Central European
Labour Studies
Institute

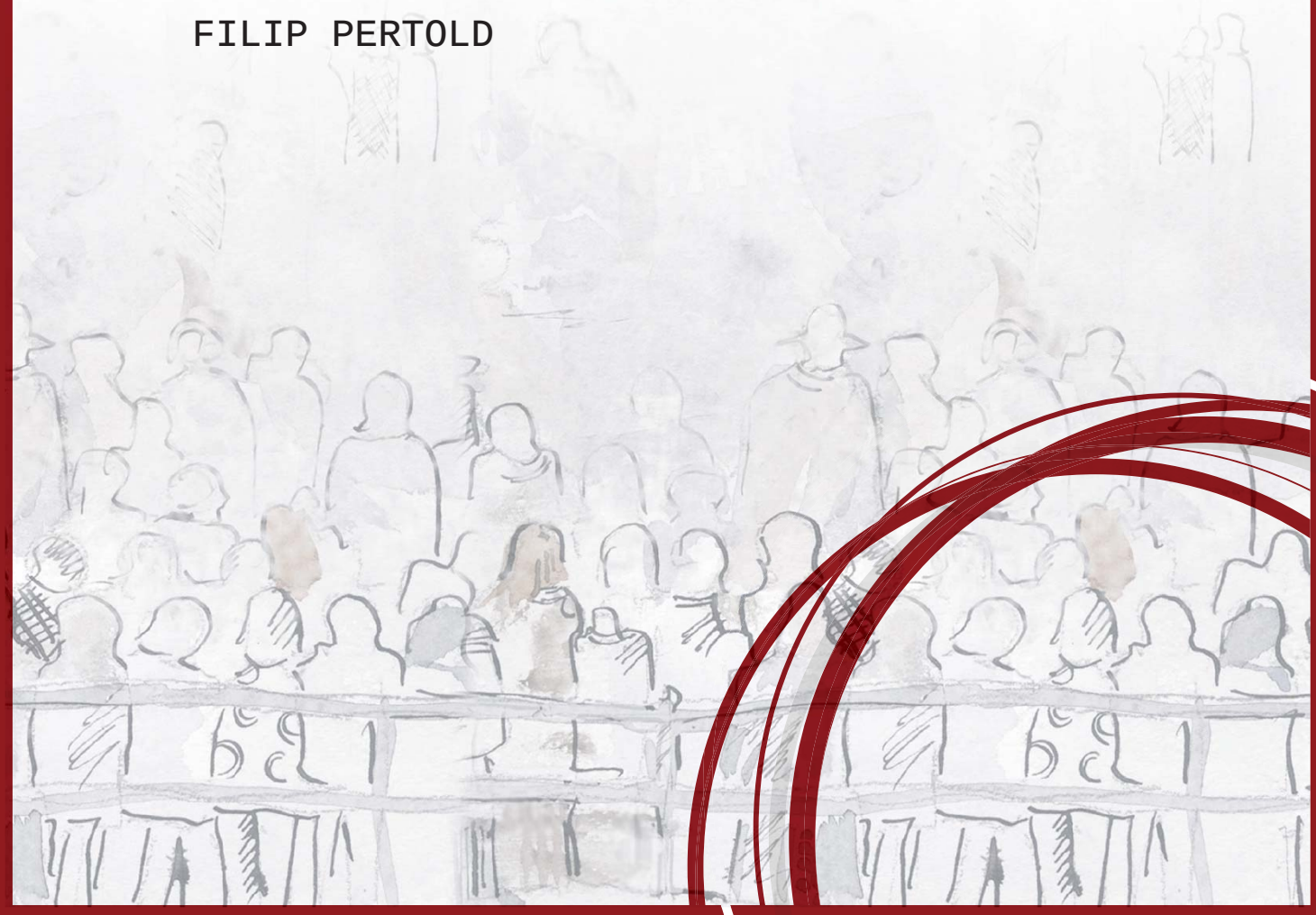
www.celsi.sk

CELSI Discussion Paper No. 35

WHAT IF THEY TAKE IT ALL? IMPACT OF ZERO REPLACEMENT RATES ON SICKNESS ABSENCE

December 2015

FILIP PERTOLD



WHAT IF THEY TAKE IT ALL? IMPACT OF ZERO REPLACEMENT RATES ON SICKNESS ABSENCE

CELSI Discussion Paper No. 35
December 2016

Filip Pertold
CERGE-EI, Charles University and the Academy of Science

Central European Labour Studies Institute (CELSI)

Zvolenská 29
821 09 Bratislava
Slovak Republic

Tel/Fax: +421-2-207 357 67
E-mail: info@celsi.sk
Web: www.celsi.sk

CELSI Discussion Paper No. 35
December 2015

ABSTRACT

What if they take it all? Impact of zero replacement rates on sickness absence

In this paper I investigate the effect of sickness absence reform that reduced the replacement rate during the first three days of absence to zero. Using rich data on about 900,000 workers each quarter I find substantial decrease of sickness absence incidence. The richness of the data allows for studying heterogeneity of the treatment effect on several dimensions, in particular, job as well as firm characteristics. I show that sickness absence was reduced mainly in manufacturing, hotels and restaurant. Further, the low skilled occupations were affected much more compared to high skilled occupations, conditional on wages. I also find females to be more sensitive with respect to the changes of replacement rate compared to men.

Keywords: sickness absence and incidence, policy reform, heterogeneous impact

JEL Classification: J22, I13

Corresponding Author:

Filip Pertold

CERGE-EI, Charles University Prague and Academy of Sciences of the Czech Republic
Politickych veznu 7, 111 21, Prague, Czech Republic
Email: filip.pertold@cerge-ei.cz

* This research has been supported by the Grant Agency of the Czech Republic (grant number G14-25969P).

1. Introduction

Sickness absence brings high costs to the society and to the entire economy through the loss of working hours and production in many European countries. According to the OECD statistics the sickness absence and disability spending constitute in many countries more than 2.2 % of GDP. Sickness absence expenses often represents about 12 % of all public social spending. In this paper I focus on the impact of a reform that reduced sickness benefits during the first three days of absence to zero.

I contribute to the existing literature by analyzing heterogeneous responses to the reform. Using rich individual data, I analyze impact of the reform with respect to firms and workers detailed characteristics, in particular, I focus on occupations and industries. I am using detailed two-digit level disaggregation of industries and occupations. Although qualitatively similar reforms have been studied before (Henrekson and Persson 2004, De Paola and Pupo and Scoppa 2009, Ziebarth and Karlsson, 2010) the decrease in benefits to zero during the first three days of absence is substantially larger change in replacement rate compared to what has been implemented before.

The dataset used in the research represents over 900,000 workers observed quarterly in years 2006-2010 and contains detailed occupational and industry code. Using difference-in-differences strategy I quantify the impact of a drop in replacement rate from 75% to none during the first three days of sickness. I find that this change in sickness absence incentives substantially affects sickness absence behavior. In particular, the number of sickness days per quarter per worker dropped by 2.3 days, which is about 15 percent of the pre-reform average level. This decrease was mainly driven by the decrease in the incidence of sickness –

the share of sick workers dropped by about 3.5 percentage points, which is also about 20% of the pre-reform mean.

However, I find substantial differences with respect to gender, industry and occupation. Females are more elastic with respect to the change in benefits. Further, the stronger impact of the reform is observed for low skilled occupations, and manufacturing and hotels and restaurants. It means that workers in specific jobs are more likely to alter their sickness absence behavior when benefits are changed, conditional on their wage. A possible explanation for this evidence is that in specific jobs where employer costs related to the sickness absence are the largest, employers do not allow for flexible working hours and workers are motivated to shirk as they need confirmation from a doctor for each day of absence regardless of the true reason for the absence. Naturally, in such jobs a change in sickness absence benefits may generate a higher change in workers' behavior. Finally, I test for the heterogeneous effect with respect to wages. Low wage workers are much more affected than high wage workers. This is in line with relative outside option theory and the previous findings.

There is substantial previous literature exploiting the effect of sickness benefits on sickness absences using institutional changes in sick leave benefits. For example using the data for Sweden from 1955 to 1999, Henrekson and Persson (2004) show the positive relationship between sickness benefits and sickness absence. This result has been confirmed by other later studies using institutional changes in sickness benefits, for example in Italy (De Paola, Pupo and Scoppa, 2009), and in Germany (Ziebarth and Karlsson, 2010). However, all of the used institutional changes cut the sickness benefits only modestly and there has been very little discussion concerning heterogeneous response to changes in benefits. In Germany, the change from fully replaced wage to sick pay of 80% of gross wages during the first 6 weeks of

absence increased the number of workers with zero absent days by 6% (Ziebarth and Karlsson, 2010). Seemingly lower cut in sickness benefits for public workers in Italy has led to around 49% decline in absences (De Paola, Pupo and Scoppa, 2009). Furthermore, an international study shows the results in the same direction. The marginal effect of sick pay benefits reduces absenteeism by about 2 days (Frick and Malo, 2000). None of these studies, however, studied heterogeneity in the response to such reforms with respect to job characteristics and across occupations in such detail as I provide in this paper.

Several other empirical studies have analyzed other contextual determinants of sickness absences, but not in the context of any reform of sickness absence benefits. Lower absenteeism was found in economies with higher unemployment rates (Leigh, 1985; Hesselius, 2007). Recently, studies show that the higher are firing costs the higher is the number of absence days (Jimeno and Toharia, 1996; Engellandt and Riphahn, 2005; Ichino and Riphahn, 2004, 2005). However, in their international comparison, Frick and Malo (2000) find no impact of the type of employment contract on absenteeism. This suggests the major influence of institutional frameworks such as the level of sickness benefits.

Several papers aim to exploit jobs charactersicts in relation to sickness absence behaviour. For example, Mastekaasa and Olsen (1998) control for occupation-workplace pairs and for occupation and workplace separately, and find that controlling for occupation significantly explains variation in sickness absence behavior, though a large portion still remains unexplained. The effect of workplace, on the other hand, seems negligible.

The aim of this paper is to study, among others, industrial and job characteristics and its relation to the elasticity of sickness absence behavior with respect to the changes in sickness absence benefits. The following part of the paper describes the main institutional details.

2. Institutional Background, Data and Descriptive Statistics

The Czech sickness insurance is a comprehensive system run by the government. All employees are by default insured and currently pay 2.5% contribution into the system from their wage. In case of sickness absence, a sick worker gets sickness benefits calculated from the sickness scheme. Final benefits are calculated according to an official formula that incorporates a high degree of redistribution. For example, replacement ratio (ratio of sickness benefits to a net wage) for low income workers was about 75 % of their net wage in 2007, workers with wage two times higher than average wage got about 40% of their net income during first 30 days of their sickness.

The Czech sickness absence policy has been changed since January 1, 2008 when there was one sharp decrease in the sickness benefits during the first 3 days of sickness. In particular, since the reform was implemented sickness absence benefits decreased from 60% of the base to zero percent of the base. According to the Czech Ministry of Social Affairs the first change decreased average benefit by 20%, corresponding to 10 percentage points of the average wage. This calculation is made for 30 days long sickness spell.

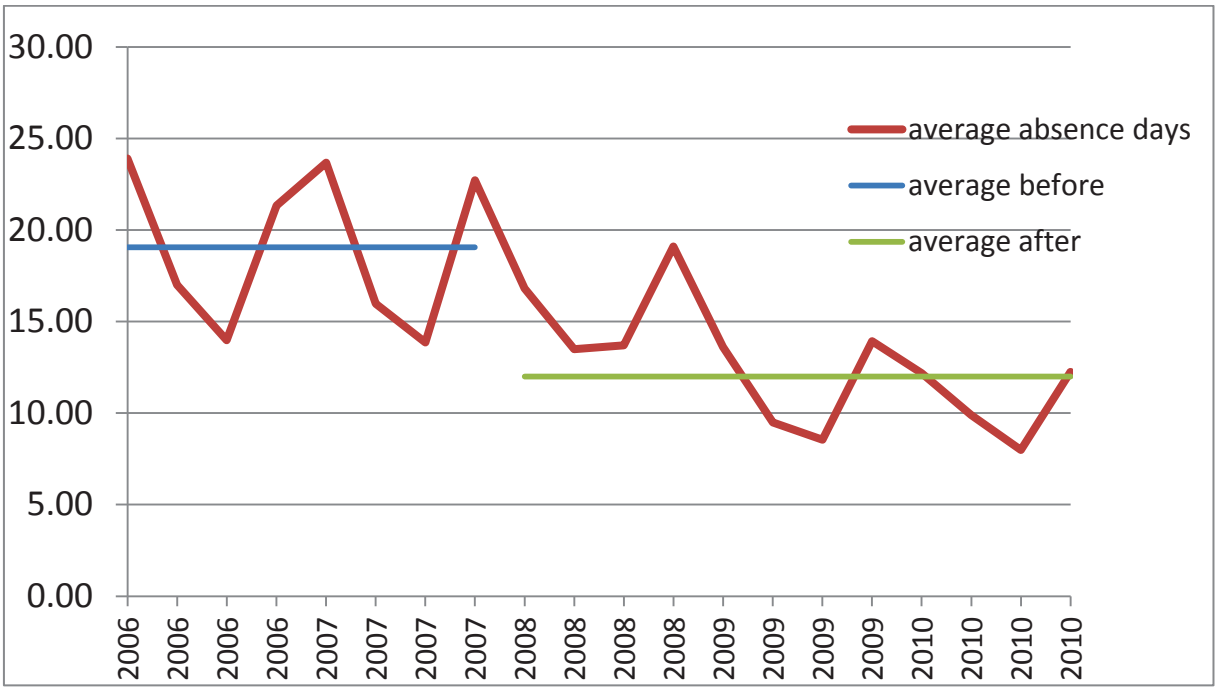
To analyze the effect of this reform on sickness absence behavior I employ linked employer-employee data from the Information system of average earnings from the period 2006-2010. This is a representative sample of private sector workers. Data contains for each quarter of year information about approximately 900,000 workers employed in firms usually larger than 10 employees and are extracted from firms' payroll information system. The structure of the data allows for panel dimension on the firm side, but for the sake of simplicity I employ only cross-sectional dimension in this version of the paper. I illustrate that the

structure of the sample is comparable over time in Table A.1 in the annex of this paper. In all observable characteristics, except for the outcome variable, the structure of the sample is similar over time. This suggests that resorting of workers across firms and employers immediately after the reform is highly unlikely.

Development of the main outcome variable is illustrated in Figure 1. It depicts the total number of sickness absence days per quarter two years before and two years after the reform. We can easily see a high degree of seasonality with regular spikes in each fourth quarter during a year. The horizontal lines depict the means of absence days before and after the reform. This graph indicates that potential response to the policy change was really substantial. In fact, I observe on average 35% decrease in absent days and 38% decrease in the share of absent workers.

It is also clear that simple before and after comparison ignores possible aggregate trends that may bias the changes. In the empirical strategy I take this and other factors into account.

Figure 1: Number of Absence Days per Quarter



Further, I focus on the heterogeneous response to the reform in this analysis. Elasticity of sickness absence with respect to the changes in replacement rates has not been widely studied before. I exploit the richness of the data and particularly analyze gender, education and more importantly, size of the firm, industry and occupation. Table 1 shows unconditional means before and after the reform.

The comparison of males and females shows that the level of sickness differs substantially, but the unconditional estimate of the response to the policy reform was similar. For occupations the unconditional means show that workers in low skilled occupation decreased sickness absence much more, compared to high skilled occupations, except for teaching professionals. For industries two of them stand out: manufacturing and hotels and restaurants. In both cases, sickness absence dropped by more than 35 percent. On the other hand, mining and financial sector were affected the least, this descriptive analysis does not

show substantial differences. I formally test heterogeneity in treatment effect in the next section.

Table 1: Sickness absence before and after the reform (two year average per quarter)

	absent days			incidence of sickness		
	before	after	change (%)	before	after	change (%)
Male	15,06	9,51	-36,85	0,13	0,08	-38,76
Female	20,74	13,09	-36,90	0,18	0,11	-37,71
College	5,77	4,49	-22,11	0,07	0,05	-26,39
Maturita	12,24	8,47	-30,80	0,12	0,08	-35,54
nomaturita	22,05	14,01	-36,46	0,18	0,11	-39,20
elementary	29,96	18,67	-37,68	0,22	0,14	-37,10
Industry						
agriculture	19,48	13,61	-30,13	0,14	0,09	-35,51
mining	18,10	13,43	-25,84	0,16	0,10	-33,97
manufacturing	20,10	12,05	-40,07	0,17	0,10	-40,61
electricity, gas, water	10,20	6,79	-33,47	0,10	0,06	-39,00
Construction	18,34	12,47	-32,00	0,14	0,09	-35,97
Maintenance, retail sale	17,29	12,22	-29,32	0,15	0,10	-33,12
Hotels and restaurants	17,96	11,14	-37,99	0,16	0,10	-36,94
transport	15,95	10,19	-36,14	0,14	0,09	-39,29
financial sector	10,49	7,85	-25,17	0,12	0,09	-29,84
real estate	14,62	9,64	-34,08	0,14	0,09	-33,57
public administration	12,54	9,43	-24,81	0,13	0,08	-33,60
Education	6,65	4,62	-30,60	0,07	0,05	-35,21
health services	14,82	10,55	-28,78	0,12	0,08	-34,96
other services	12,83	9,15	-28,65	0,12	0,08	-32,17
Firm size						
1-5	21,14	19,14	-9,45	0,18	0,14	-25,82
6-9	16,85	4,67	-72,31	0,20	0,06	-70,00
10-19	15,83	10,89	-31,21	0,13	0,08	-37,59
20-24	16,62	10,25	-38,31	0,14	0,08	-41,61
25-49	16,33	11,08	-32,16	0,14	0,09	-33,58
50-99	17,42	11,43	-34,42	0,14	0,09	-35,42
100-199	20,06	11,98	-40,29	0,16	0,09	-41,98
200-249	18,53	11,27	-39,19	0,15	0,09	-40,52
250-499	18,84	11,64	-38,18	0,15	0,10	-38,31
500-999	17,74	11,15	-37,15	0,15	0,09	-38,93
1000-1499	16,45	10,51	-36,11	0,14	0,09	-38,46
1500-1999	17,97	10,41	-42,08	0,15	0,09	-41,61
2000-2499	15,01	9,25	-38,37	0,13	0,08	-36,15

2500-2999	19,15	9,44	-50,72	0,16	0,09	-46,63
3000-3999	14,94	10,21	-31,63	0,13	0,09	-35,34
4000-4999	13,84	8,60	-37,83	0,12	0,07	-40,00
5000-9999	13,24	10,18	-23,16	0,13	0,09	-33,07
>9999	17,86	11,99	-32,86	0,16	0,10	-35,00
Occupations						
Corporate managers	6,01	4,36	-27,50	0,06	0,04	-33,33
General managers	7,31	5,51	-24,59	0,07	0,05	-34,78
Physical, mathematical and engineering science professionals	6,00	4,37	-27,14	0,08	0,05	-29,33
Life science and health professionals	5,93	4,85	-18,24	0,07	0,05	-28,17
Teaching professionals	3,25	2,54	-21,85	0,04	0,03	-27,50
Other professionals	8,77	6,51	-25,72	0,11	0,08	-29,63
Natural and engineering science associate professionals	8,75	5,94	-32,18	0,09	0,06	-36,67
Life science and health associate professionals	12,13	9,23	-23,88	0,11	0,07	-32,71
Teaching associate professionals	12,53	6,40	-48,90	0,14	0,06	-52,59
Other associate professionals	10,06	7,27	-27,75	0,11	0,08	-31,25
Office clerks	16,64	11,43	-31,32	0,16	0,10	-36,13
Customer services clerks	18,66	13,07	-29,93	0,17	0,12	-33,33
Personal and protective services workers	19,10	12,47	-34,71	0,16	0,10	-39,63
Models, salespersons and demonstrators	21,24	15,01	-29,32	0,18	0,12	-32,04
Service workers in the armed forces and civil service	29,35	20,58	-29,89	0,20	0,13	-35,18
Extraction and building trades workers	25,79	17,85	-30,76	0,20	0,13	-33,67

Metal, machinery and related trades workers	21,30	13,15	-38,27	0,17	0,10	-40,80
Precision, handicraft, printing and related trades workers	26,98	14,36	-46,80	0,22	0,12	-47,25
Other craft and related trades workers	29,72	19,89	-33,05	0,22	0,14	-33,64
Stationary-plant and related operators	21,37	12,71	-40,53	0,17	0,10	-41,82
Machine operators and assemblers	28,38	17,00	-40,09	0,22	0,14	-39,19
Drivers and mobile-plant operators	19,29	12,38	-35,83	0,15	0,09	-37,67
Sales and services elementary occupations	22,08	14,81	-32,92	0,17	0,11	-35,12
Agricultural, fishery and related labourers	35,42	22,95	-35,20	0,23	0,15	-37,50
Labourers in mining, construction, manufacturing and transport	27,71	17,11	-38,26	0,22	0,13	-39,81
Total	17,38	10,99	-36,77	0,15	0,09	-38,51

3. Regression Analysis

As the reform affected all workers in the economy I cannot employ the concept of a treatment and a control group. In the estimation I therefore follow a strategy suggested in Johansson and Palme (2005) and Paola et al. (2014). This strategy is based on simple difference-in-differences, in which a change in two periods around a reform is compared to a change one year earlier. This empirical strategy reflects the policy design, in which all workers were in fact treated by the reform and therefore there is no self-selection into the treatment and a proper control group is difficult to construct.

In the estimation strategy I follow Paola (2014) and estimate a linear model that has the following form:

$$Sickness_{it} = \alpha + \beta After_{it} + Z_{it}\gamma + \delta Quarter_t + trend_t + \varepsilon_{it}$$

For heterogenous treatment effect I estimate the following model:

$$Sickness_{it} = \alpha + \beta After_t + Z_{it}\gamma + (After_t * Z_{it})\theta + \delta Quarter_t + trend_t + \varepsilon_{it}$$

The key left hand side variable is the number of sickness days per quarter. Alternatively, I employ sickness incidence (the probability of becoming sick) and share of sickness days as a left hand side variable. Vector *Z* contains observable characteristics related to the type of job, individual demographics and firm characteristics. In some specifications I include monthly wages and run separate regressions for different levels of wages.

Baseline specifications are in Table 2. It shows that the effect of the reform is substantially lower after I control for time trend in the data. This is a rather conservative approach since a relatively short time series with quarterly frequency is at disposal (two years before the reform and three after the reform). Still, the estimated effect is rather large and corresponds to 15 percent of the pre-treatment average. Table 3 presents the results for sickness incidence and the findings are similar. It ought to be stressed that none of the effects of the reform change after individual characteristics are added into the baseline specification. Since the data are treated as pooled repeated cross-sectional samples, standard errors are clustered on individual basis.

Table 2: Number of absence days and the effect of the reform

	(1) absnemoc_q	(2) absnemoc_q	(3) absnemoc_q	(4) absnemoc_q
After	-6.389***	-2.356***	-2.241***	-2.241***
	(0.027)	(0.060)	(0.059)	(0.072)
q_2	-4.291***	-3.735***	-3.779***	-3.779***
	(0.038)	(0.039)	(0.038)	(0.033)

q_3	-5.475***	-4.421***	-4.506***	-4.506***
	(0.038)	(0.040)	(0.040)	(0.039)
q_4	0.437***	1.933***	1.809***	1.809***
	(0.038)	(0.043)	(0.043)	(0.046)
trend		-0.991***	-0.932***	-0.932***
		(0.014)	(0.014)	(0.018)
trend2		0.028***	0.027***	0.027***
		(0.001)	(0.001)	(0.001)
age			0.006***	0.006***
			(0.001)	(0.001)
college			-16.806***	-16.806***
			(0.055)	(0.072)
maturita			-12.479***	-12.479***
			(0.048)	(0.072)
nomaturita			-4.250***	-4.250***
			(0.047)	(0.074)
male			-4.603***	-4.603***
			(0.027)	(0.034)
_cons	19.707***	22.702***	33.167***	33.167***
	(0.030)	(0.052)	(0.084)	(0.113)
N	15368024	15368024	15368024	15368024
R^2	0.006	0.007	0.019	0.019

OLS, Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Sickness incidence and the effect of the reform

	(1) sickincidence	(2) sickincidence	(3) sickincidence
after	-0.015***	-0.015***	-0.015***
	(0.000)	(0.000)	(0.000)
trend	-0.012***	-0.011***	-0.011***
	(0.000)	(0.000)	(0.000)
trend2	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
q_2	-0.028***	-0.028***	-0.028***
	(0.000)	(0.000)	(0.000)

q_3	-0.033***	-0.034***	-0.034***
	(0.000)	(0.000)	(0.000)
q_4	0.008***	0.007***	0.007***
	(0.000)	(0.000)	(0.000)
age		-0.001***	-0.001***
		(0.000)	(0.000)
college		-0.107***	-0.099***
		(0.000)	(0.000)
maturita		-0.078***	-0.076***
		(0.000)	(0.000)
nomaturita		-0.028***	-0.028***
		(0.000)	(0.000)
male		-0.037***	-0.035***
		(0.000)	(0.000)
mwage			-0.000***
			(0.000)
_cons	0.205***	0.338***	0.340***
	(0.000)	(0.001)	(0.001)
N	15368024	15368024	15356200
R^2	0.012	0.028	0.029

Note: Results are from linear probability model, OLS

4. Exploring the Heterogeneity of the Reform Effect

In this part of the paper I study the heterogeneous responses to the reform in a regression framework. In particular, the focus is on several characteristics that are usually considered in the literature as important determinants of sickness absence behavior. I start with gender heterogeneity and test if females reacted more sensitively on the reform than males. Second, I analyze changes in sickness absence according to the wage level. In this respect, I hypothesize that low wage workers are to be much more elastic with respect to changes driven by the reform. However, I cannot rule out that specific workers with unobserved characteristics driving high elasticity with respect to changes in sickness absence benefits are

sorted into specific jobs. Nevertheless, the heterogeneity has not been studied before in such detail.

4.1 Gender

Gender is generally considered to be important predictor of sickness absence behavior. Consensus in the literature is that female sickness absence is more prevalent and is often found to be more responsive to changes in constraints. Table 4 presents results from a formal test of asymmetric impact of the reform on female and male sickness absence behavior. Contrary to the descriptive statistics, which suggest no difference between males and females, I find significant differences between males and females. In particular, males decreased their sickness absence significantly less compared to women. This finding is in line with the theory that the labour supply of women is more sensitive to changes in the budget constraint due to their, for example, duties at home.

Table 4: Gender differences and the effect of the reform

	(1) absnemoc_q	(2) absnemoc_q
After	-2.241***	-3.397***
	(0.059)	(0.067)
Female	4.603***	5.617***
	(0.027)	(0.039)
After*female		**-1.948*** **
		(0.054)
_cons	33.167***	33.742***
	(0.084)	(0.086)
N	15368024	15368024
R^2	0.019	0.019

Note: Unreported controls: years, quarters, age, education
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.2 Wages

Further, I find substantial difference across workers with different wages. In line with the predictions of outside option theory, low wage workers appear to be much more sensitive to the reform (Table 5).

Table A.3: Effect of the reform with respect to individual wage

	(1) absnemoc_q	(2) absnemoc_q	(3) absnemoc_q	(4) absnemoc_q
After	**-4.460*****	**-3.034*****	**-1.114*****	**-0.088**
	(0.149)	**(0.086)**	**(0.094)**	**(0.113)**
Age	-0.003	0.006***	0.036***	0.031***
	(0.003)	(0.002)	(0.002)	(0.003)
College	-16.327***	-14.391***	-8.714***	-2.228***
	(0.242)	(0.097)	(0.122)	(0.169)
maturita	-11.352***	-10.548***	-6.835***	-0.832***
	(0.102)	(0.074)	(0.119)	(0.173)
nomaturita	-4.141***	-4.122***	-1.631***	6.068***
	(0.086)	(0.072)	(0.123)	(0.214)
Male	-2.454***	-2.573***	-2.985***	-3.542***
	(0.070)	(0.042)	(0.051)	(0.062)
_cons	38.563***	30.222***	17.787***	8.271***
	(0.183)	(0.128)	(0.171)	(0.224)
N	3926128	7300976	3045444	1095136
R^2	0.014	0.012	0.008	0.007

1) Wage less than 40 percentile
2) Wage less than average
3) Wage less than 70 percentile
4) Wage more than 70 percentile

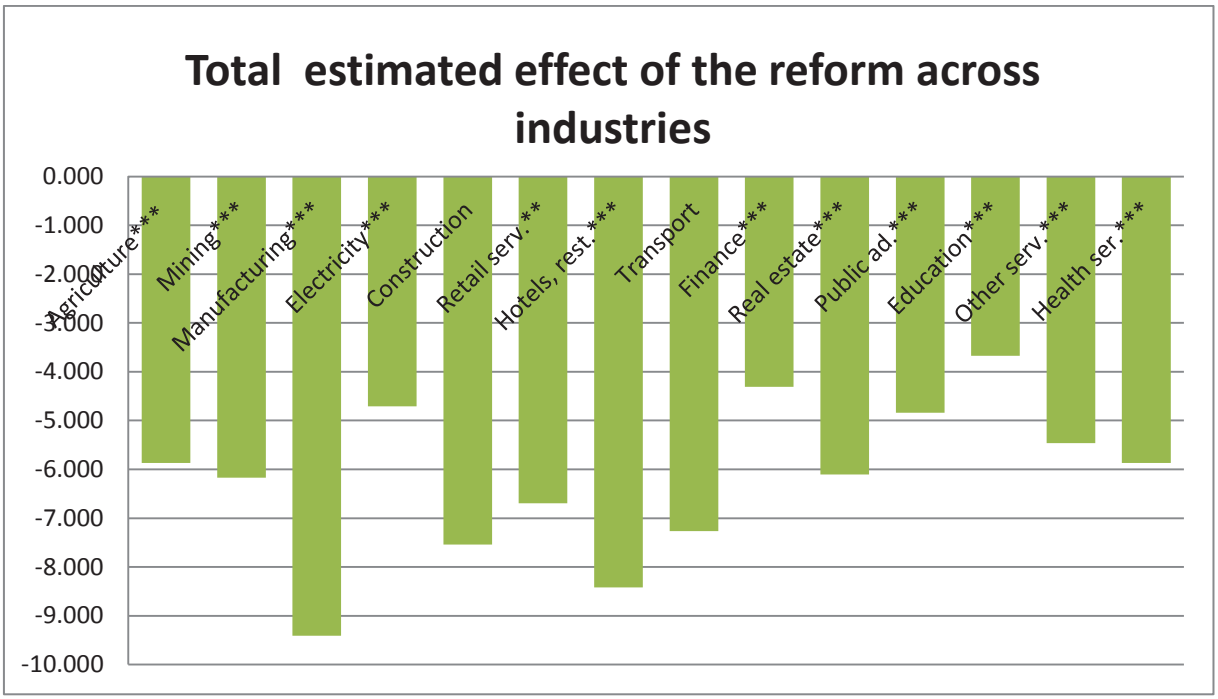
Standard errors in parentheses. Other control variables are dummies for year, quarter and trend.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

However, one needs to read this result with caution, as it might be driven by endogeneity of wage level and sickness absence. For example, high wage workers might have some unobserved characteristics that cause them to be less sick, compared to low wage workers.

4.3 Industries

Figure 2 presents the estimated effect of the reform in different industries conditional on education, age and gender. The effects are recalculated from the regressions presented in Table A.3 in the appendix. Although previous literature recognized the importance of job characteristics on sickness absence, the role of industries has not been specifically studied. In our case I find substantial heterogeneity in the response to the reform. Interestingly, I find that the largest effect is in manufacturing and hotels and restaurants. A potential explanation is the following. In both cases the production process requires the workers to be physically present in the workplace. For employers it is very costly to allow for greater flexibility in working hours and, for example, to allow working from home. They may strictly require a doctors' confirmation about sickness for any absence. In such environment workers are to be more sensitive to changes in sickness benefits and replacement rate.

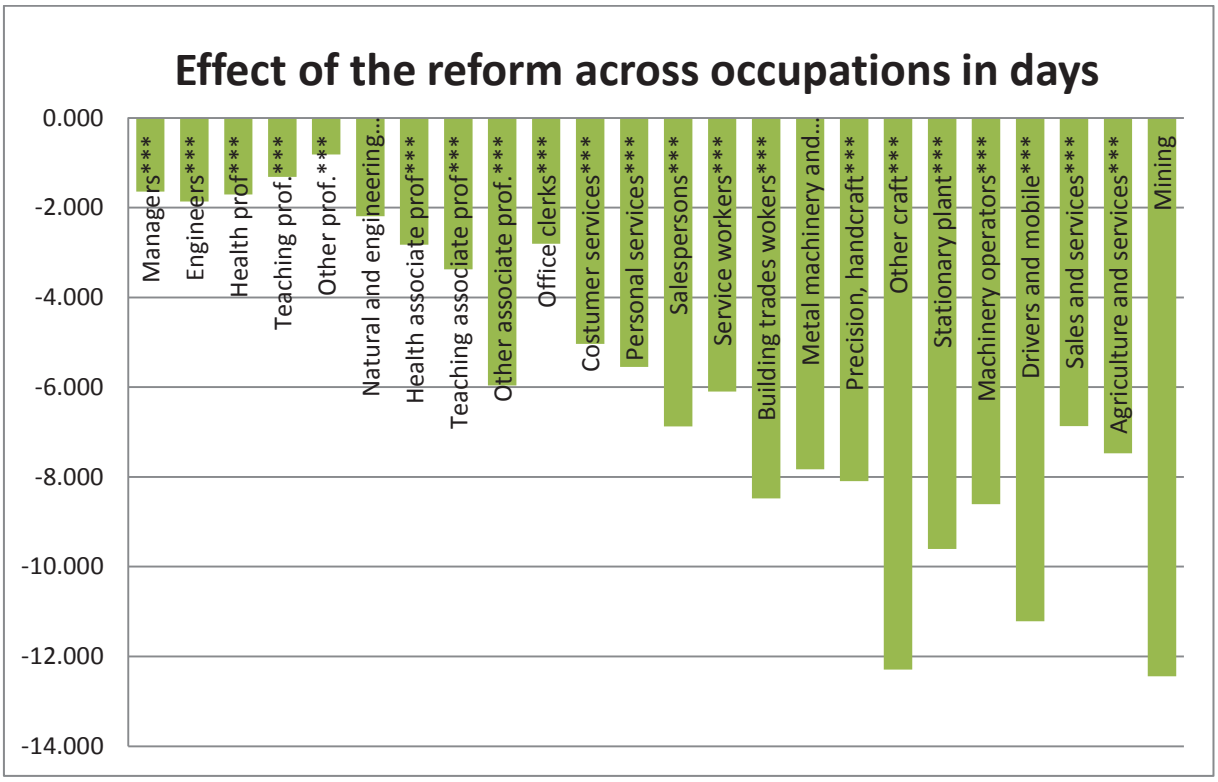
Figure 2: Estimated Effect of the Reform across Industries



4.4 Occupations

Last, I test for heterogeneity across occupations before and after the reform, conditional on wages, gender and age. I hypothesize that in occupations, where workers tend to shirk more, or where flexibility of working hours is lower, workers are more sensitive to changes in sickness absence benefits. The results presented in Figure 3 are in line with the descriptive analysis. Workers in low skilled occupations tend to react more to changes in replacement rates. There could be several explanations to this finding. First, workers in these occupations were shirking the most prior to the reform, but at the same time, such occupations may be specifically different in for example flexibility in working hours. For example, I find drivers and craft workers to be the most elastic occupations, where flexibility of working hours is probably one of the lowest.

Figure 3: Effect of the reform across occupations in days



5. Conclusion

In this paper, I analyze the effect of a substantial drop in replacement rate during the first three days of sickness absence. In particular, I show that sickness absence changed mainly through the incidence of sickness rather than the lenght of sickness absence spells. Further, I show that low skilled, low wage and low educated workers changed their sickness absence behaviour the most. With respect to firm characteristics, I find manufacturing and hotels and restaurants to be industries where sickness absence was affected the most. An explanation for the last finding can be found in the flexibility of working conditions. Manufacturing has most likely the most strict production process with respect to presentism of workers on workplace. It most likely does not allow for any kind of home office arrangement and thus motivates workers to abuse the sickness absence as much as possible.

References

De Paola, M., Pupo, V. and Scoppa, V. (2009). Absenteeism in the Italian public sector: The effects of changes in sick leave compensation. *Working Papers n. 16 – 2009*, Università della Calabria.

Engellandt, A. and Riphahn, R. T. (2005). Temporary contracts and employee effort. *Labour Economics, 12* (3), 281-299.

Frick, B. and Malo, M. (2008). Labor market institutions and individual absenteeism in the European Union: The relative importance of sickness benefit system and employment protection legislation. *Industrial Relations, 47*(4).

Henrekson, M. and Persson, M. (2004). The effects on sick leave of changes in the sickness insurance system. *Journal of Labor Economics, 22*(1), 87-113.

Hesselius, P. (2007). Does sickness absence increase the risk of unemployment? *Journal of Socio-Economics, 36*, 288-310.

Ichino, A. and Riphahn, R. (2004). Absenteeism and employment protection: Three case studies. Swedish *Economic Policy Review, 11*, 95-114.

Ichino, A. and Riphahn, R. (2005). The effect of employment protection on worker effort. A comparison of absenteeism during and after probation. *Journal of European Economic Association, 3*, 120-143.

Jimeno, J. F. and Toharia, L. (1996). Effort, absenteeism, and fixed term employment contracts. *Revista Española de Economía, 13*, 105-119.

Johansson, P. and Palme, M. (2002). Assessing the effect of public policy on worker absenteeism. *The Journal of Human Resources, 37*(2), 381-409.

Johansson, P. and Palme, M. (2005). Moral hazard and sickness insurance. *Journal of Public Economics, 89*, 1879-1890.

Leigh, J. P. (1985). The effects of unemployment and the business cycle of absenteeism. Journal of Economics and Business, 37(2), 159-170.

Mastekaasa, A., & Olsen, K. M. (1998). Gender, Absenteeism, and Job Characteristics A Fixed Effects Approach. Work and Occupations, 25(2), 195-228.

Pettersson-Lidbom, P. and Thoursie, P. S. (2013). Temporary disability insurance and labor supply: Evidence from a natural experiment. The Scandinavian Journal of Economics, 115(2), 485-507.

Ziebarth, N. R. and Karlsson, M. (2010). A natural experiment on sick pay cuts, sickness absence, and labor costs. *Journal of Public Economics, 94*, 1108-1122.

Appendix A

Table A.1: Descriptive statistics

	Before (2007/8) mean	(sd)	After 2009/10 mean	(sd)
Outcomes				
Days	17.37	(57.16)	10.99	(48.02)
Absence days-share	0.27	(0.87)	0.17	(0.74)
Male	0.59	(0.49)	0.59	(0.49)
Age	41.86	(11.23)	41.88	(11.55)
Education level				
College	0.13	(0.34)	0.15	(0.36)
Maturita	0.33	(0.47)	0.35	(0.48)
Nomaturita	0.43	(0.50)	0.41	(0.49)
Elementary	0.09	(0.29)	0.08	(0.28)
Type of economic activity				
agriculture	0.02	(0.14)	0.02	(0.13)
mining	0.03	(0.17)	0.03	(0.16)
manufacturing	0.47	(0.50)	0.41	(0.49)
electricity, gas, water	0.03	(0.17)	0.03	(0.16)
Construction	0.04	(0.19)	0.04	(0.20)
Maintenance, retail sale	0.09	(0.29)	0.11	(0.31)
Hotels and restaurants	0.01	(0.10)	0.01	(0.10)
transport	0.14	(0.35)	0.14	(0.35)
financial sector	0.05	(0.21)	0.05	(0.22)
real estate	0.04	(0.20)	0.07	(0.25)
public administration	0.01	(0.08)	0.01	(0.08)
education	0.03	(0.18)	0.03	(0.18)

health services	0.03	(0.16)	0.04	(0.21)
other services	0.02	(0.12)	0.02	(0.13)
Size of firms				
w/t employees	0.00	(0.00)	0.00	(0.01)
1-5	0.00	(0.00)	0.00	(0.00)
6-9	0.00	(0.00)	0.00	(0.00)
10-19	0.00	(0.06)	0.00	(0.07)
20-24	0.00	(0.04)	0.00	(0.04)
25-49	0.00	(0.07)	0.01	(0.09)
50-99	0.03	(0.17)	0.03	(0.17)
100-199	0.04	(0.19)	0.04	(0.20)
200-249	0.01	(0.12)	0.03	(0.16)
250-499	0.24	(0.43)	0.23	(0.42)
500-999	0.15	(0.36)	0.16	(0.36)
1000-1499	0.13	(0.34)	0.12	(0.32)
1500-1999	0.05	(0.23)	0.06	(0.23)
2000-2499	0.05	(0.22)	0.05	(0.21)
2500-2999	0.02	(0.15)	0.02	(0.15)
3000-3999	0.04	(0.19)	0.04	(0.19)
4000-4999	0.02	(0.14)	0.02	(0.14)
5000-9999	0.06	(0.24)	0.09	(0.28)
>9999	0.13	(0.34)	0.11	(0.32)
Occupations				
Corporate managers	0.05	(0.23)	0.05	(0.23)
General managers	0.01	(0.11)	0.01	(0.11)
Physical, mathematical and engineering science professionals	0.03	(0.18)	0.04	(0.20)
Life science and health professionals	0.01	(0.08)	0.01	(0.10)
Teaching professionals	0.02	(0.13)	0.02	(0.13)
Other professionals	0.04	(0.21)	0.05	(0.22)
Natural and engineering science associate professionals	0.09	(0.29)	0.10	(0.29)
Life science and health associate professionals	0.02	(0.13)	0.03	(0.16)
Teaching associate professionals	0.00	(0.03)	0.00	(0.02)
Other associate professionals	0.08	(0.27)	0.08	(0.28)
Office clerks	0.05	(0.23)	0.06	(0.23)
Customer services clerks	0.03	(0.17)	0.03	(0.18)
Personal and protective services workers	0.03	(0.17)	0.03	(0.18)
Models, salespersons and demonstrators	0.03	(0.17)	0.04	(0.19)

Service workers in the armed forces and civil service	0.01	(0.07)	0.00	(0.07)
Extraction and building trades workers	0.03	(0.16)	0.03	(0.17)
Metal, machinery and related trades workers	0.15	(0.36)	0.13	(0.34)
Precision, handicraft, printing and related trades workers	0.01	(0.10)	0.01	(0.08)
Other craft and related trades workers	0.02	(0.14)	0.02	(0.13)
Stationary-plant and related operators	0.06	(0.24)	0.05	(0.22)
Machine operators and assemblers	0.10	(0.30)	0.08	(0.28)
Drivers and mobile-plant operators	0.07	(0.25)	0.07	(0.26)
Sales and services elementary occupations	0.02	(0.14)	0.02	(0.14)
Agricultural, fishery and related labourers	0.00	(0.02)	0.00	(0.02)
Labourers in mining, construction, manufacturing and transport	0.04	(0.18)	0.03	(0.17)
N	7391876		7976148	

Table A.2: Effect of the reform with respect to individual wage

	(1) absnemoc_q	(2) absnemoc_q	(3) absnemoc_q	(4) absnemoc_q
After	**-4.460*** **	**-3.034*** **	**-1.114*** **	**-0.088**
	(0.149)	**(0.086)**	**(0.094)**	**(0.113)**
Trend	-0.990***	-0.777***	-0.290***	-0.141***
	(0.033)	(0.020)	(0.023)	(0.028)
trend2	0.024***	0.024***	0.007***	0.004***
	(0.002)	(0.001)	(0.001)	(0.001)
q_2	-5.964***	-3.980***	-2.125***	-0.789***
	(0.094)	(0.056)	(0.062)	(0.073)
q_3	-7.437***	-4.655***	-2.646***	-1.123***
	(0.099)	(0.058)	(0.065)	(0.076)
q_4	2.657***	1.430***	0.646***	0.451***
	(0.105)	(0.062)	(0.069)	(0.082)
Age	-0.003	0.006***	0.036***	0.031***
	(0.003)	(0.002)	(0.002)	(0.003)
College	-16.327***	-14.391***	-8.714***	-2.228***

	(0.242)	(0.097)	(0.122)	(0.169)
maturita	-11.352***	-10.548***	-6.835***	-0.832***
	(0.102)	(0.074)	(0.119)	(0.173)
nomaturita	-4.141***	-4.122***	-1.631***	6.068***
	(0.086)	(0.072)	(0.123)	(0.214)
Male	-2.454***	-2.573***	-2.985***	-3.542***
	(0.070)	(0.042)	(0.051)	(0.062)
_cons	38.563***	30.222***	17.787***	8.271***
	(0.183)	(0.128)	(0.171)	(0.224)
N	3926128	7300976	3045444	1095136
R^2	0.014	0.012	0.008	0.007

5) Wage less than 40 percentile
6) Wage less than average
7) Wage less than 70 percentile
8) Wage more than 70 percentile

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Heterogenous effect of the reform: industry

	(1) absnemoc_q	(2) absnemoc_q
1.after	-2.176***	-1.755***
	(0.059)	(0.205)
Trend	-0.921***	-0.912***
	(0.014)	(0.014)
trend2	0.027***	0.026***
	(0.001)	(0.001)
q_2	-3.783***	-3.785***
	(0.038)	(0.038)
q_3	-4.514***	-4.518***
	(0.040)	(0.040)
q_4	1.798***	1.794***
	(0.043)	(0.043)
age	0.011***	0.011***
	(0.001)	(0.001)
college	-15.824***	-15.825***
	(0.058)	(0.058)

maturita	-12.047***	-12.031***
	(0.049)	(0.049)
nomaturita	-4.251***	-4.249***
	(0.047)	(0.047)
male	-5.141***	-5.131***
	(0.029)	(0.029)
Mining	-0.999***	-1.533***
	(0.127)	(0.176)
Manufact.	-0.944***	0.113
	(0.101)	(0.139)
Electricity	-5.751***	-7.027***
	(0.127)	(0.177)
Construc.	0.174	0.312*
	(0.119)	(0.167)
Retail s.	-3.737***	-4.069***
	(0.108)	(0.151)
Hotels, rest	-4.853***	-4.239***
	(0.167)	(0.240)
transport	-3.102***	-3.106***
	(0.105)	(0.145)
finance	-3.467***	-5.041***
	(0.118)	(0.163)
Real estate	-2.531***	-3.291***
	(0.114)	(0.165)
Public ad.	-3.083***	-4.356***
	(0.195)	(0.278)
Education	-5.468***	-7.348***
	(0.125)	(0.174)
Health ser.	-3.272***	-4.241***
	(0.123)	(0.183)
Other serv.	-4.351***	-5.295***
	(0.145)	(0.205)
Interactions after*		

Mining		**1.059*** **(0.253)**
Manufact.		**-2.179*** **(0.202)**
Electricity		**2.522*** **(0.254)**
Construc.		**-0.310** **(0.238)**
Retail s.		**0.535** **(0.215)**
Hotels, rest		**-1.189*** **(0.334)**
transport		**-0.036** **(0.210)**
finance		**2.918*** **(0.232)**
Real estate		**1.127*** **(0.230)**
Public ad.		**2.388*** **(0.388)**
Education		**3.556*** **(0.245)**
Health ser.		**1.359*** **(0.248)**
Other serv.		**1.767*** **(0.289)**
_cons	35.050*** (0.132)	34.807*** (0.161)
N	15368000	15368000
R^2	0.020	0.020

Table A.4: Heterogenous effect of the reform: occupations

	(1) absnemoc_q	(2) absnemoc_q
1.after	-2.162***	-6.626***
	(0.059)	(0.156)
trend	-0.911***	-0.893***
	(0.014)	(0.014)
trend2	0.026***	0.025***
	(0.001)	(0.001)
q_2	-3.783***	-3.788***
	(0.038)	(0.038)
q_3	-4.512***	-4.521***
	(0.040)	(0.040)
q_4	1.804***	1.793***
	(0.043)	(0.043)
age	0.028***	0.029***
	(0.001)	(0.001)
college	-8.999***	-9.014***
	(0.067)	(0.067)
maturita	-7.974***	-7.908***
	(0.053)	(0.053)
nomaturita	-4.297***	-4.260***
	(0.048)	(0.047)
male	-5.471***	-5.450***
	(0.032)	(0.032)
_Itwokzam_2	0.248	0.253
	(4.557)	(4.554)
_Itwokzam_3	-6.138	-6.146
	(15.133)	(15.126)
_Itwokzam_4	-3.513**	-10.180***
	(1.707)	(1.714)
_Itwokzam_5	-4.297**	-10.932***
	(1.710)	(1.721)

_Itwokzam_6	-5.280	-5.331
	(13.134)	(13.127)
_Itwokzam_7	-1.531	-8.329***
	(1.708)	(1.715)
_Itwokzam_8	-2.224	-9.636***
	(1.713)	(1.731)
_Itwokzam_9	-4.597***	-11.694***
	(1.710)	(1.719)
_Itwokzam_10	-1.857	-8.318***
	(1.707)	(1.714)
_Itwokzam_11	2.122	2.132
	(26.100)	(26.088)
_Itwokzam_12	-7.077	-7.112
	(13.134)	(13.127)
_Itwokzam_13	-0.891	-6.969***
	(1.707)	(1.713)
_Itwokzam_14	-0.204	-6.268***
	(1.709)	(1.718)
_Itwokzam_15	-0.392	-4.817***
	(1.789)	(1.867)
_Itwokzam_16	-2.011	-8.103***
	(1.707)	(1.713)
_Itwokzam_17	-4.034	-4.084
	(26.100)	(26.088)
_Itwokzam_18	1.674	-3.248*
	(1.707)	(1.714)
_Itwokzam_19	2.747	-1.902
	(1.708)	(1.715)
_Itwokzam_20	-9.478	-9.506
	(26.100)	(26.088)
_Itwokzam_21	-2.732	-2.692
	(26.100)	(26.088)
_Itwokzam_22	-2.788	-2.749
	(26.100)	(26.088)

_Itwokzam_23	-9.872	-9.886
	(15.133)	(15.126)
_Itwokzam_24	3.282*	-0.638
	(1.708)	(1.715)
_Itwokzam_25	3.498**	-0.841
	(1.708)	(1.715)
_Itwokzam_26	-9.755	-9.791
	(26.100)	(26.088)
_Itwokzam_27	11.562***	8.324***
	(1.717)	(1.732)
_Itwokzam_28	11.224***	7.787***
	(1.708)	(1.716)
_Itwokzam_29	6.581***	3.182*
	(1.707)	(1.713)
_Itwokzam_30	7.847***	6.085***
	(1.712)	(1.722)
_Itwokzam_31	11.009***	8.376***
	(1.709)	(1.717)
_Itwokzam_32	5.803***	2.653
	(1.707)	(1.714)
_Itwokzam_33	9.331***	7.444***
	(1.707)	(1.713)
_Itwokzam_34	5.004***	1.046
	(1.707)	(1.713)
_Itwokzam_35	-17.369	-17.328
	(26.100)	(26.088)
_Itwokzam_36	3.022*	-0.628
	(1.709)	(1.717)
_Itwokzam_37	15.217***	14.028***
	(1.829)	(1.948)
_Itwokzam_38	8.909***	6.627***
	(1.708)	(1.709)
General managers		**8.726*** **

	(0.186)
Engineers	**8.506*****
	(0.280)
Health prof	**8.661*****
	(0.201)
Teaching prof.	**9.055*****
	(0.347)
Other prof.	**9.551*****
	(0.252)
Natural and engineering science	**8.173*****
	(0.191)
Health associate prof	**7.544*****
	(0.170)
Teaching associate prof	**6.991*****
	(0.239)
Other associate prof.	**4.407*****
	(1.083)
Office clerks	**7.563*****
	(0.174)
Costumer services	**5.328*****
	(0.185)
Personal services	**4.819*****
	(0.209)
salespersons	**3.495*****
	(0.209)
Service workers	**4.266*****
	(0.207)
Building trades wokers	**1.890*****
	(0.411)

Metal machinery and related		**2.537*** **
		(0.215)
Precision, handcraft		**2.274*** **
		(0.163)
Other craft		**-1.924*** **
		(0.320)
Stationary plant		**0.758*** **
		(0.244)
Machinery operators		**1.760*** **
		(0.185)
Drivers and mobile		**-0.849*** **
		(0.171)
Sales and services		**3.497*** **
		(0.178)
Agriculture and services		**2.892*** **
		(0.237)
Mining		**-2.076**
		(1.323)
_cons	26.904***	31.213***
	(1.709)	(1.714)
N	15368024	15368024
R^2	0.024	0.024


CELSI