THE EFFECT OF TEMPORARY EMPLOYMENT ON WAGES: A COMPARATIVE STUDY IN EIGHT COUNTRIES

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ABSTRACT

Despite decades of research, there remains a lack of clarity about the consequences of temporary employment on wage trajectories. We use panel data from 8 different countries. The method is a dummy impact function. When decomposing the total effect into distinct transitions, the effect of a transition into or out of temporary employment is less negative than previously understood. Further, the effects disappear over time, such that after four years, there is little difference in comparable transitions. Finally, while most cross-national, comparative studies emphasize differences between countries, our results suggest that much of these differences are the result of biased estimates. We reduce confusion by improving and clarifying our understanding of the consequences of temporary employment on wages. The results contribute to broader theoretical, empirical, and policy debates.

Keywords: temporary employment, nonstandard employment, job insecurity, wage mobility, labor markets, Europe

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INTRODUCTION

In this article, we ask a simple question. What is the effect of temporary employment on wages? The good news is that there is lots of previous research that examines this question. The bad news is that the evidence is often stated as "mixed" (Addison et al., 2015; Mooi-Reci and Wooden, 2017; Reichenberg and Berglund, 2019). And with good reason. There is lots of evidence that suggests the effect of temporary employment on wages is negative (Barbieri and Cutuli, 2016; de Lange et al., 2014; Gebel, 2010; Giesecke and Groß, 2004; Pavlopoulos, 2013). This evidence supports the idea that temporary employment is a "trap" that reduces wage and career mobility outcomes. At the same time, there is also lots of evidence that the effect of temporary employment on wages is positive, or at least not negative (de Graaf-Zijl et al., 2011; Gash and McGinnity, 2007; Gebel, 2013). This evidence supports the idea that temporary employment is a "bridge" that increases wage and career mobility outcomes.

The effect of temporary employment on wages may not be universally positive or negative, but the effects are not mixed. Outcomes are more positive when studies examine the school to work transition (Gebel, 2010; Pavlopoulos, 2013) or when the reference group compares temporary employment to unemployment (Gebel, 2013). Outcomes also differ by gender, education (Brown and Sessions, 2003), and age, as well as the degree to which the consequences increase or decrease over time (Booth et al., 2002; Mooi-Reci and Wooden, 2017). Last, outcomes are also more positive when the country has a more flexible labour markets, where there is less of a distinction between temporary and permanent contracts, such as the Netherlands (de Lange et al., 2014), and more negative when the country has a more segmented labour markets, where is more of a distinction between contract type, such as Spain or Italy (Amuedo-Dorantes and Serrano-Padial, 2007; Barbieri and Cutuli, 2018).

Our goal is to provide a more holistic examination of the research question that combines within a single framework many issues that are often dealt with separately. To do so, we harmonized panel data from 8 countries: Australia, Germany, Italy, Japan, the Netherlands, South Korea, Switzerland, and the United Kingdom. We use the data to distinguish the total effect of temporary employment on wages into four distinct types of transitions, (1) the effect of a transition from unemployment into temporary (U to T) relative to (2) permanent contracts (U to P) and (3) the effect of a transition from temporary into permanent (T to P) relative (4) to the effect of a transition from permanent into temporary (P to T). Further, we not only examine the effect of each distinct transition on wages at the point in time when the transition takes place, but we also examine the effect over multiple periods of time after the transition takes place.

In so doing, not only do we make an empirical contribution to our understanding of the topic area, but also a methodological and theoretical one. Methodologically, we improve on the fixed effects approach as it is applied to examine the relationship between contract type and wages. While fixed effects models are powerful tools, their limitations have long been understood (Halaby, 2004). One problem is that fixed effects modes do control for time-invarying unobserved heterogeneity, but do not control for time-varying unobserved heterogeneity. To address this problem, recent research incorporates individual-slopes (Ludwig and Brüderl, 2018; Wooldridge, 2010, pp. 377–381). A second problem is that neither fixed-effects nor fixed effects with individual slopes controls by themselves for the distinct effect of asymmetric transitions (Allison, 2019). This is the differential effect of a transition from temporary to permanent contract as distinct from a transition from permanent to temporary contract. To address both problems, we use an impact function that includes dummy variables pre- and post-transitions (Andreß et al., 2013; Ludwig and Brüderl, 2021).

In contrast to most research on temporary employment that relies on various theories to support segmentation or integration scenarios, the theoretical foundation for our research question is the theory of equalizing differences, which dates back to Adam Smith (Rosen, 1986). Without denying the complexity, the basic idea of the theory is that if temporary contracts are inferior to permanent contracts, and we know they are because temporary contracts provide lower levels of wage and non-wage benefits compared to permanent contracts (Eurofund, 2015), then the inferiority should be offset in some way, such as through higher wage growth or career mobility. While there is little evidence to suggest the theory is correct (de Graaf-Zijl, 2012; Hagen, 2002), this is explained by the fact that previous research has not isolated the effect of a transition into or out of temporary employment on wages.

The key finding is that the effect of temporary employment on wages is not negative. Instead, the effect of a transition from a permanent into a temporary contract is positive, but less positive than a transition from a temporary into a permanent contract. What negative exists is larger in countries with more segmented labour markets, like Italy, Germany, and Switzerland, and smaller and often insignificant in more flexible labour markets, like Australia, Japan, the Netherlands, South Korea, and the United Kingdom. There is little difference in the effect of a transition from unemployment into a temporary relative to a permanent contract, either at the point-in-time when the transition takes place or over time.

We make several contributions when we distinguish between the asymmetric effects of transitions into and out of temporary employment. The results explain what has been previously understood to be a negative effect of temporary employment on wages: it is the difference between the positive effect of a transition from temporary to permanent that is more positive than a transition from permanent to temporary. Therefore, individuals do transition into temporary employment jobs because they pay better wages, a finding that is both at odds with current understanding, and also consistent with the theory of equalizing differences, as it is applied to temporary employment. While the mechanism itself remains hidden, we identify where to look: Who moves from a permanent contract to a temporary contract and why? In so doing, the evidence presented here not only answers long standing questions, but also points to new directions for future research.

EMPIRICAL AND THEORETICAL BACKGROUND

Research on temporary employment has long focused on the question of whether temporary employment is a bridge or a trap (Booth et al., 2002; Büchtemann and Quack, 1989; Gash, 2008; Mattijssen and Pavlopoulos, 2019; McVicar et al., 2019; Scherer, 2004). The problem is that most research focuses on determining which scenario is correct, even though empirical and theoretical justifications for both perspectives exist (Mattijssen et al., 2020). The current challenge is less about determining whether temporary employment affects wages, and more about understanding how.

Theoretical approach

Why do workers accept job offers with temporary contracts if a temporary contract provides lower wage and non-wage benefits than a permanent contract (Eurofund, 2015, Chapter 4; OECD, 2014, Chapter 4)? At the extremes, there are two possible answers. One is that workers do not have a choice, and accept a temporary contract, involuntarily. This means that the consequences of temporary employment are explained by structure. Trap arguments are based on the segmentation scenario (Reich et al., 1973), especially theories on dual labour market (Doeringer and Piore, 1971) and dualization (Emmenegger et al., 2012), where

employers use temporary work to buffer short-term changes in consumer demand (Kalleberg, 2003). A recent review of the literature found that evidence from most research suggests the effect of temporary employment on wages is negative (Filomena and Picchio, 2021).

According to human capital theory, wage differences between contract types reflect differences in both observed and unobserved human capital (Hagen, 2002). Further, workers with temporary contracts are less likely to receive on-the-job training (Adolfsson et al., 2022), limiting human capital increase over time. Individuals with a history of temporary work sends a negative signal to future employers (Spence, 1973), which traps individuals in the secondary labour market. The problem is that it is not clear how employers receive the signal of temporary employment because, unlike unemployment or education, contract type cannot be inferred by employment duration nor is it listed on a resume.

The other answer is that workers do have a choice, and accept a temporary contract, voluntarily. This means that the consequences of temporary employment are explained by selection. Bridge arguments are based on the integration scenario, especially theories of job search (Lippman and McCall, 1976) and matching (Sørensen and Kalleberg, 2018). Even if employers use temporary employment to buffer changes in consumer demand, employers may also use temporary contracts as a screening device when they are unsure of a job match (Baranowska et al., 2011), which can increase employment opportunity.

For the unemployed, according to human capital theory, working is preferable, regardless of contract type, and temporary employment has a positive effect on wages (Gebel, 2013). For the employed, evidence suggests that individuals who accept a temporary contract may receive a short-term wage penalty, but a long-term wage premium (Gash and McGinnity, 2007; Mertens and McGinnity, 2004). Similar evidence is found in the transition from school to work (Gebel, 2010; Pavlopoulos, 2013). The problem is there is almost no evidence about how employers use non-standard employment to determine wages (Mattijssen et al., 2022).

The problem with both the segmentation and integration scenarios is that even though they are conceptually distinct, they are vague about the theory and mechanisms that explain the relationship between wages and contract type (Fuller and Stecy-Hildebrandt, 2015). For example, as we just described, human capital theory can be used to make empirical predictions for both scenarios.

Unlike most previous research, our theoretical foundation is the theory of equalizing differences (Rosen, 1986), which has a clear answer to the question about why employees accept temporary work contracts: The advantages of the temporary contract outweigh the disadvantages. Either there is no wage disadvantage or, if there is a wage disadvantage, it goes away over time. While most evidence stands in opposition to the theory of equalizing wage differences, evidence is more consistent with the theory when issues of self-selection and unobserved heterogeneity are dealt with (Filomena and Picchio, 2021).

The counterfactual

Recent research has highlighted the importance of clarifying the estimand when estimating the effect of a given input on a given output (Lundberg et al., 2021). Clarifying the estimand translates into the question: what is the appropriate counterfactual? One approach to the counterfactual focuses on the appropriate reference group. Should temporary employment be compared upward to permanent employment or downward to unemployment? There is no one single answer and both are relevant to our understanding. What is known is that the consequences are more positive when temporary employment is compared downward to

unemployment and more negative when temporary employment is compared upward to permanent employment (Fuller, 2011; Gebel, 2013). While most research focuses on the upward comparison to permanent employment, and less research focuses on the downward comparison to unemployment, previous research has yet to do both.

The other approach to the counterfactual focuses on the reference transition. For example, Booth et al. (2002), examined the consequences of temporary employment on wages compared to permanent employment in the United Kingdom. The paper correctly applies fixed effects models to a sample of employed individuals, eliminating bias from transitions into/out of unemployment and unobservable, time-invarying characteristics. However, the finding of a negative effect of 7% for male employees and 10% for female employees (Table 4) does not by itself estimate the effect of temporary employment on wages for men and women. Instead, it estimates the average effect of two distinct types of contract transitions: 1) temporary into permanent and 2) permanent into temporary. The distinct effect of asymmetric transitions remains unexamined in most social science research, including research on temporary employment (Allison, 2019).

Only a few studies use a causal framework to examine the effect of temporary employment on wages over time. Evidence from propensity score matching and fixed effects models often suggests that what negative effects do exist, decline over time both for the employed (Booth et al., 2002; Gash and McGinnity, 2007), unemployed (Gebel, 2013), and in the transition from school to work (Gebel, 2010; Pavlopoulos, 2013), but the effects over time are stronger for women than men and sometimes get worse (Mooi-Reci and Wooden, 2017).

The problem is that estimates from propensity score matching techniques are vulnerable to selection bias from unobservable characteristics. Fixed effects models provide a solution, but the traditional solution interacts temporary employment with experience. Here, the problem is that estimates from the interaction term captures the deviation from the mean of potential experience on wages, not the effect of temporary employment over time (Mooi-Reci and Wooden, 2017). The foundation for our understanding of the causal effect of temporary employment on wages over time needs to be strengthened.

Differences between countries

In the literature on temporary employment, countries are often distinguished using one of two approaches. The typological approach distinguishes countries by their welfare regime type (Halleröd et al., 2015; Van Lancker, 2012). Here, the idea is that contract type differs by countries with distinct welfare regimes because of the institutions that govern employment relationships, like labour unions, the education system (especially the relationship between educational credential and career), and labour market regulations (Comi and Grasseni, 2012; Giesecke and Groß, 2003). By contrast, the indicator based approach distinguishes countries by a given policy indicator, often employment protection legislation (Passaretta and Wolbers, 2019). Here, the idea is that countries cannot be categorized into three or four (or sometimes five) systems, but countries differ along a spectrum. Arguments exist for both perspectives.

For us, the crucial point, which is supported by both approaches, is that contract type is different in different countries, and these differences are something we want to examine. Most research on temporary employment focuses on a single country, but some comparative research does exist. What is well established, both by comparing single country studies and the small number of comparative studies, is that country-level differences exist in the consequences of temporary employment on wages (Barbieri, 2009). In general, effects are more negative in more segmented labour markets, like Germany and Italy, compared to more

flexible labour markets, like the United Kingdom (Debels, 2008; Scherer, 2004). Research focusing on the school to work transition finds similar differences between countries (Gebel, 2010; Pavlopoulos, 2013).

Without denying the value of single country studies, it is difficult to compare effects across studies due to different methods, sample sizes, and reference periods. More concerning is that most cross-national research only compares two countries, the United Kingdom and Germany (Gebel, 2010; Giesecke and Groß, 2004; Pavlopoulos, 2013). While some papers add an additional country, like Italy (Scherer, 2004), Switzerland (Gebel, 2013), or France (Gash and McGinnity, 2007), all of these countries have segmented labour markets. Only a few studies examine more than three or four European countries (Comi and Grasseni, 2012; Debels, 2008) using either the EU-SILC, or the now discontinued ECHP, but the panel window is limited to four years in the EU-SILC. Therefore, it is not yet known whether country-level differences in the effect of temporary employment on wages over time are the result of more specific differences between Germany and the United Kingdom or more general differences between segmented or flexible labour markets.

Summary

Despite decades of research, it remains unclear why workers accept job offers with temporary contracts. The problem is neither a lack of evidence nor theory, but a lack of empirical studies testing the theory by focusing on the causal mechanisms to explain the longer-term outcomes on wages in multiple countries. To correct this problem, we apply the theory of equalizing differences to examine the effect of temporary employment over time in a cross-national, comparative context, by distinguishing between the effect of asymmetric transitions.

DATA AND VARIABLES

To answer our research question of interest, we harmonize eight panel data sets from eight countries. Specifically, Australia (HILDA), Switzerland (FORS), Germany (SOEP), the Netherlands (LSP), Japan (KHPS/JHPS), Korea (KLIPS), Italy (SHIW), and the United Kingdom (BHPS/UKHLS). All data sets collect data annually, except two data sets, the SHIW in Italy and the LSP in the Netherlands, which collect data biannually.

Admittedly, we use these data sets in these countries for more empirical than theoretical reasons, as they represent the oldest, highest quality panel data in the world, where temporary employment, as defined by a fixed term contract, is prevalent. The criteria exclude the United States because temporary employment is not comparable. However, the countries also represent a good cross-section both within and between distinct welfare regime types.

Our study period is between 2000 and 2018. This is a necessity of the data, which begin and end at different times. Three data sets begin in 1984, the SHIW in Italy, the LSP in the Netherlands, and the SOEP in Germany. Three data sets began in the 1990s, the BHPS in the United Kingdom (1991), the KLIPS in Korea (1998) and the FORS in Switzerland (1999). In the 2000s, two more data sets began, HILDA in Australia (2002) and the KHPS in Japan (2004). Three panel data sets also ended. In 2009, in the United Kingdom, the BHPS was discontinued and replaced by the UKHLS and, in Japan, the JHPS began as a supplement to the KHPS. In Italy, the SHIW is ongoing, but as of May 2022 has not released a new panel wave since 2018, which contains data up to 2016.

In the Netherlands, the LSP was discontinued in 2014. While not a replacement for the LSP, the LISS began in 2009. Unlike the LSP, the LISS is an annual survey. However, compared to the LSP, the LISS has about half as many cases and higher levels of panel attrition. For these reasons, we rely on data from the LSP, but use LISS data as a robustness check.

Harmonization requires standardizing variables across different data sets. Without denying the challenge, it easier than one might think, so long as one concentrates on the question of interest. In so doing, the task described here are different than recent projects, which seek to provide a broader, more universal approach to harmonization, such as the Comparative Panel File (CPF) or the Cross National Equivalence File (CNEF). Compared to the CPF (Turek et al., 2021), our analysis adds the Netherlands and Italy, but excludes the United States and Russia, which are not as comparable with respect to temporary employment. That said, like Turek et al., we make our code publicly available for both reproduction and development.

We harmonize nine variables: person ID, year, employment status, employment contract, hours, wages and salary from a person's main job, age, education, and gender. With the exception of top codes and missing cases, four variables are already harmonized: age, gender, person ID, year. Hours and wages are harmonized into monthly values and wages are inflation adjusted to the year 2010 using the CPI index from the World Bank. Education is harmonized into a categorical variable with three levels indicating, less than secondary education, secondary education, and more than secondary education. Employment status is harmonized into a categorical variable with two levels indicating, employed or unemployed and looking for work.

The remaining variable is employment contract, which is harmonized into two levels indicating, permanent employment or not permanent, i.e. temporary in some way, which follows standard OECD and Eurostat definitions. The single exception is Australia, where we define not permanent as a fixed term contract, which excludes casual work, which is a distinct type of employment relationship that is less comparable to temporary work in other countries because it offers a wage premium in exchange for the loss of other benefits (Mooi-Reci and Wooden, 2017). However, results are qualitatively similar if we include casual employment (as shown in the Appendix, figure XX).

If we exclude missing or unknown levels, then three countries (Switzerland, Germany, and Korea) only ask whether the job duration is limited in some way, yes or no. Another five countries (Australia, Italy, Japan, the Netherlands, and the United Kingdom, before 1999) split temporary into three categories. After 1999, the United Kingdom splits temporary into four categories. For example, in Australia (variable: gjbmcnt), temporary employment is defined as either a "fixed term contract" or "casual basis"; in Italy (variable: contratt), temporary employment is defined as "fixed term" or "temporary"; in the Netherlands (variable: eb002), temporary employment is defined as either "temporary to permanent" or "temporary". Before 1999, in the United Kingdom (variable: jbterm), temporary employment is defined as "seasonal/tmp" or "contract/fixed time". In Japan, employment status is split into eight categories, of which two are temporary: "temporary" and "contreated/commissioned". In the United Kingdom, after 1999 (variable: jbterm1), one additional category for agency work is added.

We do not suggest that temporary or permanent contracts are the same across countries nor do we suggest that all temporary contracts are the same within countries. Between countries, the goal is to examine the consequences of temporary employment in many countries to isolate the effect of temporary employment from the effect of the country. Within countries,

the key point is that there is a bigger difference between permanent and temporary contracts than within temporary contracts. For reference, we conducted robustness checks in Australia and the United Kingdom, where fixed term contracts may be distinct from non-fixed term contracts. Results are qualitatively similar, as shown in Appendix XX.

An event is a transition from one employment status or contract type to another and an individual can have multiple transitions. In order for an event to occur, an individual must be observed in at least three periods of time. To illustrate this concept, we use the transition from unemployment to temporary contract (U $\rightarrow$ T) as an example. First, an individual must be observed in the year before the transition, when an individual is unemployed (U). In annual data, this is t_{-1}; in biannual data, this is t_{-2}. Second, an individual must be observed in the year during the transition (t_0), when an individual is employed with a temporary contract (T). Third, an individual must be observed in at least one period after the transition, when an individual is employed with either a temporary or permanent contract (T or P), within 4 years after the transition ($t_1, t_2, t_3, or\ t_4$). Otherwise, there is no observable event.

<< Table 1 approximately here>>

The sample selection criteria are as follows and shown in table 1. We begin with the raw panel data for each country for years between 2000 and 2018, though, as described earlier, not every country is available in every year. For example, panel data in Japan is not available until 2004 and panel data in the Netherlands is not available after 2004. This results in a sample of 367,032 unique individuals across all eight countries and data sets. We restrict the data to prime-aged workers, age 25-54 because younger and older workers are much more likely to be in a temporary contract voluntarily, reducing the sample to 210,900 unique individuals.[2]

Next, we restrict the data to individuals who are labor force participants, either unemployed or employed. If they are employed, they must have an observable contract and have observable monthly hours between 40 and 320 (i.e. no less than 10 hours per week and no more than 80 hours per week), reducing the sample to 158,005 unique individuals. Third, they must have non-missing values for education and gender. Last, we exclude observations with hourly wages that are higher or lower than the top or bottom 0.05%. The selection criteria result in a sample of 155,365 unique individuals across eight countries and data sets.

From this sample, we add two additional selection criteria. First, due to our definition of an event, we restrict the sample so that every individual is observable at least three times, either employed or unemployed. This reduces the sample by nearly 50% or 79,612 unique individuals. Additionally, post event, yearly unemployment spells are dropped from the sample. We refer to this sample as sample A, and use it to examine the effect of a transition from unemployment to a temporary or permanent contract on wages. Second, we restrict sample A to only include individuals who are both observable three times and employed. This reduces the sample by 7% to 73,809 unique individuals. We refer to this as sample B,

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[2] Eurostat. 2018 LFS. Temporary employees by sex, age and main reason [lfsa_etgar]. European Union - 28 countries. Percentage of employees with a temporary job. No permanent job wanted. From 15 to 24 years = 16.6%, 25 to 34 years = 10.8%, 35 to 44 years = 9.7%, and 55 to 64 years = 18.8%. From 45 to 54 years not provided.

and use it to examine the effect of a transition from a temporary to permanent contract or a permanent to temporary contract on wages. Despite sample selection criteria, sample A and B provide similar estimates in a given country, year of average income (LN), unemployment rate, and temporary employment rate as the World Bank[3] or OECD, as shown in Appendix XX. Therefore, the sample are representative of the broader population in a given country.

JPL to do:

Talk about panel B: data sets by event type

METHODS

Fixed effects models have long been understood to be powerful tools, but far from a universal solution in identifying causal effects (Allison, 1994; Firebaugh et al., 2013; Halaby, 2004). The appeal of the fixed effects estimator is that observed changes in outcomes only depend on changes in time-varying observed covariates, changes in the treatment status, and time-varying errors (Gangl, 2010). Despite its value and simplicity, there are two well established problems. First, fixed effects models only control for time-invarying unobservable characteristics, not time-varying unobservable characteristic (Ludwig and Brüderl, 2018). This is observable if the parallel trends assumption is violated. Second, fixed effects models do not control for the distinct effect of asymmetric transitions (Allison, 2019). This is observable if the effect of a transition from status 1 into status 0 is different than a transition from status 0 into status 1. We use an extension of the fixed effects model that adds a dummy impact function to address both problems (Andreß et al., 2013).

$$y_{it} = \beta_1 temp + X'_{it} + \alpha_i + \delta_t + \varepsilon_{it} \qquad (1)$$

We begin with the standard fixed effects approach, as shown in model 1 (FE), and applied to sample B, where all observations are employed with either a temporary or permanent contract. The dependent variable is log of hourly wages (y_{it}). The independent variable is a dichotomous categorical variable for temporary employment ($temp$), where 1 is a temporary and 0 is a permanent contract. We have two control variables (X'_{it}), one for individual-level age and another for country-level unemployment rate from the World Bank. Next, we include a fixed effect for individual (α_i) and time (δ_t), as well as an error term (ε_{it}).

<< Figure 1 approximately here>>
<< Table 1 approximately here>>

Let us imagine a simple simulation with two individuals in six periods of time, as shown in figure 1. In simulation 1, both individuals are the same age and live in the same country. Individual A begins period 1 with a temporary contract earning €100. Individual B begins period 1 with a permanent contract earning €300. In period 4, both individuals switch contracts. Individual A transitions from a temporary to a permanent contract, increasing their wages by €30, to €130. By contrast, individual B transitions from a permanent to a temporary contract, reducing their wages by €30, to €270. Individual-specific

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[3] Unemployment rate comes from World Bank data, not OECD because OECD does not include Switzerland before 2010, after 2010, both data sources are the same

counterfactual wages are average wages in a temporary contract. When we apply the FE model to simulation 1, the β coefficient for temporary employment is -30, which correctly identifies that the effect of a temporary contract reduces wages by €30, as shown in table 1.

Next, let us build on this simulation to include non-parallel trends. In simulation 2, we assume that individual A, who transitions from a temporary to a permanent contract has a higher wage trajectory, than individual B, who transitions from a permanent to a temporary contract. The only difference between simulation 1 and simulation 2 is that individual A increases their wages by €30 in each period of time and individual B increases their wages by €20 in each period of time. As shown in table 1, when we apply the FE model to simulation 2, the β coefficient for temporary employment is -45, which incorrectly identifies that the effect of a temporary contract on wages because it does not account for the distinct wage trajectories of the two individuals.

To account for non-parallel trends, we add an independent slopes argument to model 1 by adding an interaction term between a continuous variable for time with the fixed effect for individual ($T_{it}\alpha_i$). Model 2 is a fixed effects model with independent slopes (FEIS). The methodological approach follows Brüderl and Ludwig (2018), who cite Wooldridge (2010, pp. 377–81), but FEIS models also have a rich history in the literature examining the consequences of unemployment (Jacobson et al., 1993; Stevens, 1997). When we apply the FEIS model to simulation 1 or 2, the β coefficient for temporary employment is -30, which is the average difference between actual and counterfactual wages if trends remained the same.

$$y_{it} = \beta temp + X'_{it} + T_{it}\alpha_i + \alpha_i + \delta_t + \varepsilon_{it} \qquad (2)$$

The problem is that neither the FE nor FEIS models correctly distinguish between asymmetric effect of two distinct events: the positive effect of a transition from temporary into permanent (T → P) and the negative effect of a transition from permanent into temporary (P → T). As described by Allison (2019), the idea that fixed effects models do not account for asymmetric effects is not new, but little research distinguishes between asymmetric effects. This is a problem because the consequences of many social phenomenon are asymmetric, including temporary employment. Following previous work (Andreß et al., 2013; Ludwig and Brüderl, 2021), we split the variable for *temp* into two sets of dummy variables, indicating years before and after each distinct event.[4] The reference is the period before the transition and we assign the same respective value to periods greater than 3 periods before the event or 5 periods after the event, respectively. Models 3 and 4 are fixed effects models with a dummy impact function (FE + IF).

$$y_{it} = \sum_{k=1}^{K} \beta_k \, event_{it}^{t \to p} + \sum_{k=1}^{K} \beta_k \, event_{it}^{p \to t} + X'_{it} + T_{it}\alpha_i + \alpha_i + \delta_t + \varepsilon_{it} \qquad (3)$$

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[4] Other solutions also exist. For example, Allison splits the variable for *temp* into two variables, which are the cumulative sum of positive or negative changes. This is referred to as as a step impact function (Andreß et al., 2013; Ludwig and Brüderl, 2021), which is a permanent and absorbing state. However, unlike some types of events, employment status or contract type are not a permanent state. Further, a step impact function still does not address the issue of time-varying unobserved heterogeneity.

$$y_{it} = \sum_{k=1}^{K} \beta_k \, event_{it}^{u \rightarrow p} + \sum_{k=1}^{K} \beta_k \, event_{it}^{u \rightarrow t} + X'_{it} + T_{it}\alpha_i + \alpha_i + \delta_t + \varepsilon_{it} \qquad (4)$$

When we apply the FE + IF model to simulation 2, then the β coefficient for the event T → P in period 4 is +60, which is the difference in wages from period 3, the period before the transition takes place. By contrast, the comparable β coefficient for the event P → T is -10.

The FE + IF model does account for the asymmetric effect of the two events, but does not by itself control for individual wage trends. One solution is to combine a FEIS model with an impact function (i.e. FEIS + IF). The concern is that a FEIS + IF model will provide biased estimates if it is not able to distinguish the time trend from the treatment effect. The difference is predetermined by a simulation model, but not in reality. Therefore, the value of the FE + IF model is that it is agnostic with respect to wage trends and instead classifies the effect as the total difference between the year the transition takes place and the year before. However, results are qualitatively similar if we use a FEIS + IF model (See Figure XX in Appendix XX).

The issue of asymmetric effect becomes more clear in simulation 3. The only difference between simulation 2 and 3 is that the effect of a transition from a temporary to a permanent contract increases wages by €10, not €60. As shown in table 1, the FE + IF model is the only model to capture the true effect of the distinct transitions in each of the simulations.

Finally, we transform the data from person, year to person, event, year in order to model the fact that individuals can have multiple, distinct, and overlapping events. If we did not transform the data, then we could only model the effect of first events, not multiple events. However, results are qualitatively similar (See Figure XX in Appendix XX). For more details, see appendix XX. We estimate models 1, 2, and 3 on sample B, where individuals are always employed, either in a permanent or temporary contract and we estimate model 4 on sample A, where individuals are employed or unemployed. This is standard practice in the literature (Barbieri and Cutuli, 2018; Booth et al., 2002).

RESULTS

<< Figure 1 approximately here>>

We begin by estimating the effect of temporary employment on wages using sample B, where individuals are always employed, either in a permanent or temporary contract. Figure 1 displays estimates the effect at the point in time, when the transition takes place. Later, we will examine the effect over time. 95% confidence intervals are shown in parentheses, next to the point estimates.

The effects for Australia are shown in the top left cell. Using the standard fixed effects model (FE model 1), the effect of temporary employment on wages is -0.03 (-0.04/-0.02). When we add individual slopes to the fixed effects model (FEIS model 2), the effect declines to -0.02 (-0.03/-0.01). The interpretation is that the effect of temporary employment on wages is negative, an effect which is partially explained by the fact that individuals who experience temporary employment are on a different wage trajectory. The results from the

FE and FEIS models are consistent with previous evidence examining the effect of temporary employment on wages in Australia (Mooi-Reci and Wooden, 2017).

Model 3 is also a fixed effects model, but splits the variable for *temp* used in model 1 and 2 into two sets of dummy variables, called impact functions (FE + IF), indicating years before and after each distinct event, one for the transition from a temporary to a permanent contract and one for the transition from a permanent to a temporary contract. The effect of a transition from a temporary to a permanent contract increases wages by 0.06 (0.05/0.08) and the effect of a transition from a permanent to a temporary contract also increases wages by 0.03 (0.02/0.05). This changes our interpretation by clarifying the negative effect identified by model 1.

The results suggest that the negative effect of a temporary contract on wages is not the result of the fact that individuals with temporary employment are on a different wage trajectory, as suggested by model 2. Instead, the results suggest that the negative effect of temporary contract identified by model 1 are instead the result of the fact that a transition from a permanent contract to a temporary contract is less positive than a transition from a temporary to a permanent contract.

When we examine Germany, we find similar results. Using a standard FE model, the effect of temporary employment reduces is -0.07 (-0.08/-0.06), a negative effect that is partially explained when we control for individual slopes (FEIS). The FE and FEIS models are consistent with previous research using German data (Giesecke and Groß, 2003; Hagen, 2002). However, when we add an impact function (FE + IF), results suggest that the effect of a transition from a temporary to a permanent contract increases wages by 0.07 (0.05/0.08) and the effect of a transition from a permanent to a temporary contract also increases wages by 0.01 (-0.01/0.03).

With the exception of Italy, similar results are found in the other countries, even if the coefficients are not always significant. However, in Italy, there is a large positive effect of a transition from a temporary to a permanent contract (+0.25 [0.19/0.31]) and a large negative effect of a transition from a permanent to a temporary contract (-0.19 [-0.26/-0.13]). This is consistent with previous comparative research that finds the consequences of temporary employment to be worse in Italy relative to other countries (Scherer, 2004).

<< Figure 2 approximately here>>

Figure 2 displays estimates of the effect of temporary employment on wages over time. As before, we begin with Australia in the top left cell. Over time, there is little change in the difference between the positive effect of a transition from a permanent to a temporary contract that is less positive than the effect of a transition from a temporary to a permanent contract. The differential effect of the two transition types is largest in Italy, but also visible in Germany and Switzerland. By contrast, in the other five countries, what difference exists is small and insignificant. This finding replicates previous research, suggesting that the consequences of temporary employment on wages are worse in countries with more segmented labour markets compared to countries with more flexible labour markets (Gebel, 2010; Giesecke and Groß, 2004; Pavlopoulos, 2013).

<< Figure 3 approximately here>>

Now, we apply model 4 to sample A, where individuals are unemployed or employed, either in a permanent or temporary contract in order to estimate the differential effect of a transition from unemployment to a temporary or a permanent contract on wages. Figure 4 displays estimates the effect at the point in time, when the transition takes place. Later, we will examine the effect over time. In Australia, a transition from unemployment to a permanent contract increases wages by 2.70 log points (2.63/2.76), and a transition from unemployment to a temporary contract increases wages by 2.80 log points (2.69/2.91). In Germany, a transition from unemployment to permanent increases wages by 2.18 log points (2.15/2.21), and a transition from unemployment to a temporary contract increases wages by 2.08 log points (2.05/2.12). In most countries, there is a difference between the two transitions, but it is small and not often statistically significant.

The single exception is Italy. In Italy, a transition from unemployment to a permanent contract increases wages by 1.97 log points (1.84/2.10), and a transition from unemployment to a temporary contract increases wages by 1.45 log points (1.28/1.62). The difference is 0.52 log points, which is significant.

<< Figure 4 approximately here>>

Figure 4 displays estimates of the effect on wages over time of the distinct transitions out of unemployment into either a temporary or a permanent contract. There is little difference between the two transitions over time between the countries, with the exception of Italy, where the large and significant difference between the two transitions disappears over time.

The results change our interpretation of the negative effect of temporary employment. In contrast to previous research, the negative effects of identified in previous research are not the result of the fact that temporary employment has a negative effect on wages. There is no difference in the effect of a transition from unemployment to a permanent or a temporary contract. The negative effects are the result of the fact that the transition from a permanent to a temporary employment is positive, but less positive than a than a transition from a temporary to a permanent contract. The finding may be counter intuitive, but it is consistent with the theory of compensating wage differentials. Individuals transition into a temporary contract, because they pay more, not less, even if the increase is not as high as the transition into a permanent contract.

CONCLUSION
text

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