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Labour Market Dualism and the Heterogeneous Wage Gap for Temporary Employment. A Multilevel Study across 30 Countries.

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Abstract

This study investigates the hourly wage gap between 25-55 year old 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 prime-age workers and those working in medium/high-level occupations. There is no evidence that a stronger institutional dualization in terms of stronger employment protection for permanent contracts increases the wage gap. 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.

Keywords: contracts, flexibility, wages, segmentation, labour market institutions

JEL classification: J31 Hourly Wages; Wage Gap J41 Labor Contracts; J42 Monopsony; Segmented Labor Markets

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 workers with permanent contracts and workers with temporary (or fixed-term) contracts, i.e. contracts for a specific period/task, became of great interest (Barbieri, 2009; 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).

Many studies investigated the wage differentials between temporary and permanent workers as a key socio-economic outcome. Most studies focus on one or few rich western democracies like Australia (Mooi-Reci and Wooden, 2017), the US (Kalleberg, 2000) or European countries (Giesecke and Groß, 2004; Kiersztyn, 2016; Barbieri and Cutuli, 2018). There are only 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), only a handful of studies investigate the institutional and structural determinants of temporary wage gaps (Ryu, 2018; Arranz *et al.,* 2021). This stands in contrast to the large amount of research on institutional and structural determinants of temporary employment (Polavieja, 2006; Lange *et al.,* 2014; Barbieri and Cutuli, 2016) and as moderators of the relationship between temporary employment and non-monetary outcomes (Cutuli and Guetto, 2013; Fervers and Schwander, 2015).

In this article we investigate the role of macro-level labour market dualism as a determinant of the temporary employment wage gap. Following the clarification of the concept of dualization by Busemeyer and Kemmerling (2020) we focus on the narrow institutional conceptualization of dualization in terms of labour market regulation. Specifically, we investigate employment protection legislation (EPL) of permanent and temporary contracts as key institutional measures of macro-level dualization (Rueda, 2014; Fervers and Schwander,

2015; Barbieri *et al.,* 2019; Biegert, 2019). We know little about the influence of EPL on the wage differential between temporary and permanent workers. Using data for just six countries from the European Union Statistics on Income and Living Conditions (EU-SILC) Arranz et al. (2021) 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. Having a different focus on wage shares, Weistanner (2021) uses the Luxembourg Income Study (LIS) for 22 advanced capitalist societies and shows that deregulating the use of temporary contracts reduces wage shares for low-/middle-income earners and increases wage share for high-income earners.

We complement this narrow institutional conceptualization by analysing the influence of the size of the temporary employment sector as a structural conceptualization of macro-level dualism. The size of the temporary employment segment can be seen as a labour market outcome (Busemeyer and Kemmerling, 2020), which is affected by the institutional setting of dualization. This alternative measure was also used in research. For example, 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. Similar to Weisstanner (2021), Bellani and Bosio (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. As previous studies either analyzed institutional or structural dualization, our aim is to compare them in order to reach a broad empirical assessment of the influence of macro-level dualization on the temporary employment wage gap. There are also divergent underlying mechanisms of both concepts that we highlight in our theory section.

We aim to make various contributions to the comparative literature. 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 add

cross-sectional data from the EU-SILC for Hungary, Poland and Portugal and the Korean Labour and Income Panel Study (KLIPS), 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 micro-level 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 groups as key variables of social inequality and stratification (Kiersztyn, 2016; Mooi-Reci and Wooden, 2017). This approach also tries to address Busemeyer and Kemmerling (2020)'s observation that there are multiple labour market cleavages and not only the insider-outsider divide at the micro-level. Furthermore, it accounts for the heterogeneity of temporary workers, who can be found across all socio-demographic groups (Schwander, 2020). Hence, 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 macro-level dualization and the temporary employment wage gap across age and occupational 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 (Maurin and Postel-Vinay, 2005; Gebel and Giesecke, 2011; Biegert, 2019). 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 research on the differentiated effects of institutions across socio-demographic groups. As explained above we complement this institutional perspective with a structural perspective of dualization. Thus, our second key research question is which institutional and structural macro-level dualization play in enforcing or weakening social inequalities in the labour market.

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 and causal relationships between the type of contract and wages (Elwert and Winship, 2014). The issue of spuriousness is addressed in the method section. Here, we focus on causal explanations.

With the exception of the theory of compensating wage differentials (Kalleberg, 2000) theories postulate negative wage effects for temporary contracts. Segmentation theory suggests that permanent contracts dominate the well-paid primary segment, whereas temporary jobs dominate the low-paid secondary segment (Doeringer and Piore, 1971; Kalleberg, 2000; Barbieri and Scherer, 2009). Segmentation coincides with a dualization of the workforce (Rueda, 2005; King and Rueda, 2008). Efficiency wage theory argues that employers pay higher wages for permanent contracts as incentives to overcome difficulties in monitoring and firing permanent workers (Güell, 2000). Bargaining theory suggests that permanent contract holders secure a wage premium as insiders in the wage negotiation process. 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 (Cutuli and Guetto, 2013).

Whereas the previous theories support the segmentation perspective and predict pronounced and cumulative wage disadvantages, screening theory predicts smaller and transitory wage penalties for temporary jobs that are used as entry ports into 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 (Mertens and McGinnity, 2004). As contract conversions are a regular phenomenon in the screening process, a substantial proportion of permanent workers have just recently experienced their contract conversion and, thus, cannot yet fully benefit from wage gains as described in the segmentation perspective.

2.2 The moderating role of macro-level dualization

Institutional and structural dimensions of dualization are expected to shape the temporary employment wage gap. Previous research highlights that it is important to distinguish two dimensions of EPL as measures of institutional dualization (Gebel and Giesecke, 2011; Bellani and Bosio, 2021). Whereas 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 and, thus, labour market segmentation (Rueda, 2005; Barbieri and Cutuli, 2016; Biegert, 2019; Arranz *et al.,* 2021). Strict protection of permanent workers reduces the replicability of permanent workers with temporary workers by increasing the labour turnover costs (Emmenegger, 2009; Bellani and Bosio, 2021). This should increase the wage bargaining power of permanent workers because it is more costly and difficult for employees to substitute them (Lindbeck and Snower, 1989). 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). When the use of temporary contracts is deregulated, temporary workers are in weaker wage bargaining positions and have fewer training chances because they are more often trapped in cycles of temporary contracts and can be more 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 position due to strict EPL for permanent contracts, which is described as a setting of partial deregulation (Barbieri and Cutuli, 2016). 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).*

An alternative conceptualization of labour market dualization is the size of the temporary employment segment. It can be seen as a labour market outcome of institutional dualization, representing a structural feature of labour market dualization. Next to acting as a mediator of the effect of institutional dualization on wages, there are separate theoretical arguments on its effects. One major argument is that the pool of temporary workers act as a buffer stock to maintain labour market segmentation. Labour adjustment can be easily reached by hiring and firing workers from the large pool of temporary workers. Employers, with the support of permanent employees as insiders, have incentives to form such a buffer stock (Lindbeck and Snower, 1989; Rueda, 2005; Emmenegger *et al.,* 2012). If there are many temporary workers, permanent workers will be shielded, which is expected to increase their

bargaining power in wage negotiations (Polavieja, 2003) and training opportunities (Fervers and Schwander, 2015). Next to using temporary workers as buffer stocks, other motives such as using them as leave replacement or for time-limited project tasks, also do not threaten but even strengthen the position of permanent workers (DeCuyper *et al.,* 2009).

In contrast, Bellani and Bosio (2021) argue that there is a downward wage competition between labour market segments putting wage pressures on permanent employees if there are many temporary workers. However, this occurs only if temporary and permanent workers are substitutes (DeCuyper *et al.,* 2009). Whereas 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. Another counterargument is that a large temporary employment labour market is perceived as a threat by permanent workers, which reduces their subjective job security (DeCuyper *et al.,* 2009) and wage bargaining power. However, Chung (2019) does not find support for the claim that the size of the outsider labour market of a country affects the employment security gap between temporary and permanent workers. Thus, we stick to our original argumentation and 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

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; Emmenegger *et al.,* 2012; Biegert, 2019).

We focus on the core workforce aged 25 to 55 and distinguish between younger workers (25-35 year olds) and prime-age workers (36-55 year olds). Temporary jobs among prime-age 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 often act as a screening device for younger workers due to their limited work experience, which should induce only small wage penalties (Högberg *et al.,* 2019). This is because 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).*

There are contradictory expectations on occupation-specific temporary employment wage gaps. Permanent jobs in medium/higher occupational positions may offer better wage bargaining power and training opportunities as they tend to be more costly to substitute (Bellani and Bosio, 2021). In contrast, permanent jobs in lower-level occupations are in downward wage competition with temporary jobs because they are at higher risk to be substituted by temporary jobs (Weisstaner 2021). Furthermore, there are also often institutional limits to wage premiums in lower-level occupations 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/higher occupational segment compared to workers in the lower occupational segment (H5a).*

Alternatively, one may argue that the use of temporary jobs as screening devices should be more common in the medium/higher occupational segment (Scherer, 2004; Kiersztyn, 2016), whereas temporary jobs are more often used as a buffer stock in the low-skilled segment.

Temporary contracts for screening purposes are expected to entail smaller wage disadvantages than temporary jobs used as a buffer stock. Moreover, temporary jobs may also be used in jobs in the upper primary segment that require 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/higher occupational segment compared to workers in the lower occupational 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-level occupation workers tend to be disadvantaged labour market groups, prime-age workers and medium-/high-level occupation 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 worker in a higher-level occupation. 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 prime-age and medium/higher-level occupation workers.

3 Analytical approach

3.1 Data and sample

We use individual-level data from the Luxembourg Income Study (LIS) database (2021), which constitutes the largest harmonized microdata on employment and income worldwide (VanHeuvelen, 2018; LIS, 2021) (see Table A1 in the Appendix for more information on country datasets). We restrict our analyses to those country-rounds that include information on 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). This yields a sample of 30 countries, which fulfils the requirements of comparative multilevel analysis (Bryan and Jenkins, 2016). To increase statistical power and the robustness of results we include all available 236 country-rounds from the period 2000–2019. The number of country-rounds range from one (China) to 20 (South Korea) and average at eight rounds per country. Following previous LIS studies we focus on the core workforce of 25-55 year old dependent employees, excluding self-employed, unemployed, or inactive (also persons in education) individuals (VanHeuvelen, 2018). We exclude older workers (>55) and youth (<25) to avoid issues of training and early retirement. Analytical sample size is overall 1,621,241, with country-rounds ranging from 1,125 in Iceland (2010) to 82,061 in Colombia (2016).

3.2 Micro-level variables

Our dependent variable is the log of gross hourly wages from individuals' main job, which accounts for differences in working hours and currencies. Following previous LIS studies, we drop observations with top-coded working hours (99 hours/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"). Although log hourly wages already adjust for differences in working hours, we additionally control for part-time employment status to fully disentangle the effect of temporary employment from part-time employment as another form of non-standard employment. For a subsample of countries we are also able to distinguish temporary employment from informal employment (see Section 5.5).

To address confounding bias at the micro-level (Elwert and Winship, 2014), we control for variables that can be predominately seen as determinants of both temporary employment

and wages. As labour supply-sided variables, we include a binary gender variable, five-years age intervals and three levels of the highest completed educational degree according to the ISCED (International Standard Classification of Education) (low (ISCED1+2), medium (ISCED3+4), high (ISCED5–8). Including these variables should also accounts for country differences in the socio-economic composition of temporary workers (Fervers and Schwander, 2015).

There are also labour demand sided variables, such as economic sector, firm size or occupation that are often seen as determinants of temporary employment and wages. The LIS datasets only offer a limited set of demand-sided variables, namely sector of employment and occupational level. In our main specification we control for sector, distinguishing between agriculture, industry, and services, because this is the only information that is available for all countries of our analytical sample.

We do not control for occupation in our main specification because occupation might be endogenous to type of contract and lead to overcontrol bias (Elwert and Winship, 2014). For example, according to segmentation theory, having a permanent contract can be a cause of climbing internal career ladders and reaching higher and better paid occupational positions. This problem may also apply to further labour supply sided variables that might be both a determinant and consequence of contract status, such as marital status, number and age of children or living area. Section 5.1 presents robustness checks for different sets of control variables.

To test H4, H5a and H5b we performed stratified analyses by age and occupation groups. We distinguish younger (25-35) from prime-age workers (36-55). Based on the International Standard Classification of Occupation (ISCO) we differentiate three occupational levels: high (ISCO-1 “managers”; ISCO-2 “professionals”) medium (ISCO-3 “technicians and associate professions” to ISCO-8 “plant and machine operators”) and low (ISCO-9 “elementary occupations”).[1] It must be noted that stratifying our micro-level analyses by occupation groups

has identical implications as controlling for occupational level (Elwert and Winship, 2014). Thus, results of our occupation-specific analyses must be interpreted as temporary employment wage gaps net of occupation.

3.3 Macro-level variables

We include the following macro-level measures of dualization. The *size of the temporary work sector*, our structural measure of dualization, 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 dichotomized institutional measures of dualization. The dichotomization of EPL indicators follows our theoretical argumentation, in which we contrast settings of strong vs. weak EPL for permanent contracts and regulated vs. deregulated use of temporary contracts. Section 5.3 presents sensitivity analyses using continuous EPL indicators.

The first dummy variable distinguishes between *low (=0) and high (=1) levels of EPL for permanent contracts*. The second dummy variable 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 continuous OECD-EPL index of a given year is larger (smaller or equal) than the mean EPL for all country-rounds.[2] To test H2, the second dummy variable on EPL for temporary contracts is introduced in terms of two interaction terms: (i) interacted with a binary indicator for high level of EPL for permanent contracts and (ii) interacted with a binary indicator for low level of EPL for permanent contracts. This specification yields the conditional effects of interest (Buis, 2012): The estimated coefficient of the interaction term (i) represents the effect of higher vs. lower regulation of temporary contracts in the context of high level of EPL for permanent contracts. The estimated coefficient of the interaction term (ii) represents the effect of higher vs. lower regulation of temporary contracts in the context of low level of EPL for permanent contracts.

As we expect that institutional dualization is a determinant of structural dualization we only control for institutional dualization when investigating the effect of structural dualization, but not vice versa, as our interest is in the total effects (Keele *et al.,* 2020). Furthermore, we control for other macro-level institutional and structural factors that may act as confounders. For example, *strength of unions* may influence EPL (Emmenegger, 2014), the size of the temporary work sector (Hevenstone, 2010) and wage inequality via their influence in wage negotiations (Vlandas, 2018). According to dualization theories, unions represent collective interests of permanent workers (Lindbeck and Snower, 1989; King and Rueda, 2008). There is the contrasting perspective that unions compress the wage distribution to the favour of temporary workers (King and Rueda, 2008; Ryu, 2018) and that unions became inclusive and supportive for temporary workers (Fervers and Schwander, 2015; Benassi and Vlandas, 2016; 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). Section 5.4 presents sensitivity analysis using collective bargaining coverage (CBC) as an alternative measure, which is, however, not available in five countries.

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 (Potrafke, 2013; Pilc, 2015), the share of temporary workers (Gebel and Giesecke, 2011; Barbieri and Cutuli, 2016) 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 less developed countries, where informal jobs act as a functional equivalence to temporary work (Gërxhani, 2004). 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 (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.[3] Table A2 (see 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 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} and a macro-level error term v_{tc}:

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

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.

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 macro-level dualization on the micro-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

In the first-stage we estimated the conditional log wage gaps separately for all 236 country-rounds according to equation (1) for the total sample and the five age and occupation subsamples. It is hard to provide a descriptive overview of the size and statistical significance of each of these effects. Therefore, we decided to estimate simplified models in order to produce meaningful graphical illustrations of the conditional log wage gap estimates and their confidence intervals. The simplified models pool all available country-rounds for each country and include the survey year as an additional control variable. These models are still estimated separately for the full sample and the five subsamples.

Figure 1 presents the log wage gap estimates and confidence intervals for the full sample. We see wage disadvantages associated with temporary employment in all countries, with an average wage gap across all country-rounds of -0.20 log points (i.e. -18%[4]). There are large cross-country variations. The wage gap ranges from -4% in Lithuania to -32% in South Africa. Only in Lithuania is the wage gap not statistically significant.

Complementary to the strong variation in the prevalence of nonstandard work within welfare regime types documented by Hipp *et al.* (2015), we find that 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). For example, in Continental (Conservative) European countries, Germany is among the countries with the highest wage gap (-23%), whereas the wage gap is below the sample average for Belgium (-16%) and even smaller for Austria (-13%).

[Insert Figure 1 here]

We observe below average wage gaps both in the Nordic (Social-Democratic) countries Iceland (-14%) and Finland (-13%) and in the liberal countries UK (15%), Canada (-12%) and Ireland (-11%). However, among liberal countries, we also observe a large gap in Switzerland (-30%). For Central and Eastern European Countries, wage gap estimates are again rather heterogeneous, ranging from the smallest gap in Lithuania (-4%) to a rather large one for Hungary (-25%). Among Southern European countries, wage gaps are below the average (Portugal with -14% and Italy with -16%), and above the average (Spain with -24%). Likewise, for the included Asian countries we observe a below average gap in China (-12%) and relatively large gaps Japan (-20%) and in South Korea (-24%). We also uncover rather mixed findings for Central and South American countries, with small wage gaps in Guatemala (-10%) and Panama (-13%) and a large wage gap in Peru (-26%) and Brazil (-26%).

Results from age-/occupation-stratified analyses presented in Figures 2 and 3 are on average in line with previous single country findings and our expectations formulated in H4 and H5a. The average point estimate of the wage gap tends to be larger for workers in high-level (-16%) and medium-level (-18%) occupations compared to lower-level (-13%) occupations (Kiersztyn, 2016) and for prime-age (-20%) compared to younger (-14%) workers (Mooi-Reci and Wooden, 2017). With the exception of Switzerland and Peru, the finding that the wage gap is larger for prime-age compared to younger workers is almost univocal. For younger workers wage gaps are not statistically significant in China, Estonia, and Lithuania, while for prime-aged workers, only the wage gap for Lithuania is not statistically significant. Comparing the confidence intervals shows that they overlap for younger and prime-aged

workers in half of the countries, meaning that the difference in wage gap is often not statistically significant.

[Insert Figure 2 here]

In contrast to the almost universal age-gradient, there are stronger country differences in the occupational level-specific wage gradient. The wage gaps are larger for low-level compared to high-level occupations in Belgium, Brazil, Canada, Switzerland, Estonia, Hungary, Lithuania, Luxembourg and Slovakia. Moreover, the wage gap is larger for workers in low-level compared to medium-level occupations in Canada, Switzerland, Guatemala, Hungary and Lithuania. In low-level occupations wage gaps are not statistically significant for Estonia, Iceland, and the Netherlands. For medium-level occupations only the wage gaps for Lithuania is not statistically significant, while for high-level occupations it is not significant for Canada, Estonia, and Lithuania. The confidence intervals across occupational subgroups overlap in most countries.

[Insert Figure 3 here]

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

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 temporary employment wage gaps are almost always negative, a negative (positive) coefficient means that this macro-variable enlarges (shrinks) the wage gap.

Results on the full sample and the age/occupation subsamples 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 sign of the effects are even opposite to the expectation of H1. Effects are statistically insignificant with the exception of workers in low-level and high-level occupations. Thus, we do not find any evidence for H1. In contrast to H1, we even find for workers in low-level and high-level occupations that strict EPL for permanent workers reduces the wage gap.

[Insert Table 1 here]

Table 1 also displays effects of control variables. Their effects 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).

In Table 1, the regulations on temporary contracts act as a control variable next to the other macro-level characteristics. Results show that a stricter regulation of temporary contracts decreases wage gaps for the full sample and in all subgroups. Results suggest that stronger unions are associated with a lower wage inequality between contracts (especially for younger workers), which might indicate that unions do not dualize but compress contract-based wage differentials. 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 prime-aged workers but not for the occupational groups. The direct effect of globalization is less straightforward, increasing wage gaps for workers in low-level occupations and decreasing it for workers in high-level occupations. Additionally, a larger informal sector tends to amplify wage gaps for temporary workers. The moderating effect of the informal sector size is statistically significant for prime-age workers and those in low-level occupations.

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. The first interaction term shows that under the condition that the protection of permanent workers is strong, a high regulation of temporary contracts decreases the temporary employment wage gap in the full sample by 0.054 log points (5.5 percentage points) in comparison to when the regulation of temporary contracts is low. The coefficient is statistically significant at 1%. 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.

[Insert Table 2 here]

Comparing the effect of the first interaction term across subgroups does not show big differences in effect sizes. Effects are almost identical in effect size and statistical significance for younger and prime-aged 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-level and for low-level occupational workers than for high-level occupational workers. Effects are statistically significant for medium-level workers at the 5% level but statistically insignificant for low- and high-level workers. Contrary to our expectation, there is the slight tendency that institutional dualization in terms of partial deregulation in context of strongly protected permanent contracts creates smaller advantages for privileged occupational groups. However, the group-specific differences should not be exaggerated as differences are relatively small.

In contrast to the first interaction term, the second interaction term is small in size and statistically insignificant in the full sample and in four out of five age/occupation subgroups. Thus, we find no evidence for an effect of the regulation of temporary workers in settings where EPL permanent is low.[5] The exception are workers in low-level occupations, where we see that the wage gap substantially shrinks in settings of low EPL permanent and high EPL temporary, compared to when EPL temporary is low. This might be owed to the fact that temporary workers might substitute permanent workers especially in low-level occupational sectors, decreasing the latter's bargaining position (Bellani and Bosio, 2021).

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 10% level.

[Insert Table 3 here]

Subgroup-specific analyses reveal that the effect of the size of the temporary work sector is marginally stronger for prime-age workers (0.3 percentage points) than for younger ones (0.2 percentage points). While the former effect is statistically significant at the 5% level, the latter is statistically insignificant. The effect is also stronger for high-level occupational workers (0.4 percentage points, $p<0.5$). In contrast, the effect for medium-level workers is not statistically significant, while there is even an opposing effect for low-level 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. However, the group-specific differences should not be exaggerated as differences are relatively small.

5 Supplementary and sensitivity analyses

5.1 Alternative sets of micro-level control variables

Table A3 shows the sensitivity of our conditional wage gap estimates to the set of control variables. The first column replicates findings from our main specification of pooled analysis in Figure 1. The second column adds marital status, the presence of children and occupation as potentially endogenous control variables. In most countries the wage gap decreases when adding controls but the change is only marginal. The last column excludes any potentially endogenous controls and represents the most parsimonious specification with age, gender and education and time dummies as controls. Compared to the main specification in Figure 1 wage gaps increase but the change is only marginal. Overall, results are rather robust to the inclusion and exclusion of potentially endogenous controls.

5.2 Adjusting the sample restriction for age

Table A4 reports sensitivity analysis that extend the age range from 25–55 to 15–65 for the full sample. For each country data are pooled across years. The conditional log wage gap remains largely similar when broadening the age sample. Notable exceptions are Austria, Germany, and Switzerland, where the wage gap substantially increases. This might be related to the high share of apprentices in these countries, who receive low wages compared to other workers. This result supports our decision to exclude this group of apprentices by increasing the lower age limit to 25 in the main analyses.

5.3 Continuous EPL measures

As we are interested in the settings of strong vs. weak EPL for permanent contracts and regulated vs. deregulated use of temporary contracts, we use dichotomous versions of EPL indicators in our main specification. Here we present analyses using continuous EPL measures to check the sensitivity of our empirical assessment of our hypotheses H1 (Table A5), H2 (Table A6) and H3 (Table A7)). Overall, the results on the continuous measures support our conclusions from the dichotomized measures. In Table A5 we also do not find the expected effect that increasing EPL for permanent workers increases wage gaps. In Table A6 we find a substantial positive interaction effect using continuous EPL measures in the overall sample and for five out of six subgroups. Thus, the higher EPL for permanent worker, the stronger is the increasing effect of deregulating the use of temporary contracts on the wage gap. In Table A7 the continuous EPL measures just act as control variables. Neither effect size nor statistical significance of the share of temporary employment changes compared to Table 3.

5.4 Alternative measure for union power

Tables A8–A10 present sensitivity checks using collective bargaining coverage (CBC) (OECD, 2021) instead of union density as a measure of unions' strength. Unfortunately, CBC data are not available for South Africa, Panama, Peru, Guatemala, and China. Compared to results of our main specification, we come to the same conclusions about the moderating role of macro-level dualization. Effect sizes become even larger. For example, the effect size of a one percentage point increase in the share of temporary worker on the wage gap in the full sample doubles from -0.003 using union density to -0.006 using CBC a control.

5.5 Wage differentials of informal and temporary work in comparison

Particularly, in less developed countries, informal employment may act as a functional equivalent to temporary contracts (Gërxhani, 2004; Adriaenssens and Hendrickx, 2015). For ten countries we were able to study the informal wage penalty next to the temporary wage penalty. We define informal work as dependent work without formal work contracts as well as unregistered self-employment. Using the most recent LIS data for each of the ten countries we distinguish informal work from formal temporary work contracts and compare both flexible employment forms to formal permanent work contracts. Figure A1 shows that we still observe substantial wage disadvantages for temporary workers in all ten countries even after disentangling the effect of informal work. The effects are statistically significant with the exception of Estonia and Guatemala. Cross-country variation is large but the general pattern emerges that the informal wage gap is even bigger. On average across all countries, the temporary wage gap amounts to -18%, while the informal wage gap amounts to more than double than that with -44%.

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. Interestingly, our wage gap estimations do not reveal clear country patterns along the lines of usual typologies, which calls into question if welfare regime based approaches can be specific enough to disentangle the large cross-country variation (Hipp *et al.,* 2015).

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 average point estimates indicate that younger temporary workers tend to experience smaller wage gaps than prime-age temporary workers. Differences in effect sizes are statistically significant in half of the countries. Regarding wage gap differences for different occupational-groups of workers, we find that on average point estimates of wage gaps are highest in medium-level occupations, followed by high-level and low-level occupation. This might be an indication that permanent workers in medium/higher-level occupation are especially hard to replace, thus enjoying higher wage bargaining power. However, there are deviations from this order in several countries. Moreover, the differences in effect sizes are rarely statistical significant.

Despite the variations and uncertainties in the estimates of variations in the temporary employment wage gap across age and occupation subgroups we can draw a general conclusion about our first key research question. Our findings 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 workers and workers in low-level occupations). If at all, there is

indication that advantaged labour market groups (i.e. prime-age workers and workers in medium-/high-level occupation) tend to experience stronger temporary employment wage disadvantages.

To answer our second key research question we investigated the moderating influence of institutional and structural dualization on the temporary employment wage gap. Regarding the influence of EPL, our measure of institutional macro-level dualization, 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. In contrast, we do not find evidence that the deregulation of the use of temporary contracts affects the temporary employment wage gap in the context of weak EPL for permanent contracts

For our structural measure of macro-level dualization 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 both the structural and the institutional measure, there is some indication that dualization strengthens the temporary employment wage gap.

Our subgroup-specific analyses show a slight tendency that average point estimates of the effects of partial deregulation and the size of the temporary work sector are marginally

stronger for prime-age than for younger workers. Concerning the effect of the size of the temporary work force, there is also the tendency that the effect is stronger for workers in high-level occupations compared to workers in low-level occupations. For workers in low-level occupations we even find the reversed effect as the temporary wage gap declines the larger the temporary employment sector is. However, the group-specific differences should not be exaggerated as differences are relatively small.

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. 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.

Notes

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

[2] Sensitivity analysis (not displayed) shows that the results are largely robust against moderate variation of this cut-off point.

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

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

[5] 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.

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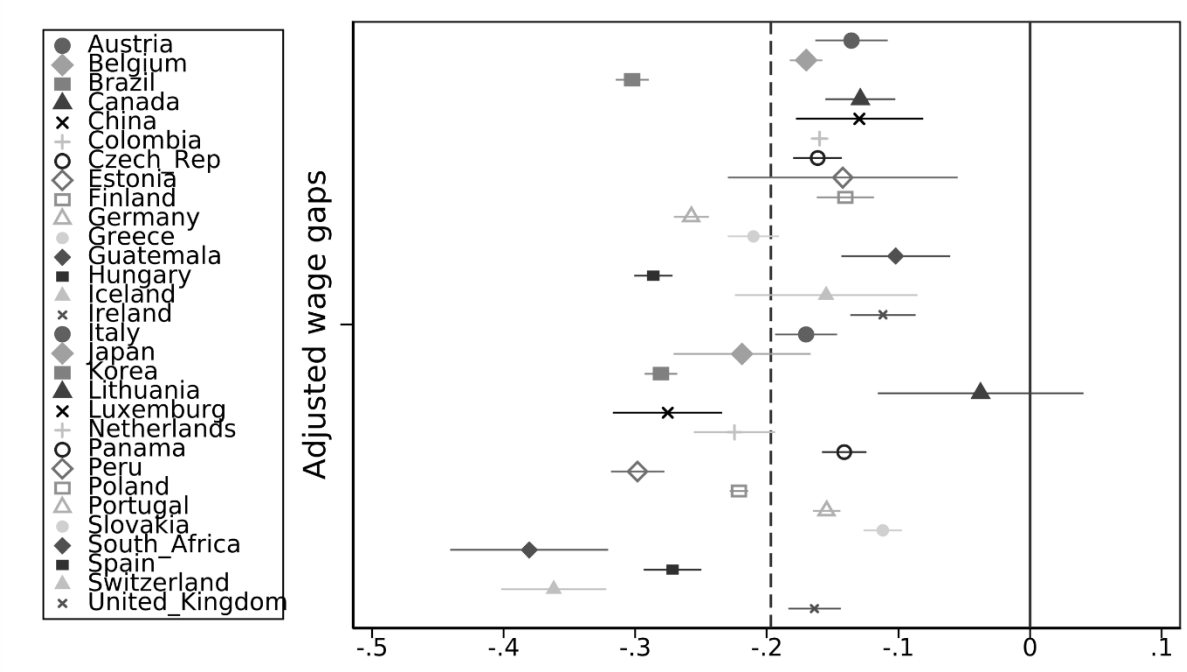
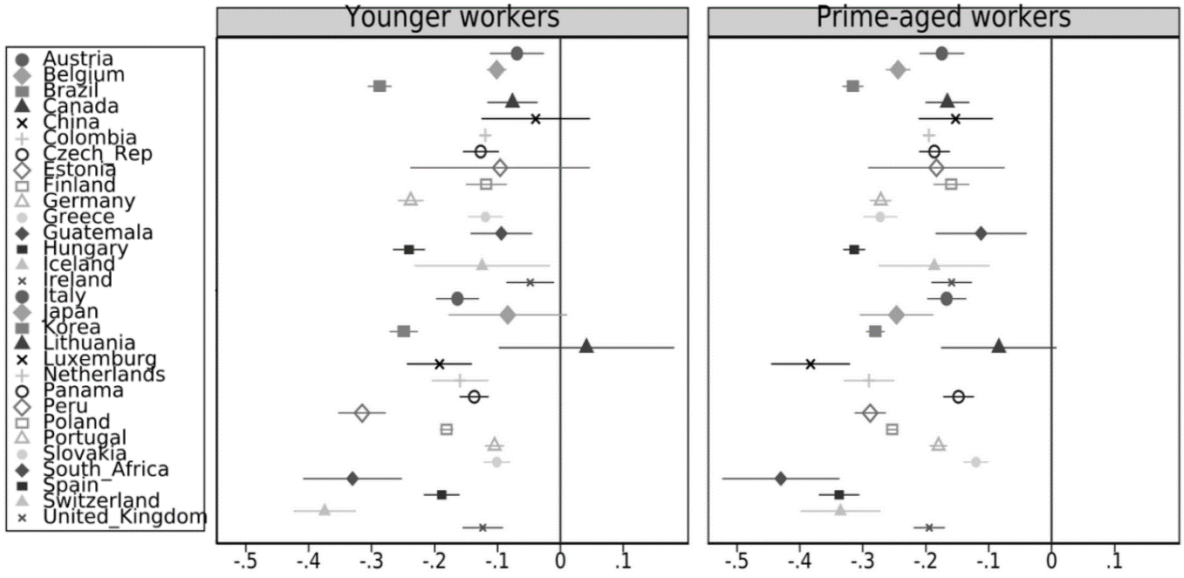
Figure 1 Average conditional wage gaps per country across all country-rounds



Notes: Country averages of the results of the first stage regression (pooled) of log gross hourly wages on type of contract, controlled for gender, age, educational level, industry, part-time status and survey year. Markers represent point estimates and lines represent 95% confidence intervals for each country. The dotted 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 (countries)=30.

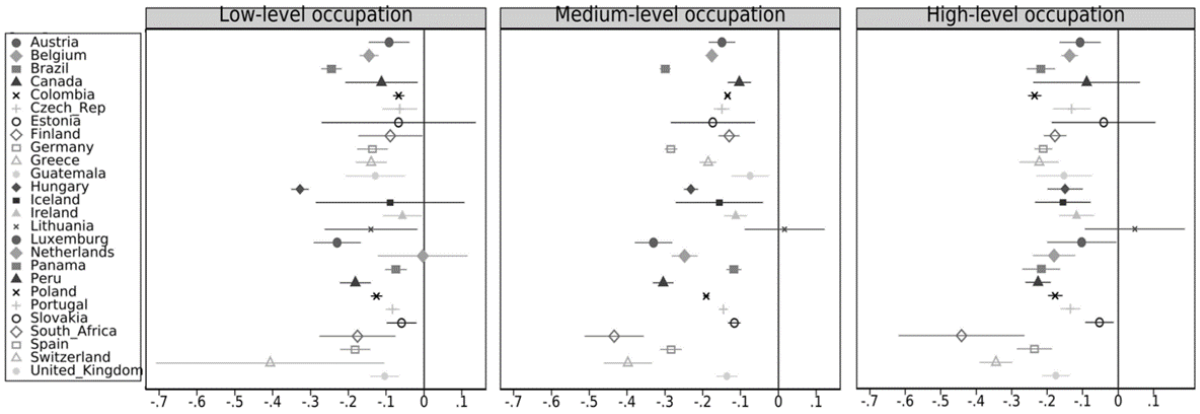
Figure 2 Average conditional wage gaps across all country-rounds, younger vs. prime-age workers



Notes: Country averages of the results of the first stage regression (pooled) of log gross hourly wages on type of contract, controlled for gender, age, educational level, industry, part-time status and survey year.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019. N (countries)=30.

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



Notes: Country averages of the results of the first stage regression (pooled) of log gross hourly wages on type of contract, controlled for gender, age, educational level, industry, part-time status and survey year.

Sources: LIS data supplemented by EU-SILC (Poland, Portugal, Hungary) and KLIPS (South Korea) data, 2000–2019. N (countries)=26.

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

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL perm high	0.025	0.034	0.000	0.040^{+}	0.006	0.034^{+}
	(0.026)	(0.032)	(0.021)	(0.023)	(0.037)	(0.019)
EPL temp high	0.040^{+}	0.042^{+}	0.047*	0.056**	0.039	0.007
	(0.022)	(0.020)	(0.021)	(0.018)	(0.031)	(0.019)
Union density	0.001	0.001*	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	0.002	0.002	0.001	-0.005***	0.003	0.003*
Globalization Index	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
GDP per capita	-0.025^{+}	-0.019	-0.032*	-0.025	-0.027	-0.010
	(0.013)	(0.012)	(0.013)	(0.020)	(0.016)	(0.015)
Size of informal	-0.005	-0.003	-0.008*	-0.015**	-0.002	0.002
sector	(0.004)	(0.004)	(0.003)	(0.004)	(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.

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

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL temp high*	0.054**	0.055*	0.063***	0.033	0.059*	0.012
EPL perm high	(0.018)	(0.021)	(0.016)	(0.022)	(0.028)	(0.021)
EPL temp high*	-0.000	-0.002	-0.002	0.139*	-0.040	-0.010
EPL perm low	(0.066)	(0.067)	(0.064)	(0.063)	(0.100)	(0.060)
EPL perm high	0.010	0.018	-0.019	0.073*	-0.017	0.029
	(0.039)	(0.048)	(0.032)	(0.034)	(0.047)	(0.028)
Union density	0.001	0.001	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	0.001	0.001	-0.000	-0.003*	0.001	0.003
Globalization Index	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
GDP per capita	-0.022	-0.015	-0.027+	-0.028	-0.023	-0.010
	(0.015)	(0.015)	(0.015)	(0.020)	(0.017)	(0.016)
Size of informal	-0.004	-0.003	-0.007+	-0.015**	-0.002	0.002
sector	(0.004)	(0.005)	(0.004)	(0.004)	(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.

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

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
Temp rate	-0.003^{+}	-0.002	-0.003*	0.004***	-0.004	-0.004*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
EPL perm high	0.025	0.027	-0.002	0.035	0.007	0.047
	(0.041)	(0.051)	(0.034)	(0.031)	(0.047)	(0.029)
EPL temp high*	0.048*	0.052*	0.057**	0.040**	0.044	0.003
EPL perm high	(0.019)	(0.022)	(0.018)	(0.014)	(0.030)	(0.017)
EPL temp high*	-0.000	-0.003	-0.004	0.144*	-0.044	-0.035
EPL perm low	(0.066)	(0.068)	(0.064)	(0.056)	(0.105)	(0.055)
Union density	0.001	0.001	-0.000	0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	-0.001	0.000	-0.002	-0.002	-0.000	0.001
Globalization Index	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
GDP per capita	-0.020	-0.015	-0.026^{+}	-0.026	-0.018	-0.010
	(0.014)	(0.015)	(0.015)	(0.019)	(0.017)	(0.016)
Size of informal	-0.004	-0.002	-0.007^{+}	-0.016***	0.000	0.003
sector	(0.004)	(0.005)	(0.004)	(0.003)	(0.006)	(0.003)
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.

Appendix

Table A1 Information on micro datasets

Country	Data source	Individuals	Rounds (years covered)
AT (Austria)	Statistics on Income and Living Conditions	20,886	6 (2000-2016)
BE (Belgium)	Statistics on Income and Living Conditions	58,215	15 (2003-2017)
BR (Brazil)	National Continuous Household Sample Survey	100,885	5 (2006-2016)
CA (Canada)	Survey of Labour and Income Dynamics	32,461	2 (2007-2010)
CH (Switzerland)	Statistics on Income and Living Conditions	56,018	12 (2006-2017)
CN (China)	Chinese Household Income Survey	10,044	1 (2013)
CO (Colombia)	Great Integrated Household Survey	295,460	4 (2007-2016)
CZ (Czech Republic)	Statistics on Income and Living Conditions	25,816	5 (2004-2016)
DE (Germany)	German Socio-Economic Panel	166,888	19 (2000-2018)
EE (Estonia)	Estonian Social Survey	15,819	4 (2007-2016)
ES (Spain)	Statistics on Income and Living Conditions	42,089	6 (2000-2016)
FI (Finland)	Income Distribution Survey	23,570	4 (2007-2016)
GR (Greece)	Statistics on Income and Living Conditions	20,680	5 (2004-2016)
GT (Guatemala)	National Survey of Living Conditions	6,987	3 (2006-2014)
HU (Hungary)*	Statistics on Income and Living Conditions	75,597	14 (2006-2019)
IE (Ireland)	Statistics on Income and Living Conditions	42,262	16 (2002-2017)
IS (Iceland)	Statistics on Income and Living Conditions	3,516	3 (2004-2010)
IT (Italy)	Survey of Household Income and Wealth	25,975	6 (2000-2016)
JP (Japan)	Japan Household Panel Survey	4,7540	3 (2008-2013)
KO (South Korea)*	Korean Labour and Income Panel Study	69,244	20 (2000-2019)
LT (Lithuania)	Statistics on Income and Living Conditions	30,035	10 (2009-2018)
LU (Luxemburg)	Socio-Economic Panel	14,435	4 (2004-2013)
NL (Netherlands)	Statistics on Income and Living Conditions	30,654	8 (2004-2018)
PA (Panama)	Continuous Household Survey	28,200	4 (2007-2016)
PE (Peru)	National Household Survey	32,524	5 (2004-2016)
PL (Poland)*	Statistics on Income and Living Conditions	125,871	15 (2005-2019)
PT (Portugal)*	Statistics on Income and Living Conditions	72,150	16 (2004-2019)
SK (Slovakia)	Statistics on Income and Living Conditions	47,549	9 (2004-2018)
UK (United Kingdom)	Family Resources Survey	80,221	7 (2012-2018)
ZA (South Africa)	National Income Dynamics Study	19,650	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)
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).

Table A3: Different model specifications for (pooled) first-stage analysis

	Main model (results illustrated in Figure 1)	+ occupation, marital status, and children in HH	Without industry and part-time status
Austria	-0.136***	-0.143***	-0.141***
	(0.014)	(0.014)	(0.014)
Belgium	-0.170***	-0.161***	-0.173***
	(0.006)	(0.006)	(0.006)
Brazil	-0.302***	-0.334***	-0.287***
	(0.006)	(0.012)	(0.006)
Canada	-0.129***	-0.098***	-0.146***
	(0.014)	(0.015)	(0.013)
China*	-0.130***	-0.120***	-0.110***
	(0.025)	(0.029)	(0.024)
Colombia	-0.160***	-0.160***	-0.155***
	(0.003)	(0.004)	(0.004)
Czech Republic	-0.161***	-0.139***	-0.162***
	(0.009)	(0.009)	(0.009)
Estonia	-0.142**	-0.122**	-0.137**
	(0.045)	(0.042)	(0.045)
Finland	-0.140***	-0.152***	-0.140***
	(0.011)	(0.010)	(0.011)
Germany	-0.257***	-0.253***	-0.290***
	(0.007)	(0.007)	(0.007)
Greece	-0.210***	-0.189***	-0.198***
	(0.010)	(0.010)	(0.010)
Guatemala	-0.102***	-0.110***	-0.069**
	(0.021)	(0.021)	(0.021)
Hungary	-0.286***	-0.248***	-0.289***
	(0.007)	(0.007)	(0.008)
Iceland	-0.155***	-0.125***	-0.123**
	(0.035)	(0.033)	(0.036)
Ireland	-0.112***	-0.096***	-0.150***
	(0.013)	(0.012)	(0.012)
Italy*	-0.170***	-0.160***	-0.120***
	(0.012)	(0.015)	(0.012)
Japan*	-0.219***	-0.213***	-0.153***
	(0.027)	(0.027)	(0.025)
Korea*	-0.275***	-0.259***	-0.285***
	(0.006)	(0.006)	(0.006)
Lithuania	-0.038	-0.000	-0.040
	(0.040)	(0.040)	(0.040)
Luxembourg	-0.275***	-0.248***	-0.268***
	(0.021)	(0.020)	(0.021)
Netherlands	-0.225***	-0.203***	-0.241***
	(0.016)	(0.016)	(0.015)
Panama	-0.141***	-0.128***	-0.113***
	(0.009)	(0.010)	(0.009)
Peru	-0.298***	-0.243***	-0.308***
	(0.010)	(0.013)	(0.010)
Poland	-0.221***	-0.183***	-0.215***
	(0.004)	(0.003)	(0.004)
Portugal	-0.155***	-0.137***	-0.151***
	(0.005)	(0.005)	(0.005)
Slovakia	-0.112***	-0.100***	-0.113***
	(0.007)	(0.007)	(0.007)
South Africa	-0.380***	-0.345***	-.0308***
	(0.031)	(0.031)	(0.033)

Spain	-0.272***	-0.264***	-0.281***
	(0.011)	(0.012)	(0.011)
Switzerland	-0.362***	-0.372***	-0.367***
	(0.020)	(0.020)	(0.020)
United Kingdom	-0.164***	-0.138***	-0.208***
	(0.010)	(0.010)	(0.010)

*Occupation not included as control

Notes: $^{+}p<0.10$, *p < 0.05, **p < 0.01, ***p < 0.001, standard errors in parentheses.

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

Table A4: (Pooled) first-stage analysis including workers aged 15 to 65 vs. 25-55

	Full sample (15-65)	Full sample (25-55)		Full sample (15-65)	Full sample (25-55)
Austria	-0.234***	-0.136***	Italy	-0.159***	-0.170***
	(0.011)	(0.014)		(0.011)	(0.012)
Belgium	-.170***	-0.170***	Japan	-0.212***	-0.219***
	(0.006)	(0.006)		(0.022)	(0.027)
Brazil	-0.279***	-0.302***	Korea	-0.249***	-0.275***
	(0.005)	(0.006)		(0.005)	(0.006)
Canada	-0.092***	-0.129***	Lithuania	-0.016	-0.038
	(0.009)	(0.014)		(0.034)	(0.040)
China	-0.160***	-0.130***	Luxembourg	-0.260***	-0.275***
	(0.023)	(0.025)		(0.019)	(0.021)
Colombia	-0.159***	-0.160***	Netherlands	-0.218***	-0.225***
	(0.003)	(0.003)		(0.015)	(0.016)
Czech Republic	-0.152***	-0.161***	Panama	-0.129***	-0.141***
	(0.008)	(0.009)		(0.007)	(0.009)
Estonia	-0.124**	-0.142**	Peru	-0.298***	-0.298***
	(0.039)	(0.045)		(0.010)	(0.010)
Finland	-0.139***	-0.140***	Poland	-0.217***	-0.221***
	(0.010)	(0.011)		(0.003)	(0.004)
Germany	-0.336***	-0.257***	Portugal	-0.149***	-0.155***
	(0.006)	(0.007)		(0.005)	(0.005)
Greece	-0.209***	-0.210***	Slovakia	-0.105***	-0.112***
	(0.009)	(0.010)		(0.006)	(0.007)
Guatemala	-0.112***	-0.102***	South Africa	-0.322***	-0.380***
	(0.017)	(0.021)		(0.027)	(0.031)
Hungary	-0.279***	-0.286***	Spain	-0.261***	-0.272***
	(0.006)	(0.007)		(0.010)	(0.011)
Iceland	-0.123***	-0.155***	Switzerland	-0.511***	-0.362***
	(0.028)	(0.035)		(0.014)	(0.020)
Ireland	-0.098***	-0.112***	United Kingdom	-0.165***	-0.164***
	(0.010)	(0.013)		(0.009)	(0.010)

Notes: $^{+}$p<0.10, *p < 0.05, **p < 0.01, ***p < 0.001, standard errors in parentheses.

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

Table A5 Effect of continuous EPL perm indicator on conditional wage gap of temporary employment

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL perm cont.	0.023	0.033	0.015	0.081**	0.004	0.018
	(0.020)	(0.025)	(0.020)	(0.024)	(0.027)	(0.015)
EPL temp cont.	-0.001	-0.007	-0.003	-0.022	-0.006	0.007
	(0.022)	(0.024)	(0.020)	(0.022)	(0.028)	(0.014)
Union density	0.001	0.002+	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	0.002	0.002	0.000	-0.006**	0.003	0.004**
Globalization Index	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
GDP per capita	-0.020	-0.012	-0.024+	0.005	-0.021	-0.012
	(0.014)	(0.015)	(0.013)	(0.021)	(0.018)	(0.016)
Size of informal	-0.002	-0.000	-0.005	-0.009	0.001	0.002
sector	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)	(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.

Table A6 Effect of continuous EPL temp indicator interacted with continuous EPL perm indicator on conditional wage gap of temporary employment

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL temp cont.	-0.036	-0.053^{+}	-0.026	-0.051*	-0.045	-0.002
	(0.029)	(0.031)	(0.026)	(0.019)	(0.036)	(0.019)
EPL perm cont.	-0.042	-0.059	-0.050	-0.024	-0.073	0.027
	(0.046)	(0.055)	(0.043)	(0.034)	(0.061)	(0.033)
EPL temp cont.*	0.056*	0.075**	0.044^{+}	0.060**	0.067^{+}	0.005
EPL perm cont.	(0.025)	(0.026)	(0.024)	(0.020)	(0.033)	(0.016)
Union density	0.001	0.001	0.000	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	0.001	0.000	-0.000	-0.007***	0.001	0.003*
Globalization Index	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
GDP per capita	-0.018	-0.009	-0.024^{+}	-0.006	-0.021	-0.010
	(0.013)	(0.013)	(0.013)	(0.020)	(0.018)	(0.016)
Size of informal	-0.001	0.000	-0.005	-0.009*	0.000	0.002
sector	(0.004)	(0.005)	(0.003)	(0.004)	(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.

Table A7 Effect of the share of temporary workers on conditional wage gap of temporary employment controlling for continuous EPL perm and temp indicators

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
Temp rate	-0.003^{+}	-0.002	-0.003*	0.004***	-0.004	-0.004*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
EPL temp cont.	0.025	0.027	-0.002	0.035	0.007	0.047
	(0.041)	(0.051)	(0.034)	(0.031)	(0.047)	(0.029)
EPL perm cont.	0.048*	0.052*	0.057**	0.040**	0.044	0.003
	(0.019)	(0.022)	(0.018)	(0.014)	(0.030)	(0.017)
EPL temp cont.*	-0.000	-0.003	-0.004	0.144*	-0.044	-0.035
EPL perm cont.	(0.066)	(0.068)	(0.064)	(0.056)	(0.105)	(0.055)
Union density	0.001	0.001	-0.000	0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
KOF Economic	-0.001	0.000	-0.002	-0.002	-0.000	0.001
Globalization Index	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
GDP per capita	-0.020	-0.015	-0.026^{+}	-0.026	-0.018	-0.010
	(0.014)	(0.015)	(0.015)	(0.019)	(0.017)	(0.016)
Size of informal	-0.004	-0.002	-0.007^{+}	-0.016***	0.000	0.003
sector	(0.004)	(0.005)	(0.004)	(0.003)	(0.006)	(0.003)
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.

Table A8 Effect of EPL perm on conditional wage gap of temporary employment controlling for CBC instead of union density

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL perm high	0.024	0.027	0.002	0.042^{+}	-0.005	0.037*
	(0.030)	(0.035)	(0.024)	(0.023)	(0.038)	(0.018)
EPL temp high	0.038	0.035	0.048^{+}	0.053*	0.052^{+}	0.021
	(0.026)	(0.025)	(0.023)	(0.020)	(0.025)	(0.024)
CBC	-0.000	0.000	-0.000	-0.000	-0.001	-0.000
	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
KOF Economic	0.002	0.002	0.000	-0.005***	0.001	0.004*
Globalization Index	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
GDP per capita	-0.025^{+}	-0.016	-0.033*	-0.012	-0.023	-0.013
	(0.013)	(0.013)	(0.013)	(0.018)	(0.015)	(0.015)
Size of informal	-0.004	-0.002	-0.008*	-0.012**	-0.003	0.000
sector	(0.005)	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)
N (country-rounds)	212	212	212	183	183	183

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.

Table A9 Effect of EPL temp in settings of strict EPL perm vs. weak EPL perm on conditional wage gap of temporary employment controlling for CBC instead of union density

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
EPL temp high*	0.065***	0.061*	0.076***	0.036	0.077**	0.029
EPL perm high	(0.023)	(0.026)	(0.020)	(0.021)	(0.027)	(0.026)
EPL temp high*	-0.052	-0.056	-0.038	0.123+	-0.090	-0.016
EPL perm low	(0.063)	(0.063)	(0.059)	(0.070)	(0.076)	(0.060)
EPL perm high	-0.008	-0.004	-0.029	0.069+	-0.039	0.026
	(0.038)	(0.047)	(0.030)	(0.039)	(0.040)	(0.026)
CBC	-0.000	-0.000	0.000	-0.000	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
KOF Economic	0.000	0.000	-0.002	-0.004*	-0.001	0.003
Globalization Index	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
GDP per capita	-0.019	-0.010	-0.027+	-0.014	-0.020	-0.012
	(0.014)	(0.014)	(0.014)	(0.018)	(0.015)	(0.016)
Size of informal	-0.004	-0.001	-0.008+	-0.012**	-0.002	0.000
sector	(0.005)	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)
N (country-rounds)	212	212	212	183	183	183

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.

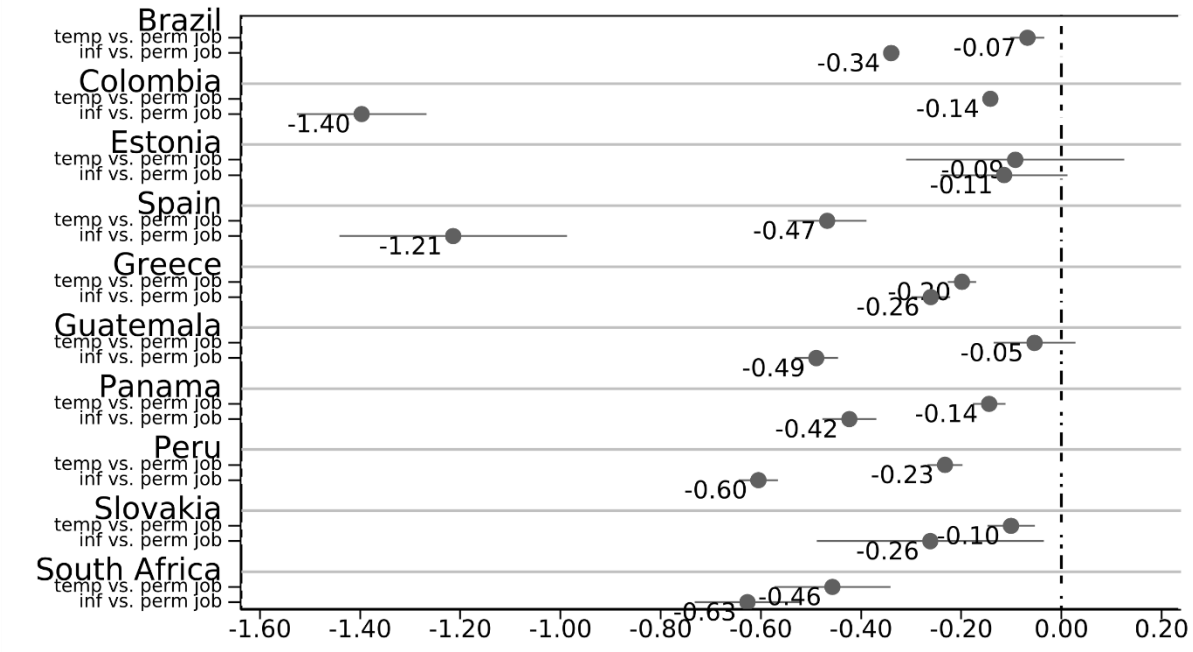
Table A10 Effect of the share of temporary workers on conditional wage gap of temporary employment controlling for CBC instead of union density

	Full sample	Younger workers	Prime-age workers	Low occupations	Medium occupations	High occupations
Temp rate	-0.006***	-0.005*	-0.006***	0.001	-0.007**	-0.007***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
EPL perm high	0.030	0.025	0.0011	0.061	-0.001	0.064*
	(0.039)	(0.049)	(0.032)	(0.040)	(0.043)	(0.027)
EPL temp high*	0.040+	0.043	0.051*	0.038+	0.047	0.007
EPL perm high	(0.023)	(0.028)	(0.022)	(0.019)	(0.028)	(0.023)
EPL temp high*	-0.056	-0.058	-0.041	0.131+	-0.113+	-0.063
EPL perm low	(0.057)	(0.061)	(0.051)	(0.072)	(0.065)	(0.051)
CBC	-0.000	-0.000	-0.000	0.000	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
KOF Economic	-0.003+	-0.002	-0.004*	-0.003	-0.005*	-0.001
Globalization Index	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
GDP per capita	-0.012	-0.005	-0.020	-0.016	-0.010	-0.003
	(0.014)	(0.014)	(0.014)	(0.017)	(0.015)	(0.015)
Size of informal	-0.001	0.001	-0.004	-0.012**	0.002	0.005
sector	(0.005)	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)
N (country-rounds)	212	212	212	183	183	183

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.

Figure A1 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, educational level, industry and part-time status.

Source: 2016 LIS data (2015 for South Africa and 2014 for Guatemala).