The Structure of the Temp Wage Gap in Slack Labor Markets

Elke J. Jahn*

University of Århus, IAB and IZA

Abstract: As a consequence of the rapid growth of temporary agency employment in Germany the debate on the remuneration of temporary agency workers has intensified recently. The study finds that the temp wage gap in Germany is indeed large. Decomposition reveals that the gap is mainly driven by differences in personal characteristics. Temps already suffer from a marked wage decline before entering the temporary help sector. Nevertheless, temporary help employment does not leave a long-lasting scar. After leaving the sector, workers no longer suffer from a wage penalty. A recent reform set a high incentive for temporary help agencies to pay their workers according to a collective agreement. Surprisingly, the unionization of the sector could not bring the widening wage gap to a halt.

Key words: temporary agency employment, wage differential, decomposition, earnings, Germany, reform

JEL-Code: J30, J31, J42

* Århus School of Business, University of Århus, Economics Department, Frichshuset, Hermodsvej 22, 8230 Åbyhøj, elja@dk, Phone: +45 298 59511

1 Introduction

Temporary agency employment is characterized by a tripartite relationship whereby a temp worker is employed by a temporary work agency, which then hires the worker out under a commercial contract to a user firm. The agency is considered to be the employer, determining issues such as wages and terms of employment. The user company has the right to assign tasks to the temp and to supervise his or her work. As part of the general movement towards increased flexibility in employment, temporary agency employment nearly doubled in most European countries in the past decade. In the European Union, the sector employed 3.3 million agency workers or 1.8 percent of the EU working population in 2006 (CIETT 2007).

The rapid growth of this employment form has raised concerns about working conditions and the quality of jobs generated in this industry, predominantly about the level of wages (e.g. Jørgensen 2007, Eurofound 2007). Beside national interest groups and unions, the European Commission sees the working conditions and remuneration of temps as an important area to regulate. In October 2008 the European Parliament approved a proposal for a directive on temporary agency employment. The central aim of the proponents is to prevent discrimination against agency temps by guaranteeing equal treatment for temps in terms of pay and working conditions as workers employed by the user company to do the same job (Eurofound 2008).

Somewhat paradoxically, this has occurred in the absence of any sound empirical evidence. Research estimating the wage gap between temporary agency workers and regularly employed workers is still in its infancy. There are at least two reasons why the available evidence should be treated with caution:

First, due to the lack of longitudinal panel data, which do not allow controlling for workers' characteristics and previous employment history, empirical evidence is still preliminary. Second, there is some indication that workers already suffer from a wage decline before enter-

ing into temporary agency employment. As a consequence, studies failing to take pre-earnings into account will overestimate the wage differentials.

The aim of this paper is to shed some light on the remuneration of temporary agency workers compared to workers working in other branches. Germany is an interesting case to analyze: First, during the past decade Germany went through a period of increasing unemployment reaching its peak in 2004 with an unemployment rate of 13 percent. Despite this labor market slackness Germany's temporary help sector grew with an average annual growth rate of 11 percent and the share of temporary agency workers soared from 0.8 percent in 1997 to 2.7 percent in 2007, employing 730 thousand workers in 2007. The fast development of this sector has fanned fears among critics that temporary help agencies not only undermine job security and stability but also the remuneration of workers.

This study gives answers to the following questions: First, how did the relative wages of temp workers evolve over time? Is the wage penalty a result of events in the workers employment history? Do workers already experience a wage decline before they enter into temporary agency work, and, closely related, are there stigma effects which can be attributed to the acceptance of a temporary agency job? Which are the main factors driving the increase of the temp pay gap?

Finally, as there has been a long-lasting discussion about the afore-mentioned EU directive, Germany already implemented the (planned) directive into national law in 2003. The key objectives of the German reform and the planned directive is to stipulate equal treatment for temporary agency workers from the first day of assignment on. German temporary work agencies and, more generally, Member States can derogate from the principle of equal treatment if the workers are paid either by a collective agreement or by an agreement between the national social partners (Eurofound 2008). Before 2003 there were very few collective agreements in the German temporary help sector. As a consequence of the reform nearly all temporary help agencies signed sectoral collective agreements in 2003. Therefore, this paper can at

least preliminary assess whether the new directive will have any practical effect on the remuneration of temporary agency workers.

2 Review of the Literature

According to the theory of compensating wage differentials (Rosen 1986), wages of temps should compensate for undesirable job characteristics, like the lack of representation by unions, lack of coverage by the social security and health system, and often lack of vacation entitlement. Temporary help jobs are in general of markedly short tenure (Antoni and Jahn 2009); temps face a higher unemployment risk and have to expect greater income volatility (Segal and Sullivan 1997). Moreover, there is some indication that temps are more exposed to risk factors than permanent workers (Storrie 2002, Pedersen et al. 2005). All these unfavorable job characteristics should result in higher wages in the temporary help industry. Comparable higher wages are also to be expected in the tight skilled labor market segments, where firms as well as agencies have difficulties to recruit new staff (Houseman et al 2003).

However, there are several arguments justifying why temporary help agencies earn less. First, temporary agency employment has features of an investment. It is often argued that employment spells in temporary help agencies increase workers' human capital and provide the opportunity to gain work experience. While being on assignment, temps can develop labor market contacts that lead to stable employment or at least to longer-term employment with higher remuneration (e.g. Autor and Houseman 2005). The outcome of these investments in terms of improved future employment and wage prospects accrues mainly to the worker. Human capital theory therefore would predict that the worker also has to bear the costs by accepting lower wages while being employed in the temporary help industry where they merely accumulate general human capital (e.g. Becker 1964).

Second, temps may also profit from the placement activity of the labor market intermediary, which decreases their search costs and improves match quality. In a well functioning

labor market, temps must pay a premium for this service. But often temps face credit market rationing, because they may have been previously unemployed. The wage penalty can be seen as a compensation for this service (Jahn 2004).

Third, compared to workers in other branches temporary help workers may be less productive. Firms may invest less in temp workers' capital equipment to enhance their productivity. Temp workers may be less career-oriented or less motivated, invest less in firm-specific human capital, and are often employed below their qualification level, which may justify a lower productivity as well. Finally, as Blank (1998) points out, agencies may also pay wages below the productivity of the workers, because they are able to exercise monopsony control over the wages of workers filling the bottom tier of a two-tier pay structure.

Regarding the size of the earnings after a temporary agency worker left the sector, the theoretical literature also does not provide consensus. In order to attract high ability workers, temporary help firms might offer a package of free general training instead of paying higher wages. Able workers are prepared to accept these packages in expectation of wage gains in a later regular employment relationship. Autor (2001) argues that economies of scale predispose temporary help agencies to provide up-front general training to their workers to a higher degree than regular firms can do. It may therefore be possible that temps are able to acquire more human capital than workers being employed in other branches for a given period of time. In addition, while being assigned, temp workers may be able to gain useful information about the particular occupation they are well suited for (Segal and Sullivan 1998). Such information and training may be accompanied by lower wages while working for a temporary help agency, but may result in an increase of wages in post-temp employment. In addition, firms increasingly use temporary agency employment as a screening device. If the client firm takes over a former temp worker, it is likely that the worker will receive the same remuneration than a directly hired worker. The reason is that two-tier wage structures within a firm may create motivational problems associated with paying similar workers at different rates

(Houseman et al. 2003). Alternatively, temp workers may be stigmatized in the sense that future employers may perceive a previous temporary help spell as an indicator of lower ability and motivation of the worker. This negative signal may result in fewer job offers and job offers with lower wages than other workers would receive (Blanchard and Diamond 1994).

Taking into account these alternative explanations temporary agency employment might have opposing negative and positive effects on the relative wages of temporary agency workers, with the dominant effects being an empirical question.

There are numerous studies for the US providing evidence for a wage gap between temps and non-temps. Using data from unemployment insurance records of the state of Washington for the period of 1984 to 1994, Segal and Sullivan (1998) estimate a wage penalty of about 10 percent after controlling for both levels and trends of unobserved characteristics. One drawback of the study is that they could not control for worker characteristics or the occupation of the worker. Segal and Sullivan (1998) explain one part of the wage gap by pre-temp earnings: The relative wage of temps already declined before they accept a job in the temporary help sector. In addition, they provide evidence that workers may accept a temp job because it opens possibilities to find a subsequent job match with the same wages as non-temps. One quarter after leaving the temporary help sector, the wage gap is still about five percent; after five quarters the wage disadvantage disappears entirely.[1]

However, Autor and Houseman (2005), using a random assignment of TANF recipients, cannot confirm that temp workers' remuneration raises after the temps have left the temporary help sector. In contrast to these results, Heinrich et al. (2008) provide evidence for welfare to work recipients that temporary help workers fare better in terms of earnings and earnings growth after leaving the temporary help sector and that their income is associated with better outcomes than not working at all. Andersson et al. (2007) estimate the impact of temporary

[1] In an earlier study, Segal and Sullivan (1997) report an average wage gap of 3 percent for temps and workers working for professional employer organizations. Because the data set used suffers from severe misreporting, the study is not discussed in greater detail. See Dey et al. (2006) for further information about identifying temps in US data sets and risks of misreporting.

agency employment on subsequent outcomes for five US states for the late 1990s. Temps suffer from lower earnings than other workers while working for a temporary help agency. Furthermore they confirm earlier findings that temporary help workers can considerably improve their income in a subsequent job, if they find stable employment outside the sector.

Contrary to the US literature Cohen and Haberfeld (1993) estimate lower returns to human capital investments for Israeli temporary help workers in some occupations, but not in others. They report an average wage gap of 8 percent in 1983. However, temps working as typists and bookkeepers have a wage advantage of about nine and 15 percent, respectively.

For European Countries the empirical evidence is rather mixed as well. Forde and Slater (2005) report an average wage gap of nine percent for the British temporary help service sector in 2000 after controlling for occupation, worker and job characteristics.

The principal of equal treatment is already into force in Portugal. Nevertheless, Böheim and Cardoso (2007) find that Portuguese temps have to accept a wage differential of about two percent during 1995 to 2000. The wage gaps differ markedly among labor market groups. Younger workers earn between one and four percent more than comparable permanent workers, whereas prime age men have to accept five percent lower wages. Stigma effects after accepting a temp job cannot be proved for young workers; but there is some evidence that prime age workers experience a slower wage progression after leaving the temporary help industry.

Apart from some studies reporting descriptive wage differentials in Germany, there are two studies estimating the wage penalty for temps. Based on data from a medium-sized company in the service sector, a recent study by Oberst et al. (2007) estimates a wage gap of 29 percent for temp workers for 2005. The results are only a rough indicator for the wage gap temp workers have to accept. Among the 500 employees, only 43 employees were employed as temps. Lack of information precludes controlling for occupation, tenure or the employment history of the temp workers. Based on the IAB Employment sample (IABS), Kvasnicka and Werwatz (2002) estimate wage differentials and pre- and post-earnings for temporary help

workers for Western Germany for the period 1980 to 1990. The authors find a 17 percent wage gap for men and 19 percent for women. In addition, Kvasnicka and Werwatz (2002) estimate pre-earnings of temps before entering the temporary help sector. They find that temp workers already suffer from a wage decline before entering the sector.

This study contributes to the literature in various ways: First, it estimates the wage gap for temp workers after the regulation on temporary agency employment were relaxed significantly in 1997. Second, the study takes a closer look on the temp wage gap of Eastern German workers. Comparing the Eastern and the Western temp wage differential may lead to new insights as the returns to experience and education still lag behind in the East German labor market, even almost 20 years after unification (Orlowski and Riphahn 2008). Third, numerous researchers presume that temps earn lower wages because they are less motivated and career-oriented. This paper takes at least part of the unobserved heterogeneity into account by controlling for the workers' employment history of the past five years, in addition to socio-demographic and job characteristics. Moreover, this paper follows the methodological approach of the displacement literature in estimating pre- and post-earnings of workers entering and leaving the sector.

Fourth, it is the first study which decomposes the change in the temp wage differential into a portion due to changes in the measured characteristics of temporary agency workers compared to non-temp workers, changes in prices of measured characteristics and changes in the unexplained temp wage gap. Finally, by exploiting the recent reform of the law covering the temporary help sector the paper investigates whether the lack of unionization of the sector has been the reason why temps are not able to capture compensation for higher flexibility.

3 The German Temporary Help Sector

In Germany, temporary agency employment is regulated by national legal statutes. The "Labor Placement Act" governs this sector, with specific regulations applying only to temporary

help agencies. As in many European countries, the law prohibits temp workers from replacing workers on strike and in the construction sector (Arrowsmith 2009) and temporary help agencies are obliged to apply to the Federal Employment Agency for authorization to operate.

Since the Labor Placement Act came into effect in 1972, it has been amended several times.[2] In April 1997, a new regulation of the temporary help service sector took effect, which consisted of three parts: First, the maximum period of assignment, which determines how long a temp may be assigned to a user firm without interruption, was extended from 9 to 12 months. Second, temporary help agencies were allowed to conclude fixed-term contracts which could be prolonged three times until total employment duration added up to 24 months. Third, the reform relaxed the synchronization ban in the sense that an agency was now allowed to conclude an employment contract for the duration of the first assignment.[3]

The most recent reform in 2003 was intended to strengthen the rights of temporary help workers by applying the principle of equal pay starting with the first day of an assignment. The new law allows deviation from the principle of equal treatment, if the agency applies the conditions stipulated in a sectoral collective agreement to all its temp workers. As a consequence, wage gaps between temps and the permanent staff of a user firm are only possible, if the wages established in the user firm are higher than those in the temp industry's collective agreement. In addition, by signing a collective agreement, the agency can free itself from all other regulations. Prior to 2002, the sector had very few collective agreements. As a consequence of the reform, numerous collective agreements were concluded. By the end of 2003, nearly 97 percent of all temporary help agencies paid their temps according to a sectoral collective agreement. Consequently, the principle of equal treatment and all other regulations have lost any practical meaning for the temporary help industry.

---

2 This section concentrates on the regulations after 1997. A detailed description of the reforms of the law regulating temporary agency employment since the 1980s can be found in Antoni and Jahn (2009).

3 In 2002, the maximum period of assignment was extended from 12 to 24 months. In addition, this reform applied the principle of equal treatment starting at the 13th month of an assignment. Given that most placements last less than six months, it is likely that this reform never had any practical effect (Bellmann et al. 2003).

4 Data Set and Descriptive Evidence

4.1 Data

The empirical part of the paper uses the IAB Sample (IABS), a two percent random sample of all German employees registered with the social security system covering the period 1975-2004. The IABS provides information on socio-economic and job characteristics at the individual level. Supplementary information on unemployment benefit recipients is added to the sample. Being of administrative nature, the IABS provides accurate longitudinal information on the workers employment and unemployment histories. Reported wages are used to calculate social security contributions of the employers and are highly reliable. Thanks to its large size and the reliability of the wage information, the IABS is well suited for the analysis of wage differentials.

Nevertheless, the IABS has also some limitations for the purpose of this study: First, employment spells in temporary help agencies are identified by an industry classification code. This implies that temporary agency workers cannot be distinguished from agencies' permanent administrative staff, which accounted for about five to seven percent of agency employees in 2003, depending on the size of the firm (Jahn and Wolf 2005).

Second, since gross wages can only be observed up to the social security contribution ceiling, about three percent of the employment spells are right-censored. This may affect the estimates in the highly-skilled segments of the labor market. We therefore use imputed wages above the social security contribution ceiling using a heteroscedastic single imputation approach specifically developed for the IABS data set by Büttner and Rässler (2008).

Third, the dataset reports gross daily wages and does not provide information on the hours worked. We therefore exclude part-time and marginal employees, interns, home-workers and workers with wages below the social security contribution threshold from the sample. In contrast to the US and some other European countries, temporary help jobs in Germany are rarely

second or part-time jobs. In 2000, only three percent of the temp workers had a part time job. Therefore, we do not expect that the exclusion of these workers affects the results.

Fourth, trainees are excluded as they belong to the agency staff and are not assigned to user firms. Fifth, the analysis is restricted to nonagricultural employees between the ages of 17 and 60. The first reason is that we want to exclude students working during the summer break. Second, as the employment career of temp workers is more unstable it is plausible to assume that they will retire earlier. Sixth, ethnic German immigrants are coded as foreigners, because their human capital and employment history may be closer to that of foreigners (Brücker and Jahn 2008).

Information on the education level is missing for about 17 percent of the individuals. Missing information on education was imputed by employing the procedure developed by Fitzenberger et al. (2005). In a first step, spells with valid and invalid educational information are identified by classifying the reliability of employers' reporting behavior. In subsequent steps, only valid educational information is used for extrapolation. This procedure allows us to correct inconsistent education information on individuals over time as well. After applying this imputation procedure, we had to drop only 1.5 percent of the individuals due to missing or inconsistent information on education.

Finally, we restrict the analysis to the period 1992 to 2004. There are two reasons for this decision: Eastern Germany is only included in the data-set after 1991. We use the information for the period 1992 to 1996 to control for the employment history of the workers of the previous five years. This allows estimating wage gaps for the period 1997 to 2004. Moreover, the period was chosen in order to avoid effects of the legal change in 1997 (see Section 3).

To estimate the wage differentials we constructed a quarterly panel data set but took advantage of the daily spell structure to construct the workers' employment history.

4.2 Definition of Variables and Descriptive Evidence

The dependent variable is the log gross daily wage of the workers deflated by the CPI deflator (base year 2000). To identify the wage differentials, we include a dummy variable, which takes on the value 1, if a worker is employed at a temporary help agency, and zero otherwise.

Three socio-demographic variables are available: Sex, age, age squared, and nationality. In addition, the IABS provides six educational variables: secondary degree without vocational training, secondary degree with vocational training, high school degree without vocational training, high school degree with vocational training (reference category), polytechnic and university degree.

We use the employment history of the past five years as a proxy for unobserved heterogeneity influencing the wage level, for example with regard to career orientation and social skills: Previously registered as unemployed, employed in the temporary help sector, and otherwise employed (base category). Individuals without previous information for more than 30 days before starting a new job are coded as previously outside the labor force. In addition, we controlled for the duration of the previous labor market status by constructing three classes: 0 to 6 months (base category), 6 to 12 months, and more than 12 months. The data set also allows differentiating whether the worker received previously unemployment benefits, maintenance allowance (reference category) or unemployment assistance. In addition, we controlled for job tenure and job tenure squared in weeks, the total employment duration in weeks during the past five years, the number of jobs and temp jobs held during the past five years.

The IABS provides detailed information on the predominant occupation of the worker, which is used as an indicator of the industry to which the worker is assigned. As the tasks of temps may vary between assignments, we use a broad classification and differentiate between six occupational groups: The first are the technical occupations with highly skilled workers (engineers, mathematicians, and chemists), the second are service occupations, and the third are clerical occupations. In addition, we divide the manufacturing occupations into three va-

riables because of evidence that particularly the German metal industry (e.g., automobile and aircraft industry) uses temps to circumvent the high wages agreed upon in collective bargaining. We therefore first pool all typical occupations in the metal industry in the dummy variable "manufacturing occupations in the metal industry," our fourth group. Then we aggregate laborers without a specific occupation, but belonging to the manufacturing occupations as well, in a separate dummy variable, the fifth group. The sixth group "other manufacturing occupations", the base category, includes all remaining workers.

To account for heterogeneity among the agencies, we included five firm size classes. The largest class, firms with more than 500 employees, acts as the reference category. Some agencies specialize in providing highly skilled temps for sophisticated tasks. We therefore include three variables capturing the percentage of temp agency employees with a university degree, with no vocational training and with vocational training (base category). The fraction of university graduates serves as a proxy for being employed in such a specialized agency.

[Table 1 about here]

As macroeconomic variables we use first, the real annual growth rate of GDP, as the demand for temporary agency workers varies with the economic cycle; second, 12 dummy variables at the regional level indicating the tightness of the regional labor market; and third, three variables indicating whether a worker works in a metropolitan, urban or rural area.[4]

Table 1 provides some descriptive statistics on selected variables in East and West Germany. In our analysis we are able to include 12 million spells, among them 157 thousand temporary agency work spells, and 645 thousand workers. About 19 percent of the temps and 20 percent of the non-temp workers are employed in East Germany. Temporary help workers on average earn less than regular workers. The average daily real gross wage of temp workers is 50 Euros during the observation period, the average wage for regular workers 88 Euros.

[4] A description of the estimated index of regional labor market tightness can be found in Blien et al. (2006).

Most temporary help workers are male (76 percent in West und 81 percent in East Germany), which is true for our entire observation period. Compared to the share of non-German workers in overall employment, which amounts on average to 9 percent, foreigners are over-represented in temporary agency jobs at 21 percent. Table 1 reveals that foreign workers do not play a role in East Germany. The average age of temp workers (35 years) is lower than in the comparison group (40 years). Workers without vocational training are overrepresented in temp employment (19 percent), compared to their share in regular employment (9 percent).

About two thirds of all temps are employed in manufacturing or as laborers, in East Germany 73 percent. In contrast to most European countries, service jobs and clerical occupations do not play an important role in the German temporary help sector. One out of four temp workers and one out of five regular workers had previously been out of the labor force and therefore appeared to have only a loose attachment to the labor market. About 50 percent of the East German and 35 percent of the West Germen temps were previously unemployed, whereas only 13 percent of the Western and 23 percent of the Eastern non-temps experienced an unemployment spell before accepting their current job. More than 60 percent of the regular employed workers had been regularly employed before their current job, which is true for only about 20 percent of the temp workers.

5 Empirical Strategy and Estimation Results

5.1 Wage Gap of Temporary Help Workers

To estimate the temp wage differentials, we use a fixed effects model. The main advantage of the fixed effects estimator for our purpose is that it allows for self-selection into temporary agency employment based on the time-invariant component of the unobservables, and it does not require strong distributional assumptions (Heckman et al. 1999, 2005; Wooldridge 2002).[5]

[5] Missing information about most common variables measuring the household context, like marriage status and number of children living in the household, makes it quite impossible to justify a matching approach.

In order to get a first approximation for the differences in mean wages between temps and non-temp workers, we estimate a simple regression model which includes a dummy variable for being a temp worker, a set of dummy variables for each quarter in the sample period and quarterly interaction terms for temporary agency work.

[Figure 1 about here]

Figure 1 displays the average wage differential for temporary help workers in Eastern and Western Germany in percent. The first striking result is that the wage differential exhibits a downward trend during the entire observation period, starting with 35 percent in 1997 and increasing up to 42 percent in 2004. This result confirms earlier findings by Kvasnicka and Werwatz (2002), who found a widening wage gap for the period 1980-1990 as well. As can be seen in Figure A1 and A2 in the Appendix, which show the development of the average and median wages in West and East Germany, the rising wage gap is a consequence of a real wage increase for regular workers of about six percent and second of a real wage loss for the temporary agency workers of about 8 percent.

Second, the wage differential for Eastern Germany is considerably lower than that for Western Germany. This difference may be a result of two facts: The general remuneration of East German workers is still considerably below that of West German workers.[6] At the same time, the reservation wage at which a worker is willing to accept a job is set by unemployment benefits and unemployment assistance. In order to attract workers, the temporary help agency sector has to pay a wage that is equal to or above the reservation wage. With respect to this bottom line, it seems that the temporary help service sector could not lower the temp wages in East Germany further. Figure A1 and A2 seem to support this surmise.

Third, during the observation period, which covers roughly one business cycle, there is no cyclical but a strong seasonal pattern visible which may be explained by the seasonality of

[6] The difference is usually explained by the lower productivity of workers who stayed in East Germany after reunification, the fact that most East German firms do not pay according to collective agreements, and, as recently shown by Orlowski and Riphahn (2008), by lower returns to experience.

temporary agency employment. Finally, as pointed out earlier, we would have expected that the wage gap decreases after 2003 as a consequence of the unionization of the sector. The descriptive evidence in Figure 1 do not confirm this expectation.

To get a more detailed picture, we include individual worker and job characteristics in an OLS model, specifically worker characteristics, occupational and regional dummies, the BIP growth rate, firm size and a set of time dummies. To this specification, we add in a second step the previous employment history as described in Section 4.1. As pointed out earlier, the inclusion of the employment career variables may be important to get a more precise estimation of the wage penalty temp workers have to accept. The previous regression model is modified to:

$$w_{it} = \alpha_0 + \tau_t + \beta D_{it} + \gamma x_{it} + \varepsilon_{it} \quad (1)$$

where w_{it} is the log of the real wage for worker i in quarter t. The τ_t's are the coefficients of a set of dummy variables for each quarter in the sample period that capture the general time pattern of earnings in the economy, D_{it} is a dummy variable that is one when the worker is employed by a temporary help agency and zero otherwise, and β measures the impact of temp work. The vector x_{it} consists of the observed worker and job characteristics and, in a second step, the employment history of the worker; ε_{it} is the error term with the usual properties. We estimate the parameters of (1) by OLS at the mean and the median.

It is well known that participation in the temporary help sector is not random. Temps rather differ from regular workers in numerous dimensions. In a next step, we take advantage of the longitudinal nature of the dataset by including worker specific dummies. By this, time-invariant differences in the characteristics of workers can be controlled for. In this case, the specification of the model changes to

(2) $$w_{it} = \alpha_0 + \tau_t + \alpha_i + \beta D_{it} + \gamma x_{it} + \varepsilon_{it},$$

which differs from (1) by the inclusion of a constant for each worker, α_i, which summarizes the impact of permanent differences among workers in unobserved characteristics.

[Table 2 about here]

The results of this stepwise procedure are summarized in Table 2. In Specification (1) worker and job characteristics are included as controls; Model (2) and (3) include in addition the employment career of the worker. Model (2) presents the mean and Model (3) the median log wage gap. Finally, Model (4) presents the results of the fixed effects specification. The results in Table 2 confirm our descriptive evidence: the wage gap in West Germany is larger than the wage disadvantage in East Germany and male temp workers have to accept a higher wage penalty than female workers. After we added the recent employment career to the set of controls the estimated wage gap in all estimations declines by roughly nine percent. This result documents that estimations of wage differentials for temp workers failing to include the recent employment history may overestimate the true wage gap. In addition, Model (2) in Table 2 reveals that the wage disadvantage for temps is rather high, even after controlling for observable worker characteristics. Male workers have to accept 23 percent lower wages; female workers must accept a wage penalty of 16 percent.[7] The finding that female temps have to accept a lower wage penalty than men also remains stable after we divided the sample into Eastern and Western Germany. The reason may be that women, who only represent the minority among temp workers, more frequently work as clerks. It is likely that their human capital matches the requirement of the temp job at hand more often. Model (3) presents the median wage gap. The general pattern remains constant but the wage gap increases slightly for men and considerably for women. Nevertheless, in light of the existing international empirical

[7] Calculated as $(e^{\hat{\beta}} - 1) * 100$, using the coefficients in Table 2.

evidence, summarized in Section 2, the German temp wage gap of 15 to 24 percent estimated so far is high and is not in line with the standard model of compensating wage differentials.

The Specification (4) in Table 2, which controls for unobserved heterogeneity, further reduces the wage differentials for all workers to 20 percent, but the difference to Model 82) is not pronounced.[8] It seems that including the employment career of the worker captures a large part of the heterogeneity between temp workers and non-temp workers. Nevertheless, the estimates of rho suggests in all cases that almost all variation in the log wages is related to individual differences. The *F* test indicates that there are significant individual effects, implying that the standard OLS regression would be inappropriate. Therefore, we only discuss the results from the fixed effects estimations here.

The individual constant term in a fixed effects panel regression model usually measures unobserved heterogeneity, such as social skills and the motivation of the workers. Temp jobs in Germany are of exceedingly short duration (Antoni and Jahn 2009). It is plausible to assume that temp workers are usually less motivated, they are less linked to their employer and they presumably invest less in firm-specific human capital. In addition, the motivation to accept a temp job may not be to build up a long-lasting employer-employee relationship. This suspicion seems to be confirmed for the male wage gap, as it decreases after adding the individual fixed effects. Surprisingly, in the case of female temporary help workers the wage differential increases in the fixed effects specification, indicating that female temp workers might be more motivated than their non-temp counterparts. Why? Female temps more often accept a temp job after an interruption in their employment career, e.g. in order to raise children. After such a break, it is often difficult for women to re-enter into the labor market. It may be plausible that they more often accept a temp job as a stepping stone into regular employment compared to men. Therefore, women may work harder and invest more in firm-specific

[8] A Hausman test rejects the null that the individual effects are uncorrelated with the regressors in all models. Moreover, a modified Wald statistic for group-wise heteroscedasticity in the residuals of the fixed effect regressions rejects the null hypothesis that there is group-wise heteroscedasticity present (Greene 2003, p. 328).

human capital than male temp workers hoping that the temp firm will be willing to offer them a follow-up job or to be taken over by the client firm.

[Table 3 about here]

Some groups tend to fare differently in the labor market. Table 3 reports wage gaps for different worker and job characteristics. The results indicate that temp workers below the age of 20 earn 14 percent less than their full-time regular counterparts. Compared to the wage differential of the full sample (20 percent), it is considerably lower. The same holds for workers which are older than 55 years. To investigate whether the wage gap varies between education, the six educational groups are summarized into three groups: without vocational training, with vocational training and with a university or polytechnic degree. It seems that the pay gap does only slightly vary between the education groups.

One would expect that workers who were employed outside the sector before entering the temporary help sector must accept the lowest wage penalty. Lower wage disadvantages for workers with a previous experience in temporary help employment would be plausible as well. Both groups have been directly employed before they entered the current temporary help job and should posses more marketable human capital compared to workers coming from unemployment or out of the labor force. These surmises cannot be confirmed by Table 3. On the contrary, workers with a previous temp experience must accept the highest wage penalty. One possible explanation could be that having a previous temp job acts as a stigma effect. Compared to temporary help workers who received unemployment assistance, previous unemployment benefit recipients must accept a slightly higher wage differential.

In Germany, the metal sector employs most of the temporary agency workers, particularly the automobile industry. They usually need workers trained in metal occupations. In addition, it is said that these industries use temp workers not only to increase flexibility, but also to circumvent the high wages agreed in collective agreements. This motive may be most impor-

tant in the metal industry, because the metal unions play a pioneering role in Germany when it comes to collective bargaining and pays the highest wages. According to this argument, the client firms' motivation to employ temp workers is mainly driven by the desire to use temp workers as a cost-cutting instrument. Table 3 does not provide any evidence that workers in the metal industry have to accept a higher wage penalty than temps working in other occupations.

According to "knowledge economy thesis" (Houseman et al. 2003) some temp workers exercise highly specific tasks. Many of these are skilled workers in information and communication technology and engineers who are assigned to large-scale projects with a limited time horizon. These workers prefer to work as temps in order to increase their remuneration by working on a flexible basis. The results in Table 3 confirm that the wage gap for technicians is considerably lower compared to the average. Nevertheless, the wage gap is still large at 12 percent and cannot support the argument that technicians work at temporary agency firms in order to increase their remuneration.

5.2 Pre- and Post-earnings

As is already evident from Table 1, temp workers often accept a temporary help job after an interruption in their employment career. About 66 percent of all temps received previously unemployment benefits or have previously been out of the labor force. Even though we controlled for the employment history of the past five years, such events may be associated with reductions in wages that would reflect circumstances that lead them to accept a temp job.

In this section, the paper follows Jacobsen et al. (1993) and Sullivan and von Wachter (2007) by taking into account pre- and post-earnings of temps. To do so, we construct a set of dummy variables representing quarters before or after a spell in temporary agency work, respectively.

$$(3) \qquad w_{it} = \alpha_0 + \tau_t + \alpha_i + \sum_{k \geq -12}^{12} \beta_k D_{it}^k + \gamma x_{it} + \varepsilon_{it}.$$

If quarter *t* is *k* quarters after the temp spell, then $k > 0$; $k < 0$ in quarter before the temp spell started. β_k is the effect of temp employment on worker's earnings *k* quarters preceding or following its occurrence.

To avoid any distorting effect of earlier temp spells on wages, we include only workers without temp spells two years before the observation period starts and who had only one temp episode, defined as the sequence of consecutive quarters in which a worker holds a temp job. In addition, we exclude workers who held a temp job during the period 2003 to 2004 from our analysis for two reasons: First, to insure that the wages are not affected by a temp spell right after 2004, which cannot be observed yet in our dataset but will affect the wages in 2004 and 2003. Second, we want to exclude effects on earnings as a consequence of the reform in 2003. Moreover, we keep only workers which are at least 8 quarters in the data set. Finally, we allow *k* to range between -12 and 12, implicitly assuming that $\beta_k = 0$ more than 12 quarters removed from the temp spell.[9]

[Figure 2 about here]

Figure 2 and Table A1 document that, compared to Model (2) in Table 2, the estimated wage gap is slightly higher in magnitude after we limited the sample as described above. Furthermore, Figure 2 shows that temp workers indeed suffer from a wage decline already before entering the temporary help service sector. Two years before entering the sector, workers had to accept a wage gap. The wage differential increases up to 7 percent one quarter before entering the temporary help service sector.

[9] As a robustness check, we let range |*k*| between eight and 16 quarters. In addition, we run the estimations including all workers and including only workers who had observations for the entire observation period. It turns out that the general results are still robust.

After successfully leaving a temp job for a permanent position, the wage gap disappears after two quarters which overlaps with the common probationary period during which workers often receive lower wages. All former temps caught up and do not have to accept lower earnings than their permanent counterparts (Table A1). Of course, these figures only hold for a subset of the temp population, namely the temp workers who have found a permanent position after leaving the temporary help service sector. In our dataset on average only 25% of the temp workers found a regular employment after leaving the temporary help sector.

The marked decline of temp wages one period before entering the temporary help sector indicates that the earning potential of temps at the time they enter into the sector is lower compared to that of their non-temp counterparts. Therefore, the estimated wage differentials reported so far in Tables 2 and 3 may only be seen as an upper limit for the true wage gap. Unfortunately the counterfactual, i.e. the earning potential of temps not working as temps, is not observable. Instead, we take the earnings of temps one quarter before entering the sector as an approximation. After taking the pre-earnings potential into account, the last specification (5) in Table 2 shows that the wage differentials decline to 14 percent for West German male temps and 16 percent for East German and West German female temps.

5.3 Decomposition of the Wage Gap

The last section has shown that the recent employment history of the workers is an extremely important factor in explaining the temp wage gap and that the temp pay gap widened substantially during our observation period. Decomposition of the wage gap might help to explain the increase in the earning differences between temp workers and non-temp workers. The basic insight of the decomposition approach is that it is useful to separately identify the impact of group specific factors like the relative qualifications of specific labor market groups and discrimination against them from the effect of price changes that are common to both groups. One reason for the rise in the temp wage differential may be that the measured characteristics

of the temp workers worsened over time or that their labor market commitment may have declined. Another possibility may be that discrimination against temp workers may have increased over time. This would be an indication that temporary agency employment increasingly stigmatizes temp workers. Another explanation could be that increases in the prices for labor market skills measured in our case by the recent employment history of workers, for which temporary agency workers have a deficit, raised the temp wage differential.

In order to shed light on these questions we decompose the temp wage gap by using the decomposition approach suggested by Juhn, Murphy and Pierce (1991) and Blau and Kahn (2004, 2006). Using this framework we begin with the wage equation:

(4) $$w_{it} = x_{it}\beta_t + \sigma_t\theta_{it},$$

where w_{it} is the log of wages at time *t*, x_{it} is a vector of explanatory variables, β_t is a vector of coefficients, θ_{it} is a standardized residual with mean zero and variance 1, and σ_t is the standard deviation of the residual. The mean outcome between two groups (i.e. temp workers and non-temp workers) can then decomposed as follows:

(5) $$\Delta w_t = \Delta x_t \beta_t + \Delta\theta_t\sigma_t$$

Where Δw_t is he difference in mean outcomes between the groups, Δx_t is a vector of the group differences in means of the regressors and $\Delta\theta_t$ is the group difference in mean standardized residuals. The first term $E = \Delta x_t \beta_t$ is the predicted gap which reflects the explained part of the differential due to differences in the observed quantities. The second term $U = \Delta\theta_t\sigma_t$ is the residual gap and reflects the unexplained part of the differential due to differences in unobserved quantities. Given two periods 1 and 2 the difference in the wage gap between temp workers and non-temp workers can be further decomposed provided one of the two periods serves as a benchmark:

(6) $$\Delta E_Q = (\Delta x_2 - \Delta x_1)\beta_1$$

(7) $$\Delta E_P = \Delta x_1(\beta_2 - \beta_1)$$

(8) $$\Delta U_Q = (\Delta \theta_2 - \Delta \theta_1)\sigma_2$$

(9) $$\Delta U_P = \Delta \theta_1(\sigma_2 - \sigma_1)$$

Equation (6) reflects the contribution of the change in the predicted gap that is explained by changes in the group difference in observed characteristics of the workers at fixed prices, the observed quantity effect, while (7) is the part which is due to changes in observed prices or the current market value of the observed characteristics indexed by non-temp worker prices. Similarly, the unexplained part of the differential can be decomposed into ΔU_Q which reflects the change that is due to changes in the group differences in residual positions and ΔU_P reflecting the changes in unobserved prices for the unobserved quantities. The sum of latter two effects is commonly taken as an estimate of discrimination in a conventional decomposition but may also be due to unmeasured productivity differences between temp workers and workers working in other branches.

Table 4 presents the results of the decomposition, where we decomposed the observable quantity effect and price effect further into the contribution of three groups of variables: the contribution of education, employment history, and occupation as described in Section 4.1.

[Table 4 about here]

Table 4 shows the results of the decomposition of changes in the temp wage gap for which we have divided the sample into two periods: 1997-2000 and 2001-2004. The first result is that, in both observation periods the differences in the observed quantities (prices and worker characteristics) explain about 53 percent during 1997-2000 and 58 percent of the log wage differential in 2001-2004, which is in line with our previous findings in Table 2. During the obser-

vation period the temp wage differential increased by 0.056 log points. The major contribution to this rise are changes in observable worker characteristics which contributed 0.062 log points, while the unexplained part decreased the wage penalty by 0.005 log points.

Relative experience levels, measured by the workers employment history, accounted for a 0.018 log point fall in the temp wage gap but at the same time measured prices for marketable human capital increased the pay gap by 0.031 log points. The observable education as well as the occupation of the temp workers contributed to a rise in the wage gap by 0.007 log points, respectively, while there is nearly no observable price effect visible for both groups of variables. However, temp workers moved up the non-temp workers residual distribution, an effect contributing to a 0.019 log point decrease in the temp pay gap.

Regarding the general pattern there is hardly any difference between Germany and the remaining specifications dividing the sample in West and East Germany and male and female workers. Two results are worth mentioning: For Female temp workers as well as for East German workers the gap effect contributed considerably to a fall in the pay gap by 0.035 log points and 0.031 log points respectively indicating "discrimination" or the unobserved quantity effects has become less important. The observable marketable human capital for female workers influences the wage gap in the same direction. But this effect is fully canceled out by the observable price effect.

5.4 The Effect of Collective Agreements in the Temporary Help Sector

In a last step, we test whether the recent reform at the beginning of 2003 had an effect on the remuneration of temps. Within the individual fixed effects framework, we are able to estimate the causal effect of the reform on the wage differential for temps by means of a difference-in-difference specification. To do so, we include a time dummy for the reform period and an interaction term for the reform dummy with the temp indicator. During the year 2003, temporary help agencies could choose between using the old regulatory framework or applying col-

lective agreements. We therefore excluded the year 2003 from our estimations. The parameter estimates of the interactions of the reform and the time dummy indicate whether there is a causal effect of the reform on the wage gap.

[Table 5 about here]

Table 5 shows that real wages decreased about three percent for the entire economy after 2003. The wage decline was much more pronounced for temp workers than for regular workers. In addition, temps had to accept a drop in earnings of about five percent. Table 5 furthermore documents, that this result is also stable, if we divide the data-set according to East and West German temps and female and male temps. The only exemptions are East German female temps. They could realize a wage increase of 2.5 percent.

Contrary to the expectation, the results indicate that the collective agreements in the temporary help sector could not bring the widening wage gap between temp workers and non-temp workers to a halt. On the contrary, it seems that the new legislation was used by the temporary help service sector to decrease wages further. A second explanation could be that parallel to the reform of the law covering the temporary help sector a bundle of other legislations came into effect. The so called "Hartz-Reforms" put notably pressure on unemployment assistance recipients which had to prove their search effort. The data indeed show that the share of temps who received previous unemployment assistance increased considerably from nine percent in 2002 to 12 percent after 2003.

Collective agreements often impose work rules, such as breaks after a predefined period of continuous work at the assembly line, number of vacation days, pension benefits or minimum training requirements, which was also the case after collective agreements were introduced in the German temporary help service sector. These benefits usually increase the quasi-fixed costs of labor and can be seen as non-wage benefits for temps and may have lowered the wages for temps.

According to anecdotal evidence, before collective agreements in the temp sector were introduced most agencies did not use working-time accounts. As temporary agency workers often work over time, they received in addition to their wages overtime premiums. This has changed considerably after the reform as specific rules in the three major collective agreements were included which requires that workers first of all have to reduce their stock of hours in periods with low demand. Consequently, one reason for the decline in remuneration could be that temp workers receive less over time premiums.

The data at hand do not provide any information of that kind. Therefore, one should be cautious in concluding that the reform worsened the general working conditions of the temps.

6 Conclusions

As in most European countries, in Germany temporary agency employment experienced a considerable growth during the past decade. Recent statistics indicate that nearly three percent of the dependent workforce is working in the temporary help sector. The reasons for this shift away from permanent positions are unclear, but it seems that user firms increasingly enjoy the flexibility to adjust their workforce, if in need. Accepting a temporary agency job can be rewarding, as temps can explore different types of jobs, often with a reduced expectation of commitment to the employer. Temp jobs may also be helpful to bridge gaps between two permanent jobs, and they even may be a stepping stone into regular employment for some temps. This is the bright side of temporary agency work. But there is a shady side as well.

It is well known that temp workers generally do not enjoy the same working conditions, wages and benefits as their regular full-time counterparts. In fact, the study has shown that this part of the labor force earns less than regular full-time employees. The raw figures suggest that agency workers receive only about 60 percent of the wage compared to their regular counterparts. Much of this difference may be accounted for by variation in the composition of

temps and regular workers with respect to age, skills, occupation and other factors related to wage outcomes. To what extent is that the case?

To investigate this issue, the paper estimated fixed effects regression models controlling for a wide range of personal and job characteristics. The results indicate that wage gaps are markedly reduced, if one controls for these characteristics. If one takes also workers' pre-earnings into account, then the wage gap drops further, indicating that studies failing to control for the employment career and pre-earnings run the risk to overestimate the wage differential. Nevertheless, temporary agency workers earn about 15 percent less. The study also shows that temp workers are extremely heterogeneous and that their relative wage situation depends on their occupation. However, compared to the prevailing international evidence, the German wage gap remains large and significant for most of the agency workers, suggesting that agency jobs may be of poor quality, at least in terms of remuneration. Decomposition of the wage gap shows that changes in the unobservable quantities or "discrimination" cannot explain the widening temp wage gap. On the contrary, it seems that during the observation period temporary agency employment has become increasingly accepted. The actual human capital measured by the recent employment history of the workers contributed to a decrease of the pay penalty but this effect was more than offset by the fall of the corresponding returns to marketable human capital.

The question arises whether these findings have to be seen as a serious cause for concern. Before entering the temporary help sector, two thirds of the temp workers have been unemployed. For most of them, working in the temporary help sector may be better than the alternatives of working in programs of active labor market policy, marginal employment or on the black market. Working in the temporary help sector also increases the chances that temp workers will get at least some training and can keep their hitherto accumulated human capital up to date. This holds at least for those temps, who would otherwise face a period of unemployment. This is the case in Germany. Temporary agency employment indeed reduces the

unemployment risk for temp workers compared to unemployed not accepting a temporary agency job (Kvasnicka 2009). To put it differently: For most temps, the alternatives are not "working as a temp or as a regular worker". It seems that the true alternatives they face are "working as a temp or staying unemployed".

The theoretical literature provides rationale why the remuneration in the temporary help sector may be lower. Temps may accept a wage disadvantage, because they are prepared to pay a premium to the agency for their matching service and the opportunity to build up labor market contacts that lead to permanent employment. In addition, temporary agency work may provide the path for subsequent job matches with better pay. Our results provide at least a first indication that those temps who are successful in finding permanent employment after the temp job has ended do not have to accept a wage disadvantage in the long run. After leaving the sector, these workers receive the same remuneration as comparable directly hired workers.

The legislation for temporary agency workers in Germany has strengthened temp workers' rights just recently. Since then, a temporary help agency has the choice to apply the principle of equal treatment, implying that the temp receives the same remuneration as a regular worker at the client firm, or pay its workers according to a collective agreement. At first sight, this looks like major progress for those at the bottom of the economic ladder. Examined more closely, our results indicate that the unionization could not bring the widening wage gap to a halt. But the study could not control for other job characteristics that normally improve, if a firm applies the rules of a collective agreement.

There is one final issue to discuss: Is the agency working directive of the European Commission to be welcomed in that it will remove worse working conditions for temps? It is likely that provisions that ensure equal treatment of agency workers will overcome partly the pay disadvantage associated with agency work for at least a small fraction of temps. But the directive will impose additional administrative costs on the agency and the client firm in agreeing what the equal pay will be. It is likely that the ones to suffer will be the temps with the lowest

productivity, who will drop out from the market by such a regulation. In this context, the results by Böheim and Cardoso (2007) are striking. The Portuguese temporary help sector is highly regulated and agencies are already required to apply the principle of equal treatment. Nevertheless, Portuguese temp workers have to accept wage differentials of significant size. This result may be taken as an indication that the imposition of equal treatment will not preclude wage gaps in the temporary help sector. If countries opt to deviate from the principle of equal treatment, as Germany, and pay the temporary agency workers according to collective agreements, than it is likely that the new regulation may deflagrate.

References

Andersson, F.; Holzer, H. and Lane, J. (2007), "Temporary Help Agencies and the Advance Prospects of Low Earners," IZA Discussion Paper No. 3113, Bonn.

Antoni, M. and Jahn, E. (2009), "Do changes in regulation affect employment duration in temporary help agencies?" Industrial and Labor Relations Review 62, 226-251.

Arrowsmith, J. (2009), "Temporary agency work and collective bargaining in the EU" European Foundation for the Improvement of Living and Working Conditions: Luxembourg.

Autor, D. (2001), "Why do temporary help firms provide free general skills training?" Quarterly Journal of Economics 116, 1409-1448.

Autor, D. and Houseman, S. (2005), "Do Temporary Help Jobs Improve Labor Market Outcomes for Low-Skilled Workers? Evidence from Random Assignments." NBER Working Paper No. 11743, Cambridge.

Becker, G. (1964), Human Capital, University of Chicago Press, Chicago.

Bellmann, L., Promberger, M. and Theuer, S. (2003), "Verbreitung und Nutzung von Leiharbeit im Jahre 2002 - eine Bestandsaufnahme." Arbeit und Beruf 54(8), 232-235.

Blanchard, O.; Diamond, P. (1994), "Ranking, Unemployment Duration, and Wages," Review of Economic Studies 61, 417-434.

Blank, R. (1998), "Contingent work in a changing labor market," in: R. B. Freeman and P. Gottschalk, eds, 'Generating Jobs: How to Increase Demand for Less-Skilled Workers', Russel Sage Foundation, New York, 259-294.

Blau, F. and Kahn, L. (1996), "Wage Structure and Gender Earnings Differentials: an International Comparison", Economica 63, S29-S62.

Blau, F. and Kahn, L. (2006), "The U.S. Gender pay gap in the 199s: Slowing Convergence," IZA Discussion Paper No. 2176, Bonn.

Blien, U.; Hirschenauer, F. and Phan, H. (2006), "Model-based classification of regional labour markets for purposes of labour market policy." IAB Discussion Paper No 29, Nuremberg.

Böheim, R. and Cardoso, A. (2007), "Temporary help services employment in Portugal. 1995-2000." National Bureau of Economic Research. Working Paper No. 13582. Cambridge. MA.

Brücker, H. and Jahn, E. (2008), "Migration and the Wage-Setting Curve: Reassessing the Labor Market Effects of Migration." Aarhus School of Business, University of Aarhus, Economics Department Working paper Series, Working paper 08-4, Aarhus.

Büttner, T. and Rässler, S. (2008), "Multiple imputation of right-censored wages in the German IAB employment register considering heteroscedasticity." in: United States, Federal Committee on Statistical Methodology (Hrsg.), Federal Committee on Statistical Methodology Research Conference 2007, Arlington, 21 S.

CIETT (2007), "Ciett Statistics 2006". http://www.ciett.org/fileadmin/templates/ciett/docs/CIETT_2006_Statistics.pdf.

Cohen, Y. and Haberfeld, Y. (1993), "Temporary Help Service Workers: Employment Characteristics and Wage Determination." Industrial Relations 32, 272-287.

Dey, M.; Houseman, S. and Polivka, A. (2006), "Manufacturers' outsourcing to employment services." Staff Working Paper No. 07-132. Kalamazoo, MI, W. E. Upjohn Institute for Employment Research.

Eurofound (2007), "Debate on temporary agency work intensifies". eiro-online. December 2007. http://www.eurofound.europa.eu/eiro/2007/12/articles/uk0712029i.htm.

Eurofound (2008), Temporary agency work directive approved". eiro-online. November 2008. http://www.eurofound.europa.eu/eiro/2008/11/articles/eu0811029i.htm

Fitzenberger, B., A. Osikominu, A. and Völter, R. (2005), "Imputation Rules to Improve the Education Variable in the IAB Employment Subsample," ZEW Discussion Paper No 05-10; Mannheim.

Forde, C. and Slater. G. (2005), "Agency work in Britain: character, consequences and regulation." British Journal of Industrial Relations 43, 249-271.

Greene, W. (2003), Econometric Analysis. Fifth Edition, Prentice Hall.

Heckman, J.; LaLonde, R. and Smith. J. (1999), "The Economics and Econometrics of Active Labor Market Programs." in: Handbook of Labor Economics. vol. III. ed. by Ashenfelder, O.; Card, D., Amsterdam, pp. 1865-2097.

Heckman, J.; Lochner, L. and Todd, P. (2005), "Earnings functions, rates of return, and treatment effects: The Mincer Equation and Beyond." NBER Working Paper No. 11544, Cambridge, MA.

Heinrich, C.; Mueser, P. and Troske, K. (2009), "The Role of Temporary Help Employment in Low-wage Worker Advancement." in: Autor, D. ed., Labor Market Intermediation, Chicago: The University of Chicago Press, forthcoming.

Houseman, S.; Kalleberg, A. and Erickcek, G. (2003), "The Role of Temporary Agency Employment in Tight Labor Markets." Industrial and Labor Relations Review 57, 105-127.

Jacobsen, L.; LaLonde. R. and Sullivan, D. (1993). "Earnings losses of displaced workers." American Economic Review 83, 685-709.

Jahn, E. (2004), "Leiharbeit – für Arbeitslose (k)eine Perspektive?" in: Ungleichheit und Umverteilung. ed. by Aaken. A.; Grötzinger. G., Marburg, 215-236.

Jahn, E. (2007), “Leiharbeit in Deutschland: Phönix aus der Asche?”. in: Kompetenzentwicklung in der Zeitarbeit – Potenziale und Grenzen. ed. by Münchhausen. G., Bonn, 21-44.

Jahn, E. and Wolf, K. (2005), “Regionale Verteilung der Leiharbeit – Konzentration oder Diffusion?” IAB Kurzbericht Nr. 14, Institute for Employment Research, Nuremberg.

Jørgensen, C. (2007), “Precarious situation of temporary agency workers”. eironline. http://www.eurofound.europa.eu/eiro/2006/10/articles/dk0610029i.htm.

Juhn, C.; Murphy, K. and Pierce B. (1991), Accounting for the Slowdown in Black-White Wage Convergence, in: Kosters, M. (ed), Workers and Their Wages, Washington DC: AET Press, 107-143.

Kvasnicka, M. (2009), “Does Temporary Agency Work Provide a Stepping Stone to Regular Employment?” in: Autor, D. ed., Labor Market Intermediation, Chicago: The University of Chicago Press, forthcoming.

Kvasnicka, M. and Werwatz, A. (2002), “On the Wages of Temporary Help Service Workers in Germany”. Discussion Paper No. 70. SFB 373. Humboldt - Universität Berlin. http://sfb.wiwi.hu-berlin.de/papers/2002.html.

Oberst, M.; Schank, T. and Schnabel, C. (2007), “Interne Arbeitsmärkte und Einsatz temporärer Arbeitsverhältniss: Eine Fallstudie mit Daten eines deutschen Dienstleistungsunternehmens.” Zeitschrift für Betriebswirtschaft 77, 1-19.

Orlowski, R; Riphahn, R. (2008), “The East German Wage Structure after Transition“, IZA Discussion Paper No. 3861, Bonn.

Pedersen, H.; Stener, H.; Claus, B. and Mahler, S. (2005), “Temporary Agency Work in the European Union” (report), European Foundation for the Improvement of Living and Working Conditions. Dublin. http://www.fr.eurofound.eu.int/pubdocs/2004/104/en/1/ef04104en.pdf.

Rosen, S. (1986), “The Theory of Equalizing Differences” in: Handbook of Labor Economics. Vol. I. ed. by Ashenfelder. O.; Layard. R., Amsterdam, 641-692.

Segal, L. and Sullivan, D. (1997), “The Growth of Temporary Services Work.” Journal of Economic Perspectives 11, 117-136.

Segal, L. and Sullivan, D. (1998), “Wage Differentials for Temporary Services Work: Evidence from Administration Data”. Federal Reserve Bank of Chicago. Working Paper Series. No. WP-98-23. Chicago.

Storrie, D. (2002), “Temporary agency work in the European Union.” European Foundation for the Improvement of Living and Working Conditions: Dublin.

Sullivan, D. and von Wachter, T. (2007), „Mortality, Mass-Layoffs, and Career Outcomes: An Analysis Using Administrative Data” NBER Working Paper No. 13626, Cambridge, Mass.

Wooldridge, J. (2002). “Econometric Analysis of Cross Section and Panel Data”, Cambridge, MIT Press.

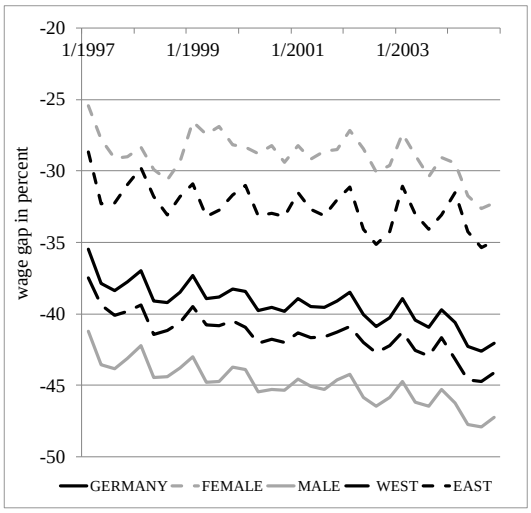
Tables and Figures

Table 1: Descriptive Statistics of Selected Variables

	West				East			
	Temp		Non-temp		Temp		Non-temp	
	mean	sd	mean	sd	mean	sd	mean	sd
Real daily wage (Euro)	51	26	93	49	44	23	69	37
Personal characteristics								
Age (years)	35	10	39	10	37	11	41	10
Male	0.75	0.43	0.66	0.47	0.81	0.40	0.57	0.49
Foreign	0.26	0.44	0.11	0.32	0.03	0.18	0.02	0.15
East								
Education (vt: vocational training)								
Secondary degree no vt	0.22	0.41	0.10	0.30	0.07	0.25	0.04	0.19
Secondary degree with vt	0.64	0.48	0.71	0.46	0.83	0.38	0.76	0.43
High school degree no vt	0.01	0.11	0.01	0.09	0.00	0.07	0.00	0.06
High school degree with vt	0.07	0.26	0.07	0.26	0.04	0.20	0.05	0.23
Politechnics	0.03	0.17	0.04	0.21	0.03	0.17	0.05	0.23
University	0.03	0.18	0.07	0.25	0.03	0.18	0.09	0.29
Previous empl. history								
Previous labor force status								
Unemployed	0.35	0.48	0.13	0.33	0.49	0.50	0.23	0.42
Not in the labor force	0.29	0.46	0.22	0.42	0.18	0.38	0.18	0.39
Temporary employed	0.16	0.37	0.01	0.11	0.16	0.36	0.01	0.09
Regular employed	0.19	0.39	0.64	0.48	0.18	0.38	0.58	0.49
Previous benefits								
Unemployment benefits	0.25	0.43	0.10	0.30	0.35	0.48	0.17	0.38
Unemployment assistance	0.10	0.30	0.02	0.14	0.12	0.33	0.05	0.21
Maintenance allowance	0.01	0.09	0.01	0.08	0.01	0.11	0.01	0.11
Prev. empl. Characteristic (5 years)								
Job tenure (weeks)	57	68	168	96	63	72	157	97
Empl. duration past 5 year (weeks)	156	80	231	55	177	71	228	55
No of previous temp jobs	0.79	1.43	0.03	0.24	0.82	1.36	0.03	0.22
No of all previous jobs	2.61	2.55	1.00	1.68	2.75	2.35	1.19	1.90
Occupation								
Technical occupation	0.03	0.18	0.09	0.29	0.02	0.15	0.07	0.26
Manufacturing other	0.08	0.26	0.16	0.37	0.09	0.29	0.17	0.38
Manufacturing metal sector	0.29	0.46	0.17	0.37	0.45	0.50	0.14	0.34
Laborer	0.27	0.44	0.01	0.11	0.19	0.39	0.02	0.13
Clerical occupation	0.14	0.34	0.36	0.48	0.11	0.31	0.39	0.49
Service occupation	0.19	0.40	0.21	0.41	0.14	0.35	0.22	0.41
Firm characteristics								
Firmsize 0-10	0.02	0.16	0.16	0.36	0.04	0.19	0.20	0.40
Firmsize 11-50	0.25	0.43	0.23	0.42	0.32	0.47	0.27	0.44
Firmsize 51-200	0.54	0.50	0.23	0.42	0.49	0.50	0.24	0.42
Firmsize 201-500	0.14	0.34	0.15	0.35	0.12	0.32	0.12	0.33
Firmsize > 501	0.05	0.22	0.24	0.43	0.04	0.19	0.17	0.38
Age of the firm (years)	10	7	19	9	7	4	9	6
Agglomeration								
Metropolitan	0.66	0.47	0.57	0.50	0.50	0.50	0.48	0.50
Urban	0.28	0.45	0.33	0.47	0.36	0.48	0.33	0.47
Rural	0.06	0.24	0.10	0.30	0.15	0.35	0.19	0.39
Observations	126,794		9,453,618		30,513		2,398,386	

Source: IABS, own calculations

Figure 1: Average Wage Gap in %, 1997 - 2004



Source: IABS 1997-2004, own calculations

Table 2: Wage Differentials for Temp and Regular Workers, 1997-2004

	Germany			West			East		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
(1) Base Model	-0.378	-0.397	-0.293	-0.399	-0.424	-0.309	-0.292	-0.301	-0.257
SE	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
R2	0.48	0.50	0.37	0.46	0.46	0.34	0.45	0.45	0.45
(2) Empl. career (mean)	-0.242	-0.257	-0.179	-0.257	-0.278	-0.187	-0.183	-0.186	-0.160
SE	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
R2	0.53	0.54	0.44	0.51	0.51	0.41	0.51	0.51	0.50
(3) Empl. career (median)	-0.271	-0.286	-0.222	-0.288	-0.310	-0.234	-0.200	-0.203	-0.197
SE	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
R2	0.34	0.35	0.28	0.31	0.31	0.26	0.33	0.33	0.34
(4) Fixed effects	-0.225	-0.226	-0.217	-0.241	-0.246	-0.222	-0.178	-0.172	-0.186
SE	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)
ρ	-0.378	-0.397	-0.293	-0.399	-0.424	-0.309	-0.292	-0.301	-0.257
(5) Pre-earnings[a)]	-0.164	-0.160	-0.166	-0.172	-0.1465	-0.178	-0.170	-0.170	-0.170
No of spells	12,009,311	7,728,175	4,281,136	9,580,412	6,338,830	3,241,582	2,428,899	1,389,345	1,039,554
No. of temp spells	157,307	119.450	37,857	126,794	94,820	31,974	30,513	24,630	5,883
No. of workers	631,551	377,395	254,156	506,506	310,180	196,326	144,310	81,096	63,214
Avg spells per worker	19.0	20.5	16.8	18.9	20.4	16.5	16.8	17.1	16.4

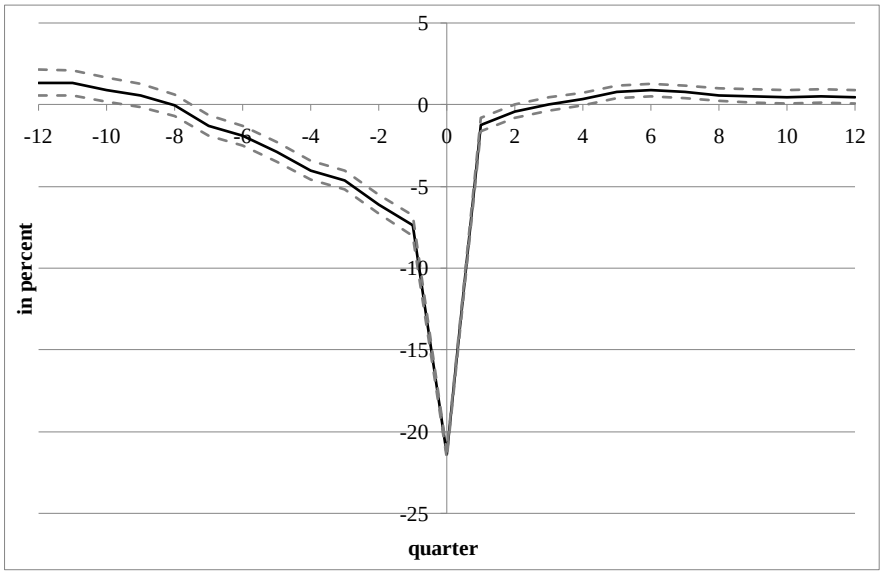
Source: IABS, own calculation; controls of the base Model (1): age, age2, educational dummies, 12 regional dummies, growth rate of the BIP, five firm size dummies, the share of low qualified workers in the firm; the share of high qualified workers in the firm and the age of the firm, six occupational dummies. Model (2) to (5) include the controls of the base model, the current job tenure, job tenure squared, the total employment duration in the past five years, the number of temp jobs and regular jobs during the past five years, previous labor force status and their duration as described in Section 4.2. All coefficients are significant at the 1 percent level, robust standard errors are reported. [a)] Calculated by $\hat{\beta}_0 - \hat{\beta}_{-1}$; after the selection described in Section 5.2 the number of observations decreases for Model (5), see Table A1.

Table 3: Wage Differentials According to Personal and Job Characteristics, 1997-2004

	Germany		West		East	
	coeff	se	coeff	se	coeff	se
Age						
<20	-0.155	(0.005)	-0.157	(0.006)	-0.167	(0.014)
20-55	-0.225	(0.001)	-0.241	(0.001)	-0.178	(0.001)
>55	-0.201	(0.006)	-0.258	(0.008)	-0.153	(0.009)
Foreign	-0.231	(0.002)	-0.236	(0.002)	-0.207	(0.012)
Education						
No vocational training	-0.214	(0.002)	-0.223	(0.002)	-0.170	(0.008)
With vocational training	-0.226	(0.001)	-0.243	(0.001)	-0.178	(0.001)
University degree	-0.221	(0.004)	-0.243	(0.005)	-0.147	(0.008)
Previous labor force status						
Regular employed	-0.202	(0.002)	-0.220	(0.002)	-0.139	(0.003)
Temp worker	-0.273	(0.002)	-0.294	(0.003)	-0.194	(0.006)
Unemployed	-0.198	(0.001)	-0.212	(0.001)	-0.157	(0.002)
Not in the labor force	-0.178	(0.002)	-0.185	(0.002)	-0.165	(0.007)
Previous UI benefits						
Unemployment assistance	-0.187	(0.003)	-0.195	(0.004)	-0.154	(0.005)
Unemployment benefits	-0.199	(0.001)	-0.221	(0.002)	-0.147	(0.003)
Occupation						
Technical	-0.122	(0.005)	-0.134	(0.005)	-0.122	(0.010)
Manufacturing metal	-0.230	(0.002)	-0.244	(0.002)	-0.194	(0.004)
Manufacturing other	-0.220	(0.001)	-0.253	(0.001)	-0.147	(0.002)
Laborer	-0.194	(0.002)	-0.209	(0.003)	-0.154	(0.005)
Clerical	-0.220	(0.002)	-0.223	(0.002)	-0.206	(0.005)
Service	-0.226	(0.002)	-0.237	(0.002)	-0.166	(0.004)

Source: IABS, own calculations; fixed effects panel specification; full set of controls described in Section 4.2 is included. Standard errors are reported in parenthesis. All coefficients are significant at the 1 percent level.

Figure 2: Pre- and Post-Earnings in %, Germany 1997-2004



Source: IABS 1997-2004, own calculations

Table 4: Decomposition of the Temp Wage Gap

	Germany			West	East
	Total	**Male**	**Female**	**Total**	**Total**
Log wage gap 1997-2000 D_1	0,507	0,605	0,349	0,538	0,406
Log wage gap 2001-2004 D_2	0,563	0,666	0,390	0,590	0,445
Change in Differential ΔD	0,056	0,062	0,041	0,052	0,040
Observed quantity 1997-2000 E_1	0,267	0,355	0,163	0,284	0,217
Observed quantity 2001-2004 E_2	0,329	0,414	0,228	0,339	0,275
Change in observed quantities ΔE	0,062	0,059	0,065	0,055	0,057
Change in observed quantities ΔE_Q	0,022	0,018	0,024	0,013	0,026
Education variables	0,007	0,006	0,011	0,007	0,008
Empl. history variables	-0,018	-0,013	-0,037	-0,021	-0,007
Occupation variables	0,007	0,006	0,012	0,006	0,010
Change in observed prices ΔE_P	0,037	0,036	0,038	0,039	0,034
Education variables	0,000	0,001	0,000	0,001	0,000
Empl. history variables	0,031	0,029	0,036	0,032	0,025
Occupation variables	-0,001	-0,002	0,001	0,000	-0,005
Unexplained wage gap 1997-2000 U_1	0,240	0,250	0,186	0,254	0,188
Unexplained wage gap 2001-2004 U_2	0,234	0,253	0,162	0,251	0,171
Change in unexpl wage gap ΔU	-0,005	0,003	-0,024	-0,003	-0,018
Gap effect ΔU_Q	-0,019	-0,012	-0,035	-0,018	-0,031
Unobserved prices ΔU_P	0,015	0,015	0,014	0,016	0,015

Source: IABS, own calculations; the interactions ΔE_{QP} and ΔU_{QP} are not reported.

Table 5: The Effect of the 2003 Reform on the Wage Gap

		Germany		West		East	
		coeff	se	coeff	se	coeff	se
Germany	Temp	-0.216	(0.001)	-0.230	(0.001)	-0.176	(0.002)
	Reform	-0.025	(0.001)	-0.032	(0.000)	-0.026	(0.001)
	Temp*Reform	-0.054	(0.001)	-0.063	(0.002)	-0.025	(0.003)
Male	Temp	-0.214	(0.001)	-0.232	(0.001)	-0.166	(0.002)
	Reform	-0.021	(0.001)	-0.037	(0.001)	-0.024	(0.001)
	Temp*Reform	-0.065	(0.002)	-0.074	(0.002)	-0.038	(0.003)
Female	Temp	-0.216	(0.002)	-0.218	(0.002)	-0.206	(0.003)
	Reform	-0.032	(0.001)	-0.030	(0.001)	-0.039	(0.001)
	Temp*Reform	-0.024	(0.003)	-0.031	(0.003)	0.024	(0.006)

Source: IABS, own calculations; the reform year 2003 has been excluded, robust standard errors are reported in parenthesis

Appendix

Figure A1: Average and Median Wages, West Germany in %, 1997-2004

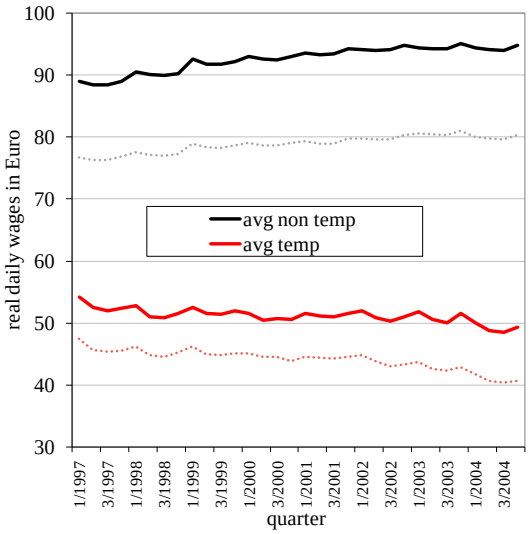


Figure A2: Average and Median Wages, East Germany in %, 1997-2004

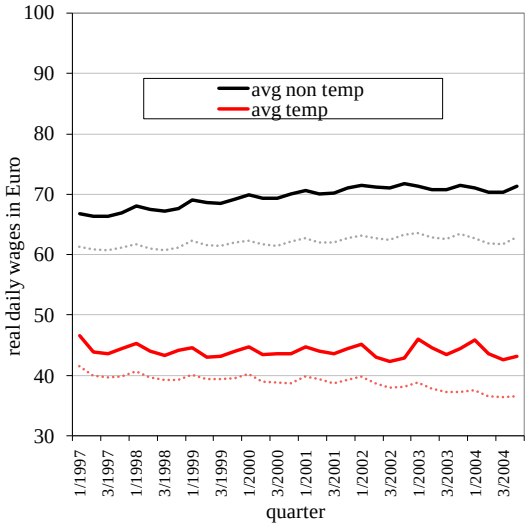


Table A1: Pre- and Post-Earnings in %, 1997-2004

	Germany			West	East
	Total	Male	Female	Total	Total
12 q before	0.013**	0.029**	-0.024**	0.021**	0.046**
11 q before	0.013**	0.027**	-0.018**	0.018**	0.039**
10 q before	0.009*	0.023**	-0.021**	0.012**	0.033**
9 q before	0.006	0.023**	-0.032**	0.008	0.030**
8 q before	0.000	0.014**	-0.031**	0.003	0.023**
7 q before	-0.013**	0.001	-0.043**	-0.012**	0.008
6 q before	-0.019**	-0.005	-0.051**	-0.015**	0.007
5 q before	-0.029**	-0.018**	-0.056**	-0.025**	-0.010*
4 q before	-0.041**	-0.030**	-0.066**	-0.038**	-0.024**
3 q before	-0.047**	-0.035**	-0.073**	-0.047**	-0.034**
2 q before	-0.063**	-0.054**	-0.084**	-0.067**	-0.059**
1 q before	-0.077**	-0.073**	-0.085**	-0.079**	-0.077**
Temp Episode (FE)	-0.241**	-0.233**	-0.252**	-0.252**	-0.247**
1 q after	-0.012**	-0.005*	-0.027**	-0.009**	-0.002
2 q after	-0.004*	0.002	-0.017**	-0.002	0.005*
3 q after	0.000	0.006*	-0.010**	0.002	0.007**
4 q after	0.003	0.008**	-0.005	0.005*	0.010**
5 q after	0.008**	0.012**	0.001	0.009**	0.013**
6 q after	0.009**	0.010**	0.009**	0.010**	0.011**
7 q after	0.008**	0.008**	0.010**	0.008**	0.008**
8 q after	0.006**	0.006*	0.008*	0.005*	0.005*
9 q after	0.005**	0.005	0.006	0.005*	0.005*
10 q after	0.005*	0.004	0.009*	0.004	0.003
11q after	0.005*	0.003	0.011**	0.005**	0.003
12 q after	0.005*	0.003	0.010*	0.005**	0.002
No, of spells	11,035,640	7,158,323	3,877,317	8,832,834	5,900,966
No of temp spells	39,652	29,191	10,461	32,700	6,952
No of workers	451,544	281,867	169,677	366,359	235,247

Source: IABS, own calculations, **, * denotes significance at the 1 and 5 percent level, respectively, full set of controls described in Section 4.1 are included,