



UvA-DARE (Digital Academic Repository)

Inequality at work

Occupations, organizations, and the wage distribution

Janietz, C.

Publication date

2024

[Link to publication](#)

Citation for published version (APA):

Janietz, C. (2024). *Inequality at work: Occupations, organizations, and the wage distribution*. [Thesis, fully internal, Universiteit van Amsterdam].

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

5. Temporary Employment and Wage Inequality over the Life Course

Introduction⁴⁶

The rise of flexible forms of employment has been a major labor market transformation in the past few decades. In several European countries, changes in employment protection legislation have stimulated the growing prevalence of temporary work contracts (Barbieri, 2009; DiPrete et al., 2006). Temporary contracts give organizations more leeway to adjust their staff size at the expense of higher job insecurity among workers. A substantial body of literature suggests that the flexibilization of employment relationships has spurred rising inequality in the labor market (Bidwell et al., 2013; Kalleberg, 2009). Workers with lower levels of educational attainment bear most negative consequences, as the substitution of temporary jobs for permanent jobs mainly affects routine work (DiPrete et al., 2002; Gebel & Giesecke, 2011).

From a life course perspective, the growing use of temporary contracts by organizations signifies a revocation of long-term employment guarantees, at least for parts of the workforce, with potential repercussions for inequality over the working career. Indeed, recent research stresses the need to examine labor market outcomes from a life course perspective (Cheng, 2014; Kalleberg & Mouw, 2018). Wage inequality grows over time among workers of similar age, and the level of intra-generational wage inequality has increased among younger cohorts (Bernhardt et al., 1999; Cheng, 2021). This career process of wage differentiation is linked to educational attainment, as higher initial wages of higher-educated workers are associated with steeper wage growth over the life course (Bhuller et al., 2017; Cheng, 2014, 2021; Schultz, 2019).

In this study, we examine temporary employment as a potential determinant of growing wage inequality over the life course. We investigate whether temporary employment explains wage differentiation between workers who are part of the same birth cohort but have different levels of educational attainment. Temporary employment can affect wage inequality as a life course process when resulting in wage growth for some workers and wage stagnation for others (Bernhardt et al., 1999; Choi, 2016; Mouw & Kalleberg, 2010a). The present country case, the Netherlands, combines strong dualization of employment protection legislation with a highly stratified education system. Dualization at the institutional level leads to greater labor market hazards at the micro level, as indicated by higher aggregate temporary employment rates (Hipp et al., 2015) and larger negative effects of temporary employment on wages (Fauser & Gebel, 2023).

We extend previous research by estimating the contribution of temporary employment to the growth in wage inequality between lower- and higher-educated workers using Dutch linked employer-employee register data. Previous research demonstrates that the hazards of

⁴⁶ A slightly different version of this chapter has been published as Janietz, Christoph, Thijs Bol and Bram Lancee. 2023. Temporary Employment and Wage Inequality over the Life Course. *European Sociological Review*. <https://doi.org/10.1093/esr/jcad075>.

temporary employment are unevenly distributed across education groups,⁴⁷ as higher-educated workers exhibit career patterns that entail more probable transitions into permanent employment and more favorable wage outcomes during temporary employment (Fuller & Stecy-Hildebrandt, 2015; Mattijssen & Pavlopoulos, 2019; Reichenberg & Berglund, 2019). Yet, as of now, we do not know to what extent these descriptive patterns of unequal career consequences translate into a continued differentiation of aggregate group-level wages over the life course.

Another contribution is that we study changes in temporary employment risk and vulnerability in a unified framework of analysis (Brüderl et al., 2019; Hogendoorn et al., 2020). Previous research on the link between temporary employment and labor market inequality has considered either unequal temporary employment rates or wage outcomes. In contrast, we examine both pathways simultaneously. First, less-educated workers may be at a higher risk of temporary employment throughout their careers. This can lead to growing wage inequality when differences in temporary employment rates between groups increase over the life course, and the wage outcomes of temporary employment are, on average, negative. Second, less-educated workers might accrue larger wage penalties during temporary employment relative to permanent employment and thus are more vulnerable to the consequences of temporary employment. If group-specific effects of temporary employment on wages diverge over the life course, wage inequality increases, even if temporary employment rates remain similar.

Following this approach, we employ fixed-effects individual slopes regression models (FEIS) (Rüttenauer & Ludwig, 2023) together with a Kitagawa-Oaxaca-Blinder decomposition for longitudinal data (Kröger & Hartmann, 2021). We decompose the observable change in wage differences between education groups over the life course into distinct components that are due to a changing composition in temporary employment rates (group-specific risk or endowment component) and the changing effects of temporary employment on wages (group-specific vulnerability or coefficients component). The advantage of this approach is that it allows us to judge the relative importance of each pathway for the growth of wage inequality over the life course.

Theory

Temporary employment and wage inequality over the life course

Sociological theories that aim to explain wage differentiation over the life course focus mostly on how employment careers are affected by the broader institutional context in which they are embedded (Fuller, 2008; Kalleberg & Mouw, 2018; R. A. Rosenfeld, 1992; Spilerman, 1977). Against this background, individual employment careers at the micro-level can be understood as sequences of jobs that unfold under specific labor market regulations at the macro-level (Kalleberg, 2011; A. B. Sørensen, 2001). Once workers of the same cohort enter the labor market, their wage trajectories will evolve differently, as labor market institutions structure the career opportunities and constraints attached to different types of employment relationships.

⁴⁷ When we use the term ‘groups’ throughout the text, we denote people who share similar observed characteristics (e.g. educational attainment).

One specific form of employment relationship that potentially reinforces wage inequality over the life course is temporary employment. The regulatory context of the Netherlands can be described as ‘partially deregulated’ and is characterized by low barriers to the use of temporary employment contracts combined with high protection of workers who hold permanent contracts (OECD, 2013). This policy constellation, commonly referred to as institutional labor market dualization (Busemeyer & Kemmerling, 2020), stimulates a higher aggregate temporary employment rate, specifically among less-educated workers (Hipp et al., 2015), and results in larger negative effects of temporary employment on wages from a cross-national perspective (Fauser & Gebel, 2023).

Given institutional labor market dualization, we expect temporary employment to be an important determinant of growing wage inequality over the life course in the Netherlands. We conceptualize temporary employment as an employment practice implemented by organizations (i.e., employers) at the meso-level. We argue that organizations link regulatory context to individual-level career trajectories. As organizations make use of temporary work contracts under national employment protection legislation, they shape the wage trajectories of workers (and ultimately aggregate inequality) by affecting the individual-level career sequences of jobs (Cobb, 2015).

In the Netherlands, this stratifying effect of temporary employment may be particularly strong among workers with different levels of educational attainment (Commissie Reguleren van Werk, 2020). The Dutch education system is well-known for its early tracking and tight linkages between school and work (Bol & van de Werfhorst, 2013). Students are selected into different educational tracks at the age of 12 years. After the completion of lower secondary education, there are three further tracks: upper secondary vocational education, tertiary vocational education, and university. The upper secondary option offers students the most occupation-specific skills, often organized in a dual system that combines school with apprenticeships, where students learn on the job. Tertiary vocational education is less specific, as education mostly takes place in schools, and students can move to a wider variety of occupations. Finally, university education is the most general, with some notable exceptions (e.g., medicine, and law) (Forster & Bol, 2018). These differences in the specificity of educational programs also imply a differential labor market mobility of workers. Higher-educated workers, on average, will be more able to move to different job positions, given their broader training.

We employ a risk and vulnerability framework (see Table 5.1) to understand how temporary employment may affect wage inequality over the life course between workers with different levels of educational attainment (Brüderl et al., 2019; Hogendoorn et al., 2020). We argue that the logic and motives with which organizations implement temporary employment lead to differing temporary employment risk and vulnerability between education groups. Under risk, we understand the group-specific likelihood of working in temporary employment at a given moment during the life course (i.e., group differences in temporary employment rates). With vulnerability, we refer to the group-specific wage effect of temporary employment relative to permanent employment at a given time point in the career (i.e., group differences in

Concept	Interpretation	Expression	Expected contribution to ΔY over the life course
Risk of temporary employment	Differing temporary employment rates by education	$\bar{X}_t^H \neq \bar{X}_t^L$	Contribution of ΔR increases over the life course
Vulnerability to temporary employment	Heterogenous effects of temporary employment on wages by education	$\hat{\beta}_t^H \neq \hat{\beta}_t^L$	Contribution of ΔV is stable <i>or</i> decreases over the life course

Table 5.1 - Summary of concepts & hypotheses

the effect of temporary employment on wages). When group differences in risk and vulnerability change over the life course, they contribute to growing inequality.

Education and risk of temporary employment

A first pathway through which temporary employment may contribute to wage inequality over the life course is its incidence. During hiring and contract renegotiation, organizations decide whether to commit to an open-ended employment relationship. Given the dualization of employment protection in the Netherlands, organizations may opt to retain operational flexibility by using easy-to-terminate temporary contracts instead of institutionally better-protected permanent contracts (Barbieri & Scherer, 2009; Gebel & Giesecke, 2011; Hipp et al., 2015). Indeed, the use of temporary contracts is a common employment strategy among organizations in the Netherlands, as the country exhibits one of the highest aggregate rates of temporary employment from a European perspective and is one of the few countries in which the temporary employment rate has continued to rise without major disruption since the early 2000s (Eichhorst et al., 2017; Latner, 2022).

Prior research reports a higher risk of temporary employment for less-educated workers and explains this educational gradient in risk with the different types of work that are performed on the job (de Vries & Wolbers, 2005; DiPrete et al., 2006; Gebel & Giesecke, 2011; Olsthoorn, 2016; Reichelt, 2015). Workers with lower educational attainment can negotiate less favorable employment contracts, as their jobs are more often characterized by lower task specificity and monitoring costs. These job attributes do not require organizations to engage in long-term employment relationships to prevent losses of shared investments in firm-specific skills (A. B. Sørensen, 2001). Given the combination of high firing costs associated with permanent contracts and low restrictions on flexible employment in the Netherlands, organizations can reduce their labor costs and shift the risks related to market volatilities to employees by using temporary contracts with no intent of later conversion, particularly among less-educated workers who predominantly hold these jobs in question (Polavieja, 2003).

By contrast, organizations tend to use temporary employment differently for higher-educated workers. Here, temporary contracts are most often intended as initial screening devices for permanent positions within the same workplace (Gebel & Giesecke, 2011; Kiersztyn, 2016). In the strongly stratified Dutch education system, tertiary degrees represent

valuable yet mostly general credentials, thereby increasing employers' incentives to opt for a preliminary screening period to minimize risk while hiring under uncertainty. In other words, temporary jobs for higher-educated workers often function as entry hubs in a firm's internal labor market, which eventually provide access to permanent employment. Empirical research presents evidence for this argument by showing, on average, earlier and more durable transitions out of temporary employment for higher-educated workers (Fuller & Stecyk-Hildebrandt, 2015; Mattijssen & Pavlopoulos, 2019).

Static risk hypothesis: Temporary employment risk is higher among lesser-educated workers than among higher-educated workers.

From a dynamic perspective, temporary employment constitutes a crucial branching point for access to tenure and seniority within organizations (Garcia-Louzao et al., 2023; Lindbeck & Snower, 1988; A. B. Sørensen, 2001). The varying intentions behind the use of temporary employment may result in diverging group-level temporary employment risk over the life course. While most higher-educated workers may transition into permanent employment over time, less-educated workers may face larger long-term barriers to transition out of temporary employment. In other words, reductions in temporary employment risk should be unequal and persistently smaller among lesser-educated workers. Therefore, we hypothesize:

Dynamic risk hypothesis: Temporary employment risk contributes to changes in wage inequality between education groups throughout the life course.

Education and vulnerability to temporary employment

A second pathway through which temporary employment may contribute to growing wage inequality over the life course is its effect on wages. In general, the institutional dualization of employment protection strengthens the wage bargaining position of permanent workers relative to temporary workers because of higher labor turnover costs for organizations (Bellani & Bosio, 2021; Lindbeck & Snower, 1988; A. B. Sørensen, 2001). This greater institutional protection of permanent contracts encourages organizations to focus their investments in firm-specific skills and the payment of efficiency wages on their permanent workforce. This results in temporary employment having an overall negative effect on wages in countries with strong institutional labor market dualization (Fauser & Gebel, 2023).

Yet, earlier research shows that the negative wage effect of temporary employment is not uniform across different labor market groups (Fauser & Gebel, 2023; Kiersztyn, 2016). Moreover, decreasing wage penalties towards the upper end of the wage distribution indicate the existence of relatively better compensated temporary employment positions in the labor market (Arranz et al., 2021; Westhoff, 2022). Importantly, the negative effect of temporary employment on wages may be larger among less-educated workers. Given the often intended use of temporary employment as a labor cost cutting strategy in case of less-educated worker's jobs, they are more likely to be situated in insecure low-status positions that are disconnected from promotion and training opportunities, as well as reward structures that other workers in the same organization receive (Barbieri et al., 2019; Booth et al., 2002; Garcia-Louzao et al., 2023).

Static vulnerability hypothesis: Temporary employment vulnerability is, on average, larger among lesser-educated workers than among higher-educated workers.

From a dynamic perspective, changes in wage effects over the life course can contribute to growing inequality when putting less-educated workers in further disadvantage. The negative wage effect of temporary employment increases with age in the Netherlands (Fauser & Gebel, 2023), but this general trend of a growing negative effect may mask group-specific patterns of change. Previous research suggests two potential patterns for changing vulnerability over the life course. First, differences in vulnerability between education groups may remain large throughout the life course. According to the literature on job mobility, workers possess differing levels of market power based on their previously acquired skills, which results in unequal wage outcomes despite similar job insecurity (DiPrete et al., 2002; Frederiksen et al., 2016; Kalleberg & Mouw, 2018; Mouw & Kalleberg, 2010a). It is argued that higher-educated workers are better able to realize wage gains while chaining temporary contracts between organizations over their entire careers. Economic job matching theories and the theory of boundaryless careers provide complementary arguments. According to these theories, workers can build successful careers by linking jobs in different organizations that match their evolving work experience and training needs (Arthur, 1994; Bidwell & Briscoe, 2010; Kalleberg & Mouw, 2018). In other words, higher-educated workers may fare better in utilizing the potential ‘bridge function’ of temporary employment, which can offer work experience and valuable social capital for subsequent job search (Barbieri & Scherer, 2009; Fauser, 2020; Fuller & Stecy-Hildebrandt, 2015; Reichenberg & Berglund, 2019). In contrast, less-educated workers are argued to be more dependent on the acquisition of firm-specific skills within firm internal labor markets that insulate them from external market forces (i.e., permanent employment) to realize wage gains (Kalleberg, 2011).

Dynamic vulnerability hypothesis (I): Temporary employment vulnerability contributes to changes in wage inequality between education groups throughout the life course.

Second, group differences in vulnerability by educational attainment may initially be large, but may also converge over the life course. A smaller wage penalty among higher-educated workers could be limited to an initial job-matching period during the early career, and afterwards dissipate over the life course. During early job matching, educational attainment may operate as a signal and mitigate vulnerability by increasing the chance for higher-educated workers to receive a favorable starting salary at a new organization despite entering the firm on a temporary contract (Bidwell, 2011; Spence, 1973). However, in the later stages, temporary employment may increasingly indicate adverse career trajectories among higher-educated workers including a growing number of workers who did not pass an earlier probation period. In other words, negative wage effects may become more similar across education groups, thereby resulting in a smaller contribution of vulnerability to changes in wage inequality.

Dynamic vulnerability hypothesis (II): Temporary employment vulnerability contributes to changes in wage inequality between education groups particularly in the earlier stages of the life course.

Data and Methodology

Sample

We analyzed Dutch wage register data from 2006 to 2019 (Centraal Bureau voor Statistiek, 2022a). The data contain job-level information on wages and hours worked, which employers report monthly for taxation purposes. In the data, uniquely identified workers are linked to their employing organizations. Workers may hold multiple jobs simultaneously, sometimes even within the same organization.

The population for the analysis consisted of all employed workers (full- and part-time) born in 1979. These workers turned 27 years old in the first year of observation (2006) and were 40 years old at the end of the observation period (2019). To analyze changes in wage inequality among a stable group of workers, we focused on workers who were continuously observed between 2007 and 2019 (N=85,786).⁴⁸ Throughout the analysis, we benchmark the point estimates based on this sample against equivalent estimates that included all workers born in 1979 with available education codes.⁴⁹ Importantly, codes for the highest attained education were only available for approximately 75% of the population. We applied weights provided by Statistic Netherlands (CBS) to correct for misrepresentation due to the non-random availability of educational codes.

This cohort design has the distinct advantage of conceptualizing wage inequality as a distribution that unfolds over the life course of workers (i.e., between ages 27 and 40), rather than looking at population-wide inequality in specific calendar years. Taking this perspective was more appropriate for this study because we argue that temporary employment affects wage differentiation as a career process by linking earlier labor market outcomes to later wage gains or losses (Gottschalk & Moffitt, 2009).

We focused on the main job of a worker. The main job was defined as the organizational affiliation of a person with the most absolute hours worked in a given calendar year. This definition affected data processing in several ways. First, we treated multiple job identifiers of the same worker in the same organization as one job, and summed all hours and earnings. Second, if a person worked for more than one organization in the calendar year, we designated the person-organization pair with the highest absolute number of hours as the main job. All other jobs were excluded from the analysis. Third, we differentiated all wages and hours within each main job by contract status (permanent or temporary) and aggregated them over the calendar year. Overall, we derived a yearly panel of main jobs nested in unique workers.

⁴⁸ ‘Continuously observed’ implies that a worker was employed at least at one point during each calendar year between 2007 and 2019. Therefore, employment gaps within individual trajectories may occur. A detailed overview of case numbers with and without available education codes can be found in Table A.17 of the appendix. Table A.20 provides an overview on the share of continuously observed workers relative to the full sample of workers with available education codes.

⁴⁹ Descriptive statistics for the full sample including all observed workers (Table A.22) as well as detailed estimation results for both continuously observed workers and all observed workers (Table A.23-A.26) can be found in the appendix.

Variables

Table 5.2 provides an overview of the variables used in the analysis. The dependent variable was the real hourly wage. The wage measure excluded additional benefits such as holiday allowances and overwork compensation. Hourly wages were adjusted for inflation by using the yearly CPI with 2015 as the reference point. We set hourly wages below 1 €/h as missing and applied a log-transformation. We top-coded a few cases (0.04%) with an hourly wage above 100 €/h.

Education was defined as the highest attained level. The variable comprised three levels of education: lower secondary education or less (ISCED 1-2; basisonderwijs, vmbo, havo-, vwo-onderbouw, mbo1), upper or post-secondary education (ISCED 3-4; havo, vwo, mbo2-4), and tertiary education (ISCED 5-8, hbo-, wo-bachelor/master, doctor). We treated education as time-invariant by assigning the highest observed level during the full observation period to all person-years of that person. 13.22% of all workers with available education codes upgraded their educational attainment during the observation period.⁵⁰ We accounted for these changes by constructing an additional control variable that flagged year-specific deviations from the assigned time-constant highest level of education.

The main explanatory variable was the employment contract status that indicated a permanent or temporary employment relationship. Because the contract status of a main job can change within a calendar year, we applied a ‘hours worked’ criterion while constructing this variable. If more working hours were accumulated on a temporary contract during the calendar year, we assigned temporary employment as the overall contract status for the full calendar year. The wage measure was adjusted accordingly using only wages and hours accrued while observing the assigned contract status. In addition, we constructed a variable that counted the cumulative number of years of temporary employment since 2006 to capture cumulative effects.

We constructed a second explanatory variable that combined information on contract status (permanent versus temporary) with an indicator of job mobility (staying versus switching between organizations). Workers employed in the same organization in their main job in both the preceding and current calendar years were designated as stayers. By contrast, when a worker changed organizations between two adjacent calendar years, we designated this as indicative of job mobility. This variable allowed us to contrast the wage effects of either staying within or moving between organizations combined with either staying temporarily employed or moving into permanent employment after holding a temporary contract in the preceding year.

⁵⁰ See Table A.19 in the appendix for additional information.

Temporary Employment and Wage Inequality over the Life Course

	All		ISCED 1-2		ISCED 3-4		ISCED 5-8	
	2007	2019	2007	2019	2007	2019	2007	2019
Real Hourly Wage	15.41	21.14	13.29	15.79	14.49	17.94	17.18	26.71
	(4.35)	(8.97)	(3.62)	(5.27)	(3.94)	(5.82)	(4.40)	(10.07)
<i>Permanent contract</i>	15.74	21.78	13.68	16.20	14.82	18.47	17.72	27.32
	(4.34)	(9.13)	(3.77)	(5.33)	(3.92)	(5.92)	(4.31)	(10.17)
<i>Temporary contract</i>	14.59	18.24	12.31	14.22	13.53	15.71	16.14	23.57
	(4.28)	(7.59)	(2.99)	(4.71)	(3.83)	(4.79)	(4.37)	(8.85)
Education								
ISCED 1-2	12.20%							
ISCED 3-4	48.33%							
ISCED 5-8	39.47%							
Male	51.70%		63.45%		54.03%		45.21%	
Immigrants and their (direct) descendants								
With own migration experience	9.14%		16.53%		8.09%		8.13%	
Without own migration experience	9.25%		9.66%		9.21%		9.18%	
Temporary employment (t)	29.36%	18.22%	27.99%	20.64%	25.66%	19.37%	34.31%	16.07%
Cumulative years of temporary employment (since 2006)	0.57	3.12	0.53	3.16	0.49	3.08	0.68	3.15
Workers with 0 years of temp. employment ('never treated')	36.16%		38.64%		38.63%		32.37%	
Workers with 13 years of temp. employment ('always treated')	1.48%		2.13%		1.43%		1.34%	
Job mobility events (t)								
Temporary (t-1) & Stay (t) & Permanent (t) &	4.63%	4.56%	3.72%	4.30%	3.20%	4.35%	6.69%	4.89%
Temporary (t-1) & Stay (t) & Temporary (t) &	12.38%	8.74%	12.10%	11.09%	10.46%	9.49%	14.84%	7.10%
Temporary (t-1) & Job Mobility (t) & Permanent (t) &	3.62%	1.31%	2.98%	1.57%	3.21%	1.42%	4.32%	1.09%
Temporary (t-1) & Job Mobility (t) & Temporary (t) &	7.98%	3.92%	7.35%	4.35%	6.85%	4.36%	9.57%	3.24%
N	85,786		7,895		32,370		45,521	

Table 5.2 - Descriptive statistics by education (continuously observed workers born in 1979)

(Note: Author's own calculations. Industry and sector not displayed. Weights applied.)

We defined the time dimension of the data along the axis of respondents' age. Alternatively, we could have conceptualized time as work experience because the level of education affects the timing of labor market entry. For example, while higher-educated school graduates usually enter the labor market in their mid-twenties, this happens at a younger age for most workers with lower levels of educational attainment. We focused on actual age for two reasons. First, the Netherlands has a minimum wage that increases stepwise with age. Only for those aged 21 years and older does the full statutory minimum wage apply. Starting the observation window at age 27 ensured that the same regulatory wage floor applied to all workers. Second, the vast majority of individuals had completed their educational trajectory at this point in their lives, thereby minimizing the number of workers who still participated in education parallel to observed employment.

We included several control variables in the adjustment sets. During the risk analysis, we controlled for gender and immigration as ancestors of the exposure variable (education) and the outcome variable (temporary employment), while other potential confounders such as class background were unobserved. During the vulnerability analysis, we controlled for industry (first level of the Dutch SBI 2008) and sector (public, private, subsidized) as ancestors of the treatment (temporary employment) and the outcome variable (wages). We did not control for industry and sector in the risk analysis, as we considered these variables to be descendants of education, thus inducing overcontrol bias when being included as a control.

Methodology

We performed the analysis in three steps. In step one, we assessed the empirically observed wage levels of workers by education and traced how these group-level wages developed over the life course.

In step two, we investigated temporary employment risk and vulnerability using two separate approaches. First, we performed a state-probability analysis to describe how the risk of temporary employment differs by level of education and how this differential risk developed over the life course. For this purpose, we estimated a pooled logistic regression model

$$\text{logit}(\text{Temp}_{it}) = \alpha + \beta \text{Edu}_i + \gamma \text{Age}_{it} + \delta \text{Edu}_i * \text{Age}_{it} + \mu' X_i + \varepsilon_{it} \quad (5.1)$$

where we interacted the set of education indicators Edu_i (with ISCED 1-2 as the reference category) with a set of age dummies Age_{it} . An additional vector of time-constant controls X_i comprised gender and immigration (descendancy) fully interacted. We used this model to derive predicted probabilities of temporary employment by education and age. The purpose of this model was to provide a description of educational differences in temporary employment risk over the life course rather than an analysis of transition rates.

Second, we estimated fixed effects individual slopes (FEIS) panel regression models to analyze vulnerability to temporary employment. We implemented the following models separately for each education group:

$$\ln \text{wage}_{it} = \beta \text{Temp}_{it} + a_{1i} + a_{2i} t + a_{3i} t^2 + \gamma \text{Year}_{it} + \delta' X_{it} + \varepsilon_{it} \quad (5.2)$$

$$\ln wage_{it} = \sum_{n=1}^7 \beta_n Event_{n,it} + a_{1i} + a_{2i} t + a_{3i} t^2 + \gamma Year_{it} + \delta' X_{it} + \varepsilon_{it} \tag{5.3}$$

With the first set of models (Equation 5.2), we estimated the average effect of temporary employment on wages. We relied purely on within-person variation to identify the effect of interest. In addition to worker- and year-fixed effects, we controlled for heterogeneous slopes, as workers with flatter wage trajectories are likely to select into temporary employment, thereby resulting in an overestimation of the negative effect of temporary employment on wages (Rüttenauer & Ludwig, 2023). We controlled for this source of bias by including interactions between person-specific IDs and a continuous time measure (t and t^2). We also controlled for industry (first level of the Dutch SBI 2008), sector (public, private, subsidized), and year-specific deviations from the highest level of education in all FEIS models.

Due to this within-design, we can't identify effects for workers who were either continuously permanently employed ('never treated', 36.16%) or continuously temporarily employed ('always treated', 1.48%) throughout the observation period. Omitting the group of 'never treated' during the estimation was arguably inconsequential for the analysis, as temporary employment did not directly affect their wages.⁵¹ The unidentified effects of the 'always treated' represented a greater challenge in the design, as they constituted part of the true average treatment effect on the treated (ATT). It is plausible that these workers would gain the most from entering permanent employment, and if this is the case, our estimates would be downward-biased. This problem was amplified by the fact that the 'always treated' were overrepresented among the less-educated workers (Table 5.2). However, the small overall share of continuously temporarily employed workers in the sample mitigated this problem. In either case, it is important to consider the estimates of these models as lower bound estimates.

With the second set of models (Equation 5.3), we estimated the effect of job mobility events after holding a temporary contract in the previous year. These effects were identified as contrasts to a worker staying in the same organization while being permanently employed throughout. In other words, while the first set of models (Equation 5.2) defines the counterfactual as the wage trajectory of the temporary employed had they been permanently employed, the second set of models (Equation 5.3) applies another counterfactual defined as the wage trajectory of the previously temporarily employed had they been embedded in a firm-internal labor market. We compared all estimated wage effects across education groups to assess the extent to which vulnerability differed by educational attainment.

As a third step, we analyzed to what extent temporary employment contributed to the divergence of average wages of less- and high-educated workers over the life course. Again, we relied on FEIS panel regression by building on Equation 5.2 estimated separately for each

⁵¹ This is likely a simplification of social reality. In case that wages of permanent workers are affected by temporary employment (e.g., due to insider-outsider dynamics during firm-based wage setting), we miss out on parts of the true effect of temporary employment on wage inequality. For example, if wages of higher-educated permanent workers increase due to managerial strategies that rely on a bifurcated workforce including the presence of less-educated temporary workers at the same firm, we underestimate the total impact of temporary employment on the wage gap.

education group.⁵² We used $Temp_{it}$ to capture the immediate effects of temporary employment. In addition, we fully interacted the temporary employment indicator with age to allow for time-varying effects over the life course. We also included the cumulative number of years of temporary employment since 2006 as a continuous variable (linear and quadratic) to capture the effects of temporary employment that accumulate over time. Other than the immediate effect, the continuous cumulative effect of each additional year in temporary employment since 2006 was constrained to be time-constant.^{53,54}

Based on these FEIS models, we decomposed the contribution of temporary employment to the growing wage gap between education groups over the life course. We used an extension of the Kitagawa-Oaxaca-Blinder (KOB) decomposition for longitudinal data (Kröger & Hartmann, 2021; Wellington, 1993). Conceptually, we decomposed the change in the mean group differences over time (ΔY). In other words, we asked how much of the change in wage difference between education groups from age 28 (s) to time point t was due to a change in the group-specific temporary employment rates (\bar{X}) or a change in group-specific wage effects of temporary employment ($\hat{\beta}$).

$$\Delta Y = \Delta Y^H - \Delta Y^L = (\bar{X}_t^H \hat{\beta}_t^H - \bar{X}_s^H \hat{\beta}_s^H) - (\bar{X}_t^L \hat{\beta}_t^L - \bar{X}_s^L \hat{\beta}_s^L) \quad (5.4)$$

This change in wage differences over the life course (ΔY) can be decomposed by looking at the outcome variable group wise across time. The wage differences over time among workers with lower levels of education (ΔY^L) were subtracted from the wage differences over time among workers with higher levels of education (ΔY^H). A positive value of ΔY indicated an increasing wage gap over the life course. Formally, this change over time can be decomposed by taking the difference between two KOB decompositions at two time points. We applied a threefold decomposition after rearranging terms following Kröger & Hartmann (2021):

$$\begin{aligned} \Delta Y = & \overbrace{(\bar{X}_t^H - \bar{X}_s^H) \hat{\beta}_s^H - (\bar{X}_t^L - \bar{X}_s^L) \hat{\beta}_s^L}^{\Delta R} \\ & + \overbrace{\bar{X}_s^H (\hat{\beta}_t^H - \hat{\beta}_s^H) - \bar{X}_s^L (\hat{\beta}_t^L - \hat{\beta}_s^L)}^{\Delta V} \\ & + \overbrace{(\bar{X}_t^H - \bar{X}_s^H) (\hat{\beta}_t^H - \hat{\beta}_s^H) - (\bar{X}_t^L - \bar{X}_s^L) (\hat{\beta}_t^L - \hat{\beta}_s^L)}^{\Delta I} \end{aligned} \quad (5.5)$$

where the subscript s denotes the starting point of the time interval under investigation at age 28 (2007). This was the initial group-level wage difference that we observed and the baseline for evaluating subsequent changes. t was a later point of time somewhere between age

⁵² We fit these models separately by education to reduce their complexity.

⁵³ We apply this restriction since the possible value range of the cumulative counter varies over time. In 2007 the maximum number of cumulative years in temporary employment is 2, while in 2017 it is 12. This affects the size of the estimated cumulative effects and makes a comparison of the change in effect size underlying the estimation of ΔV unfeasible.

⁵⁴ Alternative specifications of the decomposition and their result can be found in the appendix (Table A.27 – A.32).

29 (2008) and age 38 (2017).⁵⁵ The superscripts L and H denote the group membership of workers with either a lower or a higher level of educational attainment. \bar{X} is the temporary employment risk based on the sample means and $\hat{\beta}$ is the temporary employment vulnerability derived from the estimated regression coefficients of the FEIS models.

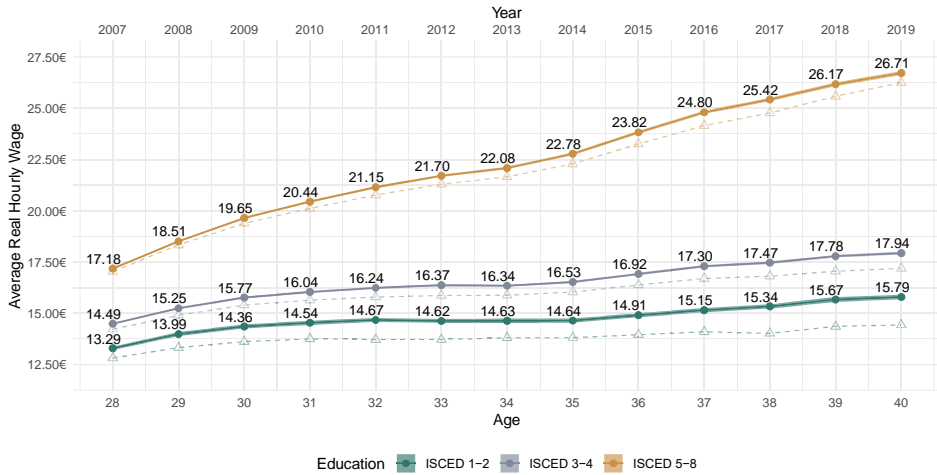
The first component ΔR is the part of the change in the wage gap that was attributable to temporary employment risk (i.e., the endowment component). It expresses the extent to which the wage gap between education groups changed because of changes in temporary employment risk between time point s and t given the initial differences (and no change) in vulnerability. The second component ΔV captures the part of the change in the wage gap attributable to temporary employment vulnerability and changes in the intercept (i.e., the coefficient component). Net of the intercept subcomponent of ΔV , it expresses how much the wage gap between groups changed because of changes in temporary employment vulnerability between s and t , given the initial differences (and no change) in risk. The third component ΔI captures the interaction between changes in risk and vulnerability. This component does not carry a substantive interpretation on its own but affects the overall joint contribution of changes in temporary employment risk and vulnerability to changes in the wage gap.

Results

Wage inequality between education groups over the life course

How did the wages of continuously observed workers born in 1979 develop over the life course in the Netherlands? Figure 5.1 shows the average real hourly wage of each education group between the ages of 28 and 40. The difference in average wages grew profoundly over the life course. The average wage of higher-educated workers increased steadily, whereas the average wages of the other groups grew only slowly with age and tended to stagnate at various times. At age 28, less-educated workers earned an average of 13.29 €/h in their main job, while higher-educated workers earned 17.18 €/h. Over time, the initial wage gap of 3.89 €/h nearly trebled and reached a difference of 10.92 €/h at age 40. Over the course of 12 years, the average wage of less-educated workers grew only slightly up to 15.79 €/h and did not reach the level of the average wage of higher-educated workers at age 28. In contrast, the average wage of higher-educated workers rose to 26.71 €/h in 2019.

⁵⁵ We restrict the decomposition to the period 2008 to 2017 as we cannot identify main effects of age for the years 2018 and 2019 in the models underlying the decomposition due to collinearity.



Source: (S)POLIS, 2007–2019

Figure 5.1 - Average real hourly wages over the life course by education

(Note: Author’s own calculations. Dashed lines with triangles display average wages based on the full sample of workers born in 1979 with available education codes. Weights applied.)

Figure 5.2 shows how the distribution of real hourly wages developed over the life course within each education group. These distributions illustrate the diverging careers that produced the growth in the wage gap. The wages of less-educated workers tended to stagnate, while those of high-educated workers tended to grow. In general, within-group wage inequality increased over time in all groups. The distribution of hourly wages among less-educated workers aged 40 was right-skewed. While the left tail of the distribution was confined by the legal minimum wage, there were a limited number of less-educated workers who established very successful careers and received a real hourly wage higher than 20 €/h. In contrast, the distribution of the hourly wages of higher-educated workers was strongly spread by the age of 40. Quite a few higher-educated workers earned very large wages and were a crucial contributing factor to the rising group average.

Overall, the descriptive results confirmed an education-based cumulative advantage over the life course in the Netherlands, thereby reaffirming earlier findings from the U.S. (Cheng, 2014, 2021). We found a substantive wage gap between education groups that already existed early in the life course and continued to grow over the course of 12 years.

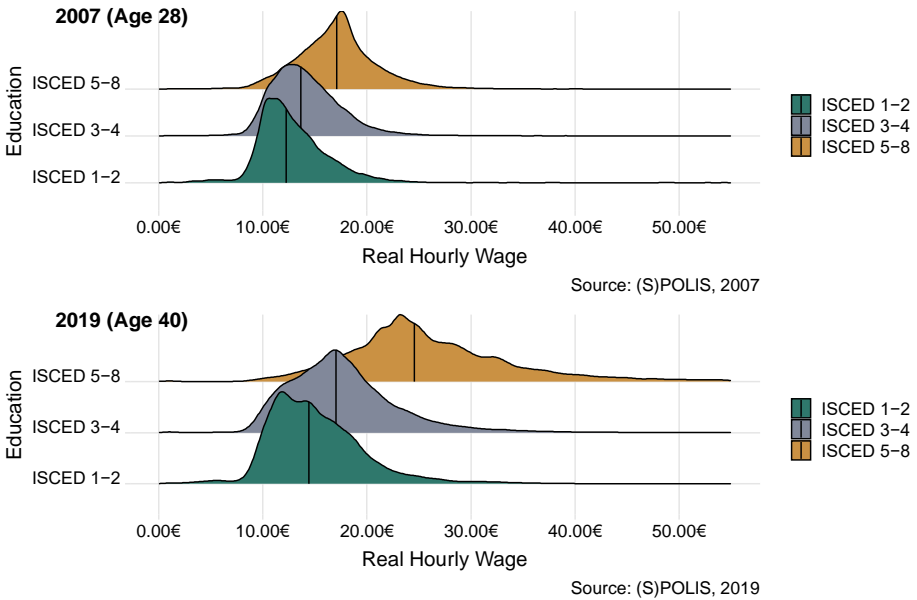
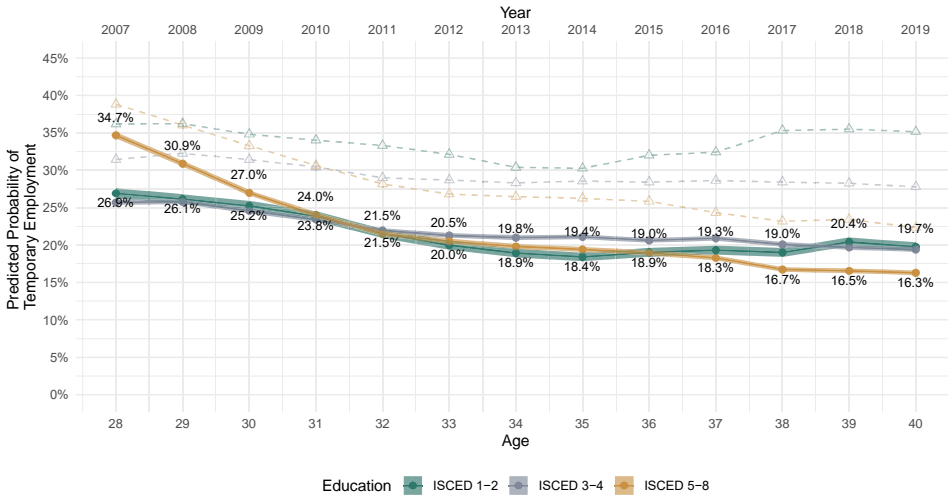


Figure 5.2 - Wage distribution in 2007 and 2019 by education

(Note: Author's own calculations. Distributions are truncated at 55€/h. Solid lines indicate the median. Weights applied.)

Education and risk of temporary employment

One way in which temporary employment may have contributed to growing wage inequality between education groups were changes in temporary employment risk over the life course. Figure 5.3 shows the predicted probability of holding a temporary employment contract based on the state-probability analysis described earlier. The argument of differing rationales of organizations to implement temporary employment in relation to a worker's level of education predicted a larger reduction in temporary employment risk among higher-educated workers over the life course. The results support this proposition. At the beginning of the observation period, the predicted probability of holding a temporary contract was higher among higher-educated workers (34.7%) than it was among less-educated workers (26.9%). However, temporary employment risk decreased more strongly among higher-educated workers between age 28 and 40, specifically during the beginning of the observation period, whereas it remained more stable among less-educated workers. By the age of 40, the risk gap had reversed, as the predicted probability of temporary employment declined to 16.3% among higher-educated workers and reached 19.7% among less-educated workers, thereby supporting the static risk hypothesis in the later life course.



Source: (S)POLIS 2006–2019

Figure 5.3 - Risk of temporary employment over the life course by education

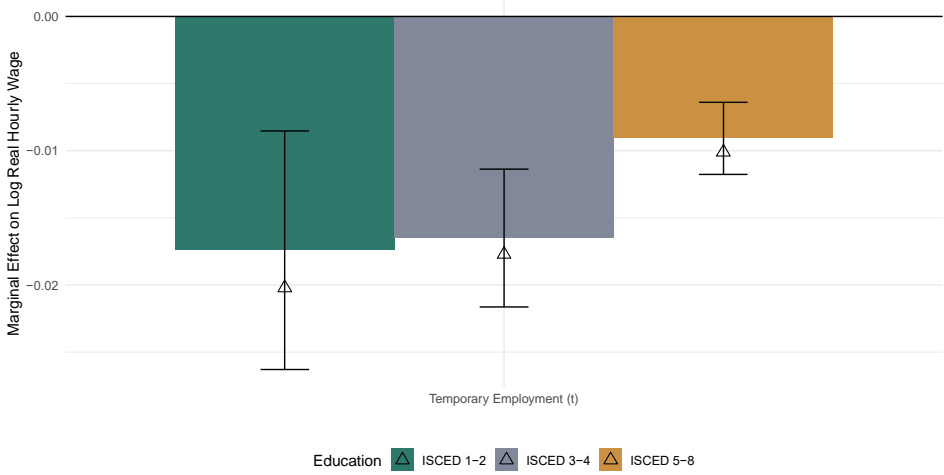
(Note: Author’s own calculations. Percentages are presented for the education groups ISCED 1-2 and ISCED 5-8. Dashed lines with triangles show estimates based on the full sample of workers born in 1979 with available education codes. Weights applied.)

Education and vulnerability to temporary employment

Besides the risk of temporary employment, changes in vulnerability to temporary employment may have contributed to the growing wage gap. We initially investigated whether the wage effects of temporary employment differed between education groups. Figure 5.4 shows the estimated average effect of temporary employment on wages during the observation period based on the first set of FEIS models. The results confirm an average wage penalty of temporary employment across all education groups. Larger average negative effects were estimated among less-educated workers (-1.74%) than among higher-educated workers (-0.91%), but these group differences were not statistically significant, thereby not supporting the static vulnerability hypothesis. These estimated average effects are smaller than the wage penalties found in previous research that use either cross-sectional designs or a conventional fixed effect estimator. This indicates that the FEIS estimator is better able to account for selection bias.⁵⁶

⁵⁶ For example, a recent study found a wage penalty of around 15% among workers aged 25-35 in the Netherlands when using cross-sectional LISS data (Fauser & Gebel, 2023).

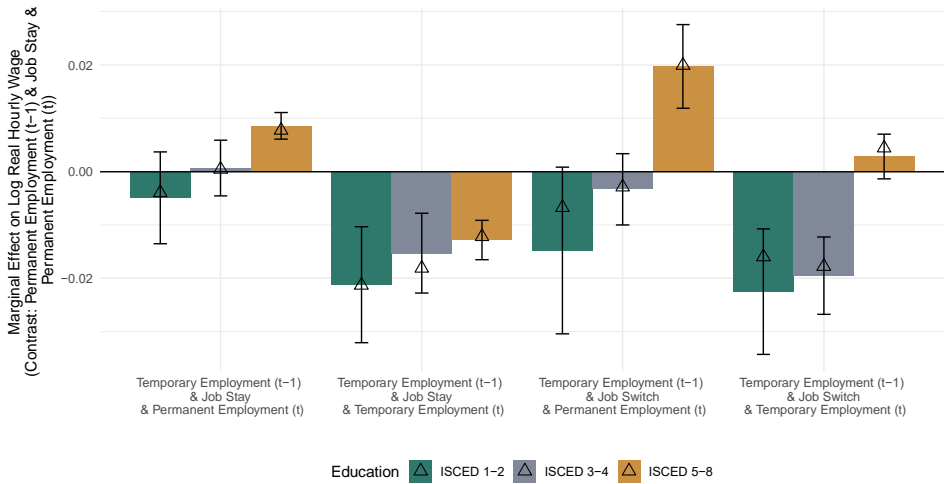
Temporary Employment and Wage Inequality over the Life Course



Source: (S)POLIS 2006–2019

Figure 5.5 - Vulnerability to temporary employment by education

(Note: Author's own calculations. Triangles indicate the estimates based on the full sample of workers born in 1979 with available education codes. Weights applied.)



Source: (S)POLIS 2006–2019

Figure 5.4 - Vulnerability to temporary employment (job mobility events) by education

(Note: Author's own calculations. Triangles indicate the estimates based on the full sample of workers born in 1979 with available education codes. Weights applied.)

Figure 5.5 displays estimated average effects of distinct job mobility events based on the second set of FEIS models. These effects were estimated as contrasts from a worker being embedded in a firm-internal labor market. Two scenarios captured the consequences of remaining in the same organization after being temporarily employed in the previous year. The smaller the wage penalty, the more similar were within-organization wage outcomes, despite initially holding a temporary contract, compared to being permanently employed throughout. We predicted that higher-educated workers would face less adverse wage outcomes in these scenarios because their temporary jobs would be structurally better connected to other employment positions within the same organization. We find mixed support for this proposition. Wage effects when transitioning from temporary to permanent positions within the same organization were indeed only positive among higher-educated workers (+0.86%). This is in line with compensatory wage gains once an initial screening period was completed, but such wage gains only accrued to higher-educated workers. In contrast, when staying in temporary employment at the same firm, higher-educated workers incurred significant wage losses (-1.28%) similar to less-educated workers (-2.12%). In other words, continued temporary employment within the same organization negatively affected wage outcomes across all education groups.

Two other scenarios captured the consequences of moving between organizations after holding a temporary contract in the previous year. The larger the wage penalty, the more adverse are the consequences of job mobility under temporary employment. We argued that highly educated workers should be better able to navigate the external labor market. This proposition is supported by the analysis. Wage effects were neutral among higher-educated workers when they entered temporary positions (+0.28%; not significant) and positive when they switched to permanent positions (+1.97%) in another organization. In contrast, the predicted wage effects among less-educated workers were negative when moving into temporary positions (-2.25%) in another firm. These findings suggest that job mobility between organizations resulting from temporary employment is an important mechanism underlying wage inequality between education groups from a career perspective.

Age	28	29	30	31	32	33	34	35	36	37	38
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
(s)											
Outcome (Y)											
Avg. log real hourly wage	2.8128	2.8866	2.9452	2.9837	3.0144	3.0373	3.0519	3.0806	3.1217	3.1595	3.1824
ISCED 5-8 (Y^H)											
ΔY^H	0.0738	0.1324	0.1709	0.2016	0.2245	0.2390	0.2678	0.3089	0.3467	0.3696	
Avg. log real hourly wage	2.5530	2.6001	2.6272	2.6382	2.6482	2.6442	2.6405	2.6413	2.6601	2.6739	2.6866
ISCED 1-2 (Y^L)											
ΔY^L	0.0471	0.0742	0.0852	0.0852	0.0952	0.0911	0.0875	0.0883	0.1071	0.1209	0.1336
Change of wage gap ($\Delta Y = \Delta Y^H - \Delta Y^L$)	0.0267	0.0583	0.0857	0.0857	0.1064	0.1334	0.1516	0.1795	0.2018	0.2258	0.2360
Sample means (\bar{X})											
ISCED 5-8 (\bar{X}^H)											
Temporary employment	0.3431	0.3054	0.2665	0.2372	0.2124	0.2023	0.1955	0.1916	0.1870	0.1804	0.1651
Cumulative years of temporary employment since 2006	0.6840	0.9894	1.2559	1.4932	1.7056	1.9079	2.1034	2.2950	2.4820	2.6624	2.8275
Cumulative years of temporary employment since 2006 (squared)	1.1539	2.2818	3.6001	5.0730	6.6216	8.2844	10.0601	11.9715	13.9330	15.8829	17.7316
ISCED 1-2 (\bar{X}^L)											
Temporary employment rate	0.2799	0.2719	0.2628	0.2485	0.2249	0.2087	0.1979	0.1925	0.1988	0.2018	0.1987
Cumulative years of temporary employment since 2006	0.5314	0.8033	1.0661	1.3146	1.5395	1.7482	1.9461	2.1385	2.3373	2.5391	2.7379
Cumulative years of temporary employment since 2006 (squared)	0.9057	1.8773	3.1075	4.5752	6.1914	7.8722	9.6723	11.6190	13.7599	16.0557	18.4105
Estimated coefficients ($\hat{\beta}$)											
ISCED 5-8 ($\hat{\beta}^H$)											
Temporary employment	-0.0144	0.0042	-0.0008	-0.0036	-0.0067	-0.0169	-0.0225	-0.0267	-0.0307	-0.0261	-0.0215
Cumulative years of temporary employment since 2006	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076
Cumulative years of temporary employment since 2006 (squared)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
ISCED 1-2 ($\hat{\beta}^L$)											
Temporary employment	-0.0042	-0.0115	-0.0150	-0.0098	-0.0273	-0.0266	-0.0148	-0.0272	-0.0277	-0.0297	-0.0203
Cumulative years of temporary employment since 2006	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007

Decomposing growing wage inequality

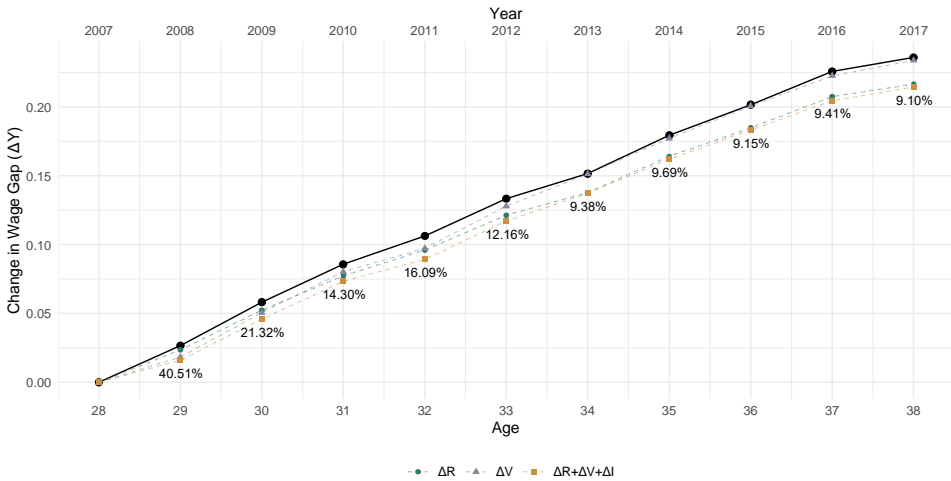
To what extent did temporary employment contribute to the divergence of group-level wages between age 28 and 30? Table 5.3 presents the results of the decomposition analysis. The value of ΔY was positive at all times and grew steadily over the life course, indicating that the wage gap monotonically increased each year relative to its initial size in 2007.

Table 5.3 also shows the relevant sample means (\bar{X}) and estimated regression coefficients ($\hat{\beta}$). The sample means (\bar{X}) illustrate changes in temporary employment risk by education over the life course. The share of temporarily employed workers decreased at a faster rate among higher-educated workers in support of the dynamic risk hypothesis. Changes in vulnerability to temporary employment show a more complex pattern. The estimated effects of temporary employment ($\hat{\beta}$) were close to 0 during the earlier years (age 29 – 32) among higher-educated workers. But wage penalties among the higher-educated worsened in later years, after a presumable initial job-matching phase with more favorable wage outcomes. By contrast, wage penalties among less-educated workers reached lower absolute values during the earlier years, but tended to be of similar size during the later years. These patterns are more in line with the second dynamic vulnerability hypothesis.

We find that changes in temporary employment risk (ΔR) contributed between 8.07% (at age 38) and 11.77% (at age 29) to the overall change in the wage gap at different time points under the counterfactual scenario of unchanged effects of temporary employment on wages (Figure 5.6). We hypothesized that the contribution of risk would persist throughout the life course. This hypothesis received partial support. The absolute size of ΔR increased, but the relative contribution to ΔY decreased over the observation period. In other words, despite its continued increase, the absolute contribution of temporary employment risk could not fully keep up with growing wage inequality over the life course (ΔY). While the divergence of group-specific temporary employment rates slowed, the divergence of average wages continued steadily. At the same time, the contribution of ΔR remained sizeable at 8.24%, and was markedly larger than the contribution of ΔV (0.88%) by age 38.

We find that changes in temporary employment vulnerability (ΔV) initially contributed between 6.15% (at age 31) to 31.59% (at age 29) to the change in the wage gap until age 32 under the counterfactual scenario of unchanged risk (Figure 5.6). This early contribution was driven by an initial divergence of $\hat{\beta}_t^H$ and $\hat{\beta}_t^L$ during which wage effects of temporary employment were mostly inconsequential for higher-educated workers and more severe for less-educated workers. After age 32, the contribution of ΔV approached around 1% as the estimated wage effects tended to converge between education groups. This is in line with the second dynamic vulnerability hypothesis that predicted a larger contribution of vulnerability during the earlier stages of the life course.

Overall, we find that the combined relative contribution of both components is estimated to range between 40.51% (at age 29) and 9.10% (at age 38) across all year pairings. The estimated contribution close to the reference year was large, but decreased after an initial job matching phase among higher-educated workers between the ages of 28 and 32, and later settled at a stable share of around 9% until the age of 38. Overall, changes in temporary employment



Source: (S)POLIS, 2007-2017

Figure 5.6 - Counterfactual change in the educational wage gap

(Note: Author’s own calculations. ‘ ΔY ’ is the empirically observed change in the wage gap and depicted as solid black line. Changes in the wage gap are evaluated based on the baseline differences at age 28. ‘ ΔR ’ describes the effect of changes in temporary employment risk on ‘ ΔY ’ under the counterfactual scenario of unchanged vulnerability. ‘ ΔV ’ describes the effect of changes in temporary employment vulnerability on ‘ ΔY ’ under counterfactual scenario of unchanged risk. ‘ $\Delta R + \Delta V + \Delta I$ ’ describes the combined contribution of changes in both risk and vulnerability to the change in the educational wage gap. Displayed percentages indicate the relative reduction of ‘ ΔY ’ under ‘ $\Delta R + \Delta V + \Delta I$ ’.)

risk were more important than changes in vulnerability for understanding change in the educational wage gap from a long-term perspective.

Robustness analysis with full education sample

We analyzed the full sample of all workers with available education codes as a robustness check (Table A.27 in the appendix). The results differed in the following ways. First, the wage gap was larger than among continuously observed workers. Second, the group of less-educated workers exhibited a much higher and more durable temporary employment rate of approximately 40% throughout the observation period. In contrast, sustained decreases in temporary employment risk among higher-educated workers were also observed in the full sample. Third, the negative wage effects among higher-educated workers were larger, while they were smaller among less-educated workers, specifically in the later stages of the life course.

Overall, the total decomposition component using the full sample differed mostly towards the end of the observation period, as it reached around 12% in relative size. This slightly larger contribution is mainly an outcome of a larger risk component due to the much stronger divergence of temporary employment rates between education groups during the observation period. The persistently larger temporary employment rate among less-educated workers in the full sample is likely driven by interrupted employment careers (churning in and out of the labor market) and the arrival of migrant workers, who were mostly incorporated into the labor market via temporary employment (changing composition).

Conclusion

In this study, we analyzed the extent to which temporary employment explains growing wage inequality over the life course. The analysis of the careers of 85,528 continuously observed workers born in 1979 shows that wage inequality between education groups increased profoundly between the ages of 28 and 40. Based on a decomposition analysis, we find that changes in temporary employment risk and vulnerability explain a meaningful part of the growth in the wage gap. The explained portion of the change in the wage gap ranges from 40.51% (at age 29) to 9.10% (at age 38). When comparing the contribution of risk and vulnerability, it is mostly change in temporary employment risk that contributes to the growth of the wage gap in the long run. The risk of temporary employment decreases at a substantially slower rate among less-educated workers over the life course.

This study contributes to both the literature on intra-generational wage inequality and previous research on the career consequences of temporary employment. First, research on intra-generational wage inequality has only recently begun to identify time-varying labor market conditions that explain rising between-group inequality over the life course (Cheng, 2014). By focusing on temporary employment, this study answers the call to determine relevant life events that are amenable to policy intervention. Second, research on the career consequences of temporary employment has mainly focused on describing the career patterns themselves and not on their combined contribution to long-lasting wage inequality between social groups (see Fauser, 2020 for a recent exception). In this regard, our study represents a move forward from a description of trajectories towards an analysis of their lasting and cumulative consequences for wage inequality between distinct social groups. Overall, the findings show that temporary employment contributes to growing wage inequality over the life course in the Dutch labor market.

This study has immediate relevance for policy. The results indicate that current labor market regulation in the Netherlands fails to protect many less-educated workers from long-term entrapment in temporary employment, given a persistent risk of temporary employment over the life course and its non-negligible contribution to growing wage inequality. Until 2020, the chaining of successive temporary contracts was restricted to a maximum duration of up to two years. However, regulation also allows for a ‘cool-off’-period of six months between contracts that resets accumulated contract time and enables organization to hire the same worker for another two years on a temporary contract. Organizations can abuse this regulation, specifically in the case of workers who possess limited options to find employment elsewhere. These workers will have to sit out for a waiting period before re-joining the same organization on a temporary contract instead of having their earlier contract converted into a permanent contract. The relatively stable share of less-educated workers who are temporarily employed and stay with the same organization between the ages of 28 and 40 in the data suggests that this is a potential quagmire for many less-educated workers. Given the ‘cool-off’ regulation, recent policy changes in 2020 that raised the maximum duration of temporary employment to three years will likely not reduce group differences in temporary employment risk.

Another policy change introduced by the “Labor Market in Balance” Act in 2020 holds greater promise for achieving a sustained reduction of inequality in risk. Since 2020,

unemployment insurance contributions paid by employers have been differentiated based on contract type, with larger mandatory contributions in the case of temporary contracts. The rationale behind this policy is to reduce the usage of temporary employment by increasing its cost for employers. Future research should monitor whether this policy change will result in lower temporary employment rates in the long run. Another policy envisioned by the recent Commission on the Regulation of Work appears to be equally promising. The commission advises to introduce a mandatory wage premium on temporary work as a compensation for higher job insecurity among temporary workers (Commissie Reguleren van Werk, 2020, p. 67). This policy would address both risk and vulnerability by raising the costs of temporary employment for employers and simultaneously reducing existing wage penalties. Given the findings of the current study, both of these policies could mitigate growing wage inequality over the life course to the extent that they reduce temporary employment risk, specifically among the group of less-educated workers.

This study has limitations and leaves several open questions that should be addressed in future research. First, our results are likely to be lower-bound estimates of the actual impact of temporary employment on group-level wage inequality. Scarring effects due to extended spells of unemployment after temporary contracts expire and potential spillover effects of temporary employment on the wages of other permanently employed workers in the same organization are not identified in the current study. In addition, we strictly relied on within-person variation to identify temporary employment effects. This does not allow us to estimate the effects of workers who are continuously temporarily employed during the observation period. Therefore, it is likely that the overall contribution of temporary employment to intra-generational wage inequality is greater.

Second, the finding of a roughly 9% long-term contribution of temporary employment to wage differentiation over the life course begets the question of what else drives wage inequality between education groups over the life course. The results indicate that less-educated workers with permanent contracts are similarly cut off from opportunities for substantial increases in economic rewards over their careers. This necessitates further study of career processes, such as job and promotion network structures within organizations (Bidwell, 2011; Tomaskovic-Devey & Avent-Holt, 2018), and how these structures are linked to persistent group-level inequality over the life course.

Third, we studied only one country: the Netherlands. In the Netherlands, the stratifying effect of temporary employment may be particularly strong by combining institutional labor market dualization with a highly stratified education system. Given national differences in employment protection legislation, education systems, and labor market performance, we should expect cross-national variation in the extent to which temporary employment risk and vulnerability are unequally distributed across education groups. For example, Italy's two-tier labor market has been shown to exhibit smaller risk differentials between education groups, while producing different patterns of group-level inequality (Barbieri et al., 2019). The risk and vulnerability approach provides a useful conceptual lens to further investigate cross-national variation in the effect of temporary employment on wage inequality in future research.