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**Dimitris Pavlopoulos**

## Starting your career with a temporary job: stepping-stone or `dead end'?

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# Starting your career with a temporary job: stepping-stone or 'dead end'?

Dimitris Pavlopoulos[*]

**Abstract**

This paper uses panel data from the UK (BHPS) and Germany (GSOEP) to investigate the wage effect of entering the labour market with a temporary job. Further than the previous literature that studied the effect of the contract type on wage dynamics in the explained part of a wage regression, we also investigate the effect of the starting contract on the variance of unobserved individual effects and random earnings shocks. For this purpose, we decompose earnings into a component determined by initial unobserved earnings ability and experience-related heterogeneity and a component determined by earnings shocks. Our results for Germany, verify the existence of a wage penalty for entering the labour market with a temporary contract. This penalty disappears after 12.5 years for male workers and after 6.5 years for the female workers. In the UK, a similar wage penalty is found for male workers that persists over their working career. In contrast, no wage penalty is found for the British female workers. In the UK, the initial unobserved earnings capacity is higher for workers starting off with a permanent job, while no such difference emerges in Germany. However, this initial unexplained wage inequality decreases faster for workers starting their career with a temporary contract than their colleagues that entered the labour market with a permanent job. Finally, the persistence of earnings shocks is higher for workers entering the labour market with a temporary contract.

**Keywords**: temporary employment, wages.
**JEL-code**: J31,J41.

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# 1 Introduction

Temporary employment is in the heart of economic and political debate in Europe. Temporary contracts are seen as a way to increase labour market flexibility in the rigid labour markets of the continental European countries. Such contracts allow employers to circumvent strict regulations concerning the hiring and firing of employees that produce market imperfections (Bentolila & Bertola, 1990; Booth, 1997) and some times even regulations concerning pay and fringe benefits (OECD, 2002). For this reason, several European countries have relaxed legislation concerning the use of temporary contracts and the share of temporary employment in the workforce has increased considerably from the mid 1980's until 2000.

However, temporary employment comes with a cost for the workers. Previous studies have established the presence of a wage penalty associated to temporary contracts (Jimeno & Toharia, 1993; Bentolila & Dolado, 1994; Booth et al., 2002; Hagen, 2002; Lane et al., 2003; Amuedo-Dorantes & Serrano-Padial, 2007). The size of this penalty is contingent on the type of the temporary contract (fixed-term or seasonal/casual), on gender as well as on occupation. However, the long-term earnings effects of a temporary contract at the beginning of the working career have received much less attention. Booth et al. (2002) finds that the wage penalty for fixed-term contracts is 8.5% for male workers and 4.7% for female workers with one year of labour market experience but it decreases to 5% and .4%, respectively for workers with 10 years of experience. Booth et al. present also some simulations showing that the wages of workers that start off with a fixed-term contract catch up fully (females) or partly (males) with their colleagues that enter the labour market with a permanent job. Lane et al. (2003) find that the wages of ex-temporary help industry workers one year after the transformation of their contract are lower than their always-permanent colleagues. Scherer (2004) suggests that a temporary contract upon entering the labour market has no effect on later occupational positions. However, Gagliarducci (2005) argues that repeated temporary contracts accompanied by intermediating periods of unemployment can have a 'scarring' effect on the working career of young workers.

The aim of this paper is to investigate the long-term wage effect of entering the labour market with a fixed-term contract. A fixed-term contract at the beginning of the working career may work either as a 'stepping-stone' to better earnings or as a 'dead end' for young workers. If the fixed-term job is associated with low investments in specific human capital then the temporary worker will become disadvantaged, in terms of the wage, compared to her/his permanent colleague with the same experience (Arulampalam & Booth, 1998).

Therefore, a wage penalty for temporary workers will emerge and persist. In a segmented labour market, this may particularly be the case for the workers employed in the secondary segment (Hagen, 2002; Giesecke & Groß, 2003). In the external labour market, employers may see fixed-term contracts as a negative signal for the productivity of workers and therefore offer them lower wages (Amuedo-Dorantes, 2000). However, if the fixed-term contract is used as a probation device, the high-productivity worker will increase her/his effort in order to get a permanent contract (Alba-Ramírez, 1994; Loh, 1994; Wang & Weiss, 1998; Güell, 2001) and her/his wage will converge with her/his colleague with a permanent job.

Contrary to previous studies that derive the effect of the contract type on wage dynamics from the explained part of a wage regression, we also investigate the effect of the starting contract on the variance of unobserved individual effects and random earnings shocks. The type of starting contract may be related to different initial unobserved earnings ability as well as to a different 'learning' effect on the unexplained part of earnings. More specifically, we decompose earnings into a component that captures initial unobserved earnings ability and experience-related heterogeneity and a component that is related to earnings shocks.

Our study is performed in two countries with different institutional characteristics with respect to temporary employment: the UK and Germany. In the UK, temporary employment remained stable since the beginning of the 1990's, when it started to rise in most European countries including Germany. The reason is that, in the UK, employment protection for permanent workers is low and, thus, employers do not need to use fixed-term contracts to achieve flexibility in lay-offs or in adjusting the working hours of their workers. On the contrary, in Germany where employment protection is much higher than in the UK, employers use fixed-term contracts to screen new hires and to adjust their working force to the fluctuations of the business cycle. Moreover, segmentation is present in the German labour market and fixed-term contracts are widespread in the secondary segment.

This paper is organized as follows: Section 2 elaborates on the econometric model that we use. Section 3 presents our data sources and the description of our sample. Section 4 analyses the results of our multivariate analysis. Finally, the conclusions and the discussion of our findings are presented in Section 5.

# 2  Econometric model

In this paper, we use an extended version of the classic random-effects model that allows for flexibility in the specification of the individual effects and the random-error component. Our modeling approach is comparable to studies that decompose earnings into a permanent and temporary component with the use of a minimum distance estimator (Lillard & Willis, 1978; Moffitt & Gottschalk, 2002; Baker & Solon, 2003; Ramos, 2003; Cappellari, 2004). Our model is slightly less flexible in the specification of these two components than the models of the aforementioned studies. However, our model simultaneously estimates the effect of the standard predictors of earnings (human capital, demographic and job characteristics) and performs the decomposition of the unexplained part of earnings in the two components, while most of the aforementioned models make a two-step estimation by first running a wage regression on the main covariates and then applying the minimum distance estimator to the residuals of the first step. Our wage equation has the form:

$$\ln w_{it} = b_0 + \mathbf{b}_1 \mathbf{X}_{it} + b_3 C_i + b_4 E_{it} + b_5 E_{it}^2 + b_6 E_{it} * C_i + b_7 E_{it}^2 * C_i + a_{itc} + \epsilon_{itc} \qquad (1)$$

where $C_i$ stands for the type of the starting contract, $E_{it}$ for labour market experience, $E_{it}^2$ for experience squared, $\mathbf{X}_{it}$ for a vector of covariates, $a_{itc}$ for the individual effects and $\epsilon_{itc}$ for the random error. $\mathbf{X}_{it}$ includes also Heckman correction terms for employment participation. In the full version of our model, the term for the individual effects $a_{itc}$ is contract-specific and it is decomposed as follows:

$$a_{itc} = \mu_{ic} + \gamma_{ic} \alpha_{itc} , \qquad (2)$$

where $\alpha_{it}$ represents labour market experience of the individual $i$ in year $t$.

Equation 2 specifies a random-growth model on experience. Following Cappellari (2004), this equation suggests that the way unobserved characteristics effort affect earnings depends on labour experience. Moreover, it suggests that the pattern is different according to the type of contract upon labour market entry. More specifically, the term $\mu_{ic}$ represents the unobserved earnings ability at the beginning of the working career. The growth coefficient $\gamma_{ic}$ represents the unobserved individual earnings ability that is related to labour market experience. Such heterogeneity in earnings is predicted by several economic theories such as human capital theory, signalling and matching theory. In human capital theory this may represent a different human-capital accumulation ability (different learning effects). This parameter is capturing effects of the different levels of 'on-the-job'

training that workers receive and that are not captured by the covariates that we include in the model. This source of unobserved heterogeneity is particularly important for young workers that typically make large investments in 'on-the-job' training in order to increase their future earnings (Mincer, 1974; Hause, 1980).

As these are all unobserved effects, we only estimate 2 variances and one covariance for each initial contract type: $\sigma_\mu^2$, $\sigma_\gamma^2$ and $\sigma_{\mu\gamma}$. The two variances $\sigma_\mu^2$ and $\sigma_\gamma^2$ measure heterogeneity in the time-constant and experience-related unobserved earnings ability. The covariance $\sigma_{\mu\gamma}$ has a very meaningful interpretation. It actually tells us whether individuals with high initial ability also have a higher tendency to increase their earnings due to the learning effect. A negative value of this covariance would mean that the two sources of unobserved heterogeneity cancel each other and as workers accumulate labour market experience their unobserved earnings ability - that was different upon entering the labour market - converges. Following Hause (1980), we can calculate the number of experience years that are needed for initial heterogeneity to take its minimum value. The lower boundary of this value is given by $a_{it} = -\sigma_{\mu\gamma}/\sigma_\gamma^2$.

Equation 2 estimates the two variances and the covariance separately for workers that entered the labour market with a temporary and with a permanent contract. This allows us to investigate whether the various aspects of the unobserved earnings ability - initial unobserved ability, learning effect and correlation between the two - differ between the two groups of workers.

The remaining error term $\epsilon_{it}$ of equation 1 captures earnings shocks. For this random error we assume an AR(1) process:

$$\epsilon_{itc} = \rho\epsilon_{i(t-1)c} + z_{itc}. \tag{3}$$

The autoregressive correlation $\rho$ measures the degree of persistence in earnings shocks. By estimating the autoregressive correlation $\rho$ and the residuals' variance $\sigma_z^2$ separately according to the starting contract type we are able to investigate whether the effect of earnings shocks on wages differs for workers that started their career with a temporary or with a permanent contract.

# 3 Data

This paper uses data from two national panel datasets: For the UK, we use the British Household Panel Survey (BHPS). The BHPS waves 1-16, covering the years 1991-2006 (Taylor et al., 2006), are used. For Germany, we make use of the German Socio-Economic Panel (GSOEP) that covers the period 1984-2007 (Wagner et al., 2007). We select individuals aged 16 - 30 that entered the labour market for the first time during the period of survey. Our sample includes 4,806 individuals for Germany of which 1,710 started their working career with a temporary contract and 4,120 individuals from the UK of which 362 entered the labour market with a temporary contract. We analyze separately male and female wage careers but we exclude the self-employed. Seasonal and casual contracts are also excluded from our sample. The main economic variable is the natural logarithm of the hourly wage and this is extracted, in the BHPS, by the usual monthly pay from the current job and in the GSOEP by the last monthly earnings from paid employment. Workers are considered as labour market entrants in year $t$ if they report paid employment as their main activity for the first time in $t$, and education as their main activity in the years $t-1$, $t-2$ or $t-3$. The majority of them are school leavers. Seasonal or part-time jobs combined with education were not taken into account. In Germany, many young people enter the labour market through an apprenticeship, which is part of the education system. For this reason, we only consider them as labour market entrants after they have completed their apprenticeship. The possession of apprenticeship qualifications is controlled for in the model.

Our sample includes all the available observations for the selected individuals regardless of whether they stay continuously employed or not. However, observations of respondents are kept in our sample only for the waves that they report paid employment as their main employment status and they report a positive wage. Thus, for example, a respondent that enters the labour market for the first time in time $t$ and is employed in $t+1$, $t+2$, $t+5$ and $t+6$ is included in our sample in the waves $t$, $t+1$, $t+2$, $t+5$ and $t+6$ but not in the waves $t+3$ and $t+4$. To control for the effect of an intervening unemployment spell between the included observations per individual, we include in our regression Heckman correction terms for employment participation. The selection equation for employment is identified with the use of the number of children up to 14 years of age as an exclusion variable.

The autoregressive process of the error term is modeled over the years of employment. In the previous example, this means that the autoregressive process is based on the estimation

of the correlation between the years $t+2$ and $t+5$ and not between the years $t+4$ and $t+5$. In other words, it always refers to the correlation of the error terms between the current year and the last year that the person was reporting employment as her/his main status.

# 4   Results

*Some descriptives*

Table 1 presents some descriptives on our sample broken up by the type of the starting contract. In this table, it is seen that workers starting their career with a temporary contract do not differ considerably from their colleagues that entered the labour market with a permanent job in their demographic and job characteristics. Differences between the two groups of workers emerge only with respect to labour market experience, tenure, contract type of current employment and previous unemployment experience. Those that entered the labour market with a temporary contract typically have less experience, shorter tenure, a higher probability of working still with a temporary contract and a higher probability to have experienced an unemployment spell the year prior to the survey. The longer labour market experience of workers entering the labour market with a permanent contract is probably a cohort effect. Temporary contracts were scarce when older cohorts were entering the labour market but much more widespread when younger cohorts were starting their careers. This should also explain the longer tenure of the workers entering the labour market with a permanent contract. The fact those workers that entered the labour market with a temporary contract are more likely to be still working on a temporary contract indicates the possible existence of some state dependence in the contract type.

Table 1 presents also the differences in the average wage between the two groups of workers. Such differences emerge in both countries, although they are rather small. In the UK, workers that entered the labour market with a permanent contract earn on average .5 pounds more per hour than their colleagues that started their career with a fixed-term contract. In Germany this difference amounts to .4 euros per hour. However, differences in average wages do not take into account the differences in labour market experience that were shown to exist between the two groups of workers. Therefore, in Figure 1 we plot the second degree Kernel-weighted local polynomial smoothing of wages on labour market experience. There are different graphs for male and female workers for the two countries

Table 1: Descriptives by contract type (in percentages)

|  | UK | | Germany | |
| --- | --- | --- | --- | --- |
|  | **Permanent** | **Temporary** | **Permanent** | **Temporary** |
| **Mean wage** (in euros) | 7.9 | 7.4 | 10.8 | 10.4 |
| **Female** | 49.6 | 43.8 | 41.8 | 45.8 |
| **Age** (in years) | 29.0 | 26.2 | 31.4 | 28.3 |
| **Education** | | | | |
| **Lower** | 11.5 | 8.5 | 19.3 | 23.3 |
| **High School** | 40.9 | 34.0 | 64.9 | 56.4 |
| **Higher** | 47.7 | 57.5 | 15.8 | 20.3 |
| **Experience** (in years) | 13.0 | 10.2 | 11.6 | 8.4 |
| **Apprenticeship** | | | 79.5 | 75.1 |
| **Tenure** (in months) | 33.7 | 19.8 | 80.4 | 53.1 |
| **Industrial sector** | | | | |
| **Manufacturing** | 17.3 | 13.6 | 27.7 | 25.0 |
| **Energy** | 1.4 | 0.6 | 1.1 | 1.3 |
| **Mining** | 3.7 | 3.2 | 0.4 | 0.1 |
| **Agriculture** | 0.9 | 0.7 | 0.9 | 0.8 |
| **Construction** | 4.3 | 5.0 | 16.1 | 15.3 |
| **Trade** | 20.3 | 18.9 | 14.9 | 14.7 |
| **Transport** | 6.6 | 3.3 | 5.2 | 4.4 |
| **Bank, insurance** | 17.4 | 14.0 | 5.1 | 3.6 |
| **Other services** | 28.2 | 40.9 | 28.8 | 34.9 |
| **Firm size** | | | | |
| **Small** | 32.2 | 29.9 | 23.3 | 20.8 |
| **Middle** | 24.8 | 26.4 | 26.1 | 29.6 |
| **Large** | 42.9 | 43.7 | 50.6 | 49.5 |
| **Temporary**[a] | 1.8 | 9.2 | 14.5 | 28.7 |
| **White collar** | 37.2 | 28.2 | 52.8 | 53.1 |
| **Part-time** | 12.8 | 9.4 | 13.1 | 14.2 |
| **Unemployment** | 4.8 | 9.9 | 4.8 | 9.3 |
| **Cases** | 3,758 | 362 | 3,096 | 1,710 |

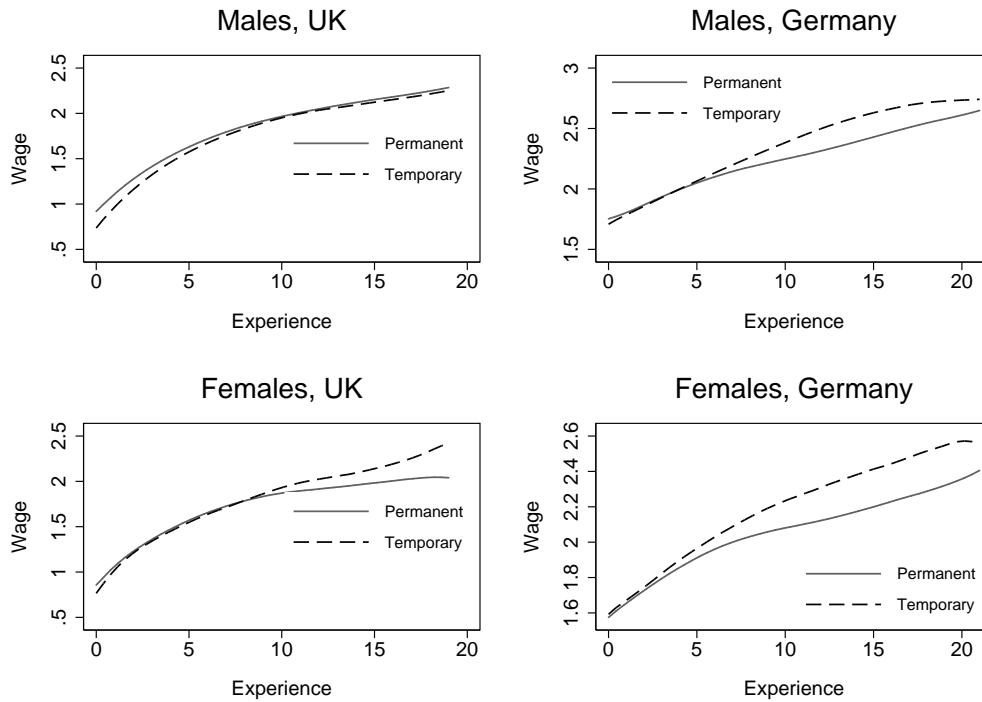[a] The percentage of temporary contracts was calculated by excluding the first year of employment.

Figure 1: Kernel-weighted local polynomial d(2): wages and experience in years.

under scrutiny. This figure shows that an initial temporary-employment penalty exists only for the British males. For the British females and for all German labour market entrants wages do not differ according to the starting contract. In fact, a wage premium for entering the labour market with a fixed-term contract emerges for the experienced German workers. However, this is probably a cohort effect as the few workers that entered the labour market with a fixed-term contract in the '70s or the beginning of the '80s are a very selective group.

## Multivariate analysis

The descriptive analysis indicated some wage differences between workers entering the labour market with a fixed-term and a permanent contract. Our multivariate analysis will show whether these differences persist when we control for demographic and job characteristics. It will also investigate whether unobserved characteristics of workers, such as ability, effort and individual preferences, as well as random shocks differ in their effect on the wages of these two groups of workers.

In total, 7 models were estimated that differ according to the restrictions they impose to equations 2 and 3. The first model is a standard random effects model as it imposes the restrictions $\mu_{ic} = \mu_i$, $\gamma_{ic} = 0$, $\epsilon_{itc} = \epsilon_{it}$ and $\rho = 1$. The second models drops the restriction $\rho = 1$ and therefore it becomes a random intercept model with an AR(1) structure for the residuals' term. The third model drops further the restriction $\mu_{ic} = \mu_i$ and estimates two variances for the time-constant individual effects: one for the workers that entered the labour market with a fixed-term contract and another one for the workers that entered the labour market with a permanent contract. Model 4 combines model 2 and model 3 and keeps only the restrictions $\gamma_{ic} = 0$ and $\epsilon_{itc} = \epsilon_{it}$. Model 5 builds on model 2 by adding a random slope for experience to the individual effects. Thus, it drops the restrictions $\gamma_{ic} = 0$ and $\rho = 1$. Model 6 extends model 5 by dropping also the restriction $\mu_{ic} = \mu_i$, thus by estimating separately the random intercept and random slope for the workers that entered the labour market with a fixed-term contract and those that entered with a permanent contract. Finally, Model 7 is our full model where all restrictions are dropped.

The comparison between these 7 models is based on the Akaike and the Bayesian Information Criteria (Agresti, 2002). The AIC is defined as $AIC = 2k - 2\ln(L)$, while $BIC = -2\ln(L) + k\ln(n)$, where $k$ is the number of parameters of the model and $n$ the number of observations in the sample. Both criteria, and especially the BIC, 'penalize' the use of more parameters in the model. We select the model with the lowest value for these two criteria. Table 2 presents these measures for all 8 models. This table indicates that the autoregressive structure in the residuals improves considerably the fit of the model (comparison of Model 2 with Model 1). Moreover, the fit of the model is considerably improved by adding a random slope on experience (comparison of Models 2-4 with Models 5-7). Finally, the fit improves further when moving from Model 5 to Model 6 and Model 7. In all cases, Model 7 is the model with the lowest value according to both information criteria. Moreover, Model 7 is the most appropriate to interpret with respect to our research question. Therefore, the estimates we interpret come from this model.

The estimated parameters for our main covariates are presented in table 5. This table compares the estimates of our preferred model (Model 7) with the estimates of Model 2, so it compares the estimates from a random intercept and a random slope model. Different patterns for the wage penalty related to fixed-term contracts emerge for males and females in the two countries under scrutiny. A wage penalty of 11.2% is found for British males upon entering the labour market. This gap persists over the first years of the working career of these workers as the relevant interaction effects are small and non-significant. On the contrary, our random-slope model (Model 7) suggests that the initial contract is

Table 2: Model fit measures

|  | UK | | | | Germany | | | |
|  | males | | females | | males | | females | |
|  | BIC | AIC | BIC | AIC | BIC | AIC | BIC | AIC |
|---|---|---|---|---|---|---|---|---|
| **Model 1** | 6129.2 | 6116.8 | 5263.2 | 5250.9 | -2741.4 | -2753.5 | 2932.4 | 2920.5 |
| **Model 2** | 4438.5 | 4420.0 | 3877.1 | 3858.5 | -4509.7 | -4527.9 | 1827.6 | 1809.8 |
| **Model 3** | 4396.9 | 4366.0 | 3854.5 | 3823.5 | -4503.0 | -4527.2 | 1834.4 | 1810.6 |
| **Model 4** | 4443.2 | 4418.6 | 3885.1 | 3860.3 | -4136.8 | -4172.9 | 2121.9 | 2086.4 |
| **Model 5** | 4194.6 | 4157.6 | 3635.2 | 3598.1 | -4772.9 | -4809.2 | 1748.5 | 1712.7 |
| **Model 6** | 4049.0 | 3999.7 | 3512.2 | 3462.7 | -4943.2 | -4991.6 | 1713.2 | 1665.5 |
| **Model 7** | 3780.9 | 3719.2 | 3255.6 | 3193.7 | -4512.4 | -4572.6 | 1708.2 | 1649.0 |

Note: BIC refers to the Bayesian Information Criterion and AIC to the Akaike Information Criterion.

rather irrelevant for the wage of your British females. These findings contrast the results of Booth et al. (2002), who find a considerable initial wage penalty that decreases as workers accumulate labour market experience. However, it should be mentioned that the sample of our study differs from the sample of Booth et al. as we use much longer time series and we focus on individuals that got their first job during the period of survey.

In Germany, the picture is different than the UK and the results of the multivariate analysis strongly contradict the findings of the descriptives. Controlling for all the job and demographic characteristics, both male and female workers that enter the labour market with a fixed-term contract face a wage penalty compared to their colleagues that start their career with a permanent job. This gap decreases very slowly as workers accumulate labour market experience and disappears only after 12.5 years of experience for males and 6.5 years for the females.[1]

Tables 4 and 5 present the estimated variances and correlations of the individual effects and the residuals. All intercept variances and experience-related variances are significant. Tables 4 indicates that, in the UK, the initial contract has different ways of affecting the wage of young male and female workers. For the British female workers, the intercept

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[1]We tried to introduce also an interaction between the quadratic term for experience and the initial contract but this was never statistically significant.

Table 3: Results on the main covariates

| | UK | | | | Germany | | | |
| | males | | females | | males | | females | |
| | Model 4 | Model 7 | Model 4 | Model 7 | Model 4 | Model 7 | Model 4 | Model 7 |
|---|---|---|---|---|---|---|---|---|
| **Permanent** | **0.122***** | **0.112**** | **0.085** | **-0.007** | **0.059***** | **0.062***** | **0.050***** | **0.044***** |
| **contract** | (0.048) | (0.050) | (0.057) | (0.039) | (0.017) | (0.019) | (0.019) | (0.021) |
| **Experience** | **0.056***** | **0.057***** | **0.066***** | **0.075***** | **0.027***** | **0.028***** | **0.024***** | **0.022***** |
| | (0.006) | (0.007) | (0.005) | (0.004) | (0.002) | (0.003) | (0.003) | (0.003) |
| **Experience*** | **-0.003** | **-0.003** | **-0.014***** | **-0.005** | **-0.004***** | **-0.005***** | **-0.009***** | **-0.007***** |
| **permanent** | (0.004) | (0.006) | (0.005) | (0.004) | (0.002) | (0.002) | (0.002) | (0.003) |
| **Experience** | **-0.001***** | **-0.0008***** | **-0.001***** | **-0.002***** | **-0.0003***** | **-0.0003***** | **-0.0003***** | **-0.0003***** |
| **squared** | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |

Note: the list of the covariates is the same as those included in Table 1. We also included correction terms for employment participation.

variance of the individual effects is higher for the workers that started their career with a fixed-term contract than their colleagues that started with a permanent contract. No such difference emerges for the British males. Therefore, it seems that the initial type of contract affects the 'explained' part of the wage regression for the male workers, while it operates through the 'unexplained' part for the female workers. In other words, the type of contract in the first job produces a wage gap for the male workers, while it is related to unobserved characteristics that affect initial earnings ability for the female workers.

In contrast, in Germany, for both the male and the female workers, the size of the intercept variance is roughly the same for workers starting their career with a fixed-term contract and their colleagues starting with a permanent contract. Thus, in Germany, the initial type of contract is not related to the unobserved initial earnings ability.

The estimated variances for experience-related heterogeneity are always higher for workers entering the labour market with a fixed-term contract than those starting with a permanent contract. The estimates for experience-related heterogeneity imply that wage growth due to one extra year of labour market experience for an individual that lies one standard deviation away from the mean is 2.8% ($= 100 \times \sqrt{\hat{\sigma}_\gamma^2}$) for the British males with initially a permanent contract and 4% with initially a fixed-term contract. The relevant growth for the British females is 2.5% and 3%, respectively. In Germany, although the variance component due to experience related unobserved heterogeneity is lower than the UK, the differences between the initial types of contracts are similar. For males that entered the labour market with a permanent contract, wage growth due to one extra year of labour

Table 4: Covariance parameter estimates - the UK

|  |  | males | | females | |
|  |  | Random intercept | Random slope | Random intercept | Random slope |
| --- | --- | --- | --- | --- | --- |
| Fixed-term contract | Variance (intercept) | 0.059*** (0.018) | 0.112*** (0.038) | 0.046*** (0.017) | 0.198*** (0.075) |
|  | Variance (experience) |  | 0.0016*** (0.0007) |  | 0.0009* (0.0005) |
|  | Covariance |  | -0.0095** (0.0045) |  | -0.0113** (0.0056) |
|  | Autoregressive correlation | 0.515*** (0.061) | 0.369*** (0.076) | 0.678*** (0.049) | 0.589*** (0.070) |
|  | Variance residual | 0.116*** (0.014) | 0.086*** (0.010) | 0.125*** (0.018) | 0.095*** (0.016) |
| Permanent contract | Variance (intercept) | 0.070*** (0.003) | 0.113*** (0.007) | 0.069*** (0.003) | 0.086*** (0.006) |
|  | Variance (experience) |  | 0.0008*** (0.0001) |  | 0.0006*** (0.0001) |
|  | Covariance |  | -0.0061*** (0.0006) |  | -0.004*** (0.0005) |
|  | Autoregressive correlation | 0.441*** (0.011) | 0.293*** (0.014) | 0.420*** (0.012) | 0.294*** (0.015) |
|  | Variance residual | 0.067*** (0.001) | 0.052*** (0.001) | 0.063*** (0.001) | 0.051*** (0.001) |

market experience for an individual that lies one standard deviation away from the mean is 1.7%, while for those entering with a fixed-term contract it is 2.5%. The relevant percentages for the females are 1.4% for permanent contracts and 2.7% for fixed-term contracts.

The covariance $\sigma_{\mu\gamma}$ is always negative and significant. This indicates that initial and experience-related unobserved heterogeneity are negatively correlated. In other words, the lower the unobserved initial earnings ability the higher the accumulation of earnings ability due to the learning effect over the working career. The minimum variance of initial unobserved heterogeneity differs considerably between the initial types of contracts. In the UK, for the workers that entered the labour market with a fixed-term contract, this minimum value is reached after 6.1 years of experience while for their colleagues entering the labour market with a permanent contract after 8 years. For the British female workers,

Table 5: Covariance parameter estimates - Germany

|  |  | males | | females | |
|  |  | Random intercept | Random slope | Random intercept | Random slope |
| --- | --- | --- | --- | --- | --- |
| fixed-term contract | Variance (intercept) | 0.032*** (0.005) | 0.070*** (0.010) | 0.037*** (0.005) | 0.065*** (0.012) |
|  | Variance (experience) |  | 0.0006*** (0.0001) |  | 0.0007*** (0.0002) |
|  | Covariance |  | -0.004*** (0.001) |  | -0.0043** (0.001) |
|  | Autoregressive correlation | 0.416*** (0.031) | 0.248*** (0.038) | 0.456*** (0.031) | 0.336*** (0.041) |
|  | Variance residual | 0.062*** (0.003) | 0.048*** (0.002) | 0.072*** (0.004) | 0.056*** (0.003) |
| Permanent contract | Variance (intercept) | 0.046*** (0.002) | 0.075*** (0.004) | 0.049*** (0.002) | 0.055*** (0.005) |
|  | Variance (experience) |  | 0.0003*** (0.00003) |  | 0.0002*** (0.00004) |
|  | Covariance |  | -0.003*** (0.0003) |  | -0.002*** (0.0004) |
|  | Autoregressive correlation | 0.405*** (0.011) | 0.256*** (0.013) | 0.390*** (0.014) | 0.298*** (0.016) |
|  | Variance residual | 0.041*** (0.001) | 0.033*** (0.001) | 0.060*** (0.001) | 0.052*** (0.001) |

the difference goes to the opposite direction. For the female fixed-term-contract starters, the minimum value of the variance is reached after 13.3 years of experience while for their permanent colleagues after 'only' 6.8 years. Once again, this shows that, for the British female workers, wage differences due to the initial contract type operate through some unobserved characteristics.

In Germany, the differences in the timing of the minimum variance of initial unobserved heterogeneity are less pronounced than in the UK. For the male workers that entered the labour market with a fixed-term contract, this is reached after 7.7 years, while for those entering with a permanent contract after 9.3 years. For the female workers, the occurrence of this minimum value is almost simultaneous for the two groups of workers: 6.3 years of experience for the fixed-term-contract starters and 6.8 years for the permanent-contract

starters.

The autoregressive correlations and the variance of the residual terms are significant in both countries. In the UK, the autoregressive correlation is somewhat higher for the workers entering the labour market with a fixed-term contract, while in Germany the relevant differences are rather small. This indicates that, in the UK, earnings shocks are more persistent over time for workers starting their career with a fixed-term contract, while in Germany no such differences emerge.

# 5   Discussion

This paper contributes in the research on flexible employment in Europe. In particular, in this paper, we investigated whether the wage of the workers entering the labour market with a fixed-term contract differs from the wage of their colleagues that start their career with a permanent job and how this difference changes as the workers accumulate labour market experience. Moreover, we studied whether earnings shocks and variance due to unobserved characteristics differs between these two groups of workers. In more detail, we decomposed the unobserved individual effects in a component that represents initial earnings ability and a component that represents experience-related heterogeneity, i.e. the learning effect. The variance of these components was estimated separately according to the type of the initial contract. Our analysis was carried out in two countries with very different labour markets and very different regulations concerning fixed-term contracts: the UK where the overall employment protection is low and temporary employment has remained rather stable since the beginning of the 1990's and Germany where employers use fixed-term contracts as a way to circumvent the strict employment protection that regulates a large part of permanent employment.

Clearly, this paper points to some negative wage effects of fixed-term contracts. For Germany, we found that upon entering the labour market, the wage penalty of temporary workers is more persistent for males as for them it disappears only after 12.5 years of working experience, compared to 6.5 years for the females. In the UK, such a wage penalty was found only for male workers. This wage penalty persists over the working career of male workers. In contrast, no initial wage differences related to the type of contract was found for the female workers. For the British female workers, the type of contract in the first job seems to be correlated only with unobserved characteristics that affect wages. For these workers, the initial wage variance due to the unobservables is higher for those that

entered the labour market with a fixed-term contract than their colleagues that started their career with a permanent contract. Contrary to the UK, in Germany the initial contract type accounts only directly for initial wage differentials and is not related to unobserved effects.

Initial difference in wage growth due to the unobservables was found to be decreasing due to the learning effect, as workers accumulate labour market experience. This decrease is faster for workers entering the labour market with a fixed-term contract than their colleagues entering with a permanent contract. In other words, for a worker that enters the labour market with a fixed-term contract, unobserved characteristics cause a larger earnings ability than his/her colleague that enters the labour market with a permanent contract. However, the learning effect is stronger for the former worker and as the learning effect cancels out with the variation in initial earnings ability, initial inequality in wages due to the unobserved effects decreases faster for workers that entered the labour market with a fixed-term contract than their colleagues that started off with a permanent job.

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