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Labor Market Dualism and the Wage Penalty for Temporary Employment: Evidence on the Interplay of Employment Protection Legislation and Labor Market Institutions from PIAAC Data

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This paper analyzes how employment protection legislation (EPL) shapes wage gaps by labor contract status among 19 countries. Drawing on the Survey of Adult Skills (PIAAC), it attempts to delineate whether the effects of overall EPL and EPL by contract status have the inequality enhancing or reducing effects for employees on fixed-term contract with other labor market institutions taken into account. The results suggest that strict overall employment protection works to the disadvantage of temporary employees and that employment protection dualism by contract status has a further negative effect on wages gaps. Finally, implications regarding labor market reform have been suggested.

Keywords: *employment protection legislation, labor market dualism, wage penalty, PIAAC*

Introduction

This paper analyzes how employment protection legislation interacts with labor market institutions to affect wage gaps by labor contract status among 19 countries. Drawing on the Programme for the International Assessment of Adult Competencies (PIAAC) data, it attempts to delineate how overall employment protection legislation (EPL hereafter) and EPL for permanent and temporary employees shape wage gaps by contract status, and how they interact with other labor market institutions in strengthening or mediating the inequality enhancing effects of EPL, especially that of job security protection for temporary contract. In so doing, this paper draws on recent discussion on labor market dualism, paying close attention to the roles that labor market institutions play in regard to hiring of temporary employees compared to their permanent counterparts or to their investment in firm specific human capital at the workplace.

Fixed term contract (FTC) or temporary employment have attracted sociological research in terms of its relevance to labor market segmentation as this form of employment has extended across countries since the late 1990s, having great impact on labor market inequality in general (Blau and Kahn 2003; Booth, Francesconi, and Frank 2002; Kalleberg 2001; Kalleberg, Reynolds, and Marsden 2003). As widely discussed, temporary employees are paid less, work under unpleasant arrangements, and have a lower probability of moving into regular or better paid jobs than their counterparts on indefinite contracts (Booth et al. 2002; Sorensen and Kalleberg 1981). This relates to the long-standing argument on segmented labor markets that posits that labor markets have two or more segments with differing pay and working conditions depending on the profitability of the sectors in which employment relationships take place. Previous studies usually focus on career trajectories of employees over lifetime or earnings mobility to measure labor market dualism and assess their consequences for inequality (Barbieri, 2009; DiPrete et al. 1997; DiPrete and Nonnemaker 1997; Grimshaw et al. 2016; Hipp, Bernhardt, and Allmendinger 2015).

Although labor market dualism has drawn much attention from scholars and policy makers, previous studies rarely question whether employment protection legislation and/or labor market institutions mitigate or exacerbate the wage gaps among employees on different contract statuses or in labor market positions (Eichhorst and Marx 2012; Emmenegger et al. 2012; Hipp et al. 2015; Thelen 2014). This paper attempts to close this gap by drawing on

the Survey of Adult Skills, which includes rich information on individual level characteristic relevant to labor market outcomes (OECD 2013b). It also brings together theoretical discussions on employment protection dualism and labor market segmentation, and delineates the mechanisms through which EPL and labor market institutions interact to influence earnings gaps by contract status. To be more specific, this paper examines how overall level of EPL interacts with labor market situations to affect labor market outcomes, and how employment protection dualism represented by differing level of job protection by contract status shapes the wage penalty for temporary employment. Special attention is paid to employers' hiring decisions as they affect the extent to which investment on firm specific skills differs by contract status based on the cost-benefit evaluation of productivity. Based on theoretical discussions and empirical findings, this paper finally suggests some policy implications regarding labor market dualism and its relevance for labor market reform agendas.

Literature Review and Hypotheses

Many studies have revealed the segmented nature of labor markets in terms of socially stratified opportunities for mobility, such as promotions and pay increases, as well as wage inequality among workers according to their position in the labor market (Acemoglu 2001; Acemoglu and Autor 2012; DiPrete, Goux, and Maurin 2002; DiPrete and Nonnemaker 1997). Although there has been dispute over the existence or characteristics of labor market segmentation, labor market segmentation has been proved to play a key role in social stratification in the labor market. In other words, dualism driven by factors such as technological development, productivity gaps, and differences in employment regulation largely influences inequality between and within labor market segments (DiPrete et al. 2002; Tolbert, Horan, and Beck 1980; Weakliem 1990).

Labor market segmentation affects labor mobility, employment chances, and income dynamics among various groups within the labor force. The specific mechanism through which dualism affects labor allocation and utilization, and determines wages and employment chances is shaped by the institutions governing these processes, such as employment protection, collective bargaining, activation orientation of welfare states and unemployment insurance system. These institutions largely affect the stratification process through direct or indirect effects on employment

protection dualism (Allmendinger, Hipp, and Stuth 2013; Auer 2006; Emmenegger et al. 2012 Fernández-Macías and Hurley 2016).

Among many dimensions of labor market dualism, this paper pays close attention to wage gaps by contract status, in other words, the wage penalty for temporary employment, which reflects employers' decision regarding hiring and firing costs for permanent and temporary positions given their personnel strategy. Sociological studies have attributed wage gaps between temporary and permanent jobs to transaction costs that reflect job contents or skills specificity, which in turn are closely related to job tenure, investment in firm-specific skill, and to career prospects on the side of employees (Gebel and Giesecke 2011; Kalleberg et al. 2003; Polavieja 2003; Williamson 1981). If job positions are expected to demand firm specific skills and higher extent of commitment of current employees, it is more reasonable for the employer to hire employees on regular contract; the benefits of investment in firm specific skills outweigh those of savings from resorting to short term contracts, because the replacements of permanent employees incur higher costs than otherwise. In a different vein, varieties of capitalism theory also stresses skills specificity as one of key pillars of comparative advantage which each political economy entertains, and denotes that coordinated market economy is well equipped with labor market institutions that supplement long term investment in firm specific skills, such as coordinated collective bargaining system, strong vocational education and training system, and employment legislation protection, while liberal market economy resorts to general skills that rely on the supply of higher education graduates supplemented by firm level collective bargaining, and flexible employment protection and labor market policies (Estevez-Abe, Iversen and Soskice 2001; Hall and Soskice 2001; Iversen and Soskice 2001).

Employment protection

Previous research has provided empirical evidence related to the effects of employment protection legislation on employment and/or unemployment rates at the aggregate level (Avdagic 2015; Bassasini and Duval 2006), but rarely investigated their impact on the wage gap by labor contract status. Employment protection affects employers' decision to hire new employees and to retain or fire current employees to adjust to market fluctuations. Strict employment protection for regular employees incentivizes employers to use temporary replacements when their use is less stringent, resulting in higher demand for temporary contracts, everything else equal. Regarding employee

allocation and use, strict employment protection encourages employers to train their employees, as they expect to recoup benefits from training for a longer period under a relatively stable employment relationship. This could result in a higher wage gap by contract status, as employers may prefer to invest in regular employees rather than temporary employees under a stable employment contract.

Employment protection legislation also affects demand for skilled and/or unskilled labor (Daniel and Siebert 2005), therefore "making firms choosy about hiring unskilled workers when employment protection raises dismissal costs" (p. 197). Additionally, this effect is much larger for unskilled labor compared to skilled labor (Scarpetta, 1996). Earlier studies (Scarpetta 1996; Daniel and Siebert 2005; DiPrete et al. 2006; Eichhorst and Marx 2011) indicate that stringent employment protection renders firm less willing to hire unskilled workers due to higher dismissal costs, creating a larger negative effect for unskilled labor. Bertola, Boeri, and Cazes (2000) point out that EPL stringency is a predictor of labor market performance, emphasizing that stable employment relationships can foster investment in human capital, especially job-specific investments.

From a slightly different angle, Daniel and Siebert (2005) emphasize the negative effects of strict employment protection on job matches, and show a negative impact on a recruit's level of education and age at entry into the labor market. This effect has more impact on less protected groups, such as those with less experience or older applicants. Hence, the previous literature has also focused on the effect of EPL stringency on aggregate level outcomes such as employment and unemployment levels for the overall population as well as for youth.

Lower levels of employment protection are more likely to increase temporary employment that pays less than standard employment relationships. However, improved chances for entry into the labor market may not guarantee decent pay or opportunities for upward mobility for less privileged groups of employees. To summarize the discussions on how EPL affects labor market outcomes by contract status, this paper puts forward the following theoretical propositions:

(1) EPL affects hiring and firing costs for employers related to new and current employees, therefore affecting labor demand. However, this effect may differ by labor contact status, resulting in an increase or decrease in wage gaps by contract status.
(2) Stringent EPL lowers labor turnover or new hires, thus having a

detrimental effect on the probabilities of employment for those at the margins in the labor market. These employees are more likely to face a wage penalty, as they would take job offers paying less than they could otherwise earn. If this holds true, the wage gap by contract status would increase under strict EPL or with higher degrees of employment protection gaps by contract status.

(3) Difference in employment protection by contract status can have varying effects on earnings: on the one hand, strict employment protection incurs high labor costs for employers, resulting in a decline in employment or job turnover rates, especially for new entrants to the labor market, such as youth and migrant workers. On the other hand, job security provisions provide employees with more employment security, therefore inducing them to work longer hours and/or more efficiently. This enables employees to make a greater extent of commitment to job tasks, which will yield productivity gains.

Labor market institutions

Besides employment protection legislation, other labor market institutions either strengthen or mediate wage gaps by contract status. Evaluating recent employment and welfare system reforms in Germany, Eichhorst (2015) argues that the recent shift in policy emphasis on activation for most vulnerable groups has yielded partial success in terms of labor market integration, but this partial success is compromised by the quality of jobs and upward mobility opportunities. Rossovoll and Sparrman (2015) investigates how labor market institutions affect wage inequality across OECD countries including EPL, unemployment insurance, wage bargaining coordination and other institutions, finding that all institutions included in their estimation have compressing effects on wage dispersion at the country level. They find that EPL for permanent and temporary contracts has differing effects on wage gaps, as the former contributes to compressing wage distribution, while the latter encourages employers to make investment in firm-specific training for permanent employees, causing the wage gap to widen in general. The relaxation of employment legislation for temporary contacts, however, eased restrictions on employment protection for temporary employees, therefore increasing the share of temporary employees and the wage gap by contract status. Hasssel (2014) shows that in Germany, labor market coordination and liberalization complement each other in sharpening insider-outsider divisions, which were driven by cooperation between export-oriented firms

and labor unions of core workers. Barbieri and Cutuli (2015) deal with labor market regulation and the dynamics of overall employment and unemployment in continental Europe, investigating institutionally driven labor market segmentation mirrored by employment protection legislation gaps by contraction status and the ratio of expenses on passive to active labor market policies. They find that partial deregulation at the margin in the labor market has been minor at large, and propose that EPL gaps by contract status be regarded as an institutionally driven market segmentation, for the measures capture partial and targeted deregulation process observed since the mid-1990s. In terms of institutional effects, unemployment generosity is likely to induce prospective job seekers to extend their job search, therefore yielding positive gains in terms of wages, especially for temporary employees. In addition, generous unemployment benefits may encourage employers to find employees with better matches to their job positions as labor costs are supposed to be borne by unemployment system.

Hypotheses

As emphasized in previous studies, EPL and labor market institutions can play a role in increasing average labor productivity and in improving welfare (Acemoglu 2001; Acemoglu and Autor 2012; Checchi and Garcı´a Pen˜alosa 2008). Strict EPL raises labor costs for employers, while bargaining power can help employers reduce adjustment costs to economic turbulence at the firm level. In addition, EPL differences affect gaps in labor costs for filling in job positions by contract status. The relative ratio of ALMP versus PLMP as % of GDP is known to be an indicator of government efforts in integrating the unemployed into the labor market, usually by providing in-work benefits financed by public spending, which leads to an increase in non-standard employment arrangements including fixed-term contract (Eichhorst and Marx 2012). In short, lower levels of employment protection decrease firing costs, therefore inducing employers to make low extent of investment in human capital for employees on fixed term contract, which would yield a higher wage penalty for temporary employment, ceteris paribus (Cutuli and Guetto 2012; O'Connel and Byrne 2012). In other words, stringent overall EPL measures encourage employers to invest in firm-specific skill for employees on permanent contract, who are more likely to stay with the employer for a longer time, which allows employers to recoup their training investment later. If this holds, stringent overall EPL tends to increase the wage penalty for temporary employment.

To summarize, overall level of EPL is positively associated with the wage penalty for temporary employment, as strict employment protection tends to increase labor costs, therefore induce employers to make low investment in human capital for employees on FTC.

> **H1:** the higher the overall level of EPL measure, the larger wage gaps by contract status will be. In other words, stringent EPL tends to increase the negative wage penalty for temporary employment.

However, recent studies have paid caution to the fact that overall EPL measure may mask complexity of EPL provisions by contract status, as it may have distinct effects on permanent and temporary employees in terms of wage gains. In this regard, Rossvoll and Sparrman (2015) estimate separate effects of EPL for temporary and permanent contract on wage dispersion in the labor market. However, overall level of EPL measure fails to reveal distinct effects of EPL for permanent employment (EPLp) and EPL for temporary employment (EPLt) on the wage gap. It is plausible that controlling for EPLp, more stringent EPLt may mitigate the wage penalty for temporary employment, as the benefits of substituting temporary employees for permanent counterparts would decrease on the employer side. On the other hand, lower levels of EPLt may accelerate the integration of marginalized groups into low segment of the labor market, which contributes to an increase in wage gaps by contract status (Hipp et al. 2015).

> **H2.** EPL for permanent and temporary employees have distinct effects on the wage penalty for temporary employment. Controlling for EPLp, the higher EPLt, the lower the wage penalty for temporary employment.

Previous studies argue that EPL by contract status has distinct effects on the possibilities of temporary employment and unemployment (Hipp et al. 2015; Rossvoll and Sparrman 2015; Olsthoorn 2017), and that the interaction effects of two EPL measures need to be taken into account in analysis. The primary concern is to control for stringency of EPL by contract status while ascertaining the interaction effects on the wage penalty for temporary employment, simultaneously. Olsthoorn (2017) suggests that an interaction term of EPLp and EPLt be included with main effect of EPL, as the former provides a best option for accounting for the misidentification of EPL variables. The interaction term reflects a change in EPLp for some value of EPL, or vice versa (p. 525). This paper also adopts Olsthoorn (2017)'s strategy

to account for EPL effects by including interaction terms while adjusting for each level of employment protection legislation by contract status. Using this interaction variable, this paper assesses whether the large gaps between EPLp and EPLt exacerbate or mitigate the negative wage penalty for temporary status.

The interaction effects of EPLt*EPTt and fixed-term contract are estimated to see if the main effects of EPLp and EPLt vary depending on the stringency of the other side of EPL. If the fixed term contract effect is relatively stronger in higher EPLp with environments with lower EPLt as a result of larger differences between EPLp and EPLt, the interaction effect would exacerbate the wage penalty for temporary employment in addition to the main effects of EPL. In other words, the interaction effects show how policies responses to economic circumstances have differed given levels of employment protection by contract status. For instance, countries with a larger difference between EPLp and EPLt such as Belgium, Portugal, Spain, and Sweden have absorbed economic shocks by means of job flexibility, while countries with a lower difference between EPLp and EPLt such as Anglo-Saxon countries and Denmark have facilitated labor market adjustment by resort to wage flexibility. If this were the case, the wage penalty for temporary employment may have been larger for countries with greater divides in employment protection by contact status as technological changes and globalization put greater pressure on the low end of wage distribution proxied by skills levels. On the labor demand side, low EPLt in high EPLp environments can bestow employers on a greater extent of saving on hiring costs, which would be reflected on wage costs, therefore giving greater incentives for employer to resort to temporary employees than otherwise. This might cause an increase in the wage penalty for temporary employment. In other words, higher values on the interaction terms between EPLp and EPLt are associated with a larger negative wage penalty for temporary employment.

> **H3.** The effects of separate measures of EPL for permanent and temporary employees depend on the differences between two measures, which capture interaction effects on the wage penalty for temporary employment. The higher the values of the interaction terms EPLp*EPLt, the larger the wage penalty for temporary employment.

The effect of EPL on the wage penalty for temporary employment may work through the channels of other labor market institutions or policies, such as

activation orientation of LM policies, benefits generosity, and wage coordination.

Activation orientation of labor market policies may increase the wage penalty for temporary employment if unemployed would be pushed into the low wage segment of labor markets due to sanctions coupled with benefit conditionality, leading to an increase in wage gaps by contract status

> **H4a.** Activation orientation of welfare states is positively associated with the wage penalty for temporary employment by pushing job seekers into low wage segment of jobs through fixed term contract.

UB generosity tend to increase reservation wages for the unemployed who seek for jobs, or incumbent employees looking for a new job; if unemployment benefits are more generous, those looking for jobs or another positions can extend their job search period seeking for a better match, which results in a better match in terms of jobs and skills. If this holds true, the more generous UB benefits, the lower wage penalty for temporary employment.

> **H4b.** The more generous unemployment benefits, the lower the wage penalty for temporary employment will be.

Higher level of wage coordination compresses overall wage dispersion, therefore contributing to a decrease in wage gap by contract status. However, if this wage compressing effect applies only for employees on permanent contact than for employees on temporary contract, this would result in an increase in the wage penalty for temporary employment. For instance, Rueda (2005) attributes the widening inequality in the labor market to coordinated wage bargaining that takes place to the advantage of labor market insiders, which has caused an institutionally driven labor market dualism.

> **H4c.** Collective bargaining coordination can either have positive or negative effects on the wage penalty for temporary employment depending on whether collective bargaining take place on an encompassing or segmentative orientation in terms of insider-outsider divides.

To summarize the hypotheses presented above, the level of protection for regular and temporary contract employees and the difference in employment protection by contract status can have both positive and negative effects for

temporary employees, the size of which is determined empirically. Following earlier research into the effects of EPL on labor market outcomes, this paper proposes two perspectives: the "integrative" view notes the beneficial effects for temporary employees; the "segmentation view" emphasizes the adverse effects for temporary employees (Avadig 2015; Giesecke and Groß 2003; Noelke 2011).

Data and Models

The labor market dualism literature relies on micro-level, longitudinal data on fringe benefits, income, or opportunity for mobility within or across national contexts (Sorensen and Kalleberg 1981; DiPrete and Nonnemaker 1997). This study attempts to assess the roles of employment protection legislation and other labor market institutions, and sheds light on the institutional complementarity of employment protection legislation and other labor market policies in terms of generating wages gaps by contract status.

The data are drawn from the 1st Round of the PIAAC (Program for the International Assessment of Adult Competencies), which was administered to a representative sample of about 150 thousand adults aged 16 to 65 across 24 countries. The survey module consists of three pillars: background questionnaire; job requirement approach; and direct assessment. The PIAAC definition of skills is broad and ambiguous, but the data measures "key information processing skills," essential for using text-based and mathematical information and fully integrating and participating in the labor market, education, and training, as well as in social and civic life. This roughly matches generic skills that are highly transferrable across contexts and learning for an individual (OECD 2013b, p. 56). The sample for analysis is restricted to the wage and salary employed, 25-54 years old, and does not include self-employed, as the key institutions and EPL do not apply for self-employed. Adopting this restriction reduces sample size to 48,713, which is about a third of the original data.

Variables

Dependent Variables: Hourly Earnings

The dependent variable is the log of hourly earnings. The hourly earnings variable is trimmed to the bottom and top one percent of the wage

distribution to limit the influence of extreme values following Hanushek et al.'s (2013) suggestions.

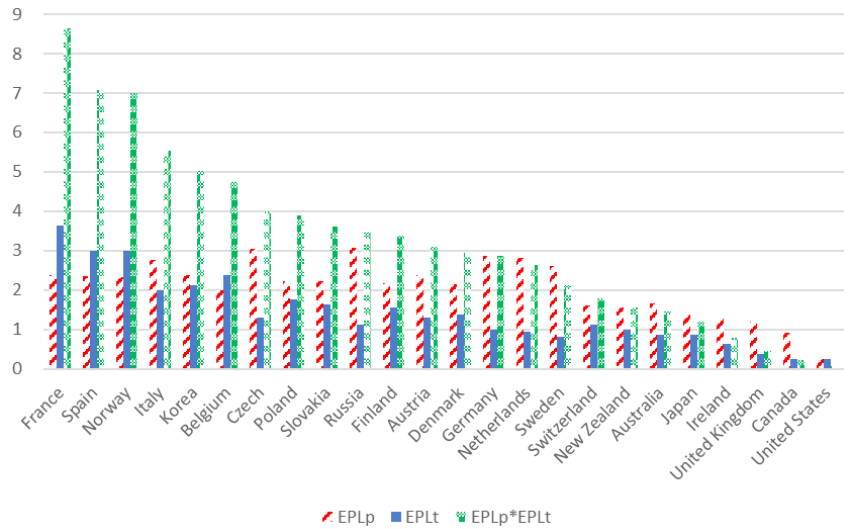
Contract Status

The key dummy variable is contract status, which consists of indefinite contract, fixed term contract, and temporary employment agency contract. For sake of brevity, this study combines the latter two categories, and includes a dummy variable for this status to measure differences by contract status. In other words, temporary employees are those employed with labor contracts other than indefinite contracts which take into account labor market flexibility and/or volatility dimensions of the labor market in a given country.

Employment Protection Legislation (EPL)

The overall level of employment protection legislation is composed of the weighted sum of 13 sub-indicators related to regulations of individual dismissal and additional provisions for collective dismissals. This measure draws on Version 3 of the EPRC (OECD 2015). Employment protection for indefinite contract employees uses version 1 of the EPR, which measures the regulatory stringency of dismissing an individual employee on indefinite contracts. It incorporates 8 data items: notification procedures; delay before notice can start; length of notice period according to tenure (9 months/4 years/20 years); severance pay at 9 months, 4 years, and 20 years; definition of justified or unfair dismissal; length of trial period; compensation following unfair dismissal; and possibility of reinstatement following unfair dismissal. To measure employment protection for temporary employees, this study uses the indicator for temporary employment from version 1 of the EPT, which measures the regulatory stringency of fixed-term and temporary work agency contracts. It incorporates 6 data items: valid cases for use of fixed-term contracts; maximum number of successive fixed-term contracts; maximum cumulative duration of successive fixed-term contracts; types of work for which temporary work agency (TWA) employment is legal; restrictions on the number of renewals of TWA assignments; and maximum cumulative duration of TWA assignments.

Besides the stringency of EPL measures by contract status, the gaps or differences in EPL measures by type of labor contract are of primary concern as these gaps in protection signal the extent to which labor markets are segmented by contract status. EPL measures range from 0 to 6, with lower scores referring to more flexible employment protection and higher scores to more stringent employment protection systems.



Note.—Countries are sorted by descending order of EPLp*EPLt in 2010
Source.—OECD (2015)

Fig. 1.—Distribution of EPL measures by contract status and their interactions across countries, 2010

However, EPL measures are prone to bias or measurement errors. First, they only measure labor market segmentation in legal terms, which may not represent labor market practices (Bertola et al., 2000; Eichhorst, Feil, and Braun 2008). Second, as long as EPL measures refer to labor market flexibility affecting dynamics in terms of employment and turnover, they only capture some dimensions of flexibility, such as numerical, external flexibility, while internal and functional flexibility are not properly taken into account.

Notwithstanding these deficits, EPL measures have remained one of the major options that allows for cross-country, longitudinal analysis. Thus, many works have relied on EPL measures rather than those from other sources (Barbieri 2009; Bassanini and Duval 2007; Bertola et al. 2000; Gebel and Giesecke 2011; Noelke 2011; Polavieja 2003)

[Figure 1] shows EPL scores for overall employment protection and for permanent and temporary contracts as well as their multiplication terms for the countries included in the following analysis. As of 2010, the overall level of employment protection is the highest in Russia with a score of 3.06, followed by Czech of 3.05. Except former Soviet bloc countries, Continental European countries have higher levels of employment protection for

permanent contracts: Germany with 2.87; the Netherlands with 2.82. Nordic countries and Southern European countries also have more stringent EPL for permanent employees. On the other end of the distribution lie Anglo-Saxon countries with the United State having the lowest score of with .26, followed by Canada with 0.92, United Kingdom 1.20 and Ireland 1.27.

Employment protection for temporary contracts, however, show a different pattern than EPLp, as the Netherlands and Sweden have rather flexible system for hiring of employees on temporary contract, while France, Spain, and Norway exhibit higher levels of EPL for temporary employees. In the middle of the distribution lie Poland, Slovakia, and Russia. Continental European countries such as Denmark and Germany have lower than average level of employment protection for temporary contracts, which may evidence two-tier labor market reforms that have aimed to easing hiring costs at the margin of the labor market (Bentolila, Dolado, and Jimeno 2011; Eichhorst and Marx 2011). The last column shows the values for the interaction terms between EPLp and EPLt: France, Spain, Norway, and Italy stand on the upper end of the distribution, followed by Korea, Belgium; post-transition economies with Anglo-Saxon countries stand on the lower end of the stringency distribution (see Appendix 1 for details).

Unemployment Benefits Generosity

Unemployment benefits affect job seeking behaviors of the unemployed, as they decrease opportunity costs and allow the unemployed to search for good matches in terms of their skills and experiences than otherwise. In addition, more generous unemployment benefits indicate that incumbent employees are more likely to invest in their own human capital accumulation via participation in job related training. On the employer side, unemployment benefits induce more flexible use of labor via temporary contracts. Therefore, the overall effects of unemployment benefits on labor market inequality depends on their interactions with other labor market institutions such as EPL and public expenditures on active labor market policies. To measure the generosity of unemployment benefits, this paper draws on Scruggs (2004)' data and updates by Van Vliet and Caminanda (2012), who use composite measures that account for periods of benefits receipt, contribution periods to meet benefit eligibility weighted by type of family and multiplied by coverage. The data refer to 2010, which precedes the PIAAC survey.

Activation orientation of labor market policies

To measure active labor market policy intensity, this study uses the ratio of

expenditure on active labor market policy to passive labor market policy measures as a percentage of GDP per capita. ALMP measures include public employment services (PES) and administration, training, job rotation and job sharing, employment incentives, supported employment and rehabilitation, direct job creation, and start-up incentives. Passive measures include out-of-work income maintenance and support, such as unemployment benefits, redundancy compensation, and early retirement benefits. The ratio of active to passive measures captures the activation orientation of labor market policies within a given country (OECD 2013a).

Wage Coordination

The wage coordination index is drawn from Kentworthy's (2001) 5-point classification of wage setting coordination scores. The variable ranges from 1 to 5, with higher values denoting centralized bargaining by peak organizations, centralization of industry-level bargaining, or extensive regularized pattern setting. In contrast, the value of 1 is assigned to countries with fragmented wage bargaining confined largely to individual firms or plants.

Individual-level Controls

Individual-level controls include age, sex, presence of child under age 6, level of final qualification (higher education, upper secondary, lower secondary, or below), foreign-born status, marital status, skills proficiency (numeracy scores), working for SMEs (employers with 250 employees or less), occupation and industry dummies (1-digit level). Country fixed effects are included in the regression analysis unless otherwise stated.

Statistical Models

This study estimates ordinary least square regression models for hourly earnings gaps by contract status to ascertain the determinants of the level of and gap in earnings. The statistical model is defined as follows:

$$Equation\ (1):\ y_{ic} = \beta_0 + \beta_1 C_{ic} + \beta_2 I_{ic} + \beta_3 (I_{ic} * N_c) + \gamma\chi + \mu_i + \varepsilon_{ic}$$

y_{ic}: log of hourly earnings of an employee i within a country c

OLS regression is fitted to estimate the wage penalty for those on temporary contract taking into account individual-level controls that affect labor market outcomes. In addition, the PIAAC skill measures, numeracy scores, are

included to take into account individual cognitive skills that affect productivity in the labor market. The baseline model is estimated on a pooled sample across countries, including country fixed effects as well as individual-level controls. The interaction terms of the temporary dummy with EPL and labor market institutions are included one at a time.

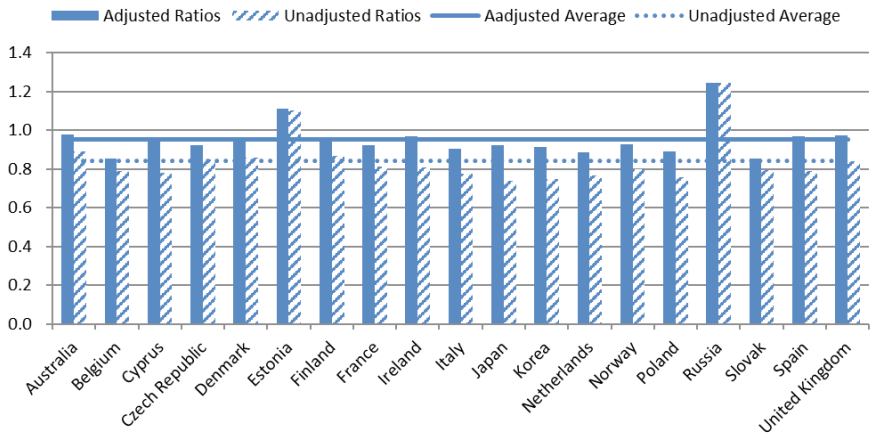
The dependent variable is the log of hourly earnings: y_{ic} is the log of hourly earnings for individual i in country c. Cognitive skills measured by numeracy score C_{ic} denote the level of human capital accumulated through formal education and daily life experience. This measure is not just proxy for skills such as level of education or labor market experiences that have been used as common practices in previous research, but direct assessment of competencies via computer-adaptive testing (OECD 2011).

Equation 1 estimates the determinants of hourly earnings with skills proficiency, individual-level controls, and country-fixed effects. β_2 is the coefficient for the temporary dummy variable, denoting the wage penalty for temporary employment. The main coefficient of interest is β_3, which denotes the interaction effects of labor market institutions N_c, and the dummy for temporary contract, I_{ic}. This coefficient explains whether the wage penalty for temporary employment exacerbates or mitigates in conjunction with labor market institutions across countries. Labor market institution variables include overall level of EPL, EPL for permanent and temporary employment, differences in employment protection by contract status, unemployment benefit generosity, and the ratio of ALMP to passive labor market policy (PLMP) expenditures. To better facilitate interpretation, all institution variables are standardized at the country level and then included in the model as an interaction term with the dummy for temporary employment status. X refers to a vector of individual levels, and γ denotes the vector of coefficients for individual-level controls. The error term ε_{ic} is assumed to be normally distributed with a mean of zero. The model does not include the main effects of institution variables as they are mainly absorbed by country fixed effects (Hanushek et al. 2013).

Analytical Results

Descriptive Statistics

[Figure 2] shows the wage differentials by contract status, unadjusted and adjusted. Unadjusted ratios denote the ratios of log hourly earnings for



Source.—PIAAC

Note.—figures represent the ratio of log hourly earnings of temporary employees to those of employees on indefinite contract. Adjusted ratios are calculated based on the coefficient for the dummy of temporary employees from regression models of log hourly earnings, controlling for age, education, skills proficiency, tenure, employer size, occupation, and industry within each country.

Fig. 2.—Ratios of log hourly earnings for temporary contract relative to regular contract employees

temporary employees to those for employees on indefinite contract. Adjusted ratios are calculated based on the coefficient for the dummy variable of temporary employees from regression models of log hourly earnings, controlling for age, education, skills proficiency, tenure, employer size, occupation, and industry within each country. For the adjusted ratio, the regression models take into account industry and individual-level controls.

As expected, the adjusted wage ratios are less than unadjusted ratios, except for the Estonia and Russia, where employees on temporary contracts are not paid less than those on regular contracts on an hourly basis. In terms of the magnitude of the relative earnings of temporary workers, Australian, Irish, and Spanish employees almost match their regular counterparts, with ratios of 0.98, 0.97, and 0.97, respectively. In contrast, temporary workers are paid less than 90% of regular workers in Belgium, the Netherlands, Poland, and Slovakia. Korea and Japan stand in the middle with average ratios around 91-92%.

Regression Results

Contract Status

Table 2 reports the results of the regression models that include contract status and its interactions with labor market institution variables. The primary interest is the coefficients for the overall EPL indices, those for separate indices for regular and temporary contracts, and those for differences in employment protection by contract status. Model 1a–1c examine the effects of various EPL measures on earnings inequality by contract status. The coefficients for the overall level of EPL interacted with the temporary contract have negative signs, meaning that strict EPL increases the wage gap by contract status. To be specific, adjusting for individual-level controls, occupation, industry, and country-fixed effects, one standard deviation increase in overall EPL leads to a 1.5% additional wage penalty for employees on temporary contract. Therefore, Hypothesis 1 is strongly supported across the models with various institution variables included.

To separate EPL effects by contract status, Model 1b suggests that this negative effect is mainly due to stricter protection for temporary employees, while more stringent employment protection for regular employees has an unexpected beneficial effect for temporary employees. Hypothesis 2 is supported in EPL only models, which attest to the inequality enhancing nature of stringent EPLt controlling for level of EPLp. However, this effect disappears when other institution variables have been included in the following models.

Model 1c shows that higher differences in employment protection by contract status also have a negative effect on the wage gaps by contract status. In Model 1c, the interaction terms of EPLp and EPLt have further deteriorated the negative wage penalty for temporary employment, which provides support for Hypothesis 3. This interaction effect remains significant for the model with unemployment benefit generosity in Model 3c.

Model 2a–Model 4c add the interaction of temporary contracts with other labor market institutions, and show how the effects of various measures of EPL on wage gaps by contract status vary when other institutions are considered. For the sake of degrees of freedom at the country-level, only one additional variable is included at one time. The adverse effects of the overall level of EPL remain consistent across models except for the models with wage coordination, where the effects turned to insignificance. However, differences in EPL by contract status have a deteriorating effect on wage penalties for

temporary employees with unemployment benefits generosity measures included in the model (Model 3c). Activation orientation of labor market policies has no significant effects on the wage penalty for temporary employees; therefore, Hypothesis 4a is rejected. In model 3a–3c, unemployment benefit generosity has some moderating effects on the wage penalty for temporary employment, suggesting that the more generous benefits the unemployment system provides, the more likely temporary employees are to catch up with regular employees, which supports for Hypothesis 4b. Stringent EPLp shows a negative effect on the wage penalty for temporary employees. When interaction terms are included, it is the difference between EPLp and EPLt that yields an earning penalty for temporary employees (Model 3c).

However, wage coordination has a deteriorating effects for the wage penalty for temporary employment, suggesting that higher levels of wage coordination may not work to the benefit of temporary employees in terms of wages, lending some evidence that more wage coordination may only work for regular workers in the countries in the sample (Hypothesis 4c).

Discussion and Conclusion

This paper aims to disentangle the EPL impact on the wage penalty for temporary employment by considering overall strictness of EPL measures and different levels of protection for permanent and temporary employees in conjunction with other labor market institution. Results suggest that overall strictness of EPL measures contribute to widening wage gaps by contract status, lending some credence to the claims for proponents of labor market reforms for promoting flexible use of labor. However, the overall effects of EPL measures may disguise distinct effects of EPLp and EPLt on wage gaps by contract status. There exists some evidence that lower EPL for temporary employment does exacerbate the wage penalty for temporary employment in itself, the effect of which may materialize only when it is combined with more generous unemployment benefits. It also merits attention that larger differences between EPLp and EPLt yield a larger wage penalty for temporary employees, controlling for overall level of EPL. To summarize, the findings of this paper cast doubt on the integrative view on recent labor market, which was targeted at the margin in the labor market, and sought to integrate marginalized job seekers of limited skills or ability into the labor market. Therefore, labor market reform should be more fine-tuned to lessen the inequality enhancing nature of two-tier employment protection liberalization

TABLE 2

Effects of EPL by Contract Status and Interactions with LM Institutions on Hourly Earnings

	Model 1a	Model 1b	Model 1c	Model 2a	Model 2b	Model 2c	Model 3a	Model 3b	Model 3c	Model 4a	Model 4b	Model 4c
	EPL	EPLp+ EPLt	EPLp+ EPLt with interaction	EPL	EPLp+ EPLt	EPLp+ EPLt with interaction	EPL	EPLp+ EPLt	EPLp+ EPLt with interaction	EPL	EPLp+ EPLt	EPLp+ EPLt with interaction
TEMPORARY	-0.040*** (0.010)	-0.040*** (0.010)	-0.045*** (0.010)	-0.075*** (0.008)	-0.077*** (0.008)	-0.076*** (0.009)	-0.059*** (0.009)	-0.060*** (0.009)	-0.066*** (0.010)	-0.071*** (0.009)	-0.069*** (0.009)	-0.067*** (0.010)
TEMPORARY* EPL	-0.015* (0.009)			-0.019** (0.010)			-0.042*** (0.014)			-0.016 (0.018)		
TEMPORARY *EPLp		0.039** (0.016)	0.095*** (0.030)		-0.009 (0.011)	-0.026 (0.028)		-0.020* (0.012)	0.031 (0.029)		-0.001 (0.012)	-0.027 (0.033)
TEMPORARY* EPLt		-0.030*** (0.011)	0.135* (0.076)		0.001 (0.008)	-0.050 (0.082)		0.007 (0.009)	0.163* (0.088)		-0.008 (0.009)	-0.092 (0.102)
TEMPORARY *EPLp*EPLt			-0.186** (0.084)			0.057 (0.089)			-0.178* (0.097)			0.095 (0.113)
TEMPORARY *ALMP/PLMP				-0.008 (0.009)	-0.010 (0.010)	-0.008 (0.009)						
TEMPORARY* UB Generosity							0.033*** (0.011)	0.015* (0.008)	0.013 (0.008)			
TEMPORARY* Wage Coordination										-0.008 (0.018)	-0.022** (0.011)	-0.021* (0.011)
Constant	2.090*** (0.073)	2.072*** (0.078)	2.071*** (0.078)	2.079*** (0.057)	2.083*** (0.057)	2.083*** (0.057)	2.011*** (0.055)	2.020*** (0.055)	2.018*** (0.055)	1.977*** (0.059)	1.976*** (0.059)	1.977*** (0.059)
Observations	34,765	33,352	33,352	30,119	30,119	30,119	26,008	26,008	26,008	23,629	23,629	23,629
R-squared	0.573	0.579	0.579	0.563	0.563	0.563	0.511	0.511	0.511	0.488	0.488	0.488

Source.—PIAAC

Note.—All models include controls for age, sex, education, childhood status, marital status, foreign born status, skills proficiency, tenure, employer size, occupation, and industry, and country fixed effects Standard errors in parentheses. *** p<0.01, ** p<0.05, * p

or flexibilization at the margin.

It is therefore urgent to pay close attention to the complementarity of labor market institutions, which may cause distinct impact on labor market integration and income equity. Further research is warranted to track long-term effects of labor market reforms with a focus on their interaction with other labor market institutions such as skills regimes or minimum wage provisions to come up with a more balanced approach to enhancing labor market mobility and maintaining employment protection of employees on distinct work arrangements.

Thus far, the analysis of the PIAAC data provides some evidence that labor market institutions do have their own effects on the wage penalty for temporary employment: unemployment benefits generosity mediate the negative effects of dualism in employment protection on labor market outcomes; coordinated wage bargaining exacerbates the wage penalty for temporary employment, suggesting that wage coordination at higher levels may not work to the interest of temporary employees.

As technological transformation proceeds and puts greater pressure on demand for low- or medium-skilled labor that are easily substituted by computers, many countries have concern that labor market dualism may further exacerbate along the lines of contract status, sex, race/ethnicity, or other sociodemographic characteristics. In addition, cheap and replaceable labor usually employed on non-standard contracts can strengthen the duality by contract status to a higher extent. This labor market dualism raises greater concerns for active labor market and skills development policies. Although government intervention in strengthening human capital investments are praised as one of the best solutions to tackle unemployment, inactivity, or labor market inequality, this measure needs to be supplemented with policy efforts to lower labor dualism (Eichhorst et al. 2008; OECD 2011, 2013b). This paper recommends that fine-grained interventions be placed in place in order to reduce wage gaps by contract status. In addition, collective bargaining coordination, when it is geared to the defense of interests of labor market insiders, may exacerbate the wage penalty for temporary employment, which calls for further scrutiny for its causes and reorientation of bargaining structure to better adapt to the widening wage inequality by contract arrangements.

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Appendix 1: Distribution of EPL measures by contract status and their interactions across countries, 2010

Country	EPLp	EPLt	EPLp*EPLt
Australia	1.67	0.88	1.46
Austria	2.37	1.31	3.11
Belgium	2.00	2.38	4.75
Canada	0.92	0.25	0.23
Czech	3.05	1.31	4.01
Denmark	2.13	1.38	2.94
Finland	2.17	1.56	3.39
France	2.38	3.63	8.65
Germany	2.87	1.00	2.87
Ireland	1.27	0.63	0.79
Italy	2.76	2.00	5.52
Japan	1.37	0.88	1.20
Korea	2.37	2.13	5.03
Netherlands	2.82	0.94	2.65
New Zealand	1.56	1.00	1.56
Norway	2.33	3.00	7.00
Poland	2.23	1.75	3.90
Russia	3.06	1.13	3.45
Slovakia	2.22	1.63	3.61
Spain	2.36	3.00	7.07
Sweden	2.61	0.81	2.12
Switzerland	1.60	1.13	1.79
United Kingdom	1.20	0.38	0.45
United States	0.26	0.25	0.06
Average	2.07	1.43	3.23

Source.—OECD (2015)