Investigating the wage and wealth consequences of temporary employment in and outside of Europe

Inauguraldissertation

zur Erlangung des akademischen Grades eines

Doctor rerum politicarum

der Fakultät für Sozial- und Wirtschaftswissenschaften

der Otto-Friedrich-Universität Bamberg

vorgelegt von

M.A. Sophia Fauser

2023

URN: urn:nbn:de:bvb:473-irb-587590
DOI: https://doi.org/10.20378/irb-58759

Kumulative Dissertation

Betreuer und Erstgutachter: Prof. Dr. Michael Gebel (Universität Bamberg)

Zweitgutachterin: Prof. Dr. Irma Mooi-Reci (University of Melbourne, Australien)

Drittprüfer: Prof. Dr. Steffen Schindler (Universität Bamberg)

Tag der Disputation: 08.03.2023

Dissertationsort: Bamberg

Acknowledgements

I have to thank many people without whom this thesis would not have been possible. Most importantly, I want to thank my first supervisor, Michael Gebel, for his support and guidance concerning not just the creation of this dissertation but also regarding my personal and professional development over the last years. Not only has it been a pleasure and privilege to work with him in the SECCOPA project, but I could also greatly benefit from his expertise in labor market research and many other topics of social inequality, as well as his experience in the life of academia in general. With his wisdom he was able to give me valuable advice on how to navigate life as a young scholar also beyond my dissertation. I also want to especially acknowledge the many extraordinary opportunities he provided me concerning the attendance of international conferences, even giving me the opportunity to do a longer research stay abroad. All of this has allowed me to extend my professional network and to initiate rewarding collaborations.

Moreover, I want to thank Irma Mooi-Reci for agreeing to be my second supervisor and for giving me the opportunity to visit her at the University of Melbourne. It was a pleasure to work with her on a project investigating the longer-term wage consequences of casual employment in Australia. During my stay I greatly benefitted from her expertise in labor market research, from her many years of experience as a social science researcher, and from her being an excellent host. In particular, I am thankful for the support and advice she has given me on not just my dissertation but on my professional development more generally.

I also want to thank Steffen Schindler for acting as the third supervisor of my thesis. I greatly appreciated his valuable feedback and comments on the papers I presented in the weekly BAGSS colloquium. These have improved my work immensely.

I also want to give great thanks to my co-author, former colleague, and friend Sonja Scheuring. Embarking on the journey towards the PhD together with her has made the past years much easier. I am especially thankful for the many conversations we shared and for the emotional support she provide me whenever I needed it. I am also thankful for the time I could spent with my other colleagues from the SECCOPA project and from the Chair, having such supportive colleagues has always made my work on the dissertation and beyond much more enjoyable.

I also want to acknowledge the financial support of the European Research Council (ERC), which has funded the “The socio-economic consequences of temporary employment: A comparative panel data analysis” (SECCOPA) project in which I worked in for the past years and in which Michael Gebel was the principal investigator.

Finally, none of this would have been possible without the unwavering support of my parents and my brother. I am eternally gratefully to them.

Bamberg, November 2022
Sophia Fauser

Overview Article: Investigating the wage and wealth consequences of temporary employment in and outside of Europe

1. Motivation

Over the last decades, the standard employment relationship, which entails continuous full-time permanent employment, underwent serious transitions, with insecure and discontinuous employment becoming more prevalent (Kalleberg, 2009). These trends of increasing employment insecurity are observed not just in Europe and America, but also on the Asian continent (Barbieri, 2009; Kalleberg & Hewison, 2013). Understanding and investigating the causes and consequences of this diversification and polarization of employment relationships has thus received much attention from social science and economic researcher as well as policy makers from all over the world (Emmenegger, Häusermann, Palier, & Seelbei-Kaiser, 2012; Kalleberg, 2012).

Rising levels of employment insecurity are partly brought on by non-standard types of employment. Non-standard employment is used in the literature as an umbrella term summarizing various types of jobs which are not full-time and permanent in nature. Specifically, prominent types of non-standard employment are self-employment, part-time employment, casual employment, temporary agency work, and temporary employment (Kalleberg, 2000). The focus of this thesis lies on *temporary employment*, often used interchangeably with fixed-term employment, which refers to work relations based on contracts with a predefined (i.e., fixed) duration. Temporary employment thus naturally entails lower levels of employment security than the "standard" permanent employment relationship and impedes workers' plannability of the future (Blossfeld & Drobnič, 2001; Burchell, 1994).

While other scholars have also investigated the causes and consequences of subjective job insecurity (Erlinghagen, 2008; Lübke & Erlinghagen, 2014), this thesis centers on comparing workers with different types of work contracts as a more objective measure of job insecurity. Moreover, contractual labor relations are more tangible than perceptions of job insecurity and thus it should be easier for policy makers to evaluate and reform them. Many countries experienced rising levels of temporary employment between the late 1990s and early 2000s followed by a stagnation of the temporary employment rate in more recent years (Latner, 2022). However, the risk of experiencing at least one temporary employment contract rose heavily since 2013 in many countries (Latner, 2022), making temporary employment an important topic to investigate in terms of social stratification and inequality.

While temporary employment and related forms of fixed-term employment (e.g., temporary agency work[1], casual employment, seasonal employment) result in higher levels of career uncertainty for workers, relying on such forms of employment entails certain advantages for employers. Most importantly, temporary jobs bring employers the advantage to adjust their work force more easily to current labor demands (Barbieri, 2009; Mertens & McGinnity, 2004). The need for more flexibility of employers to react to labor market volatilities can be attributed to a number of structural changes, ranging from the transnationalization of the economy, globalization and technological change, which increased labor market uncertainties over the last decades (Acemoglu, 2002; Blossfeld, Klijzing, Mills, & Kurz, 2005). By hiring workers on a temporary basis, employers can transfer risks of market fluctuations to the workers, as temporary contracts entail much lower dismissal costs in comparison to permanent contracts (Booth, Francesconi, & Frank, 2002; Breen, 1997). On a more positive note, this reduced firing cost, also comes with the hope that new hires are facilitated, decreasing overall unemployment rates (Esping-Andersen & Regini, 2000). This hope however did not come to reality, at least not for younger European workers (Gebel & Giesecke, 2011, 2016).

Coinciding with increasing globalization and labor market uncertainties, the distribution of income and wealth has become increasingly unequal (Dreher & Gaston, 2008). *Wealth* at the individual or household level is considered an important dimension of economic success and of social inequality (Killewald, Pfeffer, & Schachner, 2017). Wealth is a cumulative construct which refers to the things individuals own, i.e., their homes or cars, investments, businesses, and savings accumulated through past income (Keister, 2005; McGarth & Keister, 2008). A crucial determinant of wealth accumulation is the inflow of income into the household and income and wealth are thus strongly connected (Killewald et al., 2017). *Wages,* often used interchangeably with labor income, are thus an important aspect for individual's ability to accumulate wealth. Wage describes the sum of money that a worker receives under contract from their employer for their labor or services, usually paid on an daily, hourly, or piecework basis (Cambridge Dictionary). Instead, *income* refers to all the money a person receives, thus it

[1] In case of temporary agency work the de-jure (i.e., legal) and the de-facto employer need to be distinguished (Kalleberg, Reskin, & Hudson, 2000). While the de-jure employer recruits and selects the worker and is also responsible for hiring the workers as well as letting them go, the the-facto employers (i.e., clients of the de-jure employer) are the ones who receive the actual service of the temporary agency workers. While temporary agency workers usually have temporary jobs with different de-facto employers, their employment contract with the de-jure employer can be either temporary or permanent in nature. As not all dataset used in this thesis allow the identification of temporary agency workers, they are not separately investigated in this thesis.

of course also entails a person's wages, but also other types of income sources such as government transfers or returns from capital investments.

Concerning global trends of wealth inequality, studies show that for the combined total wealth in China, Europe, and the United States, the top 10 percent of wealth owners hold more than 70 percent of the total wealth, while the bottom 50 percent of wealth owners hold less than 2 percent (Zucman, 2019). In between, the middle 40 percent of wealth owners hold less than 30 percent of wealth. Looking more specifically into the relationship between labor market dualization and wage inequality, studies reveal a positive association between a higher prevalence of temporary workers and more unequal wage distributions, even when institutional drivers of wage inequality are accounted for (Cazes & Laiglesia, 2015).

Individuals and families benefit from their wealth in many respects, such as having a house to live in, a car to drive, money to invest, and importantly a sense of financial security, which lessens threats of potential income losses due to unemployment. These things in turn increase individuals' well-being and life satisfaction (Ball & Chernova, 2008; Howell, Kurai, & Tam, 2013; Hu, 2013). Moreover, wealth accumulation in the earlier life has long lasting effects even into retirement, with especially homeownership being considered as an important private pension investment, ensuring a high standard of living also in older age (Dewilde & Raeymaeckers, 2008).

As living expenses, particularly concerning real estate and rental prices are steadily increasing over the last years in most countries (OECD, 2022a, 2022c), the investigation of the drivers of wealth inequalities becomes even more important. On a societal level, rising income and wealth inequality can have severe consequences on individuals' voting behavior and societies' political stability, with studies showing that higher levels of income inequality lead to increasing levels of voter support for extremist parties (Dorn, Fuest, Immel, & Neumeier, 2018; Voorheis, McCarty, & Shor, 2015; Winkler, 2019).

Against the background of the above describe large-scale global trends, this thesis and the four research articles it is made up of is dedicated to answering the overarching research aim of *investigating the wage and wealth consequences of temporary employment in and outside of Europe.* Of course, the single research questions (more on these in Section 2) of each article are posed on a much more specific scale and merely hope to contribute a small piece to the many puzzles which the above described global trends provide.

Concerning wage and wealth consequences of temporary employment, the focus of this thesis lies primarily on wages as an important wealth generating mechanism at the individual level. Another important component of wealth, especially among middle-class individuals and households, refers to housing wealth (Wolff, 2016). The role homeownership plays in the accumulation of wealth has thus garnered widespread attention form researchers (Killewald et al., 2017; Pfeffer & Killewald, 2018). Homeownership at the household, i.e., couple level, is thus investigated in this thesis as another important characteristic of wealth accumulation. In contrast, wealth accumulation through returns from stocks or businesses are not considered in this thesis. Moreover, other drivers of wealth accumulation such as gifts and inheritances are also out of the scope of this thesis (Pfeffer & Killewald, 2018).

In combination the four articles of this thesis aim to answer three more specific research questions. First, regarding *the cross-sectional wage consequences of temporary employment and the question of how universal they are across different labor market settings and worker subgroups*. Secondly, concerning *the longer-term wage consequences of temporary employment and possible heterogeneities in these longer-term consequences between subgroups of workers and labor market settings*. Finally, relating to *the longer-term consequences in terms of wealth accumulation beyond wages of experiences of temporary employment and how they are mediated by wage consequences*.

1.1 Labor regulations and the use of temporary employment

Before turning in more detail to the consequences of temporary employment, it is also important to briefly look at some of the country-level determinants of their use. There is of course a large strand of literature focusing on the determinants of non-standard employment, highlighting many relevant institutional factors (Hipp, Bernhardt, & Allmendinger, 2015). However, as the focus of this thesis lies on the consequences of temporary employment, I will not further elaborate on these determinants besides giving an overview of the most important antecedents of the prevalence of temporary employment in relation to this thesis.

The extent to which employers can utilize temporary employment to react to labor market uncertainties and to fluctuations in labor demand, is usually expected to be affected by regulations of the labor market (Baranowska & Gebel, 2010; Gebel & Giesecke, 2016). Labor markets are often classified on a spectrum between "flexible" uncoordinated market economies (e.g., United States, United Kingdom) and "rigid" coordinated market economies (e.g., Germany, Austria) (Esping-Andersen, 1990). Strongly regulated labor markets, which allow much less job mobility than liberal labor markets (Gangl, 2003), have been identified by many

researchers as a hindrance to job creation and a driver of unemployment (DiPrete, 2005; Esping-Andersen & Regini, 2000). A prime example of this was Europe in the 1970s and early 1980s, where levels of unemployment where thought to be rising due to overly rigid labor market institutions (Esping-Andersen, 2000).

In an effort to increase labor market flexibilization, labor markets were deregulated by facilitating the use of temporary contracts. Such contracts, with a predefined fixed duration, are considered as one form of labor market flexibilization, called numerical or external flexibilization (Atkinson, 1984; Giesecke, 2009).[2] It refers to employer's flexibility in adjusting the size of their workforce to current labor demands. This is of course much easier in the case of temporary contracts, where employers can just refrain from extending the contract, while in the case of permanent contracts employers face dismissal costs, for example in the sense of severance payments.

To allow employers more numerical flexibility, many - especially European - countries have reformed their employment protection laws (Gebel & Giesecke, 2016). In contrast, liberal uncoordinated economies like the United States, Canada, and the United Kingdom are characterized by low levels of regulation and protection of employment relations, leading to a more fluid labor market and generally higher levels of job mobility (Barbieri, 2009; Giesecke & Groß, 2004), which could translate to a lower "need" for temporary employment (Hevenstone, 2010; Kahn, 2007).

There are two options for reforming employment protection laws: on the one hand, the employment protection legislation (EPL) for permanent workers can be reduced. This could be observed in such countries as Austria, Finland, Greece, Ireland, Portugal, and Spain (Gebel & Giesecke, 2016). On the other hand, the use of temporary contracts can be made less restrictive, i.e., reducing the EPL for temporary contracts. This strategy was applied by countries such as Germany, Italy, Denmark, or Belgium. A country's EPL setting is not only an important determinant for the utilization of temporary jobs (Gebel & Giesecke, 2011, 2016), it is also often considered as one the most important institutional determinants for labor market dualization and segmentation more generally (Biegert, 2019; Fervers & Schwander, 2015; Rueda, 2014). While the low labor market insider (i.e., permanent workers) protection in the

[2] Other types of flexibility refer to functional or internal flexibility, temporal flexibility and lastly wage flexibility. While functional flexibility entails employers' opportunities to assign workers different tasks within the firm, temporal flexibility refers to employers' possibilities to adjust the working time (e.g., shift work) and working hours (e.g., part-time work) to their current needs. Finally, wage flexibility entails employers' ability to change wage levels as they see fit (Atkinson, 1984; Giesecke, 2009).

flexible labor market of the UK and the stronger insider protection in the rigid labor market of Germany are prominent examples which are often contrasted and investigated in the previous literature (Gebel, 2010; Giesecke & Groß, 2004; Pavlopoulos, 2013), it is also important to extend the view to other country contexts. For this reason, the consequences of temporary employment are investigated in a variety of different countries in and outside of Europe for this thesis. Moreover, the impact of these different labor market regulations and settings on the consequences of temporary employment is researched. Although, it should be noted that the majority of the articles of this thesis still uses data from European countries.

1.2 Non-economic consequences of temporary employment

Not matter the type of labor regulations or reforms thereof, owed to the fact that the dominance of standard employment is threatened almost globally, investigating the multifaceted socio-economic consequences of temporary employment has gained just as much attention from researchers and policy makers all over the globe as the determinants of temporary employment have.

Next to the before mentioned inherent increased employment insecurity, temporary jobs are associated with a range of other non-economic consequences for workers (I will talk more about the economic consequences in the next section). These pertain for example to subjective well-being and job satisfaction, although findings from previous studies on these outcomes are not always straightforward (DeWitte, 1999). Concerning, the effect of temporary employment on well-being some studies using cross-sectional data find a negative effect in comparison to permanent employment (Scheuring, 2020), while other studies using panel data show that transitioning from a temporary job to a permanent one does not increase individuals' own or their partner's well-being (Scheuring, Voßemer, Baranowska-Rataj, & Tattarini, 2021). Findings are more univocal regarding job satisfaction, with most studies revealing that temporary workers are not as satisfied with their work as permanent workers (Dawson, Veliziotis, & Hopkins, 2017; Park & Kang, 2017).

Moreover, consequences of temporary employment on partnership stability and fertility have also been investigated in previous studies. When it comes to partnership outcomes, there are some studies that point to a positive effect of temporary employment on partnership dissolution and to a negative effect on fertility, at least if it is the female partner who experiences temporary employment (Laß, 2020). However, other studies find no evidence that women's temporary employment leads to a postponement of transitioning to motherhood (Gebel & Giesecke,

2009a). Lastly, other studies find a negative effect of temporary employment only for male's fertility intentions (Scherer, 2009).

1.3 Economic consequences of temporary employment

Besides the investigation of the non-economic consequences of temporary employment a broad literature on the economic consequences of temporary employment has also emerged. Here studies show that temporary jobs entail higher poverty risks compared to permanent jobs (Lehweß-Litzmann, 2012; van Lancker, 2012). Moreover, previous studies show that temporary jobs suffer from lower job quality in terms of fringe benefits (e.g., more than mandatory sick pay, occupational pension scheme) compared to permanent jobs (McGovern, Smeaton, & Hill, 2004).

Temporary workers are also more likely compared to permanent workers to experience future unemployment (Fuller, 2011) and less likely to experience permanent employment (Gebel, 2010). More specifically, concerning the employment consequences of temporary employment, previous studies show that low-skilled workers have the highest risk of experiencing unemployment after a temporary contract (Reichelt, 2015; Schmelzer, Gundert, & Hohendanner, 2015). Such results suggest that in the low-skilled labor market, employers indeed mainly make use of such contracts to increase the numerical flexibility of their workforce (Esping-Andersen & Regini, 2000; Kalleberg et al., 2000). Temporary employment can thus result in unemployment or lead to a new temporary job, entrapping individuals in a cycle of job insecurity (Barbieri & Cutuli, 2018; Barbieri, Cutuli, Luijkx, Mari, & Scherer, 2019). In contrast, after an initial temporary job, medium-skilled workers have the highest likelihood to receive a permanent job with the same employer and high-skilled the highest probability to obtain a permanent job with a different employer (Reichelt, 2015; Schmelzer et al., 2015). It thus seems that for higher-skilled workers, employers rather use temporary jobs as a prolonged probationary period and screening device for permanent jobs (Korpi & Levin, 2001; Wang & Weiss, 1998). In such a case temporary jobs can function as a stepping stone to permanent employment.

The employment transitions of (former) temporary workers are of course not only influenced by their skill level, but also by macro-level labor market settings discussed earlier such as EPL as well as the vocational specificity of the educational system (Gebel, 2010; Högberg, Strandh, & Baranowska-Rataj, 2019). More importantly, as I will show in the next sections, the different "functions" of temporary employment impact not only the future employment chances of

temporary job holders but also have an important impact on the cross-sectional and longer-term consequences on wages as well as other aspects of wealth accumulation (e.g., homeownership).

Of course, the economic consequences in terms of wages (Gebel, 2009, 2010; Hagen, 2002; McGinnity, Mertens, & Gundert, 2005), wage growth (Booth et al., 2002; Fuller & Stecy-Hildebrandt, 2015; Mooi-Reci & Wooden, 2017; Reichenberg & Berglund, 2019), and wealth accumulation (McGarth & Keister, 2008) are also a big part of the literature on the economic consequences of temporary employment. The overwhelming majority of previous studies, which I will discuss more thoroughly in Section 2, finds wage disadvantages for temporary compared to permanent employment (Fuller, 2011; Gebel, 2009; Giesecke & Groß, 2004; Hagen, 2002; Kiersztyn, 2016). A notable exception from this are casual workers in Australia, who usually enjoy a pay premium to compensate them for the lack of certain entitlements such as paid sick or annual leave as well as for the employment insecurity involved in casual jobs (Laß & Wooden, 2019; Stewart, Forsyth, Irving, Johnstone, & McCrystal, 2016).[3]

Findings on longer-term wage consequences and wage growth of former temporary workers are less clear cut (Booth et al., 2002; Fuller & Stecy-Hildebrandt, 2014, 2015; Gash & McGinnity, 2007; Gebel, 2010; Mooi-Reci & Wooden, 2017; Reichenberg & Berglund, 2019). However, findings in terms of wealth accumulation beyond wages are again more univocal, with previous studies clearly showing that temporary workers have a lower probability to be homeowners compared to permanent workers (Baron & Rapp, 2019; Lersch & Dewilde, 2015; McGarth & Keister, 2008). As I will illustrate in the next section, the equivocal findings on the longer-term wage consequences of temporary employment are to a large part driven by the reference category or reference observations chosen, as well as the conceptualization of wage consequences and wage growth in the different studies. Section 2 will also highlight how wages and wealth accumulation as the outcomes investigated in this thesis are interrelated with each other.

2. Main guiding principles of the thesis and its' contribution to previous literature

The aim of this chapter is to summarize the main guiding principles of this thesis (Section 2.2), review and organize the previous literature on the wage and wealth consequences of temporary employment as well as highlight the contribution of this thesis to previous studies (Sections 2.3 to 2.5). The different sections divide the literature into studies investigating cross-sectional or long-term wage consequences of temporary employment (Section 2.3 and Section 2.4) as well

[3] The term casual employment refers to jobs which lack a predefined commitment made by the employer concerning the duration of employment as well as the amount of hours to be worked (Stewart et al., 2016).

as studies looking at wealth consequences beyond wages (Section 2.5). When reviewing previous studies, a particular focus will be on the different reference categories or reference observations chosen by the different studies as well as the specific wage outcome under investigation. Section 2.3 will also illustrate findings from previous studies on how country characteristics might moderate the effect of temporary employment on wage outcomes. Moreover, in Sections 2.3 and 2.4 I will give insights into effect heterogeneities revealed for different subgroups of workers. First, however, I will give an overview of the structure of the thesis and the articles it encompasses in Section 2.1.

2.1 Structure of the thesis

The thesis at hand constitutes a cumulative dissertation encompassing this overview article as an introductory chapter as well as four research articles. These articles build the main body of work of this thesis and are summarized in Table 1. Two of the four articles are published in international peer-reviewed sociological journals listed in the Social Science Citation Index (SSCI). The other two articles have received a revise and resubmit from SSCI-listed journals.

As it is the backbone of scientific research to undergo a peer-review process, the published articles include compromises taken on my co-authors' and my part to accommodate the reviewers' suggestions and comments. Moreover, researchers must adhere to strict word limits if they want to submit their article to certain journals. For example, this affected the level of detail with which we were able to discuss theoretical arguments and test different micro and meso-level mechanisms in the fourth research article. However, in a book chapter (forthcoming) my co-author and I were able to further look into and directly investigate the impact of risk aversion as a mediator for the relationship between couples' career insecurity and homeownership.

The main aim of the thesis is to build on the previous literature concerning the wage and wealth consequences of temporary employment. As such employment statuses should be understood as part of a more holistic and dynamic employment career (Fuller & Stecy-Hildebrandt, 2015; Mattijssen & Pavlopoulos, 2019; Struffolino, 2019), which entails cross-sectional and longer-term wage and wealth consequences, three more specific research questions are posed in this thesis to reach the main research aim.

The first more specific research question asks what the cross-sectional wage consequences of temporary employment are and how universal they are across different labor market settings and worker subgroups. This research question is investigated in the first article titled *"Labor market dualism and the heterogeneous wage gap for temporary employment: A multilevel study*

Table 1: Overview of articles included in the thesis

Article	Author(s)/Share	Year	Title	Status/Journal
1	Fauser, S./50% Gebel, M./50%	2022	Labor market dualism and the heterogeneous wage gap for temporary employment: A multilevel study across 30 countries	Accepted in a revised form in *Socio-Economic Review*
2	Fauser, S./100%	2020	Career trajectories and cumulative wages: The case of temporary employment	Published in *Research in Social Stratification and Mobility*, 69, Article 10052
3	Fauser, S./100%	2022	Wage growth after temporary employment in the UK and Germany: Disentangling compensation and stigmatization from a within and between employer perspective	1st revise and resubmit from *European Sociological Review*
4	Fauser, S./50% Scheuring, S./50%	2022	Couples' early career trajectories and later life housing consequences in Germany: Investigating cumulative disadvantages	Published in *Advances in Life Course Research*, 51, Article 100445

Notes: Own illustration.

across 30 countries". The second more specific research question addresses the longer-term wage consequences of temporary employment and investigates possible heterogeneities in these longer-term consequences between subgroups of workers and labor market settings. Articles 2 (*"Career trajectories and cumulative wages: The case of temporary employment"*) and 3 (*"Wage growth after temporary employment in the UK and Germany: Disentangling compensation and stigmatization from a within and between employer perspective"*) are dedicated to illuminating this research question. Finally, the third more specific research question asks what the longer-term consequences in terms of wealth accumulation beyond wages of experiences of temporary employment are and how they are mediated by wage consequences. This research question is addressed in Article 4, titled *"Couples' early career trajectories and later life housing consequences in Germany: Investigating cumulative disadvantages"*.

2.2 Main guiding principles of the thesis

Before going into detail how each of these three research questions connects and contributes to the current relevant literature, I will first illustrate the three main principles which guided the

creation of this thesis. These main guiding principles regard (1) the formulation of a broad *interrelated micro-macro theoretical framework*, (2) adopting an *encompassing life course perspective*, and (3) the application of *state-of-the-art analytical approaches*.

Concerning the first guiding principle, the formulation of an *interrelated micro-macro theoretical framework,* the term interrelated is used to describe several aspects. Namely, the theoretical framework connects micro- and macro-level theories, as social processes taking place at the micro- (i.e., individual) level are always embedded in a lager macro (i.e., country, or societal) context. Specifically, this means that individual wage and wealth outcomes of temporary jobs are moderated (i.e., amplified or diminished) by countries' institutional and structural contexts, such as labor market dualization and segmentation, for which the before discussed EPL settings are an important indicator. While in the country-comparative article investigating two countries, the influence of the macro-level setting is described in a theoretical way and only investigated indirectly, the first article describes and investigates the moderating impact of the institutional and structural context more directly using a multilevel modeling approach.

Furthermore, the *meso-level* is often introduced in the literature to summarize influences that fall between the micro and the macro level. It often refers to households, school, firms, or geographical regions within a country. While the effect of the meso level is not investigated directly, Articles 2 and 3 still incorporate the meso level at least theoretically. Article 2 considers the household level by investigating the career experiences of couples and Article 3 considers the effect of employer changes on the wage growth of former temporary workers.

Moreover, the term interrelated refers to the linkage of sociological and economic theoretical approaches, as labor market outcomes in general and wages more specifically represent areas of interest for not just sociological but also economic researchers. Additionally, theories on the employment consequences of temporary jobs are also applied as the wage consequences of temporary jobs are heavily impacted by employment transitions of (former) temporary workers and the "function" (e.g., numerical flexibility or screening) of temporary jobs. Overall, the formulation of a theoretical framework in each of the articles allows me to follow the principles of theory guided empirical research where all hypotheses which are tested in the respective articles are derived from said theoretical framework.

Regarding the second main guiding principle, the adoption of an *encompassing life course perspective*, again several aspects are subsumed under one principle. The life course perspective refers to a research paradigm which considers that individuals' lives are embedded in specific

social structures and point in history and evolve over an extended period on different interrelated trajectories of for example family and work (Elder, 2007). As such, the life course perspective also highlights the consequences of earlier transitions for later experiences and events and the accumulation of disadvantages in a way that unequal groups may grow more unequal over time (DiPrete & Eirich, 2006; Elder, 1974).

As mentioned earlier, periods of temporary jobs are part of a longer-term dynamic career, in line with the life course approach wage and wealth outcomes are thus not only investigated as a cross-sectional consequence of temporary jobs but also from a longer-term and accumulative perspective. Such longer-term consequences reveal if over the life course, temporary jobs only entail immediate or more enduring disadvantages concerning wages and wealth accumulation.

Furthermore, these wage and wealth consequences are investigated on different outcome dimensions. As explained in Section 1.2 individuals' wealth is not just determined by their labor income (i.e., wages) but also their material possessions and financial savings. Next to the articles looking at wage and wage growth consequences of temporary jobs, I thus also co-authored a paper investigating the impact of career insecurity on homeownership and the amount of income spent on rent. This article also sheds light on income as a possible micro-level mechanism explaining such longer-term wealth outcomes.

Moreover, as individuals are usually connected to a larger household or family context (which is also often theoretically placed at the meso level), household or couple-level wealth outcomes, such as homeownership, are jointly impacted by both partners life course experiences. The article investigating homeownership as a wealth outcome, thus accounts for important interdependencies between individuals living in one household by considering the early career of both partners in a couple as a determinant of housing outcomes. With this approach the thesis incorporates another distinct feature of the life course perspective which refers to the notion of interdependencies between individuals' lives, also called linked lives (Elder, 1994). This idea was first formulated by (Elder, 1974) to describe how individual lives are usually embedded in social relationships across the life span which offer social regulation and support. Hence, the experiences of both partners in a couple are important to determine individual-, as well as couple-level outcomes. The concept of linked lives is applied not just to wealth outcomes (Dotti Sani & Acciai, 2018) but also to the well-being literature (Scheuring, Voßemer, Baranowska-Rataj, & Tattarini, 2021).

Lastly, wage and wealth outcomes are investigated against different comparison groups and observations, as well as for different subgroups of workers. The former point refers to the

adoption of both a between- (temporary workers vs. permanent workers) and within- (wage growth of temporary workers) comparison approach and the latter point to the investigation of important heterogeneities in wage outcomes along the lines of worker's occupational level, gender, and age.

By investigating age subgroups another central aspect of the life course approach is incorporated in this thesis, namely the timing of lives and the social meaning of age (Elder, 1994, 2007). These ideas refer to the occurrence, duration, and order of events as wells as to age-based beliefs and expectations, with some events (e.g., getting married or holding a temporary job) being considered more appropriate at certain ages than others (Elder, 1994). The principal of social timing thus postulates that the consequences of certain life events and transitions differ according to when they take place in an individual's life course (Elder, 2007), emphasizing the importance of investigating the consequences of temporary employment across different age groups.

Coming to the third main guiding principle, the application of *state-of-the-art analytical approaches*, the empirical strategy in each article was to utilize the most appropriate methods to answer each specific research question. Depending on the data most suitable to answer the research question of each article, cross-sectional or longitudinal methods of analysis were employed. Only Article 1 relies on cross-sectional data. However, the combination of 30 country datasets allows my co-author and me to apply a two-stage multilevel modelling strategy to reveal heterogeneities in wage gaps for temporary workers across country settings, as well as the moderating impact of macro-level variables on wage gaps. Such a country-comparative approach, which does not rely on a single case selection, gives much better opportunities to reveal wage consequences of temporary employment in a number of different country-contexts in and outside of Europe.

The other three articles rely on longitudinal data to depict wage and wealth consequences from a longer-term and dynamic life course perspective. Moreover, in two articles an innovative combination of methods is applied. Specifically in Article 2, I combine sequence analysis and propensity score matching. While sequence analysis reveals holistic and dynamic career trajectories, propensity score matching accounts for observed heterogeneities between workers on different trajectories. By using Rosenbaum bounds, I can additionally gauge the impact of unobserved heterogeneities on the propensity score matching estimates. Furthermore, in Article 4, my co-author and I employ linear and logistic regression models in combination with multichannel sequences analysis, which accounts for interdependencies within couples

regarding housing outcomes such as homeownership. Lastly in Article 3, I estimate panel fixed effects regression with individual slopes to account for not just unobserved time-constant heterogeneities between workers but also for non-random heterogeneities in their wage growth after temporary employment.

The following sections are dedicated to illustrating how each article applies the main guiding principles of this thesis and more specifically how they built on and contribute to the previous relevant literature. Particularly, in Section 2.3 I will summarize the literature on the wage disadvantages associated with temporary employment and how they vary between *macro-level* labor market settings and for different *micro-level* worker characteristics. This section will also highlight the contribution of Article 1 to this cross-country comparative literature. In Section 2.4, I will emphasize the heterogeneous longer-term wage consequences of (previous) temporary employment from a *life course approach* and summarize the relevant literature, which mainly employs panel data. This section also illustrates the *heterogeneities* in these longer-term consequences and the contributions of Article 2 and Article 3 to the relevant literature. Finally, Section 2.5 is dedicated to the literature on longer-term wealth consequences of temporary employment experiences beyond wages, in particular housing outcomes. This section also highlights the contribution of Article 4 to the existing studies on this topic, which mainly regards the couple-perspective and the investigation of wages as an important *micro-level mediator*.

2.3 The (heterogeneous) cross-sectional wage consequences of temporary employment

As mentioned in Section 1.3, wage disadvantages for temporary workers compared to permanent ones are well established in the literature. So far most empirical evidence of these consequences both in terms of wage gaps and wage growth comes from cross-sectional and longitudinal data from rich western countries, such as the US (Kalleberg, 2000), Canada (Fuller, 2011; Fuller & Stecy-Hildebrandt, 2014), Australia (Laß & Wooden, 2019; Mooi-Reci & Wooden, 2017), and various European countries, including the UK (Booth et al., 2002; Gebel, 2010), Germany (Gash & McGinnity, 2007; Gebel, 2009; Hagen, 2002), France (Gash & McGinnity, 2007), Italy (Barbieri & Cutuli, 2018), Poland (Kiersztyn, 2016), and Switzerland (Helbling, 2017) (a more detailed description and organization of this literature will follow in Section 2.4).

Although, there are some studies for highly-developed Asian countries such as South Korea and Japan (Lee & Shin, 2017; Shin, 2013), even large-scale country-comparative studies seldom include less-developed countries. The few existing country-comparative studies, which

all rely on cross-sectional data, investigate the impact of macro-level institutional and structural conditions on the wage disadvantages associated with temporary jobs. The findings of these studies are far from univocal, with some studies showing that a stricter EPL for permanent workers increases the wage gap for temporary workers, while they find no effect for the EPL for temporary workers (Dias da Silva & Turrini, 2015). Yet, other studies show that a stricter regulation of temporary contracts lowers the wage disadvantage for temporary contracts (Arranz, Fernández-Macías, & García-Serrano, 2021), while there is also evidence that an overall higher measure of EPL widens the wage gap between temporary and permanent workers (Ryu, 2018). Lastly, the share of temporary employees, an important structural feature of labor markets, is found to increase the wage disadvantages of temporary workers (Dias da Silva & Turrini, 2015).

Other macro-level impacts that are investigated in the literature are union density and collective bargaining coverage, as well as minimum wage setting. Wage floors established in the form of minimum wages impose a lower bound that can be paid to workers, and hence should decrease the wage penalties of temporary workers. While, some studies find such an effect for younger but not for older workers (Dias da Silva & Turrini, 2015), others reveal that an implementation of minimum wages at the national level reduce overall wage inequality between temporary and permanent workers (Arranz et al., 2021).

In contrast, the results from previous literature concerning the impact of union density and collective bargaining coverage are less straightforward. Theoretically, union density and collective bargaining coverage can both be considered as indicators of union power (Arranz et al., 2021; Flanagan, 1999). While, union density refers to the proportion of dependent employees who are members of a union, collective bargaining coverage measures the proportion of dependent employees with the right to bargaining who are covered by collective agreements. A higher level of wage coordination through collective bargaining coverage should compress the overall wage distribution and thus mitigate wage disadvantages of temporary employment (Rueda, 2005; Ryu, 2018). Following labor market dualization theories, however unions tend to focus on the interests of labor market insiders, such as permanent workers (King & Rueda, 2008; Lindbeck & Snower, 1989), which could increase wage gaps between contract types. Similarly, if wage coordination takes place not at an encompassing level but rather only for certain segments of the labor market it may even contribute to increasing labor market inequalities along the lines of contract types (Rueda, 2005). Consistently, Ryu (2018) reveals

for the countries included in his sample, that higher wage coordination increases wage gaps between contract types.

Emerging especially in recent years is the contrasting view, that unions become more aware of the interest of temporary workers (Benassi & Vlandas, 2016; Fervers & Schwander, 2015; Simms, Eversberg, Dupuy, & Hipp, 2018) and compress the wage distribution more in favor of temporary job holders (King & Rueda, 2008; Ryu, 2018). Still, most studies find no effect of country-level union density on the wage gap between permanent and temporary workers (Arranz et al., 2021; Dias da Silva & Turrini, 2015).

Article 1 contributes to this country-comparative literature on cross-sectional wage effects of temporary contracts by extending and diversifying the number of included countries. Thereby, it addressees the first specific research question posed by this thesis focusing on *the cross-sectional wage consequences of temporary employment and on how universal they are across different labor market settings and worker subgroups.* Specifically, this article combines cross-sectional data from the harmonized Luxembourg Income Study (LIS, 2021) with cross-sectional data from the EU Statistics on Income and Living Conditions for Hungary, Poland and Portugal (EU-SILC, 2021) and the Korean Labor and Income Panel Study (KLIPS, 2021). The supplemented LIS dataset allows to compare wage gaps for 30 countries across the globe, including European, Asian, American and African countries, revealing how generalizable previous European-focused findings actually are. In contrast, Dias da Silva and Turrini (2015) include 26 European countries, while Arranz and colleagues (2021) include just six European countries and Ryu (2018) investigates 19 countries, 16 of which are European ones.

Besides investigating the mediating effect of the *macro-level* institutional (EPL setting) and structural (share of temporary workers) context on wage gaps for a diverse country dataset, the first article further extends the previous literature by investigating relevant *worker subgroups* in the 30 included countries. By distinguishing different age and occupational skill groups, Article 1 investigates wage gap heterogeneities along important dimensions of social stratification. Previous findings from heterogeneities in wage gaps for different worker subgroups show that wage gaps are usually smaller for younger temporary workers compared to older ones (Mooi-Reci & Wooden, 2017; Perugini & Pompei, 2017), while findings are less consistent for different skill groups of workers. For example, some studies find greater wage gaps for workers who are highly educated (Gebel, 2009) or those who are working in high-skilled occupations (Kiersztyn, 2016). However there are also studies revealing larger wage disadvantages for workers in low-skilled occupations (Helbling, 2017).

Another strand of literature investigates wage gap heterogeneities across the wage distribution rather than for differently skilled or educated workers. Using such an approach and estimating quantile regressions, results usually show that wage disadvantage for temporary workers are larger for workers at the bottom of the wage distribution (Barbieri & Cutuli, 2018; Comi & Grasseni, 2012; Westhoff, 2022). However, there are also quantile regression studies showing that temporary workers in high-paid jobs suffer from larger wage disadvantages compared to permanent workers than temporary workers at the end of the wage distribution (Oliver & Sard, 2019).

The last contribution of Article 1 to this literature is to not only investigate *wage gap heterogeneities* across age and occupational skill groups but to also estimate the *moderating impact* of labor market settings in terms of dualization and segmentation on the wage gap for different subgroups. Specifically, Article 1 considers the EPL setting as one of the most important institutional determinants of labour market dualization (Barbieri et al., 2019; Biegert, 2019; Fervers & Schwander, 2015; Rueda, 2014) and the size of the temporary workforce as a direct measure of the structural dimension of labour market dualization. Article 1 can thus reveal if worker subgroups are equally affect by macro-level country features enlarging or reducing wage inequalities between temporary and permanent workers.

2.4 The (heterogeneous) longer-term wage consequences of temporary employment

The previous literature has not only focused on the cross-sectional wage gap between contract types but also on the development of the initial wage disadvantages to investigate their endurance. As mentioned in the previous section, the wage gap disadvantages associated with temporary employment in comparison to permanent employment are well established, and if we only consider studies relying on cross-sectional data to investigate wage gaps, results are quite univocal (Giesecke & Groß, 2004; Kiersztyn, 2016; Westhoff, 2022). However, when we look in more detail at the results of studies utilizing longitudinal data to investigate the development of initial wage gaps and the wage dynamics experienced by (former) temporary workers, results are less straightforward. While, all studies investigating the longer-term wage consequence of temporary jobs rely on longitudinal data, they still can be further differentiated into studies focusing only on a between-comparison approach and those combining a between- and a within-comparison approach.

First, studies focusing on a *between-comparison* of temporary and permanent workers, reveal that after a few years since the start of the temporary contract, wage gaps between former temporary workers and permanent workers disappear, at least for some groups of workers (Gash

& McGinnity, 2007; Gebel, 2010; Pavlopoulos, 2013).[4] While some studies find wage gaps to disappear quicker for women (Pavlopoulos, 2013), others find wage gaps to diminish quicker for male former temporary workers (Gash & McGinnity, 2007; Pavlopoulos, 2013). However, other between-comparison studies who investigate workers employed in temporary jobs for several years find enduring wage gaps for all years in temporary employment compared to workers in permanent employment (Barbieri & Cutuli, 2018).

Another strand of literature also brings in the *within-comparison* perspective in combination with a between-comparison approach, to investigate the wage growth of (former) temporary workers compared to workers who make different career experiences. Here studies show that, while men who work in temporary employment for several years enjoy wage growth, it is not steep enough to close initial wage gaps, leading to persistent wage disadvantages compared to men working continuously in permanent employment (Booth et al., 2002). Similar results are revealed for Australian prime-aged men who only worked in casual employment in their earlier career compared to those who only held permanent jobs (Mooi-Reci & Wooden, 2017).

In contrast, studies identify strong wage growth for former temporary workers if they are able to make quick transitions to permanent employment (Booth et al., 2002; Fuller & Stecy-Hildebrandt, 2015; Reichenberg & Berglund, 2019). These findings lead the authors to the conclusion that former temporary workers enjoy high compensating wage growth if they can transition to permanent jobs, making the disadvantages of temporary employment only transitory (Booth et al., 2002; Gebel, 2010). Specifically, Booth and colleagues (2002) reveal in the UK that women who transition from temporary to permanent jobs enjoy such high wage growth that they actually catch-up in terms of hourly wages to women who always worked in permanent jobs. Fuller and Stecy-Hildebrandt (2015) using Canadian data as well as Reichenberg and Berglund (2019) relying on Swedish data employ workers with other types of temporary employment careers as the reference group. Both studies find wage growth to be particularly pronounced for workers who can transition from temporary to permanent jobs in comparison to many other types of temporary employment careers.

Article 2 picks up at the assumption that the cost of temporary employment is only transitory, by taking a closer look at *cumulative wage consequences*, to investigate the cost of temporary

[4] Another strand of literature adopts a downward comparison perspective by comparing employment or wage consequences for temporary workers with individuals who experience unemployment (DeGraaf-Zijl, van den Berg, & Heyma, 2011; Yu, 2012; Addison & Surfield, 2009b; Gebel, 2013). They mostly reveal that taking up a temporary job is more beneficial for workers future wages and employment chances than remaining unemployed. However, such downward comparisons with the unemployed are out of the scope of this thesis.

jobs from a longer-term life course perspective. It thus contributes to answering the second specific research question of this thesis concerning *the longer-term wage consequences of temporary employment and possible heterogeneities in these longer-term consequences between subgroups of workers and labor market settings.* In particular, in this article I argue that a disappearing wage gap in terms of annual or hourly wages between (former) temporary workers and workers who are employed on a permanent job, as well as the high wage growth of former temporary workers who transition to permanent jobs do not automatically result in a compensation of the initial wage gap endured by temporary job holders. This is owed to the fact, that workers who experience temporary jobs in their early career, received lower wages for these years compared to workers who continuously held a permanent job. However, the wage disadvantages for temporary jobs could only be considered as transitory from a *life course perspective*, if former temporary works enjoy such high wage growth in their subsequent career that there is a catching-up of *overall labor earnings* in terms of cumulative wages to workers who were always permanently employed. By investigating the cumulative wage consequences of experiences of temporary employment for men and women, as well as across educational and occupational levels, Article 2 additionally contributes to the literature in terms of revealing *subgroup heterogeneities* in the longer-term effects of temporary employment along important lines of social stratification.

Furthermore, in line with the most recent literature, Article 2 employs an innovative sequence analysis approach to investigate *longer-term* cumulative wage consequences of workers *career trajectories*. Sequence analysis allows researchers to move beyond the investigation of single employment transitions and instead adopt a holistic approach where employment careers are depicted as a sequence of states and transitions (Fuller & Stecy-Hildebrandt, 2015; Mattijssen & Pavlopoulos, 2019; McVicar, Wooden, Laß, & Fok, 2019; Reichenberg & Berglund, 2019; Struffolino, 2019). Thus, sequence analysis enables to separate between temporary jobs functioning as a stepping stone to *lasting* permanent jobs from temporary jobs resulting in repeated spells of temporary jobs and potentially unemployment, signifying an entrapment in insecure careers.

Previous studies using sequence analysis to depict temporary employment careers clearly reveal that initial periods of temporary employment can result both in stepping stone as well as entrapment trajectories, with for example women and low educated workers being more likely to experience entrapment careers in Australia (McVicar et al., 2019), while younger and highly educated workers are more likely to experience a stepping stone careers in Canada (Fuller

& Stecy-Hildebrandt, 2015). By combining sequence analysis to reveal different temporary employment careers with propensity score matching, Article 2 can investigate long-term cumulative wage outcomes of similar workers experiencing either continuously permanent employment or lasting transitions from temporary to permanent employment, thus adopting a *between-comparison* approach.

Article 3 takes an even more detailed look at wage growth of former temporary job holders who move on to permanent jobs. Thus, it also contributes to answering the second specific research question of this thesis concerning *the longer-term wage consequences of temporary jobs and possible heterogeneities in these longer-term consequences between subgroups of workers and labor market settings.* In this article, I distinguish between workers who obtain a permanent job with the same employer from those who have to find a permanent job with a new employer. Moreover, for workers who receive a permanent contract from the same employer, I distinguish if the transition to a permanent contract coincides with a job change within the firm. The previous literature on wage consequence of temporary employment has not yet accounted for such employer changes or within-employer job changes. This is especially surprising considering the fact that studies investigating employment transitions after having a temporary job have already highlighted the importance of considering employer changes – without however looking into wage outcomes (Reichelt, 2015; Schmelzer et al., 2015). I argue that investigating former temporary workers who obtain a permanent job with the same employer is important to truly reveal compensating wage growth for workers for whom temporary jobs functions as a prolonged probationary period and screening device. Article 3 thus adopts a *within-comparison* approach.

Additionally, Article 3 compares two countries as well as different subgroups of workers to reveal *heterogeneities* in former temporary workers longer-term wage growth. In particular, Germany and the United Kingdom are compared as two countries with very differently regulated labor markets. The former having a rigid and coordinated labor market and the latter a more flexible and uncoordinated one. Such differences in the *labor market context* are likely to impact workers' longer-term wage dynamics after temporary employment. Moreover, temporary jobs as a screening device should be more relevant for certain *subgroups of workers*, as revealed by studies on the employment consequences of temporary jobs (Reichelt, 2015; Schmelzer et al., 2015). Article 3 thus compares workers belonging to different age groups as well as workers with different educational skill levels – again looking at subgroups which refer to important dimension of social inequality and stratification.

2.5 The consequences of temporary employment on wealth accumulation beyond wages

The literature on the economic consequences of temporary jobs focusses not only on wages and wage growth but also extends to other related outcomes such as poverty risks and wealth. Regarding the latter outcome, as mentioned earlier, material possession such as owning a car or one's home, are an important dimension of individuals' wealth (Keister, 2005). Previous studies on this aspect have mainly focused on homeownership and reveal that permanent employment in comparison to less secure employment statuses such as temporary employment increase the likelihood for homeownership (Baron & Rapp, 2019; Lersch & Dewilde, 2015; McGarth & Keister, 2008).

More generally, studies show that increased income insecurity reduces the likelihood of homeownership (Diaz-Serrano, 2005; Dotti Sani & Acciai, 2018; Haurin, 1991). Income disadvantages associated with insecure career states have thus been theorized by many studies as an important explanation for the negative homeownership consequences associated with insecure employment statuses (Dotti Sani & Acciai, 2018; Haurin, 1991; McGarth & Keister, 2008). Moreover, with homeownership being a household-level outcome, most previous studies emphasize that the career experiences of the partner are also important. However, with the exception of Dotti Sani and Acciai (2018), previous studies merely control for partners employment status (Baron & Rapp, 2019; McGarth & Keister, 2008), without focusing on couples.

Article 4 builds on and extents this literature to reveal a more *encompassing* view on the longer-term wealth consequences associated with temporary employment. Hence, the third specific research question of this thesis concerning *the longer-term consequences in terms of wealth accumulation beyond wages of experiences of temporary employment and how they are mediated by wage consequences* is addressed in this article. Specifically, in this article my co-author and I not only look at homeownership but also on the amount of income spent on rent as another relevant housing outcome affecting individuals wealth accumulation. While, homeownership represents an important material possession, the amount of income individuals and couples have to spend on rent impacts their ability to garner financial savings, which account for another important dimension of individuals' wealth (Keister, 2005).

Article 4 furthermore broadens the perspective of the previous literature and the articles included in this thesis by investigating the housing consequences of *insecure careers*. This article thus goes beyond the investigation of periods of temporary employment by also including unemployment as an insecure career status. Moreover, the employment careers of

both partners in a couple are considered in a multichannel sequence analysis approach to account for crucial *interdependencies* between individuals' life courses. This article again adopts a *between-comparison* strategy, where a holistic and dynamic treatment is defined, which accounts for both partners' levels of career insecurity.

Lastly, Article 4 contributes to the previous literature and connects to the other articles of this thesis by investigating income disadvantages as a possible *micro-level mechanism* explaining longer-term housing outcomes. To consider both longer-term income disadvantages as well as the couple-level perspective in this mechanism, the joint cumulative income of both partners is utilized, the mechanisms is thus measured at the meso level.

3. Theoretical background and hypotheses

This chapter is dedicated to the presentation and discussion of the general interrelated micro-macro model which constitutes the theoretical backbone of the thesis. First, I will illustrate the general theoretical framework of how the wage and wealth consequences of temporary employment unfold over the life course (Section 3.1). Next, I will elaborate on the more specific theoretical arguments used to derive the respective hypotheses of each article. In more detail, Section 3.2 presents micro-level arguments for the cross-sectional wage consequences of temporary employment. This section also focuses on expectations for different worker subgroups for cross-sectional wage consequences (Sections 3.2.1) and on macro-level influences on cross-sectional wage consequences (Section 3.2.2). After that, Section 3.3 focusses on the theoretical arguments for longer-term wage consequences of temporary employment. This section also highlights expectations for different worker subgroups (Section 3.3.1) and the impact of country-level characteristics on longer-term wage outcomes (Section 3.3.2). Lastly, Section 3.4 gives insights on the theoretical arguments for the longer-term wealth outcomes of temporary job experiences beyond wages, namely regarding homeownership (Section 3.4.1) and the share of income spent on rent (Section 3.4.2). The section closes with a discussion of couple-level influences on wealth accumulation (Section 3.4.3).

3.1 The general theoretical model

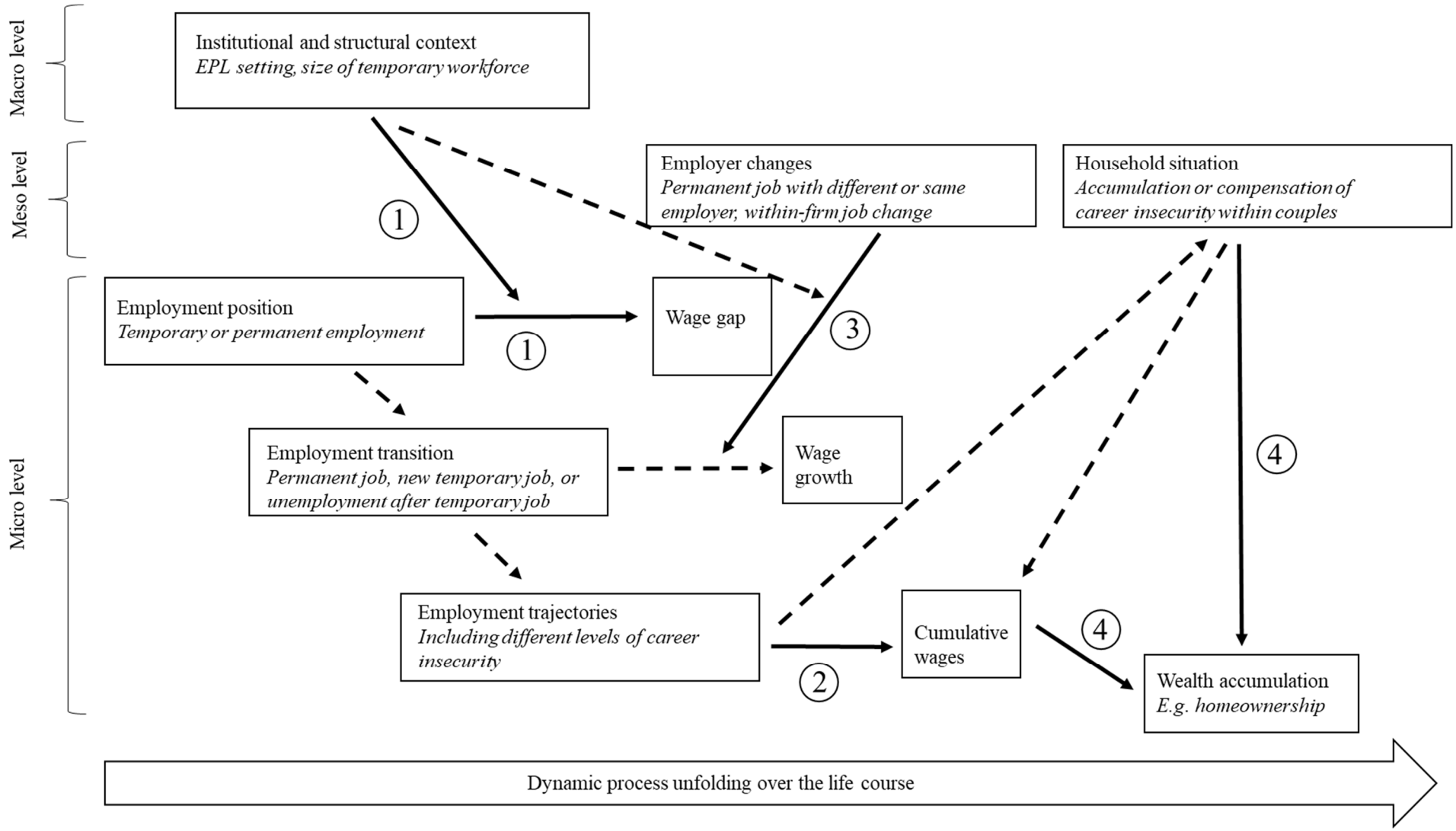
Figure 1 is an illustration of the general interrelated micro-macro model as a path diagram. It depicts how the cross-sectional and longer-term wage consequences of temporary employment unfold over the life course in a dynamic process involving employment positions, transitions, and trajectories. Additionally, Figure 1 depicts the placement of each article in this theoretical framework and highlights the effects and relationships that are investigated and theoretically assumed in each of the articles.

Moreover, the vertical axis highlights the different levels of analysis on which I assume effects to unfold. Namely, from bottom to top, these are the micro level, referring to the individual workers, the meso level, referring to households (i.e., couples) as well as to employers, and the macro level, referring to different countries. Additionally, the life course approach is visualized by the horizontal axis, emphasizing how the wage and wealth consequences of temporary jobs are manifesting over time.

Furthermore, the placement of the boxes (i.e., theoretical concepts) at the different levels of analysis signifies how the relationships investigated in each article are connected and how they build on each other. The different boxes also illustrate the different treatments and outcome dimensions investigated in the articles. Specifically, the first relationship to unfold refers to how the employment position at a specific point in time (most left box on the horizontal axis at the micro level) impacts cross-sectional wage gaps between temporary and permanent workers (included in Article 1). Following from an initial experience of temporary employment, we can expect different employment transitions to either permanent employment (included in Article 3), renewed temporary employment, or unemployment (second most left box on the horizontal axis at the micro level). Such employment transitions of course entail effects on workers' wage growth, which can be considered as a longer-term wage outcome, compared to the previously mentioned cross-sectional wage gaps. Usually, workers' careers are not only made up by one employment situation or transition but rather by a series of different employment statuses and transitions, which result in individual employment trajectories (third most left box at the micro level) (included in Article 2 and Article 4). Employment trajectories are assumed to have a large impact on workers cumulative wages. Overall, wages which cumulate over individuals' careers should reveal even longer-term wage consequences than the aforementioned wage gaps and wage growth. Lastly, cumulative labor earnings are an important factor contributing to individuals' wealth accumulation, enabling individuals to, for example, buy their own home.

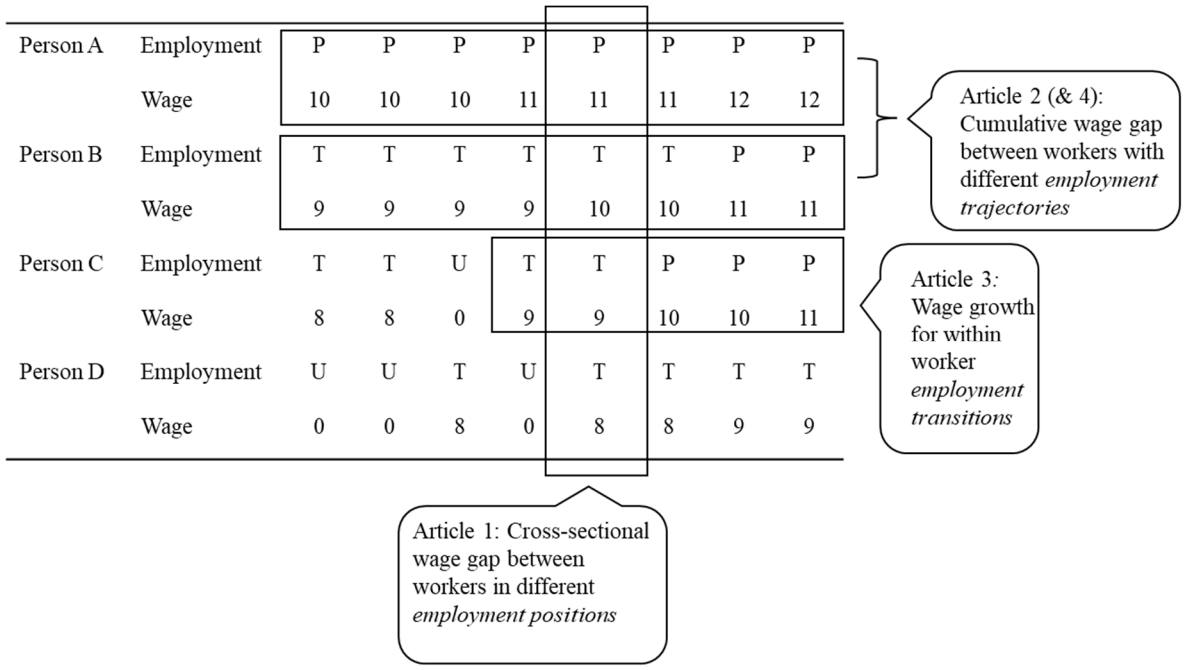
The relationships described in the previous paragraph are illustrated in even more detail in Figure 2. Specifically, Figure 2 illustrates how employment situations, employment transitions, and employment trajectories are related to each other and to different types of wage outcomes. Most importantly, it highlights that the cross-sectional wage gaps between temporary and permanent workers uncovered in Article 1 are only a snapshot of longer-term career processes, which cannot fully take differences in workers' previous careers into account. This cross-sectional view is hence extended by Article 3 which focuses on the within-worker wage growth of former temporary workers after they make transitions to permanent positions. Of course,

Figure 1 Illustration of the general interrelated micro-macro theoretical model as a path diagram



Notes: Own illustration. Solid arrows represent effects that are actually investigated in the articles, while the dashed arrows represent effects that are only theoretically assumed.

Figure 2 Illustration of the different wage outcomes investigated by the articles



Notes: Own illustration. U= unemployment, T= temporary employment, P=permanent employment.

such transitions are only a single event in workers' careers which may contain many different transitions. For this reason, Article 2 broadens the picture even further by comparing cumulative wage outcomes between workers with different employment trajectories. Lastly, Article 4 investigates cumulative earnings resulting from different employment trajectories as a mechanism for housing outcomes.

Although, the focus of this thesis lies on the described micro-level relationships, important higher-level influences on these micro-level processes are also investigated, as can be seen in Figure 1, albeit in lesser detail (except for Article 1). Nonetheless, they enrich the overall theoretical framework to encompass also meso-level and macro-level influences. Specifically, Article 1 investigates how country-level institutional and structural characteristics impact the wage gap between temporary and permanent workers. The macro- and the meso-level are introduced and investigated less explicitly by Article 3 which investigates the relevance of employer changes (meso level) for wage growth after experiencing temporary employment, comparing wage growth estimates for two countries with very different labor markets (macro level). Lastly, Article 4 implicitly includes the meso level by revealing how career (dis)advantages can accumulate within couples to effect wealth accumulation outcomes.

The further sections explain the theoretical arguments and the hypotheses derived from these for each of the introduced relationships in more detail. Moreover, an overview of all of the theoretical arguments and hypotheses included in any of the four articles is given in Table 2 at the end of this chapter.

3.2 Individual cross-sectional wage consequences of temporary employment

The wages workers receive are influenced by many factors. From the employers' perspective for example, wages are set in reaction to labor costs or labor demands (Blau & Kahn, 2002). From the employees' perspective, wages are for example impacted by their abilities or skill level as well as working experience, all of which are important aspects of workers' human capital (Mincer, 1989). Of course, wage differences between workers are also determined by the type of jobs individuals have. Following this idea, the theory of compensating wage differentials, postulates that workers must be motivated to work in undesirable jobs by receiving higher wages relative to more desirable jobs the worker could have (Rosen, 1986). Applied, to the case of temporary employment, one could expect that employers pay workers with such contracts higher wages to compensate for the higher employment insecurity and other undesirable working conditions that come along with temporary jobs (Kalleberg, 2000).

There are several other theoretical approaches explaining why, in opposition to the assumptions of the theory of compensating wage differentials, temporary workers should receive lower wages compared to permanent workers. First, according human capital theory, workers in temporary employment experience wage disadvantages due to the fact that, compared to permanent workers, they have lower firm attachment and are thus offered poorer opportunities for further training and skill acquisition (Booth et al., 2002; Kauhanen & Nätti, 2015). Not just the employer but also the temporary workers themselves are reluctant to invest into firm-specific skills of temporary workers as they both expect more frequent job changes and shorter firm tenure (DeVries & Wolbers, 2005; Forrier & Sels, 2003). In contrast to temporary workers, permanent workers should have higher incentives to invest in firm-specific skills due to their job security and resulting higher firm attachment. Under this theoretical approach, the higher wages of permanent workers compared to temporary workers are thus a result of the formers higher firm-specific human capital.

The second theoretical approach often utilized in previous studies to explain the wage gap between permanent and temporary workers is bargaining theory. Bargaining theory postulates that permanent workers enjoy wage advantages compared to temporary workers due to their stronger bargaining power as labor market insiders. This insider position is owed to the higher

replacement cost, e.g., in the form of severance payments, of permanent workers, whereas temporary workers as labor market outsiders serve as a flexible buffer stock that can be more easily adjusted to current demands, thus reducing the latter's wage bargaining power (Lindbeck & Snower, 1989; Polavieja, 2003).

Lastly, the wage disadvantages for workers with temporary jobs can also be attributed to the screening function of temporary jobs. Under this theoretical framework, temporary jobs are understood as a prolonged probationary period and screening device for permanent positions (Polavieja, 2003; Wang & Weiss, 1998). During the screening process, employers pay temporary workers lower wages to transfer the screening cost to the employee as a form of insurance for the possibility that the temporary worker does not fulfill the employer's expectations.

Following the above-described theoretical considerations, the implied or explicitly stated underlying main assumption of all four articles of this thesis is that *temporary workers experience wage disadvantages compared to permanent workers.* Specifically, in Article 1 one of the main research aims of my co-author and me is to reveal if wage gaps between temporary and permanent workers can be found across a large and diverse set of 30 countries in and outside of Europe.

3.2.1 Subgroup differences in cross-sectional wage consequences

In Article 1, we also expect to find varying wage gaps between temporary and permanent workers along the lines of different worker subgroups. In particular, we focus on different age and occupational skill-groups as key dimensions of social inequality and stratification (Kiersztyn, 2016; Mooi-Reci & Wooden, 2017) and drivers of labor market insider or outsider positions (Biegert, 2019; Emmenegger et al., 2012). First, younger workers should naturally be in an early phase of their career, putting younger permanent workers compared to older permanent workers into a weaker bargaining position as they might not yet had the chance to fully amortize their investments into firm-specific human capital. Contrastingly, older permanent job holders are more likely to have already profited from firm-specific training, as they tend to have more experience and tenure, resulting in a stronger bargaining position. Thus, my co-author and I hypothesize in Article 1 that *the wage gap between temporary and permanent workers is smaller for younger workers compared to older workers.*

For the comparison of the temporary wage gap across different skill groups, my co-author and I derive two opposing hypotheses. First, permanent jobs in medium- or high-skilled occupations are expected to offer better wage bargaining power and training opportunities as they should be

more costly to substitute (Bellani & Bosio, 2021). Moreover, there might be institutional limits to wage disadvantages experienced by temporary workers in the lower-skilled occupations because of wage floors established in the form of minimum wages (Dias da Silva & Turrini, 2015; Kiersztyn, 2016). Accordingly, my co-author and I hypothesize that *the wage gap between temporary and permanent workers is larger for workers in medium-/high-skilled occupations compared to workers in low-skilled occupations.*

However, some studies also argue that high-skilled temporary workers might also work in well-paid temporary jobs, which require transferable general skills and high levels of flexibility, as so called "free knowledge workers" (Kiersztyn, 2016). Following this argument, my co-author and I hypothesize that *the wage differential between temporary and permanent workers is smaller for workers in medium-/high-skilled occupations compared to workers in low-skilled occupations.*

3.2.2 Country-level influence on cross-sectional wage consequences

As mentioned earlier country-, i.e., macro-level, characteristics can impact the wage gap between workers with a permanent contract and those with a temporary one. Article 1, thus also has the research aim to investigate the moderating role of institutional or structural determinants in terms of labour market dualization and segmentation on the wage gap between temporary and permanent workers. Specifically, my co-author and I focus on the share of workers in temporary employment as a direct measure of the structural dimension of labour market dualization. Moreover, we focus on the impact of the previously discussed employment protection legislation (EPL) as one of the most important institutional determinants of labor market dualization (Barbieri et al., 2019; Biegert, 2019; Fervers & Schwander, 2015). We include EPL permanent and EPL temporary as distinct measures, as previous research highlights that it is important to investigate the two dimensions of EPL separately (Bellani & Bosio, 2021; Gebel & Giesecke, 2011).

As explained in Section 1.1, EPL permanent can be considered as a summary of the procedures and costs for dismissing workers with a permanent contract and EPL temporary as a summary of the regulations and restrictions for the use of temporary contracts. Similar to union strength, EPL permanent is argued to be an institution strengthening labor market insiders, such as permanent workers (Arranz et al., 2021; Barbieri & Cutuli, 2016; Rueda, 2005). Additionally, a strict protection of permanent employees decreases the ease with which employers could replace permanent workers with temporary workers (Bellani & Bosio, 2021). Naturally, if the protection of permanent workers becomes stricter, the cost for employers to substitute them

increases, strengthening the wage bargaining power of permanent job holders (Bellani & Bosio, 2021; Ryu, 2018). Therefore, it is argued that a stricter protection of permanent workers increases the wage bargaining power of permanent workers, as it entails more effort and higher costs for employers to substitute them. Moreover, under such conditions both permanent workers and employers have higher incentives to invest in the firm-specific skills of permanent workers (Ryu, 2018). Following these arguments, my co-author and I hypothesize that *the wage gap between temporary and permanent workers is stronger in a setting of strong EPL for permanent contracts, compared to a setting with low EPL for permanent contracts.*

Furthermore, researchers have emphasized that the regulation on temporary contracts is also important, especially in relation to the strictness of the protection of permanent contract holders (Barbieri, 2009). Accordingly, it is often argued that insider power is especially strong in dualized labor market settings, where the use of temporary contracts is deregulated, while workers with permanent contracts are strictly protected – a labor market setting referred to as partial deregulation (Barbieri & Cutuli, 2016). In such a setting, temporary employees can be easily dismissed or get entrapped in cycles of temporary jobs, resulting in a weak bargaining position in wage negotiations (Gebel & Giesecke, 2011). Importantly, a weak regulation of temporary contracts should only increase the relative disadvantages of temporary workers compared to permanent workers if permanent workers have a strong wage bargaining position due to being strictly protected by the EPL setting for permanent contracts. Hence, my co-author and I hypothesize that *the wage gap between temporary and permanent workers is stronger in settings with deregulated use of temporary contracts compared to settings with regulated use of temporary contracts but only when there is strong EPL for permanent contracts.*

Furthermore, Article 1 investigates the share of temporary workers as a more direct conceptualization of labour market dualization. Theoretically, a higher share of temporary workers is expected to guard permanent workers, thus increasing the latter's bargaining position in wage negotiations (Polavieja, 2003). More specifically, employers are able to easly cushion labor market volatilities by hiring and firing workers from the large available share of temporary job holders. Therefore, employers can be expected to invest into the firm-specific skills of the permanent workers and also to grand them higher wages (Fervers & Schwander, 2015). Hence, my co-author and I hypothesize that *the wage differential between temporary and permanent workers is larger in contexts where the share of temporary workers is higher.*

Lastly, Article 1 also investigates if the measures of macro-level dualization (i.e., EPL setting and share of temporary workers) have a different impact on the age and occupation subgroups discussed in the previous section. Although, my co-author and I do not formulate clear hypotheses on the impact of labor market dualization on the wage gaps for different worker subgroups, we do state some theoretically guided expectations. Whereas, older workers and medium-/high-skilled workers are generally considered to be labor market insiders, younger and low-skilled workers are usually viewed as disadvantaged labor market groups. It thus could be expected that a country-level labor market setting of dualization, which more strongly pushes insider power, positively interacts with belonging to such an insider group (Biegert, 2019). This should be especially the case for workers having double insider status such as being an older permanent employee. For instance, a segmented, dualized labor market with a deregulated use of temporary contracts and strict protection of permanent workers (Barbieri, 2009) might especially foster the wage bargaining power of privileged insider groups, such as older or medium-/high-skilled permanent workers. Hence, the country-level features assumed to have an impact on the wage gap between permanent and temporary workers could be expected to have an even stronger influence for older compared to younger workers and for medium-/high-skilled compared to low-skilled workers.

3.3 Individual longer-term wage consequences of temporary employment

To broaden the scope on the wage and wealth consequences of temporary employment, the longer-term wage consequences need of course also be assessed to investigate if the revealed cross-sectional wage disadvantages are enduring. This is the main focus of Article 2 and Article 3 of the thesis. As I already mentioned in Section 1.3 the longer-term wage consequences that can theoretically be expected are heavily impacted by the employment transitions of former temporary workers and the "function" of temporary jobs. Concerning such employment transitions, the previous literature theoretically distinguishes between the *integration* and the *entrapment* perspective.

In the entrapment scenario, employers use temporary jobs simply as a flexible buffer stock to be able to easily react to current labor market demands (Esping-Andersen & Regini, 2000; Kalleberg, 2000). Temporary jobs can thus lead to unemployment or cycles of temporary employment (Barbieri et al., 2019; Barbieri & Cutuli, 2018). Concerning, the longer-term wage consequences of such transitions, labor earnings of former temporary workers naturally drop to zero in the case of job loss. Moreover, periods of unemployment can also result in a scarring effect (Gangl, 2006), which can manifest in terms of lower wages if former temporary workers are able to re-enter the labor market after a spell of unemployment. Similar arguments are often

made for experiences of temporary employment itself, where previously held temporary jobs can be stigmatizing and a signal to future employers that a worker is of low ability or not very committed to work (Pedulla, 2016), resulting in lower future wages (Mooi-Reci & Wooden, 2017).

In the integration scenario, temporary jobs are instead believed to serve as a screening device for permanent contracts (Korpi & Levin, 2001; Wang & Weiss, 1998). While during the screening process, employers pay temporary workers lower wages to transfer the screening cost to the employee, temporary workers can expect their contract to be converted to a permanent one and to receive compensating wage growth to make up for the initial disadvantages if the employer's expectations are satisfied (Amuedo-Dorantes & Serrano-Padial, 2007; Mertens & McGinnity, 2004). Furthermore, for workers who can use temporary jobs as a stepping stone to permanent jobs, the incentives to investment in firm-specific skills should increase along with their wage bargaining power once they have a permanent position, also contributing to their wage growth.

As mentioned before, previous studies (discussed in Section 2.4) interpret the disappearing wage gap between former temporary workers and permanent workers as well as the high wage growth of individuals who experience stepping stone careers as support for the screening function of temporary jobs, concluding that the cost of temporary employment is only transitory (Booth et al., 2002; Gebel, 2010). However, in Article 2 I argue that such findings do not necessarily equate to a compensation of initial wage disadvantage faced by temporary workers in terms of cumulative wages because workers who experience temporary employment for earlier parts of their career have still earned less for those years compared to workers who always held permanent jobs. Moreover, in line with recent advancements in the literature, I argue that careers should be considered in their entire complexity to truly investigate the longer-term wage consequences of certain labor market trajectories (Mattijssen & Pavlopoulos, 2019; McVicar et al., 2019; Reichenberg & Berglund, 2019). Hence, I hypothesize that *looking at cumulative wages, one could expect that compared to standard career trajectories of continuous permanent employment, stepping stone career trajectories on average result in wages disadvantages.*

However, expectations are a little different, if former temporary workers truly enjoy especially strong subsequent wage growth after receiving a permanent contract (Fuller & Stecy-Hildebrandt, 2015; Reichenberg & Berglund, 2019). These expectations result from the assumption that in particular workers who are confident in their abilities (accounting for other

relevant characteristics such as skills and gender) are likely to accept an initial temporary job entailing lower wages if this "investment" fosters the better judgment of their actual abilities, resulting in higher lifetime earnings (Boockmann & Hagen, 2008; Gibbons & Murphy, 1992; Mertens & McGinnity, 2004). By offering contracts for temporary employee's, which provide low initial wages but imply a steep wage growth upon positive evaluation, employers can use such a self-sorting mechanism to their advantage. Hence, in contrast to the previous hypotheses, I hypothesize that *on average no cumulative wage gap between standard career trajectories and stepping stone career trajectories is observed because of higher wage growth experienced by workers on the latter trajectory*.

Concerning workers with entrapment careers, i.e., those who experience repeated spells of temporary employment or even unemployment, it is quite obvious to expect large cumulative wage penalties compared to workers with standard careers of continuous permanent employment. More specifically, I hypothesize that *on average when compared to workers with standard career trajectories, workers with entrapment career trajectories which are made up by repeated temporary jobs experience larger cumulative wage disadvantages than when workers on stepping stone career trajectories are compared to workers with standard career trajectories*. Furthermore, I hypothesize that *on average when compared to workers with standard career trajectories, workers with entrapment career trajectories which also include periods of unemployment experience larger cumulative wage disadvantages than when workers with entrapment career trajectories which are made up by repeated temporary jobs are compared to workers with standard career trajectories*.

Lastly, another important research aim of Article 2, although I do not state explicit hypotheses on this, is how cumulative wage gaps between workers on stepping stone and standard career trajectories unfold over time. First, there might be an initial but rather stable cumulative wage gap resulting only from the periods of temporary jobs. Second, there could also be a catching-up process that starts after some years after the transition to a permanent job was made, which could be an indicator of high subsequent wage growth for workers on such stepping stone career trajectories.

While the investigation of cumulative wages certainly offers interesting insights into the longer-term wage consequences of temporary employment associated with different career trajectories, there still remain some questions which cannot be addressed with such an approach. Particularly, concerning the underlying theoretical mechanisms explaining the (cumulative) wage growth consequences associated with certain career trajectories and dynamics.

Specifically, if we review the theoretical arguments in the beginning of this section more closely it becomes evident that the screening function of temporary jobs, possibly entailing high compensating wage growth, can only truly be revealed by looking at the wage growth of former temporary workers who receive a permanent job from the same employer (Fuller & Stecy-Hildebrandt, 2015). Whereas stigmatization, resulting from employers viewing previous temporary contracts, which were not turned into a permanent one by the last employer as a sign of unsuccessful screening and a negative signal about worker quality (Fuller, 2011; Fuller & Stecy-Hildebrandt, 2014; Mooi-Reci & Wooden, 2017), can only occur when former temporary workers must find work with a new employer.

Addressing these theoretical arguments is the main aim of Article 3. In this article I argue that, distinguishing workers who are able to obtain a permanent job with the same employer from those who need to change employers is crucial to separate compensation or possible stigmatization of former temporary job holders in terms of wage growth. By bringing in the employer perspective, Article 3 thus also accounts for the meso level and investigates the impact of employer changes on the wage growth experienced by former temporary workers who are able to transition to a permanent job. Specifically, following the arguments and assumptions of the screening function of temporary jobs, I hypothesize that *former temporary workers experience wage growth when they obtain a permanent contract with the same employer*.

Moreover, firm-internal job mobility and the climbing of firm-internal career ladders also contribute to workers' wage growth (Pavlopoulos, Fouarge, Muffels, & Vermunt, 2014). For workers who received a permanent job with the same employer, it is thus also necessary to distinguish those workers who receive a permanent contract on the same job from those who change jobs within the firm. Following such arguments of previous authors, I hypothesize that *former temporary workers experience higher wage growth if the transition to the permanent contract coincides with a within-firm job change.*

In contrast, following the arguments of the entrapment scenario, there should also be temporary workers, whose contracts do not get converted into permanent ones. Under the entrapment perspective this would be explained with the fact that temporary workers are mainly utilized as a flexible buffer stock with no intentions or possibilities to offer them permanent contracts (Barbieri & Cutuli, 2018; Lindbeck & Snower, 1989; Polavieja, 2003). An alternative view would be that not receiving a permanent contract from one's employer is rather the result of unsuccessful screening, i.e., workers not fulfilling the employers' expectation (Booth et al.,

2002; Gebel, 2010). Nonetheless, also for such workers, where temporary employment does not result in a permanent contract with the same employer, temporary employment might still provide a stepping stone to a permanent employment with a different employer. This is referred to as the bridge or entry port function of temporary jobs by previous authors (Fuller & Stecy-Hildebrandt, 2015).

The explanation of the bridge function lies in the fact that temporary employment might still allow workers to build human capital and form useful social contacts, which may aid them in finding permanent employment (Addison & Surfield, 2009a; Barbieri & Scherer, 2009; Korpi & Levin, 2001).[5] As mentioned earlier, a new employer might view a previous temporary contract, which the old employer did not turn into a permanent one, as a sign of poor worker quality, resulting in stigmatization and lower wage growth (Fuller, 2011; Mooi-Reci & Wooden, 2017). Hence, I hypothesize that *former temporary workers experience lower wage growth when they obtain a permanent contract with a different employer compared to when they obtain a permanent contract with the same employer.*

3.3.1 Subgroup differences in longer-term wage consequences

Article 2 and 3 also look into the longer-term wage consequences of different worker subgroups. However, in both articles I merely state theoretically informed expectations for the different subgroups, without formulating explicit hypotheses. First, it is postulated by most authors that the screening function of temporary employment could be particularly relevant for workers whose true abilities are hard to anticipate before hiring. This is the case for younger workers without much previous work experience as well as highly educated workers, who mainly apply for positions which include largely complex tasks which are hard to monitor (Fuller & Stecy-Hildebrandt, 2015; Gebel, 2010). Similar arguments are made for workers in high-skilled occupations (Kiersztyn, 2016). Moreover, it has been argued that workers with high abilities (e.g., highly educated workers or those working in high-skilled occupations) in particular self-select into temporary employment with initially large wage disadvantages but with promising chances of obtaining a permanent job (with the same employer) and steep wage growth (Gebel, 2009).

Second, many authors argue that stigmatization of former temporary workers is greater for older workers and male workers. This is explained with the fact that in comparison to older workers "job-shopping", i.e., frequent job changes, is more widespread and accepted among younger

[5] Such transitions from temporary employment to permanent employment with a new employer might happen either directly or after an unemployment spell (Fuller & Stecy-Hildebrandt, 2015).

workers who have just finished education and enter the labor market for the first time. Instead, changing jobs often and having career interruptions might be viewed as a sign of weak motivation or employment commitment among older workers (Fuller & Stecy-Hildebrandt, 2015; Mooi-Reci & Wooden, 2017). Hence, older temporary workers might contradict the "ideal worker norm", of workers totally dedicated to their work, more than younger temporary workers (Williams, 2001), resulting in stronger stigmatization of older former temporary workers compared to younger ones. In a similar vein, greater stigmatization is expected for male former temporary job holders, as due to still existing gender norms of the male "breadwinner", temporary employment might be viewed as more of a negative signal among men than women (Mooi-Reci & Wooden, 2017). Article 2 thus considers the cumulative wage outcomes resulting from different career trajectories for differently educated workers, workers in different occupations, as well as male and female workers, whereas Article 3 investigates the wage growth after within- and between-firm transitions to permanent employment for differently educated workers as well as different age groups of workers.[6]

3.3.2 Country-level influences on longer-term wage consequences

In Article 3, I also compare the wage growth consequences of transitioning from a temporary job to a permanent one in two countries with very differently regulated labor markets and educational systems, namely Germany and the United Kingdom (UK). One focus of Article 3 is thus to also reveal country-level influences on longer-term wage consequences of temporary contracts. However, the impact of these macro-level moderators are not investigated in such a quantitative way as in Article 1. Still, following theoretical arguments from previous literature I formulate expectations for differences between the two countries regarding the wage growth after within- or between-firm transitions from temporary to permanent jobs.

First, the screening function of temporary employment might be less relevant in specific labor market settings. While, Germany is largely considered as a strongly coordinated market economy, the UK is classified as a "liberal" uncoordinated market economy (Esping-Andersen, 1990; Hall & Soskice, 2001). Obviously, the risk of hiring a worker on a permanent contract who is a bad fit for the job is smaller when the restrictions of firing permanent workers are weaker, i.e., when permanent jobs are only weakly protected (Fuller & Stecy-Hildebrandt, 2015). The regulations on the employment protection of permanent workers is one crucial distinction between the rigid German labor market and the flexible UK labor market. Whereas,

[6] The occupational classification is instead investigated as a mechanism in Article 3.

permanent workers in Germany enjoy strict employment protections, permanent workers in the UK receive much weaker protection.

Specifically, the UK is among the lowest ranking OECD countries regarding the employment protection of permanent workers with the EPL permanent index amounting to 1.35 (on a scale from 0 to 6) in 2019 (OECD, 2020). In contrast, Germany has a stricter protection of permanent workers reaching 2.6 on the EPL permanent index. The protection of temporary contracts is also important, especially in relation to EPL permanent. While, Germany is characterized by a strict protection of labor market insiders, i.e., permanent workers, it exhibits only a weak regulation on the use of temporary contracts, reaching 1.38 on the EPL scale. Instead, the UK ranks not only low in the protection of permanent workers but also in terms of regulating the use of temporary contracts, reaching only 0.25 on the EPL temporary scale.

Such macro-level differences in the EPL setting could mean that the distinction between workers with permanent contracts as labor market insiders and workers with temporary contracts as labor market outsiders could be more relevant in Germany compared to the UK.[7] As the uncoordinated labor market of the UK is more fluid and allows greater mobility between jobs, workers in permanent jobs also face greater job insecurity (Barbieri, 2009; Gangl, 2003). This reduces their insider bargaining power relative to temporary workers, resulting in smaller wage advantages for permanent workers and a lesser need to utilize temporary contracts as screening devices (Gebel, 2010; Giesecke & Groß, 2004; Pavlopoulos, 2013). Hence, I hypothesize that *former temporary workers in Germany experience higher wage growth when they obtain a permanent contract with the same employer than those in the UK*.

Of course, the UK and Germany are not only different in terms of their labor market regulations but also regarding the characterization of their educational system. The educational system in the UK is rather general and educational credentials entail only little signaling power of what skills employers can expect from workers with a specific educational attainment (Marsden, 1986). Hence, on-the-job training and job mobility is of great importance in the UK, as workers need to change jobs within and between employers to accumulate the necessary skills for a specific task. In contrast, the educational system of Germany is characterized by occupational-specific training with a strong linkage to the labor market, especially when it comes to the highly differentiated and standardized apprenticeship system (Blossfeld & Mayer, 1988). These

[7] Collective bargaining coverage is another labor market institution, which is believed to foster labor market dualization by protecting labor market insiders (Lindbeck & Snower, 1989) and which is much lower in the UK compared to Germany (OECD, 2022b).

differences in the educational systems of the UK and Germany lead to a so called internal labor market (ILM) in the former country and a so called occupational labor market (OLM) in the latter country. Importantly, returns to job mobility and work experience are argued to be higher in ILMs compared to OLMs, as in the former person-job-fit is harder to determine on the basis of educational credentials alone (Gangl, 2001).

Returns to job mobility should be especially pronounced when job changes occur within the same firm because the already accumulated firm-specific skills are not lost. Therefore, as mentioned in Section 3.3 in Article 3 I additionally account for within-frim job changes for former temporary workers who secure a permanent contract with the same employer. The hypothesis stated in Section 3.3, namely that former temporary workers experience higher wage growth if the transition to the permanent contract coincides with a within-firm job change, should hence *be even more pronounced in the ILM of the UK*.

Of course, country-level differences are not only important in terms of the screening function of temporary jobs, they could also moderate the possible stigmatization of former temporary workers. In more detail, working on a temporary contract usually entails frequent job changes and shorter tenure in one job (Addison, Cotti, & Surfield, 2015). Employers might thus interpret careers characterized by frequent job changes as having a history of temporary contracts (Bendick & Nunes, 2012). Such careers are however generally more prevalent in liberal labor markets where job mobility is more common (Barbieri, 2009; Gangl, 2003). As changing jobs is also more prevalent for permanent workers in the UK, former temporary workers might experience less stigmatization in the UK than in Germany. Hence, I hypothesize that *differentiating wage growth of former temporary workers who obtain a permanent job with the same or a different employer is less relevant in the UK compared to Germany.*

However, one could also expect the opposite effects of those formulated in the hypothesis above. Specifically, due to the strong signaling power of the standardized educational system and the resulting German OLM, workers in Germany who change employers can more easily transfer their skills to their new firm, while employees in the ILM of the UK have to potentially fear the loss of the firm-specific skills they acquired when they change to a new employer (Giesecke & Groß, 2004). Hence, in contrast to the last hypothesis, I also hypothesize that *differentiating wage growth of former temporary workers who obtain a permanent job with the same or a different employer is more relevant in the UK compared to Germany.*

3.4 Wealth consequences of temporary employment beyond wages

As mentioned before wealth is not only determined by individuals' (labor) income but also by their material possessions and savings. Nonetheless, of course, the employment experiences workers make and wages they receive impact their ability to accumulate material possessions and garner financial savings to a large extent (Diaz-Serrano, 2005; McGarth & Keister, 2008). Specifically, labor market inactivity, unemployment, temporary employment, or other forms of non-standard work usually entail higher perceived job and wage insecurity (Kalleberg et al., 2000). Hence, experiencing longer periods of job insecurity might not only impede the ability to accumulate financial savings but also the ability to plan for the future and the making of longer-term decisions (Bosmans, Hardonk, Cuyper, & Vanroelen, 2016; Lazarus & Folkman, 1984). This is especially detrimental for younger workers who are in a life stage where many important decisions for the future need to made, but who are also especially at risk of facing such career insecurities (Baron & Rapp, 2019; Gebel & Giesecke, 2009a).

Naturally, wealth accumulation processes take some years to unfold and thus need to be investigated from a longer-term life course perspective, where not just single events or transitions are investigated but rather the effects of more holistic early careers (Aisenbrey & Fasang, 2010; Jalovaara & Fasang, 2020). This is the aim of Article 4, which goes beyond the investigation of wage consequences of temporary employment by looking into the housing consequences of insecure career trajectories experienced by younger workers in Germany. Specifically, homeownership is investigated as an important material possession and the share of income spent on rent as a factor impacting how much financial resources workers have left to save or spend on other things. By employing insecure career trajectories as the treatment, rather than "just" experiences of temporary employment and defining careers at the couple level, this article further extends the research scope of this thesis. As housing outcomes in particular are usually defined at the couple (or household) level, bringing in this meso perspective adds particular value to this article. Moreover, by investigating cumulative income of couples as a potential mechanism to explain housing outcomes of insecure careers, the article has a direct connection to the other articles of this thesis. Although, it is important to note that this article uses a broader definition of income, focusing not solely on wages, which however constitute an important part of individuals' income (more details in Section 4.1.4).

3.4.1 Consequences of insecure careers on homeownership

Theoretically, workers' careers do not consist of single job positions (i.e., permanent vs. temporary contract) or transitions but rather of successive employment and labor force statuses. The distinct career statues entail different advantages or disadvantages. Of course there are the

previously much talked about wage disadvantages associated with certain labor market positions – also called manifest functions of work – but also the non-economic disadvantages in terms of, for example, subjective job security – called latent functions of work (Jahoda, 1982). Both these functions play an important role in explaining consequences regarding homeownership of insecure career trajectories.

Obviously, in the case of unemployment or labor market inactivity, no wages are acquired, making it harder to afford homeownership. While, employment usually provides wages, it must be further distinguished according to contract types (Kalleberg, 2000). Permanent contracts entail (high) wages as well as the prospect of a secure, long-term job, allowing to plan into the future, thus facilitating entry into homeownership (Baron & Rapp, 2019). In contrast, temporary jobs are not just associated with lower wages (Gebel, 2010; Kiersztyn, 2016; Westhoff, 2022) but also with less job stability (Gebel, 2009; Kalleberg, 2000). Lastly, being a self-employed worker usually entails no stable wage but rather more wage insecurity and volatility compared to permanent employment, as the wage from self-employment hinges on the demand for the goods or services offered.

Theoretically, all these labor force positions could be part of a single worker's career trajectory, or (dis)advantageous positions could be experienced repeatedly, resulting in a process of cumulative (dis)advantages. Where the main assumption is that past (dis)advantages make the occurrence of future (dis)advantages more likely (DiPrete & Eirich, 2006), again highlighting the importance of the longer-term life course perspective. Workers who experience repeated spells of job insecurity early in their careers, be it via temporary jobs or self-employment, should on average accumulate lower labor income compared to workers with a standard career trajectory of continuous permanent employment (Booth et al., 2002). Of course, during periods of labor market inactivity or unemployment, individuals even have no labor income. As a result, workers who repeatedly experience any of these insecure career positions in their early career, should have more difficulties to build up the necessary savings, which are needed to be able to buy one's own home in later years.

Next to wage disadvantages, the higher employment insecurity experienced by workers on career trajectories characterized by temporary jobs, self-employment, or unemployment/inactivity makes it less rational to commit to large and long-term financial investments such as buying a house to live in. Moreover, homeownership ties workers to a certain location, making job and location changes more difficult (Baron & Rapp, 2019). Lastly, credit institutes might be less willing to lend large amounts of money to workers without a

permanent contract and the therein entailed high wage security (Akdogan, Karacimen, & Yavuz, 2019). *Taking all of this together, workers experiencing insecure career trajectories may have more difficulties to buy their own home.*[8]

3.4.2 Consequences of insecure careers on the share of income spent on rent

It is not only the ability to buy one's own home that contributes to wealth accumulation. Also the share of income people need to pay for rent is important in this regard and is also affected by career insecurity. Especially in Germany, many people do not own their own home but rather live for rent (Kaas, Kocharkov, Preugschat, & Siassi, 2021). The wage disadvantages discussed in the previous section, may also result in a greater difficulty of finding housing for rent that is affordable relative to ones income for individuals with repeated periods of insecure employment positions.

This may even exacerbate over time because usually the share of income spent on rent gets smaller the longer one can live in the same place. The most important reasons for this are that rent increases for existing rental contracts are tightly regulated by German law (Kholodilin, Mense, & Michelsen, 2016), and that wages usually rise with longer job tenure (Riekhoff, 2022). While, workers with permanent contracts can live at the same place for long periods of time if they wish to do so, individuals experiencing repeated spells of labor market inactivity, unemployment, temporary employment and potentially self-employment could also experience more frequent job and location changes (Addison et al., 2015). Hence, rent tenure is likely to be shorter on average for workers with insecure careers than for workers with stable careers. Simultaneously, landlords tend to raise rents with every new tenant to compensate for renovations and to take advantage of raising property prices, making rent on average higher for individuals who moved into their home more recently (German Federal Statistical Office, 2019). On top of that, workers on insecure career trajectories have less prospects to be promoted (Booth et al., 2002) and usually experience smaller wage growth compared to workers with careers that are characterized by longer periods of permanent employment (Fuller & Stecy-Hildebrandt, 2015; Reichenberg & Berglund, 2019).

Furthermore, workers on instable career trajectories might be more hesitant to invest much time and effort into searching for an affordable place to rent. These workers might already anticipate that they have to move again soon, for example when their temporary contract ends and they have to find new employment somewhere else. This might even result in workers with insecure career trajectories accepting rents that are more expensive in relation to their income.

[8] This is not a hypothesis that is explicitly stated in Article 4 but rather one of the underlying main assumptions.

Furthermore, just like credit institutions, landlords might be hesitant to rent to workers without a permanent job, as they like to ensure that rents are paid regularly. *Taking all of this together, workers experiencing insecure career trajectories may find it more difficult to find housing with an affordable rent in relation to their income.*[9]

3.4.3 Couple-level influences on wealth consequences beyond wages

In the case that individuals do not live alone or in shared apartments, but rather as members of one household, living and housing costs are usually shared. Especially in the case of cohabiting couples, the likelihood of being homeowners as well as the share of income paid for rent should be affected by the employment experiences of both partners (Baron & Rapp, 2019; Blom, Verbakel, & Kraaykamp, 2020; Dotti Sani & Acciai, 2018). More specifically, if both partners of a couple experience job insecurity or turbulence in their career, e.g., because both partners switch between temporary employment and spells of unemployment, the disadvantages in labor income and job stability should accumulate within the couple and jointly impact housing outcomes in later years. Obviously, compared to couples in which both partners have a permanent contract, the couple experiencing more career insecurities should have disadvantages regarding the likelihood to own their home or the share of income spent on rent. In contrast, the disadvantages associated with the career trajectory of one of the partners may also be diminished by the advantages of the other partners career.

The above arguments refer to the ideas of 'linked lives' (Elder, 1974) and 'interdependence between life domains' (Bernardi, Huinink, & Settersten, 2019). The former concept describes that individuals (on the micro level) are embedded in higher-level social units, i.e., relationships, such as partnership or marriage (often considered as the meso-level), which impact their decision-making processes and enable the sharing of resources (Elder, 1974), whereas the latter concept describes that the resources from one life-domain (i.e., working life) are related to the goals and outcomes from another life-domain (i.e., housing) (Bernardi et al., 2019). Furthermore, in a similar vein to the assumptions of cumulative (dis)advantages (DiPrete & Eirich, 2006), the arguments above also highlight the 'time-related interdependence of the life course' (Bernardi et al., 2019), describing that the accumulation of resources through employment trajectories in earlier years impacts the probability of owning a house or the share of income spent on rent in later years.

More specifically, if at least one partner of a couple is on a secure career trajectory of continuous permanent employment, the ability of this couple to make savings should not only be higher

[9] This is not a hypothesis that is explicitly stated in Article 4 but rather one of the underlying main assumptions.

but credit institutions might also be more willing to lend to such a couple. Of course, these arguments should apply even more of if both partners of a couple follow a career trajectory of continuous permanent employment. Hence, my co-author and I hypothesize in Article 4 that *the more insecure early employment trajectories of couples are the less likely couples should be homeowners later in their careers.*

Similar arguments can be made for the ability to find rental housing that is affordable relative to the couple's shared financial resources. For example, couples where both partners have a stable permanent contract should be more likely to be able to stay in the same rental home for long periods of time compared to couples with less stable careers. As workers with such career stability are also more likely to receive wage increases or promotions, their advantages, regarding the share of income they have to pay for rent should only increase over time. Lastly, couples with secure careers might expect to live at the same place for a longer time if they move and thus should be more willing to invest in longer searching periods to find a place to rent which is affordable relative to their income. Hence, my co-author and I hypothesize in Article 4 that *the more insecure early employment trajectories of couples are, the higher the share of couples' income spent on rent later in their careers should be.*

When reviewing the theoretical arguments made throughout this section, it becomes clear that one of the main explanations for the described housing disadvantages are accumulations of labor income inequalities throughout the career. First concerning homeownership, couples, in which both partners experience employment security from the start, have it easier to start saving money early and continuously to build up financial savings, which are necessary to make a large investment such as buying a house (Akdogan et al., 2019; Diaz-Serrano, 2005). In contrast, couples experiencing career insecurity in the form of repeated labor market inactivity, unemployment, temporary or self-employment should have a much harder time to accumulate large financial cushions. These disadvantages in terms of generating financial savings should of course amplify over time, depending on how long and how frequently such insecure labor market positions are experienced. Hence, my co-author and I hypothesize that *lower cumulative income partly mediates the negative effect of couples' early insecure employment trajectories on the probability of being homeowners later in their careers.*

In a similar vein, disadvantages in cumulative income should explain some of the effects of career insecurity on the share of income spent on rent. Following the logic of path dependencies of job positions and wages (Manzoni & Mooi-Reci, 2011, 2020; Mooi-Reci & Wooden, 2017), in couples in which at least one partner experiences an insecure career trajectory, the

accumulated experience of prior insecure labor market positions, and thus lower or no wages, may also impact current wages and thus the share of the income spent on rent. More specifically, employers may interpret prior experiences with non-standard or low-paying jobs as a negative signal for an employee's attachment or commitment to work (Fuller, 2011; Mooi-Reci & Wooden, 2017). Such signals can directly impact the current wages of workers, which is referred to as scarring effects in the literature (Dieckhoff, 2011; Gangl, 2006).

Such scarring effects may suggest that earlier disadvantages due to career insecurity, in terms of unemployment, low-quality jobs and lower wages, can negatively impact future wages and employment chances. In turn, subsequent lower labor income makes it harder to find housing for rent that is affordable relative to one's income. This mechanism might be even more pronounced if both partners in a couple experience insecure early career trajectories. As mentioned before, couples with a higher degree of career security may also be more likely to benefit from wage increases and promotions. The effects from promotions, wage increases and seniority payments from the earlier career are likely to be visible also in the later career. Income inequalities between couples with different career trajectories should thus accumulate over time and also affect the current share of income that has to be spent for rent. Hence, my co-author and I hypothesize that *lower cumulative income partly mediates the positive effect of couples' early insecure employment trajectories on the share of couples' income spent on rent later in their careers*.

Table 2: Overview and summary of the theoretical arguments and hypotheses

Article	Theoretical arguments	Hypotheses and expectations
1	Temporary workers have lower wages compared to permanent workers due to lower incentives to invest in firm specific skills (1) and their weaker bargaining position due to being more easily replaceable than permanent workers (2)	Heterogeneity based on (2): Stronger protection of permanent workers via EPL increases (+) wage gap Less regulated use of temporary jobs increases (+) wage gap, but only in setting of strong protection of permanent workers (partial deregulation) Higher share of temporary workers increases (+) wage gap Subgroups: Wage gap < for younger workers compared to older workers Wage gap < (>) for low-skilled workers compared to higher skilled workers
2	Temporary jobs can function as a stepping stone to permanent jobs, where workers with stepping stone careers no longer receive lower wages compared to permanent workers (3) compensating wage growth after transitions to permanent jobs could even lead to higher wages of former temporary workers (4)	Based on (3): C*umulative* wages < for former temporary workers compared to continuous permanent workers Based on (4): *Cumulative* wages for former temporary workers = to continuous permanent workers C*umulative* wages < for repeated temporary jobs compared to continuous permanent jobs
3	Screening function of temporary jobs as one underlying explanation of stepping stone career should only be applicable when permanent job is with the same employer (5) instead stigmatization is only possible for former temporary workers who have to find a permanent job with a new employer (6)	Wage growth > when former temporary workers do not have to change employers for receiving permanent employment Heterogeneity based on (5): Wage growth > for within-firm job changes Wage growth > for younger and for highly educated workers Heterogeneity based on (6): Wage growth < for older workers Country heterogeneity: Screening less relevant in flexible labor markets Stigmatization less prevalent in flexible labor markets
4	Career insecurity can accumulate within couples and over time (7), couples experiencing early career insecurity accumulate income disadvantages, which affects housing outcomes of couples (8)	Based on (7): Early career insecurity reduces (-) likelihood of homeownership and increases (+) income spent on rent in the later career Mediation (8): Cumulative income disadvantages explain effects

Notes: Own illustration.

4. Analytical strategy

The aim of this chapter is to illustrate the analytical strategy of each of the four articles of this thesis. The employed analytical strategies were always guided by the previously discussed ideas, concepts, and arguments of the general interrelated micro-macro theoretical model which serves as the theoretical framework for all articles. Of course, each analytical strategy was also designed to test the postulated hypotheses of each article as best as possible. For each analytical strategy, several decisions need to be made, and every analytical approach entails certain benefits and limitations, which will also be discussed in the following sections. Specifically, Section 4.1 describes the different data sources used, the sample selection criteria, and the operationalization of the independent and dependent variables. Section 4.2 moves on to the illustration of the methodical approaches of each of the articles.

Table 3 at the end of this chapter provides an overview and summary of the analytical strategies of each of the four articles. This overview especially highlights the different data sources used, samples analyzed and measurements employed. One of the most important difference between the different analytical strategies is the data source they rely on as this largely impacts the empirical methods that can be applied. In this thesis, data sources can be classified into cross-sectional and longitudinal (i.e., panel) data. Specially, Article 1 is the only article that relies on cross-sectional data, whereas the other three articles use longitudinal data. Articles 2 to 4 are thus able to incorporate information on the timing of the treatment (i.e., independent variable) and the investigated outcomes (i.e., dependent variable). Being able to account for the ordering of events is crucial to investigate how individual-level wage and wealth accumulation processes unfold over the life course.

4.1 Data sources, sample selection, and measurements

This subchapter is dedicated to the explanation of why each data source was chosen for the respective article and which sample was analyzed to test the hypotheses of each article (Section 4.1.1). It also discusses the possibilities given by each of the data sources to operationalize the treatment (Section 4.1.2) and the outcome (Section 4.1.3) connected to the specific research questions of each of the articles. Finally, this subchapter concludes with the description of the moderator variables used in Article 1 and the mediator variable used in Article 4 (Section 4.1.4).

4.1.1 Data sources and sample selection

Article 1 uses data from the Luxembourg Income Study, which constitutes the largest available income database of micro-level data collected from about 50 countries in Europe, North America, Latin America, Africa, Asia, and Australasia (LIS, 2021). As the LIS relies on

different national household surveys[10], which are conducted independently, it follows strict rules of data harmonization to make the data suitable for cross-country comparative analysis. Moreover, the LIS provides repeated cross-sectional data spanning approximately five decades. Specifically, the first round refers to the late 70s and early 80s and includes twelve countries, whereas the most recent round at the time when Article 1 was written, round elven, refers to the period of 2018 to 2020 and includes 27 countries. To increase the statistical power and the robustness of the results, Article 1 employs all available country-rounds from the period of 2000 to 2019, as 2019 was the most recent data available for the countries included in Article 1.

There are several advantages that make the LIS the most appropriate available data source to investigate the research questions of Article 1. First, the LIS provides detailed measures on labor force positions and different income sources and is thus widely believed to be the best available harmonized microdata on employment and income worldwide (VanHeuvelen, 2018). Other available cross-country comparative micro-datasets, such as the European Union Statistics on Income and Living Conditions (EU-SILC) or the Structure of Earnings Survey (SES) entail some disadvantages in this regard. Concerning the EU-SILC, measures of monthly gross earnings from workers' main job are only collected in some countries, whereas for most countries income variables are collected for the income reference period. The income reference period usually refers to the last calendar year or the last twelve months. In contrast employment information (i.e., contract type) is collected for the current job. For most countries the EU-SILC does thus not allow to directly link wages to type of employment. Regarding the SES, the disadvantage rather lie in the target population of the survey as only firms with at least ten employees in the private sector are covered. Thus, smaller firms and the agricultural as well as the public sector are excluded, potentially introducing bias into the analysis.

Second the LIS represents a large country-dataset, which my co-author and I extend even further by supplementing the LIS data with cross-sectional EU-SILC data for Poland, Hungary and Portugal, as well as cross-sectional data from the Korean Labour and Income Panel Study (KLIPS). As these surveys also include all variables of interest for this article, they can easily be harmonized with the other country-data. Moreover, supplementing LIS data with other national data sets has also been done by previous studies (Mandel & Shalev, 2009). Article 1 ultimately includes 30 countries, thus fulfilling the requirements of cross-country comparative multilevel analysis (Bryan & Jenkins, 2016). Furthermore, the LIS data provides a larger sample

[10] Many of the original data sources are well known surveys with guaranteed high data quality such as the Socio-Economic Panel for Germany, or the EU Statistics on Income and Living Conditions (EU-SILC) for several countries such as Ireland, Switzerland, Austria, and Greece.

size within each country compared to other cross-country comparative datasets such as the Survey of Adult Skills (PIAAC). This enables my co-author and me to look into subgroup differences and estimate the effect of micro-level variables more precisely.

The third and last main benefit of employing the LIS, lies in the diversity of the included countries. As mentioned before, the LIS includes countries from across the globe with different stages of economic development and various labor market settings. Instead, most previous studies focus on European countries or rich western democracies like the US, Australia, or Canada. With the diverse and large country dataset of Article 1, my co-author and I can investigate how generalizable results of these previous studies actually are.

Next to the micro-level data provided by the LIS, Article 1 also utilizes several macro-level measurements coming from various data sources as one of the main research aims of this article is to investigate the impact of macro-level moderators on the wage gap between temporary and permanent workers. Specifically, the EPL setting is constructed using information on the EPL index for each country provided by the OECD (OECD, 2020). The article also includes several control variables at the macro level. Namely, union power coming from the Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS) database (Visser, 2019), GDP per capita in 10,000 Int$ (World Bank, 2021), the KOF Economic Globalization Index (Gygli, Haelg, Potrafke, & Sturm, 2019), and the size of the informal sector in percent of a country's official GDP (Medina & Schneider, 2019).

Using all these data sources and restricting our sample to those country-rounds and individuals that provide information on contract type and other relevant variables, Article 1 ultimately lands at a sample of 236 country-rounds from 30 countries. Following previous LIS studies, the main analytical sample focuses on the core workforce of 25-55 year old dependent workers (VanHeuvelen, 2018). Thus, also self-employed, unemployed, or inactive (also persons in education) persons are excluded from the analysis. After applying all these sample restrictions, the analytical sample of Article 1 altogether includes 1,596,130 workers, with the samples of each country-round raging in size from 1,126 in Iceland in the 2010 survey round to 82,067 in Columbia in the 2016 survey round.

While the many advantages of the LIS outweigh its disadvantages, these still need to be addressed. A first limitation is that the article can only rely on a cross-sectional design, as large scale cross-country longitudinal micro-dataset that would allow the investigation of wage disadvantages for temporary jobs are not available (Arranz et al., 2021). Second, due to data limitations, the list of the included micro-level confounding variables had to be kept rather

parsimonious. Specifically, with the aim of including as many countries as possible only educational level, gender, and age groups are controlled, while other relevant factors such as immigrant status or cognitive abilities could not be included. A third limitations is that, even though the article relies on multiple survey-rounds for each country, due to the lack of sufficient variation of EPL measures over the included country-rounds, unfortunately the time dimension could also not be exploited at the macro-level by applying country fixed-effects. While, confounding bias at the macro-level is also addressed as good as possible by including other observable macro-level structural and other institutional factors, it has to be mentioned that not all macro-level moderators or confounding variables are available for all country-rounds. Overall, due to the cross-sectional character of the LIS data and the time invariance of the macro-level measures, Article 1 faces the limitation of both the micro- and the macro-level estimates being potentially biased by unobserved confounding variables.

Articles 2 through 4 rely (partly) on data from the German Socio-Economic Panel (SOEP). The SOEP constitutes the biggest and longest-running annual household panel in Germany. Specifically, it provides information on the employment and living conditions of (West) German households since 1984, including (former) East German households since 1990 (Wagner, Frick, & Schupp, 2007). For the first sample drawn in 1984, the response rate reached 60 percent and the average wave-to-wave re-interview rate reaches even over 70 percent (Siegers, Belcheva, & Silbermann, 2020). The SOEP furthermore ensures high data quality and panel stability by adding refreshment samples throughout the years and by following up with individuals who move out of their original household (Siegers et al., 2020; Wagner et al., 2007). This last point is especially relevant when workers on temporary contracts are the object of investigation, as such workers might be especially prone to changing their address. As of right now, roughly 30,000 individuals living in nearly 15,000 households are included in the SOEP (Goebel et al., 2019).

There are several reasons which make the SOEP the best available data source of Article 2, Article 3, and Article 4 of this thesis. The first main advantage of the SOEP refers to the information it collects. Specifically, the SOEP questionnaires collects detailed information on individuals' labor force position, their contract types and several measures of income and wages. For example, it separately measures net and gross monthly labor income, as well as a range of other income sources (e.g., government transfers, returns to capital investments, and income from rent). It thus allows a precise measurement of job positon and wage outcomes which is needed for Article 2, Article 3, and Article 4. Moreover, the SOEP also collects

information on job and employer changes between interviews, which is crucial for the investigation of the research question of Article 3. Furthermore, information on homeownership and rent payments is collected, making the SOEP especially suitable for Article 4, which looks into housing outcomes.

The second main advantage of the SOEP, pertains to the fact that it is already spanning three decades. It is thus perfect for research questions relying on a longer-term life course perspective. As the same individuals are followed for many years, the effect of more holistic career trajectories can be estimated and the temporal order of treatment and outcome can be considered. Specifically, Article 2 and Article 4 benefit heavily from this life course framework, as the panel structure of the SOEP allows to create dynamic treatments which do not only provide a single snapshot of a workers labor force status, but rather the definition of more holistic treatments which take several years of workers' careers into account. Owed to the longitudinal nature of the SOEP these treatments can then be associated with later outcomes, establishing a clear order of events and consequences. Particularly, Article 2 relates the first ten years of labor market experience to cumulative wages, whereas Article 4 relates early career trajectories of couples to later housing outcomes.

This also highlights the third main advantage of the SOEP, which refers to the fact that all household members above the age of 16 are personally and independently interviewed. In contrast, many other panel studies merely interview one person per household - the household head - who answers questions also on behalf of the other household members (such as their partners). Instead, the SOEP offers more reliable information for each household member as they are interviewed personally. This characteristic of the SOEP is especially relevant for Article 4, which investigates the effects of insecure careers taking into account the employment trajectories of both partners of a couple.

While, Article 2, Article 3, and Article 4 all utilize the SOEP, they still employ slightly different years of the SOEP. First, each of these articles covers the survey years until the most recently available wave at the time the respective article was written. For Article 2 this is the year 2017, for Article 4 it is the year of 2018, and for Article 3 it is the year 2019. Second, although the SOEP started in 1984, the earliest wave that is included stems from 1995 for Articles 3 and 4, whereas the earliest wave included in Article 2 is wave 1994. The reason for this lies in the fact that type of contract (i.e., the main variable of interest in all articles) was only measured for all workers starting in wave 1995 (Gebel & Giesecke, 2009a). Instead, for workers interviewed in 1994 and before it was only measured for individuals who started a new job. Since Article 2 is

interested in the first ten years of labor market experience after finishing education, also wave 1994 was included as for workers who had just finished their education, the job they had in 1994 was naturally a new one.

This last point also highlights the different sample restrictions of Articles 2, 3, and 4. As explained in the previous paragraph, Article 2 includes the first ten years of individuals careers after they have finished education. Restricting the sample to labor market entrants has the advantage that all workers are observed in a similar career stage, thus reducing unobserved heterogeneity stemming from differences in past work experiences, especially regarding temporary employment (Gebel, 2010). Following arguments of previous literature, vocational training is not considered as being in employment but rather as being in education (Müller, Steinmann, & Ell, 1998; Shavit & Müller, 1998). Another sample restriction of Article 1 is that workers need to be observed for ten subsequent years and on all relevant variables, to enable the classification of ten-year career trajectories. This results in the inclusion of 849 individual career trajectories and 8,490 observations.

Instead, Article 3 focusses on almost all worker age-groups, excluding only those who are approaching retirement, to investigate the impact of employer changes on wage growth after temporary employment. Specifically, the sample is restricted to 18 to 55 year old workers, who need to be observed for at least three times (more on this in Section 4.2.1). Moreover, the self-employed are excluded and workers need to be observed in temporary employment at least in one year. Overall, Article 3 can include 4,986 individual workers and 26,782 observations from the SOEP (which are however separated by within- and between-firm transitions in the analysis).

Lastly, Article 4 focuses on couples in their earlier career, for whom the decision to buy a home might be especially prevalent (Baron & Rapp, 2019). Thus, both partners of a couple need to have finished education and be between the age of 18 and 38 to be included in the sample. Furthermore, as Article 4 is interested in the accumulation of (dis)advantages not only within couples but also over time, couples need to be observed for seven subsequent years. These restrictions result in a sample of 1,257 couples and 8,799 couple-year observations.

The many advantages of the SOEP, which make it the best available data source to answer research questions on longer-tem wealth consequences, were illustrated in the previous sections. Still, even the SOEP is not without its' disadvantages. First, some drawbacks pertain specifically to the SOEP, while secondly some drawbacks are entailed in almost all (panel) datasets. Referring to the first point, as already mentioned not all years of the SOEP can be

utilized in the analysis of Articles 2, 3, and 4, as one of the most relevant variable was only really included starting in the 1995 wave. The first eleven waves are thus "lost" for the analysis, greatly reducing the potential observation window. Moreover, although the SOEP interviews respondents yearly, monthly information on the activity status between the two interviews is collected retrospectively at each interview. This is of course generally an advantage of the SOEP, allowing more detailed analysis considering also monthly labor market transitions. However, unfortunately for the topic of this thesis, this monthly information covers the labor market position, but not the specific contract type or wages. Especially, Article 3 which looks at the wage growth consequences of between- and within-firm job transitions between temporary and permanent employment might miss some transitions for workers who had more than one job or employer transition between two interviews.

Coming to the second set of disadvantages of the SOEP, these are limitations which are almost generally faced when relying on (panel) survey data. In particular, longitudinal surveys always face the problem of panel attrition, with some respondents, e.g., the unemployed or those who changed their address, being more likely to drop out of the panel than others (Siegers et al., 2020). As mentioned earlier, the SOEP tries to counteract any bias arising from non-random panel attrition by adding refreshments samples and by trying to follow up with individuals who move from their previous household. Next to wave non-response, the issue of item non-response is particularly notorious when focusing on wage and income, as many respondents refuse to answer such questions. Again, the missing information for income or wage variables is often not missing at random (Frick & Grabka, 2014). Thankfully, to minimize bias in the income distribution of the SOEP sample, imputed versions of many income and wage variables are also provided to researchers.

Article 3 employs also other data sources next to the SOEP. Specifically, as this article contains a country comparison of Germany and the UK, the British sister studies of the SOEP are also utilized in this article. Specifically, these are the British Household Panel Study (BHPS) which started in 1991 and which was discontinued in 2008, and its' successor the UK Household Longitudinal Study (UK HLS) which is currently running since the year of 2009 and still including many of the measures and questions of the BHPS (Fumagalli, Knies, & Buck, 2017). Thus, the UK HLS as the direct successor of the BHSP allows linking the two datasets and analyzing the original BHPS sample also in the UK HLS, with the first interviews with original BHPS respondents carried out in wave two of the UK HLS.

The first sample drawn for the BHPS contained roughly 10,300 individuals living in approximately 5,500 households across Great Britain. In 1999 additional samples for Scotland and Wales were added, each containing 1,500 households. Moreover, in 2001 a sample was added for Northern Ireland containing 2,000 households and making the BHPS representative for the whole of the UK. In the last wave of the BHPS, wave 18, respondents were invited to join the larger and wider-ranging UK HLS. Of the more than 8,000 BHPS respondents asked to join the UK HLS, nearly 6,700 did so.

The BHPS as well as the UK HLS offer many of the same advantages and disadvantages already highlighted for the SOEP. One particular advantage for the analysis of Article 3 is that the datasets also include the necessary detailed information on not only the current labor market positon and wages but also on job and employer changes since the previous interview. The high comparability of the SOEP and the BHPS/UK HLS is also illustrated by the fact that they are part of the Cross National Equivalent File (CNEF), which refers to an international panel data set, containing harmonized information on education, employment, income, and other areas of life. Due to their high comparability the SOEP and the BHPS/UK HLS have been utilized for cross-country comparative analysis between Germany and the UK many times before – also concerning wage outcomes of temporary employment in particular (Gebel, 2010; Giesecke & Groß, 2004; Pavlopoulos, 2013).

Of course, the sample restrictions applied to the BHPS/UK HLS are the same as for the SOEP in Article 3. Remember these were, dependent workers between the age of 18 and 55, who are observed at least three times, and at least once in temporary employment. Although, the first wave of the BHPS was carried out in 1991, the analysis is limited to the years of 1992 to 2020 as similar to the SOEP important variables are missing in the first wave. These sample restrictions result in the inclusion of a total of 1,588 individual workers and 7,449 observations for the investigation of between- and within-firm transitions form temporary to permanent employment in the UK.

4.1.2 Independent variables

The main independent variable, or treatment, of interest in all articles is the labor market position or career with a special focus on temporary employment.[11] In all utilized micro-level data sources a question asking for the duration of contract (i.e., limited vs. unlimited), or contract type (i.e., temporary or fixed-term vs. permanent) is included, which was used in each

[11] Article 1 also includes a supplementary analysis focusing on wage gaps between informal and formal employment (for more detail see Article 1).

article to distinguish temporary and permanent workers. Temporary agency workers are thus included in this definition and classified as temporary or permanent workers according to their contract type or the duration of their contract with their de-jure (i.e., legal) employer. The specific treatments employed in each article of course vary to some extent according to the research aim of each article and the theoretical concept they are supposed to measure. Naturally, following the different treatment definitions, the control groups or observations also differ between the four articles.

Article 1 employs a cross-sectional between-comparison approach in which workers with a temporary contract are compared to workers with a permanent contract. Specifically, my co-author and I define temporary workers as the treatment group and permanent workers as the control group using information on the contract type of the current main job. As the LIS data contains only cross-sectional information, this treatment definition of course only represents a snapshot of workers' current labor market position and cannot take previous experiences with temporary or permanent employment into account.

Article 2 employs a more dynamic and holistic treatment definition in comparison to Article 1, taking advantage of the panel nature of the SOEP. Specifically, the treatment consist of ten-year career trajectories of individuals who have just finished their education. In these ten years, several labor market positions are distinguished, namely, individuals can be out of the labor force, registered as unemployed, be full-time permanently employed, part-time permanently employed, full-time temporarily employed, part-time temporarily employed, or self-employed.

These labor force positions are constructed with the help of several variables, first a variable distinguishing non-working, working, and registered unemployed individuals, second a variable containing information on full- and part-time employment, and third information on contract type. Respondents who indicated that they did not have a working contract, but whose labor force status was "working", were classified as being self-employed. Missing observations in the ten-year career trajectories are only replaced if the labor market position before and after the missing observation are the same (Halpin, 2016). For example, if a worker has a permanent contract in observation one, missing information in observation two, and a permanent contract in observation 3, the missing observation would be replaced with a permanent contract.

The ten-year career trajectories are further classified into different types in order to compare individuals with different career experiences. The classification of employment trajectories is done in such a way (more on this in Section 4.2.2) that the different types of trajectories

illustrate the previously discussed theoretically possible standard and non-standard careers as closely as possible.[12] Meaning first, the *standard career trajectory* of continuous (full-time) permanent employment, second the *stepping stone career trajectory* containing lasting transitions form temporary to permanent employment, and third *entrapment career trajectories* of repeated temporary employment with possible spells of unemployment.

Since Article 2 has the aim of investigating if the cost of temporary employment can truly be considered as transitory if cumulative wages are considered as the outcome, the two types of non-standard career trajectories are compared to the standard career trajectory. Particularly, in a between-comparison approach, first workers experiencing the stepping stone career trajectory are considered as the treatment group and compared to workers on the standard career trajectory as the control group. Secondly, workers experiencing the entrapment career trajectory are considered as the treatment group and again compared to workers on the standard career trajectory as the control group.

Article 3 tries to zoom into stepping stone careers more closely by incorporating more details on the type of transitions between temporary and permanent employment. Specifically, three types of transitions are distinguished to more directly test the theoretical assumptions of the screening function of temporary jobs, as well as possible stigmatization of former temporary workers. First, *within-firm transitions without a job change*, second *within-firm transitions with a job change*, and third *between-firm transitions*. Several variables are employed to operationalized these transitions, these refer to contract type as well as information on job and employer changes since the last interview.

To measure within-firm transitions without a job change, workers who experience a transition from a temporary to a permanent job without changing their employer and who do not indicate that they experienced a job change within the firm since the last interview are considered. To measure within-firm transitions with job change, workers who experience a transition from a temporary to a permanent job without changing their employer but who do indicate that they experienced a job change within the firm since the last interview are considered. To measure between-firm transitions, workers who experience a transition from a temporary job to a permanent job who also change their employer are considered.[13]

[12] This classification of employment trajectories revealed also some career types which do not connect to any of the theoretical concepts of interest. These types of career trajectories were disregarded in the main analysis of the article.

[13] These transitions could either happen directly or with an intervening unemployment spell (Fuller & Stecy-Hildebrandt, 2015). It could be argued that in such a case the period of unemployment and not necessarily the

Evidently, this article applies a within-comparison approach where control and treatment observations are utilized which belong to the same worker. As control observations each treatment includes all observations in continuous temporary employment with the same employer. After any of the transitions of interest has happened, all observations in permanent employment are included as treatment observations if no new job or employer change occurs. Moreover, observations of workers who remain in temporary jobs are also included to account for common baseline trends (Brüderl & Ludwig, 2015). Specifically, for the three treatments these include observations in (1) continuous temporary jobs with the same employer without a job change, (2) continuous temporary employment with the same employer with a job change, and (3) continuous temporary employment with a change of employer. Thus, Article 3 also incorporates a between-comparison approach with its' within-comparison perspective.

Article 4 utilizes not only the longitudinal nature of the SOEP but also its' household perspective to predict housing outcomes. Specifically, the treatment of this article is construed to represent different levels of early career (in)security, which might accumulate over time and within couples. In this vein, information of both partners' career positions over a period of seven years is employed. For these seven-year career trajectories, each partner can be observed in one of five different labor market positions. Namely, being out of the labor force, registered as unemployed, in self-employment, having permanent employment, or having temporary employment. These labor force positions are again constructed using different variables, such as a variable separating non-working, working, and registered unemployed individuals and a variable on contract type. Like in Article 2, missing observations in the seven-year career trajectories are only replaced if the labor market position before and after the missing observation are the same (Halpin, 2016).

The seven-year career trajectories, specifically one for each partner of a couple, are further classified to depict four different types of couples' joint career trajectories in order to illustrate the accumulation of career (dis)advantages within couples. Furthermore, this allows my co-author and me to apply a between-comparison approach, where couples with different career experiences can be compared. The classification of couples' trajectories aims at illustrating varying degrees of couples' career (in)security in such a way that the four different groups of trajectories can be placed on a spectrum from least secure (most insecure) to most secure (least insecure). Specifically, my co-author and I consider the group of trajectories in which both

temporary job sends the negative signal to future employers (Gangl, 2006). Robustness checks reveal that results differ only slightly if the (few) cases of indirect between-firm transitions are excluded and do not change the overall conclusions that can be drawn from the article.

partners experience *insecure and volatile careers* consisting of temporary employment, unemployment, and labor market inactivity (mostly of the female partner) as the least secure career type. At the other end of the spectrum, my co-author and I classify couples in which both partners have standard employment careers consisting mainly of permanent jobs as the most secure career type, referring to this groups as *dual stable career* couples.

The other two groups of career trajectories can be placed somewhere between these two extremes of career insecurity and security. These are specifically the *male breadwinner/female homemaker* couple and the *self-employed/interrupted permanent* couple. Whereas, the first group of trajectories entails at least some level of career security as at least the male partner has a secure job, the self-employment of the male partner in the second group of trajectories, which might be associated with some degree of career instability, can be compensated with the relatively long spells of permanent employment of the female partner.

Since the aim of Article 4 is to investigate how different levels of early career (in)security experienced by couples impacts housing outcomes in later years, the treatment used in this article refers to the different groups of couples career trajectories. Particularly, the most secure trajectory type, the dual stable career couple, is used as the reference category and compared to the three other types of trajectories (insecure and volatile careers, male breadwinner/female homemaker, and self-employment/interrupted permanent).

4.1.3 Dependent variables

As should be clear by now, wages and wealth accumulation are the overall outcomes that are investigated by this thesis. The respective dependent variables investigated in the different articles each represent one aspect of wages or wealth accumulation, namely wage gaps, cumulative wages, wage growth and housing outcomes. Moreover, taking the limitations entailed in the respectively employed data sources into account, the outcome of each article is chosen to best investigate the research aim of each article and to test the hypotheses formulated in each article as directly as possible.

Article 1 estimates the wage gap between temporary and permanent workers in 30 countries, for which my co-author and I rely on gross wages from workers' main job. More specifically, the dependent variable is constructed to measure the log of gross hourly wages. The focus on hourly wages is necessary to account for differences in working hours, while the log transformation ensures that wage gap estimates can be compared across countries with different currencies. In particular, the log transformation allows wage effects to be interpreted in log points, which can be converted into more intuitively understandable percent using a simple

formula: (e^{β} – 1) multiplied by 100. Following previous studies based on LIS data (Mandel & Shalev, 2009), my co-author and I cut the wage distribution at the 1st and 99th percentiles before applying the log transformation.

Article 2 is instead interested in the longer-term cost of temporary employment experiences and thus looks into cumulative wages. Specifically, the ten-year career trajectories of labor market entrants are related to ten-year cumulative wages. This wage measure relies on the current monthly gross labor income available for all working individuals. For all inactive individuals as well as for the unemployed a value of zero gross labor income is assigned. To get cumulative wages from current monthly labor income, the values are adjusted for inflation and multiplied by twelve and then summed-up over the ten-year observation window.

By relating ten-year career trajectories to wages accumulated over the same ten-year period, the article tries to established a clear order of events. The same approach has been chosen by other studies investigating cumulative wage outcomes of family trajectories (Jalovaara & Fasang, 2020). Nonetheless, as is also highlighted by the authors of previous studies, no clear direction of causality can be inferred from the investigation of cumulative wages, as career trajectories and wages develop in parallel, potentially simultaneously influencing each other.

Article 3 takes another approach to investigate longer-term wage consequences of temporary employment by focusing on the wage growth experienced after different between- and within-firm transitions from temporary to permanent jobs. This outcome is operationalized using the same gross monthly labor income measure as in Article 2 (for Germany) and the corresponding variable for the UK. Monthly wages are turned into hourly wages using information on regular working hours, to take differences in working hours into account. Moreover, as Germany and the UK are compared, two countries with different currencies, the log transformation is applied to hourly wages to make the estimates comparable across countries. The interpretation of effects can be done in percent as explained in the description of the dependent variable of Article 1. However, while the outcome of Article 1 constitutes wage gaps between temporary and permanent workers, the within-approach of Article 3 means that the outcome can be interpreted as the wage growth (or regression) experienced by workers after they undergo any of the transitions of interest between temporary and permanent employment.

Article 4 is interested in wealth consequences beyond wages, namely housing outcomes. Two dependent variables are employed to depict housing outcomes, namely homeownership and the share of income spent on rent. Just like the independent variable, the two dependent variables are defined at the couple-level, as housing cost are assumed to be shared within cohabiting

couples and to be impacted by both partners career experiences (Dotti Sani & Acciai, 2018). As is common also in previous studies, homeownership is measured dichotomously, where couples are considered as homeowners if they indicate that they own the home they live in (although it might not be paid off yet) and as non-homeowners otherwise (Baron & Rapp, 2019; Thomas & Mulder, 2016). Importantly, other forms of housing such as dormitories or public institutions are excluded from this definition.

The second dependent variable is defined for all couples who do not own the home they live in and who pay rent. Specifically, rent affordability, measured as the share of a couples' income spent on rent in percent (Backhaus, Gebers, & Schröder, 2015) is considered as the second housing outcome in Article 4. This variable is thus measured continuously on a scale from zero to a hundred percent. In order to build this outcome, the ratio of the monthly rent (including utilities) to the monthly net household income is calculated. The net household income includes not only net wages of both partners but also government transfers such as housing benefits in order to relate the rent burden to the actual disposable income of couples as best as possible. Moreover, for the missing observations of household income my co-author and I utilize the imputed income to minimize bias due to non-random item non-response (Frick & Grabka, 2014).

Lastly, to establish a clear order of events also in this article, both dependent variables are measured in the last year of observation, meaning the seventh year of couples seven-year career trajectories. Applying such a longer-term life course perspective, couples' earlier experiences of career (in)security can thus be related to later housing outcomes.

4.1.4 Moderating and mediating variables

Article 1 considers also several moderating variables affecting differences in wage gaps between temporary and permanent workers across countries. These are all defined at the country level and actually enter the analysis in Article 1 as macro-level independent variables (more on this in Section 4.2.3). First, my co-author and I focus on the size of the temporary workforce, which is measured as a continuous variable using each country-year of the LIS data source. The second moderating country-level variable is based on the EPL index provided by the OECD (OECD, 2020). The OECD employment protection indicators are made up by 21 single items which quantify the costs and procedures entailed in firing individual or groups of workers as well as in hiring workers on a temporary basis (Venn, 2009). Specifically, the indicators are based on the Secretariat's reading of statutory laws, case law, and collective bargaining agreements with officials from OECD member countries and country experts also being

consulted. In the end national legislations are translated into two internationally comparable EPL measures for permanent and temporary workers, each ranging from 0 (least regulation) to 6 (most regulation) (OECD, 2020). The EPL index for permanent workers refers to the indirect and direct cost of dismissing workers with a permanent contract. While indirect costs refer to the length of notification period, the direct costs refer to the entitlement and amount of severance payments employers have to pay to workers with a permanent contract when they want to let them go. The EPL index for temporary contracts describes the regulations for the use of temporary contracts, such as the maximum duration of temporary contracts and the maximum number of repeated temporary contracts.

Based on these EPL indices two dummy variables are created to depict the country-level EPL setting. Specifically, my co-author and I distinguish between high (=1) and low (=0) levels of EPL for permanent workers and between high (=1) and low (=0) levels of EPL for temporary workers. The classification is done taking into account if the EPL index of a certain country and a certain year is larger (high EPL) or smaller/equal (low EPL) than the mean EPL measured over all country-years. Moreover, interactions between the two dummy variables are considered. Particularly, the dummy variable on high or low regulations of temporary contracts is once interacted with a high EPL level for permanent contracts and another time with a low EPL level of permanent contracts.

Is should also be mentioned here that the EPL measures provided by the OECD have also been criticized by some researchers. First, as an additive index summarizing 21 items, the EPL measures haven been considered as too broad. Instead, it has been argued that the focus on single items of the EPL indices might be more relevant and appropriate for specific theoretical arguments and research questions (Balz, 2017). Second, some relevant factors, might be missing in its' compilation. Particularly, some authors argue that procedural requirements are an important component in assessing the difficulties and costs of carrying out individual dismissal (Harcourt, Gall, Raman, Lam, & Croucher, 2021). Lastly, the de jure and the de facto regulation might be two very different things in some countries (Johnson, Kaufmann, & Zoido-Lobatón, 1998), with the actual implementation and enforcement of the written law often being quite weak (Harcourt et al., 2021) - especially in developing countries (Kus, 2010).

Article 4 includes couples cumulative wages as a meso-level mechanism explaining part of the relationship between couples' career insecurity and later housing outcomes. Specifically, the income of each partner on the micro level is assumed to accumulate over time and within the couple (meso-level). Employing the same monthly net household income variable that was used

to create the share of income spent on rent, my co-author and I multiply the income measured in each wave by twelve and sum it up over the seven-year observation period, creating a cumulative measure. Lastly, my co-author and I define couples' cumulative income in 10,000 Euro increments.

4.2 Methodological approaches

The purpose of this section is to describe the methodological approaches chosen for each article, highlighting also the respective advantages and disadvantages associated with each of the approaches. While, the different data sources used in the respective articles determine to a large extent which methods can be utilized, all articles, irrespective of their underlying data source and methods applied, rely on the assumptions and ideas of modern causal analysis. In each article this includes the formulation of the theoretical and the empirical estimands, i.e., the quantity that the researcher theoretically would like to estimate and the quantity which can be empirically estimated with the data and methods available (Lundberg, Johnson, & Stewart, 2021). Depending on the article, the interest is either in the total causal effect or the direct causal effect, with the latter referring to the effect that remains when important mechanisms are accounted for. The estimating strategies are then chosen with the aim to identify the causal effects that are stated in the hypotheses as best as possible (Lundberg et al., 2021). Section 4.2.1 is dedicated to a more detailed discussion of the basic ideas of the methods of modern causal analysis and how each article tried to incorporate them. Section 4.2.2 describes approaches to dynamic descriptions which were applied in Article 2 and Article 4, and lastly Section 4.2.3 illustrates approaches of multilevel analysis which are particularly relevant for Article 1.

4.2.1 Approaches to causal analysis

When it comes to the investigation of the wage and wealth consequences of temporary employment is it important to keep in mind that workers are rarely randomly allocated to a permanent or a temporary job. Instead, a *selection process* is likely to be at play both at the employees side but also at the employers side. As discussed in previous sections certain workers might self-select into temporary jobs as prolonged probationary periods if they expect better person-job match and higher wages in the longer-rum. Alternatively, employers might choose especially low-skilled workers as temporary employees if they mainly need them as a flexible buffer stock of workers. Moreover, the allocation to different contract types should be impacted by the different macro-level contexts in which workers and firms are placed. For instance, in times of economic crisis, firms might be more reluctant to offer workers permanent contracts which are more costly to terminate.

Such selection processes have the result that temporary and permanent workers should not only differ in the type of job they have, but also in other characteristics, described as *compositional differences* between the group of temporary and of permanent workers. A problem arises from these compositional differences if these characteristics systematically vary between the two groups of workers and also affect wage and wealth outcomes. In such a case wage and wealth outcomes between the two groups of workers might be biased as researches confound observed wage or wealth (or any other outcome) differences between temporary and permanent workers (or any other treatment) which are actually due to the different job types with those which are due to other characteristics of the workers (Hagen, 2002; Winship & Morgan, 1999). To simplify the following arguments, I will focus on job type as the treatment and wages as the outcome. However, the same ideas can be applied to more dynamic treatment definitions (more on this in Section 4.2.2) and to other research topics.

Compositional differences, or *heterogeneity*, between temporary or permanent workers might either be observed or unobserved and not only impact wages and the risk of receiving either a temporary or a permanent contract (called baseline bias) but also the reaction to the contract type (called differential treatment effect bias or causal effect heterogeneity bias) (Morgan & Winship, 2015; Winship & Morgan, 1999). The good news is that, if researchers are aware of these systematic differences and control them in their analysis of job type and wages, the remaining effect accounts for the baseline bias and may be the total *causal effect* of temporary employment. By additionally including interactions with contract type or estimating models for different subgroups, research can also account for causal effect heterogeneity bias. Unfortunately, in reality researchers often face the problem of unobserved heterogeneity, meaning that not all relevant variables are observable in the data. Estimates of causal effects could thus still be subject to unobserved baseline bias and unobserved causal effect heterogeneity.

Many researchers try to reveal causal effects by applying (cross-sectional) regression models to observational data without taking issues of unobserved heterogeneity adequately into account. This causality problem arising from the use of non-experimental data, which is the type of data usually available to social scientist, can nicely be illustrated with the help of the so-called *counterfactual model* (Rubin, 1974). This framework also allows to establish under which conditions causal effects may be estimated with observational data, when methods of modern causal analysis are applied (Caliendo, 2006; Winship & Morgan, 1999).

The counterfactual model relies on the assumption that a specific (binary) treatment, such as contract type, has a specific effect on workers' wages. This treatment (D) is experienced by some workers i, i.e., those with a temporary contract ($D_i = 1$), but not by others, i.e., those with a permanent contract ($D_i = 0$). Importantly, the counterfactual model also assumes that each workers has two potential wage outcomes (hence the alternative name of *potential outcome framework*), with the observed wages (Y_{it}) measured at some time point t after the treatment. The two potential wage outcomes of each worker can be distinguished into the wages that would have been experienced in time t in case of a temporary job (Y^1_{it}) and into the wages that would have been experienced in time t in case of a permanent job (Y^0_{it}), i.e., not having a temporary job. Under such circumstances, the causal effect of a temporary job on wages could be easily identified by taking the difference between the two potential outcomes for each worker:

(1) $\Delta_{it} = Y^1_{it} - Y^0_{it}$

Of course, in reality one worker cannot simultaneously experience wages from temporary employment and from permanent employment, thus resulting in the so-called fundamental problem of causal inference (Holland, 1986). Hence, the causal effect Δ_{it} cannot be observed for individual workers. To solve this problem, researchers estimate average causal effects instead. The average treatment effect at t can be defined as the expected casual wage difference between receiving a permanent contract and receiving a temporary contract for a worker randomly chosen from the population of interest: $ATE_{it} = E(\Delta_{it}) = E(Y^1_{it} - Y^0_{it}) = E(Y^1_{it}) - \mathrm{E}(Y^0_{it})$. Researchers and policy makers might be especially interested in the causal wage effects of those workers who are actually affected by temporary employment (Caliendo, 2006). For this, the average treatment effect on the treated at t can be estimated, which refers to the average casual wage effect of temporary employment for a randomly chosen worker who did receive a temporary job: $ATT_{it} = E(\Delta_{it} | D_i = 1) = E(Y^1_{it} - Y^0_{it} | D_i = 1) = E(Y^1_{it} | D_i = 1) - E(Y^0_{it} | D_i = 1)$. Looking in more detail at how the ATT_{it} is estimated, it becomes clear that, while the first part $E(Y^1_{it} | D_i = 1)$ can simply be calculated using the observations in the data, the second part $E(Y^0_{it} | D_i = 1)$ has to be estimated as it refers to the expected wages that temporary workers would receive had they gotten permanent contracts instead.

Several approaches can be utilized to identify the unobservable counterfactual, which are largely dependent on the type of data structure at hand. First, estimation strategies relying on *cross-sectional* data need to make strong assumptions concerning unobserved heterogeneity and likely face threats of omitted variable bias. Second, estimation strategies relying on *longitudinal* data can relax at least some of these assumptions as they benefit from observing

the same person over time. Both cross-sectional and longitudinal approaches are applied in the articles of this thesis and will be further explained in the following paragraphs.

One of the most popular cross-sectional estimation strategies among sociologists are arguably *regression models*, like the linear regression (OLS regression) or the binary logistic regression. In order to produce unbiased results they must include all relevant variables which may have an impact on experiencing the treatment as well as on the outcome, i.e., confounding variables (Elwert & Winship, 2014; Morgan & Winship, 2015). Moreover, to avoid overcontrol and endogenous selection (also called collider) bias, no variables should be included which might be impacted by the treatment itself (Elwert & Winship, 2014). In all articles of this thesis only confounding variables are included as control variables (the articles include more details on the specific variables used). A notable exception is Article 4 in which my co-author and I are interested in the mediating effect of cumulative income, which we argue is impacted by the treatment. Specifically, in this article a linear regression is estimated for the continuous outcome (share of income spent on rent) and average marginal effects (AME[14]) from binary logistic regression for the dichotomous outcome (homeownership). As is standard in the literature, my co-author and I estimate the regression models once without (total effect) and once with the mechanism (direct effect) in order to evaluate the statistical significance of the mediation effect (Mustillo, Lizardo, & McVeigh, 2018).

Another cross-sectional estimation method that is increasing in popularity *is propensity score matching* (PSM) (Caliendo & Kopeinig, 2008). This method is applied in Article 2. PSM entails certain advantages in comparison to regression models. For example, as a semi-parametric approach, PSM does not rely on strong linearity assumptions and is thus more flexible than the standard linear regression. One of the most important assumptions of PSM is the conditional independence assumption (CIA), which postulates that given a set of observable control variables (X), which are exogenous (i.e., not affected by the treatment themselves), potential wage outcomes are independent of the assignment to a permanent or a temporary contract:

$$(2) \quad Y^0_{it}, Y^1_{it} \perp D_i \mid X$$

Put differently, given the included exogenous control variables X, differences between temporary and permanent workers are balanced, thus the only remaining differences between these groups of workers is their contract type. Thus, similar to regression analysis, PSM hinges

[14] Article 4 reports AMEs derived from logistic regression as they can be easily interpreted as percentage points and compared across models, which the coefficients of logistic regressions cannot (Mood, 2010).

on the assumption that given the observable exogenous control variables, no compositional differences which might be relevant for wage outcomes between the group of temporary and permanent workers remain.

The first step of the PSM approach is to estimate each workers probability to receive a temporary contract conditional on the chosen control variables using logistic regression models. This one-dimensional propensity score $P(D_i = 1 \mid X)$ can then be utilized to create and compare statistical twins in a second step (Rosenbaum & Rubin, 1983, 1985). Such statistical twins are workers who while having similar observable characteristics, summarized as the propensity score, still receive different contract types. Another advantage of the PSM approach over linear regression models is that the common support option can be specified, which ensures that comparisons are only made between comparable workers, thus only workers with suitable control cases are considered in the estimation. In contrast linear regressions may extrapolate into the region of so-called "no-common support", comparing non-comparable workers.

Wage outcomes can them be compared between the statistical twins in order to estimate the ATT. Specifically, wages of temporary workers are compared to the wages of permanent workers who are otherwise equal to them on all variables considered in the analysis. Different matching algorithms are available for researchers to form the statistical twins, such as multiple nearest neighbor matching, Gaussian kernel matching, or kernel Epanechnikov matching (Caliendo & Kopeinig, 2008). Article 2 employs the kernel Epanechnikov matching algorithm as it produces the smallest mean standardized bias. The mean standardized bias describes the mean difference (in percent) between temporary workers and permanent workers on all variables considered for the selection into contract type still existing after the matching. It is calculated by the difference of the sample means of treated (temporary workers) and the untreated (permanent workers) samples divided by the square root of the average of the sample variances in the treated and the untreated sample (Rosenbaum & Rubin, 1985).

Regardless of its' advantages PSM just as cross-sectional regression analysis relies on the often implausible assumption that all relevant variables, which might impact contract type and wages, can be observed in the data and controlled in the analysis.[15] This strong assumption can be relaxed when longitudinal research designs are employed. Specifically, as is inherent to panel data the same workers are observed over time. In such a case the counterfactual wage outcome need not be estimated by employing a control group of permanent workers, but rather by

[15] The estimation of Rosenbaum bounds in Article 2, revealed the PSM estimates to be rather robust against the impact of unobserved variables (Rosenbaum, 2002).

utilizing observations from the same worker before the treatment has happened. The main advantage of such an approach is that it implicitly controls for all time-constant worker characteristics, available in the data or not, which may impact selection into different contract types. In Article 3 I make use of these advantages by investigating wage effects of transitions from temporary to permanent employment.

One of the most popular estimation methods for such a research question is usually the *fixed effects (FE) regression*, which provides a within-worker estimator accounting for the above mentioned time-constant unobserved heterogeneity (Brüderl & Ludwig, 2015; Wooldridge, 2010). The FE estimation builds on the error component model, where the regression error term is decomposed into a time-constant person-specific error term α_i and a time-varying person-specific error term ε_{it}. In the FE approach the values of the independent variables and the dependent variable are de-meaned by the worker-specific means. With this the time-constant error term, which summarizes the fixed effects, is deleted. The great advantage of the FE within-estimator is thus that any bias resulting from time-constant unobserved heterogeneity, which may plague cross-sectional estimates, is eradicated. This is also the great advantage of the FE model over the random effects regression model, which relies on both the random effects assumption of no time-constant unobserved heterogeneity ($E(\alpha_i|x_{it}) = 0$) and the strict exogeneity assumption of no time-varying unobserved heterogeneity ($E(\varepsilon_{it}|x_{it}) = 0$) to produce unbiased estimates. With the FE model, workers' i wages y across time t can be estimated as a function of a vector of time-varying variables X_{it}, individual fixed-effects α_i, and the idiosyncratic error term ε_{it}, which refers to unobserved time-varying variables:

$$(3) \quad y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it}$$

The FE estimation hinges on the assumption of parallel outcome trends for workers who receive the treatment and those who do not, instead estimates would be biased if workers on a steeper outcome profile are selected into the treatment (Rüttenauer & Ludwig, 2023). For example, if workers select into temporary jobs based on their wage trajectory because they expect successful screening with compensating steep wage growth (Gebel, 2009), the parallel trends assumption could be violated, thus biasing the FE estimates.

One solution to this problem is the estimation of fixed effects individual slope (FEIS) regression, which takes selection into temporary jobs based on wage profiles into account (Brüderl & Ludwig, 2015; Rüttenauer & Ludwig, 2023). Specifically, the FEIS models worker-specific constants and slopes by de-trending the data using a time-varying estimate of workers' wage trajectories. Whereas the FE estimation needs at least two observations per worker to

demean the data, the FEIS approach needs a minimum of $j + 1$ observations per worker, with j referring to the individual intercept as well as the number of individual slope parameters. Article 3 includes age as the slope parameter next to the individual intercept to account for heterogeneous wage growth over time. The sample selection in Article 3 thus requires at least three observations for each worker as already mentioned in Section 4.1.1.

4.2.2 Approaches to dynamic description

The ideas of causal analysis can of course not only be applied to single transitions or to treatments defined at a specific point in time. Specifically, in Articles 2 and Article 4 more holistic treatment definitions are employed with the help of *sequences analysis*. This alternative treatment definition broadens the overall treatment heterogeneity employed in this thesis and therefore also the overall scope of the thesis. Sequence analysis also relies on panel data and can be used for longitudinal description (Aisenbrey & Fasang, 2010; Jalovaara & Fasang, 2020).[16] It has gained new found popularity in recent years, as it allows researchers to depict important life course transitions, for example concerning labor market positions, as a sequence of events (Fuller & Stecy-Hildebrandt, 2015; McVicar et al., 2019; Reichenberg & Berglund, 2019). Whereas Article 2 employs ten-year career sequences of labor market entrants to define the treatment, Article 4 relies on seven-year sequences of couples in their early career for the treatment definition.

In order to reveal types or patterns of trajectories from workers' individual[17] sequences, sequences are grouped based on their similarity with the help of cluster analysis. One of the most popular algorithms to determine the similarity between all pairs of sequences is the Optimal Matching Approach (OMA), which follows the idea of turning the career sequence of one worker into the career sequence of another worker with the least possible cost (Halpin, 2017; Studer & Ritschard, 2016). The higher (lower) the cost the smaller (greater) the similarity between sequences. The cost for each operation that can be applied to the sequences, which are substitution, insertion, and deletion of sequence states (i.e., labor market positions), has to be decided by the researchers themselves.

[16] Even though, Article 2 and Article 4 both rely on panel data from the SOEP to define the treatment, panel regression methods cannot be applied, as career trajectories, although defined in a holistic and dynamic way, are time constant within each worker. Nonetheless, the panel data structure still enables the two articles to create a temporal order of treatment and outcome.

[17] In Article 4 multichannel sequences analysis is applied to couples career sequences. For this, the individual sequences of both partners are first combined into one sequence after which the same steps are applied as for sequence analysis using only one channel (Gauthier, Widmer, Bucher, & Notredame, 2010).

The pairwise distance matrix, which is the result of the pairwise alignment of sequences, is the basis for a cluster analysis grouping the most similar career sequence together. The Ward's method, which aims at creating cluster solutions with the least within-cluster variance and the greatest between-cluster variance, is employed in both articles to from the clusters (Ward, 1963). These clusters reveal different types of career trajectories and form the treatment and control groups in the analysis of Article 2 and Article 4. Remember, Article 2 employs stepping stone careers as one treatment group and workers with a standard career trajectory as the control group, whereas Article 4 uses dual earner couples on a stable career path as the reference group and couples with less secure career trajectories as the treatment groups. In both articles control variables are selected on account that they are confounding variables, i.e., impact the outcome and the treatment and are not a result of the treatment themselves. This might be a bit harder to achieve when treatment definition is based on several years of observations. Both articles try to account for confounding bias as best as possible by including only such control variables which are time constant and which were measured before the treatment (i.e., in the first year of observation).

4.2.3 Approaches to multilevel analysis

While Article 1 focusses on a "simple" binary treatment and employs cross-sectional data, it has to deal with another statistical issue arising from the structure of the used data. Specifically, the employed LIS data comes in a three-level structure, where workers *i* are nested in country-years *t*, which are themselves nested in countries *c*. Pooling all these observations together and estimating linear regressions to predict wage outcomes would lead to biased results as the independence of errors assumption is not met. Specifically, this assumption made by the ordinary least-squares (OLS) linear regression approach is violated in the case of nested data as the wage outcomes of workers living in the same country are more similar to each other than to the wage outcomes of workers living in another country, since all workers living in the same country are subject to the same (observed and unobserved) country-level surroundings (Bryan & Jenkins, 2016).

To account for this, researchers rely on *multilevel regression analysis*, which can be applied to two-level data, where the units of observation (e.g., individuals) are nested in a higher-level unit (e.g., countries) or as is the case in Article 1 to three-level data (Snijders & Bosker, 1999). In the latter case, the three-level regression model can be specified at the worker level as:

(4) $Y_{itc} = \beta_{0tc} + \beta_{1tc}\, temp_{itc} + \sum_{j=2}^{J} \beta_{jtc} X_{jitc} + e_{itc}$

with Y_{itc} reflecting a worker i's wage in country-year t and country c. The worker-level treatment of interest $temp_{itc}$ is worker i's contract type. The worker-level control variables, for which my co-Author and I employ only confounding variables, are represented by X_{jitc}, whereas e_{itc} illustrates the worker-level error term. This model entails the highest degree of flexibility as the intercept and all slope coefficients are allowed to vary across country-years t and countries c. The variation in the slope coefficient referring to the effect of contract type β_{1tc} is estimated as a function of time-varying country-level variables Z_{ptc} and a country-level error term v_{1tc}:

$$(5)\ \beta_{1tc} = \gamma_{10} + \sum_{p=1}^{P} \gamma_{1p} Z_{ptc} + v_{1tc}$$

Such a multilevel model may be either estimated simultaneously or in a two-stage approach (Franzese, 2005; Lewis & Linzer, 2005). As is often the case in country-comparative analysis, the higher-level sample size in Article 1 entails not too many cases, i.e., 30 countries. Under such circumstances the two-stage approach is argued to be superior to the simultaneous approach (Heisig, Schaeffer, & Giesecke, 2017). As the name already suggest, the two-stage multilevel approach constitutes of two steps. In the first step, separate liner regression models for each of the country-rounds in the analytical sample of Article 1 is estimated according to equation (4). The results of the first step can be utilized to nicely illustrate the cross-country heterogeneity of wage gaps between temporary and permanent workers.

As mentioned before, the two-stage approach allows the slope coefficients of all worker-level variables included in the wage regressions of the first step to vary across countries and years, thus entailing full flexibility and an advantage over the simultaneous approach. This is owed to the fact that the common approach in the literature of constraining control variables in simultaneously estimated multilevel models to have a constant effect across countries can lead to misspecified models and biased results (Heisig et al., 2017). The alternative, of estimating a simultaneous model with the specification of a random intercept and random slopes for each worker-level variable, is however infeasible in large-scaled data sets such as the one employed by my co-author and me.

In the second step of the two-stage multilevel approach, the parameters estimated in the first step are employed as the dependent variables while the country-level variables are used as the independent variables as depicted by equation (5). Thus, the influence of the country-level moderators (i.e., EPL setting and the share of temporary workers) on the variation of wage gaps between temporary and permanent workers can be investigated. Additionally, in this second

step regression, country-level control variables can be included, for which my co-author and I again only consider confounding variables in line with the ideas of modern causal analysis.

As the dependent variable in the regression of the second step comes from the estimations of the regressions of the first step, the uncertainties entailed in the first-step parameters should be accounted for in the second-step estimator. This is addressed in Article 1 with the application of an Estimated Dependent Variable (EDV)-correction estimated by a Feasible Generalized Least Square Estimator (FGLS) (Lewis & Linzer, 2005). Lastly, standard errors are clustered at the country-level in Article 1 to take the fact into account that several survey years are included for each country, which results in dependencies within a country across time.

Table 3: Overview and summary of analytical strategies

Article	Micro-data	Sample	Independent variables	Dependent variables	Methods
1	LIS[a], rounds 5-11, 2000-2019, 30 countries, 236 country-rounds[*]	25 to 55 year-olds, not in education, employed on a temporary or permanent contract	T group: temporary job C group: permanent job	Log gross hourly wage	Two-stage multilevel modelling approach with country-level clustered standard errors, EDV correction
2	SOEP[b], v34, 1994-2017	Individuals, who just left education (includes vocational training) and are observed for 10 subsequent years	T group1: stepping stone career trajectory, t1-t10; T group2: entrapment career trajectory, t1-t10 C: standard career trajectory, t1-t10	Cumulative gross labor income in t10	Sequence analysis and propensity score matching
3	SOEP[b], v36, 1995-2019 BHPS[c], 1992-2008, UK HLS[d], 2009-2020	18 to 55 year-olds, not in education (includes vocational training), employed on a temporary or permanent contract	T obs.1: permanent job after temporary job with same employer, no job change; T obs.2: permanent job after temporary job with same employer, with job change; T obs.3: permanent job after temporary job with different employer; C obs.1: continuous temporary job with same employer, no job change; C obs.2: continuous temporary job with same employer, with job change C obs.3: continuous temporary job with employer change	Log gross hourly wage	Fixed effects individual slope regressions with individual-level clustered standard errors
4	SOEP[b], v35, 1995-2018	18 to 38 year-olds cohabiting heterosexual couples, both partners not in education, observed for seven subsequent years	T group: couples with insecure career trajectories, t1-t7 C group: couples with stable career trajectories, t1-t7	Homeownership in t7 and share of household income spent on rent in t7 (only non-homeowners)	Multichannel sequence analysis and average marginal effects from binary logistic regressions, liner regressions, Sobel test

Notes: Own illustration. [a]LIS: Luxembourg Income Study, [b]SOEP: Socio-Economic-Panel, [c]BHPS: British Household Panel Survey, [d]UK HLS: UK Household Longitudinal Study. [*]The LIS data is supplemented with EU-SILC data for Poland, Hungary, and Portugal, as well as data from the Korean Labour and Income Panel Study. The analysis also uses macro data from different sources for 30 countries and 236 country-rounds: see Article 1 for more details. T = treatment, C = control, t = time, obs.= observations.

5. Discussion and conclusion

The final chapter of this thesis reflects on how the results of each article can be situated in the theoretical framework explaining the wage and wealth consequences of temporary employment and draws conclusions from these findings. Specifically, first, the results of each article are summarized and related to one of the three specific research questions posed in this thesis. Second, in Section 5.2 conclusions from these findings are drawn regarding the answering of the overall research aim of *investigating the wage and wealth consequences of temporary employment in and outside of Europe* of this thesis and avenues for future research discussed.

5.1 Discussion of main findings

The first specific research aim focuses on *the cross-sectional wage consequences of temporary employment and on how universal they are across different labor market settings and worker subgroups*. These research questions are investigated in Article 1 called "Labor market dualism and the heterogeneous wage gap for temporary employment: A multilevel study across 30 countries". One of the major findings of this article is that my co-author and I observe wage disadvantages for temporary workers compared to permanent workers in all of the 30 countries included in the sample. However, the results of the first step of the two-stage multilevel approach also reveal strong cross-country variation in the magnitude of wage gaps.

Concerning heterogeneities in wage gaps between different worker subgroups, wage gap estimates are less clear-cut across the included countries. The most universal finding is that younger temporary workers experience smaller wage gaps than older temporary workers, with the only exceptions being Switzerland and Peru where findings are the other way around. In contrast, concerning the wage gaps for different skill-groups of workers across countries, the results are more equivocal. While, on average across all 30 countries wage gaps are largest for medium-skilled workers, followed by high-skilled, and smallest for low-skilled workers, there are several country exceptions. Thus overall, the results do not seem to support the assumption of a mutual enforcement of disadvantages due to having a temporary contract and simultaneously belonging to a labor market outsider group (i.e., younger and low-skilled workers).

Regarding the influence of the macro-level country characteristics, the article reveals no support for the assumption that wage gaps increase in labor markets where permanent workers are strongly protected by a strict EPL setting. Instead, the article does illustrate that the interaction of the EPL setting for permanent and the EPL setting for temporary workers has an impact. Specifically, the second step of the two-stage multilevel analysis shows that in labor markets

where permanent workers are strongly protected, wage gaps increase if the use of temporary contracts is less tightly regulated in comparison to when it is more tightly regulated. It is thus, especially partial deregulation of EPL restrictions, which are an important institutional determinant of country-level labor market dualization, which amplifies labor market inequalities in terms of wage gaps between temporary and permanent workers. Concerning, the different age and occupational-skill groups that the Article investigates, the impact of this dualized regulatory setting is rather homogenous for all subgroups.

For the second macro-level moderator under investigation, the share of temporary workers as a direct indicator for the structural dimension of labor market dualization, Article 1 finds that the higher the share of temporary workers, the larger is the wage gap between temporary and permanent workers. In contrast to the findings for the impact of the EPL setting, Article 1 reveals some evidence that a higher share of temporary workers increases the wage advantage for already more privileged permanent workers. Namely, the subgroup-specific analyses reveals that the moderating effect of the temporary worker share is slightly stronger for older than for younger workers and for medium-/high-skilled in comparison to low-skilled workers. In the case of low-skilled workers, analysis even reveals the opposite effect as the temporary wage gap decreases the larger the share of temporary workers. This finding could be explained by the fact that permanent job holders working in low-skilled occupational sectors are more easily replaceable, weakening their bargaining power (Bellani & Bosio, 2021).

While Article 1 leaves little doubt concerning the existence of cross-sectional wage disadvantages associated with temporary contracts, which are revealed across a variety of labor market settings in and outside of Europe and for different worker subgroups, the persistency of these wage disadvantages is another question. However, the investigation of this question is crucial for the assessment of the consequence of temporary employment in terms of wage inequality and wealth accumulation over the life course. For this reason, the second more specific research question of this thesis addresses *the longer-term wage consequences of temporary employment and investigates possible heterogeneities in these longer-term consequences between subgroups of workers and labor market settings*. One single country, as well as one two country-comparative article are aimed at answering this research question with the help of longitudinal data. Specifically, Article 2 called "Career trajectories and cumulative wages: The case of temporary employment" and Article 3 called "Wage growth after temporary employment in the UK and Germany: Disentangling compensation and stigmatization from a within and between employer perspective" are focusing on this research question.

In Article 2 the longer-term cumulative wage disadvantages of experiences of temporary employment in the early career are revealed to be heavily impacted by the labor market positions following initial periods of temporary employment. By defining types of career trajectories, the longer-term cost of experiences of temporary employment can be determined in reference to the standard career trajectory of continuous full-time employment. As an interesting additional finding, Article 2 can also illustrates the prevalence of standard and non-standard career pathways among the group of young labor market entrants, who are especially at risk of receiving a temporary contract (Mertens & McGinnity, 2004). The size of the different groups of career trajectories reveals that standard career trajectories are the most prevalent. Whereas, stepping stone career trajectories consisting of lasting transitions from temporary to permanent jobs are also common, entrapment career trajectories entailing repeated spells of temporary employment and also periods of unemployment are less prevalent.

Concerning the cumulative wage consequences associated with the different trajectories, estimates of the PSM employed in Article 2 show that workers who experience stepping stone career trajectories accumulate lower overall labor earnings compared to workers who are always employed on full-time permanent contracts. However, cumulative wage gaps are even larger when workers who are on the entrapment career trajectory are compared to similar workers experiencing the standard career trajectory. Differentiating male and female workers, tertiary educated worker and those with less education, as well as workers in high-skilled and lower-skilled positions reveals similar results. In more detail, Article 2 finds cumulative wage disadvantages for workers with stepping stone career trajectories in all the investigated worker subgroups.

Article 2 also looks into the development of cumulative wage gaps over the ten-year observation window for workers on stepping stone career trajectories in comparison to the standard career trajectory. This analysis reveals that the cumulative wage gap increases in absolute terms over the first ten career years the article focuses on. Thus, it seems that the transitions from temporary to permanent employment these workers are able to enjoy do not result in high compensating wage growth. In more detail, the cumulative wage gap between the two career pathways increases in absolute terms even after most of the former temporary workers in the sample have received a permanent contract. In contrast, the cumulative wage gap decreases in relative terms. These findings suggest that, while workers on stepping stone career trajectories do not benefit from such high wage growth that they are compensated for their initial wage disadvantages (in the 10 years under investigation), there nonetheless is also no evidence of stigmatization of

former temporary workers in terms of very low wage growth which would entail the cumulative wage gap to also increase in relative terms.

However, it is important to note that while the investigation of career trajectories allows the investigation of the wage consequences of more holistic careers and not just single transitions or events, some details are lost when such a broad perspective is employed. Specifically, in the stepping stone career trajectories, Article 2 could not separate between former temporary workers receiving a permanent job with the same employer as a result of successful screening from those who found a permanent job with a new employer.

Article 3 zooms in on stepping stone careers by separating between- and within-employer transitions from temporary to permanent jobs with the aim of disentangling the underlying theoretical mechanisms and their relevance in two very different labor market settings. The article reveals that former temporary workers in the rigid and coordinated labor market of Germany benefit from wage growth when they are supposedly successfully screened, i.e., when they obtain a permanent contract with the same employer. Interestingly, the article also reveals that this wage growth is especially steep if the transition to a permanent job goes along with a job change within the firm. Surprisingly however, the wage growth after within-firm transitions is not always higher than the wage growth after between-firm transitions as the article expected based on the assumptions of screening and compensating wage growth and possible stigmatization of former temporary workers by new employers. Specifically, Article 3 finds wage growth of former temporary workers to be steeper when they receive a permanent contract from a new employer compared to when workers have their contract turned into a permanent one with the same employer and on the same job, but smaller compared to workers whose transition to a permanent job in the same firm coincides with a within-firm job change.

Results for the UK, a country with a flexible and uncoordinated labor market, are quite different than the findings for Germany. For the UK, the article only reveals wage growth for former temporary workers when they transition to a new and permanent job within the same firm. Compared to Germany the wage growth for this transition is however not as steep, with the effect in Germany being almost twice as big as the effect in the UK. For the two other transitions, within-firm transitions without a job change and between-firm transitions, the wage growth coefficients are not statistically significant and close to zero. While the results overall highlight the importance of separating between- and within-firm stepping stone transitions as well as accounting for within-firm job changes, they also cast doubt on the assumption that temporary jobs are used as a screening device entailing compensating wage growth to a large

extent. A notable exception in both Germany and the UK is the relatively high wage growth of former temporary workers whose transition to a permanent contract coincides with within-firm job mobility.

These finding are largely robust across different age and educational worker subgroups. For both younger (18-35) and older (36-55) workers in Germany, Article 3 shows that wage growth is steepest after within-firm transitions with a job change. Moreover, as expected, younger former temporary workers experience steeper wage growth than older workers after any of the three transitions. For the UK, estimates also reveal that across age subgroups workers who experience within-firm transitions with a job change enjoy the steepest wage growth. In contrast to expectations and the results for Germany however, this wage growth is steeper for older than for younger workers. Unlike the results for the whole sample, in case of between-firm transitions, the subgroup analysis in the UK reveals that younger workers do experience wage growth after such transitions while this is not the case for older workers.

Concerning the results for different educational groups, estimates for both countries are again similar to those for the whole sample. For both workers with tertiary education and for those with less education, wage growth is steepest after within-firm transitions with a job change. Furthermore, in Germany, in line with expectations, tertiary educated workers enjoy higher wage growth than workers with less education after within-firm transitions on the same job. Similar to the results for the whole sample, the results for such a transition among UK workers are not statistically significant. In contrast to expectations, in case of firm internal job mobility former temporary workers with tertiary education experience slightly lower wage growth compared to former temporary workers with less education in both Germany and the UK.

Although, the results do overall not point to steep compensating wage growth for within-firm transitions from temporary to permanent employment in general, they do also not point to stigmatization of former temporary workers in terms of wage growth disadvantages when they transition to a permanent job with a new employer. Instead, the findings are more in line with the notions of job search theory, which assumes that especially voluntary firm changes can lead to a better person-job match and higher wages in the long-run (Pavlopoulos et al., 2014; Riekhoff, 2022).

In sum, the results from Article 2 and Article 3 show that while cumulative wage disadvantages persist between workers with standard careers and those with stepping stone careers, workers on the latter trajectories nonetheless experience wage growth, which is especially steep in the case of within-firm job mobility. An interesting question for future research would be to

investigate if the steep wage growth of workers on stepping stone trajectories resulting from within-firm job mobility is high enough to catch up to workers with standard careers in terms of cumulative wages.

To complete the picture on the wage and wealth consequences of temporary employment, the third more specific research question asks what *the longer-term consequences in terms of wealth accumulation beyond wages of experiences of temporary employment are and how they are mediated by wage consequences*. This research question is addressed in Article 4 with the title "Couples' early career trajectories and later life housing consequences in Germany: Investigating cumulative disadvantages".

In this article my co-author and I find that couples in which both partners experience a lot of early career insecurity in the form of spells of temporary employment or unemployment the probability of homeownership in later years is much lower compared to couples in which both partners' career experiences are closer to the standard career of continuous permanent employment. In contrast, for the other career types revealed by the article, namely couples where the male partner is the breadwinner on a permanent job while the female partner is mainly inactive and couples where the male partner is self-employed while the female partner largely works in permanent employment, no such disadvantages are observed. It thus seems that especially when career insecurity accumulates within couples, the chances for homeownership decrease.

What role do wage disadvantages accumulated over the early career play for this effect? Looking into couples' cumulative income as a mediator reveals that the effect of early career insecurity on later homeownership decreases when income disadvantages are accounted for. However, couples on the most insecure career path still experience a much lower probability of being homeowners in the later career compared to couples with stable careers. Cumulative income disadvantages thus seem to be only one part of the explanation as to why couples with the most insecure career have a lower probability of homeownership. Other relevant explanations might pertain to the difficulties for these couples to receive loans from credit institutes or the fact that these couples (anticipate to) move more frequently.

Concerning the large proportion of couples living for rent in Germany, Article 4 reveals that again couples experiencing the most early career insecurity also suffer the most negative consequences regarding rent affordability. Specifically, the share of income that has to be spent on rent is higher for couples experiencing periods of temporary employment and unemployment compared to those couples experiencing mainly permanent employment. For this housing

outcome also couples in which only the female partner can be considered as having a non-standard career in terms of being mainly labor market inactive, experiences housing disadvantages as they also have to pay a higher share of their income on rent.

Again, the question arises as to what role cumulative income disadvantages play for the effect on early career insecurity on later rent affordability. Accounting for couples' cumulative income in the models greatly reduces the effect on the income spent on rent for the couple experiencing the most early career insecurity. Income disadvantage thus seem to be an important mechanism for this effect, although they do not explain it entirely. For male breadwinner/female homemaker couples this mechanism seems to be of less importance as the reduction in the effect is a bit smaller.

Overall, couples experiencing the most career insecurity are also the ones that face the most negative outcomes concerning housing outcomes. In fact, these couples are not only less likely to own their home in later years, if they live for rent they also have to spend larger shares of their income on that. While, homeownership constitutes an important material possession contributing to a person's wealth, paying higher shares of one's income on rent negatively effects the ability to build up financial savings.

5.2 General conclusions

Several general conclusions concerning the wage and wealth consequences of temporary employment can be drawn from the findings of the articles and therefore on the role of temporary employment as a driver for social inequality. Particularly, the following paragraphs will address three general conclusions which refer back to the three major guiding principles of this thesis highlighted in Section 2.2 and which give important directions for future research.

First, the thesis highlights the benefits of adopting an *interrelated micro-macro theoretical framework* to assess the wage and wealth consequences of temporary employment. Starting at the micro level, the results of the articles reveal that experiencing temporary employment (trajectories) impacts workers wage (growth) outcomes. However, both effects on wage gaps and on wage growth vary between different subgroups of workers. In particular, despite some effect heterogeneity in the observed wage gaps, Article 1 still reveals wage disadvantages for all investigated worker subgroups. While Article 1 finds evidence that across almost all of the 30 observed countries wage gaps are smaller for younger compared to older workers, Article 3 indicates, at least for Germany, that among workers who can use temporary job as a stepping stone to permanent positions, wage growth is also larger for younger compared to older workers. This is an important finding as younger workers are usually considered as labor market

outsiders who also face a higher risk of receiving a temporary contract (Gebel & Giesecke, 2009b; Giesecke & Groß, 2003). However, the results of this thesis suggest that the cost associated with temporary employment might be initially less severe and also less enduring for younger workers, which is an important fact to keep in mind for future research as well as for policy making decisions.

Still, there seem to be wealth consequences for younger workers associated with instable career positions such as temporary employment which go beyond wages, and which are only partly explained by wage outcomes. Article 4 highlights that repeated experiences of insecure career positions in the early career negatively effects housing outcomes both in terms of homeownership and concerning the amount of income that has to be spent on rent. Hence, while younger workers might be less affected by wage disadvantages associated with temporary employment, they still face disadvantages in terms of wealth accumulation. Article 4 also moves beyond just the micro level by incorporating the meso level and assessing wealth consequences at the couple level. The fact, that housing outcomes are especially negatively affected if both partner experience insecure careers illustrates the importance of the ideas of linked lives and of considering the household or couple perspective when investigating outcomes like wealth which are usually not just solely impacted by the career experiences of individual workers.

Moreover, workers are not only embedded in a household context but also in a lager country-setting. Especially, Article 1 and Article 3 highlight the importance of the macro level by revealing how micro-level wage and wealth outcomes can be moderated by countries' institutional and structural contexts. Article 1 tests the impact of these macro-level moderators directly on a diverse sample of 30 countries. Similar to the observation that labor market dualization is a global phenomenon (Rueda, Wibbels, & Altamirano, 2015), the results of Article 1 highlight that temporary employment is an important dimension of labor market segmentation not just in Europe or rich western democracies but also in less develop countries and therefore across a variety of differently regulated labor markets. Nonetheless, the magnitude of wage gaps varies quite substantially across such different country settings.

Specifically, wage gaps between temporary and permanent workers are amplified in countries of stronger dualization and insider bargaining power. The results of this thesis thus highlight that the assessment of wage consequences for temporary jobs should always - either theoretically or empirically - also consider country-level characteristics of dualization and segmentation such as the EPL setting or the size of the temporary workforce. Importantly, as

the results of the interaction effects of EPL permanent and EPL temporary in Article 1 reveal, it is especially crucial to investigate how different labor market institutions jointly impact wage gaps between temporary and permanent workers.

Lastly, the interrelated micro-macro theoretical framework adopted in this thesis illustrates the value of linking theoretical approaches from different disciplines and areas of research. As was highlighted especially in Article 2 and Article 3, the wage (growth) consequences of temporary jobs are strongly impacted by the employment transitions of (former) temporary workers and the "function" of temporary jobs. Specifically, Article 2 reveals that compared to workers with careers of continuous permanent employment overall cumulative earning disadvantages are much more pronounced for workers experiencing entrapment in insecure employment positions than for workers who can utilize temporary jobs as a stepping stone to lasting permanent employment. Concerning workers on the latter career trajectory specifically, Article 3 illustrates the importance of within-firm job mobility and of employer changes. Moreover, Article 3 derives expectations for country differences in wage growth between Germany and the UK not just from characteristics of the labor market but by also considering the national educational systems.

Second, the thesis clearly benefits from relying on an *encompassing life course perspective*. Evidently, adopting such a life course approach where wage and wealth outcomes are not merely considered at a specific point in time but rather at different stages of the life course (e.g., younger vs. older workers) as well as over longer periods of time produces valuable insights into the dynamic processes of wage and wealth consequences of temporary employment.

Especially, Article 2 and Article 4 highlight that wage and wealth outcomes of temporary employment can only be assessed holistically, if temporary employment is considered as part of a longer-term and dynamic career trajectory. Following workers' careers over several years allows researcher to better put periods of temporary employment into the context of workers' career trajectories. As wage and wealth outcomes accumulate and manifest over the life course, the cross-sectional wage disadvantages revealed in Article 1 can only give an important first impression of the pathway these workers might be set upon. Although, by comparing younger and older workers Article 1 can still reveal differences in cross-sectional wage gaps for workers in different life stages. The other articles of this thesis can give even more concrete insights into the endurance of initial disadvantages and the longer-term wage and wealth consequences associated with certain career transitions and trajectories.

While, former temporary workers, especially those who can make transitions to permanent jobs, certainly enjoy wage growth, the results of Article 2 suggest that it remains questionable if they can (quickly) make up for the initial experienced disadvantages. However, on a more positive note, Article 3 suggests that for those former temporary workers who are successfully screened for different permanent positions in the same firm, wage growth is especially steep and might compensate workers for the initially experienced disadvantages.

Next to considering the cross-sectional wage outcomes of single labor market positions as well as the longer-term wage outcomes of career transitions and trajectories, the encompassing life course perspective also entails to investigate wealth outcomes of temporary employment beyond wages. The results of Article 4, illustrate that researchers need to consider other outcomes next to wages if they want to get the full picture on the economic consequences of temporary employment. The fact that couples with insecure early careers are less likely to own their home and have to pay a higher share of their income on rent has important implications for their financial well-being as well as their ability to accumulate wealth. Moreover, if couples have to spend a higher share of their income on rent, they are less likely to accumulate enough savings to afford homeownership in the longer-run. The encompassing life course approach is thus particularly useful to highlight how disadvantages in terms of wages and other wealth outcomes seem to accumulate within couples. Interestingly however, disadvantages in cumulative income explain only part of the effects in Article 4, opening avenues for future research to look more closely into possible mechanisms. The results also give hints to policy makers how homeownership might be facilitated among couples with experiences of career insecurity.

Lastly, with the aim of adopting an encompassing life course perspective, the thesis shows the importance of investigating wage and wealth outcomes against different reference groups of workers and workers' observations. These factors largely impact the observed results as well as the conclusion that can be made from these. Specifically, the articles adopting a between-comparison perspective show wage consequences in reference to permanent workers (Article 1) or workers on standard career trajectories (Article 2 and Article 4). In contrast, Article 3 adopts a within-comparison approach investigating the wage growth of workers who make transitions from temporary to permanent employment over time. Both, an evaluation of the cost of temporary employment in reference to permanent workers, as well as an investigation of the endurance of disadvantages in reference to previous observations for the same workers, are important for a full picture on the wealth consequences of temporary employment.

Third, it can be concluded that applying *state-of-the-art analytical approaches* to a number of different datasets offers a valuable contribution when assessing wage and wealth consequences of temporary employment. Utilizing the most flexible two-stage multilevel analysis strategy in Article 1 cross-country similarities and variations in wage gaps between permanent and temporary workers can nicely be illustrated. Moreover, the impact of country level variables on wage gaps can also be investigated from a cross-country perspective. Such country-comparative analysis is invaluable to further our understanding of the impact of macro-level segmentation and dualization, particularly in terms of revealing the effect of institutional and structural characteristics on temporary employment as a driver of social and economic inequality.

Especially, Article 2 and Article 4 underline the benefit of combining different methodological approaches. Employing methods of (multichannel) sequences analysis allows these articles to define treatments in a dynamic and holistic manner. While there is value in such longitudinal description in itself, using the dynamic treatments in regression models and for propensity score matching allows the articles to relate wage and wealth outcomes to more than just single transitions or events. Article 3 moves the focus back to transitions between temporary and permanent employment. However, by employing FEIS regression it utilizes all advantages of panel data, taking not only account for selection bias stemming from time-constant unobserved heterogeneity but also for non-random heterogeneities in wage growth after temporary employment between treated and untreated workers. Irrespective of the specific empirical strategy of each article, all models include a theoretically driven careful selection of control variables to follow the main ideas of modern causal analysis.

When reviewing the general conclusions from this thesis, it also becomes clear what is still missing to complete the picture on the wage and wealth consequences of temporary employment in and outside of Europe. Thus, this thesis concludes by stating some implications for future research. First, as mentioned in Chapter 1 the dataset used in this thesis did not allow to distinguish temporary workers from temporary agency workers. Accounting for such treatment heterogeneities could reveal more nuanced results. Moreover, especially for country-comparative analysis considering even more types of non-standard jobs such as casual or seasonal employment might be fruitful. These types of job are not only more prevalent in certain countries, they might also entail more severe wage consequences (Booth et al., 2002; Mooi-Reci & Wooden, 2017).

Second, even more dimensions of wealth than the ones investigated in this thesis should be considered by future research. These could for example pertain to temporary workers' abilities

to make capital investments. Moreover, due to data limitations the longer-term wage and wealth consequences of temporary employment could only be assessed throughout individuals' working lives. However, future research should try to reveal if these consequences also last into retirement age. Moreover, implications for intra-generational wealth transmission are also imaginable and could be interesting to investigate (Pfeffer & Killewald, 2018).

Finally, due to data limitations the impact of country-level moderators could not be investigated under a country fixed-effects framework. Future research should try to address this shortcoming as this would offer valuable insights into the more causal effect of macro-level institutional characteristics and give policy makers a more concrete understanding of the consequences of certain policy measures. Moreover, in this thesis the longer-term wage consequences of temporary employment could only be investigated in a single-country article and in a small-N country comparative article. The advancement of the research on the wage and wealth consequences of temporary employment would greatly benefit from larger-scale cross-country panel analysis including a divers set of countries. Unfortunately, as far as I know there is no dataset available yet that would allow such an analysis. The longitudinal version of the EU-SILC regretfully waists its' potential in this regard by allowing no direct linkage between type of contract and wages.

Besides such large-scale cross-country panel datasets that would allow more elaborate country-comparative analysis, better national data sources are needed to investigate and confirm some of the main results as well as the theoretical mechanisms proposed in this thesis. For example, register data as they are available in countries such as the Netherlands would provide not only a much larger sample size but also more objective measures of wages and earnings. The last point is especially important as previous research shows that survey data on earnings can be biased not only due to non-random non-reporting of earnings but also due to misreporting (Valet, Adriaans, & Liebig, 2019). Moreover, better availability of linked employer-employee data would give researchers the chance to look in more detail into the importance of firm characteristics and the different strategies and reasons of firms to use temporary employment. This would allow researchers to better reveal how the different functions for which firms employ temporary workers impact the (future) employment and wage outcomes of (former) temporary workers (Mattijssen, Pavlopoulos, & Smits, 2022).

Lastly, to truly unveil the possible stigmatization and discrimination of former temporary workers audit or vignette studies are needed. Audit studies would allow researchers to investigate if applicants with a history of temporary employment are discriminated against in

terms of getting invited to a job interview compared to otherwise equal job applicants with a history of only (full-time) permanent employment (Pedulla, 2016). Moreover, such studies could reveal if call-back rates for workers with different employment histories vary between job openings advertising a permanent or a temporary position. In vignette studies researchers could test if employers are inclined to pay lower wages to a fictional job applicant who was previously employed on a temporary contact compared to a similar fictional job applicant who previously held a permanent contact. Such avenues for future research could greatly further our understanding of the wage disadvantages associated with temporary employment, the reasons for these disadvantages, as well as their persistence.

References

Acemoglu, D. (2002). Technical change, inequality, and the labor market. *Journal of Economic Literature*, *40*(1), 7–72.

Addison, J., Cotti, C., & Surfield, C. (2015). Atypical jobs: Stepping stones or dead ends? Evidence from the NLSY79. *The Manchester School*, *83*(1), 17–55.

Addison, J., & Surfield, C. (2009a). Atypical work and employment continuity. *Industrial Relations: A Journal of Economy and Society*, *48*(4), 655–683.

Addison, J., & Surfield, C. (2009b). Does atypical work help the jobless? Evidence from a CAEAS/CPS cohort analysis. *Applied Economics*, *41*(9), 1077–1087.

Aisenbrey, S., & Fasang, A. E. (2010). New life for old ideas: The "second wave" of sequence analysis bringing the "course" back into the life course. *Sociological Methods & Research*, *38*(3), 420–462.

Akdogan, K., Karacimen, E., & Yavuz, A. A. (2019). Cross-country evidence on the link between job security and housing credit. *Journal of Housing and the Built Environment*, *34*, 947–963.

Amuedo-Dorantes, C., & Serrano-Padial, R. (2007). Wage growth implications of fixed-term employment: An analysis by contract duration and job mobility. *Labour Economics*, *14*(5), 829–847.

Arranz, J., Fernández-Macías, E., & García-Serrano, C. (2021). Wage differentials and segmentation: The impact of institutions and changing economic conditions. *European Journal of Industrial Relations*, *27*(2), 203–227.

Atkinson, J. (1984). Manpower strategies for flexible organisations. *Personnel Management*, *16*, 28–31.

Backhaus, T., Gebers, K., & Schröder, C. (2015). Evolution and determinants of rent burdens in Germany. *SOEP Paper*, *806*.

Ball, R., & Chernova, K. (2008). Absolute income, relative income, and happiness. *Social Indicators Research*, *88*, 497–529.

Balz, A. (2017). Cross-national variations in the security gap: Perceived job insecurity among temporary and permanent employees and employment protection legislation. *European Sociological Review*, *33*(5), 675–692.

Baranowska, A., & Gebel, M. (2010). The determinants of youth temporary employment in the enlarged Europe. *European Societies*, *12*(3), 367–390.

Barbieri, P. (2009). Flexible employment and inequality in Europe. *European Sociological Review*, *25*(6), 621–628.

Barbieri, P., & Cutuli, G. (2016). Employment protection legislation, labour market dualism, and inequality in Europe. *European Sociological Review*, *32*(4), 501-516.

Barbieri, P., & Cutuli, G. (2018). Dual labour market intermediaries in Italy: How to lay off "lemons"—Thereby creating a problem of adverse selection. *De Economist*, *166*, 477–502.

Barbieri, P., Cutuli, G., Luijkx, R., Mari, G., & Scherer, S. (2019). Substitution, entrapment, and inefficiency? Cohort inequalities in a two-tier labour market. *Socio-Economic Review*, *17*(2), 409–431.

Barbieri, P., & Scherer, S. (2009). Labour market flexibilization and its consequences in Italy. *European Sociological Review*, *25*(6), 677–692.

Baron, D., & Rapp, I. (2019). Does fixed-term employment delay important partnership events? Comparing transitions into cohabitation, marriage, parenthood and home ownership among young adults in Germany. *Zeitschrift Für Familienforschung*, *31*(1), 40–57.

Bellani, D., & Bosio, G. (2021). Knockin' on heaven's door? Reframing the debate on temporary employment and wages: evidence from Europe. *Socio-Economic Review*, *19*(3), 869–907.

Benassi, C., & Vlandas, T. (2016). Union inclusiveness and temporary agency workers: The role of power resources and union ideology. *European Journal of Industrial Relations*, *22*(1), 5–22.

Bendick, M., & Nunes, A. (2012). Developing the research basis for controlling bias in hiring. *Journal of Social Issues*, *68*(2), 238–262.

Bernardi, L., Huinink, J., & Settersten, R. (2019). The life course cube: A tool for studying lives. *Advances in Life Course Research*, *41*, 1–13.

Biegert, T. (2019). Labor market institutions, the insider/outsider divide and social inequalities in employment in affluent countries. *Socio-Economic Review*, *17*(2), 255–281.

Blau, F., & Kahn, L. (2002). *At home and abroad: U.S. labor market performance in international perspective*. New York City, New York: Russell Sage Foundation.

Blom, N., Verbakel, E., & Kraaykamp, G. (2020). Couples' job insecurity and relationship satisfaction in the Netherlands. *Journal of Marriage and Family*, *82*(3), 875–891.

Blossfeld, H.-P., & Drobnič, S. (Eds.) (2001). *Careers of couples in contemporary societies. From male breadwinner to dual earner families*. Oxford: Oxford University Press.

Blossfeld, H.-P., Klijzing, E., Mills, M., & Kurz, K. (2005). *Globalization, uncertainty and youth in society*. London: Routledge.

Blossfeld, H.-P., & Mayer, K. U. (1988). Arbeitsmarktsegmentation in der Bundesrepublik Deutschland: Eine empirische Überprüfung von Segmentationstheorien aus der Perspektive des Lebenslaufs. *Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *40*(2), 262–283.

Boockmann, B., & Hagen, T. (2008). Fixed-term contracts as sorting mechanisms: Evidence from job durations in West Germany. *Labour Economics*, *15*(5), 984–1005.

Booth, A. L., Francesconi, M., & Frank, J. (2002). Temporary jobs: Stepping stones or dead ends? *The Economic Journal*, *112*(480), F189–F213.

Bosmans, K., Hardonk, S., Cuyper, N. de, & Vanroelen, C. (2016). Explaining the relation between precarious employment and mental well-being: A qualitative study among temporary agency workers. *Work*, *53*(2), 249–264.

Breen, R. (1997). Risk, recommodification and stratification. *Sociology*, *31*(3), 473–489.

Brüderl, J., & Ludwig, V. (2015). Fixed-effects panel regression. In H. Best & C. Wolf (Eds.), *The SAGE handbook of regression analysis and causal inference* (pp. 327–357). Thousand Oaks: SAGE.

Bryan, M. L., & Jenkins, S. P. (2016). Multilevel modelling of country effects: A cautionary tale. *European Sociological Review*, *32*(1), 3–22.

Burchell, B. (1994). The effects of labour market position, job insecurity and unemployment on psychological health. In D. Gallie, C. Marsh, & C. Vogler (Eds.), *Social change and the experience of unemployment* (pp. 188–212). Oxford: Oxford University Press.

Caliendo, M. (2006). *Microeconometric evaluation of labour market policies*. Berlin: Springer Pub. Co.

Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, *22*(1), 31–72.

Cambridge Dictionary. *Cambridge Advanced Learner's Dictionary*. Cambridge, UK: Cambridge University Press.

Cazes, S., & Laiglesia, J. R. de (2015). Temporary contracts and wage inequality. In J. Berg (Ed.), *Labour markets, institutions and inequality: Building just societies in the 21st century* (pp. 147–183). Cheltenham: Edward Elgar.

Comi, S., & Grasseni, M. (2012). Are temporary workers discriminated against? Evidence from Europe. *The Manchester School*, *80*(1), 28–50.

Dawson, C., Veliziotis, M., & Hopkins, B. (2017). Temporary employment, job satisfaction and subjective well-being. *Economic and Industrial Democracy*, *38*(1), 69–98.

DeGraaf-Zijl, M., van den Berg, G. J., & Heyma, A. (2011). Stepping stones for the unemployed: The effect of temporary jobs on the duration until (regular) work. *Journal of Population Economics*, *24*, 107–139.

DeVries, M. R., & Wolbers, M. H. J. (2005). Non-standard employment relations and wages among school leavers in the Netherlands. *Work, Employment and Society*, *19*(3), 503–525.

Dewilde, C., & Raeymaeckers, P. (2008). The trade-off between home-ownership and pensions: Individual and institutional determinants of old-age poverty. *Ageing & Society*, *28*(6), 805–830.

DeWitte, H. (1999). Job insecurity and psychological well-being: Review of the literature and exploration of some unresolved issues. *European Journal of Work and Organizational Psychology*, *8*(2), 155–177.

Dias da Silva, A., & Turrini, A. (2015). Precarious and less well paid? Wage differences between permanent and fixed-term contracts across the EU. *European Economy - Economic Papers*, *544*.

Diaz-Serrano, L. (2005). Labor income uncertainty, skewness and homeownership: A panel data study for Germany and Spain. *Journal of Urban Economics*, *58*(1), 156–176.

Dieckhoff, M. (2011). The effect of unemployment on subsequent job quality in Europe: A comparative study of four countries. *Acta Sociologica*, *54*(3), 233–249.

DiPrete, T. A. (2005). Labor Markets, inequality, and change: A European perspective. *Work and Occupations*, *32*(2), 119–139.

DiPrete, T. A., & Eirich, G. M. (2006). Cumulative advantage as a mechanism for inequality: A review of theoretical and empirical developments. *Annual Review of Sociology*, *32*, 271–297.

Dorn, F., Fuest, C., Immel, L., & Neumeier, F. (2018). Inequality and extremist voting: Evidence from Germany. *Beiträge Zur Jahrestagung Des Vereins Für Socialpolitik*.

Dotti Sani, G., & Acciai, C. (2018). Two hearts and a loan? Mortgages, employment insecurity and earnings among young couples in six European countries. *Urban Studies*, *55*(11), 2451–2469.

Dreher, A., & Gaston, N. (2008). Has globalization increased inequality? *Review of International Economics*, *16*(3), 516–536.

Elder, G. H. (1974). *Children of the Great Depression: Social change in life experience*. Chicago, Il: University of Chicago Press.

Elder, G. H. (1994). Time, human agency, and social change: Perspectives on the life course. *Social Psychology Quarterly*, *57*(1), 4–15.

Elder, G. H. (2007). Life course perspective. Retrieved from https://onlinelibrary.wiley.com/doi/epdf/10.1002/9781405165518.wbeosl046

Elwert, F., & Winship, C. (2014). Endogenous selection bias: The problem of conditioning on a collider variable. *Annual Review of Sociology*, *40*, 31–53.

Emmenegger, P., Häusermann, S., Palier, B., & Seelbei-Kaiser, M. (Eds.) (2012). *The age of dualization: The changing face of inequality in deindustrializing societies*. Oxford, New York: Oxford University Press.

Erlinghagen, M. (2008). Self-perceived job insecurity and social context: A multi-level analysis of 17 European countries. *European Sociological Review*, *24*(2), 183–197.

Esping-Andersen, G. (1990). *The three worlds of welfare capitalism*. Princeton University Press.

Esping-Andersen, G. (2000). Who is harmed by labour market regulations? Quantitative evidence. In G. Esping-Andersen & M. Regini (Eds.), *Why deregulate labour markets?* (pp. 66–98). Oxford: Oxford University Press.

Esping-Andersen, G., & Regini, M. (Eds.) (2000). *Why deregulate labour markets?* Oxford: Oxford University Press.

EU-SILC (2021). *EU Statistics on Income and Living Conditions: Cross-sectional data 2004-2019*. Luxembourg: Eurostat.

Fervers, L., & Schwander, H. (2015). Are outsiders equally out everywhere? The economic disadvantage of outsiders in cross-national perspective. *European Journal of Industrial Relations*, *21*(4), 369–387.

Flanagan, R. (1999). Macroeconomic performance and collective bargaining: An international perspective. *Journal of Economic Literature*, *37*(3), 1150–1175.

Forrier, A., & Sels, L. (2003). Temporary employment and employability: Training opportunities and efforts of temporary and permanent employees in Belgium. *Work, Employment and Society*, *17*(4), 641–666.

Franzese, R. (2005). Empirical strategies for various manifestations of multilevel data. *Political Analysis*, *13*(4), 430–446.

Frick, J. R., & Grabka, M. M. (2014). Missing income data in the German SOEP: Incidence, imputation and its impact on the income distribution. *SOEP Survey Papers*, *225*. Retrieved from http://hdl.handle.net/10419/104999

Fuller, S. (2011). Up and on or down and out? Gender, immigration and the consequences of temporary employment in Canada. *Research in Social Stratification and Mobility*, *29*(2), 155–180.

Fuller, S., & Stecy-Hildebrandt, N. (2014). Lasting disadvantage? Comparing career trajectories of matched temporary and permanent workers in Canada. *Canadian Review of Sociology*, *51*(4), 293–324.

Fuller, S., & Stecy-Hildebrandt, N. (2015). Career pathways for temporary workers: Exploring heterogeneous mobility dynamics with sequence analysis. *Social Science Research*, *50*, 76–99.

Fumagalli, L., Knies, G., & Buck, N. (2017). *Understanding Society: The UK Household Longitudinal Study: Harmonised British Household Panel Survey (BHPS)*. Colchester, Essex: Institute for Social and Economic Research (University of Essex).

Gangl, M. (2001). European patterns of labour market entry: A dichotomy of occupationalized vs. non-occupationalized systems? *European Societies*, *3*(4), 471–494.

Gangl, M. (2003). The only way is up? Employment protection and job mobility among recent entrants to European labour markets. *European Sociological Review*, *19*(5), 429–449.

Gangl, M. (2006). Scar effects of unemployment: An assessment of institutional complementarities. *American Sociological Review*, *71*(6), 986–1013.

Gash, V., & McGinnity, F. (2007). Fixed-term contracts - the new European inequality? Comparing men and women in West Germany and France. *Socio-Economic Review*, *5*(3), 467–496.

Gauthier, J.-A., Widmer, E. D., Bucher, P., & Notredame, C. (2010). Multichannel sequence analysis applied to social science data. *Sociological Methodology*, *40*(1), 1–38.

Gebel, M. (2009). Fixed-term contracts at labour market entry in West Germany: Implications for job search and first job quality. *European Sociological Review*, *25*(6), 661-575.

Gebel, M. (2010). Early career consequences of temporary employment in Germany and the United Kingdom. *Work, Employment and Society*, *24*(4), 641–660.

Gebel, M. (2013). Is a temporary job better than unemployment? A cross-country comparison based on British, German, and Swiss panel data. *SOEP Paper*, *543*.

Gebel, M., & Giesecke, J. (2009a). Economic insecurity and fertility: The effects of job insecurity and unemployment on family formation in East and West Germany. *Zeitschrift Für Soziologie*, *38*(5), 399–417.

Gebel, M., & Giesecke, J. (2009b). Labour market flexibility and inequality: The changing risk patterns of temporary employment in West Germany. *Journal of Labour Market Research*, *42*, 234–251.

Gebel, M., & Giesecke, J. (2011). Labor market flexibility and inequality: The changing skill-based temporary employment and unemployment risks in Europe. *Social Forces*, *90*(1), 17–39.

Gebel, M., & Giesecke, J. (2016). Does deregulation help? The impact of employment protection reforms on youths' unemployment and temporary employment risks in Europe. *European Sociological Review*, *32*(4), 486–500.

German Federal Statistical Office (2019). Wohnen 2018: Mieten und Mietbelastung in Metropolen besonders hoch (in German). Retrieved from https://www.destatis.de/DE/Presse/Pressemitteilungen/2019/10/PD19_N001_129.html;jsessionid=7D316B3897D2BCD20480DB669873C96A.internet8711

Gibbons, R., & Murphy, K. J. (1992). Optimal incentive contracts in the presence of career concerns: Theory and evidence. *Journal of Political Economy*, *100*(3), 468–505.

Giesecke, J. (2009). Socio-economic risks of atypical employment relationships: Evidence from the German labour market. *European Sociological Review*, *25*(6), 629–646.

Giesecke, J., & Groß, M. (2003). Temporary employment: Chance or risk? *European Sociological Review*, *19*(2), 161–177.

Giesecke, J., & Groß, M. (2004). External labour market flexibility and social inequality: Temporary employment in Germany and the UK. *European Societies*, *6*(3), 347–382.

Goebel, J., Grabka, M. M., Liebig, S., Kroh, M., Richter, D., Schröder, C., & Schupp, J. (2019). The German Socio-Economic Panel (SOEP). *Jahrbücher Für Nationalökonomie Und Statistik*, *239*(2), 345–360.

Gygli, S., Haelg, F., Potrafke, N., & Sturm, J. E. (2019). The KOF Globalisation Index – revisited. *The Review of International Organizations*, *14*, 543–574.

Hagen, T. (2002). Do temporary workers receive risk premiums? Assessing the wage effects of fixed–term contracts in West Germany by a matching estimator compared with parametric approaches. *Labour*, *16*(4), 667–705.

Hall, P. A., & Soskice, D. (2001). *Varieties of capitalism: The institutional foundations of comparative advantage*. Oxford: Oxford University Press.

Halpin, B. (2016). Multiple imputation for categorical time series. *The Stata Journal*, *16*(3), 590–612.

Halpin, B. (2017). Sadi: Sequence analysis tools for Stata. *The Stata Journal*, *17*(3), 546–572.

Harcourt, M., Gall, G., Raman, A. S., Lam, H., & Croucher, R. (2021). Critiquing the OECD's Employment Protection Legislation Index for individual dismissals: The importance of procedural requirements. *Economic and Industrial Democracy*, *42*(4), 1210–1231.

Haurin, D. R. (1991). Income variability, homeownership, and housing demand. *Journal of Housing Economics*, *1*(1), 60–74.

Heisig, J. P., Schaeffer, M., & Giesecke, J. (2017). The costs of simplicity: Why multilevel models may benefit from accounting for cross-cluster differences in the effects of controls. *American Sociological Review*, *82*(4), 796–827.

Helbling, L. A. (2017). Fixed-term jobs after vocational education and training in Switzerland: Stepping stone or impediment? *Swiss Journal of Sociology*, *43*(1), 89–113.

Hevenstone, D. (2010). National context and atypical employment. *International Sociology*, *25*(3), 315–347.

Hipp, L., Bernhardt, J., & Allmendinger, J. (2015). Institutions and the prevalence of nonstandard employment. *Socio-Economic Review*, *13*(2), 351–377.

Högberg, B., Strandh, M., & Baranowska-Rataj, A. (2019). Transitions from temporary employment to permanent employment among young adults: The role of labour law and education systems. *Journal of Sociology*, *55*(4), 689–707.

Holland, P. W. (1986). Statistics and causal inference. *Journal of the American Statistical Association*, *81*(396), 945–960.

Howell, R. T., Kurai, M., & Tam, L. (2013). Money buys financial security and psychological need satisfaction: Testing need theory in affluence. *Social Indicators Research*, *110*, 17–29.

Hu, F. (2013). Homeownership and subjective wellbeing in urban China: Does owning a house make you happier? *Social Indicators Research*, *110*, 951–971.

Jahoda, M. (1982). *Employment and unemployment: A social-psychological analysis*. New York: Cambridge: University Press, Cambridge.

Jalovaara, M., & Fasang, A. E. (2020). Family life courses, gender, and mid-life earnings. *European Sociological Review*, *36*(2), 159–178.

Johnson, S., Kaufmann, D., & Zoido-Lobatón, P. (1998). Regulatory discretion and the unofficial economy. *The American Economic Review*, *88*(2), 387–392.

Kaas, L., Kocharkov, G., Preugschat, E., & Siassi, N. (2021). Low homeownership in Germany—a quantitative exploration. *Journal of the European Economic Association*, *19*(1), 128–164.

Kahn, L. M. (2007). The impact of employment protection mandates on demographic temporary employment patterns: International microeconomic evidence. *The Economic Journal*, *117*(521), F333–F356.

Kalleberg, A. L. (2000). Nonstandard employment relations: Part-time, temporary and contract work. *Annual Review of Sociology*, *26*, 341–365.

Kalleberg, A. L. (2009). Precarious work, insecure workers: Employment relations in transition. *American Sociological Review*, *74*(1), 1–22.

Kalleberg, A. L. (2012). Job quality and precarious work: Clarifications, controversies, and challenges. *Work and Occupations*, *39*(4), 427–448.

Kalleberg, A. L., & Hewison, K. (2013). Precarious work and the challenge for Asia. *American Behavioral Scientist*, *57*(3), 271–288.

Kalleberg, A. L., Reskin, B. F., & Hudson, K. (2000). Bad jobs in America: Standard and nonstandard employment relations and job quality in the United States. *American Sociological Review*, *65*(2), 256–278.

Kauhanen, M., & Nätti, J. (2015). Involuntary temporary and part-time work, job quality and well-being at work. *Social Indicators Research*, *120*, 783–799.

Keister, L. (2005). *Getting rich: A study of wealth mobility in America*. New York: Cambridge University Press.

Kholodilin, K. A., Mense, A., & Michelsen, C. (2016). Market break or simply fake? Empirics on the causal effects of rent controls in Germany. *DIW Discussion Papers*, *No. 1584*.

Kiersztyn, A. (2016). Fixed-term employment and occupational position in Poland: The heterogeneity of temporary jobs. *European Sociological Review*, *32*(6), 881–894.

Killewald, A., Pfeffer, F., & Schachner, J. (2017). Wealth inequality and accumulation. *Annual Review of Sociology*, *43*, 379–404.

King, D., & Rueda, D. (2008). Cheap labor: The new politics of "bread and roses" in industrial democracies. *Perspectives on Politics*, *6*(2), 279–297.

KLIPS (2021). *Korean Labor and Income Panel Study (1998-2019)*. Sejong: Korean Labor Institute.

Korpi, T., & Levin, H. (2001). Precarious Footing: Temporary employment as a stepping stone out of unemployment in Sweden. *Work, Employment and Society*, *15*(1), 127–148.

Kus, B. (2010). Regulatory governance and the informal economy: Cross-national comparisons. *Socio-Economic Review*, *8*(3), 487–510.

Laß, I. (2020). The effects of non-standard employment on the transition to parenthood within couples: A comparison of Germany and Australia. *European Journal of Population*, *36*, 843–874.

Laß, I., & Wooden, M. (2019). The structure of the wage gap for temporary workers: Evidence from Australian panel data. *British Journal of Industrial Relations*, *57*(3), 453–478.

Latner, J. P. (2022). Temporary employment in Europe: Stagnating rates and rising risks. *European Societies*, *24*(4), 383–408.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Pub. Co.

Lee, B.-H., & Shin, K.-Y. (2017). Job mobility of non-regular workers in the segmented labor markets: A cross-national comparison of South Korea and Japan. *Development and Society*, *46*(1), 1–23.

Lehweß-Litzmann, R. (2012). Flexible employment, poverty and the household. *Transfer: European Review of Labour and Research*, *18*(1), 69–81.

Lersch, P. M., & Dewilde, C. (2015). Employment insecurity and first-time homeownership: Evidence from twenty-two European countries. *Environment and Planning a: Economy and Space*, *47*(3), 607–624.

Lewis, J., & Linzer, D. (2005). Estimating regression models in which the dependent variable is based on estimates. *Political Analysis*, *13*(4), 345–364.

Lindbeck, A., & Snower, D. J. (1989). *The insider-outsider theory of employment and unemployment*. Cambridge, MA: MIT Press.

LIS (2021). *Luxembourg Income Study (LIS) Database http://www.lisdatacenter.org (multiple countries; June 2020 - July 2021)*. Luxembourg: LIS.

Lübke, C., & Erlinghagen, M. (2014). Self-perceived job insecurity across Europe over time: Does changing context matter? *Journal of European Social Policy*, *24*(4), 319–336.

Lundberg, I., Johnson, R., & Stewart, B. M. (2021). What is your estimand? Defining the target quantity connects statistical evidence to theory. *American Sociological Review*, *86*(3), 532–565.

Mandel, H., & Shalev, M. (2009). How welfare states shape the gender pay gap: A theoretical and comparative analysis. *Social Forces*, *87*(4), 1873–1911.

Manzoni, A., & Mooi-Reci, I. (2011). Early unemployment and subsequent career complexity: A sequence-based perspective. *Schmollers Jahrbuch*, *131*(2), 339–348.

Manzoni, A., & Mooi-Reci, I. (2020). The cumulative disadvantage of unemployment: Longitudinal evidence across gender and age at first unemployment in Germany. *PLOS ONE*, *15*(6), 1–20.

Marsden, D. (1986). *The end of economic man? Custom and competition in labour markets*. Brighton: Wheatsheaf.

Mattijssen, L., & Pavlopoulos, D. (2019). A multichannel typology of temporary employment careers in the Netherlands: Identifying traps and stepping stones in terms of employment and income security. *Social Science Research*, *77*, 101–114.

Mattijssen, L., Pavlopoulos, D., & Smits, W. (2022). Scarred by your employer? The effect of employers' strategies on the career outcomes of non-standard employment. *Work and Occupations*, *49*(3), 316–344.

McGarth, D., & Keister, L. (2008). The effect of temporary employment on asset accumulation processes. *Work and Occupations*, *35*(2), 196–222.

McGinnity, F., Mertens, A., & Gundert, S. (2005). A bad start? Fixed-term contracts and the transition from education to work in West Germany. *European Sociological Review*, *21*(4), 359–374.

McGovern, P., Smeaton, D., & Hill, S. (2004). Bad jobs in Britain. Nonstandard employment and job quality. *Work and Occupations*, *31*(2), 225–249.

McVicar, D., Wooden, M., Laß, I., & Fok, Y.-K. (2019). Contingent employment and labour market pathways: Bridge or trap? *European Sociological Review*, *35*(1), 98–115.

Medina, L., & Schneider, F. (2019). Shedding light on the shadow economy: A global database and the interaction with the official one. *CESifo Working Papers*, *7981*.

Mertens, A., & McGinnity, F. (2004). Wages and wage growth of fixed-term workers in East and West Germany. *Applied Economics Quarterly*, *50*(2), 139–163.

Mincer, J. (1989). Human capital and the labor market: A review of current research. *Educational Researcher*, *18*(4), 27–34.

Mood, C. (2010). Logistic regression: Why we cannot do what we think we can do, and what we can do about it. *European Sociological Review*, *26*(1), 67–82.

Mooi-Reci, I., & Wooden, M. (2017). Casual employment and long-term wage outcomes. *Human Relations*, *70*(9), 1064–1090.

Morgan, S. L., & Winship, C. (2015). *Counterfactuals and causal inference*. New York: Cambridge University Press.

Müller, W., Steinmann, S., & Ell, R. (1998). Education and labour markt entry in Germany. In Y. Shavit & W. Müller (Eds.), *From school to work: A comparative study of educational qualifications and occupational destinations* (pp. 143–188). Oxford: Oxford University Press.

Mustillo, S. A., Lizardo, O. A., & McVeigh, R. M. (2018). Editors' comment: A few guidelines for quantitative submissions. *American Sociological Review*, *83*(6), 1281–1283.

OECD (2020). Strictness of employment protection. Retrieved from https://stats.oecd.org/Index.aspx?DataSetCode=EPL_OV

OECD (2022a). Analytical house price indicators : Real house price indices. Retrieved from https://www.oecd-ilibrary.org/economics/data/prices/analytical-house-price-indicators_cbcc2905-en

OECD (2022b). Collective bargaining coverage. Retrieved from https://stats.oecd.org/Index.aspx?DataSetCode=TUD

OECD (2022c). Consumer price indices (CPIs) - Complete database : Consumer prices - Annual inflation. Retrieved from https://stats.oecd.org/Index.aspx?QueryId=82174

Oliver, X., & Sard, M. (2019). The wage gap in Spain for temporary workers: The effects of the Great Recession. *International Journal of Manpower*, *40*(7), 1319–1346.

Park, M., & Kang, J. (2017). Job satisfaction of non-standard workers in Korea: Focusing on non-standard workers' internal and external heterogeneity. *Work, Employment and Society*, *31*(4), 605–623.

Pavlopoulos, D. (2013). Starting your career with a fixed-term Job: Stepping-stone or "dead end"? *Review of Social Economy*, *71*(4), 474–501.

Pavlopoulos, D., Fouarge, D., Muffels, R., & Vermunt, J. K. (2014). Who benefits from a job change: The dwarfs or the giants? *European Societies*, *16*(2), 299–319.

Pedulla, D. (2016). Penalized or protected? Gender and the consequences of nonstandard and mismatched employment histories. *American Sociological Review*, *81*(2), 262–289.

Perugini, C., & Pompei, F. (2017). Temporary-permanent contract wage gap for young and older workers in EU-28 countries. In F. E. Caroleo, O. Demidova, E. Marelli, & M. Signorelli (Eds.), *Young people and the labour market: A comparative perspective* (pp. 82–111). London: Routledge.

Pfeffer, F., & Killewald, A. (2018). Generations of advantage: Multigenerational correlations in family wealth. *Social Forces*, *96*(4), 1411–1442.

Polavieja, J. (2003). Temporary contracts and labour market segmentation in Spain: An employment-rent approach. *European Sociological Review*, *19*(5), 501–517.

Reichelt, M. (2015). Career progression from temporary employment: How bridge and trap functions differ by task complexity. *European Sociological Review*, *31*(5), 558–572.

Reichenberg, O., & Berglund, T. (2019). "Stepping up or stepping down?": The earnings differences associated with Swedish temporary workers' employment sequences. *Social Science Research*, *82*, 126–136.

Riekhoff, A.-J. (2022). Good or bad (in)stability? A cross-cohort study of the relation between career stability and earnings mobility in Finland. *Research in Social Stratification and Mobility*, *77*, 1–11.

Rosen, S. (1986). The theory of equalizing differences. In O. Ashenfelter & R. Layard (Eds.), *Handbook of labor economics* (pp. 641–692). Amsterdam: Elsevier.

Rosenbaum, P. R. (2002). *Overt bias in observational studies*. *Observational Studies: Springer Series in Statistics*. New York, NY: Springer.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1), 41–55.

Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician*, *39*(1), 33–38.

Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology*, *66*(5), 688–701.

Rueda, D. (2005). Insider–Outsider politics in industrialized democracies: The challenge to social democratic parties. *American Political Science Review*, *99*(1), 61–74.

Rueda, D. (2014). Dualization, crisis and the welfare state. *Socio-Economic Review*, *12*(2), 381–407.

Rueda, D., Wibbels, E., & Altamirano, M. (2015). The origins of dualism. In P. Beramendi, S. Häusermann, H. Kitschelt, & H. Kriesi (Eds.), *The politics of advanced capitalism* (pp. 89–111). Cambridge: Cambridge University Press.

Rüttenauer, T., & Ludwig, V. (2023). Fixed effects individual slopes: Accounting and testing for heterogeneous effects in panel data or other multilevel models. *Sociological Methods and Research*, *52*(1), 43–84.

Ryu, K. (2018). Labor market dualism and the wage penalty for temporary employment: Evidence on the interplay of employment protection legislation and labor market institutions from PIAAC data. *Development and Society*, *47*(4), 535–562.

Scherer, S. (2009). The social consequences of insecure jobs. *Social Indicators Research*, *93*, 527–547.

Scheuring, S. (2020). The effect of fixed-term employment on well-being: Disentangling the micro-mechanisms and the moderating role of social cohesion. *Social Indicators Research*, *152*, 91–115.

Scheuring, S., Voßemer, J., Baranowska-Rataj, A., & Tattarini, G. (2021). Does fixed-term employment have spillover effects on the well-being of partners? A panel data analysis for East and West Germany. *Journal of Happiness Studies*, *22*, 3001–3021.

Schmelzer, P., Gundert, S., & Hohendanner, C. (2015). The role of fixed-term contracts at labour market entry in Germany: Screening or flexibility? *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *67*, 243–267.

Shavit, Y., & Müller, W. (Eds.) (1998). *From school to work: A comparative study of educational qualifications and occupational destinations*. Oxford: Oxford University Press.

Shin, K.-Y. (2013). Economic crisis, neoliberal reforms, and the rise of precarious work in South Korea. *American Behavioral Scientist*, *57*(3), 335–353.

Siegers, R., Belcheva, V., & Silbermann, T. (2020). SOEP-Core v35 – Documentation of Sample Sizes and Panel Attrition in the German Socio-Economic Panel (SOEP) (1984 until 2018). *SOEP Survey Papers*, *826*(Series C – Data Documentation).

Simms, M., Eversberg, D., Dupuy, C., & Hipp, L. (2018). Organizing young workers under precarious conditions: What hinders or facilitates union success. *Work and Occupations*, *45*(4), 420–450.

Snijders, T. A., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: SAGE.

Stewart, A., Forsyth, A., Irving, M., Johnstone, R., & McCrystal, S. (2016). *Creighton & Stewart's labour law*. Annandale, NSW: The Federation Press.

Struffolino, E. (2019). Navigating the early career: The social stratification of young workers' employment trajectories in Italy. *Research in Social Stratification and Mobility*, *63*, 1–17.

Studer, M., & Ritschard, G. (2016). What matters in differences between life trajectories: a comparative review of sequence dissimilarity measures. *Journal of the Royal Statistical Society*, *179*(2), 481–511.

Thomas, M., & Mulder, C. (2016). Partnership patterns and homeownership: A cross-country comparison of Germany, the Netherlands and the United Kingdom. *Housing Studies*, *31*(8), 935–963.

Valet, P., Adriaans, J., & Liebig, S. (2019). Comparing survey data and administrative records on gross earnings: Nonreporting, misreporting, interviewer presence and earnings inequality. *Quality & Quantity*, *53*, 471–491.

Van Lancker, W. (2012). The European world of temporary employment: Gendered and poor? *European Societies*, *14*(1), 83–111.

VanHeuvelen, T. (2018). Within-group earnings inequality in cross-national perspective. *European Sociological Review*, *34*(3), 286–303.

Venn, D. (2009). Legislation, collective bargaining and enforcement: Updating the OECD employment protection indicators. *OECD Social, Employment and Migration Working Papers*, *89*.

Visser, J. (2019). *ICTWSS Data base. Version 6.0*. Amsterdam: Amsterdam Institute for Advanced Labour Studies AIAS.

Voorheis, J., McCarty, N., & Shor, B. (2015). Unequal incomes, ideology and gridlock: How rising inequality increases political polarization. *SSRN Working Paper*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2649215

Wagner, G. G., Frick, J. R., & Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP): Evolution, scope and enhancements. *Schmollers Jahrbuch*, *127*(1), 139–169.

Wang, R., & Weiss, A. (1998). Probation, layoffs, and wage-tenure profiles: A sorting explanation. *Labour Economics*, *5*(3), 359–383.

Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, *58*(301), 236–244.

Westhoff, L. (2022). Wage differences between atypical and standard workers in European countries: Moving beyond average effects. *European Sociological Review*, *0*(0).

Williams, J. (2001). *Unbending gender: Why family and work conflict and what to do about it*. Oxford, New York: Oxford University Press.

Winkler, H. (2019). The effect of income inequality on political polarization: Evidence from European regions, 2002–2014. *Economics & Politics*, *31*(2), 137–162.

Winship, C., & Morgan, S. L. (1999). The estimation of causal effects from observational data. *Annual Review of Sociology*, *25*, 659–706.

Wolff, E. (2016). Household wealth trends in the United States, 1962 to 2013: What happened over the great recession? *The Russell Sage Foundation Journal of the Social Sciences*, *2*(6), 24–43.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

World Bank (2021). GDP per capita, PPP (current international $). Retrieved from https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD

Yu, W. (2012). Better off jobless? Scarring effects of contingent employment in Japan. *Social Forces*, *90*(3), 735–768.

Zucman, G. (2019). Global wealth inequality. *Annual Review of Economics*, *11*, 109–138.

Article 1: Labour market dualism and the heterogeneous wage gap for temporary employment: A multilevel study across 30 countries

Co-Author: Michael Gebel

Status: Accepted in a revised form in *Socio-Economic Review*.

Acknowledgements: The authors thank the participants of the RC28 2021 spring meeting, the ECSR 2021 online meeting, and the Bamberg Graduate School of Social Sciences (BAGSS) colloquium for their insightful comments and suggestions to earlier versions of this article.

Funding: This research has received funding from the European Research Council (ERC) under the Horizon 2020 research and innovation program (grant agreements No 758491).

Abstract

This study investigates the hourly wage gap between temporary and permanent employees across 30 countries worldwide based on Luxembourg Income Study data from 2000–2019 supplemented by other survey data. Two-stage multilevel regressions reveal wage disadvantages for temporary workers, particularly for older and medium/high-skilled workers. There is no evidence that the wage gap is stronger if employment protection for permanent contracts is higher. Instead partial deregulation matters: In countries where permanent workers are strongly protected the wage gap is larger if the use of temporary contracts is deregulated. Moreover, results suggest that the larger the size of the temporary employment segment the larger the wage gap. Thus, our findings indicate that stronger institutional and structural labour market dualism amplify labour market inequality in terms of wage gaps between temporary and permanent workers. Supplementary analysis reveal that wage disadvantages are even stronger for workers without contracts than those with temporary contracts.

1. Introduction

The dualization of the workforce into insiders and outsiders has received strong attention in scientific and societal discourses (Emmenegger et al., 2012; Rueda, 2014). In the course of labour market deregulation and flexibilization the inequality between permanent contracts and temporary (or fixed-term) contracts, i.e. contracts for a specific period/task, became of great interest (Barbieri, 2009; DiPrete, 2005; Hipp et al., 2015). There is a rich literature on the socio-economic characteristics and consequences of temporary employment in comparison to permanent employment (Kalleberg, 2000; Scherer, 2009).

Particularly, many studies investigate the wage differentials between temporary and permanent workers. These studies mainly refer to one or few rich western democracies like Australia (Mooi-Reci and Wooden, 2017), the US (Kalleberg, 2000) or European countries (Barbieri and Cutuli, 2018; Giesecke and Groß, 2004; Kiersztyn, 2016). Research using longitudinal data gained important insights into the role of unobserved heterogeneity (Booth et al., 2002), the wage dynamics (Gash and McGinnity, 2007) and the importance of studying employment patterns of temporary workers instead of single temporary employment transitions (Fauser, 2020).

There only exist few large-n comparative studies on the temporary employment wage gap. Whereas some of these studies do country-specific analyses for a limited set of countries (Comi and Grasseni, 2012; Kahn, 2016), there are only a handful of studies on the institutional and structural determinants of temporary wage gaps (Arranz et al., 2021; Ryu, 2018). This stands in contrast to the large amount of research on the role of institutional and structural factors as determinants of temporary employment (Barbieri and Cutuli, 2016; De Lange et al., 2014; Polavieja, 2006) and as moderators of the relationship between temporary employment and non-monetary outcomes (Cutuli and Guetto, 2013; Fervers and Schwander, 2015; Karabchuk and Soboleva, 2020).

In one of the few studies on the institutional and structural determinants of the temporary employment wage gap, Arranz et al. (2021) investigate the impact of the recession and labour market institutions using data for just six countries from the European Union Statistics on Income and Living Conditions (EU-SILC). They show that a stricter regulation of temporary contracts lowers the monthly wage penalty of temporary contracts. Drawing on the Survey of Adult Skills (PIAAC) for 19 countries, Ryu (2018) finds that increasing the overall strictness of employment protection legislation (EPL) widens the wage gap. Based on EU-SILC data from 13 European countries Bellani and Bosio (2021) reveal that higher shares of temporary workers

reduces the hourly wages of permanent workers. Using the Luxembourg Income Study (LIS) for 22 advanced capitalist societies Weistanner (2021) shows that deregulating the use of temporary contracts reduces the wage shares for low-income and middle-income earners but increases the wage share for high-income earners. However, the studies of Bellani and Bosio (2021) and Weisstanner (2021) have a different focus by looking at (full-time) permanent workers only, which does not allow any conclusion on the wage differential between contract types.

In this article we focus on the role of labour market dualism as a determinant of the temporary employment wage gap. Specifically, we investigate employment protection legislation (EPL) as one of the most important institutional determinants of labour market dualization (Barbieri et al., 2019; Biegert, 2019; Fervers and Schwander, 2015; Rueda, 2014) as well as the size of the temporary employment sector as a direct measure of the structural dimension of labour market dualization. To isolate the effect of these two aspects of labour market dualism we control for other institutional and structural macro-variables. We aim to contribute to this comparative literature in various ways.

First, we expand the number of countries by using harmonized cross-sectional data of the LIS (2021), which can be seen as the best data source for comparative income studies (VanHeuvelen, 2018). We supplement this database with cross-sectional data from the EU-SILC for Hungary, Poland and Portugal and the Korean Labour and Income Panel Study (KLIPS) to increase the number of countries even further, ultimately resulting in a sample of 30 countries with information on our variables of interest. The larger number of countries improves the estimation of the effects of macro-level variables (Bryan and Jenkins, 2016). We include multiple survey rounds from the years 2000 to 2019 to further increase statistical power and the robustness of our results. By studying European and non-European countries we account for Rueda et al. (2015)'s observation that labour market dualization is a worldwide phenomenon. Moreover, we can investigate how generalizable results of previous European-focused studies actually are. In addition, compared to other country-comparative data sets such as PIAAC we reach a larger sample size within each country, which allows a more precise estimation of the micro-level variables and subgroup differences.

Second, we shed light on the heterogeneity of the temporary wage gap. Whereas economic studies often use quantile regressions to study the heterogeneity of the wage gap across the wage distribution (Comi and Grasseni, 2012), we follow a more sociological approach by focusing on differences between age and occupational skill groups as key variables of social

inequality and stratification (Kiersztyn, 2016; Mooi-Reci and Wooden, 2017). This also accounts for the heterogeneity of temporary workers, who can be found across all socio-demographic groups. Our first key research question is whether there is a mutual enforcement of disadvantages in terms of an interaction effect between the labour market outsider status as a temporary worker and belonging to a disadvantaged age or occupation group.

Third, we study the heterogeneity of the relationship between labour market dualization and the temporary employment wage gap across age and occupational skill groups. This is a contribution to the research investigating the heterogeneity in the influence of institutional factors across social groups, which connects research on institutions with research on social inequalities in the labour market (Biegert, 2019; Gebel and Giesecke, 2011; Maurin and Postel-Vinay, 2005). Our second key research question is which role EPL and the size of temporary employment sector play in enforcing or weakening social inequalities in the labour market. In this regard, we follow the call of Hipp et al. (2015) who concluded in their review of research on temporary employment that there is need for more sociological research on the differentiated effects of institutions across socio-demographic groups.

Fourth, in supplementary analysis we consider the wage penalties for informal work, i.e., workers without a contract or unregistered self-employment (Gërxhani, 2004). Next to temporary workers they represent a second important group of labour market outsiders (Rueda et al*.,* 2015). This applies particularly to less wealthy countries in which the informal sector represents a key aspect of labour market dualization (Gërxhani, 2004; Medina and Schneider, 2019). Given its high degree of flexibility, informal work may act as a functional equivalent to temporary work. Similarly to the literature on the wage gap for temporary jobs, previous research on the wage gap for informal work mainly focused on single countries such as Lehmann and Pignatti (2018)' study on Ukraine. We extend previous small-N comparative studies (Danquah et al*.,* 2021) by studying the wage gap for informal work in 10 countries. Our specific contribution is that we compare the wage gaps for temporary work and informal work, whereas previous research studied these two dimensions of labour market inequality separately.

2. Theoretical background and expectations

2.1 The micro-level: General wage effects of temporary employment

The wage gap between workers with a temporary or permanent contract can be due to spurious (i.e., non-causal) and causal relationships between the type of contract and wages (Elwert and Winship, 2014). Whereas the issue of spuriousness is addressed in the method section, we focus on causal explanations in this theory section.

With the exception of the theory of compensating wage differentials (Kalleberg, 2000) theories postulate negative wage effects for temporary contracts. Labour market segmentation theory suggests that permanent contracts dominate the well-paid primary segment, whereas temporary jobs dominate the low-paid secondary segment (Barbieri and Scherer, 2009; Doeringer and Piore, 1971; Kalleberg, 2000). Segmentation coincides with a dualization of the workforce (King and Rueda, 2008; Rueda, 2005). Employers, with the support of permanent employees as insiders, have incentives to form such a secondary segment of temporary jobs as a buffer stock protecting the core workers (Emmenegger et al., 2012; Lindbeck and Snower, 1989; Rueda, 2005). Refined versions of segmentation theory suggest that temporary jobs may also be used for higher-skilled jobs in the upper primary segment that require transferable general skills and high levels of flexibility (Giesecke and Groß, 2003). Temporary contracts also often function as screening devices and entry ports into higher-skilled jobs (Scherer, 2004; Kiersztyn, 2016).

Complementary to segmentation theory, efficiency wage theory argues that employers use higher wages for permanent contracts as incentives to overcome difficulties in monitoring and higher firing costs (Güell, 2000). Furthermore, bargaining theories suggest that permanent contract holders secure a wage premium as insiders in the wage negotiation process. The insider position results from the high turnover costs of replacing permanent workers (Lindbeck and Snower, 1989) and the buffer stock of temporary workers (Polavieja, 2003).

According to human capital theory permanent workers secure higher wages as a return to their firm-specific human capital investments that are incentivized by their stronger firm attachment. In contrast, temporary jobs give low incentives for skill acquisition due to the short planning horizon (Cutuli and Guetto, 2013). No or only small wage disadvantages are expected for temporary workers in the upper primary segment as they already possess valued general skills (Kiersztyn, 2016). Screening theory predicts transitory wage penalties for temporary jobs that are used as entry ports in the primary segment (Güell, 2000; Polavieja, 2003). Screening costs – as a form of insurance against poor matching quality – are transferred to the temporary worker but compensating wage growth is expected (Amuedo-Dorantes and Serrano-Padial, 2007; Mertens and McGinnity, 2004). In a cross-sectional perspective screening theory predicts that temporary jobs used as entry ports pay less than permanent contracts but the wage gap is not expected to be as large as for temporary employees in the secondary segment where temporary jobs mainly serve as flexible buffer stocks.

2.2 The moderating role of macro-level dualization

In the following, we formulate theoretical expectations regarding the moderating role of macro-level dualization for the temporary employment wage gap. Specifically, we consider the role of EPL and the size of the temporary employment segment.

Previous research highlights that it is important to distinguish two dimensions of EPL (Bellani and Bosio, 2021; Gebel and Giesecke, 2011). While EPL for permanent contracts summarizes the procedures and costs of dismissing permanent workers, EPL for temporary contracts quantifies the restrictions on the use of temporary contracts and temporary agency work. Following the literature on dualization, employment protection of permanent contracts is often seen as an institution strengthening insiders (Arranz et al., 2021; Barbieri and Cutuli, 2016; Biegert, 2019; Rueda, 2005). Strict protection of permanent workers reduces the replicability of permanent workers with temporary workers (Bellani and Bosio, 2021). Thus, a stronger protection of permanent workers is expected to increase the wage bargaining power of permanent workers because it is more costly and difficult for employees to substitute them. It also gives both workers and employers stronger incentives to invest in firm specific skills of permanent workers (Ryu, 2018). Hence, we expect that *the wage differential between temporary and permanent workers is stronger in case of strong EPL for permanent contracts, compared to a setting with low EPL for permanent contracts (H1).*

Previous research has highlighted that regulation on temporary contracts also matters, especially in relation to the degree of protection of permanent workers (Barbieri, 2009). It is argued that insider power is strongest in dualized settings with a deregulated use of temporary contracts but strong EPL for permanent contracts (Barbieri and Cutuli, 2016). This constellation is described as partial deregulation in terms of a strong protection of permanent workers and the deregulation of temporary contracts (Barbieri and Cutuli, 2016). When the use of temporary contracts is deregulated, temporary workers do not have strong bargaining power in wage negotiations because they are trapped in cycles of temporary contracts and can be easily dismissed (Gebel and Giesecke, 2011). However, the deregulation of temporary contracts should only lead to stronger relative disadvantages compared to permanent workers if the latter have a strong wage bargaining position due to strict EPL for permanent contracts. Hence, we expect that *the wage differential between temporary and permanent workers is stronger in settings with deregulated use of temporary contracts compared to settings with regulated use of temporary contracts but only when there is strong EPL for permanent contracts (H2).*

A more direct conceptualization of labour market dualization is the size of the temporary employment segment. If there are many temporary workers, permanent workers will be shielded, which is expected to increase their bargaining power in wage negotiations (Polavieja, 2003). Economic fluctuations can be buffered by easily hiring and firing workers from the large pool of temporary workers. In such a protected environment, firms are expected to invest into the firm-specific capital of the permanent work force and pay them higher wages (Fervers and Schwander, 2015).[1] Thus, we expect that *the wage differential between temporary and permanent workers is larger in contexts where the share of temporary workers is higher (H3).*

2.3 Subgroup-specific effects: The role of age and occupation

Whereas the theoretical arguments on negative wage effects of temporary employment presented in Section 2.1 are well established, the arguments and evidence is less clear cut with regard to differences across different groups of workers. In the following we focus on age and occupation as key lines of social stratification of the workforce and indications of labour market insider/outsider positions (Barbieri, 2009; Biegert, 2019; Emmenegger et al., 2012).

Temporary jobs among older workers are more often used as a buffer stock in the secondary segment offering limited career opportunities and potentially acting as a signal of failure (Mooi-Reci and Wooden, 2017). In contrast, temporary jobs are often used as a screening device for younger workers due to their limited work experience (Högberg et al., 2019). The predominant use of temporary jobs as screening devices should only induce small wage penalties. Furthermore, younger permanent workers are still in the early phase of their career, which puts them into weaker bargaining positions and limits opportunities to fully amortize their investments into firm-specific capital in terms of higher wages. In contrast, prime-age permanent workers are more likely to be in a stronger bargaining position and having profited from firm-specific training, as they tend to have more experience and tenure. Hence, we expect *the wage differential between temporary and permanent workers to be smaller for younger workers compared to prime-age workers (H4).*

Clear theoretical predictions are more difficult to form when it comes to the comparison of the skill-specific temporary wage gap. Permanent jobs in the medium/high-skill segment are

[1] In contrast, Bellani and Bosio (2021) argue that the deregulation of temporary jobs induced a downward wage competition between labour market segments putting wage pressures on permanent employees. However, this occurs only if temporary and permanent workers are substitutes. While Bellani and Bosio (2021) find empirical support for this claim of a negative effect on the wages of permanent employees in certain occupational fields and in case of low EPL for permanent workers, we do not expect strong implications for the *wage differential* between permanent and temporary employees because there will be also downward wage pressures for temporary employees.

expected to offer better wage bargaining power and training opportunities as they tend to be more costly to substitute (Bellani and Bosio, 2021). There are also often institutional limits to wage premiums in the lower skill segment because there might be wage floors that restrict downward pressures on wages (Kiersztyn, 2016). Accordingly, we expect *the wage differential between temporary and permanent workers to be larger for workers in the medium-/high-skilled segment compared to workers in the low-skilled segment (H5a).*

Alternatively, one may argue that the use of temporary jobs as screening devices should be more common in the medium-/high-skill job segment, whereas temporary jobs are more often used as a buffer stock in the low-skilled segment. Moreover, temporary jobs may also be used in jobs in the upper primary segment that require transferable general skills and high levels of flexibility and that are well paid (Kiersztyn, 2016). Accordingly, we expect *the wage differential between temporary and permanent workers to be smaller for workers in the medium-/high-skilled segment compared to workers in the low-skilled segment (H5b).*

It becomes even more difficult to derive clear-cut hypotheses with regard to the three-way interactions, i.e., whether and how the subgroup-specific temporary wage gap is moderated by macro-level dualization. We refrain from stating explicit hypotheses and leave it up to the empirical tests to shed some light on these heterogeneities. Here, we just formulate some general tendencies as theoretical expectations. Whereas younger and low-skilled workers tend to be disadvantaged labour market groups, older workers and medium-/high-skilled workers are usually labour market insiders. It can be expected that macro-level dualization that supports insider power positively interacts with insider groups (Biegert, 2019). This should be particularly the case for a double insider status such as being a permanent high-skilled worker. For example, a two-tiered, dualized labour market with deregulated temporary contracts and strong protection of permanent contracts (Barbieri, 2009) should particularly increase the bargaining power of such privileged insider groups. Thus, the macro-level influences on the wage gap between permanent and temporary contracts formulated in H1–H3 are expected to be even stronger for older and medium/high skilled workers.

3. Analytical approach

3.1 Data and sample restrictions

We use individual-level data from the Luxembourg Income Study (LIS) database (2021), which constitutes the largest and best available harmonized microdata on employment and income worldwide (LIS, 2021; VanHeuvelen, 2018) (see Table A1 in the Appendix for more information on country datasets). We restrict our analyses to those country-rounds that include

information on contract type and other relevant variables. To maximize the number of countries, we add cross-sectional EU-SILC data for Poland, Hungary and Portugal, as well as cross-sectional data from the Korean Labour and Income Panel Study (KLIPS).[2] This yields a sample of 30 countries, which fulfils the requirements of cross-country comparative multilevel analysis (Bryan and Jenkins, 2016). To increase statistical power and the robustness of results we include all available country-rounds in the period 2000–2019. With these restrictions, we ultimately arrive at a sample of 236 country-years from 30 countries, with the number of country-rounds ranging from one (China) to 20 (South Korea) and averaging at eight rounds per country. Following previous LIS studies we restrict our main analytical sample to the core workforce of 25-55 year old dependent employees, excluding self-employed, unemployed, or inactive (also persons in education) individuals (VanHeuvelen, 2018).[3] Analytical sample sizes of country-rounds range from 1,126 in Iceland (2010) to 82,067 in Columbia (2016). Altogether our analytical sample includes 1,596,130 individuals.

3.2 Micro-level variables

Our dependent variable is the log of gross hourly wages from individuals' main job. Log hourly wages account for differences in working hours and provides estimates of effects that are comparable across countries with different currencies. Following previous studies and LIS recommendations, we drop observations with top-coded working hours (99 hours per week) and cut the wage distribution at the 1st and 99th percentiles before applying the log transformation (Mandel and Shalev, 2009).

Our main independent variable distinguishes between having a fixed-term (1 "temporary job") versus an unlimited contract in the main job (0 "permanent job"). Supplementary analysis on informal work are provided in Section 5.

To address confounding bias at the micro-level, we include gender, age and education as micro-level control variables. This also accounts for differences in the socio-economic composition of temporary workers across countries (Fervers and Schwander, 2015). Gender differentiates between men and women. Age is measured in five-year intervals. Education refers to the highest completed educational level according to the ISCED (International Standard Classification of Education) scale, which we group in three categories: low (ISCED 1+2), middle (ISCED 3+4), high (ISCED 5–8). As our interest is in the total effect of contract on wages we do not control

[2] Supplementing LIS data with national data sets has also been done by other authors, such as Mandel and Shalev (2009).
[3] Results are largely similar when we set the lower age limit to 15 instead of 25.

for variables that might be consequence of the contract to avoid overcontrol and endogenous selection bias (Elwert and Winship, 2014).[4]

However, in our analysis of three occupational subgroups, we investigate the differences in wage gaps net of occupation, which might be endogenous if occupation placement is affected by contract status and not vice versa. Based on the International Standard Classification of Occupation (ISCO) we differentiate three occupation groups: high-skilled (ISCO-1 "managers"; ISCO-2 "professionals") skilled (ISCO-3 "technicians and associate professions" to ISCO-8 "plant and machine operators") and low-skilled (ISCO-9 "elementary occupations") jobs.[5] Moreover, we perform subgroup-specific analyses for two age groups, distinguishing younger (age 25 to 35) from older workers (age 36 to 55).

3.3 Macro-level variables

We include the following macro-level explanatory variables of interest, which are time-varying country characteristics. The *size of the temporary work sector* is calculated as the temporary employment rate in each country-round by aggregating from our microdata. Based on the OECD (2020) EPL indices for permanent and temporary workers we created two dummy variables. The first dummy distinguishes between *low (=0) and high (=1) levels of EPL for permanent contracts*. The second dummy differentiates between *low (=0) and high (=1) levels of EPL for temporary contracts*, i.e., regulations on temporary contracts. We classify countries as being high (low) EPL countries if the OECD-EPL index of a given year is larger (smaller or equal) than the mean EPL for all country-rounds.[6] To test H2 the second dummy variable on EPL for temporary contracts is introduced in terms of two interaction terms: (i) interacted with a high level of EPL for permanent contracts and (ii) interacted with a low level of EPL for permanent contracts.

We control for other macro-level institutional and structural factors that may act as confounders by affecting both our macro-variables of interest and our outcome variable. For example, it is expected that the *strength of unions* influences the level of employment protection regulation (Emmenegger, 2014) and the size of the temporary work sector (Hevenstone, 2010). Moreover, unions' power in negotiating wages is seen as an institutional factor that is expected to affect wage inequality (Vlandas, 2018). According to dualization theories, unions represent collective

[4] Sensitivity analysis show that the estimated wage differentials do not differ much when including potentially endogenous control variables like marital status, number and age of children, living area, or occupation into our models.

[5] The analyses by occupation subgroups is restricted to 26 countries as the ISCO information is not available for China, Italy, Japan and South Korea.

[6] Sensitivity analysis shows that the results are largely robust against moderate variation of this cut-off point.

interests of labour market insiders, i.e., the permanent core workforce (King and Rueda, 2008; Lindbeck and Snower, 1989). There is the contrasting perspective that unions compress the wage distribution to the favour of temporary workers (King & Rueda, 2008; Ryu, 2018) and that unions became inclusive and supportive for temporary workers (Benassi and Vlandas, 2016; Fervers and Schwander, 2015; Simms *et al.*, 2018). We utilize union density to measure union power, which indicates the proportion of dependent employees who are members of a union (from ICTWSS database, Visser, 2019).

Moreover, we control for the *economic development* and *economic globalization*, which seems particularly relevant given our set of countries covering different world regions. It can be argued that these economic structural conditions affect EPL (Pilc, 2015; Potrafke, 2013), the share of temporary workers (Barbieri and Cutuli, 2016; Gebel and Giesecke, 2011) as well as wage inequality (Dreher and Gaston, 2008). Under unfavourable economic conditions and international competition, the temporary employment wage gap may increase as (downward) wage adjustments should be easier to realize for temporary workers as outsiders than for permanent workers as insiders. We measure economic development in terms of GDP per capita in 10,000 Int$ (World Bank, 2021) and use the KOF Economic Globalization Index (Gygli et al., 2019).

We also control for the *size of the informal sector*, which seems important as we include countries across the world (Gërxhani, 2004). Given its functional equivalence to temporary work by also providing flexibility we assume that the spread of informal work affects the size of temporary work, its regulatory framework and wage inequality. We expect that the larger the informal segment the stronger is the temporary employment wage gap because a large informal workforce may strengthen the bargaining power, the job security and specific human capital accumulation of insiders. We include the estimated size of the informal employment sector in percent of a country's official GDP, as the informal economy refers to all economic activities which are hidden from official authorities but which would contribute to a country's GDP if they were recorded (Medina and Schneider, 2019).

Unfortunately not all macro indicators are available for all countries such that not all 236 country-round first-stage results on wage gaps enter our second-stage analysis.[7] Table A2 (see

[7] To reduce missings we replace missing macro-level measures with values of the previous or the following year if these are available.

Appendix) provides descriptive statistics on the macro indicators of interest and the macro-level control variables.

3.4 Method

Our data set has a three-level structure where individuals *i* are nested in country-rounds *t*, which are nested in countries *c*. The three-level model can be written at the individual level as

$$Y_{itc} = \beta_{0tc} + \beta_{1tc} temp_{itc} + \sum_{j=2}^{J} \beta_{jtc} X_{jitc} + e_{itc} \quad (1)$$

where Y_{itc} reflects an individual *i*'s gross hourly wage in country-round *t* and country *c*. The micro-level variable of interest $temp_{itc}$ is an individual *i*'s type of contract. X_{jitc} represent individual-level control variables (gender, age and education) and e_{itc} is the individual-level error term. The model has the highest degree of flexibility given that the intercept and all slope coefficients are allowed to vary across country-rounds *t* and countries *c*. The variation in the slope coefficient of interest, β_{1tc}, i.e., the effect of the type of contract on wages, is modelled as a function of time-varying macro-level variables Z_{qtc} (size of temporary sector, EPL, GDP, union density, KOF globalization index) and a macro-level error term v_{1tc}:

$$\beta_{1tc} = \gamma_{10} + \sum_{q=1}^{Q} \gamma_{1q} Z_{qtc} + v_{1tc} \quad (2)$$

This multilevel model can be estimated either simultaneously or in a two-stage approach (Franzese, 2005; Lewis and Linzer, 2005). We employ the two-stage approach as it is superior if there are few cases on the higher level as it is the case in comparative microdata research (Heisig *et al.,* 2017).

In the first stage, equation (1) is estimated in separate linear regression models for each of the 236 country-years in our sample. In line with previous LIS studies, we use population weights in the micro-level regressions (Brady and Bositc, 2015; VanHeuvelen, 2018). The two-step approach has the advantage of full flexibility in the model specification because all slope coefficients, including the ones of the micro-level control variables, are allowed to vary across countries and time without imposing any further distributional assumptions. Estimating an equivalent simultaneous multilevel model would require the specification of a random intercept and random slopes for each micro-level variable. Next to the strict joint multivariate normal distribution of the random parameters the estimation of such a model is infeasible in large-scaled data sets such as the LIS. Given the large number of observations in each country-round the typical argument of the need of "borrowing strength" across macro-level units in a simultaneous estimation does not apply in our case. Another advantage of the two-step procedure is that the results of the first-step estimation allow nice descriptions and visualizations of the wage effect of temporary contracts.

In the second stage, the estimated first-stage parameters $\hat{\beta}_{1tc}$ are regressed on macro-level variables according to equation (2). This allows us to investigate the influence of country-level institutions (i.e., EPL and size of temporary workforce.) on the macro-level variation of wage gaps between temporary and permanent employment. As suggested by Lewis and Linzer (2005) and implemented in the Stata twostep-ado by Kohler and Giesecke (2021) we apply an Estimated Dependent Variable (EDV)-correction by a feasible generalized least square estimator, which accounts for uncertainties in the first-stage parameter estimation next to the macro-level error term of the second-stage regression. We cluster standard errors at the country-level to account for the fact that various rounds are included for each country, which generates dependencies within a country across time.

Besides studying all workers jointly, we perform subgroup-specific analysis for two age and three occupation subgroups. This is implemented by performing the two-stage multilevel analyses separately for each subgroup. This subgroup analysis uncovers if the subgroup differences in wage differentials found by single country studies (Kiersztyn, 2016; Mooi-Reci and Wooden, 2017) generalize to a larger and more diverse country selection and broader observation period. Moreover, it allows us to test our expectations on three-way interactions, i.e., if the effects of labour market institutions is heterogeneous across worker groups.

4. Results

4.1 First-stage analysis of the two-stage multilevel analysis

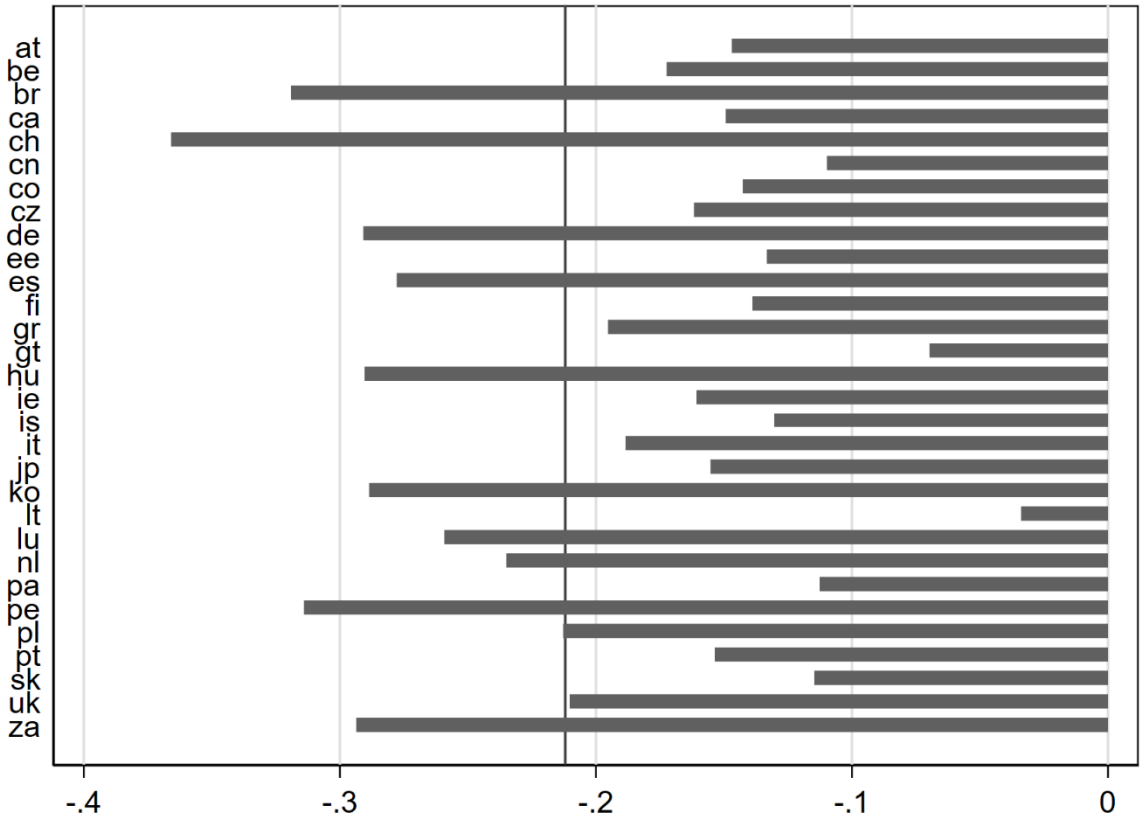
Figure 1 presents the log wage gap estimates obtained by the first-step separate linear regressions for the 236 country-rounds. Specifically, we present the average conditional wage gap across all respective country-rounds. Conditional wage gap means the wage gap after controlling for the micro-level confounding variables. The average is taken for each country across all available rounds.

We see wage disadvantages associated with temporary employment in all countries, with an average wage gap across all country-rounds of -0.21 log points (i.e. -19%[8]). There are large cross-country variations. The wage gap ranges from -3% in Lithuania to -31% in Switzerland.

Hardly any clear country patterns emerge regarding world regions or along the lines of typical welfare state or labour market regimes (Ferragina and Filetti, 2022). Complementary to the strong variation in the prevalence of nonstandard work within welfare regime types documented by Hipp et al. (2015), we find a strong variation in the temporary employment wage gap within

[8] To get percent from log points: ($e^{ß}$ – 1) multiplied by 100.

Figure 1 Average conditional wage gaps per country across all country-rounds



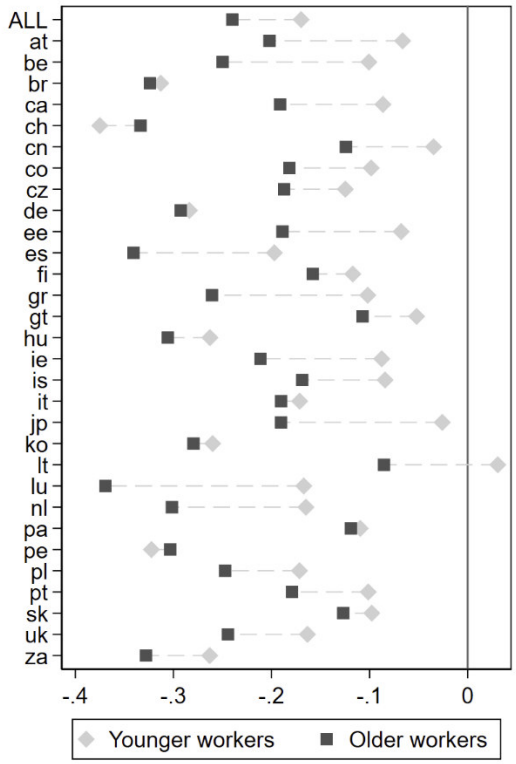
Notes: Country averages of the results of the first stage regression of log gross hourly wages on type of contract, controlled for gender, age and educational level. The dark grey vertical line denotes the average over all countries and rounds.
Sources: Own calculations based on LIS data, supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data (2000-2019). N (country-rounds)=236.

regimes. For example, in Continental (Conservative) European countries, Germany is among the countries with the highest wage gap (-25%), whereas the wage gap is below the sample average for Belgium (-16%) and even smaller for Austria (-14%). We observe below average wage gaps both in the Nordic (Social-Democratic) countries Iceland (-12%) and Finland (-13%) and in the liberal countries Canada (-14%) and Ireland (-15%). However, among liberal countries, we also observe a large gap in Switzerland (-31%) and an average gap in the UK (-19%). For Central and Eastern European Countries, wage gap estimates are again rather heterogeneous, ranging from the smallest gap in Lithuania (-3%) to a rather large one for Hungary (-25%). In between this range, we find the wage gaps for Slovakia (-11%), Estonia (-12%), the Czech Republic (-15%), and Poland (-19%). Among Southern European countries, wage gaps are below the average (Portugal with -14% and Italy with -17%), and above the average (Spain with -24%). Likewise, for the included Asian countries we observe a low gap

in China (-10%), a below average gap in Japan (-14%) and a relatively large gap in South Korea (-25%). We also uncover rather mixed findings for Central and South American countries, with small wage gaps in Guatemala (-7%), Panama (-11%), and Colombia (-15%) and a large wage gap in Peru (-27%) and Brazil (-27%).

Results from stratified analyses by age and occupation subgroups presented in Figures 2 and 3 confirm on average previous single country findings and our expectations formulated in H4 and H5a. The wage gap tends to be larger for workers in high-skilled and medium-skilled occupations compared to lower-skilled occupations (Kiersztyn, 2016) and for prime-age workers compared to younger workers (Mooi-Reci and Wooden, 2017). The finding that the wage gap is on average larger for prime-age (-21%) compared to younger workers (-16%) is almost univocal (Figure 2). The only exceptions are Switzerland and Peru, where the wage gap is larger for younger workers than for older ones. On average, the wage gap amounts to -15% in high-skilled, -18% in medium-skilled and -13% in low-skilled occupations (Figure 3). In contrast to the almost universal age-gradient, there are

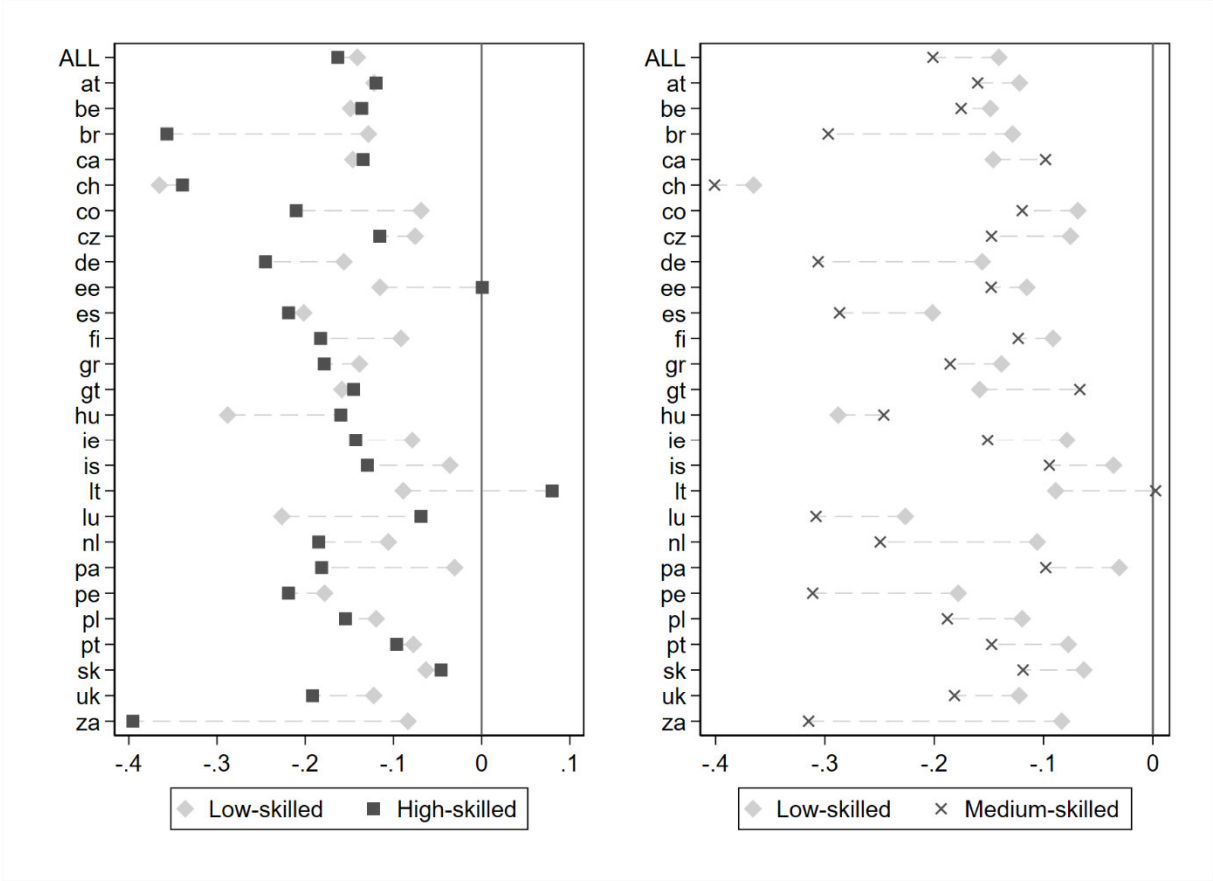
Figure 2 Average conditional wage gaps across all country-rounds, younger vs. older workers



Notes: Country averages of the results of the first stage regression of log gross hourly wages on type of contract, controlled for gender, age and educational level.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019. N (country-rounds)=236.

Figure 3 Average conditional wage gaps across all country-rounds, low-skilled vs. high-skilled and low-skilled vs. medium-skilled workers



Notes: Country averages of the results of the first stage regression of log gross hourly wages on type of contract, controlled for gender, age and educational level.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019. N (country-rounds)=206.

stronger country differences in the occupational skill-specific wage gradient. The wage gaps are larger for low-skilled compared to high-skilled occupations in Austria, Belgium, Canada, Switzerland, Estonia, Guatemala, Hungary, Lithuania, Luxembourg and Slovakia. Moreover, the wage gap is larger for workers in low-skilled compared to medium-skilled occupations in Canada, Guatemala, Hungary and Lithuania.

4.2 Second-stage analysis of the two-stage multilevel analysis

As described before, the second-stage analysis of the two-stage multilevel approach investigates the effect of the macro-level variables of interest on the first-stage wage gap estimates. We conduct the second-stage analysis for the full sample of workers as well as for subgroups. Results of the second-stage estimation are displayed in Table 1 to 3, each Table represents results for one of hypothesis H1 to H3. It is important to note that, as the estimated wage gaps are almost always negative, a negative coefficient means that this macro-variable enlarges the

wage gap between contract types. In contrast, a positive coefficient indicates that this macro-variable shrinks the wage disadvantage associated with temporary employment.

Results on the full sample of workers show that in settings where the protection of permanent workers is strict, in comparison to when EPL permanent is not strict, wage gaps between contract types do not increase as expected in H1 (Table 1). The effect is statistically insignificant. We also do not find the expected widening of a strict EPL permanent setting on the wage gap in any of the age or occupation worker subgroups. In contrast to H1, for low-skilled workers, we even find that strict EPL for permanent workers reduces the wage gap.

In Table 1, the regulations on temporary contracts act as a control variable next to the other macro-level characteristics. It must be noted that the effect of a control variable must be very carefully interpreted as it represent the remaining direct effect net of the other variables and not the total effect. Moreover, the direct effect may be subject to confounding bias as the model was not build with the intention to address confounding bias of the control variables but only of the explanatory variable of interest (Keele et al., 2020). Results show that a stricter regulation of temporary contracts decreases wage gaps for the full sample and some subgroups. Stronger unions are associated with a lower wage inequality between contracts, which is an indication

Table 1 Effect of EPL perm on conditional wage gap of temporary employment (H1)

	Full sample	Younger workers	Older workers	Low-skilled	Medium-skilled	High-skilled
EPL perm high	0.029	0.037	0.006	0.051*	0.011	0.039
	(0.024)	(0.031)	(0.018)	(0.024)	(0.034)	(0.024)
EPL temp high	0.043+	0.045*	0.046*	0.067**	0.039	0.025
	(0.021)	(0.021)	(0.021)	(0.022)	(0.029)	(0.020)
Union density	0.001*	0.002**	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	0.001	0.002	-0.000	-0.005***	0.002	0.004**
Globalization Index	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
GDP per capita	-0.028*	-0.022+	-0.035**	-0.037	-0.027	-0.014
	(0.012)	(0.012)	(0.013)	(0.023)	(0.016)	(0.016)
Size of informal	-0.005	-0.003	-0.008*	-0.018**	-0.002	0.004
sector	(0.004)	(0.005)	(0.003)	(0.005)	(0.005)	(0.005)
N (country-rounds)	224	224	224	194	194	194

Notes: Results of the second stage of the two-stage multilevel approach. +p<0.10, *p < 0.05, **p < 0.01, ***p < 0.001, standard errors (clustered on country-level) in parentheses.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019.

that unions do not dualize but compress contract-based wage differentials. The moderating union effect is statistically significant for the full sample and for younger workers. There is a negative association between GDP and the temporary employment wage gap, which suggest that the temporary employment wage gap increases under favourable economic conditions. The moderating GDP effect is statistically significant for the full sample and for the age subgroups but not for the skill groups. The direct effect of globalization is less straightforward, increasing wage gaps for low-skilled workers and decreasing it for high-skilled workers. Additionally, a larger informal sector tends to amplify wage gaps for temporary workers. The moderating effect of the informal sector size are statistically significant for older and low-skilled workers.

In line with H2 we find in Table 2 that the relative strictness of EPL temporary matters for the size of temporary wage gaps only in settings of strict protection of permanent workers. When protection of permanent workers is strong, a high regulation of temporary contracts decreases the temporary employment wage gap in the full sample by 0.063 log points (6.5 percentage points) in comparison to when the regulation of temporary contracts is low. The coefficient is statistically significant at 1% with clustered standard errors. Put differently, in settings of partial deregulation, that is where the protection of permanent workers is high and the regulations on temporary contracts are low, the wage gap is more pronounced compared to settings where both EPL indices are high. In contrast, we find no evidence for an effect of the regulation of temporary workers in settings where EPL permanent is low.[9]

Our subgroup-specific analyses test whether the impact of the EPL setting is more pronounced for certain groups of workers. They reveal that effects are rather similar for younger workers and older workers. Effects slightly vary between occupational skill groups. In settings where EPL permanent is strict, a high regulation (compared to a low regulation) of temporary contracts decreases wage gaps more for medium-skilled and for low-skilled workers than for high-skilled workers. Effects are statistically significant for medium-skilled workers at the 5% level and for low-skilled workers at the 10% level but statistically insignificant for high-skilled workers. Contrary to our expectation, it seems that institutional dualization in terms of partial deregulation in context of strongly protected permanent contracts creates smaller advantages for privileged insider groups. In contrast, in the less privileged medium-skill and low-skill segments the wage segmentation across contracts is strengthened in the context of partial

[9] An interesting side finding is that a stricter EPL for permanent contracts statistically significantly reduces the wage gap only in the context of a high regulation of temporary contracts.

Table 2 Effect of EPL temp in settings of strict EPL perm on conditional wage gap of temporary employment (H2)

	Full sample	Younger workers	Older workers	Low-skilled	Medium-skilled	High-skilled
EPL temp high*	0.063**	0.065*	0.067***	0.054+	0.061*	0.034
EPL perm high	(0.019)	(0.023)	(0.017)	(0.026)	(0.026)	(0.021)
EPL temp high*	-0.020	-0.023	-0.019	0.117	-0.052	-0.015
EPL perm low	(0.063)	(0.068)	(0.058)	(0.078)	(0.090)	(0.084)
EPL perm high	0.004	0.012	-0.019	0.070+	-0.015	0.029
	(0.036)	(0.048)	(0.027)	(0.037)	(0.043)	(0.032)
Union density	0.001	0.001+	0.000	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	-0.000	0.000	-0.001	-0.004*	0.000	0.003
Globalization Index	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
GDP per capita	-0.023	-0.017	-0.030*	-0.039	-0.023	-0.012
	(0.014)	(0.014)	(0.014)	(0.023)	(0.016)	(0.016)
Size of informal	-0.004	-0.002	-0.007	-0.017**	-0.001	0.004
sector	(0.004)	(0.005)	(0.003)	(0.005)	(0.005)	(0.005)
N (country-rounds)	224	224	224	194	194	194

Notes: Results of the second stage of the two-stage multilevel approach. +p<0.10, *p < 0.05, **p < 0.01, ***p < 0.001, standard errors (clustered on country-level) in parentheses.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019.

deregulation. However, the group-specific differences should not be exaggerated as differences are relatively small.

Table 3 reports the analyses we performed to test H3. Results show a statistically significant impact of the size of the temporary workforce on wage gaps. In support of H3, we see for the full sample of workers that a higher share of temporary workers increases the wage gap between permanent and temporary workers. Specifically, a one percentage point increase in the share of temporary workers, increases the wage gap between contract types by -0.003 log points (0.3 percentage points). The effect is statistically significant at the 5% level.

Subgroup-specific analyses reveal that the effect of the size of the temporary work sector is marginally stronger for older workers (0.3 percentage points) than for younger ones (0.2 percentage points). While the former effect is statistically significant at the 1% level, the latter is statistically insignificant. Effects are also stronger for medium-skilled workers (0.5 percentage points, p<0.05) and high-skilled workers (0.6 percentage points, p<0.01). In contrast, there is

Table 3 Effect of the share of temporary workers on conditional wage gap of temporary employment (H3)

	Full sample	Younger workers	Older workers	Low-skilled	Medium-skilled	High-skilled
Temp rate	-0.003*	-0.002	-0.003**	0.006**	-0.005*	-0.006**
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
EPL perm high	0.021	0.022	-0.002	0.021	0.015	0.059+
	(0.039)	(0.051)	(0.030)	(0.032)	(0.043)	(0.032)
EPL temp high*	0.057**	0.062*	0.061***	0.063**	0.043	0.013
EPL perm high	(0.021)	(0.024)	(0.019)	(0.014)	(0.029)	(0.022)
EPL temp high*	-0.020	-0.024	-0.021	0.124+	-0.059	-0.044
EPL perm low	(0.062)	(0.068)	(0.057)	(0.067)	(0.091)	(0.074)
Union density	0.001	0.001+	0.000	0.002	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	-0.002	-0.001	-0.003*	-0.002	-0.002	0.001
Globalization Index	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
GDP per capita	-0.022	-0.016	-0.028+	-0.036+	-0.016	-0.005
	(0.014)	(0.014)	(0.014)	(0.021)	(0.016)	(0.015)
Size of informal	-0.003	-0.001	-0.007+	-0.018***	0.002	0.007
sector	(0.004)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)
N (country-rounds)	224	224	224	194	194	194

Notes: Results of the second stage of the two-stage multilevel approach. +p<0.10, *p < 0.05, **p < 0.01, ***p < 0.001, standard errors (clustered on country-level) in parentheses.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019.

even an opposing effect for low-skilled workers as the temporary employment wage gap decreases the larger the size of the temporary work sector is (p<0.01). Overall, this is some indication that macro-level dualization, measured via the size of the temporary employment sector, strengthens the temporary employment wage gap particularly among privileged insider groups.

5. Supplementary analysis on informal employment

One important contribution of our study is the broad geographical coverage, which also includes less developed countries. Arguably, however, this diversity comes at the cost of increased heterogeneity of labour market structures. Specifically, in lower and middle-income countries, informal employment instead of temporary workers might be more important in buffering market volatilities and protecting the core workforce (Gërxhani, 2004). These forms of employment are not based on any (official) employment contract or covered by labour law and excluded from social security benefits. Given its high degree of flexibility, informal work may act as a functional equivalent to temporary contracts to circumvent strict employment

regulations and to reduce labour costs (King and Rueda, 2008). Strong regulations, high taxes and low tax morale, weak labour law enforcement, corruption, low job quality and welfare arrangements in the formal sector, strong social networks, high social trust and low institutional trust are often seen as determinants of informal work (Adriaenssens and Hendrickx, 2015; Gërxhani, 2004). Individuals end up in informal work either because they are excluded from formal work, or they voluntary choose informal work (Gërxhani, 2004; Williams and Horodnic, 2019). The predominant view is that informal work is precarious work characterized by poor working conditions and low wages (Lehmann and Pignatti, 2018; Williams and Horodnic, 2019).

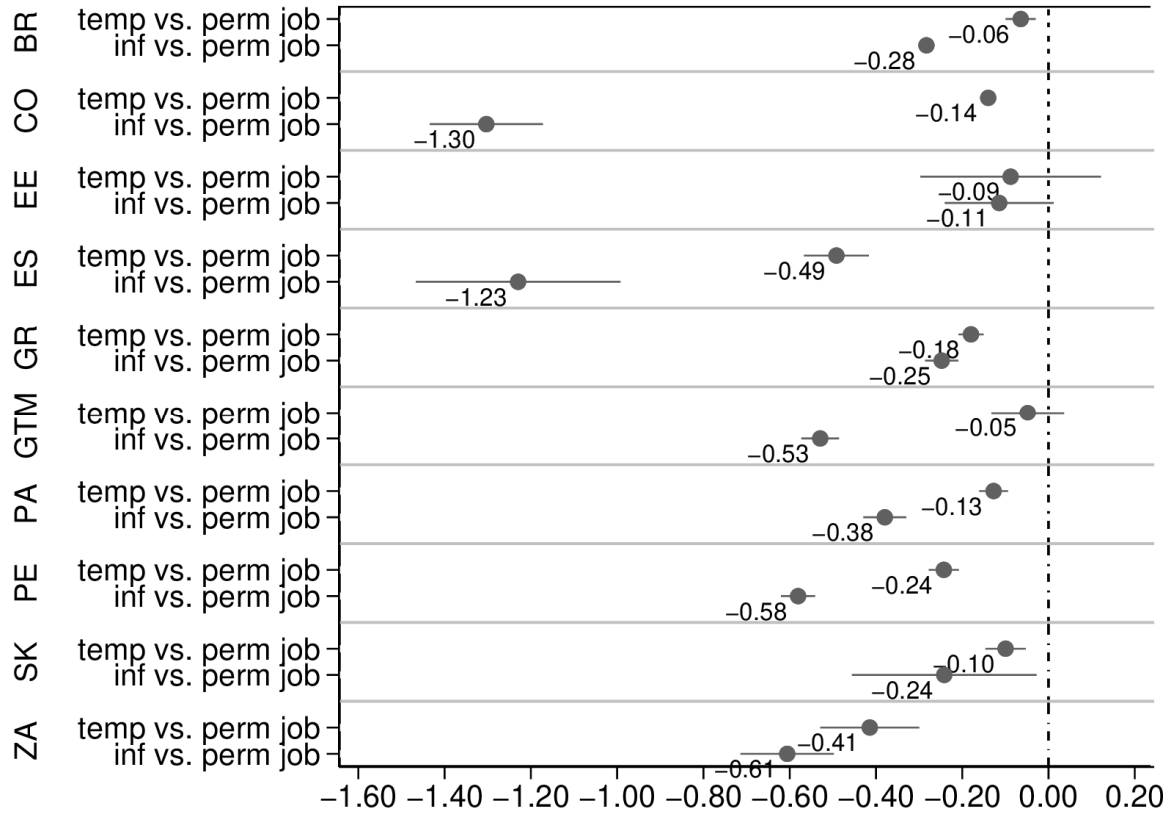
For some countries, the LIS database includes information on informal employment, which gives us the opportunity to study the informal wage penalty next to the temporary wage penalty. Namely, these countries are Brazil, Colombia, Estonia, Spain, Greece, Guatemala, Panama, Peru, Slovakia, and South Africa. We define informal work as dependent work without formal work contracts as well as unregistered self-employment.[10] We utilize the most recent LIS data for each of the countries and define three distinct types of employment. The first category refers to workers who work on formal permanent work contracts. These workers constitute the reference category. Our first treatment group refers to workers who work on formal temporary work contracts[11], while the second treatment group refers to all workers who state that their job is informal (i.e., without a written contract). Remember that we exclude self-employed workers from the main analysis, however as many informal workers identify themselves as being self-employed the supplementary analysis only excludes self-employed workers in the *formal* sector.

Figure 4 shows the adjusted log hourly wage gaps associated with informal as well as temporary employment. For each country the first effect refers to the temporary wage gap, while the second effect refers to the informal wage gap. First, we see that even when we exclude informal workers, we still observe wage gaps between temporary workers and permanent workers in all of the included countries. Second, there are wage disadvantages also associated with informal employment compared to formal employment. While cross-country variation is large, there is

[10] There are alternative definitions in terms of undeclared taxable (main or supplementary) income, undeclared economic transactions, non-coverage by mandatory social security, which cannot be applied based on LIS data (Williams and Horodnic, 2019).

[11] We do not exclude informal workers from our main analysis as we only have this information for some countries. Thus, in the case that informal workers also gave information on type of contract (temporary vs. permanent) they are included in the main analysis on temporary wage gaps in order to have the same sample selection in all included countries.

Figure 4 Comparison of conditional wage gaps for temporary and informal jobs across countries



Notes: Differences in log gross hourly wages by type of job, controlled for gender, age and educational level.
Source: 2016 LIS data (2015 for ZA and 2014 for GTM).

the general pattern that the informal wage gap is bigger than the temporary wage gap in each country. On average across all countries, the temporary wage gap amounts to -17%, while the informal wage gap amounts to more than double than that with -43%.

The results highlight that the wage gap associated with informal employment is even more substantial than the wage gap for temporary employment. Another important finding is that there are also non-negligible wage disadvantages for temporary workers in the formal sector. Thus, temporary employment seems to constitute another important dimension of labour market segmentation even in countries where the informal economy supposedly functions as the main driver of labour market inequality. These findings also give rise to further research questions on the interplay of the two wage gaps and the macro-level determinants. However, given the limited numbers of countries with information on informal work, such multilevel analyses are out of the scope of this paper but should be addressed in future research if appropriate multilevel data becomes available.

6. Discussion and conclusion

With this study, we aim to contribute to the scarce literature investigating the role of institutional and structural labour market dualization in explaining wage gaps between temporary and permanent employment. We utilize LIS data from the period of 2000 to 2019 and a two-stage multilevel approach on a diverse worldwide set of 30 countries.

Our results reveal wage disadvantages for temporary workers in all 30 countries but also strong cross-country variations. Furthermore, while, we on average confirm heterogeneous wage disadvantages found by previous small-N studies for different worker subgroups, these findings are far from universal. The most consistent finding is that younger temporary workers experience smaller wage gaps than older temporary workers. In the sense that employers use temporary contracts as screening devices especially for labour market entrants, for whom they can then act as a stepping-stone to permanent employment, the observed smaller wage gap for younger workers might also be considered as transitory (Wang and Weiss, 1998). In contrast, the larger wage gap observed for older temporary workers may even lead to stigmatization and future wage disadvantages as past experiences of temporary employment could be considered as a deviation of the "ideal worker" norm, especially for prime aged (male) workers (Mooi-Reci and Wooden, 2017).

Regarding wage gap differences for different skill-groups of workers, we find that on average wage gaps are highest for medium-skilled workers, followed by high-skilled and low-skilled workers, although there are some country exceptions. Overall, our results nonetheless seem to support the assumption that medium/higher-skilled permanent workers are especially hard to replace, thus enjoying higher wage bargaining power. Concerning our first key research question our findings thus do *not* point to a mutual enforcement of disadvantages due to being a temporary worker with belonging to a more disadvantage labour market group (i.e., younger and low-skilled workers).

Regarding the influence of EPL, we find no support that wage gaps are amplified in settings where permanent workers are strongly protected. This adds to recent findings showing that strong EPL is not harmful but even buffers unemployment earnings scarring (Gonalons-Pons and Gangl, 2022). What matters is the interaction of EPL settings. Our results indicate that it is especially partial deregulation that increases labour market inequalities in terms of wage gaps. Specifically, we find that in settings of strong protection of permanent workers, wage gaps increase if the use of temporary contracts is deregulated in comparison to when it is more

regulated. Effects of this dualized regulatory setting are rather homogenous across the age and occupational-skill groups that we consider in subgroup-specific analyses.

Furthermore, we find that the larger the temporary employment segment is the larger is the temporary wage gap. Hence, our study produces consistent findings when using an institutional measure of labour market dualization in terms of partial deregulation or when using a structural measure of labour market dualization in terms of the size of the temporary employment sector. For the structural measure, there is some indication that dualization strengthens the temporary employment wage gap particularly among privileged insider groups. Our subgroup-specific analyses show that the effect of the size of the temporary work sector is marginally stronger for older than for younger workers as well as for medium-/high-skilled compared to low-skilled workers. For low-skilled workers we even find the reversed effect as the temporary wage gap declines the larger the temporary employment sector is. This might be explained by a higher replaceability of permanent workers in the low-skilled occupational sectors, decreasing their bargaining position (Bellani and Bosio, 2021).

We have to keep several limitations in mind when reviewing these results. By including as many countries as possible, we had to rely on a cross-sectional design both at the micro and macro level. As Arranz et al. (2021) highlight there are no large-scale comparative panel data available to estimate the temporary employment wage gap. The EU-SILC longitudinal data unfortunately lack key information in this respect, as this dataset does not include any variables on current labour income that could be precisely linked to current type of employment for most countries. Although we include multiple survey years for each country, the lack of sufficient variation of EPL measures over time keeps us from utilizing the time dimension at the macro level in a country-level fixed-effects framework. We tried to account for confounding bias by controlling for other observed macro-structural and other institutional factors. Due to limited sets of variables in our data sets, we were also only able to account for a limited set of confounding variables at the micro-level, too. Overall, we must emphasize that our estimates both at the micro and the macro level are subject to confounding bias due to unobserved confounding variables and, thus, should be given a careful interpretation.

Furthermore, due to space limitations, it has not been our ambition to study a full set of possible macro-level institutional and structural determinants of the temporary wage gap. The results of our macro-level institutional and structural control variables give only limited insights into the role of other macro-factors as our models were not build to identify and estimate the effect of

each macro-variable. Future research should zoom into the role of other macro-level institutional and structural determinants that we have not considered here in detail.

Despite these limitations, the results of our study still manage to emphasize that it is the relative strictness of EPL settings that is important, with partial deregulation increasing wage inequality between contract types. Finally, the fact that our first-stage wage gap estimations do not reveal clear country patterns along the lines of usual typologies, calls into question if welfare regime based approaches can be specific enough to disentangle the large cross-country variation observable in the rate of temporary employment and the magnitude of wage gaps (Hipp et al., 2015).

References

Adriaenssens, S. & Hendrickx, J. (2015). Can informal economic activities be explained by social and institutional factors? A comparative analysis, *Socio-Economic Review,* 13(4), 627–649.

Amuedo-Dorantes, C. & Serrano-Padial, R. (2007). Wage growth implications of fixed-term employment: An analysis by contract duration and job mobility, *Labour Economics,* 14(5), 829–847.

Arranz, J., Fernández-Macías, E. & García-Serrano, C. (2021). Wage differentials and segmentation: The impact of institutions and changing economic conditions, *European Journal of Industrial Relations,* 27(2), 203–227.

Barbieri, P. (2009). Flexible employment and inequality in Europe, *European Sociological Review,* 25(6), 621–628.

Barbieri, P. & Cutuli, G. (2016). Employment protection legislation, labour market dualism, and inequality in Europe, *European Sociological Review,* 32(4), 501–516.

Barbieri, P. & Cutuli, G. (2018). Dual labour market intermediaries in Italy: How to lay off "lemons"—Thereby creating a problem of adverse selection, *De Economist,* 166, 477–502.

Barbieri, P., Cutuli, G., Luijkx, R., Mari, G. & Scherer, S. (2019). Substitution, entrapment, and inefficiency? Cohort inequalities in a two-tier labour market, *Socio-Economic Review,* 17(2), 409–431.

Barbieri, P. & Scherer, S. (2009). Labour market flexibilization and its consequences in Italy, *European Sociological Review,* 25(6), 677–692.

Bellani, D. & Bosio, G. (2021). Knockin' on heaven's door? Reframing the debate on temporary employment and wages: Evidence from Europe, *Socio-Economic Review,* 19(3), 869–907.

Benassi, C. & Vlandas, T. (2016). Union inclusiveness and temporary agency workers: The role of power resources and union ideology, *European Journal of Industrial Relations*, 22(1), 5–22.

Biegert, T. (2019). Labor market institutions, the insider/outsider divide and social inequalities in employment in affluent countries, *Socio-Economic Review,* 17(2), 255–281.

Booth, A. L., Francesconi, M. & Frank, J. (2002). Temporary jobs: Stepping stones or dead ends?, *The Economic Journal,* 112(480), F189–F213.

Brady, D. & Bositc, A. (2015). Paradoxes of social policy: Welfare transfers, relative poverty, and redistribution preferences, *American Sociological Review,* 80(2), 268–298.

Bryan, M. L. & Jenkins, S. P. (2016). Multilevel modelling of country effects: A cautionary tale, *European Sociological Review,* 32(1), 3–22.

Comi, S. & Grasseni, M. (2012). Are temporary workers discriminated against? Evidence from Europe, *The Manchester School,* 80(1), 28–50.

Cutuli, G. & Guetto, R. (2013). Fixed-term contracts, economic conjuncture, and training opportunities: A comparative analysis across European labour markets, *European Sociological Review,* 29(3), 616–629.

Danquah, M., Schotte, S. & Sen, K. (2021). Informal work in sub-Saharan Africa: Dead end or stepping-stone?, *IZA Journal of Development and Migration,* 12(1).

De Lange, M., Gesthuizen, M. & Wolbers, M. H. J. (2014). Youth labour market integration across Europe: The impact of cyclical, structural, and institutional characteristics, *European Societies,* 16(2), 194–212.

DiPrete, T. A. (2005). Labor markets, inequality, and change: A European perspective, *Work and Occupations,* 32(2), 119–139.

Doeringer, P. B. & Piore, M. J. (1971). *Internal labor markets and manpower analysis,* Lexington, Heath.

Dreher, A. & Gaston, N. (2008). Has globalization increased inequality?, *Review of International Economics,* 16(3), 516–536.

Elwert, F. & Winship, C. (2014). Endogenous selection bias: The problem of conditioning on a collider variable, *Annual Review of Sociology,* 40, 31–53.

Emmenegger, P. (2014). *The power to dismiss: Trade unions and the regulation of job security in Western Europe,* Oxford, UK, Oxford University Press.

Emmenegger, P., Häusermann, S., Palier, B. & Seelbei-Kaiser, M. (eds) (2012). *The age of dualization: The changing face of inequality in deindustrializing societies,* Oxford, New York, Oxford University Press.

Fauser, S. (2020). Career trajectories and cumulative wages: The case of temporary employment, *Research in Social Stratification and Mobility,* 69, 1–13.

Ferragina, E. & Filetti, F. D. (2022). Labour market protection across space and time: A revised typology and a taxonomy of countries' trajectories of change, *Journal of European Social Policy,* 32(2), 148-165.

Fervers, L. & Schwander, H. (2015). Are outsiders equally out everywhere? The economic disadvantage of outsiders in cross-national perspective, *European Journal of Industrial Relations,* 21(4), 369–387.

Franzese, R. (2005). Empirical strategies for various manifestations of multilevel data, *Political Analysis,* 13(4), 430–446.

Gash, V. & McGinnity, F. (2007). Fixed-term contracts - the new European inequality?: Comparing men and women in West Germany and France, *Socio-Economic Review,* 5(3), 467–496.

Gebel, M. & Giesecke, J. (2011). Labor market flexibility and inequality: the changing skill-based temporary employment and unemployment risks in Europe, *Social Forces,* 90(1), 17–39.

Gërxhani, K. (2004). The informal sector in developed and less developed countries: A literature survey, *Public Choice,* 120, 267–300.

Giesecke, J. & Groß, M. (2003). Temporary employment: Chance or risk?, *European Sociological Review,* 19(2), 161–177.

Giesecke, J. & Groß, M. (2004). External labour market flexibility and social inequality. Temporary employment in Germany and the UK, *European Societies,* 6(3), 347–382.

Gonalons-Pons, P. & Gangl, M. (2022). Regulated earnings security: The relationship between employment protection and unemployment scarring over the Great Recession, *Socio-Economic Review*, 20(1), 169–198.

Güell, M. (2000). Fixed-term contracts and unemployment: An efficiency wage analysis, *Industrial Relations Section Working Papers,* 433, 1–41.

Gygli, S., Haelg, F., Potrafke, N. & Sturm, J. E. (2019). The KOF Globalisation Index – revisited, *The Review of International Organizations,* 14, 543–574.

Heisig, J. P., Schaeffer, M. & Giesecke, J. (2017). The costs of simplicity: Why multilevel models may benefit from accounting for cross-cluster differences in the effects of controls, *American Sociological Review,* 82(4), 796–827.

Hevenstone, D. (2010). National context and atypical employment, *International Sociology,* 25(3), 315–347.

Hipp, L., Bernhardt, J. & Allmendinger, J. (2015). Institutions and the prevalence of nonstandard employment, *Socio-Economic Review,* 13(2), 351–377.

Högberg, B., Strandh, M. & Baranowska-Rataj, A. (2019). Transitions from temporary employment to permanent employment among young adults: The role of labour law and education systems, *Journal of Sociology,* 55(4), 689–707.

Kahn, L. M. (2016). The structure of the permanent job wage premium: Evidence from Europe, *Industrial Relations,* 55(1), 149–178.

Kalleberg, A. L. (2000). Nonstandard employment relations: part-time, temporary and contract work, *Annual Review of Sociology,* 26, 341–365.

Karabchuk, T. & Soboleva, N. (2020). Temporary employment, informal work and subjective well-being across Europe. Does labor legislation matter?, *Journal of Happiness Studies,* 21, 1879–1901.

Keele, L., Stevenson, R. T. & Elwert, F. (2020). The causal interpretation of estimated associations in regression models, *Political Science Research and Methods,* 8(1), 1–13.

Kiersztyn, A. (2016). Fixed-term employment and occupational position in Poland: The heterogeneity of temporary jobs, *European Sociological Review,* 32(6), 881–894.

King, D. & Rueda, D. (2008). Cheap labor: The new politics of "bread and roses" in industrial democracies, *Perspectives on Politics,* 6(2), 279–297.

Kohler, U. & Giesecke, J. (2021). *TWOSTEP: Stata module to perform twostep multilevel analysis.* https://EconPapers.repec.org/RePEc:boc:bocode:s459021.

Lehmann, H. & Pignatti, N. (2018). Informal employment relationships and the labor market: Is there segmentation in Ukraine?, *Journal of Comparative Economics,* 46(3), 838–857.

Lewis, J. & Linzer, D. (2005). Estimating regression models in which the dependent variable is based on estimates, *Political Analysis,* 13(4), 345–364.

Lindbeck, A. & Snower, D. J. (1989). *The insider-outsider theory of employment and unemployment,* Cambridge, MA, MIT Press.

LIS (2021). *Luxembourg Income Study (LIS) Database* http://www.lisdatacenter.org *(multiple countries; June 2020 - July 2021),* Luxembourg, LIS.

Mandel, H. & Shalev, M. (2009). How welfare states shape the gender pay gap: A theoretical and comparative analysis, *Social Forces,* 87(4), 1873–1911.

Maurin, E. & Postel-Vinay, F. (2005). The European job security gap, *Work and Occupations,* 32(2), 229–252.

Medina, L. & Schneider, F. (2019). Shedding light on the shadow economy: A global database and the interaction with the official one, *CESifo Working Papers,* 7981.

Mertens, A. & McGinnity, F. (2004). Wages and wage growth of fixed-term workers in East and West Germany, *Applied Economics Quarterly,* 50(2), 139–163.

Mooi-Reci, I. & Wooden, M. (2017). Casual employment and long-term wage outcomes, *Human Relations,* 70(9), 1064–1090.

OECD (2020). Strictness of employment protection, accessed at https://stats.oecd.org/Index.aspx?DataSetCode=EPL_OV on January 8, 2021.

Pilc, M. (2015). What determines the reforms of employment protection legislation? A global perspective, *Equilibrium: Quarterly Journal of Economics and Economic Policy,* 10(4), 111-129.

Polavieja, J. (2003). Temporary contracts and labour market segmentation in Spain: An employment-rent approach, *European Sociological Review,* 19(5), 501–517.

Polavieja, J. (2006). The incidence of temporary employment in advanced economies: Why is Spain different?, *European Sociological Review,* 22(1), 61–78.

Potrafke, N. (2013). Globalization and labor market institutions: International empirical evidence, *Journal of Comparative Economics,* 41(3), 829–842.

Rueda, D. (2005). Insider–Outsider politics in industrialized democracies: The challenge to social democratic parties, *American Political Science Review,* 99(1), 61–74.

Rueda, D. (2014). Dualization, crisis and the welfare state, *Socio-Economic Review,* 12(2), 381–407.

Rueda, D., Wibbels, E. & Altamirano, M. (2015). The origins of dualism. In Beramendi, P., Häusermann, S., Kitschelt, H. & Kriesi, H. (eds) *The politics of advanced capitalism,* Cambridge, Cambridge University Press, pp. 89–111.

Ryu, K. (2018). Labor market dualism and the wage penalty for temporary employment: Evidence on the interplay of employment protection legislation and labor market institutions from PIAAC data, *Development and Society,* 47(4), 535–562.

Scherer, S. (2004). Stepping-stones or traps?: The consequences of labour market entry positions on future careers in West Germany, Great Britain and Italy, *Work, Employment and Society*, 18(2), 369–394.

Scherer, S. (2009). The social consequences of insecure jobs, *Social Indicators Research,* 93, 527–547.

Simms, M., Eversberg, D., Dupuy, C. & Hipp, L. (2018). Organizing young workers under precarious conditions: What hinders or facilitates union success, *Work and Occupations*, 45(4), 420–450.

VanHeuvelen, T. (2018). Within-group earnings inequality in cross-national perspective, *European Sociological Review,* 34(3), 286–303.

Visser, J. (2019). *ICTWSS Data base. Version 6.0,* Amsterdam, Amsterdam Institute for Advanced Labour Studies AIAS.

Vlandas, T. (2018). Coordination, inclusiveness and wage inequality between median- and bottom-income workers, *Comparative European Politics,* 16, 482–510.

Wang, R. & Weiss, A. (1998). Probation, layoffs, and wage-tenure profiles: A sorting explanation, *Labour Economics,* 5(3), 359–383.

Weisstanner, D. (2021). Insiders under pressure. Flexibilization at the margins and wage inequality, *Journal of Social Policy,* 50(4), 725–744.

Williams, C. C. & Horodnic, I. A. (2019). Evaluating working conditions in the informal economy: Evidence from the 2015 European Working Conditions Survey, *International Sociology,* 34(3), 281–306.

World Bank (2021). GDP per capita, PPP (current international $), accessed at https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD on March 26, 2021.

Appendix

Table A1 Information on micro datasets

Country	Data source	Individuals	Rounds (years covered)
AT (Austria)	Statistics on Income and Living Conditions	21,017	6 (2000-2016)
BE (Belgium)	Statistics on Income and Living Conditions	58,721	15 (2003-2017)
BR (Brazil)	National Continuous Household Sample Survey	100,893	5 (2006-2016)
CA (Canada)	Survey of Labour and Income Dynamics	29,862	2 (2007-2010)
CH (Switzerland)	Statistics on Income and Living Conditions	57,156	12 (2006-2017)
CN (China)	Chinese Household Income Survey	10,057	1 (2013)
CO (Colombia)	Great Integrated Household Survey	295,693	4 (2007-2016)
CZ (Czech Republic)	Statistics on Income and Living Conditions	27,232	5 (2004-2016)
DE (Germany)	German Socio-Economic Panel	176,449	19 (2000-2018)
EE (Estonia)	Estonian Social Survey	15,923	4 (2007-2016)
ES (Spain)	Statistics on Income and Living Conditions	42,250	6 (2000-2016)
FI (Finland)	Income Distribution Survey	23,570	4 (2007-2016)
GR (Greece)	Statistics on Income and Living Conditions	20,684	5 (2004-2016)
GT (Guatemala)	National Survey of Living Conditions	7,054	3 (2006-2014)
HU (Hungary)*	Statistics on Income and Living Conditions	76,219	14 (2006-2019)
IE (Ireland)	Statistics on Income and Living Conditions	42,306	16 (2002-2017)
IS (Iceland)	Statistics on Income and Living Conditions	3,520	3 (2004-2010)
IT (Italy)	Survey of Household Income and Wealth	25,988	6 (2000-2016)
JP (Japan)	Japan Household Panel Survey	4,820	3 (2008-2013)
KO (South Korea)*	Korean Labour and Income Panel Study	69,938	20 (2000-2019)
LT (Lithuania)	Statistics on Income and Living Conditions	30,180	10 (2009-2018)
LU (Luxemburg)	Socio-Economic Panel	14,457	4 (2004-2013)
NL (Netherlands)	Statistics on Income and Living Conditions	31,975	8 (2004-2018)
PA (Panama)	Continuous Household Survey	28,200	4 (2007-2016)
PE (Peru)	National Household Survey	32,574	5 (2004-2016)
PL (Poland)*	Statistics on Income and Living Conditions	127,196	15 (2005-2019)
PT (Portugal)*	Statistics on Income and Living Conditions	72,164	16 (2004-2019)
SK (Slovakia)	Statistics on Income and Living Conditions	47,654	9 (2004-2018)
UK (United Kingdom)	Family Resources Survey	82,160	7 (2012-2018)
ZA (South Africa)	National Income Dynamics Study	20,218	5 (2008-2017)

Notes: * denotes that the authors harmonized that dataset.

Table A2 Descriptive statistics for macro-level indicators and controls, mean (SD) over all country-rounds

	EPL permanent	EPL temporary	Temporary worker share	Union density	Economic Globalization (KOF)	GDP per capita, Int$ (in 10,000)	Size of informal sector
ALL	2.4	1.7	16.9	23.4	74.9	3.4	17.7
	(0.6)	(0.9)	(11.5)	(15.4)	(12.0)	(1.5)	(8.8)
AT	2.6	1.3	8.1	30.9	81.9	4.1	7.5
	(0.1)	(0.0)	(1.9)	(4.0)	(1.6)	(0.9)	(0.8)
BE	2.7	2.2	10.0	53.5	86.6	4.0	17.0
	(0.1)	(0.1)	(0.5)	(1.3)	(1.0)	(0.6)	(1.0)
BR	1.3	4.1	35.0	18.4	43.8	1.4	32.9
	(0.3)	(0.0)	(13.9)	(1.4)	(2.2)	(0.2)	(3.9)
CA	1.3	0.3	9.7	30.2	67.7	4.0	11.9
	(0.0)	(0.0)	(0.4)	(0.1)	(0.9)	(0.0)	(0.4)
CH	2.1	1.3	10.5	17.0	83.5	5.7	5.5
	(0.0)	(0.0)	(1.4)	(1.4)	(2.2)	(0.7)	(0.3)
CN	3.0	1.8	77.0	42.6	45.6	1.2	11.6
	(-)	(-)	(-)	(-)	(-)	(-)	(-)
CO	2.2	1.9	30.0	9.5	44.8	1.2	29.2
	(0.0)	(0.0)	(0.6)	(0.2)	(2.5)	(0.2)	(2.4)
CZ	3.0	1.2	12.9	15.9	79.0	2.8	13.5
	(0.1)	(0.4)	(1.6)	(3.4)	(1.9)	(0.6)	(1.4)
DE	2.9	1.2	15.6	19.8	79.2	3.9	10.6
	(0.0)	(0.4)	(2.0)	(2.6)	(1.1)	(0.9)	(1.3)
EE	2.2	2.4	2.1	6.5	85.2	2.6	21.1
	(0.2)	(0.6)	(0.4)	(1.6)	(0.5)	(0.5)	(1.3)
ES	2.5	2.9	26.2	16.5	74.1	3.0	21.0
	(0.2)	(0.3)	(3.5)	(1.5)	(1.5)	(0.6)	(1.3)
FI	2.0	1.6	9.7	68.9	81.3	4.1	10.9
	(0.0)	(0.0)	(0.8)	(2.8)	(1.1)	(0.3)	(0.6)
GR	2.9	2.5	21.8	22.2	70.0	2.7	23.3
	(0.3)	(0.3)	(5.4)	(1.9)	(1.3)	(0.2)	(1.6)
GT	1.1	2.4	23.6	-	52.2	0.7	47.0
	(0.0)	(0.0)	(1.4)		(0.6)	(0.1)	(2.4)
HU	2.3	1.2	11.3	12.7	83.0	2.5	20.2
	(0.1)	(0.1)	(1.9)	(3.3)	(1.2)	(0.5)	(0.7)
IE	1.8	0.6	8.9	31.6	88.7	4.9	11.8
	(0.1)	(0.1)	(1.0)	(2.7)	(0.1)	(1.3)	(1.0)
IS	1.9	0.6	10.1	88.1	71.0	3.9	12.5
	(0.0)	(0.0)	(1.6)	(0.4)	(3.4)	(0.3)	(1.4)
IT	3.2	2.1	13.8	34.5	68.6	3.4	20.5
	(0.2)	(0.6)	(3.2)	(0.8)	(2.4)	(0.5)	(1.5)
JP	1.9	0.9	20.6	18.1	59.2	3.6	10.5
	(0.0)	(0.0)	(3.2)	(0.3)	(2.0)	(0.2)	(0.4)
KO	2.3	2.1	24.9	10.4	57.8	3.1	24.5
	(0.0)	(0.0)	(2.7)	(0.7)	(4.8)	(0.8)	(2.1)
LT	2.7	2.3	2.9	8.6	76.0	2.7	21.5
	(0.1)	(0.3)	(0.6)	(1.1)	(2.6)	(0.6)	(1.8)
LU	2.6	3.8	10.1	38.4	90.6	8.2	8.9
	(0.0)	(0.0)	(1.2)	(3.8)	(2.1)	(1.3)	(0.7)
NL	3.3	1.0	12.6	18.4	88.4	4.9	9.1
	(0.1)	(0.1)	(1.1)	(1.7)	(0.9)	(0.7)	(0.4)
PA	1.7	4.5	24.1	-	72.9	1.9	-
	(0.0)	(0.0)	(1.2)		(0.9)	(0.7)	
PE	2.3	2.3	64.4	-	58.3	0.9	49.3
	(0.0)	(0.0)	(4.9)		(4.5)	(0.2)	(4.8)
PL	2.5	1.6	28.2	16.3	68.9	2.4	21.0
	(0.0)	(0.0)	(2.4)	(2.6)	(3.4)	(0.6)	(1.6)

Table A2 continued

PT	3.3	2.1	19.0	18.6	76.7	2.8	17.8
	(0.5)	(0.3)	(1.5)	(2.4)	(2.5)	(0.4)	(1.3)
SK	2.9	1.7	11.9	15.0	80.2	2.7	13.5
	(0.2)	(0.6)	(1.4)	(4.6)	(1.8)	(0.5)	(0.8)
UK	1.6	0.4	8.0	24.4	81.1	4.3	9.4
	(0.1)	(0.0)	(0.7)	(1.2)	(0.6)	(0.4)	(0.3)
ZA	2.1	0.5	14.8	41.1	56.1	1.2	24.7
	(0.0)	(0.0)	(2.1)	(-)	(1.0)	(0.0)	(1.7)

Note: Means of variables. Standard deviations (SD) in parentheses.
Sources: Temporary workers share based on own calculations using LIS, EU-SILC (Portugal, Poland, Hungary) and KLIPS (South Korea) data from 2000 to 2019. EPL (OECD, 2020), Union density (Visser, 2019), GDP per capita in 10,000 Int$ (World Bank, 2021), Economic Globalization Index (Gygli *et al.,* 2019), size of informal sector (Medina and Schneider, 2019).

Article 2: Career Trajectories and cumulative wages: The case of temporary employment

Status: Published in *Research in Social Stratification and Mobility*, 69, Article 10052, doi: 10.1016/j.rssm.2020.100529.

Acknowledgements: Previous versions of this article were presented at the ISA RC28 Spring Meeting at Frankfurt University, Germany, 21-23 March 2019 and the 3rd Joint Graduate Conference, organized by DemoSoc at the University Pompeu Fabra Barcelona, Spain, 20-21 June 2019. We are thankful to participants of these conferences for helpful comments and suggestions. We also wish to express our gratitude to Michael Gebel for his constructive feedback on earlier versions of this article, as well as to the two anonymous reviewers. All remaining errors are our own.

Funding: This research has received funding from the European Research Council (ERC) under the Horizon 2020 research and innovation program (grant agreements No 758491).

Abstract

Using data from the German Socio-Economic Panel (SOEP, 1994-2017), we investigate how 10-year career sequences, which can be grouped into distinct career patterns, relate to cumulative labor market income. We utilize propensity score matching to compare standard career sequences, consisting of continuous full-time permanent work, to stepping stone career sequences, characterized by initial periods of temporary employment and subsequent permanent employment. We thus investigate if temporary workers are compensated for initial wage penalties in their later career. This life course approach reveals a more holistic picture about the consequences of temporary employment than previous studies, which mostly focus on the effect of single transitions and on wages at single time points. The results show that among labor market entrants the standard permanent employment career is the most prevalent one but that stepping stone careers are also common. Nonetheless, individuals who start their career in temporary employment and then transition to permanent jobs face long-term cumulative wage disadvantages of -51,461.2 Euro (-14.07 %) compared to individuals with standard permanent careers. Furthermore, over the 10 years we study, we find an increasing cumulative wage gap even after the transitions to permanent jobs take place. This last finding suggests that compared to individuals with standard careers, former temporary workers do not experience a compensating higher wage growth in their later careers.

1. Introduction

Recent labor market debates in many industrialized societies are focusing on the chances and risks of "flexible" temporary employment as an alternative to standard (i.e., full-time permanent) forms of employment. Temporary employment, meaning employment with a predefined, fixed duration, is thought to allow employers to more easily adjust their work forces to current demands. Thereby reducing firing costs and facilitating new hires - hopefully decreasing unemployment rates (Esping-Andersen & Regini, 2000). This development, however, is also viewed critically. Particularly in countries where permanent positions are highly protected, the deregulation for the use of temporary contracts may provide a new source of labor market inequality (Gash, 2008; Gash & McGinnity, 2007; Gebel & Giesecke, 2011). Indeed, temporary positions have been shown to offer poorer working conditions, less training opportunities, and worse career prospects compared to standard positions (Giesecke & Groß, 2003; Kalleberg, Reskin, & Hudson, 2000) This might especially affect labor market entrants for whom employers often utilize temporary jobs as an extended probationary period (Gebel, 2010; Gebel & Giesecke, 2009).

Owing to these developments, a broad literature on the consequences of temporary employment from a wide range of countries has emerged. The literature's focus lies on a variety of outcomes such as health and well-being (Scherer, 2009; Voßemer et al., 2018), as well as future employment chances (Barbieri & Scherer, 2009; Gash, 2008; Gash & McGinnity, 2007; Gebel, 2010; Giesecke & Groß, 2004; Kiersztyn, 2020; Leschke, 2009; Mooi-Reci & Dekker, 2015).

Another large part of the literature investigates the effects of temporary employment in terms of wages. Concerning such outcomes, previous studies generally show wage disadvantages for temporary workers compared to workers with permanent contracts, although findings are sometimes heterogeneous for men and women (Booth, Francesconi, & Frank, 2002; Fuller & Stecy-Hildebrandt, 2014; Gash & McGinnity, 2007; Gebel, 2010; Mooi-Reci & Wooden, 2017). As well as for different educational levels and occupational positions of temporary workers (Gebel, 2009; Helbling, 2017; Kiersztyn, 2016). Additionally, some studies show that initial hourly or annual wage penalties disappear as the career progresses or transitions from temporary employment to permanent employment are made (Booth et al., 2002; Gash & McGinnity, 2007; Gebel, 2010; Mooi-Reci & Wooden, 2017). This last finding is mostly considered as evidence of compensating wage growth and transitory costs of temporary employment.

However, in recent years, such studies, which measure employment status at single or only a few points in time, are deemed to apply a treatment definition that is too static. Instead, more and more researchers argue that in order to study life course events and their consequences, we have to move our focus beyond the investigation of single transitions between two states. Rather, a view should be adopted that considers crucial transitions as a sequence of states and events. Such a holistic perspective is considered especially appropriate to investigate transitions from school to work in general (Brzinsky-Fay, 2007, 2014; Scherer, 2001) or more specific transition processes in relation to temporary employment (Fuller & Stecy-Hildebrandt, 2015; Mattijssen & Pavlopoulos, 2019; McVicar, Wooden, Laß, & Fok, 2019; Reichenberg & Berglund, 2019; Struffolino, 2019). The authors of these studies posit that only when careers are regarded in their whole complexity as a succession of states, can we truthfully determine the career consequences of temporary employment. As this approach allows us to distinguish temporary employment as a means of getting a foot in the labor market, which may result in permanent employment in the medium-term, from enduring entrapment in insecure employment. We follow this line of argumentation in this study and employ sequence analysis of the first 10 career years of labor market entrants in Germany. This strategy allows us to define a dynamic treatment and holistically assess mobility patterns of (former) temporary workers, as well as reveal wage developments associated with them.

In their seminal work Fuller and Stecy-Hildebrandt (2015) are among the first authors to utilize sequence analysis as a tool to study labor market experiences of temporary workers and this approach has gained even more popularity in past years (Mattijssen & Pavlopoulos, 2019; McVicar et al., 2019; Reichenberg & Berglund, 2019; Struffolino, 2019). In their study, Fuller and Stecy-Hildebrandt (2015) determine typical career trajectories for a pool of Canadian workers observed in the longitudinal SLID (Survey of Labor and Income Dynamics), including only those workers who are employed in temporary jobs at the beginning of the observation period. They find that a large proportion (39 %) of the individual sequences in their sample can be described as stepping stone careers. This term refers to those kind of career trajectories that begin with periods of temporary employment but where workers make lasting transitions to permanent employment after some years. In a second step of their analysis, the authors relate the identified career trajectories, which cover 60 months, to five yearly measures of annual wages. They reveal high wage growth for individuals on stepping stone trajectories with 36 % between the first and the last observed wave.

The stepping stone career pattern is also identified in a study of temporary workers in the Netherlands (Mattijssen & Pavlopoulos, 2019). For their analysis, the authors use register data from Statistics Netherlands, focusing on workers who enter temporary jobs in 2007 and are observed for 96 months (eight years). They find that 29.6 % of their sample experience lasting transitions from temporary to permanent employment and high monthly wages. However, the authors find an even larger proportion of dead-end careers (39.7 %), where workers are entrapped in repeated spells of low paid temporary employment or even experience periods of unemployment. Nonetheless, they also illustrate that employment and income security do not necessarily go hand in hand, as 24.7 % of the identified individual trajectories combine income insecurity and employment security or vice versa.

An even finer differentiation of career trajectories is revealed by a study of temporary workers in the Swedish labor market (Reichenberg & Berglund, 2019). For their analysis based on the Swedish Labor Force Survey, the authors consider workers who are observed in temporary jobs in any of their eight observation periods that span over two years. This rather short window of observation might explain why with approximately 24 % the most prevalent career pattern they find consists of continuous temporary employment. Another group of trajectories, which could be described as illustrating the entrapment risk of temporary jobs, consists of periods of unemployment and temporary employment but only describes 5.4 % of their sample. Furthermore, the authors reveal two types of stepping stone career trajectories, which both summarize career sequences that start in temporary employment and end in permanent employment. The difference between the springboard (roughly 15 %) and the “normal” stepping stone career trajectory (approx. 10 %), solely lies in the swiftness of transitions from temporary to permanent employment. Consequently, the largest wage advantages are then revealed for individuals on the springboard and the stepping stone career sequences. In terms of annual earnings in the last observation period, workers on the springboard and the stepping trajectories earn respectively 43.4 % and 34.6 % more compared to individuals on the continuously temporary employed career trajectory. Conversely, workers on the more severe entrapment trajectory consisting of unemployment and temporary employment on average experience a wage penalty of -44.5 % compared to similar workers who are continuously in temporary employment.

In our study, we aim to build on the very insightful works described above, by not only employing sequence analysis to define holistic and dynamic treatments but also by utilizing measures of cumulative wages. Thus, revealing long-term wage consequences associated with

experiences of temporary employment. We think that the previously demonstrated catching-up of annual or hourly wages between former temporary workers and continuously permanent employed workers or the high annual wage growth of individuals with stepping stone careers do not necessarily equate to a compensation of initial disadvantage faced by temporary workers. This is because individuals who experience temporary employment for some parts of their career have still earned less for those years compared to people who were always in permanent forms of employment. Only in the case that temporary employment leads to higher wage growth in the subsequent career and there is a catching-up of overall labor earnings, could the cost of temporary employment be considered as transitory. Thus, we focus on comparing cumulative wages between career trajectories marked to more or less extend by periods of temporary employment, to truly asses if there are vanishing or rather long-term wage inequalities associated with experiences of temporary employment at labor market entry. Expressed more generally from a life course perspective, we want to investigate if early career inequalities can influence future disadvantages or if disadvantages accumulate over time (DiPrete & Eirich, 2006).

Unlike the sequence analysis studies discussed above, we do this by focusing on a sample of labor market entrants, because this has the advantage of investigating individuals in a similar career stage. Thus, we can reduce any biases caused by unobserved heterogeneity concerning previous work experience and especially previous experiences of temporary employment (Gebel, 2010). Moreover, by also including people starting their career sequence in permanent jobs we not only investigate the prevalence of stepping stone or entrapment career trajectories at labor market entry but also of the standard career trajectory, consisting of continuous full-time permanent employment. Thus, a reference group of workers with standard careers is employed in our wage analysis to investigate if any long-term cumulative wage disadvantages associated with experiences of temporary employment exist.

In this study, we aim to contribute to the literature in several ways. First, by revealing 10-year career sequences of labor market entrants in Germany in order to assess their mobility patterns. Second by investigating cumulative wage developments that can be associated with certain types of careers. With this approach, we cannot only investigate labor market entry as a whole dynamic process but can also reveal long-term wage consequences of experiences of temporary employment in the early career. Any enduring cumulative wage inequalities between careers marked by temporary employment and standard permanent careers, may in turn negatively affect wealth accumulation of former temporary workers and delay crucial life decisions such

as family formation or buying a house (McGrath & Keister, 2008). Additionally, in countries like Germany, where pension benefits are heavily influenced by labor market income and career trajectories, experiences of temporary employment and low pay could increase risks of old age poverty (Fasang, Aisenbrey, & Schömann, 2013; Möhring, 2015). With our above described strategy, we can thus investigate if temporary employment constitutes a new source of lasting labor market inequality or if any initial disadvantages associated with temporary employment fade over time.

The remainder of the paper is organized as follows: Section 2 provides a description of the theoretical approaches as well as our hypotheses. In section 3 we detail the data set, variables and methods used for our analysis. This is followed by section 4, which presents the empirical results. Finally, section 5 offers a discussion of the results as well as a conclusion.

2. Theory and hypotheses

2.1 The integration scenario

The literature on the consequences of temporary employment usually distinguishes between two perspectives – the integration and the entrapment perspective (Giesecke & Groß, 2003; Korpi & Levin, 2001). The integration scenario paints a rather optimistic picture and assumes that temporary jobs, that is jobs with a predefined fixed duration, function as a sort of prolonged probationary period and are used as a screening device for permanent jobs (Wang & Weiss, 1998). Upon positive evaluation by the employer, the temporary contract is converted into a permanent one. Periods of temporary jobs can thus function as a stepping stone to more secure and lasting permanent employment with the same employer. Such stepping stone career trajectories, where initial spells of temporary employment are followed by continuous permanent employment, are revealed in all of the sequence analysis studies discussed in the previous section. Thus, the findings highlight that the integrative power of temporary jobs cannot just be theorized, but also found in practice when careers are investigated holistically.

The screening function of temporary jobs, which is the main argument for their integration potential, is especially relevant for labor market entrants, whose skills are hard to judge for the employer before hiring (Fuller & Stecy-Hildebrandt, 2015; Gebel, 2010). While the German labor market is classified as rather rigid, with strict dismissal regulations for permanent jobs (Gangl, 2003), it experienced a partial deregulation for the use of temporary contracts with the introduction of the Act on Part-Time Work and Fixed-Term Employment Contracts (TzBfG) in 2001 (Gebel & Giesecke, 2011; Reichelt, 2015). This regulation gives employers in Germany both the incentive and the liberty to use temporary employment as a screening device for young

labor market entrants and a sort of insurance against bad (permanent) hires (Blanchard & Landier, 2002; Gebel, 2010; Kahn, 2007; Reichelt, 2015). By first hiring unexperienced young workers on a temporary basis and paying them lower wages, employers can thus transfer screening costs to their temporary employees. However as some previous studies demonstrate, once contracts are converted to permanent one's, former temporary workers should no longer face wage penalties compared to workers who were always in permanent employment (Booth et al., 2002; Gebel, 2010). Nonetheless, looking at cumulative wages, we could still expect that *compared to standard careers of continuous permanent employment, stepping stone careers on average result in wages disadvantages (H1)*, as a catching-up of annual or hourly wages does not necessarily equate to a compensation for the initial wage penalties.

Alternatively, it could also be expected that once person-job fit is determined and permanent contracts are awarded, former temporary workers are compensated for their initial disadvantages by high subsequent wage growth (Fuller & Stecy-Hildebrandt, 2015; Gebel, 2010; Reichenberg & Berglund, 2019). Such arguments are based on the believe that especially workers who are confident in their abilities (given other observable characteristics like qualification and gender) are willing to accept initial temporary employment and lower wages if this "investment" facilitates better assessment of their true skills and higher lifetime earnings (Boockmann & Hagen, 2008; Gibbons & Murphy, 1992; Hagen, 2002; Mertens & McGinnity, 2004). Firms can take advantage of this self-selection sorting mechanism by providing wage contracts for temporary workers, which imply low initial wages but steep wage growth after positive evaluation. Thus, it could also be plausible that *on average no cumulative wage gap between standard career trajectories and stepping stone career trajectories is observed (H2)* because of higher wage growth experienced by workers on the latter trajectory.

Regardless of which of those two opposing hypothesis (H1 or H2) finds support, another important research question that we want to address here is how differences in cumulative wages develop over time. Is there an initial but stable cumulative wage disadvantage stemming only from the periods of temporary employment? Or is there a catching-up process that sets in after some years when transitions to permanent positions are made, indicating compensating subsequent wage growth for workers with stepping stone careers?

For the number of temporary workers who are unable to meet their employers' expectations or whose temporary contracts cannot be converted to permanent ones for other reasons, temporary jobs could still be a stepping stone to permanent contracts with new employers. This is described as the bridge or entry port function of temporary employment (Fuller & Stecy-

Hildebrandt, 2015). This function becomes possible because temporary employment (opposed to unemployment) helps individuals acquire human capital and helpful social contacts (Barbieri & Scherer, 2009; Korpi & Levin, 2001). It is not necessarily straightforward how stepping stone careers with the bridge function as the underlying mechanism differ from stepping stone careers where the screening function is at play. One expectation could be that the screening function leads to transitions to permanent employment after a shorter duration in temporary employment than the bridge function. Thus, theoretically two stepping stone career trajectories are identifiable, as it is also illustrated by Reichenberg and Berglund (2019), who reveal a "normal" stepping stone trajectory, as well as a springboard trajectory for temporary workers in Sweden. With the difference between the two trajectories lying in the swiftness of transitions from temporary to permanent employment. The cumulative wage profile is also hard to predict in this case, where former temporary workers receive permanent contracts with a new employer. Next to the two options of an initial but stable or a decreasing cumulative wage penalty mentioned above, an alternative option in this case could be a cumulative wage gap that increases over the years. This could be imaginable if new employers view a previous temporary contract, that is not extended or converted into a permanent one by the old employer, as a negative signal and thus pay former temporary workers lower wages (Fuller, 2011; Mooi-Reci & Wooden, 2017).

2.2 The entrapment scenario

In contrast to the integration scenario described in the previous section, the entrapment scenario conjures up a more pessimistic picture. Here temporary contracts are not used as a screening device but rather as a tool for employers to flexibly adjust their work force to current demands (Esping-Andersen & Regini, 2000; Kalleberg et al., 2000). Thus, it is assumed that temporary employment can lead to unemployment or cycles of insecure jobs and entrapment in the so called secondary labor market (Barbieri, Cutuli, Luijkx, Mari, & Scherer, 2016). Rooted in dual labor market and segmentation theory, under this perspective it is argued that inferior jobs dominate in the secondary labor market, while well paid and secure jobs are found in the primary segment of the labor market (Doeringer & Piore, 1971; Gash, 2008). Jobs in the secondary labor market are characterized not only by their temporary nature but also by lower wages, which result from the low bargaining power of temporary workers as labor market outsiders opposed to the higher bargaining power of the labor market insiders in the primary sector (Lindbeck & Snower, 1989). Additionally, little training opportunities and chances for skill acquisition are offered to temporary workers, thus hindering upward mobility chances (Booth et al., 2002). Furthermore, in this framework a history of temporary employment can be

stigmatizing and a signal to future employers that a worker is of low ability or not very committed to work. Such bad signals can again diminish chances of temporary workers to enter the primary sector of the labor market and can result in repeated temporary work or even unemployment (Fuller, 2011; Gebel, 2010; Scherer, 2004). Mobility between labor market segments is believed to be low especially in rigid labor markets like in Germany, with its strict protection of permanent workers (Gangl, 2003).

Thus, under the entrapment perspective, it is again theoretically possible to identify two kinds of entrapment career sequences. One, where trajectories are made up by repeated cycles of temporary employment and a second one where temporary employment is interrupted by periods of unemployment.[1] In the case of unemployment, former temporary workers not only experience a drop of labor earnings to zero for the time of the unemployment spell, but also a scarring effect, which influences their future career chances. For workers who re-enter the labor market after a period of unemployment this scarring effect can manifest both in relation to reduced wages (Gangl, 2006) and increasing risks of temporary employment in the subsequent career (Dieckhoff, 2011). Hence, we expect that for workers whose careers are mainly made up by repeated temporary jobs, large cumulative wage penalties can be observed on average when compared to people with standard careers. *These gaps should be even larger than the wage disadvantages identified by a comparison of workers who are able to change from temporary contracts to permanent ones (i.e., stepping stone careers) to workers with standard careers (H3)*. Additionally, we expect, that for *workers whose careers are made up by temporary jobs with interruptions of unemployment, larger cumulative wage penalties can be expected on average when compared to people with standard careers than when workers who are predominately in temporary employment are compared to workers with standard careers (H4)*.

3. Data, sample and method

We use data from waves 1994 to waves 2017 of the German SOEP (Socio-Economic Panel [SOEP], 2019) to investigate the above stated hypotheses. The SOEP is a panel study that collects representative micro-data on West German households since 1984. All household members who are 17 years and older are personally interviewed every year on subjects such as education, labor force status and income (Wagner, Göbel, Krause, Pischner, & Sieber, 2008). Individuals living in East Germany are interviewed as well since German reunification. Only individuals who are observed for 10 subsequent years after finishing their education are

[1] Recall that Reichenberg and Berglund (2019) reveal two career trajectories for Swedish temporary workers that are very similar to these.

included in the sample of analysis. Hence, the year when a respondent is last observed in education is treated as the year of labor market entry, although technically some individuals "start" their labor market careers by being out of the labor force or unemployed. In line with previous literature, being in vocational training or any other sort of training (e.g., internships) is also considered as being in education and not as being in employment (Müller, Steinmann, & Ell, 1998).

Restricting the sample to individuals who are observed for 10 subsequent years on all relevant variables is a rather strict sample definition, but necessary to identify reliable 10-year career sequences. These sequences are made up by the yearly collected information on individuals' labor force statuses. Specifically, seven distinct states are considered: out of the labor force (including individuals doing military or any kind of community service), unemployed, full-time permanent job, part-time permanent job, full-time temporary job, part-time temporary job, and self-employed. Three separate variables are used to create these career states. First, a variable that indicates individuals' labor force status, distinguishing non-working, registered unemployed, and working individuals. Second, a variable which differentiates full-time employment and part-time employment. Third, a variable which asks respondents if they have a permanent or fixed-term contract. Individuals who answer that they have no working contract but whose labor force status is indicated as "working", are considered as self-employed. We refrain from replacing missing states in the career sequences for the most part, with the exception of replacing missing states with permanent employment if individuals were in permanent employment in the state before and after the missing state (Halpin, 2016). This restriction results in a sample size of 849 individual career sequences. These sequences of labor force events constitute the unit of analysis in this study and allow us to focus on a dynamic treatment of career trajectories instead of on a single transition between two career states (Aisenbrey & Fasang, 2010).

In order to identify distinct career trajectories or patterns from the individual sequences, the sequences are grouped based on their similarity using cluster analysis. The pairwise similarity of sequences can be determined with various algorithms (Halpin, 2014; Studer & Ritschard, 2016). The idea behind all algorithms is to transform one sequence into the other with the least possible costs. The lower the cost, the higher the similarity between sequences. The cost for each single operation (substitution, deletion, or insertion of single sequence states), that is needed to turn one sequence into the other is assigned by the researcher. There is no universally best algorithm for the alignment of sequences, rather the right choice depends on what aspect

of the sequence the researcher wants to place most importance on (Studer & Ritschard, 2016). We tried several different algorithms, namely Hamming Distance, Dynamic Hamming Distance, Optimal Matching (OM) and Time Warp Edit Distance (TWED), before settling on the TWED with constant substitution costs. TWED stretches and compresses the time dimension to achieve similarity between sequences, instead of using insertion and deletion like the OM algorithm (Halpin, 2014). Thus, the TWED algorithm prioritizes the spell structure of the sequences more than other algorithms do. This feature is an important advantage of the TWED algorithm when studying labor market careers. Because a transition from temporary employment directly to permanent employment constitutes something entirely different from a transition from temporary employment to permanent employment with an intervening spell of unemployment. It is important to note, however, that the career trajectories determined with the various algorithms are actually very similar. More specifically, there are almost no differences between the TWED and the Hamming Distance.[2]

Ultimately, the pairwise similarities between sequences result in a so called "distance matrix". This distance matrix summarizes the (dis)similarity among all pairs of sequences, is symmetrical and has a diagonal of zero (indicating identical sequences). The distance matrix is used to group the most similar sequences into distinct career trajectories or patterns with cluster analysis. We use the most commonly applied Wards algorithm to determine the clusters (Ward, 1963). The aim of the cluster analysis is to generate patterns of career sequences that are characterized by minimum variance within the patterns and maximum variance between the patterns. Determining the right amount of clusters is not straightforward in this case, so we follow the previous literature and decide on the number of clusters by taking objective measures (Studer, Ritschard, Gabadinho, & Müller, 2011) and the theoretical meaningfulness of different cluster solutions into account (Aisenbrey & Fasang, 2010; Fuller & Stecy-Hildebrandt, 2015). With this approach, we finally arrive at a seven cluster solution. While these clusters contain many different individual sequences that vary in their details to more or less extent, they nonetheless follow a general trajectory that can be identified and described (Fuller & Stecy-Hildebrandt, 2015). The sequence analysis was done in Stata with the help of the SADI ado package (Halpin, 2014).

For the actual analysis, the final step of our research strategy entails to compare the identified career trajectories in terms of their 10-year cumulative wages. We use the current monthly gross

[2] In addition to estimating distances between sequences with various algorithms, we also tried different insertion and deletion cost for the Optimal Matching as well as various gap and stiffness parameters for the TWED. Again, results are largely similar.

labor income of all working individuals as a base for this measure. We assign all non-working and unemployed individuals a value of zero gross labor market income. Additionally, we adjust the income for inflation and multiply it by 12 before summing the wages over the 10-year observation period. To make sure that any differences in cumulative wages are not a result of self-selection into different career trajectories, propensity score matching (PSM) is employed (Caliendo & Kopeinig, 2008; Rosenbaum & Rubin, 1983, 1985). This method ensures that cumulative wages are compared between "statistical twins" – that is individuals who have similar observable characteristics and only differ in their career trajectories.

To achieve this, the first part of the PSM approach is to run a logistic regression to estimate each individual's probability (i.e., a propensity score) of entering a specific pattern of career trajectories conditional on a set of control variables, which are observable in the data. Only confounding variables that affect selection into career trajectory patterns as well as cumulative wages are used as control variables. To avoid overcontrol bias any variables that may affect wages but which are also influenced by the career trajectories are not included (Elwert & Winship, 2014). In this case, the control variables are education, gender, migration background, birth year, and year of labor market entry of the respondent. As well as a self-assessment of the respondents' willingness to take risks[3], the father's ISCO when the respondent was 15 years old, information on whether the respondent lived in East or West Germany in the year of labor market entry, and the marital status and existence of children at labor market entry. Additionally, the focus on a sample of young labor market entrants ensures that factors such as previous work experiences are not different between the trajectories (Gebel, 2010). Arguably, the control variables are not solely responsible for shaping career trajectories over time. However, it can be expected that the development of careers is to some extent path-dependent (Fuller & Stecy-Hildebrandt, 2015).

The second part of the PSM consists of creating the statistical twins, meaning individuals who despite having similar observable characteristics, summarized as the propensity score, experience different career trajectories. Thus, comparing cumulative wages between these twins results in the estimation of average effects of entering certain career trajectories. More specifically, the average treatment effect of the treated (ATT) is identified. One of the most important assumptions of the PSM method is that treatment effects are estimated under conditional independence: dependent on the employed exogenous control variables, any

[3] As measured on a scale from 0 (not at all willing to take risks) to 10 (prone to take risks).We assume risk aversion to be stable within individuals (Harrison, Johnson, McInnes, and Rutström, 2005).

differences between those who experience the career trajectory of interest (treatment group) and those who experience the reference career trajectory (control group) are balanced. Moreover, the common support option makes sure that comparisons are only made between comparable respondents, thus only individuals with suitable control cases are considered for the estimation of the ATT.

The alternative estimation strategy of random effects models (RE) would, similar to the conditional independence assumption, rely on the strict exogeneity assumption and the random effects assumption. These are violated in case of unobserved (time varying or time constant) confounding variables, inducing a confounding bias in the estimates. In contrast, the fixed effects model (FE) approach would not rely on the random effects assumption because time constant confounding variables are eliminated by the within transformation. Unfortunately, the fixed effects model (as well as the FE individual slopes model) is not applicable to our research question, as we cannot observe cumulative wages before entry into the labor market. Thus, we are missing the pre-treatment outcome measure required by the FE approach. Ultimately, we choose to employ PSM as this semi-paramedic approach is more flexible than linear regressions by not relying on any strong linearity assumptions. A further advantage is that ATTs obtained by PSM illustrate easily interpretable differences in cumulative earnings between the treatment and the control group. By additionally estimating ATTs of cumulative wage gaps for each year of our 10-year observation period, we can investigate how the gap develops over time in a manner similar to growth curves obtained from RE models.

We consider several matching algorithms to estimate the ATTs in order to test the sensitivity of the results. Namely, these are kernel Epanechnikov, Gaussian kernel, and Uniform kernel, as well as multiple nearest neighbor matching using the three nearest neighbors and a caliper of 0.01. Results are reported for the matching algorithm that produced the smallest mean bias[4], which is the kernel Epanechnikov algorithm.

4. Results

4.1 Descriptive results

The results of the clustering of career sequences shows that 10-year careers of labor market entrants can be grouped into seven distinct career patterns (Figure 1). The most prevalent pattern with 24.15 % of the individual sequences can be best described as the standard career

[4] Generally, the mean bias expresses the mean difference on all variables considered for selection into a career trajectory of interest (treatment) still existing between said trajectory and the reference trajectory (control group). Although, there is no clear indicator for a successful matching process, differences between the treatment and control group are usually considered as balanced for a mean bias of 5 % or lower (Caliendo & Kopeinig, 2008).

trajectory. It consists of individuals who work in full-time permanent positions for most of the observation period. Specifically, of the observed 10 years, overall workers in this cluster spend on average 9.91 years in full-time permanent jobs (Table 1). Unsurprisingly, the medoid sequence of this pattern (i.e., most common sequences within the cluster) consists of 10 years of full-time permanent employment. The second pattern, with 18.02 % of the sequences, largely contains workers who start their career in full-time temporary jobs and then transition to full-time permanent jobs. Most of these transitions happen after one to two years in the labor market. This is also visible when looking at the duration these workers spend in different states. Of their first 10 years in the labor market, individuals in this cluster spend on average 1.56 years in full-time temporary jobs and 7.53 years in full-time permanent positions. Workers in this cluster actually spend the most amount of years in full-time permanent jobs after workers in the standard employment career cluster. Accordingly, the most typical sequence in this cluster consists of two years of full-time temporary employment followed by eight years of full-time permanent employment. Hence, this pattern can be viewed as a nice illustration of the stepping stone career trajectory and the integration potential of temporary jobs. Pattern number three also summarizes individuals who spend most of their career in full-time permanent employment. However, workers in this pattern also experience interrupting spells of other labor force statuses. This interrupted permanent pattern is the second biggest one after the standard career trajectory pattern. Although with 18.37 % of career sequences, it is only slightly larger than the stepping stone career trajectory pattern.

Figure 1 Patterns of career trajectories (SOEP 1994-2017)

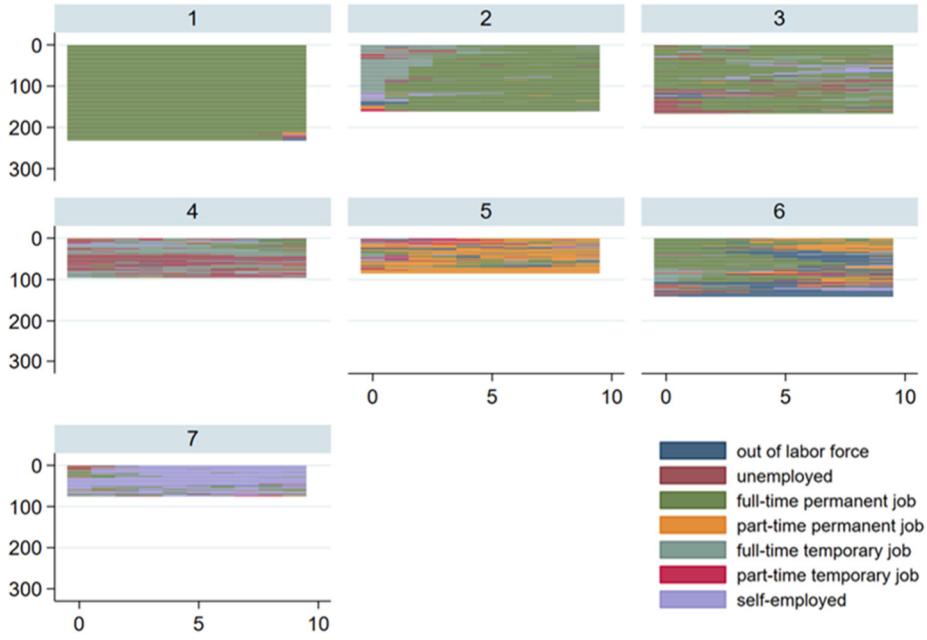


Table 1 Total duration in career states by clusters of career trajectories, (SOEP 1994-2017)

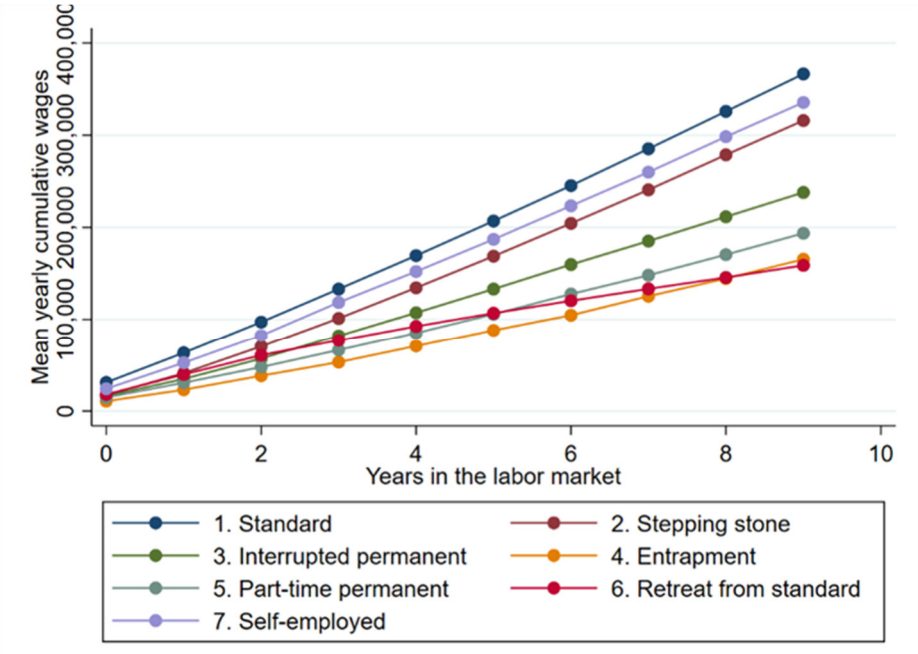
	Out of labor force	Unemployed	Full-time permanent job	Part-time permanent job	Full-time temporary job	Part-time temporary job	Self-employed	Total years
1. Standard	0.02	0.02	9.91	0.02	0.00	0.01	0.01	10
2. Stepping stone	0.18	0.22	7.53	0.10	1.56	0.13	0.28	10
3. Interrupted permanent	0.33	1.43	6.77	0.10	0.75	0.08	0.54	10
4. Entrapment	0.38	3.76	1.46	0.22	3.07	0.48	0.62	10
5. Part-time permanent	0.86	0.40	1.76	5.56	0.32	0.73	0.36	10
6. Retreat from standard	3.24	0.52	3.67	1.39	0.58	0.25	0.35	10
7. Self-employed	0.24	0.35	1.61	0.20	0.16	0.12	7.32	10

With an average of 6.77 years in full-time permanent jobs, workers in this cluster also spend most of their early career in standard employment. The next pattern, pattern number four, includes individuals who spend most of their career in full-time temporary employment with interruptions of unemployment. On average, individuals in this cluster spend 3.76 years in unemployment and 3.07 years in full- time temporary employment, while they only experience 1.46 years in full-time permanent employment. The most common career sequence of this pattern consists of five years in unemployment, four years in full-time temporary employment and one year in full-time permanent employment. The trajectories summarized in this cluster are best described as depicting the entrapment risk that is attributed to temporary employment. However, with 10.01 % of the sequences, entrapment career trajectories are considerably less prevalent than the standard career trajectory or the stepping stone trajectory. Pattern number five consist of 8.48 % of the individual sequences and of workers who are mostly employed in part-time permanent jobs, with an average of 5.56 years spent in this state. Pattern number six summarizes workers who start their career in full-time permanent employment but then retreat partly or fully from the labor market by working in part-time permanent positions or dropping out of the labor force. This retreat from standard employment is reflected by an average of 3.67 years in full-time permanent employment, 3.24 years of being out of the labor force and 1.39 years in part-time permanent employment. This pattern represents 13.43 % of the sequences. Finally, the last pattern, pattern number seven, describes workers who mostly work in self-employment and containing 7.54 % of the individual sequences constitutes the least prevalent career trajectory of labor market entrants. Individuals in this pattern spend an average of 7.32 years in self-employment.

In Figure 2, these just described career trajectories are related to average yearly changes in gross cumulative wages. After one year in the labor market – note that the graph starts counting at 0, which, however, is individuals' first year in the labor market – differences in average cumulative wages between career trajectories are still rather small but start to increase with more years of labor market experience. Workers on standard and self-employment career trajectories have on average the highest wage growth in terms of cumulative wages. Interestingly, workers on the stepping stone trajectory follow right after. Remember that these are cumulative wages and not monthly or annual wages, so people with stepping stone careers would actually need to have a higher hourly wage growth in order to catch up to people who are on the standard career trajectory. Maybe somewhat surprisingly, workers with stepping stone careers also enjoy steeper wage growth compared to workers who experience the interrupted permanent career trajectory. Individuals on the entrapment trajectory endure the lowest wage growth on average, however towards the end of the observation period they are able to measure up to workers who start in full-time permanent employment and then retreat to more or less extent from the labor market.

When reviewing these results, however, it is important to note that this is just a descriptive graph, which does not consider important confounding variables. Therefore, the next section

Figure 2 Development of cumulative wages by career trajectory (SOEP 1994-2017)



presents the results of the propensity score matching. Table A1 depicts the control variables that are employed to estimate the propensity score and shows how they are distributed across the identified career trajectories (in the appendix).

4.2 Results of the PSM

As we are mainly interested in wage penalties for experiences of temporary employment, this section focusses on comparing individuals on the stepping stone and entrapment career trajectories (treatment groups) to similar individuals who are on the standard career trajectory (control group). First, looking at 10 year cumulative wages (Table 2), the results of the PSM show that workers who experience transitions from full-time temporary to full-time permanent jobs indeed suffer long-term cumulative wage disadvantages compered to workers with standard careers, who are always in full-time permanent jobs. More precisely, the ATT for the stepping stone trajectory amounts to -51,461.2 Euro ($p<0.01$). This means that over the observed first 10 years of their labor market careers, workers on the stepping stone trajectory have overall earned 51,461.2 Euro (or 14.07 %) less than workers on the standard career trajectory. However, for workers on the entrapment trajectory, even larger wage penalties become visible when comparing them to workers with standard careers. The estimated cumulative wage difference in this case constitutes -159,066.6 Euro ($p<0.001$) (or -47.65 %). This huge wage gap is most likely not only the result of repeated temporary employment, but also of the many spells of unemployment that characterize the entrapment career trajectory. The estimation of Rosenbaum bounds demonstrates that the matching results are quite robust to the impact of unobserved variables influencing the selection into different career trajectories (Rosenbaum, 2002) (Table A2 and A3 in the appendix).

While the finding that workers with stepping stone careers are unable to catch up to individuals with standard careers in terms of their total 10-year labor earnings is a first important insight, it is also of great interest to see what happens in these 10 years. Remember that for temporary

Table 2 10-year difference of cumulative wages of standard vs. stepping stone and entrapment career trajectory

	Stepping stone trajectory	Entrapment trajectory
ATT (SE)	-51,461.2**	-159,066.6***
	(19,871.3)	(26,435.12)
Unmatched difference (SE)	-49,132.7***	-192,388.8***
	(14,826.64)	(20,419.7)
Differences in percent	-14.07 %	-47.65 %

Notes: *p < 0.05, **p < 0.01, ***p < 0.001; results from kernel Epanechnikov matching with bootstrapped standard errors (500 repetitions), exact matching on education, other matching variables: gender, migration background, birth year, living in West Germany at labor market entry, self-assessed risk aversion, initial marital status, initial existence of children, father's ISCO when resp. 15, year of labor market entry, ATT measures differences in outcomes between the treatment and control group, SOEP 1994–2017.

workers most transitions to permanent jobs take place after one or two years in the labor market, so the question of how cumulative wage differences change over time is also crucial. Do these workers experience a wage gap that only increases over the years, or is there an initial wage gap during the first years (when these workers are still in temporary employment) that remains stable after the transitions to permanent employment happen, or do the wage penalties even decrease over the years?

Table 3 lists the ATTs for stepping stone careers for all remaining years of the 10-year observation period. Looking at the results reveals that people on stepping stone trajectories actually experience an initial wage gap, which over the years steadily increase in absolute size but decreases in relative terms. While, after one year in the labor market, people on stepping stone trajectories face a wage disadvantage of -12,808.8 Euro ($p<0.001$) compared to people on the standard career trajectory, after five years this disadvantage increases to -32,012.9 Euros ($p<0.001$). Despite the fact that at this point basically all transitions to full-time permanent positions have happened (in our sample). The five subsequent years these workers are employed in full-time permeant positions can also not stop the wage gap from increasing even further.

Table 3 Yearly differences of cumulative wages of standard vs. stepping stone career trajectory

	ATT (SE)	Unmatched difference (SE)	Difference in percent
9 years	-46,016.5**	-45,786.3***	-14.23 %
	(15,951.0)	(12,887.8)	
8 years	-43,218.2**	-43,349.9***	-15.30 %
	(13,870.2)	(11,398.5)	
7 years	-38,856.3**	-39,720.8***	-16.08 %
	(12,348.7)	(9,340.4)	
6 years	-35,300.6***	-36,983.2***	-17.42 %
	(10,559.8)	(7,730.4)	
5 years	-32,012.9***	-33,709.9***	-19.37 %
	(8,351.9)	(6,831.8)	
4 years	-29,769.1***	-30,996.9***	-22.94 %
	(6,818.2)	(5,153.2)	
3 years	-25,165.5***	-26,175.2***	-26.62 %
	(4,982.4)	(3,760.5)	
2 years	-20,871.6***	-21,903.6***	-34.06 %
	(3,500.0)	(2,730.0)	
1 year	-12,808.8***	-13,433.2***	-42.44 %
	(1,851.9)	(1,415.5)	

Notes: *p < 0.05, **p < 0.01, ***p < 0.001; results from kernel Epanechnikov matching with bootstrapped standard errors (500 repetitions), exact matching on education, other matching variables: gender, migration background, birth year, living in West Germany at labor market entry, self-assessed risk aversion, initial marital status, initial existence of children, father's ISCO when resp. 15, year of labor market entry, ATT measures differences in outcomes between the treatment and control group, SOEP 1994–2017.

However, it is also important to note that the wage disadvantage decreases in relative terms from -42.44 % in the first year to -14.23 % in the ninth year. Taking the development of the relative cumulative wage gap into account, reveals that former temporary workers do not experience lower annual wage growth compared to workers with standard careers. Which we theoretically could expect because of stigmatization of former temporary workers. If stigmatization would be at play, the relative wage gap would also increase over the years. However, as the increase in the absolute cumulative wage gap demonstrates, former temporary workers also do not experience high wage growth that would compensate them for initial disadvantages. As in this case, the wage gap would also decrease in absolute terms. Estimates of Rosenbaum bounds show that the matching results are again robust to unobserved heterogeneity (not presented).

4.3 Effect heterogeneity

Lastly, we provide results of subgroup analysis to further test the robustness of our results. Specifically, we focus on dimensions for which heterogeneous effects are revealed in previous studies and which are closely related to social stratification and inequality (Ganzeboom & Treiman, 1996; Gebel, 2009, 2010; Helbling, 2017; Kiersztyn, 2016, 2020; Mooi-Reci & Wooden, 2017). Thus, the subgroup analysis provides effects of distinct career trajectories on cumulative wages, separately for men and women, different educational levels (tertiary or no tertiary education) and occupational classifications of the first job (ISCO88, high: mangers, professionals and associate professionals, low: rest). Although previous studies show especially high transitions rates from temporary jobs to permanent jobs for individuals working in high occupational positions (Kiersztyn, 2020), they also reveal greater initial wage losses for those working in higher occupational positions as well as highly educated temporary workers (Gebel, 2009; Kiersztyn, 2016). The last finding is often viewed as support for the assumption that especially workers with high abilities self-select into temporary jobs with high initial wage penalties but with positive prospects for conversions to permanent jobs and steep wage growth (Gebel, 2009). Greater and more enduring wage penalties are furthermore found for prime age working men rather than women in some studies (Booth et al., 2002; Gebel, 2010; Mooi-Reci & Wooden, 2017). Which is explained with greater stigmatization of male former temporary workers, as due to still existing gender norms, temporary employment is viewed as a signal of low work commitment for men more than women (Mooi-Reci & Wooden, 2017). Hence, investigating the development of the cumulative wage for these subgroups allows us to reveal if different mechanisms (self-selection or stigmatization) are at play between subgroups.

We reduce our observation window to seven years in order to increase the sample size to be able to have sufficient observations for this subgroup analysis. This shorter observation period produces slightly different clusters than the ones' revealed in the main analysis. However, the patterns of career trajectories are largely similar. More specifically, we can again identify a cluster of standard career trajectories consisting of on average 7.00 years in full-time permanent employment. A cluster of stepping stone trajectories consisting of on average 1.83 years in full-time temporary employment followed by 4.57 years in full-time permanent employment, and an entrapment cluster consisting of trajectories made up by on average 2.91 years in full-time temporary employment, 0.81 years in unemployment and 1.37 years in full-time permanent employment (not presented). However, the entrapment cluster is still not large enough to allow subgroup analysis. Moreover, this cluster contains a number of sequences, which start with unemployment and thus provide no information on the initial ISCO (this is also the reason why initial ISCO cannot be included in the main analysis as a matching variable). Thus, the subgroup analysis focusses on a comparison between workers experiencing the standard career trajectory to workers on stepping stone trajectories.

At first glance, the subgroup analysis is in line with the above presented results of an enduring cumulative wage gap.[5] However, looking more closely at the results for the different subgroups, we see some heterogeneity in the relative wage differences and the development of the wage gap over time (Table 4, 5, and 6). First, in line with previous research we find that the initial wage disadvantage is more pronounced for highly educated temporary workers (Table 5) and those employed in high occupational positions (Table 6). However, in contrast to previous studies, we do not find that the initial wage penalty is higher for men than women (Table 4). Second, when looking at the change of the cumulative wage gap over time, it is important to keep in mind that not all people who experience a stepping stone career, transition from temporary to permanent jobs at the same time. Nonetheless, we can get a general understanding of the trend of the wage growth when comparing the cumulative wage gap in year one (when all workers on the stepping stone trajectory have a temporary job) and year seven (when all workers made their transition to a permanent job). In line with previous studies, the cumulative wage gap seems to be more enduring from men (Table 4). The same holds true for highly educated workers (Table 5) and workers who started their careers in high occupational positions (Table 6).

[5] Results are also robust for different periods (sequence starts before or after 2001, not presented).

Table 4 Yearly differences of cumulative wages of standard vs. stepping stone career trajectory, by gender

	Females			Males		
	ATT (SE)	Unmatched difference (SE)	Difference in percent	ATT (SE)	Unmatched difference (SE)	Difference in percent
7 years	-21,296.6+	-17,147.4+	-9.96 %	-28,971.1**	-33,347.0***	-11.24 %
	(11,677.0)	(9,208.5)		(10,888.5)	(8,859.1)	
6 years	-32,027.1**	-18,113.4*	-16.88 %	-21,665.4*	-32,312.6***	-10.05 %
	(11,579.4)	(7,801.2)		(10,274.5)	(7,695.9)	
5 years	-29,069.5**	-17,448.4**	-18.65 %	-19,427.8*	-30,351.6***	-11.17 %
	(10,106.0)	(6,478.0)		(7,820.6)	(6,425.2)	
4 years	-26,333.6***	-17,968.33***	-21.46 %	-18,543.6**	-27,187.8***	-13.75 %
	(7,467.7)	(5,131.7)		(5,926.0)	(4,552.4)	
3 years	-24,371.2***	-17,883.5***	-26.70 %	-15,688.5***	-22,803.4***	-16.10 %
	(5,378.9)	(3,923.1)		(4,267.0)	(3,625.7)	
2 years	-19,002.2***	-15,142.5***	-31.96 %	-17,606.7***	-18,484.5***	-26.42 %
	(3,756.7)	(2,816.0)		(3,335.6)	(2,617.7)	
1 year	-11,090.0***	-9,498.3***	-38.23 %	-10,429.2***	-11,087.47***	-32.04 %
	(1,881.8)	(1,469.2)		(1,877.4)	(1,322.7)	

Notes: +p<0.1, *p < 0.05, **p < 0.01, ***p < 0.001; results from kernel Epanechnikov matching with bootstrapped standard errors (500 repetitions), exact matching on education, other matching variables: migration background, birth year, living in West Germany at labor market entry, self-assessed risk aversion, initial marital status, initial existence of children, father's ISCO when resp. 15, year of labor market entry, ATT measures differences in outcomes between the treatment and control group, SOEP 1994–2017.

Table 5 Yearly differences of cumulative wages of standard vs. stepping stone career trajectory, by education

	Tertiary education			No tertiary education		
	ATT (SE)	Unmatched difference (SE)	Difference in percent	ATT (SE)	Unmatched difference (SE)	Difference in percent
7 years	-50,064.4+	-65,964.5***	-15.78 %	-14,307.8+	-19,982.0**	-6.63 %
	(27,009.1)	(16,815.2)		(7,564.5)	(6,523.8)	
6 years	-29,065.4*	-34,548.6***	-12.08 %	-27,577.9***	-33,856.1***	-16.81 %
	(12,772.7)	(8,306.3)		(6,425.2)	(5,301.0)	
5 years	-33,095.5**	-32,805.0***	-16.30 %	-25,870.6***	-29,783.6***	-19.13 %
	(10,544.1)	(68,14.37)		(5,599.0)	(43,89.2)	
4 years	-26,757.4***	-29,860.3***	-17.20 %	-16,229.2***	-25,521.7***	-16.35 %
	(7,397.9)	(5,471.4)		(3,867.0)	(3,530.7)	
3 years	-23,296.4***	-26,687.6***	-20.68 %	-13,916.2***	-21,443.9***	-19.22 %
	(5,461.8)	(3,886.3)		(2,963.4)	(2,802.5)	
2 years	-20,004.4***	-24,027.3***	-27.44 %	-10,359.9***	-14,629.9***	-21.96 %
	(3,577.3)	(2,849.83)		(2,397.6)	(1,943.0)	
1 year	-14,923.9***	-15,967.3***	-40.19 %	-5,308.3***	-7,196.9***	-22.70 %
	(1,990.7)	(1,530.5)		(1,268.9)	(1,000.8)	

Notes: +p<0.1, *p < 0.05, **p < 0.01, ***p < 0.001; results from kernel Epanechnikov matching with bootstrapped standard errors (500 repetitions), exact matching on education, other matching variables: gender, migration background, birth year, living in West Germany at labor market entry, self-assessed risk aversion, initial marital status, initial existence of children, father's ISCO when resp. 15, year of labor market entry, ATT measures differences in outcomes between the treatment and control group, SOEP 1994–2017.

Table 6 Yearly differences of cumulative wages of standard vs. stepping stone career trajectory, by initial ISCO

	High ISCO			No high ISCO		
	ATT (SE)	Unmatched difference (SE)	Difference in percent	ATT (SE)	Unmatched difference (SE)	Difference in percent
7 years	-49,701.8**	-43,840.9***	-17.57 %	-21,519.0*	-35,082.9***	-10.93 %
	(15,771.1)	(12,139.4)		(10,204.3)	(8,157.7)	
6 years	-35,800.0**	-30,556.2***	-15.22 %	-21,321.0*	-36,302.5***	-13.82 %
	(11,045.2)	(6,817.3)		(8,326.4)	(7169.1)	
5 years	-33,127.5**	-29,498.1***	-17.22 %	-20,104.0**	-31426.2***	-15.67 %
	(8,185.2)	(5,864.6)		(6,726.8)	(5,947.5)	
4 years	-30,916.2***	-27,713.7***	-20.53 %	-17,277.8***	-28,566.1***	-17.10 %
	(6,628.7)	(4,724.5)		(5,280.3)	(4,607.0)	
3 years	-25,420.2***	-24,740.5***	-23.36 %	-13,964.9***	-22,826.2***	-18.91 %
	(4,599.0)	(3,528.2)		(4,140.5)	(3,528.2)	
2 years	-19,931.3***	-20,092.8***	-28.16 %	-11,724.5***	-15,778.2***	-23.83 %
	(3,349.3)	(2,550.9)		(3,283.7)	(2,588.6)	
1 year	-13,625.3***	-12,372.8***	-37.72 %	-5,002.6**	-7,454.4***	-20.73 %
	(1,947.1)	(1,375.1)		(1,764.7)	(1,338.8)	

Notes: p<0.1, *p < 0.05, **p < 0.01, ***p < 0.001; results from kernel Epanechnikov matching with bootstrapped standard errors (500 repetitions), exact matching on education, other matching variables: gender, migration background, birth year, living in West Germany at labor market entry, self-assessed risk aversion, initial marital status, initial existence of children, father's ISCO when resp. 15, year of labor market entry, ATT measures differences in outcomes between the treatment and control group, SOEP 1994–2017.

When just comparing year one to year seven, we see in all subgroups that the absolute gap in Euro increases and that it decreases in relative terms. This again hints at neither compensating wage growth, nor a stigmatization experienced by former temporary workers of different subgroups. Some caution is however warranted when interpreting these results as the stepping stone cluster used for the subgroup analysis was rather heterogeneous concerning the year when temporary workers changed to permanent contracts.

5. Discussion and conclusion

The aim of this study is to investigate if experience of temporary employment at labor market entry can generate lasting disadvantages in terms of labor market income. This was done by utilizing sequence analysis to relate 10-year career trajectories to cumulative wages. The emphasis on career pathways, instead of single transition between states, incorporates the complexity of individuals' labor market experiences more adequately than previous research and allows us to define a dynamic treatment (Fuller & Stecy-Hildebrandt, 2015). Additionally, the focus on cumulative wages reveals a more holistic picture of the consequences of temporary employment than the investigation of annual or hourly wage growth. The results show that among young labor market entrants – a group especially at risk to face temporary employment (Gebel & Giesecke, 2009) – the standard career of full-time permanent employment is still the most prevalent. While, stepping stone careers are also common, entrapment in temporary employment with spells of unemployment is considerably less likely. However, unlike some

previous studies (Reichenberg & Berglund, 2019), in our sample we only find one stepping stone and entrapment career trajectory respectively. Nonetheless, our results indicate that in the German labor market workers can profit from the integrative power of temporary jobs, rather than have to fear entrapment in insecure employment, which may result from employers using temporary jobs as a means to easily adjust their work force to current demands. However, as in the analysis we could not distinguish between permanent jobs with the same or a new employer, we do not actually know if the transitions to permanent jobs are a result of successful screening or of the accumulation of helpful social contacts and the bridge function of temporary jobs.

Regardless of which mechanism is at play, estimates of the propensity score matching reveal that workers who are able to use temporary employment as a stepping stone to permanent employment still endure long-term wage penalties. When compared to a matched sample of workers who are always in full-time permanent positions, workers on the stepping stone career trajectory generate significantly less cumulative wages. This finding supports H1, which expected wage disadvantages for experiences of temporary employment but contradicts H2, which expected no long-term disadvantages for workers with stepping stone careers. However, an even higher wage gap is observed for individuals on the entrapment trajectory after 10 years in the labor market when compared to a similar sample of workers on the standard career trajectory. This finding gives support to H3, which expected more severe wage disadvantages for entrapment careers when compared to standard careers than for stepping stone careers. As we only find one cluster of entrapment career trajectories, which includes both careers mainly made up by temporary jobs and careers consisting of temporary jobs and unemployment, we cannot actually test hypothesis H4, which expected larger wage disadvantages for the latter when compared to standard careers than for the former.

Although, even for individuals with stepping stone careers, we find that the cumulative wage gap is increasing over the years, at least within the first 10 career years we focus on in this study. Thus, the higher employment security that these workers are able to enjoy in the long-run does not go together with high compensating wage growth. More specifically, the fact, that the cumulative wage gap does not remain stable but rather further increases in absolute terms even when these former temporary workers have obtained permanent positions, suggests that former temporary workers are paid less by the hour than their counterparts who were always in permanent positions. Thus, they do not experience higher wage growth than workers with standard careers that would compensate them for their initial disadvantages. However, the fact that the cumulative wage gap decreases in relative terms, also suggests that former temporary

workers are not stigmatized or discriminated against in terms of having lower annual wage growth. These results are robust also when differentiating subgroups on dimensions closely related to social stratification.

The fact that we find no evidence of a catching up of hourly or annual wages for workers with stepping stone careers to workers with standard careers partly contradicts previous findings for Germany (Gash & McGinnity, 2007; Gebel, 2010) and other countries (Booth et al., 2002; Mooi-Reci & Wooden, 2017). However, it should also be noted that we employ an entirely different estimation strategy and treatment definition than those studies. More specifically, while previous studies mostly consider single transitions or employment statuses, we try to consider whole careers and are thus able to separate between standard, stepping stone, and entrapment *trajectories*. We thus compare the maybe most privileged group of labor market insiders, working in stable permanent employment for their whole (early) career, enjoying high bargaining power and seniority payments (Lindbeck & Snower, 1989), to workers who experience much more initial labor market insecurity both in terms of employment stability and wages. Besides this different treatment and control group definition, one further explanation for our result of a lasting cumulative wage gap could thus be a trade-off accepted by workers on the stepping stone trajectory. Former temporary workers might place more importance on future employment security than steep compensating wage growth that would allow them to catch up to a very privileged group of workers.

To further disentangle the mechanisms behind these results, it would be important to differentiate stepping stone careers resulting from the screening function of temporary jobs (permanent job with same employer) from stepping stone careers resulting from the bridge function (permanent job with different employer). An investigation of the former group would allow us to more directly test the assumption of self-selection of high ability workers into temporary jobs with favorable prospects of conversion of contracts into permanent ones and steep wage growth. An investigation of the latter group is especially suitable to investigate possible stigmatization and discrimination of former temporary workers when they find a permanent job with a new employer. Unfortunately, this distinction is usually not made in the previous literature on wage consequence of temporary employment and due to our limited sample size, we were also not able to provide this distinction in our analysis.

Moreover, it is important to consider several other limitations when reviewing these results. First, as career trajectories and cumulative wages develop in parallel, it is hard to establish a clear direction of causality. Second, although Rosenbaum bounds reveal our results to be quite

robust to unobserved influences, our results are only unbiased if the conditional independence assumption is not violated. Accordingly, future research should try to take even more variables relevant to the selection into career trajectories into account than we are able to do in this study, such as for example more detailed measures on cognitive and non-cognitive skills. Furthermore, the focus of the study lies on gross cumulative labor income, thus any other sources of income (e.g., insurances, state transfers, or income generated through real estate) are not considered. Additionally, by investigating individual career sequences, the consequences of temporary employment are assessed in relation to individual financial well-being rather than household financial well-being. As individuals are usually embedded in a household context, future research should try to also take labor market experiences and financial resources of other household members into account. Something that for example becomes possible with multichannel sequence analysis (Gauthier, Widmer, Bucher, & Notredame, 2010; Mattijssen & Pavlopoulos, 2019). We refrained from taking for example partner's careers into account for this study, as this would be an additional sample restriction to our already strict sample definition that lead to modest sample sizes as it is. Because of this modest sample size, it was also not possible to separate between different types of temporary employment (e.g., temporary agency work) or between very specific career trajectories (i.e. spring-board vs. stepping stone). Future research should also try to relate more differentiated career sequences, similar to the ones identified by Reichenberg and Berglund (2019), to cumulative wages.

Despite these limitations, this study could add to the literature on the consequences of temporary employment by revealing a more nuanced picture than before, which focuses on career trajectories rather than single transitions and on cumulative wages rather than annual or hourly wages. With this strategy, we were able to highlight that the question if temporary jobs can be considered as a new dimension of lasting labor market inequality has no simple answer. More specifically, we find that a larger proportion of workers manages to use temporary employment as a stepping stone to more secure permanent jobs than get entrapped in cycles of insecure jobs and unemployment. However, we also find that in terms of income security, there are lasting disadvantages in terms of overall earnings of temporary employment, which are especially pronounced for workers on the entrapment career trajectory. This has important implications for the wealth accumulation of young workers, which in turn might influence crucial life decisions such as family formation and homeownership, as well as financial well-being in older ages.

References

Aisenbrey, S., & Fasang, A. E. (2010). New life for old ideas: The "second wave" of sequence analysis bringing the "course" back into the life course. *Sociological Methods and Research*, 38(3), 420–462.

Barbieri, P., Cutuli, G., Luijkx, R., Mari, G., & Scherer, S. (2016). Substitution, entrapment, and inefficiency? Cohort inequalities in a two-tier labour market. *Socio-Economic Review,* 17(2), 409–431.

Barbieri, P., & Scherer, S. (2009). Labour market flexibilization and its consequences in Italy. *European Sociological Review*, 25(6), 677–692.

Blanchard, O., & Landier, A. (2002). The perverse effects of partial labour market reform: Fixed-term contracts in France. *The Economic Journal*, 112(480), F214–F244.

Boockmann, B., & Hagen, T. (2008). Fixed-term contracts as sorting mechanisms: Evidence from job durations in West Germany. *Labour Economics*, 15(5), 984–1005.

Booth, A. L., Francesconi, M., & Frank, J. (2002). Temporary jobs: Stepping stones or dead ends? *The Economic Journal*, 112(480), F189–F213.

Brzinsky-Fay, C. (2007). Lost in transition? Labour market entry sequences of school leavers in Europe. *European Sociological Review*, 23(4), 409–422.

Brzinsky-Fay, C. (2014). The measurement of school-to-work transitions as processes: About events and sequences. *European Societies*, 16(2), 213–232.

Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), 31–72.

Dieckhoff, M. (2011). The effect of unemployment on subsequent job quality in Europe: A comparative study of four countries. *Acta Sociologica*, 54(3), 233–249.

DiPrete, T. A., & Eirich, G. M. (2006). Cumulative advantage as a mechanism for inequality: A review of theoretical and empirical developments. *Annual Review of Sociology*, 32, 271–297.

DiPrete, T. A., & Gangl, M. (2004). Assessing bias in the estimation of causal effects: Rosenbaum bounds on matching estimators and instrumental variables estimation with imperfect instruments. *Sociological Methodology*, 34(1), 271–310.

Doeringer, P. B., & Piore, M. J. (1971). *Internal labor markets and manpower analysis*. Lexington: Heath.

Elwert, F., & Winship, C. (2014). Endogenous selection bias: The problem of conditioning on a collider variable. *Annual Review of Sociology*, 40, 31–53.

Esping-Andersen, G., & Regini, M. (Eds.) (2000). *Why deregulate labour markets?* Oxford: Oxford University Press.

Fasang, A. E., Aisenbrey, S., & Schömann, K. (2013). Women's retirement income in Germany and Britain. *European Sociological Review*, 29(5), 968–980.

Fuller, S. (2011). Up and on or down and out? Gender, immigration and the consequences of temporary employment in Canada. *Research in Social Stratification and Mobility*, 29(2), 155–180.

Fuller, S., & Stecy-Hildebrandt, N. (2014). Lasting disadvantages? Comparing career trajectories of matched temporary and permanent workers in Canada. *Canadian Review of Sociology*, 51(4), 293–324.

Fuller, S., & Stecy-Hildebrandt, N. (2015). Career pathways for temporary workers: Exploring heterogeneous mobility dynamics with sequence analysis. *Social Science Research*, 50, 76–99.

Gangl, M. (2003). The only way is up? Employment protection and job mobility among recent entrants to European labour markets. *European Sociological Review*, 19(5), 429–449.

Gangl, M. (2006). Scar effects of unemployment: An assessment of institutional complementarities. *American Sociological Review*, 71(6), 986–1013.

Ganzeboom, H. B. G., & Treiman, D. J. (1996). Internationally comparable measures of occupational status for the 1988 international standard classification of occupation. *Social Science Research*, 25(3), 201–239.
Gash, V. (2008). Bridge or trap?: Temporary worker's transitions to unemployment and to the standard employment contract. *European Sociological Review*, 24(5), 651–668.
Gash, V., & McGinnity, F. (2007). Fixed-term contracts - the new European inequality?: Comparing men and women in West Germany and France. *Socio-Economic Review*, 5(3), 467–496.
Gauthier, J.-A., Widmer, E. D., Bucher, P., & Notredame, C. (2010). Multichannel sequence analysis applied to social science data. *Sociological Methodology*, 40(1), 1–38.
Gebel, M. (2009). Fixed-term contracts at labour market entry in West Germany: Implications for job search and first job quality. *European Sociological Review*, 25(6), 661–675.
Gebel, M. (2010). Early career consequences of temporary employment in Germany and the United Kingdom. *Work, Employment and Society*, 24(4), 641–660.
Gebel, M., & Giesecke, J. (2009). Labour market flexibility and inequality: The changing risk patterns of temporary employment in Germany. *Journal for Labour Market Research* (Zeitschrift Für Arbeitsmarktforschung), 42, 234–251.
Gebel, M., & Giesecke, J. (2011). Labor market flexibility and inequality: The changing skill-based temporary employment and unemployment risks in Europe. *Social Forces*, 90(1), 17–39.
Gibbons, R., & Murphy, K. (1992). Optimal incentive contracts in the presence of career concerns: Theory and evidence. *Journal of Political Economy*, 100(3), 468–505.
Giesecke, J., & Groß, M. (2003). Temporary employment: Chance or risk? *European Sociological Review*, 19(2), 161–177.
Giesecke, J., & Groß, M. (2004). External labour market flexibility and social inequality. Temporary employment in Germany and the UK. *European Societies*, 6(3), 347–382.
Hagen, T. (2002). Do temporary workers receive risk premiums?: Assessing the wage effects of fixed-term contracts in West Germany by a matching estimator compared with parametric approaches. *Labour: Review of Labour Economics and Industrial Relations*, 16(4), 667–705.
Halpin, B. (2014). Sadi: Sequence analysis tools for Stata. *University of Limerick Department of Sociology Working Paper Series. University of Limerick, Limerick.*
Halpin, B. (2016). Multiple imputation for categorical time series. *The Stata Journal*, 16(3), 590–612.
Harrison, G. W., Johnson, E., McInnes, M. M., & Rutström, E. E. (2005). Temporal stability of estimates of risk aversion. *Applied Financial Economics Letters*, 1(1), 31–35.
Helbling, L. A. (2017). Fixed-term jobs after vocational education and training in Switzerland: Stepping stone or impediment? *Swiss Journal of Sociology*, 43(1), 89–113.
Kahn, L. M. (2007). The impact of employment protection mandates on demographic temporary employment patterns: International microeconomic evidence. *The Economic Journal*, 117(521), F333-F356.
Kalleberg, A. L., Reskin, B. F., & Hudson, K. (2000). Bad jobs in America: Standard and nonstandard employment relations and job quality in the United States. *American Sociological Review*, 65(2), 256–278.
Kiersztyn, A. (2016). Fixed-term employment and occupational position in Poland: The heterogeneity of temporary jobs. *European Sociological Review*, 32(6), 881–894.
Kiersztyn, A. (2020). Who moves from fixed-term to open-ended contracts? Youth employment transitions in a segmented labour market. *Acta Sociologica*, 64(2), 198–214.
Korpi, T., & Levin, H. (2001). Precarious footing: Temporary employment as a stepping stone out of unemployment in Sweden. *Work, Employment and Society*, 15(1), 127–148.
Leschke, J. (2009). The segmentation potential of non-standard employment: A four-country comparison of mobility patterns. *International Journal of Manpower*, 30(7), 692–715.

Lindbeck, A., & Snower, D. J. (1989). *The insider-outsider theory of employment and unemployment*. Cambridge, MA: MIT Press.
Mattijssen, L., & Pavlopoulos, D. (2019). A multichannel typology of temporary employment careers in the Netherlands: Identifying traps and stepping stones in terms of employment and income security. *Social Science Research*, 77, 101–114.
McGrath, D., & Keister, L. (2008). The effect of temporary employment on asset accumulation processes. *Work and Occupations*, 35(2), 196–222.
McVicar, D., Wooden, M., Laß, I., & Fok, Y.-K. (2019). Contingent employment and labour market pathways: bridge or trap? *European Sociological Review*, 35(1), 98–115.
Mertens, A., & McGinnity, F. (2004). Wages and wage growth of fixed-term workers in East and West Germany. *Applied Economics Quarterly*, 50(2), 139–163.
Möhring, K. (2015). Employment histories and pension incomes in Europe. *European Societies*, 17(1), 3–26.
Mooi-Reci, I., & Dekker, R. (2015). Fixed-term contracts: Short-term blessings or long-term scars? Empirical findings from the Netherlands 1980–2000. *British Journal of Industrial Relations*, 53(1), 112–135.
Mooi-Reci, I., & Wooden, M. (2017). Casual employment and long-term wage outcomes. *Human Relations*, 70(9), 1064–1090.
Müller, W., Steinmann, S., & Ell, R. (1998). Education and labour-market entry in Germany. In Y. Shavit & W. Müller (Eds.), *From school to work. A comparative study of educational qualifications and occupational destinations* (pp. 143–188). Oxford: Oxford University Press.
Reichelt, M. (2015). Career progression from temporary employment: How bridge and trap functions differ by task complexity. *European Sociological Review*, 31(5), 558–572.
Reichenberg, O., & Berglund, T. (2019). "Stepping up or stepping down?": The earnings differences associated with Swedish temporary workers' employment sequences. *Social Science Research*, 82, 126–136.
Rosenbaum, P. R. (2002). *Observational Studies*. New York: Springer.
Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41–55.
Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician*, 39(1), 33–38.
Scherer, S. (2001). Early career patterns: A comparison of Great Britain and West Germany. *European Sociological Review*, 17(2), 119–144.
Scherer, S. (2004). Stepping-stones or traps?: The consequences of labour market entry positions on future careers in West Germany, Great Britain and Italy. *Work, Employment and Society*, 18(2), 369–394.
Scherer, S. (2009). The social consequences of insecure jobs. *Social Indicators Research*, 93, 527–547.
Socio-Economic Panel (2019). Data for years 1984-2017, version 34.
Struffolino, E. (2019). Navigating the early career: The social stratification of young workers' employment trajectories in Italy. *Research in Social Stratification and Mobility*, 63, 1–17.
Studer, M., & Ritschard, G. (2016). What matters in differences between life trajectories: A comparative review of sequence dissimilarity measures. *Journal of the Royal Statistical Society*, 179(2), 481–511.
Studer, M., Ritschard, G., Gabadinho, A., & Müller, N. S. (2011). Discrepancy analysis of state sequences. *Sociological Methods and Research*, 40(3), 471–510.
Voßemer, J., Gebel, M., Täht, K., Unt, M., Högberg, B., & Strandh, M. (2018). The effects of unemployment and insecure jobs on well-being and health: The moderating role of labor market policies. *Social Indicators Research*, 138, 1229–1257.

Wagner, G. G., Göbel, J., Krause, P., Pischner, R., & Sieber, I. (2008). Das Sozio-oekonomische Panel (SOEP): Multidisziplinäres Haushaltspanel und Kohortenstudie für Deutschland – Eine Einführung (für neue Datennutzer) mit einem Ausblick (für erfahrene Anwender). *Wirtschafts- Und Sozialstatistisches Archiv*, 2(4), 2, 301–328.

Wang, R., & Weiss, A. (1998). Probation, layoffs, and wage-tenure profiles: A sorting explanation. *Labour Economics*, 5(3), 359–383.

Ward, J. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 58(301), 236–244.

Appendix

Table A1 Row proportions for control variables by career trajectory, (SOEP 1994-2017)

	Standard	Stepping stone	Interrupted permanent	Entrapment	Part-time permanent	Retreat from standard	Self-employed	Total % (N)
Gender								
Male	32.94	18.96	23.22	10.66	2.84	2.13	9.24	100 (422)
Female	15.46	17.10	13.58	9.37	14.05	24.59	5.85	100 (427)
Education								
Primary and lower secondary	18.54	15.61	24.88	13.17	5.85	19.51	2.44	100 (205)
Upper secondary	27.51	16.86	20.41	9.47	7.10	10.95	7.69	100 (338)
Post-secondary, non-tertiary	32.56	26.74	16.28	3.49	8.14	11.63	1.16	100 (86)
Short tertiary	30.00	12.00	14.00	12.00	6.00	14.00	12.00	100 (50)
Tertiary	18.24	20.59	8.82	10.00	15.29	11.76	15.29	100 (170)
Migration background								
No	25.36	18.05	17.77	10.60	7.45	12.46	8.31	100 (698)
Yes	18.54	17.88	21.19	7.28	13.25	17.88	3.97	100 (151)
Labor market entry								
East Germany	22.22	12.85	21.88	15.97	8.33	12.50	6.25	100 (288)

Table A1 continued

West Germany	25.13	20.68	16.58	6.95	8.56	13.90	8.20	100 (561)
Father's ISCO-88								
Major group 1: Managers/professionals	27.27	20.00	18.18	9.09	5.45	5.45	14.55	100 (55)
Major group 2	20.00	25.38	10.77	3.85	13.85	13.08	13.08	100 (130)
Major group 3	23.20	24.80	10.40	12.00	7.20	16.00	6.40	100 (125)
Major group 4	29.31	18.97	20.69	10.34	8.62	8.62	3.45	100 (58)
Major group 5	21.21	12.12	21.21	21.21	15.15	6.06	3.03	100 (33)
Major group 6+7	26.32	15.09	19.65	10.88	8.07	13.33	6.67	100 (285)
Major group 8+9: machine operators/ elementary occupations	22.09	12.27	26.99	9.82	5.52	17.79	5.52	100 (163)
Initial marital status								
Married	27.41	10.15	14.72	8.63	13.71	11.68	13.71	100 (197)
Not married	23.16	20.40	19.48	10.43	6.90	13.96	5.67	100 (652)
Initial children								
Has children	24.31	13.33	18.43	10.98	10.98	10.98	10.98	100 (255)
No children	24.07	20.03	18.35	9.60	7.41	14.48	6.06	100 (594)
Risk aversion (SD)	4.96 (1.48)	5.02 (1.56)	4.90 (1.72)	5.11 (1.52)	4.58 (1.67)	3.93 (1.67)	5.26 (1.64)	

Table A1 continued

Mean birth year (SD)	1971.39 (8.12)	1975.02 (7.14)	1972.73 (8.25)	1974.68 (7.58)	1971.99 (8.89)	1974.10 (8.62)	1967.27 (7.99)	
Mean year of labor market entry (SD)	1999.80 (4.06)	2001.27 (4.07)	1998.79 (3.93)	2000.86 (3.78)	2002.25 (4.42)	1999.96 (4.44)	1999.97 (3.16)	
Total %	24.15%	18.02%	18.37%	10.01%	8.48%	13.43%	7.54%	100%
(N)	(205)	(153)	(156)	(85)	(72)	(114)	(64)	(849)

The Rosenbaum bounds approach helps us to estimate how strong the influence of an unobserved variable needs to be to change the results obtained by the PSM (DiPrete & Gangl, 2004; Rosenbaum, 2002). In our case, they allow us to assess the sensitivity or robustness of the identified cumulative wage disadvantages. Specifically, the Gamma values in the very left column of Table A2 and A3 illustrate how strongly any unobservable would need to influence the chance to experience the treatment rather than being in the control group to undermine our results of cumulative wage disadvantages. Concerning the comparison between people on stepping stone trajectories to people with standard careers, the critical value of Gamma lies between 1.75 and 2 (see Table A2, column p-value-). This tells us that even if there was an omitted variable that affects the chance to experience a stepping stone career rather than a standard career in relation of 1.75 to 1, we would still observe a significant cumulative wage gap.

In the case of experiencing an entrapment career rather than a standard career, the critical value of Gamma lies between 4.75 and 5 (see Table A3, column p-value-). This means that we would have to question our result if an unobserved variable caused the chance of an entrapment career to differ between the treatment and control group by a factor of 5. Thus, we can conclude that our results are quite robust to unobservables affecting the assignment to the treatment groups.

Table A2 Rosenbaum bounds for ATT; kernel Epanechnikov matching, standard vs. stepping stone trajectory

			Hodges–Lehmann point estimate			
Gamma	p-value+	p-value-	t-hat+	t-hat-	CI+	CI-
1	0.000	0.000	-48,618.6	-48,618.6	-67,924.9	-28,832.5
1.25	0.000	0.000	-60,102.1	-36,785.0	-80,446.6	-17,099.6
1.5	0.000	0.004	-69,330.6	-27,443.5	-90,603.9	-7,669.2
1.75	0.000	0.030	-77,591.7	-19,693.3	-99,644.2	1,082.9
2	0.000	0.106	-84,570.2	-13,196.6	-10,7524.0	8,487.5
2.25	0.000	0.244	-90,816.7	-7,392.01	-11,4889.0	14,553.8
2.5	0.000	0.421	-96,221.5	-1,967.9	-12,1148.0	20,103.3
2.75	0.000	0.598	-101,701.0	2,883.0	-127,439.0	25,178.6
3	0.000	0.744	-106,323.0	7,115.65	-133,044.0	30,082.4

Table A3 Rosenbaum bounds for ATT; kernel Epanechnikov matching, standard vs. entrapment trajectory

			Hodges–Lehmann point estimate			
Gamma	p-value+	p-value-	t-hat+	t-hat-	CI+	CI-
3	0.000	0.002	-235,009.0	-94,748.6	-273,689.0	-40,593.3
3.25	0.000	0.004	-238,564.0	-88,450.7	-278,259.0	-32,480.0
3.5	0.000	0.007	-243,938.0	-83,400.0	-283,225.0	-26,003.6
3.75	0.000	0.011	-248,283.0	-77,180.1	-288,744.0	-18,119.9
4	0.000	0.017	-251,321.0	-72,834.9	-293,285.0	-8,522.9
4.25	0.000	0.024	-254,242.0	-68,561.7	-296,741.0	-415.4
4.5	0.000	0.033	-256,115.0	-64,650.0	-301,438.0	5,902.8
4.75	0.000	0.044	-259,408.0	-60,287.3	-305,845.0	13,629.7
5	0.000	0.056	-262,217.0	-57,341.2	-308,846.0	20,461.4

Article 3: Wage growth after temporary employment in the UK and Germany: Disentangling compensation and stigmatization from a within and between employer perspective

Status: Revise and resubmit at *European Sociological Review*.

Acknowledgements: The author thanks Michael Gebel for helpful feedback to earlier versions of this article. Previous versions of this article were presented at the 5th Joint Interdisciplinary Graduate Conference in Milan, the 14th International German Socio-Economic Panel User Conference in Berlin, and the Annual SASE meeting in Amsterdam. The author is thankful to participants of these conferences for helpful comments and suggestions.

Funding: This work was supported by the European Research Council (ERC) under the Horizon 2020 research and innovation program (grant agreement No 758491).

Abstract
This study takes a closer look at wage growth of former temporary workers by distinguishing workers who can obtain permanent jobs with the same employer from those who find permanent work with a new employer. We argue that by making this distinction, we can separate successful screening and compensating wage growth from possible disadvantages in wage growth due to stigmatization of former temporary workers. We use data from the German Socio-Economic Panel (1995-2019) and the British Household Panel Study (1992-2008) as well as its' successor the UK Household Longitudinal Study (2009-2020) and estimate fixed effects individual slopes regression to investigate the importance of this distinction. Our results reveal that in both the rigid German labor market and in the more flexible UK labor market, wage growth of former temporary workers is indeed larger after successful screening, but only if it coincides with a job change within the firm. If the transition to a permanent job occurs on the same job, only workers in Germany experience wage growth. However contrary to our expectations, this wage growth is lower compared to the wage growth of workers who find a permanent job with a new employer.

1. Introduction

The wage disadvantages associated with temporary employment (i.e., jobs with a predefined fixed duration) in comparison to permanent employment are well established in the literature relying on cross-sectional data (Westhoff, 2022; Giesecke and Groß, 2004; Kiersztyn, 2016). However, results from cross-sectional studies might be biased as they cannot account for unobserved confounders. Another strand of literature, utilizing panel data to investigate the development of wage gaps over time, reveals that initial wage gaps between contract types disappear some years after the start of the temporary contract for some groups of workers (Gash and McGinnity, 2007; Gebel, 2010; Pavlopoulos, 2013). Moreover, panel studies considering more holistic career dynamics reveal strong wage growth for former temporary workers after they make transitions to permanent employment (Booth, Francesconi and Frank, 2002; Fuller and Stecy-Hildebrandt, 2015; Reichenberg and Berglund, 2019). All these findings are often interpreted as support for the assumption that temporary jobs can function as a prolonged probationary period and screening device, whereby after successful screening workers are compensated for their initial wage disadvantages, making the cost of temporary employment only transitory (Gebel, 2010; Booth, Francesconi and Frank, 2002; Wang and Weiss, 1998).

In contrast to this rather optimistic picture, there are also studies which reveal lasting wage disadvantages even some years after the experience of an initial temporary job (Gash and McGinnity, 2007; Fuller and Stecy-Hildebrandt, 2014) or when staying in temporary employment for several years (Barbieri and Cutuli, 2018). Similar results are revealed when more specifically comparing workers who mainly worked in temporary employment to workers who continuously held permanent jobs (Fauser, 2020; Booth, Francesconi and Frank, 2002). Such results are often explained as stigmatization of former temporary workers, with the underlying assumption being that employers interpret previous temporary contracts, which were not turned into a permanent one by the previous employer as a sign of unsuccessful screening and a negative signal about worker quality (Fuller, 2011; Mooi-Reci and Wooden, 2017; Fuller and Stecy-Hildebrandt, 2014).

From the description of these previous studies on wage consequences of temporary employment, it becomes evident that the screening function of temporary jobs can only truly be investigated by looking at the wage growth of former temporary workers who obtain a permanent job with the same employer (Fuller and Stecy-Hildebrandt, 2015). While stigmatization should only occur when former temporary workers must find work with a different employer. However, studies on wage growth have thus far neglected to take this distinction into account. This is especially surprising since studies looking at the employment

transitions after an initial temporary job already make the distinction of obtaining a permanent job with the same or a different employer to more directly investigate the screening function of temporary jobs (Reichelt, 2015; Schmelzer, Gundert and Hohendanner, 2015) – without however looking at the wage outcomes of such transitions.

We aim to make several innovative contributions to the literature by investigating the wage growth of former temporary workers, separating workers who were able to secure permanent employment with the same employer from those who change employers. We argue that this distinction is crucial to more directly test the underlying theoretical arguments of screening and compensating wage growth or possible stigmatization of former temporary workers. Additionally, for workers who received a permanent job with the same employer we distinguish those who receive a permanent contract on the same job from those who change jobs within the firm, to account for the fact that within-firm job changes may also contribute to wage mobility (Pavlopoulos et al., 2014).

Another contribution is that we compare two countries with very differently regulated labor markets, namely Germany with a rigid and coordinated labor market and the United Kingdom (UK) with a more flexible labor market. Such differences in institutional settings are likely to moderate individual-level wage dynamics (Arranz, Fernández-Macías and García-Serrano, 2021). While wage disadvantages of temporary jobs are found in many countries, they are usually less pronounced in liberal labor markets (Helbling, 2017; Gebel, 2010; Fuller and Stecy-Hildebrandt, 2015). Lastly, as a supplementary analysis we compare different subgroups of workers, as temporary jobs as a screening device could be more relevant for certain groups of workers, such as younger and high-skilled workers (Gebel, 2009; Gebel, 2010), whereas stigmatization might be more pronounced for older workers (Fuller and Stecy-Hildebrandt, 2015; Mooi-Reci and Wooden, 2017).

We utilize panel data for our research endeavor of estimating wage growth after temporary employment. Specifically, we use the German Socio-Economic Panel (SOEP, 1995-2019) and the British Household Panel Study (BHPS, 1992-2008) as well as its' successor the UK Household Longitudinal Study (HLS, 2009-2020) and focus our analysis on workers between 18 to 55 years of age, thus excluding workers approaching retirement age. These datasets offer the advantage of including detailed information on not only the current employment situation and income but - crucially for our analysis - also on job and employer changes. By applying fixed effects individual slope (FEIS) regression to this data, we can not only account for selection bias arising through time-constant unobserved heterogeneity but can also take

heterogeneous wage profiles between treated and untreated workers into account (Rüttenauer and Ludwig, 2023).

2. Perspectives on wage consequences of temporary jobs

2.1 Initial disadvantages, screening, and compensating wage growth

From the perspective of the theory of compensating wage differentials, workers must be convinced to work in undesirable jobs by receiving higher wages relative to more desirable jobs they could have (Rosen, 1986). Applied, to the study at hand temporary workers should receive higher wages than permanent workers as permanent jobs usually come along with higher employment security and more desirable working conditions (Kalleberg, 2000). Hence, a transition from a temporary to a permanent job should not result in wage growth but rather in a regression of wages as workers transitioning from temporary to permanent employment could accept a trade-off between enjoying higher employment stability and receiving lower wages.

In contrast to the theory of compensating wage differentials, there are several other theoretical approaches explaining why temporary workers experience wage disadvantages compared to permanent workers. First, following human capital theory temporary workers earn lower wages because they are offered poorer opportunities for further training and skill acquisition due to their low firm attachment. Both the temporary workers as well as their employers are hesitant to invest into firm-specific skills of temporary workers as they expect more frequent job changes and shorter firm tenure (Forrier and Sels, 2003; DeVries and Wolbers, 2005). Contrastingly, permanent workers should have higher incentives to invest in firm-specific skills due to their higher firm attachment, resulting in higher wages.

Second, under bargaining theory permanent workers benefit from wage advantages thanks to their stronger bargaining power as labor market insiders. This insider position results from the higher replacement cost, e.g., in the form of severance payments, for permanent workers, whereas temporary workers as labor market outsiders serve as a flexible buffer stock that can be more easily adjusted to current demands (Lindbeck and Snower, 1989; Polavieja, 2003). Of course, the stricter the protection of permanent workers, the more costly it is for employers to substitute them, increasing their wage bargaining power (Ryu, 2018; Bellani and Bosio, 2021).

The wage disadvantages for temporary workers can also be attributed to the screening function of temporary jobs. Under this framework, temporary jobs are used as a prolonged probationary period and screening device for permanent jobs (Wang and Weiss, 1998; Polavieja, 2003). During the screening process, employers pay temporary workers lower wages to transfer the screening cost to the worker as a form of insurance in case the worker does not fulfill the

employer's expectations. However, if the employer's expectations are met and the screening is successful, former temporary workers can expect a permanent contract as well as compensating wage growth to make up for the initial wage disadvantages (Mertens and McGinnity, 2004; Amuedo-Dorantes and Serrano-Padial, 2007). Following the expectations of the screening function, we thus expect that *former temporary workers experience wage growth when they obtain a permanent contract with the same employer (H1)*. Additionally, after a successful transition to a permanent job, the incentives to investment in firm-specific human capital should also increase for these former temporary workers as well as their wage bargaining power, also contributing to their wage growth.

2.2 The impact of country level-differences on the screening function

The "risk" of a permanent hire with a poor person-job match is smaller when permanent workers are less well protected and more easily replaceable (Fuller and Stecy-Hildebrandt, 2015). The screening function of temporary jobs might hence be less important under certain labor market conditions. Whereas Germany is classified as a strongly coordinated market economy, the UK is considered as a "liberal" uncoordinated market economy (Esping-Andersen, 1990; Hall and Soskice, 2001). One important distinction between such market economies is the regulation of labor relations, with the German labor market being characterized by strict employment protection of permanent workers, while the UK is among the lowest ranking OECD countries in terms of employment protection (OECD, 2021).[1] As uncoordinated labor markets are more fluid and allow greater mobility between jobs (Gangl, 2003; Barbieri, 2009), permanent workers also face greater employment insecurity, reducing their insider bargaining power. Another labor market institution which is argued to contribute to the protection of labor market insiders and to labor market dualization is collective bargaining (Lindbeck and Snower, 1989), which is much lower in the UK compared to Germany (OECD, 2022). These country-level differences could mean that the distinction between permanent workers as labor market insiders and temporary workers as labor market outsiders could be less pronounced in the UK than in Germany, also resulting in smaller wage differences and less need to use temporary jobs as screening devices (Gebel, 2010; Giesecke and Groß, 2004; Pavlopoulos, 2013). We thus expect that *former temporary workers in Germany experience higher wage growth when they obtain a permanent contract with the same employer than those in the UK (H2)*.

[1] Specifically, Germany has a rather strict protection of permanent workers and a relative lax regulation of temporary jobs. On a scale from 0-6, Germany reaches 2.6 on the protection of permanent workers and 1.38 for the regulation of temporary contracts (OECD, 2021). In contrast, the UK ranks low in the strictness of protecting permanent workers (1.35) and even lower in the regulations of the use of temporary contracts (0.25).

However, Germany and the UK differ not only in their labor regulations but also in the organization of their educational system. Whereas, the German educational system provides occupational specific training with a strong linkage to the labor market, the more general educational system in the UK results in much less signaling power of educational credentials and a greater importance of on-the-job training and job mobility (Marsden, 1986). Thus, employees in the UK must change jobs within and between firms more often to accumulate the necessary skills for a specific task. In contrast, in Germany these skills are provided by the highly differentiated and standardized apprenticeship system (Blossfeld and Mayer, 1988). This dichotomy of educational systems results in a stronger so called internal labor market (ILM) in the UK, while the occupational labor market (OLM) is more pronounced in Germany. With person-job-match being harder to determine on the basis of educational certificates, returns to job mobility and work experience are generally higher in ILMs compared to OLMs (Gangl, 2001). This should be especially the case when job mobility occurs within firms as the acquired firm-specific skills can be put to use. We could thus expect that *in both countries former temporary workers experience higher wage growth if the transition to the permanent contract coincides with a within-firm job change – and that this is even more pronounced in the ILM of the UK (H3).*

2.3 Bridge and possible stigmatization

There are of course a number of temporary workers, who do not fulfill their employers' expectations and for whom screening is thus not successful (Booth, Francesconi and Frank, 2002; Gebel, 2010; Gebel, 2009). These workers will not obtain a permanent job with the same employer. Besides unsuccessful screening, there might also be other reasons why temporary contracts are not converted to permanent ones by the employer, for example, when temporary jobs are mainly used to create a flexible buffer stock of workers with no intentions or possibilities to turn temporary contracts into permanent ones (Polavieja, 2003; Lindbeck and Snower, 1989; Barbieri and Cutuli, 2018). However, even for those workers, who do not receive a permanent job with the same employer, temporary jobs could still provide a stepping stone to permanent jobs with a new employer, which is called the bridge or entry port function of temporary jobs (Fuller and Stecy-Hildebrandt, 2015). The underling argument for this is that temporary jobs can help workers build human capital and form useful social contacts, which can be utilized for finding a permanent job (Korpi and Levin, 2001; Barbieri and Scherer, 2009; Addison and Surfield, 2009).

The transition to a permanent job with a new employer could happen either directly or after an intervening period of unemployment (Fuller and Stecy-Hildebrandt, 2015). The theoretically to

expect wage consequences of finding permanent work with a new employer are not straightforward. One possibility could be that the new employer considers a previous temporary job, which did not lead to a permanent one with the same employer, as a negative signal for the workers quality.[2] This stigmatization could lead to lower wage growth (Fuller, 2011; Mooi-Reci and Wooden, 2017). We thus expect that *former temporary workers experience lower wage growth when they obtain a permanent contract with a different employer compared to when they obtain a permanent contract with the same employer (H4)*. This should be the case independently of the fact if the latter transition coincides with a within-firm job change or not.

2.4 The impact of country-level differences on the bridge function

Shorter job tenure and more frequent job changes, which typically go along with experiences of temporary jobs (Addison, Cotti and Surfield, 2015) and which employers thus might interpret as a history of temporary employment (Bendick and Nunes, 2012), are more common in liberal labor markets where job mobility is generally higher (Gangl, 2003; Barbieri, 2009). This could mean that former temporary workers experience less stigmatization in the UK than in Germany, as job mobility is greater in general, also for permanent workers. We thus expect that *differentiating wage growth of former temporary workers who obtain a job with the same or a different employer is less relevant in the UK compared to Germany (H5a)*.

However, owed to the German OLM and the strong signaling power of the standardized educational credentials, German workers can more easily transfer their skills to other firms, whereas workers in the ILM of the UK have to face the loss of the important firm-specific skills when they change jobs between employers (Giesecke and Groß, 2004). In contrast to hypothesis H5a, we could thus also expect that *differentiating wage growth of former temporary workers who obtain a job with the same or a different employer is more relevant in the UK compared to Germany (H5b)*.

3. Empirical strategy

3.1 Data and sample

We utilize yearly panel data for our research endeavor of estimating wage growth after temporary employment. Specifically, we use the German Socio-Economic Panel (SOEP, 1995-2019) and the British Household Panel Study (BHPS, 1992-2008) as well as its' successor the UK Household Longitudinal Study (HLS, 2009-2020). Although, the SOEP started in 1984

[2] Job search theory argues that employer changes can lead to a better person-job match and higher wages in the long-run (Jovanovic, 1979; Riekhoff, 2022; Mouw and Kalleberg, 2010). However, this is mainly supported in the case of voluntary employer changes and not for involuntary employer changes due to dismissal or the ending of a temporary contract (Fuller, 2008; Pavlopoulos et al., 2014).

(Wagner et al., 2008), the earliest year we include is 1995 as contract type was not measured detailed enough in the years before. Although, the BHPS study started in 1991, the analysis is limited to the period of 1992-2020 as important variables are missing in the first wave. The datasets offer the advantage of including detailed information on not only the current employment situation and wages but also on job and employer changes. Moreover, the SOEP and the BHPS are highly comparable and have been utilized for cross-country comparative analysis on temporary employment many times before (Gebel, 2010; Giesecke and Groß, 2004; Pavlopoulos, 2013). The UK HLS as the successor of the BHSP allows linking the two dataset and analyzing the original BHPS sample also in the UK HLS (Fumagalli, Knies and Buck, 2017).[3]

We restrict our sample to workers between ages 18 to 55 (excluding workers approaching retirement age) who are dependently employed and not in education or vocational training and experience at least one year of temporary employment. The sample selection purposely not only includes workers who experience a transition from temporary to permanent employment but also those who remain in temporary employment. In doing so, we can also include information on the wage growth of workers who continuously remain in temporary employment to control for common baseline trends (Brüderl and Ludwig, 2015).

Moreover, as our employed method of analysis requires at least three observations per person (more on this below) (Rüttenauer and Ludwig, 2023), we exclude workers with less than three observations. Finally, we exclude workers with missing observations on the variables used in the analysis. For the analysis of *within-firm* transitions from temporary to permanent jobs *without* a job change, these restrictions result in the inclusion of 15,450 observations from 2,617 workers in Germany and 3,766 observations from 762 workers in the UK. Of the included workers, 2,138 experience the transition of interest in Germany and 635 in the UK. For the analysis of *within-firm* transitions from temporary to permanent jobs *with* a job change, these restrictions result in the inclusion of 3,757 observations from 838 workers in Germany and 1,623 observations from 362 workers in the UK. Of the included workers, 153 experience the transition of interest in Germany and 140 in the UK. Lastly, for the analysis of *between-firm* transitions from temporary to permanent jobs, these restrictions result in the inclusion of 7,575 observations from 1,531 workers in Germany and 2,060 observations from 464 workers in the

[3] The first interviews with original respondents of the BHPS were carried out in wave 2 of the UK HLS.

UK. Of the included workers, 899 experience the transition of interest in Germany and 350 in the UK.

3.2 Panel regression analysis

One of the most popular ways to estimate wage growth when panel data is available is the estimation of fixed effects (FE) regression, which provides an within estimator accounting for time-constant unobserved heterogeneity (Brüderl and Ludwig, 2015; Wooldridge, 2010). Specifically, when applying the FE estimation the first step is the error-component model which decomposes the regression error term into a time-constant, person-specific error term α_i and a time-varying person-specific error term ε_{it}. In the second step the values of both the dependent and the independent variables are demeaned by the person-specific means, thus deleting the time-constant error term summarizing the fixed-effects. Because of this within-transformation, the effects of any time-constant variables, such as gender, cannot be estimated. However, the great advantage of the FE within-estimator is that any bias resulting from time-constant unobserved heterogeneity is eradicated. We can thus model workers' (i) wages (y) across time (t) as a function of a vector of time-varying variables (X_{it}), individual fixed-effects (α_i), and the idiosyncratic error term (ε_{it}) referring to unobserved time-varying variables:

$$y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it}$$

The estimation of the FE relies on the assumption of parallel outcome trends of treated and untreated individuals and would be violated if individuals with a steeper outcome trajectory are selected into the treatment (Rüttenauer and Ludwig, 2023). As workers might select into temporary jobs based on their wage profile if they expect successful screening and compensating wage growth (Gebel, 2009), the parallel trends assumption might be violated and FE estimates might be biased. One solution to this problem is the estimation of fixed effects individual slope (FEIS) regression, which takes selection into temporary jobs based on wage profiles into account (Brüderl and Ludwig, 2015; Rüttenauer and Ludwig, 2023). Specifically, the FEIS models worker-specific constants and slopes by de-trending the data using a time-varying estimate of workers' wage trajectories.

To reveal if FE estimates are biased and to decide which model to use in our analysis, we estimated the Artificial Regression Test (ART) and the Bootstrapped Hausman Test (BSHT) (Rüttenauer and Ludwig, 2023; Ludwig, 2019) for all transitions under investigation in both countries respectively. These tests produced inconsistent results for the three investigated transitions as well as between Germany and the UK. First, in Germany both tests revealed FE estimates to be inconsistent in case of *within-firm* transitions from temporary to permanent jobs

without a job change (ART: $p < 0.005$, BSHT with 50 replications: $p < 0.000$) as well as for *between-firm* transitions (ART: $p < 0.05$, BSHT with 50 replications: $p < 0.10$), while FE estimates can be considered as unbiased in case of *within-firm* transitions from temporary to permanent jobs *with* a job change (ART: n.s., BSHT with 50 replications: n.s.). Second, in the UK both tests were insignificant for all three transitions, with the exception of *between-firm* transitions where the ART showed FE results to be inconsistent ($p<0.10$). In sum, we find some indication that there might be selection into temporary jobs on wage profiles of workers in Germany but not so much in the UK. This might be considered as support for the assumption that the distinction of permanent and temporary jobs might be less relevant in the flexible UK labor market than in the rigid Germany labor market. For reasons of consistency, we decide to report results for FEIS models for both countries. However, the results of the FE models are largely the same and are available from the authors upon request.

While the FE approach needs at least two observations per worker to demean the data, the FEIS estimator requires a minimum of $j + 1$ observations per worker, with j referring to the number of individual slope parameters as well as the individual intercept. Next to the individual intercept, we include age as our slope parameter to capture heterogeneous wage growth over time in the analysis and thus require at least three observations for each worker. Analysis was carried out in Stata, applying clustered standard errors on the individual level.

3.3 Variables

Our outcome of interest is the wage of former temporary workers after transitioning to a permanent contract, which we measure with gross hourly wages to take differences in working hours into account. Moreover, we take the natural logarithm of the gross hourly wages to make our estimates comparable across the two countries with different currencies.

Our main independent variables refer to the three previously discussed transitions between temporary and permanent jobs. We utilize various variables to construct these treatments. These are the type of contract (1=permanent and 0=temporary[4]) and information on employer and job changes since the previous interview. First, to depict *within-firm transitions without a job change*, we consider workers who experience a transition from temporary to permanent employment without changing their employer and who do not indicate that they experienced a job change since the previous interview. Second, to depict *within-firm transitions with job change*, we consider workers who experience a transition from temporary to permanent

[4] In the UK there is also information on seasonal or casual contracts, which we exclude from the analysis as they are not comparable to temporary contracts in Germany or the UK (Pavlopoulos, 2013).

employment without changing their employer but who do indicate that they experienced a job change since the previous interview. Third, to depict *between-firm transitions*, we consider workers who experience a transition from temporary to permanent employment who also change their employer. This last transition could either be direct or after a period of unemployment as these workers might need some time to find a new job (Fuller and Stecy-Hildebrandt, 2015).

One could argue that disadvantages in wage growth after temporary employment with an intervening period of unemployment could be due to the scarring effect of unemployment (Gangl, 2006), where the experience of unemployment would send the negative signal, and not necessarily the temporary job. Sensitivity checks comparing wage growth after direct and indirect transitions to permanent employment with a new employer show that in the case of the former wage growth is only marginally larger and still a lot smaller than wage growth after within-firm transitions with a job change. Moreover, there are only a few cases of indirect between-employer transitions in our data.

For all three treatments, we include all observations of temporary employment with the same employer. After any of the transitions of interest is experienced, we include all observations in permanent employment provided that no new job or employer change occurs. The control observations for the three treatments respectively include observations in continuous temporary employment in the same firm without a job change, continuous temporary employment in the same firm with a job change, and continuous temporary employment with a change of employer.

As control variables, we only include time-varying variables which have an impact on the transitions of interest and on wages to avoid overcontrol bias (Elwert and Winship, 2014). We are thus not including measures like number of children or marital status as these could be affected by employment positions (Laß, 2020). However, sensitivity analysis reveals that the results are largely the same when we include marital status and the number of children living in the household as control variables. To take time trends into account we control the survey period (Germany: 1995-1999, 2000-2004, 2005-2009, 2010-2014, 2015-2019/ UK: 1991-1999, 2000-2004, 2005-2009, 2010-2014, 2015-2020). We also control for state-level unemployment rates (Office for National Statistics, 2022; Federal Employment Agency, 2022), as unemployment rates are known to affect wages (Bande, Fernández and Montuenga, 2008; Blanchflower and Oswald, 1995) and job transitions of temporary workers (Passaretta and Wolbers, 2019). Only in Germany, do we additionally consider if workers live in East or West

Germany for between-employer transitions, as this distinction still has an effect on labor market opportunities and wages (Schnabel, 2016). The last variable is only considered for between-firm transitions as it should be time-constant in the case of within-firm transitions and thus absorbed by the fixed-effects estimator. Lastly, we control for age categories (18-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55) for all transitions and use age in its' metric form as the slope variable in the FEIS models.

4. Results

Results for the wage growth experienced by former temporary workers after any of the three transitions of interest in Germany and the UK are presented in Table 1. For Germany, as expected in H1, we see that former temporary workers experience wage growth after being supposedly successfully screened, i.e., when they obtain a permanent contract with the same employer. Specifically, estimates for German workers reveal that they experience wage growth of 3.25% when they transition to a permanent contract within the same firm and without changing their job.[5] The coefficient is statistically significant at the 1% level. However, we also see that German workers enjoy even higher wage growth if the transition to a permanent job coincides with a job change within the same firm, giving support to H3. Specifically, in this case estimates for German workers reveal that they experience wage growth of 22.63%. The coefficient is statistically significant at the 1% level.

Partly in contrast to what we expected in H4, wage growth of former temporary workers is not always lower when they obtain a permanent contract with a different employer compared to when they obtain a permanent contract with the same employer. More specifically, estimates for German workers reveal that they experience wage growth of 8.87% when they can use their former temporary job as a bridge to a permanent job with a new employer. With the coefficient also being statistically significant at the 1% level. Hence, the wage growth of former temporary

Table 1 FEIS estimates for wage growth after temporary employment

	Germany	UK
Within-firm without job change	0.032***	-0.008
	(0.006)	(0.015)
Within-firm with job change	0.204***	0.119***
	(0.041)	(0.031)
Between-firm	0.085***	0.00
	(0.017)	(0.006)

Note: *p < 0.05, **p< 0.01, ***p <0.001, standard errors (clustered on individual-level) in parenthesis.
Source: SOEP 1995-2019, BHPS 1992-2008 and UK LHS 2009-2020, own calculations.

[5] To turn log points into %: (eß – 1) multiplied by 100.

workers is larger when they find a permanent job with a new employer compared to when workers have their contract turned into a permanent one but stay in the same job, but smaller compared to those who change to a new and permanent position within the same firm.

Surprisingly, results are quite different in the UK. Here, former temporary workers only experience wage growth when they transition to a new and permanent job within the same firm. These workers experience wage growth of 12.64%, with the coefficient being statistically significant at the 1% level. For the two other transitions the wage growth coefficients are close to zero and not statistically significant. As the wage growth after within-firm transitions with a job change is smaller in the UK than in Germany, while the wage growth after within-firm transitions without job change is only significant in Germany, we find support for H2. In this hypothesis we expected that former temporary workers in Germany experience higher wage growth when they obtain a permanent contract with the same employer than those in the UK. These results also give support to H3, which expected high wage growth for within-firm job transitions especially in the UK, and partly to H4, which expected wage growth to be lower for between-firm compared to within-firm transitions.

It could be considered surprising that former temporary workers in the UK do not benefit from wage growth if they transition to a permanent job with a new employer or if their current job gets turned into a permanent one. However, remember that we include workers who continuously work in temporary jobs as control observations. Our results for the UK thus reveal that temporary workers who experience any transition to permanent employment do not enjoy higher wage growth than workers who stayed in temporary employment – unless this transition coincides with a within-firm job change. Overall, these findings could thus indicate that in general the distinction between permanent and temporary employment might not be as relevant in the UK than in Germany.

Concerning our expectation on whether accounting for employer changes is more important in Germany (H5a) or in the UK (H5b), the results are not as straightforward. While our results overall reveal that separating within-firm and between-firm transitions makes a difference in terms of wage growth, we cannot infer from our results that this distinction is more or less important in any of the two countries. Rather, our results highlight that next to employer changes, within-firm job changes are an important aspect to consider in both countries.

5. Supplementary analysis

It is usually argued that the screening function of temporary jobs is especially relevant for workers whose skills are particularly hard to assess before hiring, such as younger workers who

do not yet have much previous work experiences or highly educated workers applying for jobs including largely complex tasks which are difficult to monitor (Gebel, 2010; Fuller and Stecy-Hildebrandt, 2015). We could thus expect that younger and highly educated former temporary workers experience higher wage growth when they obtain a permanent contract with the same employer compared to older and less highly educated workers.

Moreover, it is often argued that in both countries frequent job changes are more common for younger workers who have just left education and are still at the beginning of their career compared to older and prime aged workers. Whereas, it is usual for young labor market entrants to "shop around" for the right job at the beginning of their career, frequent job changes and discontinuous careers might be interpreted as a signal of poor motivation or work commitment for older workers (Fuller and Stecy-Hildebrandt, 2015; Mooi-Reci and Wooden, 2017). Such older workers might contradict the "ideal worker norm" of individuals totally committed to their employer (Williams, 2001), leading to greater stigmatization of older former temporary workers compared to younger ones. We could thus expect that older former temporary workers experience lower wage growth when they obtain a permanent contract with a different employer compared to younger workers.

To test if wage growth after temporary employment differs for these subgroups of workers, we investigate the three transitions separately for younger (under 36 years) and older (over 35 years) workers. In a second subgroup analysis we distinguish highly-educated workers (tertiary education) from workers with lower levels of education (less than tertiary education).

First, coming to the results for younger (18-35) and older (36-55) workers, we see that overall, the results for the different transitions for each of the subgroups are in line with the results for the whole sample: wage growth is largest after within-firm transitions with a job change (Table 2). Moreover, results in Germany are in line with expectations. Younger former temporary workers experience higher wage growth after any of the three transitions. Estimates in the UK reveal that workers who experience within-firm transitions with a job change benefit from wage growth, however contrary to expectations and the results for Germany this is lower for younger (10.51%, $p<0.05$) than older workers (14.34%, $p<0.05$). However, in case of between-firm transitions, the subgroup analysis in the UK is in line with expectations and reveals that younger workers do experience wage growth after such transitions (7.97%, $p<0.05$), while this is not the case for older workers.

Table 2 FEIS estimates for wage growth after temporary employment, age subgroups

	Germany		UK	
	Younger	Older	Younger	Older
Within-firm without job change	0.039***	0.029***	-0.015	0.003
	(0.010)	(0.008)	(0.020)	(0.020)
Within-firm with job change	0.309***	0.022	0.100*	0.134*
	(0.062)	(0.048)	(0.045)	(0.053)
Between-firm	0.092***	0.071**	0.077*	-0.052
	(0.025)	(0.026)	(0.036)	(0.046)

Note: *p < 0.05, **p< 0.01, ***p <0.001, standard errors (clustered on individual-level) in parenthesis.
Source: SOEP 1995-2019, BHPS 1992-2008 and UK LHS 2009-2020, own calculations.

Next, we present results for different education groups in Table 3. In Germany, in line with expectations, after within-firm transitions on the same job tertiary educated workers enjoy higher wage growth (3.77%, p<0.001) than workers with less education (2.74%, p<0.001). In contrast, the results for this transition are not statistically significant in the UK. Surprisingly, in case of within-firm transitions with a job change, workers with tertiary education experience slightly lower wage growth compared to workers with less education in both Germany and the UK.

Lastly, we take a more detailed look at a potential mechanism for within-firm transitions from temporary to permanent employment with a job change as these transitions result in the highest wage growth in both Germany and the UK. The explanation for this high wage growth could not solely lie in the transition from a temporary to a permanent job but also in the fact that these workers might experience a promotion from their employer. Previous research has revealed that promotions can lead to immediate wage growth (Booth, Francesconi and Frank, 2003), although within-firm job changes do not necessarily coincide with promotions (Pavlopoulos et al., 2014). To account for promotions as a mechanism, we include the nine major subgroups of the International Standard Classification of Occupations (ISCO), excluding the tenth major subgroups referring to members of the armed forces, into the models. The results for the full sample of workers are largely the same as the results presented in Table 1. Promotions are thus not driving the high wage growth for workers who experience a within-firm transition from temporary to permanent employment with a job change.[6]

[6] For between-employer transitions we additionally estimated models controlling for the employment sector (Agriculture, Energy, Mining, Manufacturing, Construction, Trade, Transport, Bank/Insurance, Service sector, Other) and firm size (Germany: under 20, 20 to under 200, above 200/ UK: under 25, 25 to under 200, above 200) as these factors impact wages (Abowd et al., 2012; Oi and Idson, 1999) and might vary over time as a result of the between-firm job transition.

Table 3 FEIS estimates for wage growth after temporary employment , education subgroups

	Germany		UK	
	Tertiary	Less than tertiary	Tertiary	Less than tertiary
Within-firm without job change	0.037***	0.027***	0.008	-0.026
	(0.011)	(0.008)	(0.018)	(0.027)
Within-firm with job change	0.198**	0.201***	0.109**	0.122*
	(0.063)	(0.048)	(0.035)	(0.060)
Between-firm	0.120***	0.058**	-0.026	0.017
	(0.029)	(0.022)	(0.033)	(0.052)

Note: *p < 0.05, **p< 0.01, ***p <0.001, standard errors (clustered on individual-level) in parenthesis.
Source: SOEP 1995-2019, BHPS 1992-2008 and UK LHS 2009-2020, own calculations.

6. Discussion

In this study, we aimed to contribute to the literature on the longer-term wage consequences of temporary employment by more directly testing the screening function of temporary jobs as well as possible stigmatization of former temporary workers in two very different labor markets. To this end, we use FEIS models to estimate the wage growth of former temporary workers, separating workers who were able to secure permanent employment with the same employer from those who changed employers, which has not been done in such an explicit way before. Overall, we find clear evidence in both Germany and the UK that (presumably) successfully screened former temporary workers enjoy higher wage growth compared to former temporary workers who find permanent work with a new employer – but only if this transition coincides with a job change within the firm. If the transition to a permanent job occurs on the same job, only workers in Germany experience wage growth. In contrast to our expectations however, this wage growth is lower compared to the wage growth of workers who find a permanent job with a new employer.

While not all results might go in the expected direction, they still highlight that estimates of wage consequences of temporary employment might be distorted if within- and between-employer transitions are not distinguished. Moreover, we reveal the importance of within-firm job changes. As we find for both the rigid German labor market and the flexible UK labor market, that wage growth is highest when temporary jobs are used as a screening device for another job within the same firm, while staying on the same job but receiving a permanent contract does not have the expected benefits in terms of wage growth especially in the UK. We could interpret this finding as support for the assumption that the distinction between temporary workers as labor market outsiders and permanent workers as insiders might not be as relevant in the uncoordinated labor market of the UK.

We find no signs of stigmatization of former temporary workers when they find a permanent job with a new employer. While, these findings contradict our expectations, they are in line with assumptions of job search theory, which postulates that employer changes can lead to a better person-job match and higher wages in the long-run (Jovanovic, 1979; Mouw and Kalleberg, 2010; Riekhoff, 2022) – especially in the case of voluntary job mobility (Fuller, 2008; Pavlopoulos et al., 2014). This highlights one of the limitations of our study, as we do not know if workers who found a permanent job with a new employer left the firm voluntarily before the end of their temporary contract as they found a better job offer somewhere else, or if they were forced to find a new job because their temporary contract expired. Another limitation to consider is that we focus on a positively selected sample of workers for whom temporary jobs provide a stepping-stone to permanent jobs, be it with the same or a new employer. Although we include control observations of workers in continuous temporary employment, we exclude all workers from the sample for whom temporary employment results in longer periods of unemployment. Lastly, we are only able to use yearly and not monthly data and thus might miss some job transitions for workers who experience more than one transition in the period between two interviews.

Despite these limitations our results illustrate that in the case that temporary jobs are used as a screening device for other positions in the firm, workers who are successfully able to climb such internal career ladders benefit from high wage growth after transitioning form a temporary to a permanent job. However, if former temporary workers stay in their job, they do not necessarily enjoy high compensating wage growth when their contract is turned into a permanent one, casting at least some doubt on the assumption that employers use temporary jobs as a screening device to a large extend.

References

Abowd, J. M., Kramarz, F., Lengermann, P., McKinney, K. L. & Roux, S. (2012). Persistent inter-industry wage differences: Rent sharing and opportunity costs. *IZA Journal of Labor Economics*, 1(7), 1–25.

Addison, J. & Surfield, C. (2009). Atypical work and employment continuity. *Industrial Relations: A Journal of Economy and Society*, 48(4), 655–683.

Addison, J., Cotti, C. D. & Surfield, C. J. (2015). Atypical jobs: Stepping stones or dead ends? Evidence from the NLSY79. *The Manchester School*, 83(1), 17–55.

Amuedo-Dorantes, C. & Serrano-Padial, R. (2007). Wage growth implications of fixed-term employment: An analysis by contract duration and job mobility. *Labour Economics*, 14(5), 829–847.

Arranz, J., Fernández-Macías, E. & García-Serrano, C. (2021). Wage differentials and segmentation: The impact of institutions and changing economic conditions. *European Journal of Industrial Relations*, 27(2), 203–227.

Bande, R., Fernández, M. & Montuenga, V. (2008). Regional unemployment in Spain: Disparities, business cycle and wage setting. *Labour Economics*, 15(5), 885–914.
Barbieri, P. (2009). Flexible employment and inequality in Europe. *European Sociological Review*, 25(6), 621–628.
Barbieri, P. & Cutuli, G. (2018). Dual labour market intermediaries in Italy: How to lay off "lemons"—thereby creating a problem of adverse selection. *De Economist*, 166, 477–502.
Barbieri, P. & Scherer, S. (2009). Labour market flexibilization and its consequences in Italy. *European Sociological Review*, 25(6), 677–692.
Bellani, D. & Bosio, G. (2021). Knockin' on heaven's door? Reframing the debate on temporary employment and wages: Evidence from Europe. *Socio-Economic Review*, 19(3), 869–907.
Bendick, M. & Nunes, A. (2012). Developing the research basis for controlling bias in hiring. *Journal of Social Issues*, 68(2), 238–262.
Blanchflower, D. G. & Oswald, A. J. (1995). An introduction to the wage curve. *Journal of Economic Perspectives*, 9(3), 153–167.
Blossfeld, H.-P. & Mayer, K. U. (1988). Arbeitsmarktsegmentation in der Bundesrepublik Deutschland: Eine empirische Überprüfung von Segmentationstheorien aus der Perspektive des Lebenslaufs. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 40(2), 262–283.
Booth, A. L., Francesconi, M. & Frank, J. (2002). Temporary jobs: Stepping stones or dead ends? *The Economic Journal*, 112(480), F189–F213.
Booth, A. L., Francesconi, M. & Frank, J. (2003). A sticky floors model of promotion, pay, and gender. *European Economic Review*, 47(2), 295–322.
Brüderl, J. & Ludwig, V. (2015). Fixed-effects panel regression. In Best, H. and Wolf, C. (Eds.). *The SAGE handbook of regression analysis and causal inference*. Thousand Oaks: SAGE, pp. 327–357.
DeVries, M. R. & Wolbers, M. H. J. (2005). Non-standard employment relations and wages among school leavers in the Netherlands. *Work, Employment and Society*, 19(3), 503–525.
Elwert, F. & Winship, C. (2014). Endogenous selection bias: The problem of conditioning on a collider variable. *Annual Review of Sociology*, 40, 31–51.
Esping-Andersen, G. (1990). *The three worlds of welfare capitalism*. Princeton, New Jersey: Princeton University Press.
Fauser, S. (2020). Career trajectories and cumulative wages: The case of temporary employment. *Research in Social Stratification and Mobility*, 69, 1–13.
Federal Employment Agency (2022). Arbeitslosigkeit im Zeitverlauf. https://statistik.arbeitsagentur.de/SiteGlobals/Forms/Suche/Einzelheftsuche_Formular.html?nn=1610104&topic_f=laender-heft.
Forrier, A. & Sels, L. (2003). Temporary employment and employability: Training opportunities and efforts of temporary and permanent employees in Belgium. *Work, Employment and Society*, 17(4), 641–666.
Fuller, S. (2008). Job mobility and wage trajectories for men and women in the United States. *American Sociological Review*, 73(1), 158–183.
Fuller, S. (2011). Up and on or down and out? Gender, immigration and the consequences of temporary employment in Canada. *Research in Social Stratification and Mobility*, 29(2), 155–180.
Fuller, S. & Stecy-Hildebrandt, N. (2014). Lasting disadvantages? Comparing career trajectories of matched temporary and permanent workers in Canada. *Canadian Review of Sociology*, 51(4), 293–324.
Fuller, S. & Stecy-Hildebrandt, N. (2015). Career pathways for temporary workers: Exploring heterogeneous mobility dynamics with sequence analysis. *Social Science Research*, 50, 76–99.

Fumagalli, L., Knies, G. & Buck, N. (2017). Understanding Society. The UK Household Longitudinal Study: Harmonised British Household Panel Survey (BHPS). Colchester, Essex: Institute for Social and Economic Research (University of Essex).
Gangl, M. (2001). European patterns of labour market entry: A dichotomy of occupationalized vs. non-occupationalized systems? *European Societies*, 3(4), 471–494.
Gangl, M. (2003). The only way is up? Employment protection and job mobility among recent entrants to European labour markets. *European Sociological Review*, 19(5),429–449.
Gangl, M. (2006). Scar effects of unemployment: An assessment of institutional complementarities. *American Sociological Review*, 71(6), 986–1013.
Gash, V. & McGinnity, F. (2007). Fixed-term contracts - the new European inequality? Comparing men and women in West Germany and France. *Socio-Economic Review*, 5(3), 467–496.
Gebel, M. (2009). Fixed-term contracts at labour market entry in West Germany. Implications for job search and first job quality. *European Sociological Review*, 25(6), 661–675.
Gebel, M. (2010). Early career consequences of temporary employment in Germany and the UK. *Work, Employment and Society*, 24(4), 641–660.
Giesecke, J. & Groß, M. (2004). External labour market flexibility and social inequality. Temporary employment in Germany and the UK. *European Societies*, 6(3), 347–382.
Hall, P. A. & Soskice, D. (2001). *Varieties of Capitalism: The institutional foundations of comparative advantage*. Oxford: Oxford University Press.
Helbling, L. A. (2017). Fixed-term jobs after vocational education and training in Switzerland: Stepping stone or impediment? *Swiss Journal of Sociology*, 43(1), 89–113.
Jovanovic, B. (1979). Job matching and the theory of turnover. *Journal of Political Economy*, 87(5), 972–990.
Kalleberg, A. L. (2000). Nonstandard employment relations. Part-time, temporary and contract work. *Annual Review of Sociology*, 26, 341–365.
Kiersztyn, A. (2016). Fixed-term employment and occupational position in Poland: The heterogeneity of temporary jobs. *European Sociological Review*, 32(6), 881–894.
Korpi, T. & Levin, H. (2001). Precarious footing. Temporary employment as a stepping stone out of unemployment in Sweden. *Work, Employment and Society*, 15(1), 127–148.
Laß, I. (2020). The effects of non-standard employment on the transition to parenthood within couples: A comparison of Germany and Australia. *European Journal of Population*, 36, 843–874.
Lindbeck, A. & Snower, D. J. (1989). *The insider-outsider theory of employment and unemployment*. Cambridge, MA: MIT Press.
Ludwig, V. (2019). XTFEIS: Stata module to estimate linear Fixed-Effects model with Individual-specific Slopes (FEIS). https://EconPapers.repec.org/RePEc:boc:bocode:s458045.
Marsden, D. (1986). *The end of economic man? Custom and competition in labour markets.* Brighton: Wheatsheaf.
Mertens, A. & McGinnity, F. (2004). Wages and wage growth of fixed-term workers in East and West Germany. *Applied Economics Quarterly*, 50(2), 139–163.
Mooi-Reci, I. & Wooden, M. (2017). Casual employment and long-term wage outcomes. *Human Relations*, 70(9), 1064–1090.
Mouw, T. & Kalleberg, A. L. (2010). Do changes in job mobility explain the growth of wage inequality among men in the United States, 1977–2005? *Social Forces*, 88(5), 2053–2077.
OECD (2021). Strictness of employment protection. https://stats.oecd.org/Index.aspx?DataSetCode=EPL_R.
OECD (2022). Collective bargaining coverage. https://stats.oecd.org/Index.aspx?DataSetCode=TUD.

Office for National Statistics (2022). Unemployment. https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment.
Oi, W. Y. & Idson, T. L. (1999). Firm size and wages. *Handbook of Labor Economics*, 3(B), 2165–2214.
Passaretta, G. & Wolbers, M. H. J. (2019). Temporary employment at labour market entry in Europe: Labour market dualism, transitions to secure employment and upward mobility. *Economic and Industrial Democracy*, 40(2), 382–408.
Pavlopoulos, D. (2013). Starting your career with a fixed-term Job: Stepping-stone or "dead end"? *Review of Social Economy*, 71(4), 474–501.
Pavlopoulos, D., Fouarge, D., Muffels, R. & Vermunt, J. K. (2014). Who benefits from a job change: The dwarfs or the giants?. *European Societies*, 16(2), 299–319.
Polavieja, J. (2003). Temporary contracts and labour market segmentation in Spain: An employment-rent approach. *European Sociological Review*, 19(5), 501–517.
Reichelt, M. (2015). Career progression from temporary employment: How bridge and trap functions differ by task complexity. *European Sociological Review*, 31(5), 558–572.
Reichenberg, O. & Berglund, T. (2019). "Stepping up or stepping down?": The earnings differences associated with Swedish temporary workers' employment sequences. *Social Science Research*, 82, 126–136.
Riekhoff, A.-J. (2022). Good or bad (in)stability? A cross-cohort study of the relation between career stability and earnings mobility in Finland. *Research in Social Stratification and Mobility*, 77, 1-11.
Rosen, S. (1986). The theory of equalizing differences. In Ashenfelter, O. and Layard, R. (Eds.). *Handbook of labor economics*. Amsterdam: Elsevier, pp. 641–692.
Rüttenauer, T. & Ludwig, V. (2023). Fixed effects individual slopes: Accounting and testing for heterogeneous effects in panel data or other multilevel models. *Sociological Methods and Research,* 52(1), 43-84.
Ryu, K. (2018). Labor market dualism and the wage penalty for temporary employment: Evidence on the interplay of employment protection legislation and labor market institutions from PIAAC data. *Development and Society*, 47(4), 535–562.
Schmelzer, P., Gundert, S. & Hohendanner, C. (2015). The role of fixed-term contracts at labour market entry in Germany: Screening or flexibility? *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 67, 243–267.
Schnabel, C. (2016). United, yet apart? A note on persistent labour market differences between Western and Eastern Germany. *Jahrbücher für Nationalökonomie und Statistik*, 236(2), 157–179.
Wagner, G. G., Göbel, J., Krause, P., Pischner, R. and Sieber, I. (2008). Das Sozio-oekonomische Panel (SOEP): Multidisziplinäres Haushaltspanel und Kohortenstudie für Deutschland – Eine Einführung (für neue Datennutzer) mit einem Ausblick (für erfahrene Anwender). *Wirtschafts- und Sozialstatistisches Archiv*, 2(4), 301–328.
Wang, R. & Weiss, A. (1998). Probation, layoffs, and wage-tenure profiles. A sorting explanation. *Labour Economics*, 5(3), 359–383.
Westhoff, L. (2022). Wage differences between atypical and standard workers in European countries: Moving beyond average effects. *European Sociological Review*, 0(0).
Williams, J. C. (2001). *Unbending gender: Why family and work conflict and what to do about it*. New York: Oxford University Press.
Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Article 4: Couples' early career trajectories and later life housing consequences in Germany: Investigating cumulative disadvantages

Co-Author: Sonja Scheuring

Status: Published in *Advances in Life Course Research*, 51, Article 100445, doi: 10.1016/j.alcr.2021.100445.

Acknowledgements: The authors thank Michael Gebel, Steffen Schindler, the participants of the Bamberg Graduate School of Social Sciences (BAGSS) colloquium and of the YOUNG-IN workshop on "Old Age Security in the Light of Rising Labor Market Uncertainty", as well as the three anonymous reviewers for their helpful comments and suggestions to earlier versions of this article.

Funding: This research has received funding from the European Research Council (ERC) under the Horizon 2020 research and innovation program (grant agreements No 758491).

Abstract
Using data on couples from the German Socio-Economic Panel (1995–2018), this study investigates how couples' early career trajectories affect housing outcomes in early adulthood and how this effect is mediated by couples' joint cumulative income. We apply a life course perspective by identifying dynamic treatments consisting of couples' consecutive employment statuses and examining their longer-term effects on homeownership and income shares spent on rent. Using multichannel sequence and regression analysis, we find that couples in which both partners have insecure employment trajectories, characterized by frequent spells of fixed-term employment and unemployment, are 25 percentage points less likely to own a home in early adulthood compared to couples with more secure career trajectories. Surprisingly, the couples' cumulative income does not remarkably mediate this effect, explaining less than one-fifth of the total effect. For couples who do not own their home but rent, we find that couples with insecure careers spend between 2 and 5 percentage points more of their joint income on rent compared to couples where both partners have secure career trajectories. Cumulative income disadvantages mediate the effects on shares of income spent on rent and reduce the effect sizes by 30% to 40%. Our findings indicate that inequalities caused by early career patterns can accumulate not only over time but also within couples and transfer to other areas of life, exacerbating housing and wealth inequalities in the longer run.

1. Introduction

Rising housing and rental prices are issues that have been extensively discussed in public debate in many industrialized countries, mainly for two reasons. First, homeownership is an important private pension investment to ensure low living expenses and a high living standard during retirement (Dewilde & Raeymaeckers, 2008). However, rising property prices prevent individuals and families from making the transition to homeownership, which could foster old-age poverty in the long run. Rising property prices are observed in almost all European countries, but the tensions are particularly visible on the German housing market. In Germany, construction prices for residential buildings have been rising by an average of 4% every year since 2000 (German Federal Statistical Office, 2020).

Second, competitive housing markets with increasing rents make it more difficult for renters to save privately for their pensions and accumulate capital to obtain loans to purchase a home (Arundel & Lennartz, 2020). In Germany, households that moved into their home in 2015 or later paid an average of 12% more rent than the average household in 2018 (German Federal Statistical Office, 2019). Therefore, homeownership opportunities are becoming increasingly difficult to attain and realize due to the increasingly difficult situation on the housing market.

Housing research has examined the determinants of homeownership and, in particular, highlighted the importance of the employment situation (Lazarus & Folkman, 1984; Bosmans et al., 2016; Baron & Rapp, 2019). Unemployment, temporary employment, or other forms of non-standard work are argued to include greater perceived job and income insecurity (Kalleberg et al., 2000). This insecurity might impede the ability to plan for the future, which affects longer-term decisions (Bosmans et al., 2016; Lazarus & Folkman, 1984).

In particular, young workers who are in a phase of life in which many crucial decisions for the future are made (e.g., concerning family formation or homeownership) are at risk of facing such career insecurities (Gebel & Giesecke, 2009; Baron & Rapp, 2019). Previous studies show that the likelihood of becoming a homeowner depends strongly on the type of employment status (Baron & Rapp, 2019; McGarth & Keister, 2008; Lersch & Dewilde, 2015) and income uncertainty (Diaz-Serrano, 2005; Haurin, 1991) that individuals experience.

The housing literature has a long tradition of theoretically referring to a life course framework when considering the impact of family histories on longer-term housing careers (Henretta, 1987; Haurin et al., 1994; Ineichen, 1981). This strand of literature also emphasizes the role of the couple perspective (Kurz, 2000; Wagner & Mulder, 2000; Baron & Rapp, 2019; Dotti Sani & Acciai, 2018). The life course perspective compliments this line of research by focusing on

the longer-term effects on moving behavior (Herbers et al., 2014) or housing qualities (Feijten & Mulder, 2005), emphasizing the relevance of the timing of events and the longevity of effects.

This paper ties in with the life course perspective by making three contributions to the previous literature on career (in)security and housing. First, we analyze the effect on housing of couples' joint employment trajectories that incorporate different employment statuses of both partners in parallel. To do so, we apply a two-step approach by first performing multichannel sequence analysis and cluster analysis to define patterns of couples' careers. This first step allows us to build a dynamic treatment, which takes both partners' early career (in)security into account. In a second step, we estimate the effect of these career types of couples on the probability to be homeowners and the income spent on rent in early adulthood, namely when couples are in their mid-twenties to late thirties. Previous studies have highlighted the importance of career interruptions, but have mainly focused on individual employment statuses (Kurz, 2000) or unemployment experiences (Herbers et al., 2014; Feijten & Mulder, 2005). In addition, several studies emphasize the importance of a longer-term couple perspective (Baron & Rapp, 2019; Blom et al., 2020; Kurz, 2000), but few studies apply this design. If at all, these studies control for the partner's employment status (McGarth & Keister, 2008) and only rarely focus on couples (Dotti Sani & Acciai, 2018).

Second, we add to the housing literature by looking not only at the likelihood of homeownership but also at rental outcomes. While the previous literature mainly compares the effect of different independent variables on being either a homeowner or a renter (Arundel & Lennartz, 2020; Thomas & Mulder, 2016; Bobek et al., 2021; Lennartz & Helbrecht, 2018), we utilize the concept of rent burdens (Backhaus et al., 2015). More precisely, we refer to the share of income spent on rent. Rent burden, or sometimes referred to as rent affordability, is an important topic of public debate, but the literature on its determinants is sparse (Backhaus et al., 2015).

Third, we empirically test whether households' cumulative income (dis)advantages mediate the effects on the two housing outcomes. Following up on an earlier study showing that labor income insecurity reduces the probability of becoming a homeowner (Diaz-Serrano, 2005), we apply this insight to the context of employment trajectories with varying degrees of income (in)security and extend it to rent outcomes. The mediation effect of income has been theorized in several studies (McGarth & Keister, 2008; Dotti Sani & Acciai, 2018; Haurin, 1991), but has not yet been empirically tested in a longer-term context of housing consequences.

Three research questions are posed to examine whether (dis)advantages in employment trajectories at early career stages can accumulate within couples and over time to affect housing

outcomes. We ask, first, how couples' early career trajectories affect the probability of being homeowners in the last year of observation. Second, we examine whether couples' early career trajectories affect the share of income spent on rent in the last year of observation. Third, we investigate the relevance of joint cumulative income as a mediator of the effect of couples' early career (in)securities on both the probability of being homeowners and the share of income couples spend on rent.

To answer our research questions, we use longitudinal household data of the German Socio-Economic Panel (SOEP) from 1995 to 2018 on couples between the ages of 18 and 38 who are observed for seven years. We apply multichannel sequence analysis and cluster analysis to reveal distinct patterns of employment career (in)security within couples and multivariate regression analysis to examine the longer-term effects of these patterns on homeownership and the share of income spent on rent.

1.1 The German context

Germany represents an especially interesting case for our study for two main reasons: the characteristics of its housing system and its labor market system. More specifically, Germany has the lowest homeownership rate in the Eurozone, with about 40% of households owning their home in 2020, and the second lowest among OECD countries (Kaas et al., 2020). Accordingly, almost two-third of households are renters. Renting and social housing for renters have a long tradition in Germany, dating back to the period after World War II (Voigtländer, 2009). There is only moderate rent regulation, i.e., landlords are relatively free to choose tenants and rent prices, however rent increases for existing rental contracts are tightly regulated (Kholodilin et al., 2016). Moreover, tenants are strongly protected, which could make it more attractive to rent than to own a home. This strong renter protection also makes the renting market more rigid and more selective about who rents and who owns their home (Voigtländer, 2009; Kurz, 2000; Wagner & Mulder, 2000).

At the same time, the German labor market has one of the lowest youth unemployment rates within the Eurozone. In 2014, for example, about 4% of people aged 15 to 34 were unemployed, 49% were labor market inactive (including education and civil service), and 47% were employed. Of all employed young persons, 80% had a permanent job contract, about 15% had a fixed-term job contract, and 5% were self-employed (Dietrich, 2018). Germany is one prime example of a strictly separated 'two-tiered' labor market. Such labor markets comprise a primary labor market segment with highly regulated and protected well-paid permanent employment and a secondary labor market segment, including atypical employment of lower

quality, which is less regulated and protected (Gundert & Hohendanner, 2014). Therefore, individuals in the secondary segment may be particularly disadvantaged when it comes to housing decisions.

2. Theory and hypotheses

2.1 Employment statuses and the life course framework

Employment careers consist of successive labor market and employment statuses. Different labor market or employment statuses should offer distinct advantages or disadvantages in terms of manifest functions like income or latent functions such as (perceived) job stability (Jahoda, 1982). Unemployment or inactivity do not provide the manifest function of income, making it more difficult to afford homeownership or expensive rents. In contrast, employment provides income, but must be further distinguished by type of contract or employment (Kalleberg, 2000).

Permanent employment offers income and the prospect of a secure, stable, and long-term job, possibly facilitating entry into homeownership and the payment of high rents. In contrast, *fixed-term employment* is associated with rather low job stability and often lower income (Gebel, 2010; Kalleberg, 2000; Barbieri & Scherer, 2009). The term fixed-term employment summarizes all forms of contracts that have a predetermined expiry date, including fixed-term contracts with one employer, temporary agency work on a fixed-term contract, as well as casual or seasonal work. Alternatively, *self-employment* is not tied to any specific employer, but depends on the demand for the goods or services offered by the self-employed person. This dependency makes both income and continuity of employment more fluctuating and uncertain compared to permanent employment.

Since all these labor market statuses could be part of a single employment trajectory, it is important to examine not only the effects of current employment statuses or single transitions. Rather, for an accurate prediction of homeownership and the income spent on rent, the focus should be on how (dis)advantages of different employment paths might transfer to housing.

Because couples share housing costs, both the probability of being homeowners and the amount of income spent on rent should depend on the early employment careers of both partners. For instance, if both partners have high career volatility early in their career, e.g., because both partners switch frequently between unemployment and self-employment, the disadvantages in income and job security accumulate within the couple and should jointly affect housing in later years. The effect for these couples should be negative compared to couples in which both partners are permanently employed during their early careers. Accordingly, the advantages of

one partner's career trajectory may also offset the disadvantages of the other partner's insecure career.

These arguments refer to the idea of 'interdependence between life domains' (Bernardi et al., 2019), meaning that resources from one domain (i.e., the employment domain) are related to goals from another domain (i.e., the housing domain). The couple perspective refers to the idea of 'linked lives' (Elder 1994) or 'multilevel interdependence of the life course' (Bernardi et al., 2019). These interdependencies, or linked lives, describe the idea that individuals are embedded in higher level social units, i.e., relationships, such as partnership or marriage, which influence them in their decision-making processes and enable the sharing of resources (Elder, 1994). In addition, the arguments point to the 'time-related interdependence of the life course' (Bernardi et al., 2019), meaning that accumulated resources in the employment trajectory directly affect the likelihood in later years of being homeowners and the amount of income that is spent on rent.

2.2 The effect of couples' career trajectories on homeownership

Individuals experiencing repeated periods of job instability early in their careers, such as fixed-term employment or self-employment, earn lower wages on average compared to individuals with standard careers (Gash, 2008; Booth et al., 2002a; Booth et al., 2002b; Gebel, 2010). In periods of unemployment or labor market inactivity, individuals even receive no labor income. As a result, these individuals are unlikely to build important savings early in their careers, which are however necessary to afford a home in later years. In addition to the income disadvantages, the job insecurity or job instability experienced in such trajectories makes it rational to avoid making large and long-term financial investments such as buying a home. Homeownership would also tie individuals to a specific location, making frequent job and location changes more difficult (Baron & Rapp, 2019).

In turn, since lenders want to keep the risk of mortgage default low, credit institutions might find it less attractive to lend to the unemployed, inactive, or individuals with insecure employment careers (Akdogan et al., 2019). From a life course and linked lives perspective, these disadvantages accumulate not only over time but also within households (Elder, 1994; Bernardi et al., 2019). Subsequently, these cumulative disadvantages could reduce the likelihood of entry into homeownership for couples in which both partners have an insecure employment trajectory.

In contrast, if at least one partner has a secure and continuous permanent job that also leads to potentially higher savings, credit institutions might also be more willing to lend to these

individuals. In case of couples where both partners have secure employment careers, characterized primarily by permanent employment and a secure income, credit institutes should be even more willing to give out large loans.

H1a: The more insecure early employment trajectories of couples are the less likely couples should be homeowners later in their careers.

One of the most important explanations for these homeownership disadvantages are accumulations of income inequality within early careers. Couples in which both partners have secure careers from the start can save money continuously to gain security and be able to make large investments. In contrast, couples on insecure career pathways with repeated unemployment, inactivity, fixed-term or self-employment have a much harder time generating large savings (Akdogan et al., 2019). Moreover, young workers on insecure career pathways not only earn less or no pay on average compared to permanent workers, but they also have poorer or almost no prospects for promotion and corresponding earnings increases (Booth et al., 2002b; Gebel, 2010; Gash, 2008). These disadvantages in savings faced by young people with unstable employment trajectories amplify over time and make it more complicated for couples to achieve homeownership.

H1b: Lower cumulative income partly mediates the negative effect of couples' early insecure employment trajectories on the probability of being homeowners later in their careers.

2.3 The effect of couples' career trajectories on the share of income spent on rent

It is not only the ability to buy one's own home that may be negatively affected by early career instability. Because of income disadvantages, individuals with repeated spells of insecure employment statuses, such as inactivity, unemployment, fixed-term, or self-employment may have more difficulty finding affordable rental housing relative to their income. This difficulty can be exacerbated over time because landlords tend to raise rents with each new tenant to compensate for renovations and use rising property values to their advantage.

The longer one can live in the same place, the smaller the share of income one tends to spend on rent. Two important reasons are that rent increases for existing rental contracts are tightly regulated by German law (Kholodilin et al., 2016), and incomes usually rise over time. Repeated inactivity, unemployment, fixed-term or even self-employment should be associated with more frequent job changes and moves than stable permanent employment (Addison et al., 2015). Therefore, on average, rent tenure is likely to be shorter for workers with insecure careers than for workers with stable careers. Simultaneously, for workers with insecure careers,

promotions and income increases are less likely than for workers with continuous permanent careers (Booth et al., 2002b; Gebel, 2010; Gash, 2008). Consequently, workers affected by unstable and insecure careers may find it more difficult to obtain housing with affordable rents relative to their income.

In addition, individuals with insecure career patterns may be more reluctant to search extensively for affordable rental housing. Individuals with insecure career patterns might anticipate moving soon, such as when their fixed-term contract expires, and they need to find a new job. This anticipated volatility could also lead individuals with insecure career trajectories to accept rents that are more expensive relative to their income. Besides that, landlords – comparable to credit institutions – might be less willing to rent to employees with non-permanent jobs or to the unemployed to ensure continuous payment of rents, if landlords do not need tenants only for temporary interim rent. These preferences of landlords could further force individuals with unstable careers and low incomes to accept housing on unfavorable conditions, increasing the likelihood of paying a significant portion of their own income for rent.

Just as buying a house is usually a household decision for which both partners' income and career prospects are considered (Blom et al., 2020), finding affordable rental housing should also be determined by the couples' shared resources. Hence, all of these considerations apply even more when both partners in a couple experience insecure careers. In contrast, couples with secure careers and higher incomes should be more willing to invest in longer searching periods to find adequate and affordable rental housing relative to their income, as they expect to live at the same place for a longer time. Due to their stable jobs, it is more likely that both partners will remain in the same rental home for an extended period of time. Since individuals with such stable careers are more likely to receive promotions and salary increases, their advantages in the shares of income spent on rent should become even more favorable over time.

H2a: The more insecure early employment trajectories of couples are, the higher the share of couples' income spent on rent later in their careers should be.

Accumulated income disadvantages can theoretically explain some of these differences, although the reasons are not the same as for the link between career instability and homeownership. For couples with at least one partner who is on an insecure career path, it is likely that the accumulation of prior low or no income directly affects the current income and thus the share of the income spent on rent. More specifically, prior low income due to unstable careers could be interpreted as a signal of low work attachment and commitment by employers (Mooi-Reci & Wooden, 2017; Fuller, 2011).

These signals can directly affect the current income in terms of so-called scarring effects (Gangl, 2006; Dieckhoff, 2011). Scarring effects suggest that earlier disadvantages due to insecure careers, such as lower earnings and lower-quality jobs or periods of unemployment, can negatively affect future employment chances and income. This mediating effect may be even stronger when both partners have unstable early career trajectories. Within unstable career trajectories, couples accumulate low earnings from low-quality jobs.

These disadvantages reduce subsequent joint income, narrowing the gap between income and rent payments, i.e., the disposable income. Couples with high career security are more likely to receive more frequent promotions and salary increases. The accumulation of these increasing income advantages also affects the current income shares spent on rent. It is likely that the promotions or seniority payments from the earlier career are still visible in the later career.

H2b: Lower cumulative income partly mediates the positive effect of couples' early insecure employment trajectories on the share of couples' income spent on rent later in their careers.

3. Empirical strategy

3.1 Data

The data for our analysis come from the German Socio-Economic Panel (SOEP). The SOEP is an annual household panel providing information on the employment and living conditions of German households since 1984 (Wagner et al., 2007). The initial response rate is over 60% for the first sample drawn in 1984, and the average wave-to-wave re-interview rate is over 70% (Siegers et al., 2020). Besides the high response rates, the survey ensures high data quality and panel stability by adding refreshment samples throughout the years and by following up on individuals who have left their original household (Siegers et al., 2020; Wagner et al., 2007).

For our analyses, the SOEP yields three main advantages. First, it provides detailed annual data on individuals' activity status, type of contract, and various housing measures, such as information on homeownership and rent. Second, we have independent information from both partners because each adult household member is interviewed separately. This design allows us to construct reliable sequences of couples' employment trajectories. Third, the SOEP is one of the longest-running household panel surveys, allowing us to examine longer employment sequences and later career outcomes such as homeownership and the share of income spent on rent.

Our sample is restricted to the years from 1995[1] to 2018 and includes heterosexual couples, married or otherwise, living together in a household throughout the observation period. Both partners have completed education, which excludes e.g., insignificant student jobs from the analysis. To depict early careers, both partners are between 18 and 38 years old. In addition, the probability of homeownership increases significantly for individuals in this age range (Andrews & Sánchez, 2011).

Couples must be observed for seven subsequent years to be included in the sample. This restriction ensures that we only analyze stable and longer-term couples who are at a stage in life when family formation and transition to homeownership are most likely (Baron & Rapp, 2019). Moreover, we arrive at the seven-year observation window as a compromise between being able to investigate early careers of stable couples holistically and not losing too many cases with an even longer observation period. We do not define our observation period as the first seven years in the labor market after partners completed their education, since partners within couples do not necessarily complete education at the same time.

Of the 174,609 couple-years we observe in the SOEP, 136,667 are deleted because they fall outside our age restriction, and another 20,015 because they fall outside our required seven-year observation period. After additionally deleting observations with missing values on relevant variables, the restrictions finally yield a sample size of 1,257 couples and 8,799 couple-years. In our sample, male partners are on average born in 1973 and are on average about 28 years old at the first observation. Female partners are on average born around 1975 and are on average 26 years old at the first observation.

3.2 Methods

To test the hypotheses, we apply multichannel sequence analysis (Gauthier et al., 2010). This approach allows us to illustrate careers as a succession of states and create holistic treatments of career (in)security or career (in)stability that do not only focus on single career statuses or transitions (Fuller & Stecy-Hildebrandt, 2015; Aisenbrey & Fasang, 2010). Thus, sequences consist of annually measured employment statuses of both partners.[2] The first step of this approach is to measure the distance between sequences of couples. To measure this distance, the individual career sequences of both partners are combined into one sequence consisting of multiple states (in this case, the employment status of each partner).

[1] We include only the waves from 1995 and onwards since the type of contract was not measured accurately enough for our analysis in the waves before.

[2] We replace missing employment statuses in the sequences of each partner if the state before and after the missing state are the same as suggested by Halpin (2016).

In a second step, the similarities between each couples' sequence are judged using Optimal Matching (OM). Within this approach, a pair of sequences is considered more distinct from one another if more changes need to be made to one sequence to transform it into the other (Studer & Ritschard, 2016; Halpin, 2017). Each change applied to the sequences is associated with a certain cost assigned by the researcher. Here, we assign constant substitution costs of 2 and insertion or deletion (indel) costs of 1. Other algorithms, such as Hamming distances, are more sensitive to timing differences between sequences (Studer & Ritschard, 2016). However, timing differences are not central to answering our research question. We are mainly interested in how much career (in)stability certain trajectories entail, rather than when this (in)stability occurs.

The alignment of sequences results in a so-called distance matrix, which provides information about the (dis)similarity for each pair of couple sequences. This matrix forms the basis for a cluster analysis that reveals distinct patterns of couples' employment trajectories. We use the most commonly applied hierarchical Ward's algorithm for clustering of sequences (Halpin, 2017; Ward, 1963). This algorithm seeks to minimize the within-cluster variance, which increases homogeneity within the clusters.

Deciding on the correct number of clusters is not straightforward. We take suggestions from previous literature and form our decision based on the meaningfulness of the different cluster solutions according to our proposed theory. In addition, we rely on objective measures such as the elbow method and average silhouette width (Aisenbrey & Fasang, 2010; Fuller & Stecy-Hildebrandt, 2015; Studer, 2013). While the elbow method suggests an optimal cluster number of three or four clusters, looking at the average silhouette width suggest a three-cluster solution fits best. Ultimately, we opt for a four-cluster solution, as the three-cluster solution would not sufficiently differentiate different types of atypical employment, a difference that is not only empirically, but also theoretically important.

Of course, partitioning all couple sequences into four types of couples' career patterns still leaves some heterogeneity within the clusters, with rare couple career sequences not represented as a separate cluster. Nonetheless, each cluster summarizes a specific pattern of couples' career trajectories that can be generalized to all individual couple sequences within the cluster (Fuller & Stecy-Hildebrandt, 2015). The multichannel sequence analysis is performed in R using the TraMineR package (Gabadinho et al., 2011).

The final step of our analysis uses the resulting clusters of career trajectories to predict homeownership and the share of income spent on rent. The patterns of couples' career trajectories resulting from clustering the multichannel sequences are measured during the early

career t_0. The housing outcomes, namely the share of income spent on rent and homeownership, are measured in the later career t_1. Using this definition, we impose a causal order of events. We estimate average marginal effects (AMEs) from binary logistic regression models (homeownership) and perform linear regression analyses (share of income spent on rent). Standard errors are clustered on the couple level to reveal correct test statistics.

To test our hypotheses on homeownership and the shares of income spent on rent, we estimate two models. The first model includes only the patterns of career trajectories to predict homeownership (H1a), or shares of income spent on rent (H2a). The second model additionally includes the cumulative household income as a mediator into the two distinct models (H1b, H2b). Therefore, the coefficient for each career pattern in the first model equals the total effect (H1, H2a), while the coefficients in the second model show the direct effect (H1b, H2b). The difference between the two coefficients shows how much can be explained by the household income (indirect effect). We use the *KHB* ado in Stata (Kohler & Karlson, 2010), which allows the estimation of the statistical significance of the mediation effect also for binary logistic regression models (Mustillo et al., 2018).

3.3 Measures

3.3.1 Independent variable

We use the clusters of couples' career sequences as our treatment. In these sequences, each partner can be observed in five different states: being out of labor, registered as unemployed, self-employed, having a permanent job, or having a fixed term-job. Therefore, we depict the labor market positions discussed in the theory section. These states are measured on an annual basis in the SOEP for seven consecutive years and for both partners within a household. From the cluster analysis, we obtain four distinct clusters or patterns of couples' early employment trajectories, which we describe in more detail in the descriptive results section (4.1).

3.3.2 Dependent variables

Homeownership is measured at the household level (i.e., at the couple level) by asking whether the dwelling in which couples currently live is owned or rented by them. Responses are summarized into homeownership (=1) and no homeownership (=0), indicating that household members are tenants. Couples living in any other types of housing, such as dormitories, are excluded from the analysis.

For all couples who pay rent and do not own their home, we consider the affordability of their rent as our second outcome of the housing situation. Specifically, we measure what percentage of the couples' total income is spent on rent (Backhaus et al., 2015). For this ratio, we look at

the share of total household net income, which includes any government payments like housing benefits, that is spent on rent (including utilities). This measurement of income is important because if we were to look only at employment income, we would systematically overestimate the negative effect of insecure couple careers on the share of income spent on rent. Government payments such as housing benefits are intended to help poorer households with housing affordability, which may also cushion the impact of those careers on the shares of income spent on rent.

The two outcome variables are measured in the last year of observation (year seven), when partners within couples are between a minimum of 25 (the lower age limit of the sample restriction 18+7) and a maximum of 38 years old (the upper age limit of the sample restriction).

3.3.3 Mediator

Cumulative income is measured by the same income variable we use to measure the shares of income spent on rent. The mediator measures couples' cumulative net household income (in 10,000 Euro increments) over the seven-year observation period. For the very few missing values (approximately 3 percent of the couple-years), we use the imputed version of the household income variable to avoid losing important information on couples (Frick & Grabka, 2014). Otherwise, the unimputed version could have biased the results.

3.3.4 Control variables

Sociodemographic characteristics of both partners measured in the first year of observation are included as control variables. These characteristics include the highest educational attainment in the couple, the year of the start of the sequence, the year of birth of both partners, the migration background of both partners, the occupation of the parents when respondents were 15 years old (highest within the couple), the East or West German location of the household, and the existence of children in the household. We expect this sociodemographic information to affect both the assignment to the couple employment clusters and the likelihood of being homeowners and the shares of income spent on rent. We only include confounding control variables that have an effect on both treatment and outcome to avoid overcontrol and simultaneity bias in our models (Elwert & Winship, 2014). Table 1 in the Appendix summarizes how these control variables are distributed in each of the four clusters, while Table 2 in the Appendix summarizes how the dependent variables are distributed across clusters.

4. Results

4.1 Descriptive results of the multichannel sequence analysis

Our descriptive findings refer to the four distinct career patterns revealed by the cluster analysis on the multichannel employment sequences, which are presented in a sequence index plot (Figure 1). The clusters on the left describe the careers of male partners, while the clusters on the right illustrate the careers of female partners.

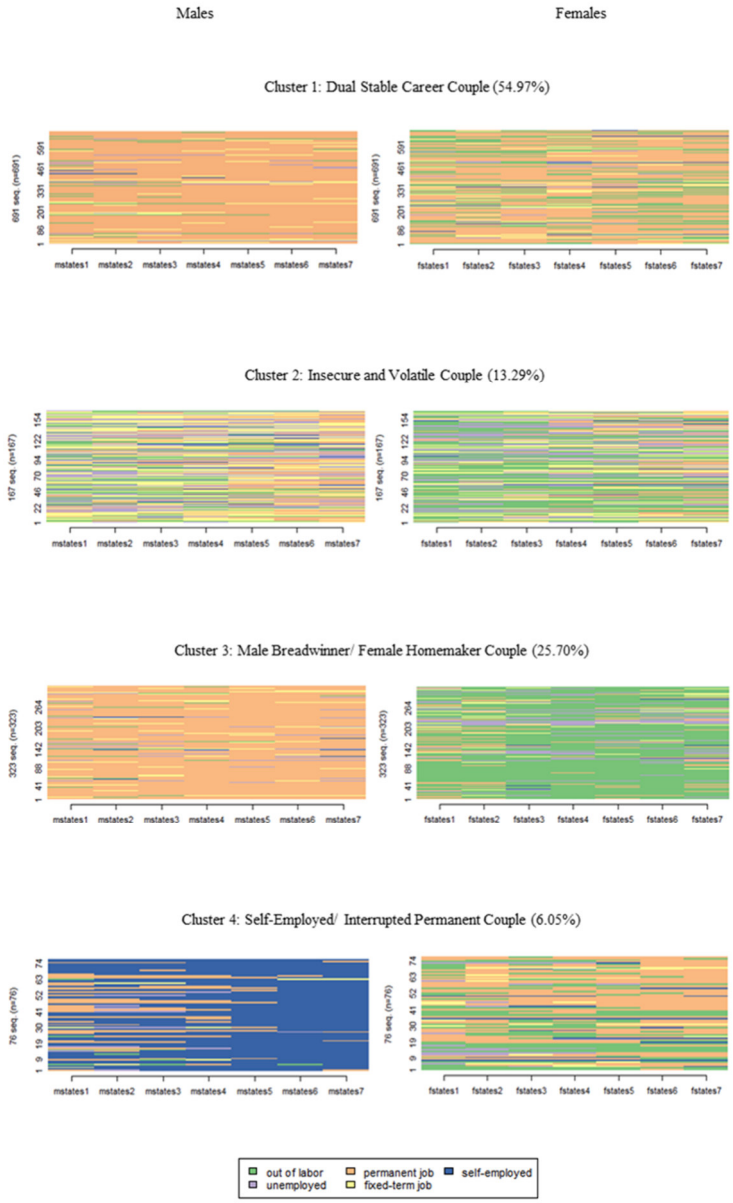
The first cluster (first row in Figure 1) summarizes the majority of couples, with slightly more than 50%, and can best be described as *dual stable career couples*. In this cluster, both partners work in permanent jobs for most years of their early careers. However, while men are permanently employed for most years (5.96 years on average), we see some interruptions (out of labor) for women. These gaps could indicate interruptions due to childcare or other caregiving responsibilities. Female partners spend an average of 4.66 years in permanent employment in this cluster.

The second cluster (second row in Figure 1) comprises about 13% of couples. Both partners have *insecure and volatile careers*. Especially the male partners spend a lot of time in fixed-term employment (2.13 years on average) and unemployment (1.74 years on average). However, men in this cluster also spend some years in permanent employment (1.75 years on average). Looking at the respective cluster, we see that some men make transitions to permanent employment, especially at the end of our observation window. Among female partners in this cluster, the most time is spent out of labor (2.87 years on average). However, the amount of time they spend in unemployment (1.57 years on average) and in fixed-term employment (1.40 years on average) follows closely behind. In general, couples in this cluster seem to have more instable and turbulent careers.

The first two clusters have in common that both partners follow similar career trajectories. This similarity could reflect assortative mating. It also means that career advantages or disadvantages associated with certain career trajectories accumulate in these couples.

The third cluster (third row in Figure 1) comprises the second most couples (about a quarter) and can be best described as the typical arrangement of *male breadwinner/female homemaker*. In this cluster, men work most of the time in permanent jobs (6.03 years on average), while the female partner does not take part in the labor market most of the time (5.20 years on average). Compared to the *dual stable career couple* and the *insecure and volatile couple* cluster, we see a clear division of tasks within the couple. The male partner takes on the task of breadwinning

Figure 1 Clusters of couples' early career trajectories



Note: Socio-Economic Panel, version 35, 1995–2018.

and works on a secure employment trajectory, while the female partner presumably takes on the task of homemaker and does not actively participate in the labor market.

The last cluster, the *self-employed/interrupted permanent* cluster (last row in Figure 1), is the smallest with only slightly more than 6% of cases. It includes couples where the male partner is mainly self-employed (5.37 years on average) and the female partner moves in and out of the labor market between periods of permanent employment. The female partner spends the most years in permanent employment (3.49 years on average), followed by periods of labor inactivity

(2.25 years on average). In contrast to the *dual stable career* and the *insecure and volatile* cluster, the career experiences of the partners in the *male breadwinner/female homemaker* and the *self-employed/interrupted permanent* clusters are very different from each other.

The four clusters illustrate the different levels of stability and security associated with couples' career trajectories. The *dual stable career couple*, in which both partners have standard careers consisting mainly of permanent employment, arguably entails the most career security. At the other end of the spectrum, is the cluster of couples with *insecure and volatile careers* consisting of fixed-term employment, unemployment, and even, especially for female partners, labor market inactivity. These career patterns closely resemble the entrapment often associated with non-standard jobs. The other two clusters can be located somewhere between these two extremes of career security and insecurity. The *male breadwinner/female homemaker* cluster represents a degree of security because at least the male partner has a stable job. The self-employment of the male partner in the last cluster, the *self-employed/interrupted permanent couple* cluster, which could also entail some degree of career insecurity, is balanced by relatively long periods of permanent employment of the female partner.

A look at the characteristics of the couples in each cluster (Table 1 in the Appendix) reveals that couples in the *insecure and volatile career* cluster are the youngest within the sample. At sequence start, men in this cluster are on average 26 years old, while their female partners are on average 24 years old. In addition, the couples in this cluster are from the youngest birth cohort, with men born on average around 1977 and women around 1979.

These findings are consistent with previous literature showing that labor market insecurity is most prevalent among recent cohorts of young workers (Gebel & Giesecke, 2009; Baron & Rapp, 2019; Gebel & Giesecke, 2016). Men are on average oldest in the cluster *self-employed/interrupted permanent* (about 29 years), but closely followed by men in the *dual stable career couple* cluster (about 28 years). Women are oldest in the *dual stable career couple* cluster with about 26 years. Finally, women in the *male breadwinner/female homemaker* cluster belong to the oldest birth cohort, born on average around 1974. Among men, the oldest birth cohorts are found in the *self-employed/interrupted permanent* and the male *breadwinner/female homemaker* cluster, with birth years around 1972.

4.2 Multivariate analyses: regression results

To test our hypotheses, we estimate regression models that incorporate the identified career patterns to predict housing outcomes in early adulthood and account in a second step for cumulative income as a mediator. We are especially interested in the disadvantages that may

arise from insecure careers compared to secure careers. Hence, we use the *dual stable career couples* cluster (i.e., the most secure one) as the reference category in our models. For the binary logistic regression models, we estimate AMEs that indicate the probability in percentage points to experience homeownership for couples belonging to the remaining clusters relative to the reference cluster. The coefficients of all regression models can be found in the Appendix (Table 3 for homeownership and Table 4 for income spent on rent).

4.2.1 The effect of couples' career trajectories on homeownership

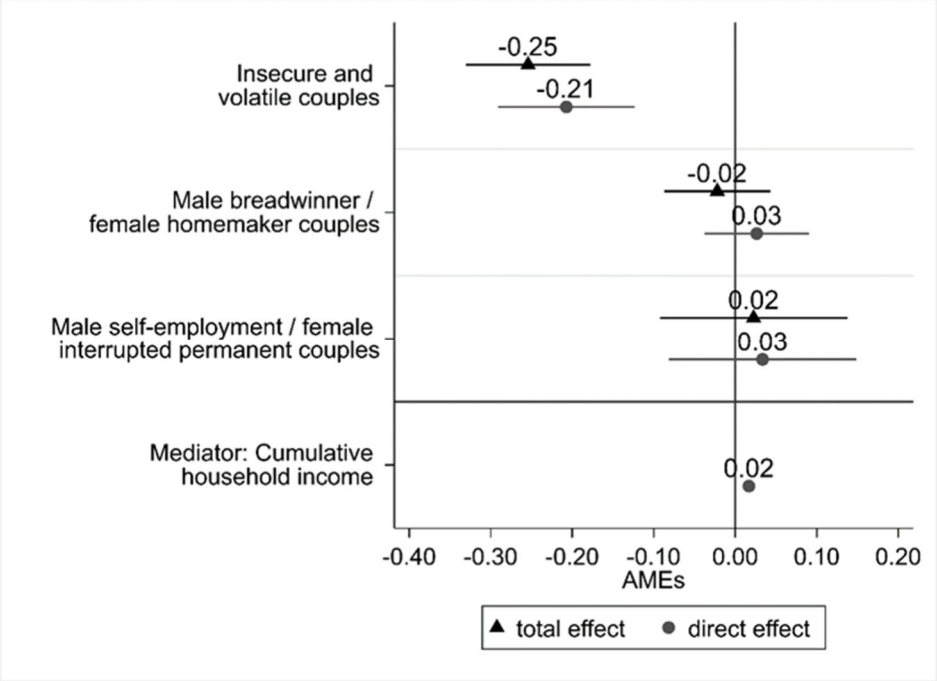
We expect in H1a that the more insecure a couple's early career trajectory is, the less likely it is to be homeowners in early adulthood. In H1b, we hypothesize that the cumulative household net income may be a mediator of the effect of couples' career (in)security on the probability of homeownership. To test these hypotheses, we estimate a model once without (total effect, results on H1a) and once with the mediator (direct effect, results on H1b) and perform a statistical test for the mediation effect (Table 3, last column). The main findings are depicted in Figure 2.

The first coefficient in each row (triangle) represents the total effect estimated based on the specification without cumulative income as a mediator (finding on H1a). Directly below each total effect is the respective direct effect (finding on H1b), illustrating the impact of the employment trajectories after controlling for the cumulative net household income (circles). In the last row, we see the effect of cumulative household net income on the probability of homeownership, which is included only in the second model specification. The results represent AMEs of the logistic regression predicting homeownership in the last observation, that is, when couples are in their later careers.

The estimates for the total effects show that couples in *the insecure and volatile* cluster have a much lower probability of homeownership (25 percentage points) compared to secure career couples. *Male breadwinner/female homemaker couples* are 2 percentage points less likely to be homeowners. However, this difference is statistically insignificant. In contrast to what we expected, male *self-employed/female interrupted permanent couples* have a 2 percentage points higher likelihood of being homeowners compared to the most secure pattern.

While we hypothesize that self-employment is relatively insecure, previous studies show that farmers, who are often also self-employed, tend to be homeowners (Kurz 2000; Kurz 2004). Moreover, studies which argue that self-employees are likely to have business relationships to local clients, tying them to this specific location, also find that self-employed are more likely

Figure 2 Effect of couples' career trajectories on homeownership and cumulative income as a mediator for this effect



Note: Socio-Economic Panel, version 35, 1995–2018. Reference group consists of dual stable career couples. The lines through the point estimates represent the 95% confidence intervals. Effects of control variables are not included into the graph but can be found in Table 3 in the Appendix.

to own their home (Mulder & Wagner, 1998). These findings and the fact that self-employment is a heterogeneous employment category could explain the small positive and statistically insignificant effect we find.

In line with our hypotheses on H1a, we see that couples' insecure early career trajectories – especially when both partners experience early career insecurity – reduce the likelihood of being homeowners in early adulthood.

Turning to the results for H1b, we see a statistically significant difference of 4 percentage points (-.25-(-.21) = -.04 with z = -3.44) between the total effect and the direct effect of the likelihood of homeownership for *insecure and volatile couple* career trajectories compared to the most secure one. The direct effect is smaller than the total effect, but still significant and meaningful (21 percentage points). When comparing *male breadwinner/female homemaker couples* to secure couples, the coefficient becomes positive when cumulative income is included in the model. These couples are now slightly more likely to be homeowners compared to the secure employment career couples. However, this difference is statistically insignificant (z = .46). Comparing the likelihood of the *self-employed/interrupted permanent couple* to be

homeowners with the secure couple employment trajectories, the total effect is almost equal to the direct effect, implying that there is no substantial mediation effect, although it is still significant ($z = 2.73$).

Finally, there is a positive effect of the cumulative net household income of 2 percentage points, i.e., a 10,000 Euros increase in cumulative income increases the likelihood to be homeowners by 2 percentage points. This effect is not as substantial as one might have expected.

These results imply – in line with our hypothesis H1b – that there is a mediating effect of cumulative household earnings, even if it is rather small and only occurs for *insecure and volatile couples*.

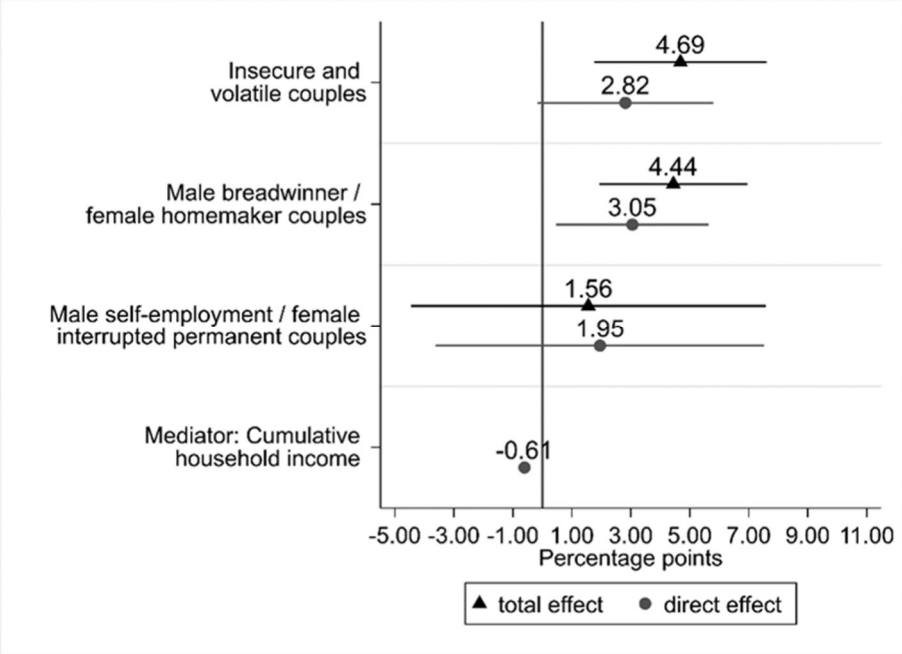
4.2.2 The effect of couples' career trajectories on the share of income spent on rent

In H2a we expect that the more insecure couple career patterns are, the higher the share of income spent on rent will be. The final hypothesis, H2b, addresses the mediating role of cumulative income (dis)advantages on the relationship between career trajectories and the share of income that is spent on rent in early adulthood. The total (triangle, findings on H2a) and direct effect (circle, findings on H2b) are shown in Figure 3, which presents the results of the linear regression models (results of the statistical tests for the mediator can be found in Table 4, last column).

Looking at the total effects, we see that couples with insecure careers spend a significantly higher share of their income on rent, which makes their housing less affordable. More specifically, compared to the most secure couple career pattern, couples in the *insecure and volatile career* cluster spend about 5 percentage points of their income more on their rent. Interestingly, the traditional *male breadwinner/female homemaker couple* is also at a significant disadvantage here compared to the *dual stable career couple*. Moreover, the effect is almost as large as for the most insecure career couples. For *self-employed/interrupted permanent* employment couples, the ratio is also higher compared to secure couple career trajectories (1.56 percentage points), but statistically insignificant. These findings support hypothesis H2a.

Regarding the results for H2b, the largest total effect, that of *insecure and volatile couples* compared to *dual stable career couples*, is partly mediated by cumulative income. More specifically, the direct effect is 1.87 percentage points smaller, implying a decrease in the effect size of almost 40%. This difference is also statistically significant ($z = 2.52$). As for the comparison between the traditional *male breadwinner/female homemaker couples* to the most

Figure 3 Effect of couples' career trajectories on the share of income spent on rent and cumulative income as a mediator for this effect



Note: Socio-Economic Panel, version 35, 1995–2018. Reference group consists of dual stable career couples. The lines through the point estimates represent the 95% confidence intervals. Effects of control variables are not included into the graph but can be found in Table 4 in the Appendix.

secure type of couples' career trajectories, the large positive total effect decreases by 1.39 percentage points. In relative terms, the total effect shrinks by 31%. Thus, the cumulative income disadvantages cannot explain as much of the effect as for the most insecure couples, but the reduction is still statistically significant (z = 1.96). Therefore, cumulative income disadvantages appear to play an important role in the larger shares of income spent on rent by the *insecure and volatile couples* and *male breadwinner/female homemaker couples* compared to *dual stable career couples*.

Although the effect is not fully explained by cumulative income, it explains more than one-third of the effect for both types of couples. For *self-employed/interrupted permanent couples*, for whom the total effect is the smallest, adding the cumulative income to the model slightly increases the effect by .39 percentage points. However, this increase is neither empirically nor statistically significant (z = -.56). The findings thus do not support the hypothesis that cumulative household income plays any important role in this rather small group difference. Finally, looking at the effect of cumulative income, we find that a 10.000 Euros increase in cumulative household income leads to a statistically significant .61 percentage points decrease in the share of income spent on rent.

Overall, prior cumulative income advantages reduce the share of income spent on rent, suggesting that prior income disadvantages also add up and negatively affect current shares of income spent on rent. The data on hand support our last hypothesis (H2b) that cumulative income (dis)advantages mediate the effect of insecure employment trajectories on the shares of income that couples spend on rent in early adulthood for *insecure and volatile* and *male breadwinner/female homemaker couples*. These findings support the notion that prior experiences with low-quality jobs may have negative signalling effects that affect the subsequent career of couples in the *insecure and volatile career* cluster.

4.3 Sensitivity analyses

To test the sensitivity of the results, we conduct several sensitivity tests in two sets. The first set refers to the choice of measurement of career insecurity and the second set is related to the role of (cumulative) income and absolute rent prices.

4.3.1 Choice of measurement

To test the sensitivity of our clusters, we apply two other algorithms in addition to the OM approach, namely the Hamming distance and the Dynamic Hamming distance, which are more sensitive to timing differences between sequences than the OM approach (Studer & Ritschard, 2016). Both alternative algorithms lead to very similar cluster solutions of couples' early career trajectories compared to the patterns we uncover with the OM approach. We also test the sensitivity of our results to the alternative of an index of sequence volatility, i.e., the index of turbulence (Halpin, 2017). This index considers the number of spells[3] in each (couple) sequence as a measure of career turbulence (see Table 5 in the Appendix for the distribution across clusters). Using the index of turbulence at the couple level as a predictor of housing outcomes leads to essentially similar results, namely that higher levels of turbulence lead to a lower likelihood of homeownership and a higher share of income spent on rent (not presented).

4.3.2 Role of (cumulative) income and rent prices

We introduce initial household income as an additional control variable in our regression models instead of including it in our measurement of cumulative income. This change in model specification produces somewhat smaller effects for the insecure and volatile career couple in the case of homeownership compared to the main model (Table 6 in the Appendix, models M1

[3] Consecutive years in the same sequence state are considered as one spell, e.g., three years of unemployment (first spell), followed by two years of fixed-term employment (second spell), and another two years of unemployment (third spell), would be considered as three employment spells. We count the spells first separately for each partner and combine them in a second step to create the index at the couple level.

and M2), however results are very similar for the share of income spent on rent (Table 7 in the Appendix, models M1 and M2).

Additionally, to ensure that our findings on the share of income paid for rent are not driven by household income or rental prices per se, we estimate models where we include these two variables separately, measured in the seventh year. While the household income in later years reduces the share of income spent on rent by about 5 percentage points, couples with *insecure and volatile careers* still pay about 4 percentage points more of their income on rent (Table 7 in the Appendix, model M5). These findings reaffirm that cumulative household income is an important explanation for the higher shares of income paid for rent by couples with more insecure careers, beyond the impact of the current income. Accounting for rent in the seventh year shows that rent itself only slightly increases the share of income spent on rent, while couples with *insecure and volatile careers* still spend over 3 percentage points more of their income on rent (Table 7 in the Appendix, model M6).

Finally, we examine the effect of cumulative income for each partner separately to see if one partner's contributions to cumulative household income are more important than the other's in explaining our results. For this individual measure of cumulative income, we consider only income from employment as well as unemployment and parental benefits and exclude all government transfers received at the household level (i.e., housing benefits). For homeownership, the results show that the male partner's cumulative income is much more important than the female partner's cumulative income both as a predictor of homeownership and in explaining the negative effect of career insecurity (Table 6 in the Appendix, model M1, M3, and M4). For the share of income spent on rent, the results are different. Here, female partner's cumulative income is a more important predictor of the share of income paid for rent and for reducing the effect of career insecurity (Table 7 in the Appendix, model M1, M3, and M4). The male partner's cumulative income also has an impact, but in this case, it is not as important as the female partner's cumulative income.

Overall, our findings appear insensitive to other model specifications as well as other measures of early career insecurity in couples.

5. Discussion and conclusion

This paper reaffirms the previous literature by showing that job instability, e.g., through fixed-term employment, lowers the probability of homeownership (Baron & Rapp, 2019). We extend these findings by taking a life course perspective. We show that disadvantages in homeownership result from the accumulation of longer-term instable employment careers

within couples. These cumulative disadvantages within early careers lead to significantly lower probabilities of homeownership compared to stable career patterns. Other couple career patterns do not appear to affect the probability of being homeowners. Thus, regarding homeownership, the double burden of instable careers experienced by both partners is more damaging than when only one partner has an insecure employment path.

Although income has been suggested as an important mediator in previous studies (McGarth & Keister, 2008; Dotti Sani & Acciai, 2018), we find that income plays a very small role in mediating the effect of early career on the probability of being homeowners. These results suggest that other channels, such as lower plannability or difficulty in obtaining credit, might play an even more important role for couples with insecure career trajectories.

We complement previous studies on the effects of employment status on homeownership (Baron & Rapp, 2019; McGarth & Keister, 2008; Lersch & Dewilde, 2015) by additionally accounting for shares of income spent on rent, an outcome that has been neglected so far by the literature (Backhaus et al., 2019). Even though Germany is still the prime example of people renting instead of buying a home, the share of renters is steadily increasing in all European countries (Arundel & Doling, 2017; Dotti Sani & Acciai, 2018). Therefore, the effects uncovered in this study may provide a glimpse into the future for other countries.

We show that career insecurity among couples significantly increases the share of income spent on rent. Not only does this mean that these couples have less money available for leisure activities that are important for ensuring well-being, but it may also be harder for them to save money to afford homeownership or build financial cushions. Previous literature suggests that income uncertainty is an important explanation for the decision to buy a home (Diaz-Serrano, 2005). We show that longer-term income instabilities or disadvantages are crucial in mediating the effects of career insecurity on the income spent on rent.

The fact that the most severe negative effects of couples' employment trajectories on housing are experienced by couples who are already most disadvantaged in terms of their career prospects (i.e., insecure and volatile couples) illustrates how disadvantages persist and even accumulate. Specifically, we uncover a double disadvantage experienced by couples with the most insecure careers. These insecure career couples are less likely to own a home in their early adulthood and more likely to rent, for which they have to spend a higher share of their income. Thus, our findings highlight the difficulties of already disadvantaged groups in catching up with advantaged dual stable career couples in terms of wealth accumulation. This finding is alarming in light of rising levels of social inequality and old-age poverty.

Despite the strengths of the present study, some limitations remain. Due to the choice of our study design and data restrictions, we cannot differentiate between very specific employment statuses such as specific forms of self-employment or atypical employment, or between less common career trajectories. We could not consider a more precise definition of our mediator, such as more holistic income trajectories, to reveal how cumulative income disadvantages arise. While our sensitivity analysis suggests differences in the role of gender in income contributions for the two outcomes, future research should more fully account for heterogeneity in employment statuses, as well as possibly gendered income trajectories to better understand how and for whom the mediator works in detail.

In addition, we face the problem that non-random panel attrition might bias our results. Since individuals who move frequently or experience periods of unemployment are more likely to drop out of panel studies such the SOEP (Siegers et al., 2020), we may underestimate the extent of career insecurity within couples. Our results could therefore be interpreted as conservative estimates of the relationship of career insecurity and housing situation, as we may not be observing couples with the most volatile careers in our sample.

Due to data limitations, we were also unable to analyze effects of early career trajectories on housing outcomes or financial well-being in retirement. Moreover, by focusing on Germany, we cannot investigate effects of employment trajectories from a country-comparative perspective to better understand the consequences of different housing market systems (Lersch & Dewilde, 2015). These open questions should be analyzed in future research by studying theoretically driven employment sequences and outcome dynamics over longer periods utilizing multilevel analyses for different countries.

Limitations aside, this paper advances our knowledge of longer-term consequences of (in)stable employment that go beyond income effects. We use multichannel sequence analysis that uncover complex career patterns (Gauthier et al., 2010) and relate the career patterns to housing outcomes in later lives. Overall, this article shows that the effects of employment trajectories on housing outcomes depend on intertwined early career trajectories.

These findings suggest that studies focusing only on individuals' employment status may greatly underestimate the effects and associated costs of career insecurity. Moreover, this article broadens the focus from considering homeownership versus renting to include renting quality outcomes. We provide first results on the severe negative consequences of career (in)security on rent affordability. Our findings thus underline the various disadvantages of non-standard employment for individuals and the accumulation of disadvantages within couples.

Finally, our results imply that government benefits such as housing payments do not sufficiently mitigate the housing disadvantages of couples' insecure and volatile careers. Examining the mediating effect of more detailed income trajectories of couples as well as the longer-term consequences of the revealed housing inequalities, such as poverty, family formation, or health and well-being, could be useful for more holistic policymaking. A country-comparative perspective will help to improve our understanding of how different housing policies moderate these impacts.

References

Addison, J. T., Cotti, C. D., & Surfield, C. J. (2015). Atypical jobs: Stepping stones or dead ends? Evidence from the NLSY79. *The Manchester School*, 83(1), 17–55.

Aisenbrey, S., & Fasang, A. E. (2010). New life for old ideas: The "second wave" of sequence analysis bringing the "course" back into the life course. *Sociological Methods & Research*, 38(3), 420–462.

Akdogan, K., Karacimen, E., & Yavuz, A. A. (2019). Cross-country evidence on the link between job security and housing credit. *Journal of Housing and the Built Environment*, 34, 947–963.

Andrews, D., & Sánchez, A. C. (2011). The evolution of homeownership rates in selected OECD countries: Demographic and public policy influences. *OECD Journal: Economic Studies*, 1, 207–243.

Arundel, R., & Doling, J. (2017). The end of mass homeownership? Changes in labour markets and housing tenure opportunities across Europe. *Journal of Housing and the Built Environment*, 32, 649–672.

Arundel, R., & Lennartz, C. (2020). Housing market dualization: linking insider–outsider divides in employment and housing outcomes. *Housing Studies*, 35(8), 1390–1414.

Backhaus, T., Gebers, K., & Schröder, C. (2015). Evolution and determinants of rent burdens in Germany. *SOEP Paper*, 806.

Barbieri, P., & Scherer, S. (2009). Labour market flexibilization and its consequences in Italy. *European Sociological Review*, 25(6), 677–692.

Baron, D., & Rapp, I. (2019). Does fixed-term employment delay important partnership events?: Comparing transitions into cohabitation, marriage, parenthood and home ownership among young adults in Germany. *Journal of Family Research*, 31(1), 40–57.

Bernardi, L., Huinink, J., & Settersten, R. A. (2019). The life course cube: A tool for studying lives. *Advances in Life Course Research*, 41, 1–13.

Blom, N., Verbakel, E., & Kraaykamp, G. (2020). Couples' job insecurity and relationship satisfaction in the Netherlands. *Journal of Marriage and Family*, 82(3), 875–891.

Bobek, A., Pembroke, S., & Wickham, J. (2021). Living in precarious housing: non-standard employment and housing careers of young professionals in Ireland. *Housing Studies*, 36(9), 1364–1387.

Booth, A. L., Dolado, J. J., & Frank, J. (2002a). Symposium on temporary work. Introduction. *The Economic Journal*, 112(480), F181–F188.

Booth, A. L., Francesconi, M., & Frank, J. (2002b). Temporary jobs: Stepping stones or dead ends? *The Economic Journal*, 112(480), F189–F213.

Bosmans, K., Hardonk, S., De Cuyper, N., & Vanroelen, C. (2016). Explaining the relation between precarious employment and mental well-being: A qualitative study among temporary agency workers. *Work*, 53(2), 249–264.

Dewilde, C., & Raeymaeckers, P. (2008). The trade-off between home-ownership and pensions: Individual and institutional determinants of old-age poverty. *Ageing & Society*, 28(6), 805–830.

Diaz-Serrano, L. (2005). Labor income uncertainty, skewness and homeownership: A panel data study for Germany and Spain. *Journal of Urban Economics*, 58(1), 156–176.

Dieckhoff, M. (2011). The effect of unemployment on subsequent job quality in Europe: A comparative study of four countries. *Acta Sociologica*, 54(3), 233–249.

Dietrich, H. (2018). Erwerbsarbeit und Arbeitslosigkeit Jugendlicher [Gainful employment and unemployment of young people]. In A. Lange, H. Reiter, S. Schutter, & C. Steiner (Eds.), *Handbuch Kindheits- und Jugendsoziologie* (pp. 205–239). Wiesbaden: Springer Fachmedien Wiesbaden.

Dotti Sani, G., & Acciai, C. (2018). Two hearts and a loan? Mortgages, employment insecurity and earnings among young couples in six European countries. *Urban Studies*, 55(11), 2451–2469.

Elder, G. H. (1994). Time, human agency, and social change: Perspectives on the life course. *Social Psychology Quarterly*, 57(1), 4–15.

Elwert, F., & Winship, C. (2014). Endogenous selection bias: The problem of conditioning on a collider variable. *Annual Review of Sociology*, 40, 31–53.

Feijten, P., & Mulder, C. H. (2005). Life-course experience and housing quality. *Housing Studies*, 20(4), 571–587.

Frick, J. R., & Grabka, M. M. (2014). Missing income data in the German SOEP: Incidence, imputation and its impact on the income distribution. *SOEP Survey Papers*, 225.

Fuller, S. (2011). Up and on or down and out?: Gender, immigration and the consequences of temporary employment in Canada. *Research in Social Stratification and Mobility*, 29(2), 155–180.

Fuller, S., & Stecy-Hildebrandt, N. (2015). Career pathways for temporary workers: Exploring heterogeneous mobility dynamics with sequence analysis. *Social Science Research*, 50, 76–99.

Gabadinho, A., Ritschard, G., Mueller, N. S., & Studer, M. (2011). Analyzing and visualizing state sequences in R with TraMineR. *Journal of Statistical Software*, 40(4), 1–37.

Gangl, M. (2006). Scar effects of unemployment: An assessment of institutional complementarities. *American Sociological Review*, 71(6), 986–1013.

Gash, V. (2008). Bridge or trap?: Temporary worker's transitions to unemployment and to the standard employment contract. *European Sociological Review*, 24(5), 651–668.

Gauthier, J.-A., Widmer, E. D., Bucher, P., & Notredame, C. (2010). Multichannel sequence analysis applied to social science data. *Sociological Methodology*, 40(1), 1–38.

Gebel, M. (2010). Early career consequences of temporary employment in Germany and the UK. *Work, Employment and Society*, 24(4), 641–660.

Gebel, M., & Giesecke, J. (2009). Labour market flexibility and inequality: The changing risk patterns of temporary employment in West Germany. *Journal for Labour Market Research* (Zeitschrift für Arbeitsmarktforschung), 42, 234–251.

Gebel, M., & Giesecke, J. (2016). Does deregulation help? The impact of employment protection reforms on youths' unemployment and temporary employment risks in Europe. *European Sociological Review*, 32(4), 486–500.

German Federal Statistical Office (2019). Wohnen 2018: Mieten und Mietbelastung in Metropolen besonders hoch (in German) [Housing 2018: Rents and rent burdens particularly high in metropolitan areas]. https://www.destatis.de/DE/Presse/Pressemitteilungen/2019/10/PD19_N001_129.html;jsessionid=7D316B3897D2BCD20480DB669873C96A.internet8711.

German Federal Statistical Office (2020). Preisindex für die Bauwirtschaft: Februar 2020 (1. Vierteljahresausgabe) [Price index for the construction industry: February 2020 (1st quarterly edition)]. Fachserie 17, Reihe 4. Wiesbaden.

Gundert, S., & Hohendanner, C. (2014). Do fixed-term and temporary agency workers feel socially excluded?: Labour market integration and social well-being in Germany. *Acta Sociologica*, 57(2), 135–152.

Halpin, B. (2016). Multiple imputation for categorical time series. *The Stata Journal*, 16(3), 590–612.

Halpin, B. (2017). SADI: Sequence analysis tools for Stata. *The Stata Journal*, 17(3), 546–572.

Haurin, D. R. (1991). Income variability, homeownership, and housing demand. *Journal of Housing Economics*, 1(1), 60–74.

Haurin, D. R., Hendershott, P. H., & Kim, D. (1994). Housing decisions of American youth. *Journal of Urban Economics*, 35(1), 28–45.

Henretta, J. C. (1987). Family transitions, housing market context, and first home purchase by young married households. *Social Forces*, 66(2), 520–536.

Herbers, D. J., Mulder, C. H., & Mòdenes, J. A. (2014). Moving out of home ownership in later life: The influence of the family and housing careers. *Housing Studies*, 29(7), 910–936.

Ineichen, B. (1981). The housing decisions of young people. *The British Journal of Sociology*, 32(2), 252–258.

Jahoda, M. (1982). *Employment and unemployment: A social-psychological analysis*. New York: Cambridge: University Press, Cambridge.

Jalovaara, M., & Fasang, A. E. (2020). Family life courses, gender, and mid-life earnings. *European Sociological Review*, 36(2), 159–178.

Kaas, L., Kocharkov, G., Preugschat, E., & Siassi, N. (2020). Low homeownership in Germany—a quantitative exploration. *Journal of the European Economic Association*, 19(1), 128–164.

Kalleberg, A. L. (2000). Nonstandard employment relations: Part-time, temporary and contract Work. *Annual Review of Sociology*, 26, 341–365.

Kalleberg, A. L., Reskin, B. F., & Hudson, K. (2000). Bad jobs in America: Standard and nonstandard employment relations and job quality in the United States. *American Sociological Review*, 65(2), 256–278.

Kholodilin, K. A., Mense, A., & Michelsen, C. (2016). Market break or simply fake? Empirics on the causal effects of rent controls in Germany, *DIW Discussion Papers*, No. 1584, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin.

Kohler, U., & Karlson, K. (2010). KHB: Stata module to decompose total effects into direct and indirect via KHB-method: Statistical Software Components S457215. Boston College Department of Economics.

Kurz, K. (2000). Soziale Ungleichheiten beim Übergang zu Wohneigentum [Social inequalities in the transition to homeownership]. *Zeitschrift für Soziologie*, 29(1), 27-43.

Kurz, K. (2004). Labour market position, intergenerational transfers and home-ownership. A longitudinal analysis for West German birth cohorts. *European Sociological Review*, 20(2), 141–159.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Pub. Co.

Lennartz, C., & Helbrecht, I. (2018). The housing careers of younger adults and intergenerational support in Germany's 'society of renters'. *Housing Studies*, 33(2), 317–336.

Lersch, P. M., & Dewilde, C. (2015). Employment insecurity and first-time homeownership: Evidence from twenty-two European countries. *Environment and Planning A: Economy and Space*, 47(3), 607–624.

McGarth, D. M., & Keister, L. A. (2008). The effect of temporary employment on asset accumulation processes. *Work and Occupations*, 35(2), 196–222.

Mooi-Reci, I., & Wooden, M. (2017). Casual employment and long-term wage outcomes. *Human Relations*, 70(9), 1064–1090.

Mulder, C. H., & Wagner, M. (1998). First-time home-ownership in the family life course: A West German-Dutch comparison. *Urban Studies*, 35(4), 687–713.

Mustillo, S. A., Lizardo, O. A., & McVeigh, R. M. (2018). Editors' comment: A few guidelines for quantitative submissions. *American Sociological Review*, 83(6), 1281–1283.

Siegers, R., Belcheva, V., & Silbermann, T. (2020). SOEP-Core v35 – Documentation of sample sizes and panel attrition in the German Socio-Economic Panel (SOEP)(1984 until 2018). *SOEP Survey Papers*, 826.

Studer, M. (2013). Weighted cluster library manual: A practical guide to creating typologies of trajectories in the social sciences with R. *LIVES Working Paper*, 24.

Studer, M., & Ritschard, G. (2016). What matters in differences between life trajectories: A comparative review of sequence dissimilarity measures. *Journal of the Royal Statistical Society: Series A*, 179(2), 481–511.

Thomas, M. J., & Mulder, C. H. (2016). Partnership patterns and homeownership: A cross-country comparison of Germany, the Netherlands and the United Kingdom. *Housing Studies*, 31(8), 935–963.

Voigtländer, M. (2009). Why is the German homeownership rate so low? *Housing Studies*, 24(3), 355–372.

Wagner, G. G., Frick, J. R., & Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP): Evolution, scope and enhancements. *Schmollers Jahrbuch*, 127(1), 139–169.

Wagner, M., & Mulder, C. H. (2000). Wohneigentum im Lebenslauf [Home ownership in the life-course]. *Zeitschrift für Soziologie*, 29(1), 44-59.

Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 58(301), 236-244.

Appendix

Table 1 Descriptive statistics for control variables by couples' career trajectories

	Dual stable career couples	Insecure and volatile couples	Male breadwinner/ female homemaker couples	Male self-employed/ female interrupted permanent couples
Highest education in household				
Primary and lower secondary	3.33	13.17	10.53	1.32
Upper secondary	48.05	54.49	52.63	50.00
Post-secondary, non-tertiary	14.33	8.98	11.76	11.84
Short tertiary	9.99	2.40	8.05	13.16
Tertiary	24.31	20.96	17.03	23.68
Males' migration background				
None	80.61	73.65	59.75	77.63
Direct or indirect	19.39	26.35	40.25	22.37
Females' migration background				
None	79.74	76.65	59.75	78.95
Direct or indirect	20.26	23.35	40.25	21.05
Sequence starts in				
East Germany	26.92	35.33	19.20	32.89
West Germany	73.08	64.67	80.80	67.11
Children in household				
No	60.20	52.69	40.87	51.32
Yes	39.80	47.31	59.13	48.68
Highest ISCO-88 of parents				
Major group 1: Managers	11.72	12.57	8.67	14.47
Major group 2: Professionals	18.38	25.15	17.65	23.68
Major group 3: Technicians and associate professionals	23.15	21.56	16.41	17.11
Major group 4: Clerical support workers	11.43	5.99	7.74	9.21
Major group 5: Service and sales workers	9.26	7.78	9.60	3.95
Major group 6+7: Skilled workers / craft and related trades workers	18.23	16.77	24.46	21.05
Major group 8+9: machine operators/ elementary occupations	7.81	10.18	15.48	10.53
Mean birth year males (SD)	1972.92 (6.53)	1977.39 (6.69)	1972.14 (6.73)	1971.91 (6.17)
Mean birth year females (SD)	1974.72 (6.68)	1979.01 (6.78)	1974.30 (6.90)	1974.41 (6.64)
Mean year of sequence start (SD)	2000.99 (6.10)	2003.45 (6.22)	1999.85 (5.76)	2000.43 (5.86)

Table 1 continued

Mean cumulative net household income (SD)	221904.56 (69545.89)	175788.57 (76036.50)	182731.28 (53579.55)	214203.79 (72734.02)
Total %	54.97	13.29	25.70	6.05
N	691	167	323	76

Note: Socio-Economic Panel, version 35, 1995–2018.

Table 2 Descriptive statistics for housing consequences by couples' career trajectories

	Dual stable career couples	Insecure and volatile couples	Male breadwinner/ female homemaker couples	Self-employed/ interrupted permanent couples	Total % (N)
Homeownership					
No	49.18	19.67	26.09	5.05	100 (732)
Yes	63.05	4.38	25.14	7.43	100 (525)
Income share spent on rent (SD)	25.96 (13.67)	28.50 (14.94)	32.16 (14.78)	28.02 (17.92)	(688)*

Note: Socio-Economic Panel, version 35, 1995-2018, *44 (732-688=44) renters did not give information on their rent, they were not dropped form the analysis on homeownership to increase sample size. Results are largely the same when they are dropped.

Table 3 Results of the logistic regression of homeownership, AMEs

	Null Model	+ Control variables	+ Mediator	Δ total / direct effect
	AME (*z-value*)	*AME* (*z-value*)	*AME* (*z-value*)	*AME* (*z-value*)
Couples' career trajectories				
Ref.: Dual stable career couples				
Insecure and volatile couples	-0.34***	-0.25***	-0.21***	-0.04***
	(-10.42)	(-6.52)	(-4.85)	(-3.44)
Male breadwinner/female	-0.07**	-0.02	0.03	0.05***
homemaker couples	(-2.11)	(-0.66)	(0.81)	(2.73)
Male self-employed/female	0.03	0.02	0.03	0.01
interrupted permanent couples	(0.57)	(0.38)	(0.57)	(0.46)
Controls				
Highest education in household				
Ref.: Primary and lower secondary				
Upper secondary		0.23***	0.22***	
		(4.25)	(3.69)	
Post-secondary, non-tertiary		0.24***	0.22***	
		(3.66)	(3.24)	
Short tertiary		0.45***	0.40***	
		(6.17)	(5.29)	
Tertiary		0.22***	0.13**	
		(3.54)	(2.05)	
Females' migration background				
Ref.: None				
Direct or indirect		0.02	0.02	
		(0.52)	(0.43)	
Males' migration background				
Ref.: None				
Direct or indirect		-0.07	-0.06	
		(-1.53)	(-1.40)	
Location at sequence start				
Ref.: East Germany				
West Germany		0.07**	0.01	
		(2.38)	(0.34)	
Children in household				
Ref.: No children				
Children		-0.01	0.01	
		(-0.27)	(0.24)	
Highest ISCO-88 of parents				
Ref.: Major group 1: Managers				
Major group 2: Professionals		-0.06	-0.06	
		(-1.34)	(-1.15)	
Major group 3: Technicians and associate		0.03	0.04	
professionals		(0.66)	(0.91)	

Table 3 continued

Major group 4: Clerical support workers		-0.04	-0.02
		(-0.64)	(-0.28)
Major group 5: Service and sales workers		-0.06	-0.03
		(-1.01)	(-0.50)
Major group 6+7: Skilled workers / craft		-0.02	0.02
and related trades workers		(-0.33)	(0.39)
Major group 8+9: machine operators /		-0.06	-0.03
elementary occupations		(-0.93)	(-0.51)
Birth year males		-0.03***	-0.02***
		(-4.55)	(-3.77)
Birth year female		-0.01	-0.00
		(-1.39)	(-0.48)
Year of sequence start		0.03***	0.02***
		(5.43)	(2.62)
Mediator			
Cumulative net household income			0.02***
(in 10.000 Euros)			(6.32)
N	1257	1257	1257

Note: Socio-Economic Panel, version 35, 1995–2018. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 4 Results of the linear regression of the income share spent on rent

	Null Model	+ Control variables	+ Mediator	Δ total / direct effect
	β (*t-value*)	*β* (*t-value*)	*β* (*t-value*)	*β* (*z-value*)
Couples' career trajectories				
Ref.: Dual stable career couples				
Insecure and volatile couples	2.54*	4.69***	2.82*	-1.87***
	(1.75)	(3.15)	(1.86)	(-2.52)
Male breadwinner/female	6.20***	4.44***	3.05**	-1.39***
homemaker couples	(4.67)	(3.48)	(2.32)	(-1.96)
Male self-employed/female	2.06	1.56	1.95	0.39
interrupted permanent couples	(0.76)	(0.51)	(0.69)	(-0.59)
Controls				
Highest education in household				
Ref.: Primary and lower secondary				
Upper secondary		-3.06*	-2.79	
		(-1.73)	(-1.63)	
Post-secondary, non-tertiary		-5.19**	-5.30***	
		(-2.49)	(-2.61)	
Short tertiary		-5.85**	-4.87*	
		(-2.03)	(-1.75)	
Tertiary		-5.42***	-2.16	
		(-2.58)	(-1.03)	
Females' migration background				
Ref.: None				
Direct or indirect		-1.88	-1.74	
		(-1.11)	(-1.08)	
Males' migration background				
Ref.: None				
Direct or indirect		0.65	-0.03	
		(0.39)	(-0.02)	
Location at sequence start				
Ref.: East Germany				
West Germany		0.40	2.14*	
		(0.33)	(1.73)	
Children in household				
Ref.: No children				
Children		4.37***	3.82***	
		(3.60)	(3.19)	
Highest ISCO-88 of parents				
Ref.: Major group 1: Managers				
Major group 2: Professionals		3.15*	2.71	
		(1.81)	(1.62)	
Major group 3: Technicians and associate		1.63	0.78	
professionals		(1.00)	(0.50)	

Table 4 continued

Major group 4: Clerical support workers		3.74	2.84
		(1.53)	(1.20)
Major group 5: Service and sales workers		2.78	1.22
		(1.41)	(0.62)
Major group 6+7: Skilled workers / craft		3.40*	1.95
and related trades workers		(1.91)	(1.14)
Major group 8+9: machine operators /		3.76	2.31
elementary occupations		(1.58)	(1.01)
Birth year males		0.05	-0.11
		(0.23)	(-0.49)
Birth year female		-0.19	-0.35
		(-0.81)	(-1.52)
Year of sequence start		-0.74***	-0.24
		(-3.13)	(-1.00)
Mediator			
Cumulative net household income			-0.61***
(in 10.000 Euros)			(-5.74)
N	688	688	688

Note: Socio-Economic Panel, version 35, 1995–2018. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5 Average number of spells in individual and couple sequences

	Overall average (SD)	Average per cluster (SD)			
		Dual stable career couples	Insecure and volatile couples	Male breadwinner/ female homemaker couples	Self-employed/ interrupted permanent couples
Male	2.09	1.84	3.32	1.97	2.08
partner	(1.38)	(1.25)	(1.35)	(1.37)	(1.23)
Female	2.75	2.71	3.16	2.64	2.72
partner	(1.39)	(1.34)	(1.36)	(1.49)	(1.32)
Couple	4.84	4.56	6.48	4.61	4.80
	(2.10)	(1.89)	(2.06)	(2.23)	(1.86)

Note: Socio-Economic Panel, version 35, 1995-2018.

Table 6 Summary of sensitivity checks for the effect of couples' career trajectories on homeownership

	M1	**M2**	**M3**	**M4**
	AME (*z-value*)	*AME* (*z-value*)	*AME* (*z-value*)	*AME* (*z-value*)
Insecure and volatile couples	-0.25***	-0.21***	-0.22***	-0.25***
	(-6.52)	(-4.87)	(-5.05)	(-6.23)
Male breadwinner/female homemaker couples	-0.02	0.00	-0.04	-0.02
	(-0.66)	(0.05)	(-1.16)	(-0.53)
Self-employed/interrupted permanent couples	0.02	0.04	0.01	0.02
	(0.38)	(0.62)	(0.10)	(0.39)
Initial income		0.09***		
		(3.28)		
Male cumulative income			0.02***	
			(7.61)	
Female cumulative income				0.00
				(0.08)
Control variables?	✓	✓	✓	✓
N	1257	1257	1257	1257

Note: Socio-Economic Panel, version 35, 1995–2018. * p < 0.10, ** p < 0.05, *** p < 0.01. Reference group consists of dual stable career couples. The set of included control variables refer to the respective control variables of the model in Table 3, but coefficients are not displayed here, M1 equals the main model (Figure 2).

Table 7 Summary of sensitivity checks for the effect of couples' career trajectories on the share of income spent on rent

	M1	**M2**	**M3**	**M4**	**M5**	**M6**
	β (*t-value*)	*β* (*t-value*)	*β* (*t-value*)	*β* (*t-value*)	*β* (*t-value*)	*β* (*t-value*)
Insecure and volatile couples	4.69***	4.73***	3.33**	2.92*	3.60**	3.34***
	(3.15)	(3.12)	(2.20)	(1.91)	(2.52)	(2.90)
Male breadwinner/ female homemaker couples	4.44***	4.45***	4.87***	1.66	2.84**	3.10***
	(3.48)	(3.47)	(3.84)	(1.08)	(2.25)	(3.64)
Self-employed/ interrupted permanent couples	1.56	1.55	2.34	0.76	3.66	-0.82
	(0.51)	(0.50)	(0.80)	(0.24)	(1.42)	(-0.34)
Initial income		0.10				
		(0.18)				
Male cumulative income			-0.45***			
			(-4.80)			
Female cumulative income				-0.61***		
				(-4.21)		
Income year 7					-4.63***	
					(-9.11)	

Table 7 continued

Rent price year 7						0.03^{***}
						(16.47)
Control variables?	✓	✓	✓	✓	✓	✓
N	688	688	688	688	688	688

Note: Socio-Economic Panel, version 35, 1995–2018. * p < 0.10, ** p < 0.05, *** p < 0.01. Reference group consists of dual stable career couples. The set of included control variables refer to the respective control variables of the model in Table 4, but coefficients are not displayed here, M1 equals the main model (Figure 3).