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Costs and Benefits of Temporary Contracts

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November 2005

Abstract

Applying data from 13 waves of the Swiss Labor Force Survey (1991-2003) I assess costs and benefits of fixed-term contracts. First, I analyze the existence of a contract related wage gap and the effort response of temporary employees in terms of unpaid overtime hours. Second, I investigate whether workers' absence response to temporary contracts varies across types of absences. And third, I examine the impact of temporary contracts on accident rates. I find that temporary employees suffer a wage gap of 7 percent and provide about 45 percent more unpaid overtime hours than permanently employed persons. I find neither a significant impact in terms of total absences nor in terms of accidents even though the probability of receiving employer provided training is by 35 percent lower for temporary employees. Splitting total absences in two subcategories yields no significant impact of temporary contracts on absences due to accident and illness, but a significant positive effect on absences due to private reasons. The probability of absences due to private reasons is by 124 percent higher for temporary employees than for permanent employees. The results in terms of absences are not affected by including absences due to missing reasons in the analysis.

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1 Introduction

In most industrialized countries, a rising share of employment contracts is not open-end (permanent) but fixed-term (temporary). The considerable quantitative relevance of fixed-term contracts even in economies with little labour market regulation¹ has raised widespread scientific attention in labour market research: are there macroeconomic impacts on unemployment and labor turnover?² Can temporary contracts be considered as stepping-stones?³ Are temporary contracts connected to behavioural responses by employees?⁴

This study analyzes costs and benefits of temporary contracts at the micro-level. As potential benefits the incentive characteristics of temporary contracts are analyzed. As potential costs I investigate the impact of temporary contracts on accident rates, and on different absence types. The incentive impact of this contract type could be measured by higher effort in terms of lower absences and more unpaid overtime hours. Temporary contracts could benefit the employer as he is provided with a tool to elicit worker effort and to manage level and composition of the work force at the same time. On the other hand, in signalling his quality the employee can use temporary employment as a stepping stone to permanent employment with typically higher wages.⁵ In sum, incentive and screening effects of this contract type can contribute to the flexibility of the labor market as a whole.

Potential costs of temporary contracts are increased accident rates: as temporary employment coincides with a shorter contract duration and uncertainty about rehiring, temporary workers are possibly subject to lower investment in specific human capital or employer provided training. Less employer provided training combined with a higher level of effort resulting from the incentive-mechanism could cause higher accident rates. Higher accident rates of temporarily compared to permanently employed workers were found for the

¹ The growth patterns of this contract type differ considerably across countries and appear to often be higher for countries with a high level of labour market regulation. Since 2000 the positive trend came to an end for several European Countries. In 2002, the share of temporary employment reached 31% in Spain, 22% in Portugal, 5.4% in Ireland, and 6.3% in the United Kingdom. See overview European Commission (2003, pp. 212-237).

² See e.g. Danziger and Neuman (2005), OECD (1999), Cahuc and Postel-Vinay (2002), Dolado et. al. (2002), Holmlund and Storrie (2002), and Blanchard and Landier (2002).

³ See e.g. Booth et al. (2002), Hagen (2005), Larsson et. al. (2005), Portugal and Varejao (2003) or Zijl et al. (2004).

⁴ See e.g. Engelland and Riphahn (2005) for the behavioural impact on effort and Guadalupe (2003) for the behavioural impact on accident rates.

⁵ Empirical evidence for a contract related wage difference is provided by Hagen (2005) for the German labor market and by Brown and Sessions (2003, 2005) for the British labor market.

Spanish labor market.⁶ From this the following welfare effects could arise: higher accident probabilities are a direct “cost” for the temporary employee. As an employer with a higher share of temporarily employed workers would have to reorganize his staff more often compared to a situation with a lower share of temporarily employed workers he would also be confronted with higher direct costs. In addition, if accident insurances are experience rated the employer would additionally face higher risk premia. Otherwise, firms with a high share of temporary contracts could increase average risk premia and thus impose cost-externalities for firms with few temporarily employed persons. The costs of temporary employment for the labor market as a whole could be a qualitative and quantitative reduction of the total work force.

This appears to be the first study to investigate costs and benefits of temporary contracts in an integrative perspective. Incentive effects for the Swiss labor market have recently been investigated empirically by Engellandt and Riphahn (2005) and the impact of temporary contracts on work accidents was analyzed by Guadalupe (2003) for the Spanish labor market.⁷ By applying data from 13 waves (1991-2003) of the Swiss Labor Force Survey (SLFS)⁸ instead of 6 waves (1996-2001) I refine the study of Engellandt and Riphahn (2005) with a richer data set. At the same time, I extend and partially innovate the prior analysis in several regards: (i) I investigate the existence and magnitude of a contract related wage gap for Switzerland more rigorously.⁹ (ii) Instead of a discrete measure of unpaid overtime, I apply weekly unpaid overtime hours standardized by the weekly contractual working hours of the employee. This helps to avoid measurement errors as the contractual working time might differ between temporarily and permanently employed workers.¹⁰ (iii) I provide more reliable and detailed results for the impact of temporary contracts on absences. (iv) In order to capture differing or even contrary employee absence responses to temporary contracts across types of absences, I newly differentiate absences in two different subcategories. The first comprises absences due to personal, family, or other reasons (private reasons). In contrast, the second

⁶ See Guadalupe (2003).

⁷ Amuedo-Dorantes (2002) does not find for Spain that temporary employment has a contractual impact on the probability of suffering a work accident once working conditions and other factors are controlled for. The relevance of adequate controls is also stressed by Hernanz and Toharia (2004). They argue that in the case of Spain and Italy contractual differences virtually vanish when job characteristics are controlled for.

⁸ The SLFS is a rotating panel data set that contains information on workers' current contract and on effort indicators such as absenteeism and unpaid overtime work.

⁹ Engellandt and Riphahn (2005, p. 284) only provide parenthetical evidence for a wage gap without performing individual fixed effect controls. Henneberger et al. (2004, p. 253) do not find evidence for a contract related wage gap after controlling for individual fixed effects. However, using only 1,404 observations from the Swiss Household Panel the result may suffer from a small sample size.

¹⁰ Moreover, I can more easily quantify the behavioural impact of temporary employment on unpaid overtime.

subcategory consists of absences due to illness or accidents. (v) The role of missing reasons of absences is carefully handled.

I add new empirical evidence to the existing literature in this field of research which is still in its infancy. The case of Switzerland is of particular interest because the impact of temporary contracts on accident rates has not been analyzed for an economy with a liberal labor market so far. My results show that temporarily employed individuals receive significantly less employer provided training, but they are not subject to higher accident rates. They earn less and provide significantly more unpaid overtime hours, but have also more absences due to private reasons. The contractual impact mostly varies with employee tenure and seems not to change if missing reasons of absences are integrated in the analysis.

2 Theory, Discussion and Hypotheses

Employee productivity is a function of several observable and unobservable properties regarding the employee, the firm, and the position in the business cycle. Every period anew, employee performance is the realization of a random process and can be considered in consequence as the path of a stochastic process. In a panel data regression framework employee performance (output) within in a firm may be decomposed as follows:

$$Q_{it} = \alpha + \mu_i + \theta_j + \beta_1 Y_{it} + \beta_2 (\mu_i \theta_j Y_{it}) + \gamma X_{it} + \delta_t + \varepsilon_{it}$$

Q represents the employee performance, μ_i and θ_j reflect unobservable individual ability respective unobservable job-specific characteristics¹¹, Y represents employee effort, X comprises observable characteristics of employee ability such as education or tenure, δ_t reflects year fixed effects and ε is the random error term.

Given all other characteristics, employee productivity will be driven by employee effort. The degree to which a marginal increase in employee effort translates into an augmentation of the firm output is given by:

$$\frac{\partial Q_i}{\partial Y_i} = \beta_1 + \beta_2 \mu_i \theta_j$$

In consequence, the extent to which employee productivity translates into employee productivity is scaled by job-specific characteristics and unobservable employee ability. As

unobservable employee ability and job-specific characteristics are supposed to be time constant, the chosen level of effort remains the principal instrument to control and signal individual productivity.

Since the individual contribution of an employee to the firm value is often not observable, effort indicators such as absences and (unpaid) overtime work are widespread productivity proxies used in the literature.¹² In contrast to supervisor evaluations, worker-self-evaluations, or firm wide productivity measures they represent objective outcomes and therefore provide a more reliable reflection of individual behaviour.¹³

Being conscious of the possibility of career advancement temporary employees should seek to pass employer screening and to obtain permanent contracts which provide higher wages and often further fringe benefits. In consequence, temporary employees should exert a higher level of effort. Following investment calculations an employee will increase his effort as long as his marginal actual costs of working harder are overcompensated by the marginal risk adjusted present value of later benefits. As some costs and benefits will be nonmonetary they can be integrated in the calculation by their monetary equivalents.

Engellandt and Riphahn (2005) found indeed that temporary employees display a higher level of effort regarding their probability to provide unpaid overtime compared to permanent workers. Given the quite unregulated labor market in Switzerland with little employment protection even for “permanent” workers¹⁴, the finding is interpreted as a consequence of market driven incentives resulting from the nature of temporary contracts.¹⁵

However, in their study the incentive power of temporary contracts was not as clear for the effort indicator ‘absences’, where a significant difference in absence rates of temporary and permanent workers was not found. This study aims to analyze the contractual impact of temporary contracts on different kinds of absences in greater detail. Separating the different forms of absenteeism should allow to test whether the different subcategories of absences are subject to the same behavioural impact of temporary contracts.

¹¹ For example, job specific controls may capture differences between employee tasks in the human resource department and those of the research department of a firm or the team size.

¹² See e. g. Engellandt and Riphahn (2005), Meyer and Wallette (2005), Anger (2005), Ichino and Riphahn (2004), Booth, Francesconi and Frank (2002), Treble (2001) or Parent (1999). Souza-Poza and Ziegler (2003) find a significant relationship between unobserved productivity and self-perceived overemployment of employees in the Swiss Labour Market.

¹³ See e.g. Prendergast (1999) and Schwab and Olson (1990) for a discussion.

¹⁴ See Rehbindler (2002).

¹⁵ See Engellandt and Riphahn (2005).

Suppose, only a positive effort response was in place one would expect a negative impact of temporary contracts on the absence probability due to private reasons as well as on the absence probability due to accident and illness. This expectation can be derived from agency theory as both subcategories of absences are subject to information asymmetries to the advantage of the employee. In forgoing possibilities of opportunistic behaviour the temporary employee can signal individual effort and work motivation to the screening employer.

If the finding of no significant contractual difference in absence rates is replicated with the richer data from 13 instead of only 6 waves of the SLFS I now could exclude imprecise estimation as an explanation. However, the finding of an insignificant effort response in terms of absences could also arise if the contractual impact differs by reason of absence. For example, temporary employees can forgo possibilities of opportunistic behaviour with respect to private absence reasons but at the same time can be subject to a higher accident risk. Alternatively, temporary employees can exhibit also a higher absence probability with respect to private reasons as they engage in a more intensive external job search. In order to shed more light on the true behavioural choices of the employees and the relevance of neutralizing effects the differentiated empirical analysis by absence reason appears adequate.

There are two reasons, why a contractual impact on the likelihood of work accidents could be observed.¹⁶ One reason are moral hazard effects in relation to work accidents. They can arise based on an individual comparison of the benefits from the unemployment and the accident insurance. If individual claims from the accident insurance are more generous than individual claims from the unemployment insurance workers who know that their contract is close to expiration have an incentive to report more accidents.¹⁷ Since fixed-term contracts have on average a shorter lifespan compared to permanent contracts one would thus expect more accidents among temporary than among permanent employees. This mechanism may be reinforced if the employer is not penalized for above average accidents via firm-specific risk premia.

In Switzerland, there is no minimum required contribution period to accident insurance to qualify for compensation payments in case of accidents. The insurance premia are sector-specific for small firms and currently sector-specific and firm-specific for larger firms. Accidents entitle to a full compensation of the medical costs and with the exception of a deferred period of 3 days to 80% of the insured income until the ability to work is

¹⁶ For a more detailed discussion see Guadalupe (2003).

¹⁷ The incentive should correspond to the individual assessment of the unemployment risk.

recovered.¹⁸ In contrast, the entitlement to unemployment benefits is conditional on prior contributions for at least 12 months. Contributions of at least 18 months would entitle to around 520 daily allowances instead of 400 otherwise. The amount of unemployment benefit is in general 70% of the previous wage and 80% for the lowest income groups.¹⁹ Within this institutional setting a moral hazard problem may appear especially for temporary employees without entitlement to unemployment benefits or with entitlement to a lower degree.

Another reason for a contractual impact on work accidents can be derived from human capital theory. Investments in specific human capital in a broader sense - and so including also training in safety and health - beyond a legal minimum depend on the expected return of the investment. In this respect, the incentives for the employer and worker to invest in specific human capital are lower for workers with a short contract duration than for workers with a longer contract duration. In consequence, a systematic difference in the human capital of temporary and permanent employees may result which may lead to systematically higher accident rates for temporarily employed persons.

Overall my empirical analysis seeks to test the following hypotheses:

- H1: Temporary contracts are connected with a wage gap.
- H2: To overcome the wage gap temporarily employed workers display a higher level of effort. The effort responses differ across the potential dimensions of effort.
- H3: The impact of temporary employment on employee absences varies by the type of absence.
- H4: Temporarily employed workers receive less employer provided training and suffer higher accident rates.

3 Data

3.1 Data and Sample

The data for my analysis are taken from 13 annual waves (1991-2003) of the Swiss Labor Force Survey (SLFS). The SLFS is a telephone survey among randomly chosen individuals aged 15 and above. It does not cover foreign workers without a permanent residence permit. Until 2001 the typical annual survey sampled 16-18,000 households. The sample size

¹⁸ See Swiss Collecting Agency for the Statistics of the Accident Insurance (Suva, 2004).

¹⁹ 80 percent is also provided for invalids or in cases of a maintenance obligation to children. See official website of the Swiss State Secretariat for Economic Affairs (<http://www.treffpunkt-arbeit.ch>, 2005).

increased to 41,000 households in 2002 and to 57,000 households in 2003. The SLFS is a rotating panel where every individual is interviewed up to five times. The questionnaires cover socio-demographic indicators, employees' type of contract, employee income, and measures of effort.

Pooling the observations from 13 annual surveys yields 302,814 observations. I restrict the sample to non-self-employed individuals who are full-time employed, not in an apprenticeship or in military service and who are not of retirement age (men below age 65, women below age 63). I do not consider observations from those “temporary” employees, who declare themselves as workers from a temporary employment agency, as members of public sector sponsored employment programs or as being in a probationary period.²⁰ Missing control variables and 73 observations with missing reasons of absences are dropped. A possibly systematic influence of these absences is analyzed in a control sample. My reference sample covers 99'110 person-year observations, representing 50'412 different employees with on average 2 annual observations per person.

3.2 Key Dependent and Explanatory Variables

The respondents of the SLFS can choose among informations about hourly wages, monthly wages or yearly wages and also between net and gross wages. In order to investigate the existence of a wage gap for temporarily employed workers compared to permanently employed (H1) I take the yearly gross wage of the employees.

To test effort responses across different dimensions of effort (H2) I consider two effort indicators. The first indicator measures the (annual) average number of weekly provided unpaid overtime hours standardized by the contractual working time.²¹ The second indicator describes whether a person missed work for the entire week prior to the survey due to illness, accident, personal or family matters, or “other” reasons.²²

In order to analyze the impact of temporary contracts on different absence types (H3) I split the indicator for absences in two subcategories: absences due to illness or accident²³ and absences due to private reasons such as personal and family matters or “other” reasons. As one might expect some similarity between absences due to private reasons and absences due

²⁰ This restriction should ensure clean classifications and avoid measurement errors as temporary agency workers and workers in a probationary period could be in fact also provided with open-end contracts. Public sector sponsored employment programs are considered as not comparable with market determined contracts.

²¹ Unpaid overtime captures overtime that is neither remunerated financially nor in leisure.

²² Similar indicators were used by Booth et al. (2002) in the case of overtime and Jimeno and Cortés (1996) for absences.

²³ A further split of this subcategory was not possible because of the answer categories of the questionnaire.

to missing reasons, I construct also a private absence indicator including missing reasons of absences.

To investigate the fourth hypothesis I construct two additional dependent variables: employer provided training and occurrence of a work accident in the past 12 months. Whereas the effort measure (overtime hours and absences) is available for all 13 waves of the SLFS, separate information on work accidents is only gathered in the waves of 1999 and 2002. Information on vocational training varies considerably over time. In the waves of 1999 and 2003 detailed and comparable information about vocational training was collected. The individuals were asked how many courses they attended during the past 12 months. Then for two randomly chosen courses detailed information about these courses is surveyed. This allows to construct an employer provided training dummy variable which indicates whether at least one of the two randomly chosen courses was financed in total or in part by the employer.

The key explanatory variable indicates whether the individual works on a temporary contract. 4.6 percent of all employees in my sample are temporarily employed. As illustrated in figure 1, the share of temporary contracts remained relatively stable over the 13 years.²⁴

Table 1 compares temporary and permanent employment across the different dependent variables. The table shows the descriptive evidence for the four hypotheses. On average, temporary employees earn about 10'000 Swiss Francs less than permanent employees. Regarding hypothesis 2 the standardized number of unpaid overtime hours is by 0.8 times higher among temporary workers compared to permanent workers. In contrast, the total absence probability seems not to depend on the contract type.

The impact of the contract type on the two subcategories of absences varies sizeably as suggested by hypothesis 3: whereas the probability of absences due to illnesses and accidents and due to missing reasons seems to be nearly equal between the contract types, the probability of absences due to private reasons appears to be about 100 percent higher for the temporarily employed. The finding is surprising as it suggests a clear negative effort response.²⁵

With respect to hypothesis 4 the evidence appears mixed: whereas the probability of receiving employer provided training is by 8.1 percentage points higher for permanent employees the probability of suffering a work accident seems – contrary to the descriptive evidence in Spain – not to systematically depend on the type of contract.

²⁴ Only in two years (1992 and 2003) the share exceeded 5 percent or did not reach 4 percent (2000 and 2001). In all other years the share remained between 4 and 5 percent.

²⁵ Even if the employee did not receive any wage continuation during absence from work, the employer would have to reorganize his staff with some costs.

Table 2 describes the individuals employed in permanent and temporary contracts. It documents several differences between the two contract types: temporary work is more frequent in the western part of Switzerland, among foreign workers, young, females, and non-married workers. The educational patterns are nonlinear as temporary workers are more frequent in the lowest and highest educational categories. Contrary to the study of Engelland and Riphahn (2005) I find no considerable difference in the mean weekly contractual working time of temporary and permanent workers. However, the standard deviation of contractual working time is nearly two times higher among temporary workers than among permanent workers. Permanent workers have a much longer tenure.

4 Econometric Approach

The purpose of my analysis is to test the four hypotheses derived in section 2. In order to obtain outcomes which are not influenced by composition effects all regression models include control variables describing the employee (age, sex, marital status, household with child, nationality, language-region in Switzerland, level of education)²⁶, the job (tenure, firm-size, industry, occupation), and survey year effects. Given the panel nature of the data, for all model specifications related to the first three hypotheses I chose fixed effects or random effects estimates if the control for individual-specific unobserved heterogeneity improved the model and I discuss probit estimates with robust standard errors²⁷ otherwise.

As baseline specification I estimate the following equation:

$$Y_{it} = \alpha + \beta C_{it} + \gamma X_{ijt} + \theta J_{it} + \mu_i + \delta_t + \varepsilon_{it} ,$$

Following my 4 hypotheses Y represents the quantitative or qualitative dependent variable of interest: yearly gross income, number of unpaid overtime hours, and dummy variables reflecting different types of absences; a dummy variable indicating the presence of employer provided training as proxy for investments in firm specific human capital and a dummy variable capturing the occurrence of a work accident.

C is the key explanatory variable and indicates a fixed term contract. In consequence, if temporary employees behave different from permanent employees β would be different from zero. X comprises job and firm characteristics such as tenure, firm size, occupation, and industry. J controls for sociodemographic characteristics such as age, sex, marital status,

²⁶ In some model specifications I also control for an individual health shock. This variable describes whether a worker has ever experienced a health based work absence of more than half a year. The measure for a health shock is only available since 1998.

household with child, nationality, language-region in Switzerland, and level of education. Unobservable individual ability is captured by μ and survey year effects by δ . The random error term is given by ε . Different checks for robustness are conducted depending on the results of the baseline regression, their specific relevance for the hypothesis and the specific structure of the available data.

Problems of endogeneity may arise if the selection into temporary contracts represents not a random draw but a selection based on unobservable factors. This problem is addressed in endogeneity checks by adding a contract switching indicator CS to the baseline specification:

$$Y_{it} = \alpha + \beta C_{it} + \lambda CS_{it} + \gamma X_{ijt} + \theta J_{it} + \mu_i + \delta_t + \varepsilon_{it},$$

This indicator describes whether a person who is currently permanently employed was a temporary employee in the preceding period. If λ is insignificant the behaviour of the once temporarily employed does not differ anymore from those already permanently employed in the pre-period. Such a behavioural dynamic would be unlikely in case of an endogeneity problem.²⁸ In consequence, it is then possible to interpret the coefficient of the temporary employment indicator as contractually determined.

4.1 Contractual Impact on Wages and on Unpaid Overtime Hours

Table 3a presents the baseline regression results for the inspection of a contractual wage gap and the employee effort response in terms of unpaid overtime hours. The results of the robustness and endogeneity checks are shown in table 3b.

In the case of yearly gross wage a Hausman test indicates that unobservable ability is correlated with the covariates. In consequence, in all regressions with yearly gross wage as dependent variable I conduct linear fixed-effects estimations. The fixed-effect estimation reveals a significant wage gap of 7 percent for employees holding a temporary contract. The robustness checks (see table 3b) show that the wage gap is higher for female employees, diminishes over time and runs out after three years of tenure.

Even though the fixed-effects estimation should address already the endogeneity problem a further check for endogeneity is conducted: a contract switching indicator is added to describe the income dynamics of temporary employees after their promotion into permanent

²⁷ Robust standard errors are calculated by the Huber White sandwich estimator.

²⁸ If for example temporary employment were a selection of higher motivated workers the temporary employment indicator as well as the contract switching indicator should have the same significant positive coefficient. Therefore, only if temporary employment constituted a proper incentive environment, the contract switching indicator should have an differing (insignificant) coefficient.

contracts. Whereas the coefficient of the temporary contract type indicator remains significantly negative, the coefficient of the contract switching indicator is negative but insignificant: the former temporary employees do not earn less than other permanent employees. This pattern would be unlikely in case of endogenous selection into temporary contracts by factors which are time invariant and favors an interpretation of the wage gap as contractual impact.

The wage gap of 7 percent should constitute an incentive for temporary employees to display a higher level of effort than permanent employees. In table 3a the contractual wage impact on the left side is juxtaposed with the effort response in terms of unpaid overtime hours on the right side. As 83 percent of the employees do not perform unpaid overtime hours, the variable is left-censored and I conduct tobit regressions. The likelihood ratio test of the panel-level variance component yields significant unobserved heterogeneity and I therefore apply random-effect tobit estimations in all models with unpaid overtime hours as dependent variable.

The estimation results for unpaid overtime indicate robustly that temporary employees provide significantly more overtime hours than permanent employees. The average predicted contractual impact reveals an increase in overtime hours by 45 percent. On the basis of 41.7 regular working hours per week permanent employees are predicted to perform on average 2.8 percent unpaid overtime hours. An increase of 45 percent yields an increase in performed overtime from 1.16 to 1.55 hours.

4.2 Contractual Impact on Absences and on Subtypes of Absences

All regressions results with an absence indicator as dependent variable are presented in tables 4a,b and 5a,b. Table 4 contains the results for the total absence indicator and for the indicator of absences due to accident and illness. Table 5 sums up the results for the indicator reflecting absences due to private reasons and absences due to private and missing reasons. In all regressions with an absence indicator as dependent variable the likelihood ratio test of the panel-level variance component yields no significant unobserved heterogeneity. In consequence, probit estimations with robust standard errors are conducted in all models with an absence indicator as dependent variable.

The probit regression yields a positive and insignificant coefficient for the temporary contract status in the baseline specification for total absences as well as in the subsamples for

male and female employees.²⁹ The positive coefficient for the contract type indicator becomes even significant for employees with more than one year of tenure. These findings have three implications: first, in contrast to the study of Engellandt and Riphahn (2005) an imprecise estimation as explanation for a missing significant negative relationship is unlikely.³⁰ Second, the first hypothesis of differing effort responses across different dimensions of effort (unpaid overtime and absences) is confirmed. Third, instead of an effort response there is some evidence for a frustration effect of those employees who do not succeed in overcoming their temporary contract status soon.

In the preceding section a significant incentive impact of temporary contracts on total absences could not be found. Now, I analyze the impact of temporary employment on the two subcategories of absences separately. In the model with absences due to accident or illness the coefficient for the contract type indicator is positive but insignificant. Performing the same robustness checks as for the model with total absences as dependent variable the coefficients show also similar patterns in sign and significance. This finding is incompatible with the assumption that temporary employees use their contract status solely as a means to signal their effort. The finding is at the same time incompatible with the assumption that temporary contracts have an impact on absences which is solely characterized by a higher accident proneness.

However, so far it is not possible to discriminate between two possible explanations for this finding: on the one hand there may not exist any effect at all and on the other hand there may exist two contrary impacts which neutralize each other.³¹ In order to discriminate between these two possible explanations the model is enlarged by an accident and health shock indicator. The accident indicator controls for absences which are due to accidents and the health shock indicator controls for heterogeneity in the health constitution of the employees. If a neutralizing mechanism were in place the accident indicator would allow controlling for it and the health indicator should improve the precision of the estimated contractual effect.

In fact, the coefficient of the temporary contract type indicator changes the sign but remains insignificant. As a consequence the interpretation that there is no contractual impact at all on absences due to accident or illness becomes more likely. A further evidence for this

²⁹ Further robustness checks are performed by adding a health shock indicator or/and an accident indicator to the model. Also in these specifications the coefficient for the contract type indicator remains insignificant.

³⁰ The number of temporary workers who experienced a work absence is with 71 observations about six times higher than in the study of Engellandt and Riphahn (2005).

³¹ The neutralizing effect might result from a higher accident proneness which is compensated by a lower affinity to be absent due to illness.

interpretation would be given if the investigation of hypothesis 4 yielded that there is no impact of temporary contracts on accidents.

In table 5a,b I analyze the contractual impact on the second subcategory of total absences. I find that absences due to private reasons are significantly higher among temporary employees than among permanent employees. The probability of being absent due to private reasons is by 124 percent higher for temporary employees than for permanent employees. The average predicted probability of private absences increases from 0.14 percent for permanent employees to 0.29 percent for temporary employees.

The finding appears to be robust across samples and specifications. Also, temporary employees adapt their behaviour once they have been promoted to permanent contracts. After leaving the temporary contract status they do not continue to have a higher probability of being absent due to private reasons. So, the positive coefficient for the temporary contract type dummy variable is unlikely to be caused by endogeneity and likely to be a contractual effect.

In economic terms, this finding is compatible with a higher external job search activity among temporary employees compared to permanent employees. Additional evidence for this interpretation might be seen in the fact that 21 percent of those temporarily employed in one period move on to permanent employment in the next period. 22 percent of these contract switchers change the employer. In contrast, permanent employees have only a probability of 11 percent of changing the employer.³² Independent of the true absence reason³³ this finding indicates a cost for the employer.

4.3 Contractual Impact on Employer Provided Training and Accident Rates

Incentives for the employer and employee to invest in specific human capital are lower for workers with a lower expected tenure than for workers with a higher expected tenure. The systematic difference in the human capital endowment may in consequence lead to higher accident rates for temporarily employed persons. To investigate this problem empirically I use the same covariates as in the models above and provide the estimation results in table 6.

First, I use the indicator for employer provided training as a dependent variable. Indeed, the probability to receive employer provided training is significantly and robustly lower for

³² I suppose a change of the employer if the tenure in the actual period is higher than the tenure in the following period. This procedure appears justified as long as possibly erroneous answers do not differ systematically between permanent and temporary employees.

³³ Alternatively one might argue that temporary employees in the aggregate compensate the wage discount and unpaid overtime hours by absences.

temporary than for permanent employees.³⁴ Effect simulation reveals, that the probability of receiving employer provided training is 35 percent lower for temporary employees compared to permanent employees.

Subsequently, in using an indicator for work accidents as dependent variable I examine whether this finding also leads to systematically higher accident rates for temporary employees. I find no significant impact of the temporary contract indicator on the probability to suffer a work accident. This result does not change if seasonal or casual workers are disregarded and if the sample is restricted to employees with higher tenure.³⁵ To check whether a higher working intensity of temporary employees also affects their leisure behaviour I redefine the dependent variable in including also leisure accidents. Again, no significant impact from the contract type on accident rates is found.

5 Conclusion

I analyze costs and benefits of fixed-term versus open-end contracts based on 13 waves of data from the Swiss Labor Force Survey. I hypothesize that temporary contracts are connected with a wage gap and yield effort responses which differ across unpaid overtime hours and absences, two potential dimensions of effort. I test whether the employee response to temporary contracts varies by type of absence.

Within the absence dimension I expect heterogeneity by the type of absence. Two subcategories of absences are considered: absences due to private reasons and absences due to accident or illness. Finally, I analyze systematic differences in the build up of firm specific human capital between temporary and permanent employees. I conclude by examining whether the contract type has an impact on an employees probability to suffer an accident.

I find indeed that temporary contracts are connected with a wage gap and that the effort response differs across the two dimensions of effort: temporary employees provide significantly more unpaid overtime hours than permanent employees. Temporary employees do not have a lower probability of being absent. Contrary to the study of Engellandt and Riphahn (2005) the richer data allow to judge an imprecise estimation as an unlikely explanation.

³⁴ The temporary contract type indicator has a significantly negative coefficient. The coefficient remains significantly negative after focussing the sample to employees with higher tenure or after excluding seasonal and casual workers. Contrary to the previous checks for endogeneity the coefficient of the contract switching indicator has a significant (negative) coefficient.

³⁵ The restriction of tenure with more than one year is made to disentangle more clearly the effects from probationary periods from those of the temporary contract type. Here, in addition, the restriction allows to control for non contractual incentives which may result from the social security system.

The subsequent division of absences in two different subcategories reveals that the contractual impact differs also by category of absences: whereas the probability of being absent due to private reasons is by 124 percent higher for temporary employees than for permanent employees no impact on absences due to accident or illness is found. The patterns do not change by adding absences due to missing reasons to either category of absences.

The higher probability of being absent due to private reasons constitutes a source of costs for the employer and is compatible with the interpretation that temporary employees are more active in the external job-search. Furthermore, to the extent that the more intensive external jobsearch of temporary employees leads to unforeseen firm exits additional problems of labour turnover costs may arise.

The insignificant coefficient in the regressions with absences due to accident or illness as dependent variable is compatible with the explanation that there is no contractual impact of temporary contracts at all for this absence type. However, this finding could also be due to two contrary and neutralizing impacts: a higher accident probability (human capital effect) and a lower illness risk (signalling behaviour).

Contrary to Guadalupe (2003) I find no contractual impact on accident rates. As the probability to receive employer provided training differs significantly by type of contract this finding is surprising. The relationship between specific human capital, contract type, and accident proneness therefore seems to be an interesting topic for further research. In total, the empirical pattern favors the interpretation that there exists neither a contractual impact on the accident probability nor on the illness probability.

In sum, the use of temporary contracts is connected with costs and benefits for the employer. The wage discount and the robust incentive impact on unpaid overtime hours are to the advantage of the employer. However, the advantages are increasingly neutralized over time: the wage gap runs out after 3 years of tenure. The incentive impact on overtime hours declines whereas the cost impact in terms of all types of absence probabilities increases. Therefore, temporary contracts serve as a screening tool with incentive impact at the beginning of the employment relationship.

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Figure 1
Development of employment contracts on the Swiss labor market

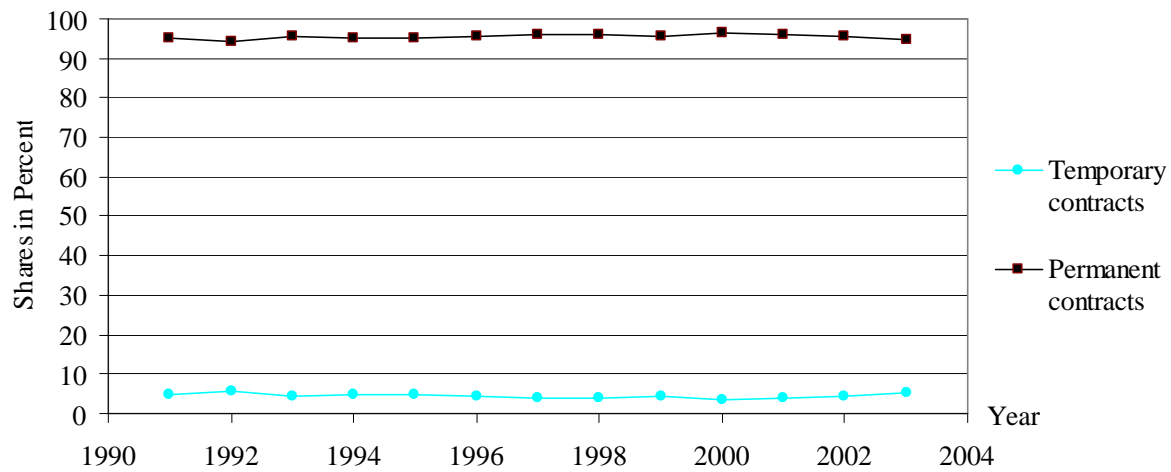


Table 1
Descriptive statistics of dependent variables by type of employment contract

| | Permanent | Temporary |
|--|--------------------|--------------------|
| Qualitative dependent variables | | |
| Probability of all absences | 1.48 | 1.54 |
| Probability of absences due to accident or illness | 1.34 | 1.24 |
| Probability of absences due to private reasons | 0.14 | 0.30 |
| Probability of absences due to missing reasons | 0.07 | 0.09 |
| Probability of employer provided training | 29.82 | 21.71 |
| Probability of a work accident | 5.02 | 5.71 |
| Quantitative dependent variables | | |
| Regular weekly working hours | 41.66 | 41.72 |
| Unpaid overtime hours in percent of regular working time | 2.58 | 4.56 |
| Yearly gross income, logarithmized | 79,324.59 11.18 | 69,119.49 10.93 |
| Number of observations | 94,506 | 4,604 |

Note: Statistics on qualitative variables are provided in percent of column total. Information on quantitative variables are calculated as conditional means. The number of observations differs by variable. For most variables 99,110 observations are available. Integration of observations with missing reasons of absences yields to additional 73 observations. However, as informations on work accidents are only available in the SFLS'waves of 1999 and 2002, for employer provided training only in the SFLS'waves of 1999 and 2003, the number of observations decline to 17,969 respective to 23,916. Furthermore, there exist only 86,798 observations for the unpaid overtime indicator and 87,013 observations for the income variable as they both have more missing information than the absence indicator.

Table 2
Descriptive statistics of explanatory variables by type of contract

| | Permanent | Temporary |
|---|-----------|-----------|
| Sociodemographic characteristics | | |
| Age in years | 39.45 | 35.19 |
| Male | 69.40 | 59.64 |
| Married | 51.46 | 39.49 |
| Household with child | 39.34 | 37.21 |
| Western Switzerland | 33.26 | 44.64 |
| Foreigner | 22.49 | 29.87 |
| Health problems | 2.05 | 1.98 |
| Education none or basic | 13.40 | 15.55 |
| Education medium | 55.11 | 34.43 |
| Education advanced school | 5.75 | 13.58 |
| Education advanced vocational training | 16.25 | 8.80 |
| Education academic | 9.49 | 27.65 |
| Employment characteristics | | |
| Tenure in years | 9.84 | 5.72 |
| Firm size 1-19 employees | 28.36 | 30.82 |
| Firm size 20-99 employees | 29.08 | 25.26 |
| Firm size > 99 employees | 40.78 | 39.10 |
| Firm size – Missing information | 1.78 | 4.82 |
| Number of observations | 94,506 | 4,604 |

Note: Statistics on qualitative variables are provided in percent of column total. Information on quantitative variables are calculated as conditional means. The variable for health problems comprises only 53,105 observations instead of 99,110 as the information on this variable is not gathered before 1998

Table 3a

Contractual impact on yearly gross wage and on standardized unpaid overtime hours

| | Wage, logarithmized | | | Unpaid overtime hours | | |
|-----------------------------------|----------------------|----------|-----|-----------------------|----------|-----|
| | Coeff. | Std.Err. | | Coeff. | Std.Err. | |
| Temporary contract | -0.068 | 0.006 | *** | 0.053 | 0.007 | *** |
| <i>Individual characteristics</i> | | | | | | |
| Education-medium | 0.051 | 0.011 | *** | 0.074 | 0.006 | *** |
| Education-advanced school | 0.056 | 0.016 | *** | 0.171 | 0.009 | *** |
| Education-medium | 0.086 | 0.013 | *** | 0.189 | 0.007 | *** |
| Education-academic | 0.103 | 0.019 | *** | 0.270 | 0.008 | *** |
| Man | -0.007 | 0.095 | | 0.058 | 0.004 | *** |
| Age (in years/10) | -0.003 | 0.032 | | 0.034 | 0.002 | *** |
| Married | 0.009 | 0.006 | | 0.023 | 0.004 | *** |
| Household with child | 0.009 | 0.005 | * | 0.011 | 0.004 | *** |
| Foreigner | -0.031 | 0.015 | ** | -0.023 | 0.004 | *** |
| Western Switzerland | -0.023 | 0.025 | | 0.017 | 0.003 | *** |
| <i>Employment characteristics</i> | | | | | | |
| Tenure (in years/10) | 0.043 | 0.007 | *** | -0.014 | 0.005 | *** |
| Tenure^2 (in years/100) | -0.014 | 0.002 | *** | 0.004 | 0.001 | *** |
| Firm size, 20-99 employees | 0.009 | 0.004 | ** | -0.018 | 0.004 | *** |
| Firm size, >99 employees | 0.018 | 0.005 | *** | -0.043 | 0.004 | *** |
| Firm size missing information | -0.016 | 0.010 | | -0.083 | 0.015 | *** |
| <i>Fixed effect controls</i> | | | | | | |
| Occupation dummies (7) | Yes | - | *** | Yes | - | *** |
| Industry dummies (9) | Yes | - | *** | Yes | - | *** |
| Yearly dummies (12) | Yes | - | *** | Yes | - | *** |
| Constant | Yes | - | *** | Yes | - | *** |
| Variance of random effect | - | - | | 0.001 | | *** |
| Estimator | Linear fixed effects | | | Random effects tobit | | |
| Predicted contractual effect | - | | | 45.053 | | |
| R-squared overall | 0.103 | | | - | | |
| Log likelihood | - | | | -21165.188 | | |
| Number of observations, | 87,013 | | | 86,798 | | |
| left-censored | - | | | 72,456 | | |

Note: 1. ***, ** and * represent statistical significance at the 1, 5 and 10 percent level.
2. The asterisks for the fixed effect controls indicate the joint significance of these measures.
3. The predicted contractual effect reflects the outcome “unpaid overtime hours” (standardized) when the temporary contract indicator is set to 1 relative to when it is set to 0, minus 1:
 $E(y^* | X, \text{Temp}=1)/E(y^* | X, \text{Temp}=0)-1$, with $y^* = \max(0, y)$. For the prediction of y^* it is assumed that the random effect is zero.

Table 3b
Heterogeneity by gender, robustness checks and endogeneity control

| | Wage, logarithmized | | Unpaid overtime hours | |
|--|---------------------|-----------|-----------------------|-----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| <i>Subsample restricted to male employees</i> | | | | |
| Temporary contract | -0.051 | 0.008 *** | 0.057 | 0.009 *** |
| Predicted contractual effect | - | | 47.407 | |
| Number of observations | 60,166 | | 60,418 | |
| <i>Subsample restricted to female employees</i> | | | | |
| Temporary contract | -0.097 | 0.011 *** | 0.040 | 0.012 *** |
| Predicted contractual effect | - | | 37.355 | |
| Number of observations | 26,847 | | 26,380 | |
| <i>Subsample restricted to tenure with more than 1 year - Distinction from probationary periods:</i> | | | | |
| Temporary contract | -0.025 | 0.008 *** | 0.070 | 0.008 *** |
| Predicted contractual effect | - | | 64.774 | |
| Number of observations | 75,699 | | 75,935 | |
| <i>Subsample restricted to tenure with more than 3 years - Accessing development over time:</i> | | | | |
| Temporary contract | 0.002 | 0.009 | 0.062 | 0.010 *** |
| Predicted contractual effect | - | | 53.636 | |
| Number of observations | 58,829 | | 60,092 | |
| <i>Subsample without seasonal and casual workers – Forming a more homogenous group</i> | | | | |
| Temporary contract | -0.061 | 0.007 *** | 0.059 | 0.008 *** |
| Predicted contractual effect | - | | 51.527 | |
| Number of observations | 86,509 | | 86,369 | |
| <i>Specification including contract switching indicator – Check true contractual impact</i> | | | | |
| Temporary contract | -0.039 | 0.010 *** | 0.075 | 0.012 *** |
| Contract switching | -0.015 | 0.010 | 0.020 | 0.016 |
| Number of observations | 42,203 | | 42,049 | |

Note:

1. ***, ** and * represent statistical significance at the 1, 5 and 10 percent level, respectively.
2. The models control for the same set of covariates as in the baseline regression in table 3a.
3. For each dependent variable the same estimator as in table 3a is used.
4. Contract switching indicates workers with permanent contract in t and temporary contract in t-1. In this specification the reference is permanent contract in t-1 and in t.
5. In a pooled least square regression the wage gap amounts to 21 percent and in random-effect estimation to 15 percent.

Table 4a

Contractual impact on total absences and on absences due to accident and illness

| | Total absences | | Absences due to accident and illness | |
|------------------------|----------------|----------|--------------------------------------|----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| Temporary contract | 0.050 | 0.052 | 0.010 | 0.056 |
| Number of observations | 99,110 | | 99,110 | |

Note:

1. Predicted contractual effect reflects the outcome probability when the temporary contract indicator is set to 1 relative to when it is set to 0, minus 1:
 $[\text{Pr}(\text{Effort high} \mid X, \text{Temp}=1) / \text{Pr}(\text{Effort high} \mid X, \text{Temp}=0)] - 1$
2. The insignificant contractual impact is not affected by adding absences due to missing reasons to either category of absences.

Table 4b
Robustness checks

| | Total absences | | Absences due to accident and illness | |
|---|----------------|-----------|--------------------------------------|----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| <i>Subsample restricted to male employees</i> | | | | |
| Temporary contract | 0.015 | 0.070 | -0.006 | 0.074 |
| Number of observations | 68,336 | | 68,336 | |
| <i>Subsample restricted to female employees</i> | | | | |
| Temporary contract | 0.095 | 0.077 | 0.033 | 0.085 |
| Number of observations | 30,774 | | 30,774 | |
| <i>Subsample restricted to tenure with more than 1 year</i> | | | | |
| Temporary contract | 0.121 | 0.059 ** | 0.084 | 0.063 |
| Number of observations | 86,429 | | 86,429 | |
| <i>Subsample restricted to tenure with more than 3 years</i> | | | | |
| Temporary contract | 0.179 | 0.068 *** | 0.128 | 0.074 * |
| Number of observations | 68,628 | | 68,628 | |
| <i>Subsample without seasonal and casual workers</i> | | | | |
| Temporary contract | 0.060 | 0.055 | 0.019 | 0.060 |
| Number of observations | 98,536 | | 98,536 | |
| <i>Specification including indicator for health problems</i> | | | | |
| Temporary contract | 0.053 | 0.073 | 0.023 | 0.077 |
| Number of observations | 53,105 | | 53,105 | |
| <i>Specification including indicator for accidents</i> | | | | |
| Temporary contract | -0.095 | 0.144 | -0.150 | 0.162 |
| Number of observations | 17,969 | | 17,969 | |
| <i>Specification including indicators for health problems and accidents</i> | | | | |
| Temporary contract | -0.092 | 0.149 | -0.154 | 0.169 |
| Number of observations | 17,946 | | 17,946 | |

Note: 1. ***, ** and * represent statistical significance at the 1, 5 and 10 percent level.
2. In all models of table 4a,b pooled probit with robust standard errors is used as estimator.
3. The models of table 4a,b control for the same covariates as in table 3a.
4. Contract switching indicates workers with permanent contract in t and temporary contract in t-1.
The reference in this specification is permanent contract in t-1 and in t.

Table 5a
Contractual impact on absences due to private reasons

| | Absences due to private reasons | | Absences due to private and missing reasons | |
|------------------------------|---------------------------------|----------|---|----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| Temporary contract | 0.241 | 0.102 ** | 0.215 | 0.091 ** |
| Predicted contractual effect | 123.526 | | 97.860 | |
| Estimator | Probit, robust Std.Err. | | Probit, robust Std.Err. | |
| Number of observations | 99,110 | | 99,183 | |

Note: 1. Predicted contractual effect reflects the outcome probability when the temporary contract indicator is set to 1 relative to when it is set to 0, minus 1:
 $[\text{Pr}(\text{Effort high} \mid X, \text{Temp}=1) / \text{Pr}(\text{Effort high} \mid X, \text{Temp}=0)] - 1$
2. No significant contractual impact is found for absences due to missing reasons as an independent absence type.

Table 5b
Heterogeneity by gender, robustness checks and endogeneity control

| | Absences due to private reasons | | Absences due to private and missing reasons | |
|--|---------------------------------|-----------|---|-----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| <i>Subsample restricted to male employees</i> | | | | |
| Temporary contract | 0.174 | 0.152 | 0.213 | 0.127 * |
| Predicted contractual effect | 88.230 | | 99.964 | |
| Number of observations | 61,609 | | 68,381 | |
| <i>Subsample restricted to female employees</i> | | | | |
| Temporary contract | 0.320 | 0.145 ** | 0.235 | 0.130 * |
| Predicted contractual effect | 188.576 | | 113.566 | |
| Number of observations | 27,591 | | 30,802 | |
| <i>Subsample restricted to tenure with more than 1 year</i> | | | | |
| Temporary contract | 0.298 | 0.118 ** | 0.261 | 0.105 ** |
| Predicted contractual effect | 193.038 | | 127.143 | |
| Number of observations | 86,429 | | 86,495 | |
| <i>Subsample restricted to tenure with more than 3 years</i> | | | | |
| Temporary contract | 0.383 | 0.126 *** | 0.371 | 0.111 *** |
| Predicted contractual effect | 314.668 | | 216.764 | |
| Number of observations | 68,628 | | 68,679 | |
| <i>Subsample without seasonal and casual workers</i> | | | | |
| Temporary contract | 0.258 | 0.109 ** | 0.245 | 0.095 ** |
| Predicted contractual effect | 136.125 | | 116.891 | |
| Number of observations | 98,536 | | 98,609 | |
| <i>Specification including contract switching indicator</i> | | | | |
| Temporary contract | 0.305 | 0.171 * | 0.144 | 0.161 |
| Contract switching | 0.289 | 0.200 | 0.144 | 0.194 |
| Number of observations | 40,647 | | 47,229 | |

Note:

1. ***, ** and * represent statistical significance at the 1, 5 and 10 percent level.
2. In all models of table 5a,b pooled probit with robust standard errors is used as estimator.
3. The models of table 5a,b control for the same covariates as in table 3a.
4. Contract switching indicates workers with permanent contract in t and temporary contract in t-1. The reference in this specification is permanent contract in t-1 and in t.
5. In the model with absences due to private reasons as dependent variable, the sum of observations for the subsamples by gender differ from the number of observations given in table 4a as some observations are dropped due to collinearity.

Table 6
Contractual impact on employer provided training and accident rates (H3)

| | Employer provided training | | Work accident | |
|---|----------------------------|-----------|---------------|----------|
| | Coeff. | Std.Err. | Coeff. | Std.Err. |
| <i>Baseline regressions</i> | | | | |
| Temporary contract | -0.321 | 0.047 *** | 0.080 | 0.079 |
| Predicted contractual effect | -34.904 | | - | |
| Number of observations | 23,916 | | 17,969 | |
| <i>Subsample restricted to tenure with more than 1 Year</i> | | | | |
| Temporary contract | -0.275 | 0.056 *** | 0.132 | 0.100 |
| Predicted contractual effect | -30.137 | | - | |
| Number of observations | 21,024 | | 15,576 | |
| <i>Subsample restricted to tenure with more than 3 Years</i> | | | | |
| Temporary contract | -0.199 | 0.069 *** | 0.054 | 0.127 |
| Predicted contractual effect | -22.732 | | - | |
| Number of observations | 16,386 | | 12,379 | |
| <i>Subsample without seasonal and casual workers</i> | | | | |
| Temporary contract | -0.297 | 0.049 *** | 0.037 | 0.089 |
| Predicted contractual effect | -32.679 | | - | |
| Number of observations | 23,761 | | 17,852 | |
| <i>Specification with indicator for health problems</i> | | | | |
| Temporary contract | - | - | 0.079 | 0.079 |
| Number of observations | - | | 17,946 | |
| <i>Specification with dependent variable comprising leisure accidents</i> | | | | |
| Temporary contract | - | - | 0.054 | 0.058 |
| Number of Observations | - | | 17,969 | |
| <i>Specification including contract switching indicator</i> | | | | |
| Temporary contract | -0.280 | 0.080 *** | - | - |
| Contract switching | -0.170 | 0.102 * | - | - |
| Number of observations | 10,974 | | - | |

Note: 1. ***, ** and * represent statistical significance at the 1, 5 and 10 percent level.
2. In all models pooled probit with robust standard errors is used as estimator.
3. The models control for the same individual and firm characteristics as in table 3a.