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Evidence from Europe

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# **Are Temporary Workers Discriminated Against? Evidence from Europe**

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## **Abstract**

The aim of this paper is to analyse the wage gap between temporary and permanent jobs in 12 European countries. We use the semi-parametric (quantile regression) approach and evaluate the wage gap across the entire wage distribution. We show that the fixed-term wage gap decreases as higher quantiles are considered, and that having a fixed-term contract penalizes low-skilled workers (at the bottom of the earnings distribution) more than high-skilled ones. Finally, we decompose the wage differential across the entire wage distribution in order to account for the relative importance of observed characteristics versus different returns to skills. We find that workers with the same characteristics as temporary workers would receive higher wages if they worked on permanent contracts in almost all the countries considered, and that this finding is stable across the entire wage distribution.

**Keywords:** Temporary jobs, fixed-term contracts, wage differentials, quantile regression, decomposition.

**JEL classification numbers:** J31

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## 1. Introduction

In the past two decades, in order to increase the flexibility of labour markets and improve their overall economic performance, European countries with high levels of employment protection for permanent workers have implemented policies to enhance the use of temporary contracts. In these countries, firms are now able to adjust their workforces to economic cycle fluctuations by increasing or reducing the number of temporary workers. Since 1999 the increase in atypical employment (part-time, fixed-term, and temporary agency contracts) has become a central issue for labour-market policy in the European Union (EU). In June 1999<sup>1</sup> a first European directive was adopted to improve the quality of fixed-term contract work and to reduce any form of discrimination against temporary workers.<sup>2</sup>

In the early 2000s numerous empirical studies highlighted the first detrimental economic effects of the introduction of temporary jobs. OECD (2002), on reviewing many of the findings and providing new evidence, concluded that OECD countries exhibit considerable diversity in temporary employment incidence and evolution but share some common features: temporary workers are younger and less educated; they are more likely to be employed in low-skill occupations and small firms; and the wage penalty suffered by temporary workers is statistically and economically significant, ranging up to the 14% recorded in France. Indeed, according to the theory of compensating wage differentials, we may in principle expect a competitive labour market to reward any “adverse conditions” that workers face. It is well documented (for a review see OECD, 2002) that workers with fixed-term contracts have many disadvantages which could be recompensed: a higher probability of unemployment; lower welfare provision; greater instability and therefore a lower fertility rate; and higher risk of on-the-job injuries (OECD, 2004; Guadalupe, 2003). To date, however, hardly any empirical studies have found evidence of a wage premium for these workers; on the contrary, temporary workers seem to earn systematically less than permanent employees (OECD, 2003, Brown and Session, 2005, Booth and Francesconi, 2002, Picchio, 2008).

There are instead many reasons why temporary workers may experience a wage penalty. Firstly, they tend to invest in a lower amount of firm-specific training, with the consequence that they earn lower wages and have flatter wage profiles (Booth et al., 2002).

The documented negative wage differential can be easily explained by either efficiency-wage or insider/outsider arguments. In the former case, Rebitzer and Taylor (1991) showed that it may be optimal for a profit-maximising firm to hire both temporary and permanent workers and pay

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<sup>1</sup> The European Commission recommended that each country should adopt the Directive by July 2001, but the implementation process took longer in some countries (e.g. it was adopted in 2003 in Greece)

<sup>2</sup> In 2008 the Temporary and Agency Workers Directive (2008/104/EC) affirmed that workers obtaining jobs through employment agencies should obtain equal pay and conditions with those in the firm doing the same work.

a lower wage to temporary workers, even if workers are homogenous and perfect substitutes, when the monitoring of workers is costly and product demand is uncertain. According to Guell (2000), the possibility of contract renewal may be used as an effort-incentive device instead of wages. Fixed-term workers accept lower wages because firms link their performance to the promise of a contract renewal or their hiring on a permanent one. In both studies, the introduction of fixed-term contracts leads to segmentation of the labour market.

According to insider/outsider models, if a firing cost exists, it may be more efficient for firms to have a buffer stock of workers (outsiders) on fixed-term contracts and with low employment rights who can easily (and less expensively than permanent insiders) be fired if adverse shocks occur. (Lindbeck and Snower, 1988). Whenever firms use temporary labour as a buffer, the risk of job loss is reduced for permanent workers, and higher bargained wages for the permanent “insiders” are observed (Bentolila and Dolado, 1994). Koutentakis (2008) shows that if temporary workers are present, there is an additional upper limit on the wage bargained by permanent workers, and if this limit is exceeded, firms facing a negative shock will fire permanent workers. Hence, the wages of permanent workers are proportional to the wages of temporary workers. If permanent workers want to increase their wages without jeopardising their job security they must increase the temporary workers’ wages as well.

Finally, firms can also use fixed-term contracts as a screening device, or a sort of extension of the probationary period (Loh, 1994). Low-paid temporary contracts may be attractive also to high ability workers, who accept lower wages for a short period and then experience a steeper wage growth.

Most previous empirical studies focus on the mean wage differentials observed (OECD 2003), and study the wage penalty associated with temporary contracts in one country (Jimeno and Toharia (1993) for Spain, Booth and Francesconi (2002) for the UK, Blanchard and Landier (2002) for France, Segal and Sullivan (1998) for the US, Hagen (2002) for Germany and Picchio (2008) for Italy). There are two exceptions. Firstly, Brown and Session (2005), using data from the British 1997 Social Attitudes Survey and the 1997 wave of the ISSP, studied the wage gap associated with a temporary job in nine European countries (UK, Germany, France, Italy, Switzerland, Denmark, Norway, Sweden and Portugal) and some OECD countries (USA, Canada, Japan, New Zealand), finding evidence that “individuals employed under fixed-term contracts in a number of countries receive lower wages than their permanent contract counterparts.”. On the basis of these results, they state that “Such a finding could be indicative of

wage discrimination against fixed-term employees” and suggest that legal protection for fixed-term workers should be increased, as the European Commission has recommended since 1999. Secondly, Mertens et al. (2007) compared the wage gap associated with a fixed-term contract in Spain and Germany but moved a step forward from previous studies by evaluating the gap across the wage distribution using a quantile regressions technique.

The aim of this paper is to analyse the wage gap between temporary and permanent jobs in 12 European countries in 2006. Our findings contribute to the existing literature in several ways. First, our cross-country comparison of European countries with differences in the wage setting institutions yields better understanding of the effect of specific national labour-market institutions on the fixed-term contract pay gap. We thus update and extend Brown and Sessions’s (2005) results. Second, differently from the conventional empirical approach that estimates a Mincerian wage equation using the least square method, and following Mertens et al.(2007), we evaluate the wage gap across the entire wage distribution of temporary and permanent workers. Therefore, in this paper we use both non-parametric and semi-parametric (quantile regression) approaches. We expect the wage gap to be greater at the bottom of the wage distribution in those countries where the above-described insider mechanism is stronger, for example because there is greater employment protection for permanent workers. In fact, whenever temporary work is used as a buffer by firms, we expect to observe young workers with a low level of specific accumulated human capital (i.e. with probationary contracts) or low-skilled workers with temporary contracts.<sup>3</sup> And these types of workers are typically found at the bottom of the wage distribution “competing” with low-skilled permanent workers. A high level of employment protection for permanent (low-skilled) workers will increase their bargaining power, and a relatively higher wage penalty will be observed at the bottom of the wage distribution. We show that the fixed-term wage gap decreases as higher quantiles are considered, and that having a fixed-term contract penalizes low-skilled workers more than high-skilled ones.

Finally, we take a step forward and analyse the extent to which temporary-contract workers are discriminated against by the labour market and, using the procedure developed by Machado and Mata (2005), we decompose the wage differential across the entire wage distribution to account for the relative importance of observed characteristics versus different returns to skills. When comparing results across countries we find that workers with the same characteristics as permanent workers would receive lower wages if they worked on a temporary contract, and that the “discrimination” is stable across the wage distribution.<sup>4</sup>

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<sup>3</sup> Unfortunately, with EU-SILC data it is not possible to divide temporary contracts into more detailed categories.

<sup>4</sup> We realize that self-selection into different type of contract may be an issue, but limitations of the dataset prevent us from addressing and controlling self-selection.

## 2. Data and descriptive statistics

EU-SILC is a large-scale household survey that covers most member countries in the Enlarged European Union, and it has replaced the former European Community Household Panel (ECHP). As for ECHP, rather than trying to harmonise output from national surveys, the European statistical agency (Eurostat) adopts an input-oriented approach and uses the same community questionnaire as the basis for the national versions of the survey. A useful feature of EU-SILC is that the definitions of, and questions on, earnings, the reference period, and the survey methods are common across countries. This format increases comparability, but it does not eliminate all problems because the interpretation of common questions may vary across countries owing to country-specific institutions and history (OECD, 1991). We focus our analysis on the 2006 wave.<sup>5</sup>

In EU-SILC, respondents who define themselves as “working full-time” or “working part-time”<sup>6</sup> are asked about their type of contract. We follow the EU-SILC classification and define temporary workers as those not working under a permanent contract.<sup>7</sup> Our analysis focuses on twelve countries<sup>8</sup>: Austria, Belgium, Czech Republic, Germany, Spain, France, Greece, Hungary, Italy, Poland, Portugal and the Slovak Republic. We group countries according to their geographical position and welfare regimes into three main groups: Continental (Germany, France, Belgium, and Austria), Mediterranean (Italy, Greece, Spain and Portugal) and Eastern (Czech Republic, Hungary, Slovak Republic and Poland).

We exclude from our analysis individuals aged under 22 in order to avoid conflating issues related to early education enrolments. We also exclude workers aged 55 and over in order to overcome problems related to different national retirement schemes. After excluding self-employment, workers in agriculture and fishery, and all observations with missing values on relevant variables, we end up with a sample of more than 74,000 observations, distributed by country and type of contract as shown in Table 1. The first panel of Table 1 reports the descriptive

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<sup>5</sup> The questions for the 2006 wave refer to wage and working conditions in the previous year, 2005.

<sup>6</sup> pl030=1 or pl030=2

<sup>7</sup> Variable pl140. Classified among temporary workers are those workers with defined durations of their contracts, but also:

- persons with seasonal jobs
- persons engaged by an employment agency or business and hired out to a third party to perform a "work mission" (unless they have a work contract of unlimited duration with the employment agency or business)
- persons with specific training contracts. If there is no objective criterion for the termination of job or work contracts, these should be regarded as permanent or of unlimited duration.

<sup>8</sup> Nordic countries are excluded because the question on the type of contract is not correctly collected; The UK and Ireland are excluded because of their small shares of temporary workers, which prevent precise estimation of the parameters of interest.

statistics of the samples. As expected, temporary jobs are more frequent in Spain and Poland, in which the percentages of temporary workers are respectively 25.9 and 25.1. Hungary and Austria have the lower percentage of temporary jobs, 6.1%. On average, individuals with permanent contracts are older, better educated (with the exception of Austria, Italy and Portugal), more likely to be male (with the exception of Poland, Hungary and Slovak Republic), and earn an higher hourly wage.

Furthermore, almost everywhere, temporary contracts are concentrated in the lower deciles of the wage distribution, as shown in figure 1. In particular, in Poland, the majority of workers in the first decile of the (hourly) wage distribution have temporary jobs, while in Spain and Greece half of the workers in the first decile have temporary contracts.

The wage variable that we use is the gross hourly wage, with the exception of Greece, Italy and Portugal, where we use the net hourly wage.<sup>9</sup> As can be seen from Table 1, the average hourly wage is always lower for temporary-contract workers. Indeed, in order to analyse the role of temporary and permanent contracts in explaining the wage differentials, we believe that it is more interesting to focus on the entire distribution of the dependent variable rather than only on the conditional mean.

A non-parametric test, namely the Kolmogorov-Smirnov test based on the concept of stochastic dominance, is used to formally test for differences in all moments? of the wage distribution.<sup>10</sup>

At this point, in order to further illustrate the comparison between the types of contracts and examine the differences among the entire wage distributions, Figure 1A in Appendix A reports the

<sup>9</sup> We compute hourly wage by dividing the monthly gross employee cash or near-cash income by the number of months worked in the reference period, and then dividing by 4.5 times the number of hours worked in a week (main + secondary jobs).

<sup>10</sup> The concept of first order stochastic dominance allows one to establish a ranking for compared distributions. Let F and G denote the cumulative distribution functions of wages for two groups, e.g. permanent and temporary contracts. First order stochastic dominance of F relative to G is defined as:  $F(z) - G(z) \leq 0$  uniformly in  $z \in \mathfrak{R}$ , with strict inequality for some z. To test whether there are statistically robust differences between the distributions we adopt the non-parametric one-sided and two-sided Kolmogorov-Smirnov tests

The two-sided test can be formulated as:

$$H_0: F(z) - G(z) = 0 \quad \forall z \in \mathfrak{R} \quad \text{vs.} \quad H_1: F(z) - G(z) \neq 0 \quad \text{some } z \in \mathfrak{R}$$

The one-sided test can be expressed as:

$$H_0: F(z) - G(z) \leq 0 \quad \forall z \in \mathfrak{R} \quad \text{vs.} \quad H_1: F(z) - G(z) > 0 \quad \text{some } z \in \mathfrak{R}$$

Hence, the two-sided test permits one to determine whether or not both distributions are identical, while the one-sided test determines whether one distribution dominates the other.

Therefore, in order to conclude that F stochastically dominates G, a rejection of the null hypothesis for the two-sided test is required while the null for the one-sided test cannot be rejected. This indicates that, graphically, F is to the right of G. The Kolmogorov-Smirnov test statistics for the two-sided,  $KS_2$ , and the one-sided test,  $KS_1$ , are:

$$KS_2 = \sqrt{nm/N} \max_{1 \leq i \leq N} \{F_n(z_i) - G_m(z_i)\}$$

$$KS_1 = \sqrt{nm/N} \max_{1 \leq i \leq N} |F_n(z_i) - G_m(z_i)|$$

Where n and m are the sample sizes of the two groups of contracts, N is given by n+m,  $F_n$  and  $G_m$  represent the empirical distribution of functions for F and G, respectively.

graphs of the cumulative functions of log wage for temporary and permanent contracts in each country. As shown, for each country, the cumulative distribution function of wages for permanent jobs is to the right of the cumulative distribution function of wages for temporary jobs. Moreover, the results of the Kolmogorov-Smirnov test for first order stochastic dominance confirm that the hourly wages of workers with permanent contracts stochastically dominate those of workers with temporary contracts. In order to sum up how the wage penalty suffered by temporary workers varies across the wage distribution, we compute a raw (unconditional) gap at each decile of the wage distribution which is reported in the second panel of table 1.<sup>11</sup> Our results show that the raw gap varies substantially across the wage distribution in almost all countries. As we move from the bottom to the top of the wage distribution, the raw gap declines in Germany, France and Italy, increases in Portugal and Poland, and seems to be stable elsewhere. But this evidence does not account for differences in individual and job characteristics. Consequently, in the next section, we add such controls to our estimates.

### 3. Estimation and Decomposition

As a first step, we estimate a standard Mincerian wage equation which includes educational dummies, age and age squared, a gender dummy and a part-time dummy. In order to control for some of the unobserved heterogeneity, we add controls for occupation<sup>12</sup> and industry<sup>13</sup>.

Most previous studies have employed a standard OLS technique which concentrates on the conditional mean of the log wage distribution (for a review see Picchio, 2008). However, this method may not be adequate if the dependent variable violates the assumption of normality. This is exactly what occurs with our dataset. In fact, the assumption of normality is formally rejected for our dependent variable.<sup>14</sup>

Hence, a semi-parametric approach may be more appropriate than the standard OLS estimator, which relies on normal distribution. In addition, as mentioned in the introduction, we are specifically interested in studying whether the impact of different kinds of contract changes across the wage conditional distribution. To address these issues we apply a quantile regression (QR) approach which seems more interesting, as well as more appropriate, because we are able to give a

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<sup>11</sup>In computing the raw gap along the wage distribution, we follow Albrecht et al. (2003) and estimate a dummy permanent at each decile of the wage distribution in order to compute the standard errors as well.

<sup>12</sup> Legislators and managers, Professionals, Technicians and associated professionals, Clerical workers, Service workers and shop and market sales workers, Craft and related trades workers, Plant and machine operators and assemblers, Elementary occupations.

<sup>13</sup> Mining-manufacturing and electricity generation, construction, wholesale and retail trade, hotels and restaurants, transport and communications, financial intermediation, real estate and business, public administration, education, health, other services

<sup>14</sup> Both the Shapiro-Francia test and Skewness and Kurtosis test reject the null hypothesis of normal distribution.

more precise picture of the dynamics of the dependent variable at different points of the distribution rather than at the conditional mean. In our analysis we use both OLS and QR methods to provide a comparison.

Let  $y_t \{t = 1 \dots T\}$  be a random sample of a random variable  $Y$  with distribution  $F$ . Then,  $Q_\theta(y|x)$  for  $\theta \in (0,1)$  denote the  $\theta$ th quantile of the distribution of  $y$ , given a vector  $x$  of covariates. We model the conditional quantile by:  $Q_\theta(y|x) \equiv \inf\{y | F(y|x) \geq \theta\} = x' \beta(\theta)$ , where  $\beta(\theta)$  is a vector of quantile regression coefficients.

Koenker and Basset (1978), on introducing this technique, show that  $\beta(\theta)$  can be estimated by:

$$\text{Min}_{\beta(\theta)} \left\{ \sum_{t: y_t \geq x_t' \beta(\theta)} \theta |y_t - x_t' \beta(\theta)| + \sum_{t: y_t < x_t' \beta(\theta)} (1-\theta) |y_t - x_t' \beta(\theta)| \right\}$$

In this way the quantiles are estimated by giving different weights to positive and negative residuals. The median case,  $\theta = 1/2$ , is equivalent to minimising the sum of absolute value of the residual.<sup>15</sup>

One of the advantages of the QR approach is that it enables one not to concentrate only on a single central tendency measure, but to estimate different slope coefficients at different quantiles of the conditional distribution of the dependent variable. Therefore, these coefficients may be interpreted as differences in the response of the dependent variable to changes in the regressors at several points of the conditional distribution of  $y$ . Moreover, the QR approach is more robust than OLS to modest deviations of the residuals from normality, such as outliers or long tail situations. In addition, the QR approach is equivalent to monotonic linear and non linear transformations of the dependent variable; finally, even if the residuals are i.i.d. and the estimates of the conditional mean yield the same information, the QR estimates of the intercepts provide a picture of the asymmetry of the conditional distribution.<sup>16</sup>

Using the QR approach we estimate a standard Mincerian equation (education, age, age squared and gender) for each country. Thus the coefficient of the dummy of interest (permanent=1) could be interpreted as the percentage wage gain associated with a permanent job, anything else equal (gender, educational level, experience and occupation).

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<sup>15</sup> The estimation of the linear conditional mean function  $E|y|x| = x' \beta$  is solved by  $\text{Min}_{\beta} \sum_t \left( y_t - x_t' \beta \right)^2$

<sup>16</sup> For more details on the advantages of QR estimation see, among others, Mata and Machado (1996).

The equality of the coefficient estimated is tested using the variance-covariance matrix of the coefficients of the system of quantile regressions. The null hypothesis is that the  $j$ th coefficient at the  $\theta_a^{th}$  quantile is statistically the same as the one in the  $\theta_b^{th}$  quantile ( $H_0: \theta_a^{th} = \theta_b^{th}$ ). This test allows us to analyse whether the coefficients of the permanent dummy vary significantly across the conditional distribution.

### 3.1 Quantile Regression results

The raw gap shown in Table 1 does not account for differences between temporary and permanent workers; but we may expect individual and job characteristics to affect the results by reducing the wage penalty suffered by temporary jobs compared with those of permanent jobs. In other words, temporary workers are more likely to be younger and concentrated in certain occupations and sectors. Therefore, conditional estimates may be more accurate and account for the existing individual and job heterogeneity in the characteristics.

In the regression analysis we investigate how the wage inequality between temporary and permanent jobs varies across the wage distribution, introducing into our estimation model a dummy variable that takes value 1 if workers have permanent jobs. Hence, the estimated permanent dummy captures the extent to which the wage gap between temporary and permanent workers remains unexplained after controlling for individual characteristics, such as age, age squared, education, and job characteristics, such as part-time, occupations and sectors dummies.

In Table 3 we report the quantile regression estimations applied to ten percentiles separately for each country; in addition, for comparison purposes, we provide the results obtained from OLS model. Overall, the values of the coefficients estimated differ widely across quantiles, and compared to the benchmark results from the OLS regression, they bear out the adoption of QR technique. The estimated coefficients for each group of countries are graphically presented in Figures 2.

Overall, as expected, the values of the coefficients of the raw gap, shown in Table 1, are always greater than the estimated coefficients of the permanent dummy reported in Table 3. In addition, in contrast to the heterogeneous patterns found with the raw gap, the results show a common trend across countries whereby the conditional wage penalty associated with temporary jobs is higher at the bottom of the wage distribution and clearly decreases with higher quantiles. This finding is in line with the insider/outsider framework, according to which the existence of higher employment protection in favour of permanent jobs gives relatively more “insider” power to permanent compared with temporary workers at the lower tail of the distribution.

We find an interesting pattern for continental countries (Austria, Belgium, Germany and France), and especially for Germany and France, where the wage differential between permanent and temporary jobs decreases widely as we move from the lower tail to the upper tail of the wage distribution. The value of the permanent dummy coefficient for Germany ranges between 0.502, at the 10<sup>th</sup> percentile, and 0.119, at the 90<sup>th</sup> percentile, while for France it ranges between 0.368 and 0.055. Both countries exhibit a wider wage gap at the bottom of the distribution in favour of permanent jobs compared to the top of the distribution; but in Germany the wage gain is always higher than in France and constantly decreases by percentile.<sup>17</sup> Overall, for these two countries, the strong evidence of wage loss among low-earning temporary workers and the marked reduction of the penalty for the high-earning temporary workers are highlighted by the F-tests of equality between quantiles reported in Table 1A in Appendix A. The null hypothesis is rejected for all the pairwise comparisons. A different pattern is found for Austria. The values of the permanent dummy coefficient show a lower wage gain in favour of permanent workers and a much steadier trend than in the other two continental countries. Moreover, on inspection of the F-tests, the wage differential seems similar across the entire wage distribution. Finally, in the case of Belgium there is no tendency for the permanent dummy to change as one moves up the wage distribution. At the upper quantiles (80<sup>th</sup> and 90<sup>th</sup>) the dummy coefficient is not statistically significant; however, the negative value suggests that temporary workers may earn more than their permanent counterparts.

In regard to Mediterranean countries (Greece, Italy, Portugal and Spain), the coefficients associated with the permanent dummy clearly decrease as we move up the wage distribution. This is important evidence of a reduction in the wage loss in favour of temporary jobs in the upper quantiles. In this set of countries, the wage gain for permanent workers at the top of the distribution is more than 50% less than that at the bottom of the distribution. In Greece, for example, the permanent dummy coefficient varies significantly from 0.286 at the 10<sup>th</sup> percentile to 0.087 at the 90<sup>th</sup> percentile, with a steady reduction across the entire distribution. In Italy, the wage gap ranges significantly between 0.246 (10<sup>th</sup> percentile) and 0.061 (90<sup>th</sup> percentile). These differentials are confirmed by the F-test of equality. In particular, there is evidence of differences in the magnitude of the permanent dummy coefficients across the distributions especially for Italy, but also for Greece, and Spain; while for Portugal the null hypothesis of equality is rejected only for three pairwise comparisons. In other words, in the case of Mediterranean countries, there is evidence that temporary workers earn less than their permanent counterparts, but this differential is considerably greater in lower percentiles and decreases markedly with higher percentiles. This pattern is

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<sup>17</sup> The quantile regression results for Germany are in line with other evidence on this country (Mertens et al. 2007).

confirmed for all countries, with the exception of Portugal, for which there is no tendency for the wage gap to change along the wage distribution. Comparing these results with those for the continental countries, in particular Germany and France, we find a similar pattern, but the value of the dummy coefficients is lower in the Mediterranean countries, especially at the bottom and in middle of the wage distribution.

Turning to Eastern countries (Hungary, Czech Republic, Slovak Republic and Poland), we find that the patterns of Hungary, Czech Republic and Poland are rather similar, which suggests that there is no tendency for the wage differentials to change on moving from the lower to the upper tail of the wage distribution. However, the values of the permanent dummy coefficient show a wider wage gap in Poland, where the coefficient ranges significantly between 0.215 and 0.176, and a narrower wage gap in the Czech Republic, where the coefficients vary significantly from 0.064 at the 10<sup>th</sup> percentile to 0.059 at the 80<sup>th</sup> percentile<sup>18</sup>. The finding of a steady pattern without a reduction in the wage loss for temporary jobs is confirmed by the F-tests of equality shown in Table 1A in Appendix A. In fact the null hypothesis of equality is rejected for all the pairwise comparisons. The Slovak Republic exhibits a trend different from that of the other Eastern countries. The wage gap decreases across the distribution, which is strong evidence that the wage gain for permanent jobs tends to be higher at the lower quantiles but decreases as one moves up the wage distribution. The value of the dummy coefficient ranges significantly between 0.163 at the 10<sup>th</sup> percentile and 0.057 at the 70<sup>th</sup> percentile. These results are confirmed by the F-tests of equality

To sum up, although it is not possible to draw identical conclusions for all the European countries analysed, the quantile regression results reveal that there is a similar pattern among groups of country with different labour-market institutions. Moreover, the empirical estimation performed supports the contention that concentrating on the average wage gap alone (using OLS) is inadequate.

The above results have been obtained by running a pooled regression. Pooled regressions require that the returns to observed characteristics be the same across types of contract, and that differences in the wages be due only to a shift factor (the type of contract dummy). Hence the estimated permanent dummy captures the extent to which the gap remains unexplained – at various quantiles – after controlling for individual and jobs characteristics. In the next section, we allow the returns to vary across type of contract and estimate a “raw” wage differential.

### 3.2 Decomposition

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<sup>18</sup> The permanent dummy coefficient at the 90<sup>th</sup> percentile is not statistically significant.

The standard methodology for analysing the permanent/temporary wage gap, with OLS, applies the Oaxaca decomposition. In practice, the raw wage gap is decomposed into two parts: the first reflects differences between the human capital endowments of the two groups; the second explains differences in prices, which are the remuneration of those endowments (i.e. wage discrimination). This approach is helpful if the object of interest is the mean, but it is not very helpful if one is interested in the wage gap distribution. We therefore explain the wage differences, quantile by quantile, between permanent and temporary workers by using a version of the methodology developed by Machado and Mata (2005)<sup>19</sup> and as suggested in Albrecht et al. (2003) and Arulampalam et al. (2007). The decomposition of the differences between the two groups of workers at each quantile is as follows:

$$x^p\beta^p(\theta_i) - x^t\beta^t(\theta_i) = x^p(\beta^p(\theta_i) - \beta^t(\theta_i)) + \beta^t(\theta_i)(x^p - x^t) \quad i=1,9 \quad (1)$$

where P refers to permanent workers while T refers to temporary ones, and  $\theta$  is the decile of interest. The left-hand side of equation (1) is the raw gap presented in the previous section. In this case, we allow both characteristics and returns to vary between temporary and permanent workers, and calculate the raw differentials as on the left-hand side of equation (1) for 10 different points (deciles) of the wage distributions.

Because our purpose is to analyse the gap at the  $(\theta_i)$  percentile due to differing returns between permanent and temporary workers, we are interested in the term:  $x^p(\beta^p(\theta_i) - \beta^t(\theta_i))$  in equation (1) which gives the differences in pay that temporary workers would face at percentile  $(\theta_i)$  if they had the characteristics of permanent workers. A positive value indicates that the returns to temporary characteristics are lower than those of permanent ones, and this obviously points to “discrimination”. A negative value of the estimated wage gap implies the reverse. The first term on the right hand-side of equation (1) is computed as follows:

Step 1: estimate the quantile regression coefficients at a particular percentile  $\theta_i$  of interests<sup>20</sup> using permanent and temporary data sets,  $\beta^p(\theta_i)$  and  $\beta^t(\theta_i)$

Step 2: make 100 draws of 100 individuals at random (with replacement) from the permanent subsample for each  $\theta_i$ . We use the characteristics of permanent workers to predict the wages using the estimated coefficients,  $\beta^p(\theta_i)$  and  $\beta^t(\theta_i)$ , from step (1). This enable us to generate i) the counterfactual distribution of temporary workers’ wages that would arise if their characteristics

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<sup>19</sup> An alternative method is to implement a nonparametric density estimation developed by Di Nardo et.al (1996). The idea behind this procedure is to estimate a counterfactual density using a kernel density estimation that yields a visually clear representation of what the distribution of wages would be if everyone were paid permanent wages.

<sup>20</sup> Following Arulampalam et al. (2007) and Albrecht et al. (2003), we estimate 100 percentiles, from the first to the ninety-ninth.

were distributed like those of permanent workers; ii) the counterfactual distribution of permanent workers' wages.

Step 3: Using the counterfactual distributions calculated in step (2),<sup>21</sup> compute the wage gap between permanent and temporary workers due to differences in returns at each percentile  $\theta_i$ .<sup>22</sup>

We also compute the percentage of the raw differentials explained by the wage differentials that would arise if permanent workers were paid temporary returns so that we could have a measure of discrimination against temporary workers. This gives a more detailed picture of the proportion of the raw gap accounted for by the differences in returns to (observed) characteristics. The higher the percentage, the greater the “discrimination” against temporary workers. Moreover, a percentage greater than 100 means that the characteristics of temporary workers compensate them for any “discrimination”.

### 3.3 Decomposition results and explanation

The results of the decomposition are reported in table 4. For each country-percentile we report the raw differential log earnings (unconditional) calculated as on the left-hand side of equation (1), the simulated differences in returns (first term on the right-hand side of equation (1)), and the percentage of the raw gap accounted for by differences in returns. A positive value of the wage differentials indicating the differences in pay<sup>23</sup> which temporary workers would face at quantile  $\theta$  if they had the characteristics of permanent workers means that the returns to temporary characteristics are lower than those to permanent ones; and a negative value implies the reverse. In other words, a positive simulated wage gap implies that even if temporary workers had the same characteristics as permanent ones, they would incur a wage penalty (due to differences in returns). The simulated wage gap is positive in all country-deciles, pointing to some kind of discrimination against temporary workers.

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<sup>21</sup> A different procedure would be to use the real observed wage distribution of permanent workers in the comparison. However, the counterfactual wage distribution of permanent workers and the real one are very similar. We choose to use the former because it is more comparable with the counterfactual wage distribution of temporary workers that is simulated.

<sup>22</sup> Using the Machado and Mata approach it is also possible to compute the standard errors by repeating the procedure many times; but we do not estimate standard errors because, owing to the small sample size, the counterfactual distribution would be exactly the same.

<sup>23</sup> Log wage of permanent workers characteristics evaluated with permanent returns minus the log wage of permanent characteristics evaluated with temporary returns.

The proportion of the raw gap differential explained by differences in returns is shown in the last row for each country in table 4. A value greater than 100% implies that temporary workers have characteristics that compensate them for any discrimination faced in the labour market. For example, in the middle of the distribution for Portugal and at the top of the distribution for Italy and Austria, temporary workers have better characteristics than permanent ones. Overall, a significant portion of the (unconditional) wage differential is accounted for by differences in returns to observed characteristics in all countries. This finding is stable across the wage distribution almost everywhere, and the proportion ranges between 60% and 80%.

Our estimations show that even if temporary workers had the same characteristics as permanent ones, they would receive a lower wage in almost all countries. We now try to explain the documented cross-country differences in the tendency of wage differentials across the wage distribution, relating our results to the main labour-market institutions shaping the wage distribution. Unfortunately, the macroeconomic variables available to explain the differences observed do not change across the wage distribution. We present some pair-wise correlations which, of course, cannot be interpreted as causal relationships. We use three different indicators to exploit cross-country differences in the patterns described in section 3.2. Two are similar to the sticky floor and glass ceiling indicators used in the gender discrimination literature. The first is the difference between the conditional wage gap estimated at the bottom of the wage distribution and that observed at the median ( $d_{10-d50}$ ). The greater this difference, the worse is the pay penalty suffered by workers at the very bottom of the distribution relatively to median workers. The second indicator ( $d_{50-d90}$ ) is exactly the same indicator applied to the upper part of the distribution: we compute the difference between the conditional median wage gap and the conditional wage gap observed at the ninth decile. Finally, in order to explain cross-country differences in discrimination, we use the proportion of the gap explained by differences in returns at the median of the wage distribution.

Stricter employment protection for temporary workers has been introduced in many European countries in recent decades (OECD, 2004). In figure 3 we cross-tabulate the OECD index of employment protection for fixed-term contracts against the three indicators described above. Figure 3a shows that countries with higher fixed-term contract employment protection tend to have a greater value of the  $d_{10-d50}$  index. It seems that the more fixed-term workers are protected, the more the pay penalty for those workers declines across the first part of the wage distribution. In other words, when fixed-term contract workers are highly protected, it seems that the wage differentials suffered at the bottom of the wage distribution are greater than those for median workers. A positive relationship also emerges when we consider the upper part of the wage

distribution (Figure 3b). That is to say, the pay penalty suffered at the median of the wage distribution is greater than that experienced by workers located at the top of the wage distribution. Indeed, more protection may imply higher firing costs, which are likely to be relatively higher at the bottom of the wage distribution and may be discounted by firms in terms of lower wage paid. A mildly positive relationship is found when the index of discrimination is used, although it is not statically significant. In countries with lower employment protection for fixed-term contract workers, the “discrimination” against them is less at the middle of the distribution.

Employment protection for permanent workers increases the firing costs faced by firms; it can thus influence also the temporary-permanent wage gap. Figure 4 plots the OECD index of regular employment protection against our three indexes. No clear patterns emerge when d1-d5 and d5-d9 indexes are used. By contrast, the proportion of the median gap accounted for by differences in returns is significantly and positively correlated with the protection of regular employment: in countries where regular employment is more protected, the discrimination against temporary workers seems to be greater.

## **5. Conclusion**

In this paper use both non-parametric and semi-parametric (quantile regression) approaches to evaluate the wage gap between temporary and permanent workers across the entire wage distribution. Our results show a common trend among countries whereby the conditional wage penalty associated with temporary jobs is higher at the bottom of the wage distribution and clearly decreases with higher quantiles. This finding is in line with the insider/outsider theory implication that the existence of greater employment protection for permanent jobs gives relatively more “insider” power to permanent workers with respect to temporary ones at the lower tail of the distribution. We also analyse the extent to which temporary-contract workers are discriminated against by the labour market, and, using the procedure developed by Machado and Mata (2005), we decompose the wage differential across the entire wage distribution to account for the relative importance of observed characteristics versus different returns to skills. Upon comparing results across countries we find that workers with the same characteristics as permanent workers would receive lower wages if they worked on temporary contracts, and that the “discrimination” is stable along the wage distribution. We find evidence that the more fixed-term workers are protected, the more their pay penalty declines across the entire wage distribution. More protection may imply higher firing costs, which are likely to be relatively higher at the bottom of the wage distribution and may be discounted by firms in terms of lower wage paid. Finally, the proportion of the median gap accounted for by differences in returns is significantly and positively correlated with the

protection of regular employment: in countries where regular employment is more closely protected, the greater discrimination towards temporary workers seems to be.

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**Table 1: descriptive statistics**

<i>Personal characteristics</i>									
<i>Country</i>		Age	Tertiary education	Secondary educ.	Primary education	Females	Hourly wages	Nobs	% of the sample
Austria	<i>Temp</i>	38.1	.22	.61	.17	.52	11.73	259	6.0
	<i>Perm.</i>	39.5	.19	.69	.11	.45	13.54	4045	
Belgium	<i>Temp</i>	33.3	.45	.33	.16	.61	13.87	317	7.9
	<i>Perm.</i>	39.4	.46	.38	.14	.46	15.88	3698	
Germany	<i>Temp</i>	34.8	.35	.56	.08	.57	10.45	846	9.9
	<i>Perm.</i>	42.1	.41	.54	.04	.51	16.00	4300	
France	<i>Temp</i>	34.5	.26	.49	.10	.58	9.20	802	11.5
	<i>Perm.</i>	40.3	.31	.49	.10	.47	12.65	6149	
Greece	<i>Temp</i>	35.6	.24	.38	.37	.48	4.92	638	21.9
	<i>Perm.</i>	38.6	.33	.45	.21	.42	7.05	2273	
Italy	<i>Temp</i>	35.5	.17	.46	.36	.55	7.34	1376	11.4
	<i>Perm.</i>	39.7	.13	.53	.33	.43	8.91	10638	
Portugal	<i>Temp</i>	32.8	.20	.19	.58	.51	3.67	492	16.9
	<i>Perm.</i>	39.4	.15	.18	.65	.48	4.82	2405	
Spain	<i>Temp</i>	34.6	.31	.23	.44	.49	6.94	2185	25.9
	<i>Perm.</i>	39.4	.38	.27	.35	.42	9.28	6241	
Czech Republic	<i>Temp</i>	36.2	.12	.78	.09	.51	2.69	616	12.5
	<i>Perm.</i>	38.9	.15	.79	.04	.47	3.11	4293	
Hungary	<i>Temp</i>	36.9	.20	.61	.17	.47	2.28	360	7.2
	<i>Perm.</i>	38.8	.23	.66	.11	.50	2.75	4574	
Slovak Republic	<i>Temp</i>	35.6	.16	.79	.03	.50	1.81	621	13.1
	<i>Perm.</i>	39.4	.20	.77	.02	.51	2.05	4107	
Poland	<i>Temp</i>	34.1	.14	.77	.08	.43	1.96	2407	25.1
	<i>Perm.</i>	39.6	.26	.69	.04	.49	3.00	7158	

**Unconditional wage differentials**

Quantiles	10	20	30	40	50	60	70	80	90
Austria	0.320	0.172	0.169	0.153	0.163	0.169	0.120	0.118	0.113
Belgium	0.156	0.168	0.210	0.194	0.190	0.170	0.120	0.157	<i>0.047</i>
Germany	0.753	0.748	0.679	0.591	0.513	0.431	0.364	0.312	0.302
France	0.491	0.356	0.277	0.298	0.316	0.348	0.349	0.361	0.325
Greece	0.333	0.283	0.320	0.339	0.392	0.404	0.419	0.415	0.402
Italy	0.307	0.240	0.213	0.206	0.226	0.223	0.228	0.200	0.119
Portugal	0.136	0.138	0.173	0.178	0.194	0.239	0.308	0.397	0.433
Spain	0.259	0.255	0.262	0.253	0.291	0.314	0.332	0.366	0.326
Czech Republic	0.137	0.170	0.209	0.205	0.188	0.195	0.170	0.115	0.092
Hungary	<i>0.033</i>	0.126	0.221	0.238	0.253	0.224	0.182	0.168	0.147
Slovak Republic	0.165	0.164	0.226	0.213	0.132	0.144	0.116	0.077	0.071
Poland	0.276	0.319	0.380	0.421	0.457	0.490	0.512	0.509	0.507

The coefficients in *italics* are not statistically significant at the 10% level.

**Table 2: Kolmogorov-Smirnov test for comparison between temporary and permanent wages**

Country	Equality of distributions	Difference favourable to:	
		Temporary	Permanent
Austria	0.1755 (0.000)	-0.1755 (0.000)	0.0057 (0.984)
Belgium	0.2355 (0.000)	-0.2355 (0.000)	0.0081 (0.962)
Germany	0.3620 (0.000)	-0.3620 (0.000)	0.0000 (1.000)
France	0.3771 (0.000)	-0.3771 (0.000)	0.0049 (0.967)
Greece	0.3385 (0.000)	-0.3385 (0.000)	0.0000 (1.000)
Italy	0.2743 (0.000)	-0.2743 (0.000)	0.0012 (0.996)
Portugal	0.2016 (0.000)	-0.2016 (0.000)	0.0017 (0.998)
Spain	0.2610 (0.000)	-0.2610 (0.000)	0.0008 (0.998)
Czech Republic	0.1915 (0.000)	-0.1915 (0.000)	0.0016 (0.997)
Hungary	0.1894 (0.000)	-0.1894 (0.000)	0.0000 (1.000)
Slovak Republic	0.1818 (0.000)	-0.1818 (0.000)	0.0026 (0.993)
Poland	0.3258 (0.000)	-0.3258 (0.000)	0.0001 (1.000)

P-values are in parentheses.

**Table 3: Estimated coefficients of permanent contract dummy by decile and OLS.**

Country		QUANTILE REGRESSION									OLS
		10	20	30	40	50	60	70	80	90	(mean)
Austria	<i>Perm</i>	0.269	0.157	0.151	0.154	0.143	0.114	0.126	0.146	0.111	0.156
		(0.080)	(0.035)	(0.027)	(0.027)	(0.031)	(0.033)	(0.026)	(0.039)	(0.037)	(0.032)
	<i>Obs.</i>										4292
Belgium	<i>Perm</i>	0.078	0.088	0.084	0.083	0.061	0.062	0.050	-0.006	-0.051	0.040
		(0.036)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.032)	(0.045)	(0.074)	(0.022)
	<i>Obs.</i>										4001
Germany	<i>Perm</i>	0.502	0.459	0.408	0.361	0.311	0.249	0.197	0.177	0.119	0.310
		(0.037)	(0.039)	(0.028)	(0.026)	(0.034)	(0.022)	(0.027)	(0.020)	(0.027)	(0.020)
	<i>Obs.</i>										8360
France	<i>Perm</i>	0.368	0.276	0.240	0.204	0.178	0.168	0.147	0.100	0.055	0.201
		(0.048)	(0.029)	(0.019)	(0.017)	(0.016)	(0.015)	(0.020)	(0.021)	(0.027)	(0.018)
	<i>Obs.</i>										6870
Greece	<i>Perm</i>	0.286	0.256	0.220	0.184	0.159	0.136	0.109	0.102	0.087	0.169
		(0.034)	(0.027)	(0.024)	(0.027)	(0.025)	(0.022)	(0.023)	(0.028)	(0.034)	(0.019)
	<i>Obs.</i>										2911
Italy	<i>Perm</i>	0.246	0.190	0.169	0.147	0.138	0.123	0.100	0.092	0.061	0.136
		(0.024)	(0.015)	(0.012)	(0.013)	(0.009)	(0.012)	(0.012)	(0.013)	(0.024)	(0.011)
	<i>Obs.</i>										12014
Portugal	<i>Perm</i>	0.211	0.160	0.164	0.164	0.155	0.143	0.141	0.106	0.126	0.158
		(0.031)	(0.024)	(0.020)	(0.021)	(0.023)	(0.021)	(0.026)	(0.026)	(0.034)	(0.019)
	<i>Obs.</i>										2897
Spain	<i>Perm</i>	0.217	0.183	0.158	0.153	0.158	0.156	0.133	0.123	0.104	0.153
		(0.018)	(0.015)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.021)	(0.010)
	<i>Obs.</i>										8411
Czech Republic	<i>Perm</i>	0.064	0.102	0.081	0.084	0.063	0.074	0.059	0.059	0.037	0.073
		(0.021)	(0.020)	(0.018)	(0.020)	(0.017)	(0.018)	(0.019)	(0.024)	(0.030)	(0.015)
	<i>Obs.</i>										4909
Hungary	<i>Perm</i>	0.129	0.134	0.115	0.131	0.119	0.121	0.120	0.138	0.128	0.127
		(0.032)	(0.027)	(0.029)	(0.029)	(0.025)	(0.029)	(0.027)	(0.032)	(0.039)	(0.022)
	<i>Obs.</i>										4934
Slovak Republic	<i>Perm</i>	0.163	0.136	0.118	0.111	0.088	0.070	0.057	0.024	0.006	0.086
		(0.034)	(0.023)	(0.017)	(0.019)	(0.021)	(0.021)	(0.022)	(0.022)	(0.032)	(0.017)
	<i>Obs.</i>										4676
Poland	<i>Perm</i>	0.215	0.189	0.187	0.195	0.205	0.212	0.209	0.193	0.176	0.197
		(0.019)	(0.014)	(0.015)	(0.013)	(0.014)	(0.015)	(0.017)	(0.019)	(0.023)	(0.012)
	<i>Obs.</i>										9453

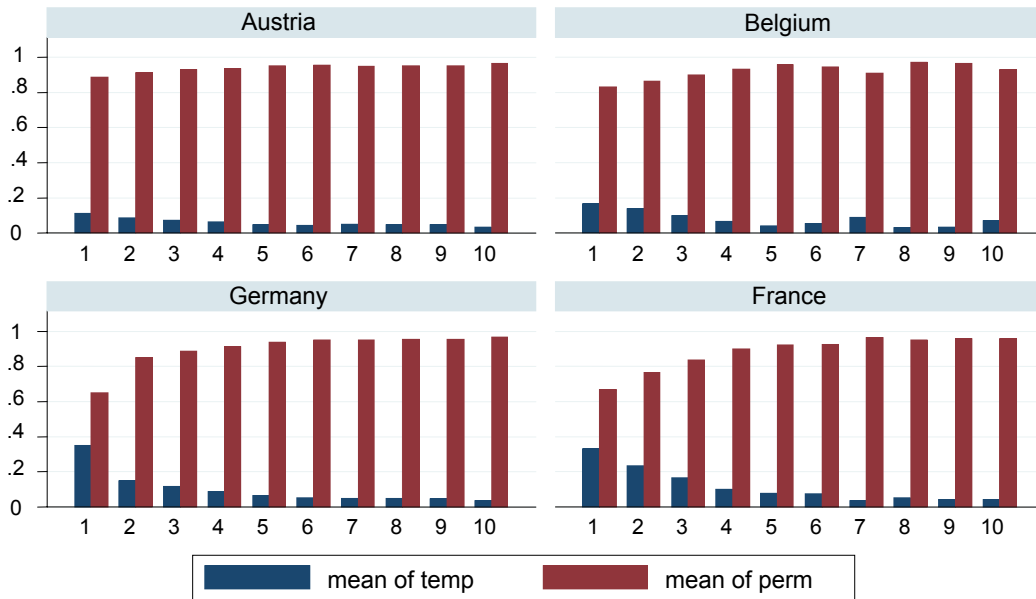
Standard errors are in parentheses. A standard Mincerian wage equation (educational dummies, age, age squared, gender dummy and part-time dummy) is estimated by country.

**Table 4**  
**Decomposition of the permanent temporary wage gap (decile of the wage distribution) and percentage of the raw gap accounted for by differences in returns.**

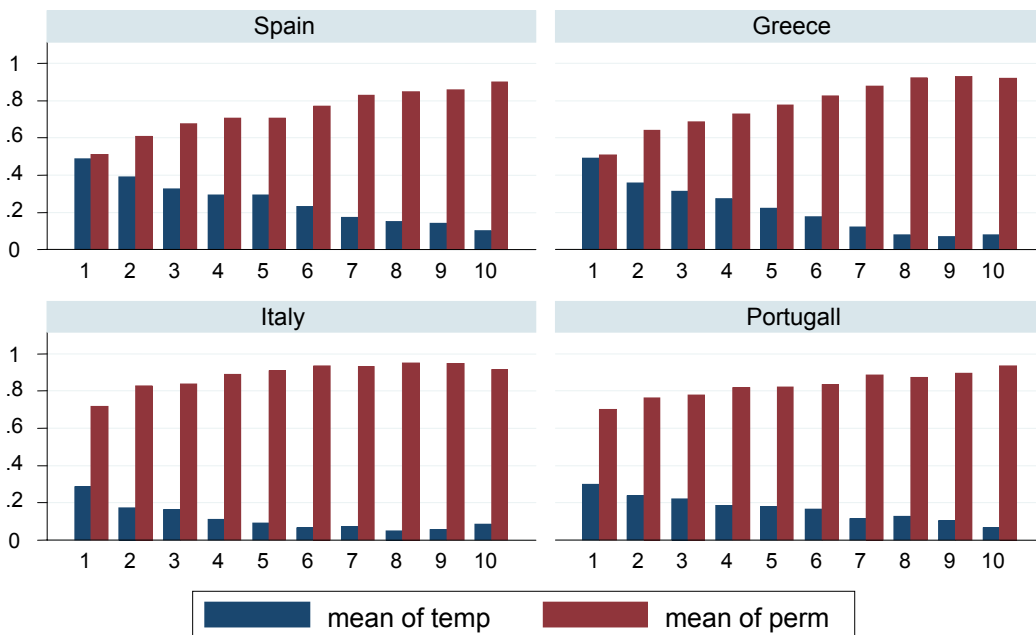
<b>Country</b>		10	20	30	40	50	60	70	80	90
<b>Austria</b>	<i>Raw differential</i>	0.320	0.172	0.169	0.153	0.163	0.169	0.120	0.118	0.113
	<i>Differences in returns</i>	0.278	0.187	0.152	0.141	0.131	0.131	0.131	0.132	0.132
	<i>Proportion explained</i>	87.0	109.0	89.8	91.8	80.4	77.3	109.5	112.2	116.6
<b>Belgium</b>	<i>Raw differential</i>	0.156	0.168	0.210	0.194	0.190	0.170	0.120	0.157	<i>0.047</i>
	<i>Differences in returns</i>	0.119	0.130	0.136	0.138	0.142	0.141	0.127	0.109	<i>0.017</i>
	<i>Proportion explained</i>	76.7	77.1	65.0	71.4	74.6	83.3	105.7	69.6	36.9
<b>Germany</b>	<i>Raw differential</i>	0.753	0.748	0.679	0.591	0.513	0.431	0.364	0.312	0.302
	<i>Differences in returns</i>	0.492	0.457	0.414	0.372	0.328	0.289	0.254	0.226	0.182
	<i>Proportion explained</i>	65.3	61.1	61.0	63.0	63.8	67.1	69.8	72.6	60.3
<b>France</b>	<i>Raw differential</i>	0.491	0.356	0.277	0.298	0.316	0.348	0.349	0.361	0.325
	<i>Differences in returns</i>	0.396	0.286	0.249	0.254	0.274	0.289	0.290	0.268	0.226
	<i>Proportion explained</i>	80.8	80.4	89.8	85.2	86.5	83.2	83.2	74.2	69.5
<b>Greece</b>	<i>Raw differential</i>	0.333	0.283	0.320	0.339	0.392	0.404	0.419	0.415	0.402
	<i>Differences in returns</i>	0.224	0.222	0.234	0.251	0.272	0.278	0.278	0.273	0.242
	<i>Proportion explained</i>	67.5	78.4	73.1	73.9	69.4	68.9	66.2	65.7	60.2
<b>Italy</b>	<i>Raw differential</i>	0.307	0.240	0.213	0.206	0.226	0.223	0.228	0.200	0.119
	<i>Differences in returns</i>	0.223	0.184	0.171	0.167	0.171	0.180	0.187	0.182	0.159
	<i>Proportion explained</i>	72.5	76.7	80.4	80.9	75.5	80.6	81.9	91.1	134.0
<b>Spain</b>	<i>Raw differential</i>	0.259	0.255	0.262	0.253	0.291	0.314	0.332	0.366	0.326
	<i>Differences in returns</i>	0.218	0.214	0.221	0.229	0.237	0.249	0.260	0.268	0.267
	<i>Proportion explained</i>	84.2	84.0	84.6	90.4	81.4	79.5	78.3	73.2	81.8
<b>Portugal</b>	<i>Raw differential</i>	0.136	0.138	0.173	0.178	0.194	0.239	0.308	0.397	0.433
	<i>Differences in returns</i>	0.077	0.106	0.135	0.170	0.198	0.235	0.276	0.330	0.380
	<i>Proportion explained</i>	56.8	76.5	78.4	95.4	102.3	98.3	89.6	83.1	87.8
<b>Hungary</b>	<i>Raw differential</i>	<i>0.033</i>	0.126	0.221	0.238	0.253	0.224	0.182	0.168	0.147
	<i>Differences in returns</i>	<i>0.071</i>	0.089	0.128	0.135	0.126	0.128	0.136	0.127	0.117
	<i>Proportion explained</i>	<i>211.8</i>	70.5	57.7	56.5	49.7	57.2	74.6	75.6	79.4
<b>Czech Republic</b>	<i>Raw differential</i>	0.137	0.170	0.209	0.205	0.188	0.195	0.170	0.115	0.092
	<i>Differences in returns</i>	0.089	0.108	0.121	0.119	0.102	0.095	0.072	0.061	0.029
	<i>Proportion explained</i>	64.6	63.5	58.0	58.4	54.1	48.5	42.7	53.3	32.1
<b>Slovak Republic</b>	<i>Raw differential</i>	0.165	0.164	0.226	0.213	0.132	0.144	0.116	0.077	0.071
	<i>Differences in returns</i>	0.147	0.143	0.151	0.139	0.113	0.101	0.082	0.066	0.062
	<i>Proportion explained</i>	89.5	87.4	66.7	65.2	85.3	69.9	70.6	85.2	88.1
<b>Poland</b>	<i>Raw differential</i>	0.276	0.319	0.380	0.421	0.457	0.490	0.512	0.509	0.507
	<i>Differences in returns</i>	0.196	0.238	0.273	0.299	0.307	0.311	0.307	0.302	0.289
	<i>Proportion explained</i>	71.1	74.8	71.9	71.1	67.3	63.4	59.9	59.3	57.0

The coefficients in *italics* are not statistically significant at the 10% level.

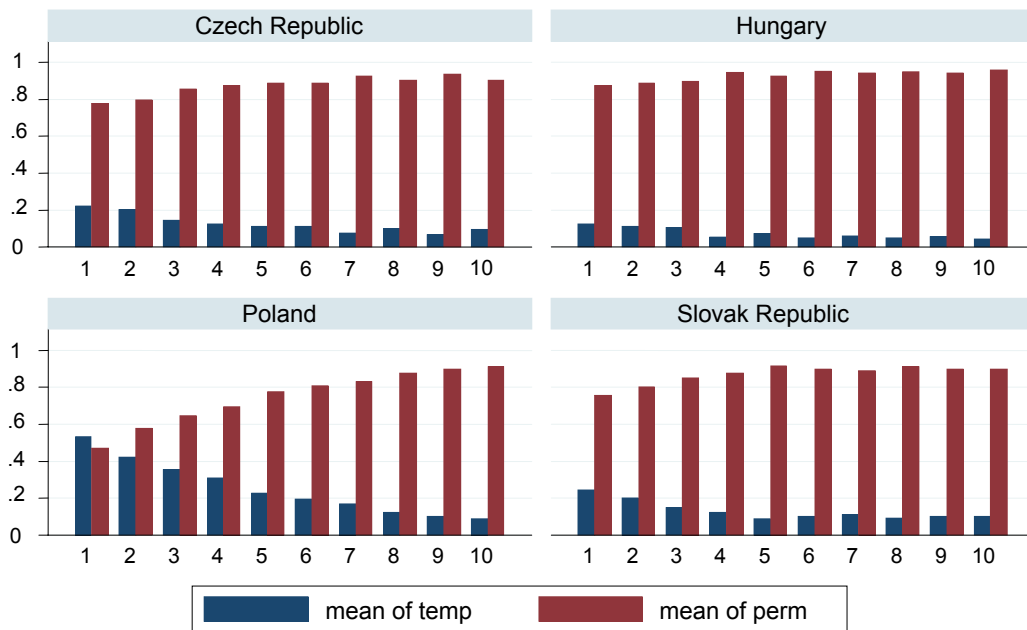
**Figure 1a: percentages of temporary and permanent workers by quantile of the (hourly) wage distribution in the Continental countries. By country (2006)**



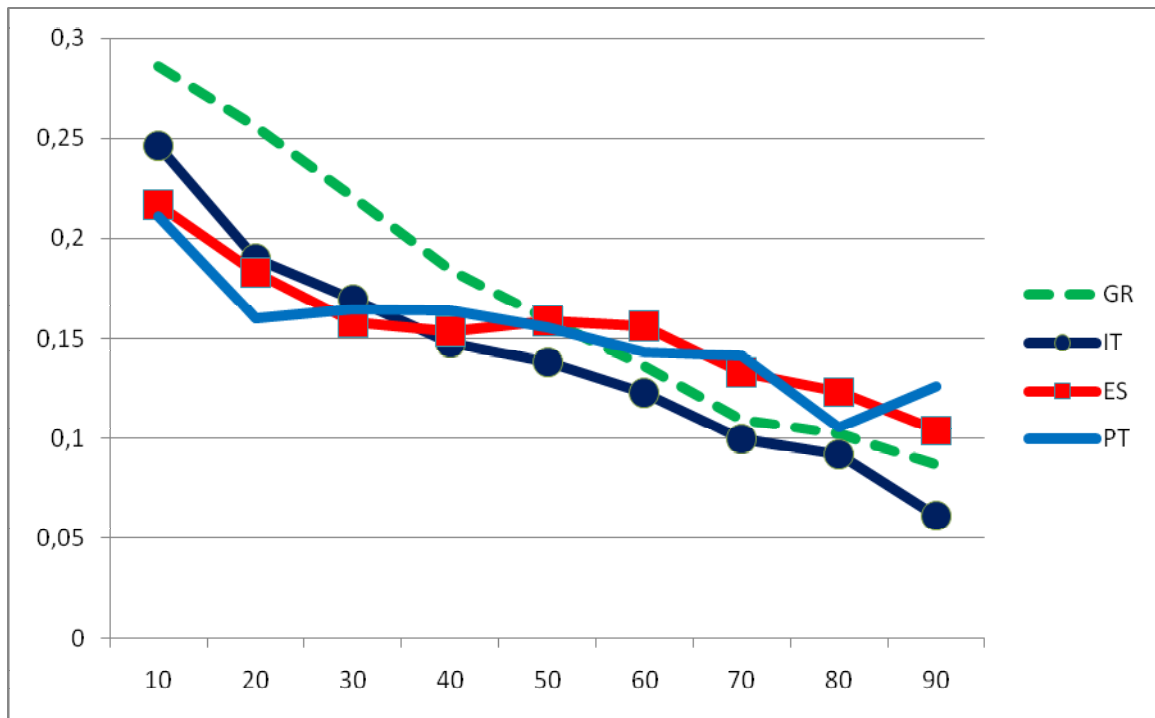
**Figure 1b: percentages of temporary and permanent workers by quantile of the (hourly) wage distribution in Mediterranean countries. By country (2006)**



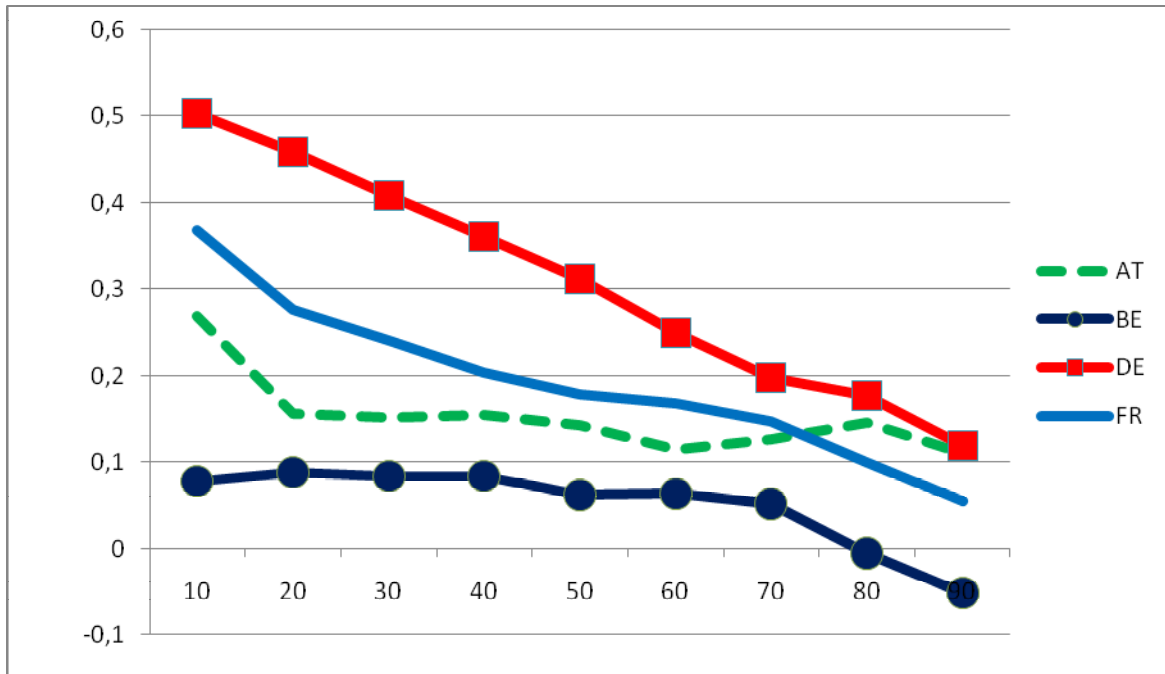
**Figure 1c: percentages of temporary and permanent workers by quantile of the (hourly) wage distribution in Eastern countries. By country (2006)**



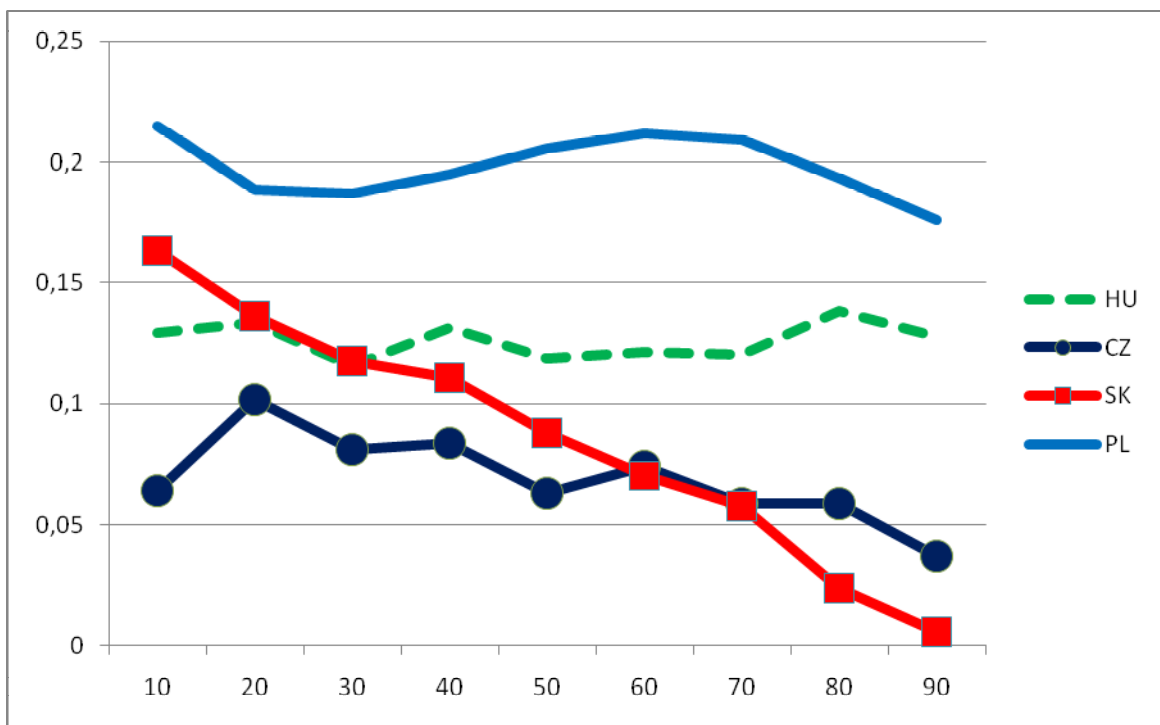
**Figure 2a: Estimated coefficients of permanent job by decile - Mediterranean Countries**



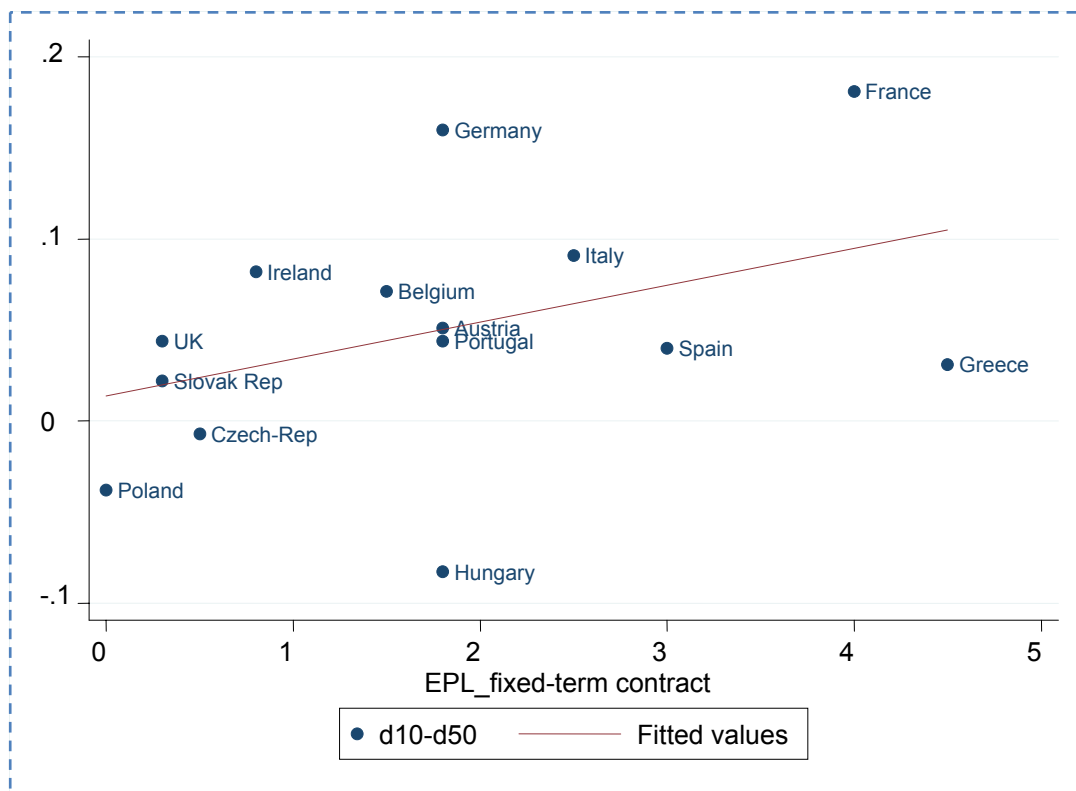
**Figure 2b: Estimated coefficients of permanent job by decile - Continental Countries**



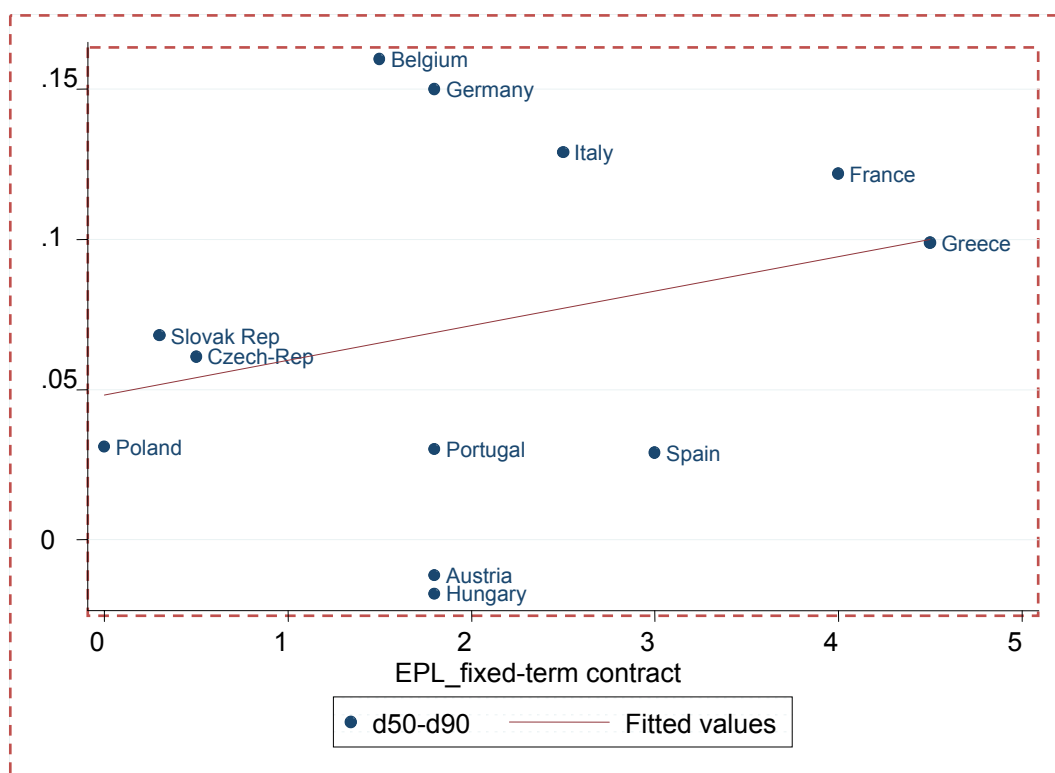
**Figure 2c: Estimated coefficients of permanent job by decile - Eastern Countries**



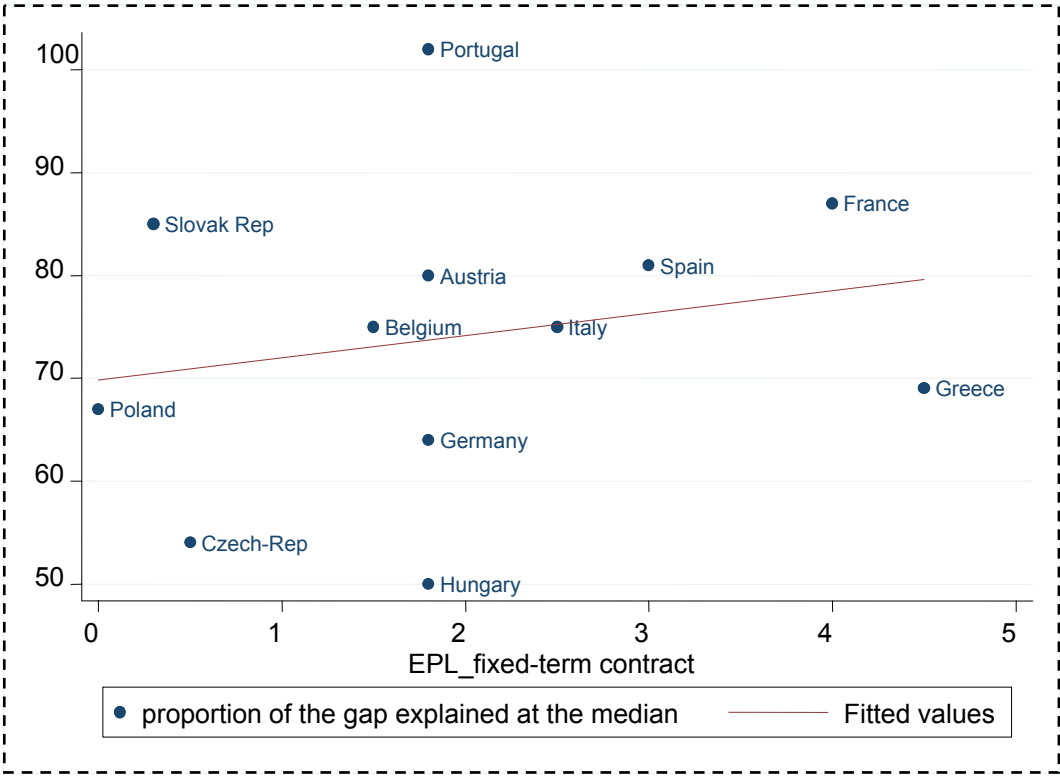
**Figure 3a: Simple correlation between d10-d50 and employment protection of fixed-term workers**



**Figure 3b: Simple correlation between d50-d90 and employment protection of fixed-term workers**



**Figure 3c: Simple correlation between the proportion of the median gap accounted for by differences in returns and employment protection of fixed-term workers**



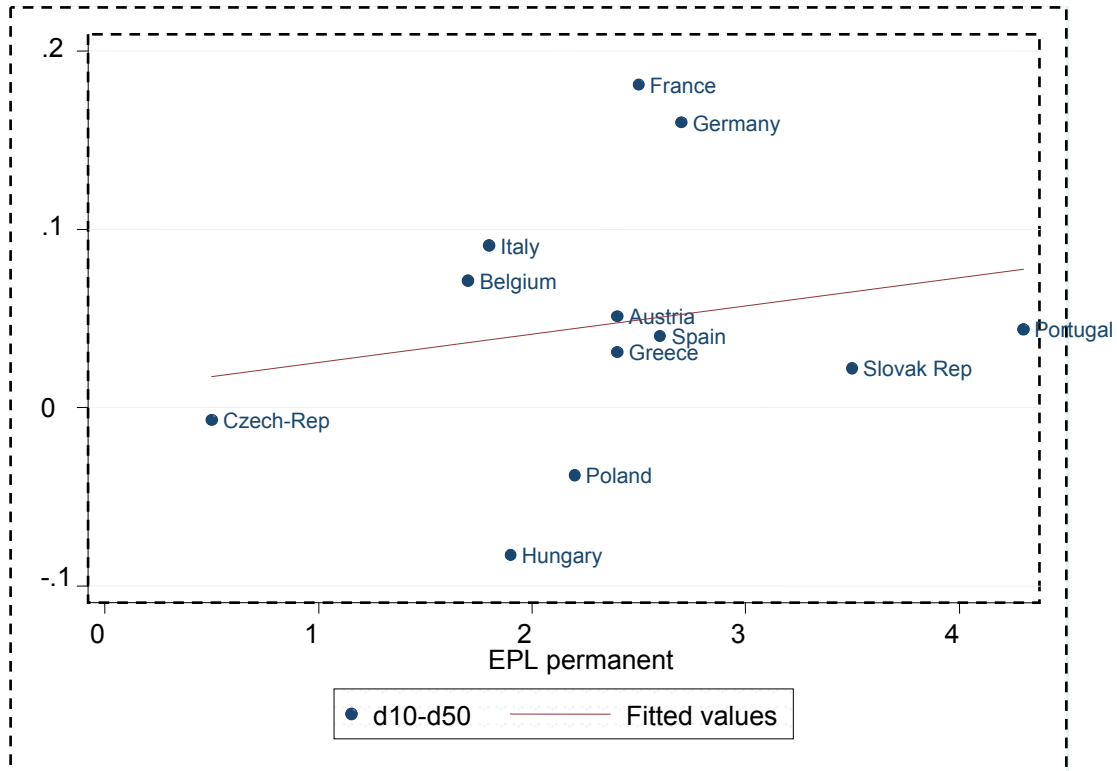
Notes 3a: On the vertical axe is the difference between the conditional wage gap observed at the first decile and that observed at the median, taken from table 3. Correlation: 0.46; Regression coefficient: 0.025 (SE:0.015)

Notes 3b. On the vertical axe is the difference between the conditional wage gap observed at the median and that observed at the ninth decile, taken from table 3. Correlation: 0.26; Regression coefficient: 0.011 (SE:0.013)

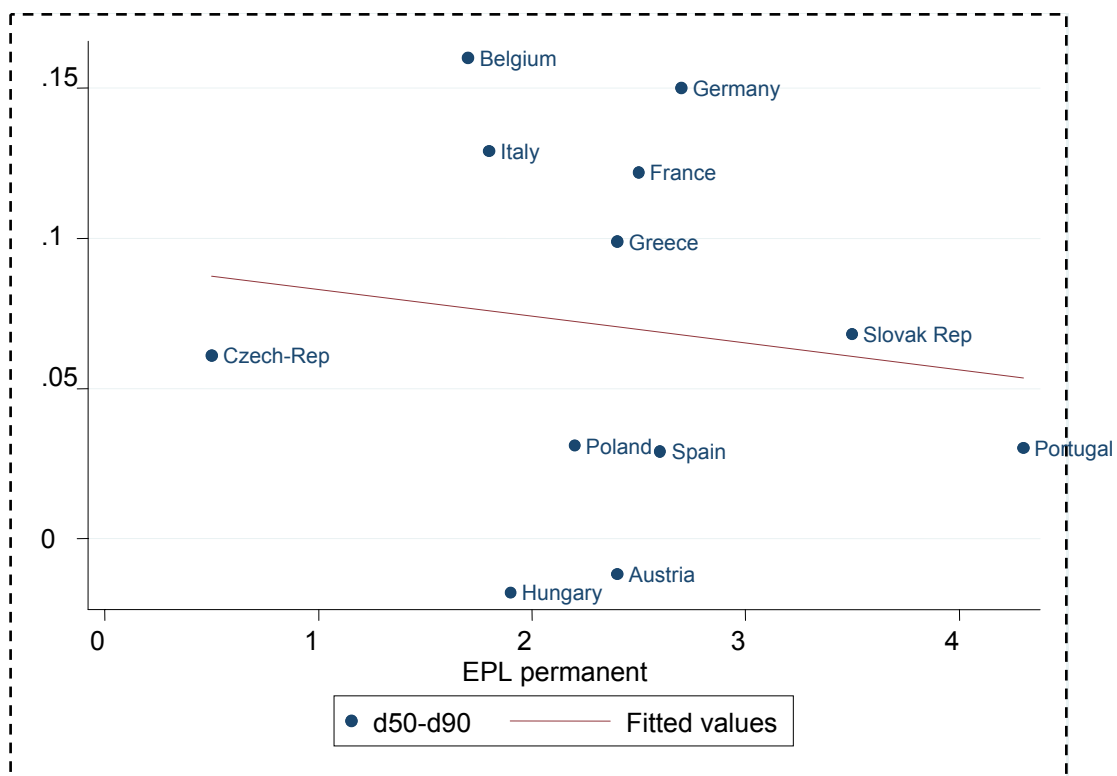
Notes 3c: On the vertical axe is the proportion of the raw gap explained by differences in return at the first decile, taken from table 4. Correlation: 0.21; Regression coefficient: 2.18 (SE:3.24)

Notes EPL versus fixed term workers is taken from OECD (2004)- table 2.A2.2, first column, and refers to year 2003

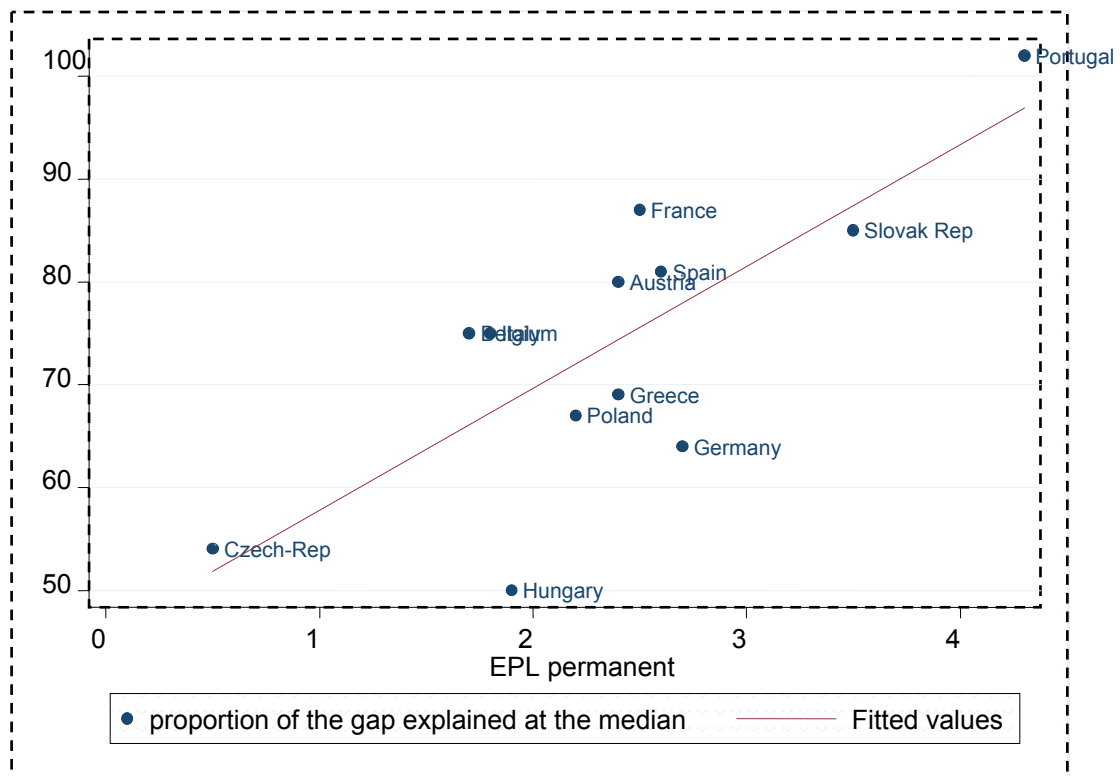
**Figure 4a: Simple correlation between d10-d50 and employment protection of regular workers**



**Figure 4b: Simple correlation between d50-d90 and employment protection of regular workers**



**Figure 4c: Simple correlation between the proportion of median gap accounted by differences in returns and employment protection of regular workers**



Notes See figure 3 for description of the vertical axes.

Notes3a: Correlation: 0.20; Regression coefficient: 0.016 (SE:0.025)

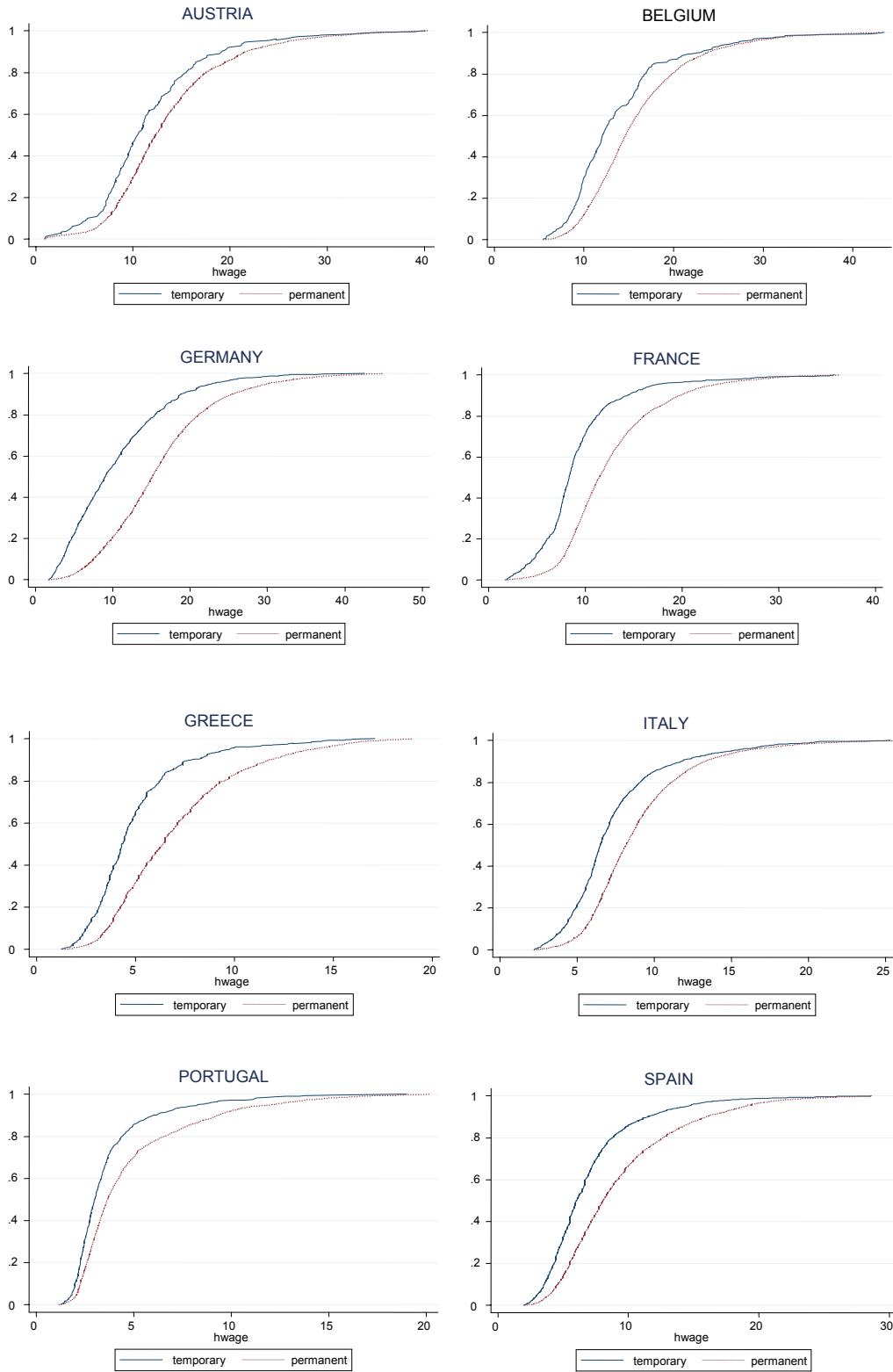
Notes3b: Correlation:- 0.14; Regression coefficient:- 0.009 (SE:0.020)

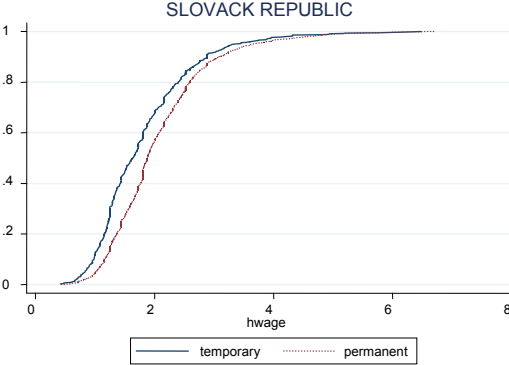
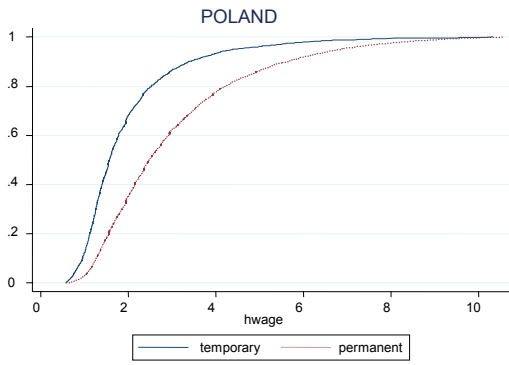
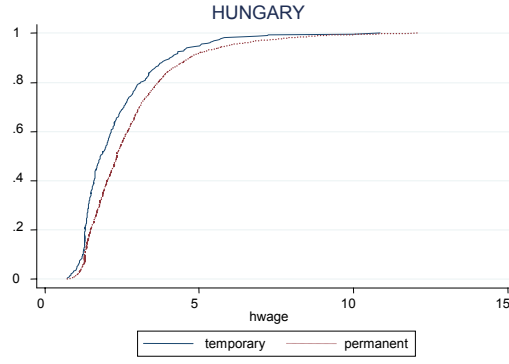
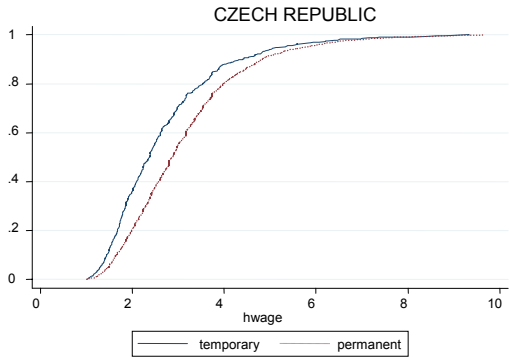
Notes3c: Correlation:0.77; Regression coefficient: 11.9 (SE:3.12)

EPL versus permanent workers is taken from OECD (2004) and refers to year 2003

## Appendix A

**Figure A1: Cumulative functions of log wage for temporary and permanent contracts. By country (2006).**





**Table 1A: Tests for coefficient equality between pairwise deciles**

<b>Quantiles being tested:</b>	<b>10 vs. 50</b>	<b>10 vs. 90</b>	<b>20 vs. 50</b>	<b>20 vs. 80</b>	<b>50 vs. 80</b>	<b>50 vs. 90</b>
<b>Countries:</b>						
<b>Austria</b>	0.1027	0.0696	0.7021	0.8266	0.9345	0.4534
<b>Belgium</b>	0.6401	0.1016	0.2779	0.0461	0.1051	0.1158
<b>Germany</b>	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
<b>France</b>	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
<b>Greece</b>	0.0006	0.0000	0.0003	0.0000	0.0321	0.0384
<b>Italy</b>	0.0000	0.0000	0.0002	0.0000	0.0001	0.0006
<b>Portugal</b>	0.1005	0.0722	0.8576	0.0797	0.0462	0.4193
<b>Spain</b>	0.0021	0.0000	0.0812	0.0005	0.0120	0.0078
<b>Czech Republic</b>	0.9634	0.4405	0.0568	0.1251	0.8468	0.4010
<b>Hungary</b>	0.7623	0.9741	0.5889	0.9009	0.5365	0.8205
<b>Slovak Republic</b>	0.0257	0.0007	0.0411	0.0001	0.0059	0.0146
<b>Poland</b>	0.6256	0.1592	0.2485	0.8256	0.4985	0.2154

The table reports the prob-values for the F-test.