kept pace. Consequently, PhDs outside academia often find that their training is not fully utilized, which can depress wages and job satisfaction (Alfano, Cicatiello, et al., 2021; Gaeta et al., 2017).

Our second main finding concerns the gendered impact of leaving academia. Our results present a nuanced picture: only after accounting for discipline, parental status, contract hours and temporary contracts, do we find that women experience a larger immediate salary increase, but slower wage growth over time after leaving academia than men. Rather than accounting for gendered salary trajectories following a transition, the push and pull factors therefore seem to affect men and women differently. Specifically, part-time, flexible contracts function as a double-edged sword for women. Women may initially benefit from widespread acceptance of part-time and flexible employment when applying for jobs outside academia. Meanwhile, men with a history of part-time work and temporary contracts may face greater scrutiny in the hiring process, because they challenge work norms that associate masculinity with continuous, full-time employment (Borgkvist et al., 2021; Pedulla, 2016; Rudman & Mescher, 2013). In the long run, however, gender stereotypes that work in women's favor in the hiring process initially may inhibit their later training and promotion opportunities, as their competence and ambition may be called into question (Benschop et al., 2013; Borgkvist et al., 2021; Fernandez-Lozano et al., 2020). In sum, part-time and temporary employment may push men out of academia more than women, partly explaining men's smaller initial salary increase when they leave. However, men's salaries eventually catch up, while women's salaries increasingly lag behind, widening the gender pay gap over time.

Critically, our findings show that gender pay gaps persist over time, regardless of the career trajectory taken. If anything, gender differences in salaries increase after researchers leave academia once job characteristics are considered. This persistent inequality highlights another ongoing undervaluation of women's scientific contributions across sectors and domains. Closing gender pay gaps therefore requires not only targeting hiring, retention and promotion in specific organizations and sectors, but also broader efforts to challenge stereotypes about women's competence as researchers. Furthermore, our results problematize the disproportionate outflow of women from universities. While leaving academia can initially increase salaries, slower wage growth outside the university turns this advantage into a disadvantage over time. A large-scale study on retention and academic careers of PhDs at Dutch universities found that women leave the university at higher rates than men (Mulders et al., 2024). Combined with the current study this implies that women miss out on significant late-career earnings. Therefore, efforts to improve retention and promotion of women in universities are crucial. In the Netherlands, women are more likely to be placed in the lower salary tiers within academic positions than men, even at similar experience levels (LNVH, 2016). These disparities are particularly tricky because they are less visible than gender differences in appointments between positions with different titles. Additionally, it is essential to continue combating social safety issues and foster inclusive workplace climates, as these remain influential in women's turnover decisions (Nielsen, 2017; Spoon et al., 2023).

Several limitations to this study merit attention. One limitation of this study is that we were unable to include variables related to research output or funding obtained by our sample of researchers. Researchers

[9] Results can be found in Appendix 5.

with a more extensive publication record and those who have successfully obtained funding likely enjoy greater opportunities for advancement within the university (van den Besselaar & Sandström, 2015; Van den Besselaar & Sandström, 2016). Additionally, researchers in the natural sciences may engage in patenting, which simultaneously enhances their reputation within academia and improves career prospects in industry by demonstrating their ability to develop commercial and real-world applications from their research (Göktepe-Hulten & Mahagaonkar, 2010). The inclusion of these bibliometric indicators would have allowed us to control for potential differences in scientific productivity between researchers, as this could have affected their career opportunities and salary trajectories inside and outside academia. However, bibliometric indicators remain imperfect measures of scientific merit, as they are also subject to (gender) biases (Hofstra et al., 2020; Knobloch-Westerwick et al., 2013; Wang et al., 2017). Consequently, their inclusion could have potentially masked some gender disparities in salaries.

A second limitation of this study is that we are unable to make causal claims about the impact of a transition out of academia on researchers' wages. We have significantly extended cross-sectional analyses of gender wage gaps among PhDs in different sectors by including between-person transition effects, allowing us to separate wage changes after the transition from relatively stable differences in wage trajectories between those who stay and those who leave. Nevertheless, transitions out of academia are not random, and unobserved factors—such as short-term wage fluctuations, external job offers, contract end dates or negative experiences in academia—may influence both the likelihood of transitioning and subsequent wage trajectories. Although we have attempted to control for push and pull factors informing a decision to leave academia, our results remain correlational. We commend future research that address selection processes, for instance by employing a propensity score matching design to compare individuals with similar career trajectories who differ only in their transition status.

Third, we are limited in accounting for international mobility of scholars, particularly of those who move abroad immediately following their PhD. While our combination of survey and register data enables us to construct detailed salary and job trajectories for researchers working in the Netherlands, we have no information on international academic careers. Additional data would be required to identify whether internationally mobile scholars start working in academia after their PhD. By selecting scholars who start working at Dutch universities within one year of completing a PhD, we exclude those who initially work in foreign institutions and later immediately return to Dutch academia. This small group (N = 159) is likely positively selected, as international mobility is generally regarded as prestigious and beneficial for career advancement (Holding et al., 2024). Our findings therefore primarily apply to scholars with domestic academic careers, and caution is warranted in generalizing our results to internationally mobile scholars. Nevertheless, our findings are likely a conservative estimate of gender inequality in salaries, as men are more internationally mobile than women immediately after the career, and so women are more likely to miss out on financial advantages of international mobility (see Table A5, Appendix 8).

Studying even more complex patterns of mobility into and out of the university form an interesting avenue for future research. Prior research suggest that working at a foreign institution can increase scholars' wages upon return, as it expands networks and is a marker of status (Holding et al., 2024; Stephan et al., 2013). Similarly, brief stints outside academia can help researchers broaden their skill sets, and foster awareness of practical applications of research. Alternatively, reentering academia may be challenging when researchers lack teaching experience, or when sector-specific skills are not easily transferable. Sometimes, universities may match previous salaries for incoming faculty from the private sector, indicating that intersectoral mobility can enhance wages (van Engen & Kroon, 2024). Signing bonuses also increase wages for incoming faculty, and this has been found to contribute to gender wage gaps (Pouwels & Mutsaers, 2023). Future research should explore how these dynamic career trajectories differ by gender and how this affects gender wage gaps among researchers.

CRediT authorship contribution statement

Jochem Tolsma: Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Anne Maaike Mulders:** Writing – review & editing, Writing – original draft, Visualization, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Bas Hofstra:** Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Christoph Janietz:** Writing – review & editing, Data curation, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to spellcheck and improve readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Declaration of Competing Interest

none.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.rssm.2026.101132.

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