



Universität St.Gallen

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September 2013 Discussion Paper no. 2013-20

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Electronic Publication: <http://www.seps.unisg.ch>

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¹ Without implicating them, I thank Marius Brühlhart, Lukas Kauer, Rafael Lalive, Raphael Parchet, Michael Rosholm, Josef Zweimüller and seminar participants at IAB Nuremberg, Zurich, Engelberg, and Lausanne for helpful comments and discussions. I acknowledge funding from the Swiss National Science Foundation (Grant No. 100012-120356/1). I would also like to thank Jonathan Gast and David Sanchez at the Swiss State Secretariat for Economic Affairs for help concerning the data and information on institutional details.

Abstract

This paper discusses the effects of a higher unemployment benefit replacement rate on unemployment durations, employment, and earnings. A reform of unemployment insurance in Switzerland in July 2003 increased the replacement rate by up to 5.88 p.p. for individuals who earned between 3,536 and 4,340 CHF and have no children, while it did not change the replacement rate for all other unemployed persons. This allows to study the effects of a higher replacement rate adopting a difference-in-differences (DiD) approach. I find no statistically significant effect of an increase in the replacement rate on unemployment durations, employment, and earnings for Swiss men and migrants, but a statistically significant positive effect on unemployment durations for Swiss women.

Keywords

Unemployment durations, unemployment insurance, replacement rate, post-unemployment outcomes.

JEL Classification

J21, J64

1 Introduction

Unemployment insurance is one of the most important safety net programs in developed countries. However, institutional details such as the generosity of unemployment benefits and potential unemployment benefit duration vary strongly between countries. In 2009, for OECD countries, replacement rates were between 36% (New Zealand) and 86% (Portugal) and potential unemployment benefit duration between 6 months (i.e. US) and unlimited (Belgium) for unemployed individuals who are single and earned an average wage. This raises the question of how to design an optimal unemployment insurance balancing between effective poverty prevention and adverse incentive effects.¹ From an efficiency point of view, it is on the one hand imperative to know how unemployed individuals adjust their job search effort to changes in the parameters of unemployment insurance. But on the other hand, we also want to know how post-unemployment work prospects change when the unemployment insurance design changes.

This paper sheds light on the effect of the replacement rate, one of the key parameters in unemployment insurance design, on unemployment durations, employment probabilities and earnings in Switzerland. Importantly, the research design adopted allows to focus on low and medium income individuals. They are of special interest as the poverty prevention aspect of unemployment insurance is more important for them than for high income individuals. Furthermore, these individuals might be credit constrained and cannot save enough to smooth consumption over an unemployment spell.² Thus, an increase in unemployment benefits might increase unemployment durations through the liquidity effect and through moral hazard, where the first is welfare enhancing while the second is welfare deteriorating (see e.g. Chetty (2008)).³

Switzerland, a country with 7.8 million inhabitants and an unemployment rate as low as 3.6% (August 2010), spent more than 5.4 billion Swiss Francs ($\sim$ 5.9 billion dollars) on unemployment benefits in the year 2010. Before July 2003, the Swiss unemployment insurance provided benefits for up to two years with a benefit replacement rate of 70% or 80%, depending on pre-unemployment income and on the presence of dependent persons. In July 2003, the unemployment insurance underwent a large reform

¹For a recent contributions inferring the optimal unemployment insurance design from estimated labour supply elasticity w.r.t. unemployment benefits (substitution effect) and assets or cash-on-hand (liquidity effect) see Chetty (2008) and Kroft and Notowidigdo (2011).

²See Browning and Crossley (2001) for a contribution on unemployment spells and consumption smoothing.

³Chetty (2008) discriminates between the two channels by studying reactions on unemployment benefits and severance pay for different income quantiles. This is not possible in this study as the identification strategy only holds for a restricted income range.

where the potential benefit duration was reduced from 520 to 400 work days. A special feature of this reform was that benefits were increased by up to 5.88 percentage points for a small group of unemployed individuals who earned between 3,536 and 4,340 Swiss Francs before entering unemployment and who had no children. Exploiting this reform, the causal effect of a change in the replacement rate on unemployment durations, employment and earnings can be identified adopting a difference-in-differences approach. The difference-in-differences estimates contrast the changes in the outcomes for treated and control groups. The treated group consists of individuals who earned between 3,536 and 4,340 Swiss Francs before entering unemployment. As a control group, individuals with lower (3,000 - 3,535 Swiss Francs) or higher (4,341 - 4,800 Swiss Francs) incomes will be used. The assumptions that have to hold to identify the treatment effect on the treated in independent repeated cross sections are - in short - no endogenous entry into unemployment because of the increase in the replacement rate, and equal time trends of the outcome for treatment and control groups in absence of the treatment. I will provide evidence in favour of both assumptions.

Having estimated the effect of changes in the replacement rate on unemployment durations, this paper completes the picture by providing evidence on employment probabilities and earnings using data from a 25% sample of the social security system database. More precisely, it estimates the effects on employment probabilities, earnings, and earnings of the employed, respectively, a quarter of a year, half a year, one, two and five years after the start of the unemployment spell. This methodology presents at once survival probabilities in unemployment for the early outcomes, as well as the probability of leaving the labor force for the later observation points.

The literature on the effects of unemployment benefit levels on unemployment durations is very extensive and the question has repeatedly been a subject of research since the early eighties. Mortensen (1977) and Pissarides (1994) develop the now standard job search model with on-the-job search and variable job search effort. They conclude that the effect of an increase in unemployment benefits on unemployment durations is in general ambiguous since job search effort decreases in the early stages of the unemployment spell but increases as potential benefit duration is exhausted. Many empirical papers investigate the link between unemployment insurance design - specifically benefit levels and potential unemployment benefit durations - and unemployment duration. Nickell (1979) and Meyer (1990) use survival analysis to investigate the effect of benefit levels and potential unemployment benefit duration on unemployment exits. They find that exits fall strongly when benefit levels increase. However, these estimates have to be interpreted with care, as they cannot properly control for unobserved heterogeneity among

the unemployed. Carling et al. (2001) study a policy change in Sweden and find that a cut of 5% in the benefit level increased job finding rates by 10%. Roed and Zhang (2003) combine survival analysis with quasi-experimental variation in unemployment benefits in Norway and find an elasticity of unemployment duration with respect to benefits of around 0.95 for men and 0.35 for women. Lalive et al. (2006) find, that a 6 percentage point increase in unemployment benefits in Austria increases unemployment durations by 0.38 weeks, which implies an elasticity of 0.15. They also show, that unemployed individuals react much less to changes in the benefit level than to changes in potential unemployment benefit duration. Meyer (2007) shows that a large change of 36% in the benefit level in New York State strongly increases unemployment durations. Holmlund (1998) surveys the literature and finds ambiguous results concerning the effect of benefit levels on duration.⁴

Even though an efficient unemployment insurance should not only aim at reducing unemployment durations but should also allow the unemployed to search for a suitable job, empirical papers studying the effects of unemployment insurance on post-unemployment outcomes are considerably less frequent. Addison and Blackburn (2000) use a displaced worker survey in the US and compare unemployment benefit recipients with non-recipients, which corresponds to a difference in the replacement rate of 44%. They find a slight positive effect of unemployment benefits on earnings. Card et al. (2007) use Austrian data to evaluate two discontinuities in the eligibility criteria for severance pay and extended benefit duration, respectively. They find that both increase unemployment durations significantly but have no effect on subsequent job-match quality. Lalive (2008) investigates a change in potential benefit duration of 13 quarters in Austria and finds no effects on wages. van Ours and Vodopivec (2008) study a reform in Slovenia that decreased potential benefit duration from 9-12 months to six months. They find no effect on job quality, measured as wages paid and durations of jobs. Centeno and Novo (2009) look at the effect of potential benefit duration on post-unemployment wages for different income quartiles. They find that low-wage individuals who are likely liquidity constrained do benefit from longer benefit duration in terms of higher post-unemployment wages. This is not the case for high-wage individuals, however. Le Barbanchon (2012) uses a regression discontinuity approach to French data to study the effects of strongly prolonged potential benefit duration on workers with low employability. He finds large effects on the unemployment hazard rates but no significant effects on job-match quality.⁵

⁴See also Atkinson and Micklewright (1991) for a critical survey over the theoretical and empirical literature studying the effect of unemployment insurance on unemployment duration and Fredriksson and Holmlund (2006) for a more recent survey focusing on incentive schemes in unemployment insurance.

⁵Schmieder et al. (2012) take a different approach to study the long-term effects of potential benefit

This paper contributes to the existing literature in two aspects. *First*, it provides estimates on the semi-elasticity of unemployment durations on the replacement rate using quasi-experimental variation in the Swiss unemployment insurance replacement rate that has not yet been exploited, namely a policy change that increased the replacement rate for some unemployed individuals by up to 5.88 percentage points, while the replacement rate stayed constant for all other individuals. *Second*, the paper provides evidence on the effect of the replacement rate on post-unemployment outcomes, such as earnings and employment probabilities.

The results suggest that the replacement rate has no statistically significant effect on unemployment durations for Swiss men and migrants, but has statistically significant effects for Swiss women - female unemployment durations increase by almost 10% when increasing the replacement rate by 10 percentage points. These results are surprising when compared to the study of Roed and Zhang (2003), who find stronger effects for men than for women, but note that our estimates apply specifically for low- and medium income earners. Consistent with earlier literature, difference-in-differences show no statistically significant effects of the replacement rate on post-unemployment outcomes.

The paper is structured as follows. The next section provides background on the Swiss unemployment insurance system and on how the reform in July 2003 influences the replacement rate. Section 3 provides a description of the data as well as summary statistics. Section 4 estimates the effect of the replacement rate on unemployment durations. Section 5 shows results on employment probabilities and earnings. Finally, Section 6 concludes.

2 Background

In the Swiss unemployment insurance system, individuals qualify for benefits if they (a) are full- or part-time unemployed;⁶ (b) were in paid employment before getting unemployed and therefore have an accountable work loss; (c) live in Switzerland; (d) have completed obligatory schooling and are not yet retired; (e) have contributed to unemployment insurance for at least 6 months (before July 2003) or 12 months (after July 2003) within the last two years;⁷ (f) are placeable; and (g) comply to the local labor

duration. They look at recurrent unemployment spells and find that the effect on the initial spell is much larger than the effect when taking into account all recurrent spells within five years.

⁶Part-time unemployed means that a person either works part-time but looks for a full-time position, or that the person doesn't work and looks for a part-time position.

⁷This is the contribution framework period ("Rahmenfrist für die Beitragszeit"). It is without exceptions limited to two years. On the first day at which the unemployed person fulfils all the eligibility

offices regulations.

If an unemployed individual qualifies for benefits, he receives between 70% and 80% of his insured pre-unemployment earnings, where the exact replacement rate depends on the presence of dependent persons and on the level of insured earnings. Insured earnings correspond to the realised earnings through employment in the last six months of the contribution framework period and are top coded at 8,900 Swiss Francs. Benefits can be claimed for up to 520 work days (two years), depending on the unemployment insurance contribution time before getting unemployed.⁸ Those who register at a local labor office do not only receive monetary compensation but also job search assistance. Job search is monitored and non-compliance with job search requirements or the non-acceptance of a reasonable job offer lead to complete withdrawal of benefits for up to 30 days.⁹

In July 2003, the Swiss unemployment insurance underwent a large reform. The two major changes were that, *first*, after the reform, the unemployed have to pay contributions for at least 12 months to be eligible for benefits, while before the reform, they were allowed benefits after six months of unemployment insurance contributions. *Second*, potential unemployment benefit duration was decreased from 520 to 400 work days.¹⁰

This paper exploits a less-known feature of the unemployment insurance benefit schedule and how it altered with the reform in July 2003. Figure 1 shows the benefit replacement rate against insured pre-unemployment earnings. Specifically, it shows the replacement rate schedule for insured earnings between 3,000 and 5,000 Swiss Francs (CHF) and for individuals who do not have any children. The solid line shows the replacement rate schedule before the reform in July 2003, and the dashed line after the reform.

Before July 2003, low-income unemployed individuals get 80% of their insured earnings up to a maximum amount of 130 CHF per day. This maximum amount corresponds

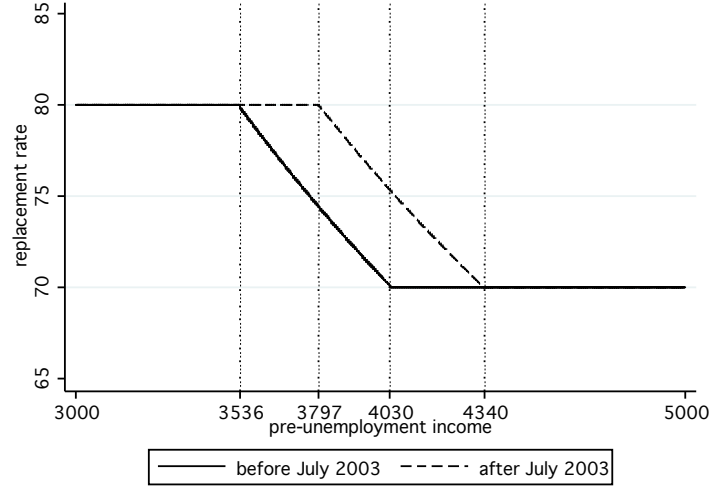
criteria, the contribution framework period is calculated to start exactly two years earlier. Note that there is also a benefit framework period (“Rahmenfrist für den Leistungsbezug”) which starts on the first day at which the unemployed person fulfils all the eligibility criteria. The benefit framework period is two years, with exceptions for elderly individuals, individuals who start a subsidized education, or individuals who start subsidized self employment for whom the benefit framework period is extended to four years. After the benefit framework period, unemployed individuals are no longer eligible for benefits even if they still attend an active labor market program.

⁸260 work days when contributed 12 months, 400 work days when contributed 18 months, and 520 days when contributed 24 months and older than 55 years or handicapped.

⁹In special cases, benefits can be withdrawn for up to 60 days if the default of the unemployed was very severe, that is if the unemployed denied a suitable job offer without any valid reason at all. See also Arni et al. (2009) for details on the Swiss benefit sanction system.

¹⁰Before July 2003, the unemployed could claim up to 150 days of regular benefits. The benefit period was prolonged with special benefits if they participate in active labor market policies or if no suitable labor market measures were available. In practice, the regulations were implemented by the local labor offices such that everybody could receive 520 work days of benefits.

Figure 1: Replacement rate before and after July 2003



Notes: The figure shows the replacement rate schedule as defined by the regulation over the Swiss Unemployment Insurance (AVIG). Pre-unemployment income are insured earnings. The replacement rate is in percentage of insured earnings.

to monthly insured earnings of 3,536 CHF, as a month is defined to have 21.7 work days. Once 130 CHF of daily compensation are reached, the benefits no longer increase with income as long as the replacement rate is higher than 70%, which is equivalent to say that benefits stay constant at 130 CHF for unemployed who earned between 3,536 and 4,030 CHF. For higher incomes, the replacement rate amounts to 70% of previous earnings and thus, benefits do again increase with insured earnings (solid line in Figure 1). After the unemployment insurance reform, the maximum daily benefits that an unemployed individual can receive with a replacement rate higher than 70% increased to 140 CHF (dashed line in Figure 1). That is, benefits stay constant at 140 CHF per day for individuals who earned between 3,797 and 4,340 CHF before getting unemployed, and are 80% of insured earnings for those that earned less than 3,797 CHF, and 70% of earnings for those that earned more than 4,340 CHF.¹¹ All other features of the replacement rate schedule remained unchanged. The changes in the replacement rate schedule were applied to in-progress spells. That is, from July 1, 2003 on, every unemployed got the benefit amount that corresponded to the new replacement rate after the reform.

The unemployment insurance reform increased the replacement rate by maximally

¹¹Before and after July 2003, insured earnings are top coded at 8,900 Swiss Francs, and therefore unemployment benefits are top coded at 287 Swiss Francs per day.

5.88 percentage points for individuals with previous insured earnings between 3,536 and 4,340 CHF, while it didn't change for individuals with lower or higher incomes. We can therefore identify effects of changes in the replacement rate adopting a difference-in-differences approach.

3 Data

The data for this study stems from two different sources. *First*, the Swiss unemployment insurance register, and *second*, the Swiss social security system. This section describes the data sources and the sample selection and provides first descriptive statistics for the variables of interest.

3.1 Description

The main data source is the Swiss unemployment insurance register. The data base contains all individuals who registered at an office of the public employment service in the years 1998 to 2007. Apart of registration and de-registration dates (daily precision), the data mainly contains personal characteristics that are important to determine unemployment benefits, but also other information that help the caseworker to assign suitable jobs. Most importantly, we know insured pre-unemployment earnings and the exact unemployment duration.¹²

The main analysis of this paper is restricted to Swiss men as this presents the majority of registered unemployed and is a relatively homogeneous group. However, some results for Swiss women and migrant men are also provided. Only non-married individuals who have no dependent persons are kept in the sample as only those are affected by the reform in July 2003.¹³ The sample is further restricted to contain only full-time unemployed individuals who are registered for at least 2 days at a local labor office (this is also the minimal work loss to be eligible for unemployment benefits), who are eligible for unemployment benefits and do actually get them. Note that the sample contains only individuals who contributed to unemployment insurance at least 12 months before getting unemployed. This, to make sure that individuals who enter unemployment

¹²Of all the contained information, I use age, mother tongue, a mobility indicator, qualification, the function in the previous job, the sector of previous employment, the caseworkers assessment of placement possibilities, and the type of the residence community as controls in the estimations.

¹³The replacement rate does not depend on marital status but depends on the presence of children. However, the data does not inform us about the presence of children but about the presence of dependent persons. When married, it is not clear if the dependent person is the spouse or a child. Therefore only non-married individuals without any dependent persons are kept in the sample.

insurance before and after the reform in July 2003 are indeed comparable. Also, only individuals of age between 25 and 50 are considered. This corresponds to the prime-age labor market participants and ensures that most of the unemployed have finished their education. Moreover, individuals older than 55 were differently affected by the reform of the unemployment insurance in July 2003 as their potential benefit duration was not reduced to 400 days. Keeping these older individuals in the sample could therefore confound the analysis if interaction effects between the benefit replacement rate and potential benefit duration are present and treatment and control groups do not balance with respect to the age composition. Handicapped individuals are excluded because they do not have a kink in their replacement rate schedule and were therefore not affected by the policy change.

To analyse employment and earnings, data from the Swiss social security system is used. The data is a 25%-sample of all individuals who have ever contributed to social security between 1982 and 2008 and provides information on monthly employment status and real earnings. The data can be merged with the unemployment register data through a unique identifier. I then keep information on employment status and earnings three, six, twelve, 24, and 60 months after the *start* of the unemployment spell.¹⁴

3.2 Summary statistics

Table 1 provides summary statistics of insured earnings, replacement rates, and the outcome variables before and after July 2003. The whole sample contains 119,412 unemployed individuals, whereof 60,265 enter unemployment before July 2003. Earnings range from a minimum of 0 to a maximum of 8,900 CHF - which is the amount where earnings are top-coded in the data - and have a mean of about 5,000 CHF. Note however, that the analysis will only contain individuals with earnings between 3,000 and 4,800 CHF, that is individuals who earn less than the mean. Replacement rates have a mean of 72%.¹⁵

Mean unemployment durations are 29.5 weeks (more than six months) before July 2003, and only half a week less after the reform. Note that the distribution of unemployment durations has changed before and after the reform as median duration increased

¹⁴Note that some of these informations are not truly post-unemployment outcomes, but may arise during an unemployment spell. However, the indicators two and five years after the beginning of unemployment are necessarily after registered unemployment.

¹⁵Note that some of the unemployed have replacement rates lower than 70%. This can arise for individuals who enter unemployment in 1998 and have an ongoing benefit framework period from 1997. Replacement rates were temporally decreased by 2.1 percentage points to ameliorate the financial situation of the unemployment insurance funds in 1997.

Table 1: Summary statistics for prime-age men (all incomes)

Variable	(1) Mean	(2) Std.Dev.	(3) 5%-quantile	(4) Median	(5) 95%-quantile
<i>A. Before July 2003</i>					
Insured earnings	4,920.18	1,643.28	2,600.00	4,675.00	8,333.00
Replacement rate	72.44	4.05	70.00	70.00	80.00
Unemployment duration (weeks)	29.56	28.06	3.71	18.71	102.43
Employed: after 3 months	0.50	0.50			
after 6 months	0.65	0.48			
after 1 year	0.72	0.45			
after 2 years	0.76	0.43			
after 5 years	0.76	0.42			
Earnings (CHF): after 3 months	1,913.72	2,933.33	0.00	27.51	7,064.30
after 6 months	2,905.95	3,073.04	0.00	2,543.09	8,093.91
after 1 year	3,528.02	3,367.20	0.00	3,743.00	8,726.90
after 2 years	3,958.09	3,397.15	0.00	4,259.63	9,313.77
after 5 years	4,385.77	3,971.83	0.00	4,631.00	10,535.99
<i>B. After July 2003</i>					
Insured earnings	5,059.17	1,656.09	2,670.00	4,860.00	8,760.00
Replacement rate	72.64	4.14	70.00	70.00	80.00
Unemployment duration (weeks)	29.09	25.84	4.00	19.86	89.57
Employed: after 3 months	0.50	0.50			
after 6 months	0.64	0.48			
after 1 year	0.74	0.44			
after 2 years	0.81	0.39			
after 5 years	0.82	0.39			
Earnings (CHF): after 3 months	1,824.50	2,884.18	0.00	0.00	6,659.84
after 6 months	2,761.77	2,942.63	0.00	2,275.66	7,718.48
after 1 year	3,589.07	3,130.01	0.00	3,907.12	8,603.24
after 2 years	4,255.81	3,293.75	0.00	4,563.93	9,169.57
after 5 years	4,810.42	4,037.41	0.00	5,016.05	10,050.35

Notes: 60,265 observations before July 2003. 59,147 observations after July 2003. Unemployment durations are right censored at 730 days. Insured earnings are censored at 8,900 CHF. Post-unemployment outcomes (employment and earnings) are for 25% of the whole population. Post-unemployment outcomes are 3 / 6 / 12 / 24 / 60 months after the begin of the unemployment spell. Earnings are real earnings and set to 0 CHF for non-employed individuals. *Source:* Unemployment register 1998-2007 (SECO).

by almost one week, while the mean decreased. Looking at the probability of being employed shows that after three months already 50% of the unemployed have found a job. This increases to 65% after half a year and 72% after a year and from then on it stays fairly constant. It also shows that five years after the start of an unemployment

spell, about 20 to 25% of the individuals either left the labor force or became again unemployed. When analysing earnings, it first has to be noted that individuals who are not employed still enter the sample with earnings that are equal to 0 CHF. Therefore, earnings do not capture real earnings for those employed but are a mixture between employment status and real earnings and can be interpreted as a “net-effect”. Later, I will also analyse earnings of those who are employed. Earnings do vary strongly between individuals. Notice also, that median earnings are lower than median pre-unemployment earnings for as long as 2 years after the start of unemployment.

4 Unemployment Durations

This section presents the effect of an increase in the replacement rate on unemployment durations adopting a difference-in-differences approach. Figure 1 presented the change in the benefit replacement rate due to the unemployment insurance reform in July 2003. Individuals who had insured earnings between 3,536 and 4,340 CHF were positively affected by the reform. Those who profited the most - with respect to the change in the replacement rate - were individuals with insured earnings between 3,797 and 4,030 CHF. For them, the replacement rate increased by 5.88 percentage points. As the replacement rate stayed constant for individuals with monthly earnings lower than 3,536 CHF or monthly earnings higher than 4,340 CHF, these individuals build a natural control group for the difference-in-differences analysis.

4.1 Identification and Underlying Assumptions

Next, I present the assumptions that have to hold for the difference-in-differences estimator to identify the average treatment effect on the treated when applied to independent cross sections and discuss their plausibility in the current context. Let’s adopt the following notation: Y_{0B} is the non-treatment outcome before the reform, Y_{0A} is the non-treatment outcome after the reform, and Y_{1A} is the treatment outcome after the reform. In a repeated cross section, each individual is observed in only one of the three states. Let $D \in \{0, 1\}$ be a treatment indicator that is 1 if an individual receives treatment. If the individual enters unemployment before the reform, its outcome is $Y_B = Y_{0B}$, because nobody receives treatment. If the individual enters unemployment after the reform, its outcome is $Y_A = DY_{1A} + (1 - D)Y_{0A}$. The difference-in-differences estimator is then

$$DiD = [E(Y_A|D = 1) - E(Y_A|D = 0)] - [E(Y_B|D = 1) - E(Y_B|D = 0)]$$

That is, the difference-in-differences estimator identifies the average treatment effect on the treated by comparing differences in unemployment durations for individuals in the treated and in the control group, before and after the reform in July 2003. Individuals who earned between 3,536 and 4,340 CHF belong to the treatment group as they were affected by the reform.

Two key assumptions have to hold for the difference-in-differences estimator to identify the average treatment effect on the treated.¹⁶ *First*, the treated and the control groups should exhibit parallel time trends. *Second*, the treatment should not itself change the composition of the unemployed individuals, and therefore should not change the expected outcome in absence of the treatment.¹⁷

Assumption DiD1: Parallel time trends of Y_0 for the treated and the control groups: $E(Y_{0A} - Y_{0B}|D = 1) = E(Y_{0A} - Y_{0B}|D = 0)$

This is the main identifying assumption. In the current setting this is a rather restrictive assumption as it requests that unemployment durations of individuals with lower / higher income would evolve in the same way over time than unemployment durations of the treatment group. An indication for the validity of the assumption can be given by implementing a placebo analysis.¹⁸ Table 2 shows the results of a difference-in-differences analysis for Swiss men, assuming a virtual unemployment insurance reform in July 2000 and using only data on individuals entering unemployment before January 2003. The same specification as for the main analysis in section 4.2 is estimated:

$$y_i = \alpha + \beta_1 T_i + \beta_2 A_i + \beta_3 T_i \cdot A_i + \gamma X_i + \epsilon_i$$

Column (1) contains the whole sample of unemployed individuals entering unemployment before January 2003. Columns (2) to (5) sequentially exclude observations before the placebo reform to address anticipation effects. This might be important for the main analysis where individuals can switch the benefit regime, it should however have no effect in the placebo analysis. If the estimates for the coefficients on the interaction

¹⁶See also Lee and Kang (2006) for a more extensive discussion of the assumptions that have to hold in a repeated cross section setting.

¹⁷Note that the two assumptions are presented without conditioning on the covariates. The first assumption has to hold when conditioning on the set of pre-reform covariates. The second assumption has to hold when conditioning on the set of post-reform covariates.

¹⁸Note that the placebo analysis is also a first implicit test for the existence of anticipation effects. If strong anticipation effects before the reform led unemployed individuals in the treatment group to search less intensively for a job, this would lead to a positive difference-in-differences estimate in the placebo analysis.

effect “Treatment · After” were significant, even though there is no treatment in this case, this is strong evidence for unequal time trends for treatment and control groups. None of the estimated placebo treatment effects turns out to be statistically significant. Therefore, the assumption of equal time trends is not violated in July 2000.¹⁹

Table 2: Difference-in-Differences estimates for placebo reform in July 2000 for prime-age men (3,000-4,800 CHF)

Dependent variable: Log unemployment duration					
Excluded pre-reform time:	(1) 0 months	(2) 3 months	(3) 6 months	(4) 9 months	(5) 12 months
Treatment	-0.011 (0.022)	-0.015 (0.022)	-0.010 (0.024)	0.012 (0.025)	0.031 (0.027)
After	0.063*** (0.016)	0.051*** (0.016)	0.034** (0.017)	0.020 (0.017)	0.019 (0.018)
Treatment · After	-0.014 (0.033)	-0.010 (0.033)	-0.016 (0.034)	-0.037 (0.035)	-0.056 (0.036)
Treatment effect (10 p.p.)	-0.026	-0.018	-0.029	-0.066	-0.100
Elasticity	-0.034	-0.024	-0.039	-0.089	-0.134
R-squared	0.083	0.082	0.081	0.080	0.080
Observations	24,167	23,377	22,165	20,754	19,791

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. Only individuals in the data that enter into unemployment before January 2003. *Source:* Unemployment register 1998-2007 (SECO).

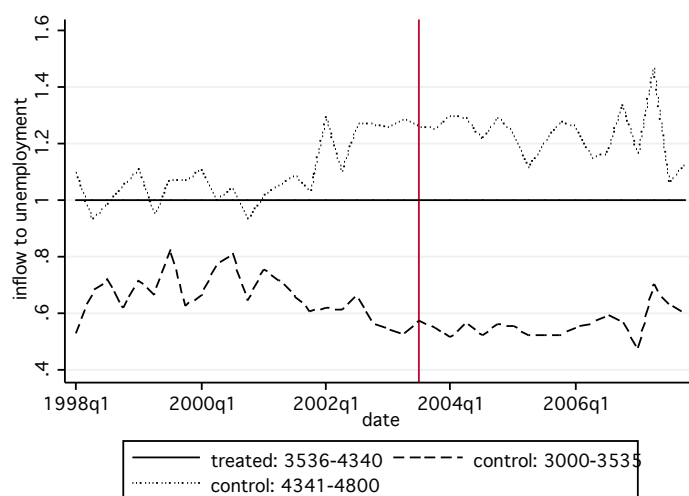
Assumption DiD2: The treatment does not change the composition of the treated and the control groups, and therefore does not change the expected outcome in absence of the treatment.

This assumption is important when applying difference-in-differences in repeated cross sections. If there is endogenous entry to unemployment, that is if individuals do enter unemployment more frequently because they expect to get higher benefits, then the

¹⁹Table 8 in the Appendix shows the results of the same placebo analysis for women and migrants. Note that there is still the possibility that asymmetrically adverse labor market conditions occur during the reform period in July 2003, which would lead to a violation of assumption DiD1. Note also that the reform in July 2003 has not only changed the replacement rate, but also potential unemployment benefit duration. Even though the change in potential benefit duration was the same for treatment and control groups, it could arise that individuals react differently to this change depending on unobserved heterogeneity correlated with income.

assumption is violated. Figure 2 shows the unemployment inflow of the control groups as a ratio of the unemployment inflow of the treated group. Inflow is calculated as the number of persons entering unemployment in a given quarter, weighted by the earnings bandwidth of the group. In the case of endogenous entry into the treatment group, we would expect the relative inflow for both of the two control groups to decrease around the reform. Even though the evidence is mixed, the fact that the relative inflow of the high earnings control group increases is evidence against endogenous entry. The pattern seems more compatible with asymmetrically adverse labor market conditions for some earning groups than with strategic behaviour of the unemployed individuals.²⁰

Figure 2: Inflow ratio between controls and treated (prime-age men)



Notes: The figure shows the inflow ratio of the control groups in comparison to the treatment group. Inflow is calculated as the number of person entering unemployment in a given quarter, weighted by the earnings bandwidth of the group. *Source:* Unemployment register 1998-2007 (SECO).

A second piece of evidence against endogenous entry is presented in Table 3. One channel through which endogenous entry could arise is that individuals decide to enter unemployment because of a higher replacement rate, and therefore voluntarily quit

²⁰The inflow pattern observed in Figure 2 could also arise if the composition of the treatment and the control group changes. This could, for example, arise because of nominal wage increases. Table 11 in the Appendix shows summary statistics for all background characteristics by treatment and control group and by date of entry. Furthermore, it shows the significance levels of Difference-in-Difference estimations on the background variables, without including any control variables. The composition with respect to age, mobility, and qualification does change significantly. However, the differences are very small in an economic sense.

their job.²¹ The data contains information on how a job seeker lost his job. If the unemployed quit the job or if he behaved such that the employer laid him off for good reason, this is classified in the data as being himself responsible for his job loss.²² Table 3 adopts a difference-in-differences approach to investigate if the reform in July 2003 had an influence on the percentage of unemployed individuals who quit their job. The reform increased job quits by 1.4 percentage points for the treatment group, but the estimate is not statistically significant. Moreover, after the reform, quitting a job is by 2.5 percentage points less likely. Together, Figure 2 and Table 3 provide evidence that assumption DiD2 is satisfied in this study.

Table 3: Difference-in-Differences estimates: endogenous entry (prime-age men)

	(1)
Dependent variable:	fraction quit job
Treatment	0.007 (0.006)
After	-0.025*** (0.005)
Treatment · After	0.014 (0.009)
Treatment effect (10 p.p.)	0.026
Elasticity	0.035
R-squared	0.021
Observations	50,940

Notes: Robust standard errors in parentheses. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. *Source:* Unemployment register 1998-2007 (SECO).

If both assumptions hold, the difference-in-differences estimator can be rewritten as

$$DiD = E(Y_{1A} - Y_{0A} | D = 1)$$

²¹Note that also employers could be more reluctant to lay their workers off when unemployment replacement rates are higher. This would, however, lead to an increase in the relative inflow to unemployment of the treatment group, which was not confirmed in Figure 2.

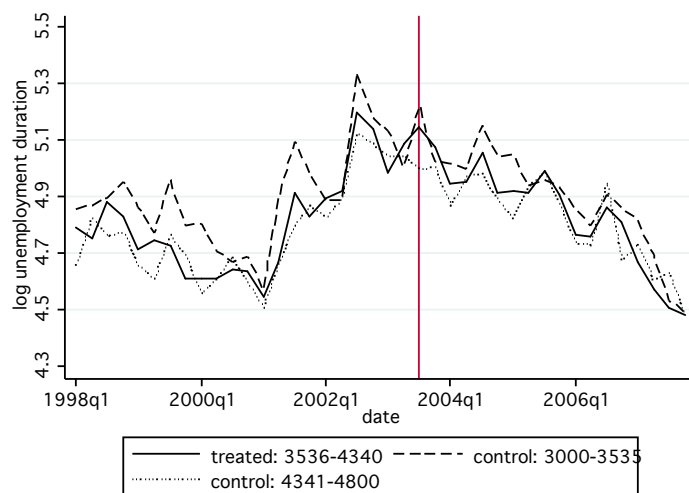
²²The data contains the first reason for a sanction of an unemployment spell. That is, if an unemployed individual was sanctioned twice, i.e. first for quitting his job voluntarily and a second time for non-compliance with job search requirements, the data contains the information that the individual has quit his job. The sanction has not necessarily been enforced in the first month of unemployment as the evaluation of the responsibility of the unemployed individual can take some time.

and therefore identifies the average treatment effect on the treated.

4.2 Results

Figure 3 shows the evolution of log unemployment durations for treated and control groups over time. The vertical line marks July 2003, when the reform of the unemployment insurance took place. Unemployment durations increase before the reform because of an ongoing recession, and decrease after July 2003 when the economy recovers. In general, unemployment durations of the three groups evolve very similarly. Unemployment durations of the low income control group are slightly higher than those of the treatment and the high income control groups. From Figure 3 there is no clear evidence for an effect of the increased replacement rate on unemployment durations. Table 9 in the Appendix shows summary statistics on unemployment durations before and after the reform for the different groups.

Figure 3: Log unemployment duration for treated and controls (prime-age men)



Notes: The figure shows log unemployment durations for the control groups and the treatment group. The vertical line marks July 2003, when the unemployment insurance reform took place. *Source:* Unemployment register 1998-2007 (SECO).

Table 4 shows the results, when investigating the effect of a higher replacement rate on unemployment durations, applying the difference-in-differences estimator. The following econometric specification is estimated by OLS:

$$y_i = \alpha + \beta_1 T_i + \beta_2 A_i + \beta_3 T_i \cdot A_i + \gamma X_i + \epsilon_i$$

where y_i is log unemployment duration. T_i is the treatment indicator that takes values between 0 and 1, depending on the intensity of the treatment. If the indicator is 0, the individual belongs to the control group. If it takes the value 1, the reform increased the replacement rate for the concerned individual by 5.88 percentage points. Values between 0 and 1 mean a treatment intensity between 0 and 5.88 percentage points, where the values are obtained by linear interpolation. A_i is a dummy for entering unemployment after July 2003. $T_i \cdot A_i$ is the interaction term between T_i and A_i , and its coefficient β_3 identifies the treatment effect on the treated. Finally, X_i is a vector of control characteristics and includes age, mother tongue, a mobility indicator (five categories), qualification (three categories), function in the previous job (seven categories), sector of previous employment (ten categories), caseworkers assessment of placement possibilities (five categories), and the type of the residence community (number of inhabitants, agglomeration). The sample used in the estimations of Table 4 consists of unemployed Swiss men who have insured pre-unemployment earnings between 3,000 and 4,800 CHF. The treatment group consists of those individuals who have insured earnings between 3,536 and 4,340 CHF before entering unemployment.

Table 4: Difference-in-Differences estimates for prime-age men (3,000-4,800 CHF)
Dependent variable: Log unemployment duration

	(1)	(2)	(3)	(4)	(5)
Excluded pre-reform time:	0 months	3 months	6 months	9 months	12 months
Treatment	-0.019 (0.015)	-0.023 (0.016)	-0.018 (0.016)	-0.021 (0.017)	-0.024 (0.017)
After	-0.010 (0.011)	0.000 (0.011)	0.015 (0.011)	0.041*** (0.012)	0.062*** (0.012)
Treatment · After	0.030 (0.022)	0.034 (0.022)	0.029 (0.023)	0.032 (0.023)	0.035 (0.023)
Treatment effect (10 p.p.)	0.055	0.060	0.052	0.057	0.063
Elasticity	0.073	0.081	0.069	0.076	0.085
R-squared	0.078	0.078	0.078	0.080	0.080
Observations	50,940	49,652	48,097	46,282	45,183

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community.

Source: Unemployment register 1998-2007 (SECO).

Column (1) in Table 4 shows the baseline estimates. The coefficient on “Treatment · After” is an estimate of the effect of an increase in the replacement rate by 5.88 percentage points on log unemployment durations. The point estimate indicates, even though it is not statistically significant at any conventional level ($p = 0.168$), that the reform

increased unemployment durations of the treatment group by 3%. The semi-elasticity that expresses the percentage increase in unemployment duration for an increase in the replacement rate by 10 percentage points is 5.5%. Evaluated at the sample mean, this translates to an increase in unemployment durations of about 11 days for every 10 percentage points increase in the replacement rate. Note that these estimates have to be interpreted as the treatment effect on the treated after the reform in July 2003. That is, with maximum potential benefit duration of 400 days and minimum contribution requirement of 12 months.

One feature of the reform of the Swiss unemployment insurance was that unemployment spells which were in progress changed their replacement rate immediately at the date when the new benefit regime was introduced. Neglecting this could bias our results downwards in two distinct ways. *First*, there is a mechanic reaction of individuals that switch the benefit regime in the middle of their unemployment spell. Once they receive higher benefits, they might lower their search effort as incentives have changed. *Second*, individuals who anticipate the the benefit regime switch when staying unemployed might lower their search effort already from the beginning of their spell in anticipation of the future increase in unemployment benefits. Both reactions will lead to an underestimation of the estimated coefficients by increasing the unemployment durations of the treatment group prior to the reform. To check if these anticipation effects do influence the estimations, I exclude in columns (2) to (5) of Table 4 progressively more individuals entering unemployment just before July 2003. Even though in columns (4) and (5) the individuals entering unemployment after the reform stay significantly longer unemployed, the estimated effect of the reform on the treatment group remains very robust and amounts to 0.035 ($p = 0.130$) in Column (5). The longer unemployment durations after the reform, when cutting some quarters of unemployment inflow before July 2003, are in line with our expectations as unemployment rates started to increase in the year 2001 because of a recession and reached a peak in the year 2004. Individuals entering unemployment after the reform therefore faced unfavourable labor market conditions compared to individuals entering before 2003.

Table 5 disentangles the effect of the reform for different background characteristics of the unemployed by introducing interaction terms to the regression. Specifically, it checks if unemployed individuals react more or less to changes in the replacement rate depending on age, mother tongue, mobility, qualification, and ease of placement. This is implemented using the following econometric specification:

$$y_i = \alpha + \beta_1 T_i + \beta_2 A_i + \beta_3 T_i \cdot A_i + \beta_4 T_i \cdot \tilde{X}_i + \beta_5 A_i \cdot \tilde{X}_i + \beta_6 T_i \cdot A_i \cdot \tilde{X}_i + \gamma X_i + \epsilon_i$$

where $\tilde{X}_i$ is a restricted set of background characteristics, containing age, and dummies for being German speaking, mobile, qualified, and for being easy to place. Age, and the dummies for being mobile, qualified, and for being easy to place are included as deviations from their mean, while the dummy for being German speaking is included in levels. Therefore, the coefficient on the interaction term $T_i \cdot A_i$ in columns (2) to (6) shows the effect of an increase in the benefit replacement rate on unemployment durations for Swiss residents speaking any other language than German and having mean age, mobility, qualification and placement chances. For ease of illustration, Table 5 only presents the coefficients β_1 to β_3 and the vector of coefficients β_6 that identify differences in the treatment effects of the replacement rate on unemployment durations, by background characteristics.

Table 5: Difference-in-Differences estimates with interaction terms for prime-age men (3,000-4,800 CHF)

Dependent variable: Log unemployment duration						
	(1)	(2)	(3)	(4)	(5)	(6)
Excluded pre-reform time:	0 months	0 months	3 months	6 months	9 months	12 months
Treatment	-0.019 (0.015)	-0.034 (0.026)	-0.046* (0.026)	-0.045* (0.027)	-0.060** (0.028)	-0.063** (0.029)
After	-0.010 (0.011)	-0.064*** (0.018)	-0.061*** (0.019)	-0.047** (0.019)	-0.037* (0.019)	-0.014 (0.019)
Treatment · After	0.030 (0.022)	0.073** (0.036)	0.084** (0.037)	0.083** (0.037)	0.098*** (0.038)	0.101*** (0.038)
T · A · German speaking		-0.067 (0.046)	-0.079* (0.047)	-0.084* (0.047)	-0.102** (0.048)	-0.102** (0.049)
T · A · age		-0.001 (0.004)	-0.001 (0.004)	-0.002 (0.004)	-0.003 (0.004)	-0.002 (0.004)
T · A · mobile		-0.127 (0.088)	-0.119 (0.088)	-0.133 (0.089)	-0.143 (0.090)	-0.146 (0.091)
T · A · qualified		0.012 (0.050)	0.003 (0.050)	-0.012 (0.052)	-0.028 (0.053)	-0.032 (0.054)
T · A · easy to place		0.002 (0.063)	0.002 (0.064)	0.000 (0.064)	-0.004 (0.065)	0.006 (0.065)
R-squared	0.078	0.078	0.079	0.078	0.081	0.081
Observations	50,940	50,940	49,652	48,097	46,282	45,183

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Regressions also include interaction terms of German speaking, age, mobile, qualified, and easy to place with treatment dummy and after dummy. Age, mobile, qualified, and easy to place are in mean deviation. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. *Source:* Unemployment register 1998-2007 (SECO).

The treatment effect for the “Non-German speaking” individuals, estimated by the coefficient on $T_i \cdot A_i$ in columns (2) to (6), is much larger than the baseline estimate in column (1). Non-German speakers do react strongly - and statistically significantly - to an increase in the benefit replacement rate. Comparing the effect for German speakers, which is derived by taking the difference between the treatment effect for the Non-German speakers and the interaction term for the German speakers, shows that German speakers do basically not react to the change in incentives. This result is very much in line with Eugster et al. (2009), Eugster et al. (2011), and Eugster and Parchet (2011), who show that French- and Italian-speaking Swiss have longer unemployment durations, stronger demand for social insurance, and higher tax levels.

So far, I have only analyzed Swiss men. This is the largest group of unemployed in the Swiss unemployment insurance and therefore of special interest for policy makers. Nevertheless, Table 6 repeats the analysis of Table 4 for Swiss women and migrant men. Note that the analysis for women should not be influenced by family considerations and policy, as in our sample there are only non-married individuals without any dependent persons (no children).²³

Panel A. in Table 6 shows that women react somewhat stronger than men to an increase in the replacement rate. The point estimates are statistically significant and the semi-elasticity indicates that unemployment durations increase by about 10% if the replacement rate increases by 10 percentage points. Evaluated at the sample mean this translates into an increase in unemployment durations of about 19 days for Swiss women, compared to 11 days for Swiss men. Panel B. in Table 6 presents the results for migrants. The point estimates on the coefficients of interest are all statistically insignificant and very close to zero. Therefore, we can conclude that migrants do not react to the increase in unemployment benefits due to the reform in unemployment insurance. Table 10 in the Appendix shows that there is no statistically significant heterogeneity in the treatment effects for women and migrants with respect to age, mother tongue, mobility, qualification, and easiness of placement. However, the treatment effect for Non-German speaking women as well as for German speaking women are no longer statistically significant when controlling for treatment effect heterogeneity.

In sum, difference-in-differences estimates suggest a small but not statistically significant mean effect of the replacement rate on unemployment durations for Swiss men. The effect is statistically significantly positive for Latin speaking Swiss men and zero for German speaking individuals. The reform has a stronger mean effect on unemployment

²³It could however be that a woman gives birth to a child while being unemployed. We cannot observe this in our data.

Table 6: Difference-in-Differences estimates for women and migrants (3,000-4,800 CHF)

Dependent variable: Log unemployment duration					
Excluded pre-reform time:	(1) 0 months	(2) 3 months	(3) 6 months	(4) 9 months	(5) 12 months
<i>A. Women</i>					
Treatment	-0.014 (0.019)	-0.016 (0.019)	-0.017 (0.020)	-0.012 (0.020)	-0.013 (0.021)
After	0.078*** (0.013)	0.096*** (0.013)	0.114*** (0.014)	0.135*** (0.014)	0.151*** (0.014)
Treatment · After	0.054** (0.026)	0.057** (0.026)	0.057** (0.026)	0.053** (0.027)	0.053* (0.027)
Treatment effect (10 p.p.)	0.097	0.102	0.103	0.094	0.095
Elasticity	0.130	0.137	0.138	0.126	0.128
R-squared	0.089	0.089	0.091	0.092	0.094
Observations	35,031	33,978	33,003	31,982	31,176
<i>B. Migrants</i>					
Treatment	0.031 (0.024)	0.021 (0.025)	0.018 (0.026)	0.010 (0.027)	0.013 (0.028)
After	0.007 (0.017)	0.019 (0.018)	0.028 (0.018)	0.054*** (0.018)	0.077*** (0.019)
Treatment · After	-0.001 (0.033)	0.009 (0.034)	0.012 (0.034)	0.020 (0.035)	0.017 (0.036)
Treatment effect (10 p.p.)	-0.002	0.016	0.022	0.036	0.030
Elasticity	-0.003	0.022	0.030	0.048	0.040
R-squared	0.073	0.073	0.073	0.075	0.076
Observations	21,466	20,959	20,308	19,592	19,108

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. *Source:* Unemployment register 1998-2007 (SECO).

durations of Swiss women then of Swiss men, and no effect on the durations for migrant men.

5 Post-Unemployment Outcomes

This section complements the evidence providing estimates of the effect of the replacement rate on post-unemployment outcomes. For a policy maker in charge of designing an unemployment insurance system it is, from a welfare perspective, imperative to know not only how changes in the incentives from the replacement rate change unemployment

durations but also how labor market prospects after unemployment are affected. As there were no measurable effects of the replacement rate on unemployment durations, post-unemployment outcomes might provide a guideline towards an optimal replacement rate.

This section investigates three different measures for labor market success, each three months, six months, one year, two years, and five years after the start of the unemployment spell.²⁴ *First*, I investigate if the individuals are in paid employment, are still in unemployment, or have left the labor force. More concretely, the employment probability after unemployment is estimated. *Second*, earning levels are analysed. Earnings are measured in Swiss Francs and are zero for individuals who are not in paid employment. Therefore, this measure provides a mix between employment status and earning levels and can be interpreted as a net effect. *Finally*, log earnings provide evidence on the effect on earning levels for those who found a job. Naturally, individuals who are still unemployed or left the labor force fall out of the sample when analyzing log earnings.

Table 7 contains difference-in-differences estimates for the three post-unemployment outcomes. Panel A. shows the effects of an increase in the replacement rate on the probability of being employed three months, six months, one year, two years, and five years after the start of the unemployment spell. Note that the data on employment and earnings are a 25% sample of everybody that contributed at least once to social security between 1982 and 2008. Because of the restricted time frame, employment and earnings five years after the start of the unemployment spell cannot be observed for many individuals who enter unemployment after July 2003. This explains the strongly decreasing number of observations from Columns (1) to (5). Column (1) shows that increasing the replacement rate by 10 percentage points has no statistically significant effect on employment three months after the start of unemployment. The point estimate is negative, what we would expect if a higher replacement rate reduces unemployment exits. In Column (2), the point estimate gets smaller in absolute value but stays negative. Only one and two years after the start of unemployment point estimates turn positive. However, none of the estimates is statistically significant.

Panel B. in Table 7 shows estimates on real earnings. Note that these estimates are directly influenced by the estimates in Panel A. If there was no effect of the reform on earnings for those who work, but a negative effect on unemployment durations, then the estimated effect on earnings in Panel B. would be negative. This is in line with what we

²⁴Note that the estimates after three months, six months, and one year might be for outcomes during the unemployment spell, while those two years and five years are necessarily outcomes after the unemployment spell.

Table 7: Difference-in-Differences estimates for post-unemployment outcomes (prime-age men, 3,000-4,000 CHF)

	(1)	(2)	(3)	(4)	(5)
	3 months	6 months	1 year	2 years	5 years
<i>A. Employment</i>					
Treatment	0.006 (0.019)	0.010 (0.018)	0.009 (0.017)	0.002 (0.017)	0.016 (0.017)
After	0.001 (0.013)	-0.012 (0.012)	0.025** (0.012)	0.047*** (0.011)	0.065*** (0.018)
Treatment·After	-0.010 (0.026)	-0.006 (0.024)	0.015 (0.023)	0.016 (0.022)	-0.047 (0.038)
Treatment effect (10 p.p.)	-0.018	-0.010	0.027	0.029	-0.084
R-squared	0.03	0.04	0.04	0.04	0.05
Observations	10,259	10,259	10,259	9,501	5,614
<i>B. Earnings</i>					
Treatment	31.9 (78.1)	-86.0 (85.1)	-22.8 (88.7)	-170.3* (93.2)	-56.9 (102.0)
After	42.8 (54.5)	-36.0 (62.9)	165.7*** (61.9)	251.3*** (67.4)	478.3*** (141.0)
Treatment·After	-146.5 (104.7)	-11.2 (116.8)	-69.2 (119.7)	153.2 (138.4)	-380.3 (248.9)
Treatment effect (10 p.p.)	-262.6	-20.1	-124.1	274.5	-681.5
R-squared	0.04	0.05	0.06	0.07	0.09
Observations	10,259	10,259	10,259	9,501	5,614
<i>C. Log earnings conditional on employment</i>					
Treatment	0.000 (0.060)	-0.087* (0.049)	-0.003 (0.044)	-0.063 (0.043)	-0.024 (0.037)
After	-0.030 (0.041)	-0.023 (0.032)	0.054* (0.030)	0.084*** (0.027)	0.042 (0.044)
Treatment·After	0.026 (0.080)	0.070 (0.065)	-0.075 (0.059)	0.019 (0.053)	0.030 (0.084)
Semi-elasticity (10 p.p.)	0.046	0.125	-0.135	0.034	0.054
R-squared	0.03	0.04	0.04	0.04	0.06
Observations	5,536	6,881	7,469	7,312	4,160

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. No observations excluded before reform. Effects are robust to anticipation effects. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. *Source:* Unemployment register 1998-2007 (SECO).

observe. However, the estimates stay negative one year after the start of unemployment, while the coefficient on employment is positive. This is an indication that there is no positive effect of the reform on earnings. Note that all the estimated coefficients are statistically insignificant.

Finally, Panel C. investigates log earnings. The advantage of taking log earnings is that the estimated effects are only for those individuals who actually work. The disadvantage is that sample selection will influence the results. The point estimates on log

earnings are always positive except one year after unemployment. It seems that, at least during the unemployment spell, individuals who were affected by the reform increased their wage expectations and accepted more frequently better paid jobs. After the unemployment spell, the picture is not clear. Also in these estimations, point estimates are never statistically significantly different from zero. To conclude, Table 7 does not provide evidence for an effect of the level of the replacement rate on employment probabilities and earnings. The only statistically significant estimates suggest that labor force participation along with earnings increased in general after the reform in July 2003.

Table 7 shows the estimated treatment effect of the reform for very selected points in time, namely 3 months, 6 months, 1 year, 2 years, and 5 years after the start of an unemployment spell. Figure 4 complements the evidence by showing the estimated effects for each month from 1 month up to 5 years after the start of the unemployment spells. In general, there is no large effect of the reform on post-unemployment outcomes, with the exception of a statistically significant negative effect on earnings between 10 and 17 months after the start of unemployment. Sub-figure C presents log earnings conditional on employment. The figure makes evident that the statistically significant negative effects on earnings between 10 and 17 months after the start of unemployment arises through individuals who accept jobs that pay less, and not that individuals exit unemployment later.

Note that for the majority of unemployed individuals, unemployment benefits are limited to 400 days, which is about 18 months. The negative effect for earnings that arises for individuals leaving unemployment just before unemployment benefits expire does not contradict economic theory. If unemployment benefits increase (as is the case for the treatment group), it might be worth to lower the reservation wage, and thus to accept a job that pays less to ensure eligibility for unemployment benefits the next time you become unemployed.

6 Conclusions

This paper analyzed the effects of the level of the replacement rate on unemployment durations, employment, and earnings taking advantage of a reform in the unemployment insurance system in July 2003. Adopting a difference-in-differences approach, we get point estimates that indicate an increase in the unemployment duration by 5.5% when increasing the replacement rate by 10 percentage points for Swiss men. These estimates are however not statistically significant. Swiss women react stronger and increase unemployment durations by 9.7% for a 10 percentage points increase in the replacement rate.

Figure 4: Difference-in-Differences estimates for post-unemployment outcomes (prime-age men)



Notes: The figure shows DiD estimates on different post-unemployment outcomes. The line shows the estimated effects, the points denote effects that are statistically significantly different from zero at a significance level of 10%. *Source:* Unemployment register 1998-2007 (SECO).

These estimates are statistically significant at a 5% threshold. The estimated effects on post-unemployment outcomes are less robust and lead to the conclusion that there is no effect of the level of the replacement rate on employment probabilities or earnings after the unemployment spell is finished for men or women.

Is the absence of any statistically significant effect of the replacement rate on unemployment durations due to the small change in the replacement rate of only 5.88 percentage points? Carling et al. (2001) and Lalive et al. (2006) study changes of benefit levels in the order of 5 and 6 percentage points. Both studies do find statistically significant effects. The magnitude of the benefit change does not seem a first order reason for the in-existent effects in Switzerland.

In light of the design of unemployment insurance, increasing the replacement rate slightly for low- and medium-income individuals does not lead to strong disincentive effects, while it could be important in light of poverty prevention. Studies of the effect of changes in potential unemployment benefit duration on unemployment durations show strong disincentive effects of prolonged potential benefit duration (Lalive et al.; 2006). A policy maker should therefore take into consideration the possibility of decreasing potential unemployment duration while increasing the replacement rate to limit disincentive effects while not affecting poverty prevention, which was exactly the case in the reform in July 2003 studied in this paper.

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A Additional tables

Table 8: Difference-in-Differences estimates for placebo reform in July 2000 for women and migrants (3,000-4,800 CHF)

Dependent variable: Log unemployment duration					
Excluded pre-reform time:	(1) 0 months	(2) 3 months	(3) 6 months	(4) 9 months	(5) 12 months
<i>A. Women</i>					
Treatment	-0.026 (0.027)	-0.008 (0.028)	-0.001 (0.029)	-0.004 (0.032)	-0.004 (0.034)
After	0.070*** (0.019)	0.065*** (0.020)	0.046** (0.020)	0.031 (0.021)	0.023 (0.022)
Treatment · After	0.025 (0.039)	0.006 (0.040)	0.000 (0.041)	0.002 (0.043)	0.002 (0.044)
Treatment effect (10 p.p.)	0.044	0.012	0.000	0.004	0.004
R-squared	0.100	0.100	0.099	0.098	0.095
Observations	15,407	14,750	14,032	13,254	12,538
<i>B. Migrants</i>					
Treatment	-0.008 (0.035)	-0.006 (0.036)	0.008 (0.038)	0.037 (0.043)	0.057 (0.046)
After	0.095*** (0.026)	0.082*** (0.026)	0.045 (0.027)	0.029 (0.029)	0.033 (0.030)
Treatment · After	0.056 (0.051)	0.055 (0.052)	0.041 (0.053)	0.012 (0.057)	-0.007 (0.059)
Treatment effect (10 p.p.)	0.101	0.0987	0.0742	0.0209	-0.0129
R-squared	0.069	0.066	0.066	0.064	0.066
Observations	9,141	8,858	8,389	7,811	7,432

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. Only individuals in the data, that enter into unemployment before January 2003. *Source:* Unemployment register 1998-2007 (SECO).

Table 9: Summary statistics for log unemployment duration

	(1)	(2)	(3)	(4)	(5)
	Control group		Treatment group		Difference
Income (CHF)	3,000-3,535	4,341-4,800	3,000-3,535 4,341-4,800	3,536-3,430	(4)-(3)
<i>A. Men</i>					
Before	4.91 (0.01)	4.80 (0.01)	4.84 (0.01)	4.82 (0.01)	-0.02* (0.01)
After	4.92 (0.01)	4.84 (0.01)	4.87 (0.01)	4.87 (0.01)	0.00 (0.01)
Difference	0.02 (0.02)	0.04*** (0.02)	0.03** (0.01)	0.05*** (0.01)	0.02 (0.02)
Observations	9,922	16,414	26,336	24,604	50,940
<i>B. Women</i>					
Before	4.79 (0.01)	4.74 (0.02)	4.77 (0.01)	4.75 (0.01)	-0.02 (0.02)
After	4.89 (0.01)	4.86 (0.01)	4.87 (0.01)	4.87 (0.01)	-0.00 (0.01)
Difference	0.10*** (0.02)	0.11*** (0.02)	0.11*** (0.01)	0.12*** (0.01)	0.02 (0.02)
Observations	9,258	8,773	18,031	17,001	35,032
<i>C. Migrants</i>					
Before	4.91 (0.02)	4.91 (0.02)	4.91 (0.01)	4.91 (0.01)	-0.00 (0.02)
After	0.96 (0.02)	4.90 (0.02)	4.92 (0.01)	4.94 (0.01)	0.02 (0.02)
Difference	0.05* (0.03)	-0.01 (0.03)	0.02 (0.02)	0.03* (0.02)	0.03 (0.03)
Observations	4,662	6,219	10,881	10,585	21,466

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Source:* Unemployment register 1998-2007 (SECO).

Table 10: Difference-in-Differences estimates with interaction terms for women and migrants (3,000-4,800 CHF)

Dependent variable: Log unemployment duration						
	(1)	(2)	(3)	(4)	(5)	(6)
	Women			Migrants		
Excluded pre-reform time:	0 months	0 months	12 months	0 months	0 months	12 months
Treatment	-0.014 (0.019)	-0.013 (0.033)	-0.034 (0.037)	0.031 (0.024)	0.013 (0.026)	0.003 (0.030)
After	0.078*** (0.013)	0.031 (0.022)	0.096*** (0.024)	0.007 (0.017)	0.012 (0.019)	0.080*** (0.020)
Treatment · After	0.054** (0.026)	0.068 (0.045)	0.089* (0.049)	-0.001 (0.033)	0.013 (0.036)	0.024 (0.038)
T · A · German speaking		-0.022 (0.055)	-0.050 (0.059)		-0.147 (0.101)	-0.086 (0.111)
T · A · age		0.004 (0.004)	0.003 (0.005)		0.004 (0.006)	0.004 (0.006)
T · A · mobile		-0.029 (0.107)	-0.030 (0.113)		-0.070 (0.157)	-0.109 (0.165)
T · A · qualified		0.018 (0.065)	-0.058 (0.071)		0.142** (0.068)	0.114 (0.073)
T · A · easy to place		-0.026 (0.069)	-0.040 (0.072)		-0.098 (0.096)	-0.096 (0.100)
R-squared	0.089	0.089	0.094	0.073	0.073	0.076
Observations	35,031	35,031	31,176	21,466	21,466	19,108

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Regressions also include interaction terms of German speaking, age, mobile, qualified, and easy to place with treatment dummy and after dummy. Age, mobile, qualified, and easy to place are in mean deviation. Controls include age, mother tongue, mobility, qualification, function in previous job, sector of previous employment, caseworkers assessment of placement possibilities, type of residence community. *Source:* Unemployment register 1998-2007 (SECO).

Table 11: Summary statistics for prime-age men

	Control group		Treatment group		DiD
	Before	After	Before	After	Significance
Observations	13,933	12,448	13,077	11,482	
<i>A. Treatment / Forcing Variables</i>					
Insured earnings	4,055.09 (643.51)	4,137.82 (621.49)	3,973.48 (234.47)	3,976.75 (231.77)	***
Replacement rate	74.06 (4.91)	73.45 (4.75)	72.83 (3.28)	75.64 (3.58)	***
<i>B. Outcome Variables</i>					
Unemployment duration (weeks)	28.44 (27.39)	28.01 (25.49)	28.24 (27.49)	28.35 (26.04)	
Unemployment duration (logs)	4.84 (1.00)	4.87 (0.96)	4.82 (1.02)	4.87 (0.98)	*
Employed: after 3 months	0.54 (0.50)	0.54 (0.50)	0.54 (0.50)	0.54 (0.50)	
after 6 months	0.68 (0.47)	0.67 (0.47)	0.68 (0.47)	0.66 (0.47)	
after 1 year	0.70 (0.46)	0.74 (0.44)	0.72 (0.45)	0.74 (0.44)	
after 2 years	0.74 (0.44)	0.80 (0.40)	0.75 (0.44)	0.79 (0.40)	
after 5 years	0.72 (0.45)	0.80 (0.40)	0.74 (0.44)	0.78 (0.41)	
Earnings (CHF): after 3 months	1,633.52 (2,047.59)	1,683.48 (2,236.70)	1,651.62 (2,078.17)	1,560.52 (2,019.57)	*
after 6 months	2,522.02 (2,348.00)	2,494.17 (2,543.22)	2,469.90 (2,275.65)	2,313.02 (2,264.73)	
after 1 year	2,784.02 (2,438.98)	2,986.36 (2,423.25)	2,825.07 (2,356.52)	2,831.53 (2,437.31)	
after 2 years	3,167.24 (2,567.14)	3,489.51 (2,519.94)	3,055.21 (2,442.41)	3,336.33 (2,839.00)	
after 5 years	3,337.93 (2,869.55)	3,806.18 (3,288.42)	3,293.30 (2,661.52)	3,693.75 (3,013.77)	*

cont.	Control group		Treatment group		DiD
	Before	After	Before	After	Significance
Earnings (logs): after 3 months	7.63 (1.16)	7.61 (1.23)	7.65 (1.14)	7.60 (1.11)	
after 6 months	7.96 (0.97)	7.93 (1.03)	7.92 (1.06)	7.89 (0.99)	
after 1 year	8.01 (1.07)	8.07 (0.97)	8.05 (0.91)	8.00 (0.95)	*
after 2 years	8.14 (0.93)	8.21 (0.75)	8.08 (0.99)	8.15 (0.81)	
after 5 years	8.23 (0.86)	8.23 (0.96)	8.19 (0.85)	8.30 (0.70)	
<i>C. Individual Control Variables</i>					
Age	31.70 (6.11)	31.56 (6.22)	31.44 (6.08)	31.14 (6.05)	***
Native language: German	0.65 (0.48)	0.66 (0.47)	0.65 (0.48)	0.64 (0.48)	**
French	0.26 (0.44)	0.25 (0.43)	0.26 (0.44)	0.26 (0.44)	
Italian	0.07 (0.26)	0.06 (0.23)	0.07 (0.26)	0.07 (0.25)	
Romansh	0.01 (0.07)	0.00 (0.07)	0.01 (0.08)	0.00 (0.07)	
Mobility: Immobile	0.04 (0.19)	0.01 (0.08)	0.04 (0.19)	0.01 (0.09)	**
Daily commuting	0.89 (0.19)	0.94 (0.24)	0.89 (0.20)	0.93 (0.25)	
Parts of Switzerland	0.04 (0.19)	0.03 (0.17)	0.04 (0.20)	0.03 (0.17)	***
Whole Switzerland	0.02 (0.15)	0.02 (0.13)	0.02 (0.15)	0.02 (0.14)	**
Abroad	0.01 (0.11)	0.01 (0.10)	0.01 (0.09)	0.01 (0.10)	*
Qualification: High	0.76 (0.43)	0.69 (0.46)	0.74 (0.44)	0.66 (0.48)	***
Medium	0.14 (0.34)	0.16 (0.36)	0.15 (0.36)	0.17 (0.38)	
Low	0.11 (0.31)	0.15 (0.36)	0.12 (0.32)	0.17 (0.38)	***

cont.	Control group		Treatment group		DiD Significance
	Before	After	Before	After	
Function: Independent	0.00 (0.06)	0.00 (0.05)	0.00 (0.05)	0.00 (0.05)	
Management	0.03 (0.16)	0.02 (0.15)	0.02 (0.14)	0.02 (0.12)	
Skilled	0.72 (0.45)	0.71 (0.45)	0.71 (0.46)	0.69 (0.46)	**
Unskilled	0.24 (0.42)	0.24 (0.43)	0.26 (0.44)	0.27 (0.45)	**
Apprentice	0.01 (0.07)	0.01 (0.09)	0.00 (0.07)	0.01 (0.08)	
Student	0.01 (0.10)	0.01 (0.12)	0.01 (0.08)	0.01 (0.12)	
Economic branch: Agriculture	0.02 (0.13)	0.02 (0.14)	0.02 (0.13)	0.02 (0.14)	
Energy	0.00 (0.07)	0.00 (0.07)	0.00 (0.07)	0.00 (0.07)	
Manufacturing 1	0.06 (0.24)	0.05 (0.21)	0.05 (0.23)	0.04 (0.20)	
Manufacturing 2	0.11 (0.32)	0.09 (0.29)	0.11 (0.32)	0.09 (0.28)	
Construction	0.13 (0.33)	0.10 (0.30)	0.12 (0.32)	0.09 (0.28)	
Trade	0.24 (0.43)	0.24 (0.43)	0.27 (0.44)	0.27 (0.44)	
Traffic	0.06 (0.25)	0.06 (0.24)	0.07 (0.26)	0.06 (0.24)	
Banking	0.21 (0.41)	0.22 (0.42)	0.21 (0.41)	0.22 (0.41)	
Services	0.09 (0.29)	0.09 (0.29)	0.08 (0.28)	0.09 (0.29)	
Public	0.06 (0.24)	0.12 (0.32)	0.06 (0.23)	0.12 (0.32)	

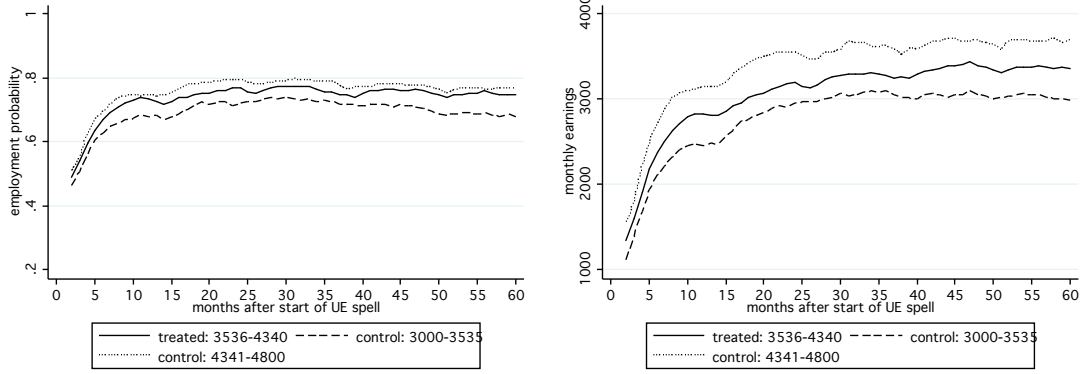
cont.	Control group		Treatment group		DiD Significance
	Before	After	Before	After	
Placement: No help	0.04 (0.19)	0.01 (0.11)	0.04 (0.19)	0.01 (0.12)	
Easy	0.16 (0.37)	0.09 (0.29)	0.16 (0.37)	0.09 (0.29)	
Medium	0.66 (0.47)	0.75 (0.43)	0.66 (0.47)	0.74 (0.44)	
Hard	0.11 (0.32)	0.13 (0.34)	0.11 (0.32)	0.14 (0.35)	
Special case	0.02 (0.14)	0.01 (0.12)	0.02 (0.14)	0.01 (0.12)	
<i>D. Municipality Control Variables</i>					
Latin	0.33 (0.47)	0.33 (0.47)	0.34 (0.47)	0.34 (0.48)	
Agglomeration	0.54 (0.50)	0.75 (0.43)	0.53 (0.53)	0.74 (0.44)	
Municipality population: > 200,000	0.06 (0.24)	0.06 (0.24)	0.06 (0.23)	0.06 (0.24)	
100,000 - 200,000	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.33)	
50,000 - 100,000	0.05 (0.21)	0.03 (0.18)	0.05 (0.21)	0.04 (0.19)	
30,000 - 50,000	0.04 (0.20)	0.04 (0.20)	0.05 (0.21)	0.04 (0.21)	
20,000 - 30,000	0.05 (0.22)	0.05 (0.22)	0.05 (0.21)	0.05 (0.22)	*
10,000 - 20,000	0.15 (0.36)	0.17 (0.37)	0.15 (0.36)	0.15 (0.36)	*
5,000 - 10,000	0.14 (0.35)	0.14 (0.34)	0.14 (0.34)	0.13 (0.34)	
2,000 - 5,000	0.18 (0.39)	0.19 (0.39)	0.18 (0.39)	0.19 (0.40)	
1,000 - 2,000	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	
0 - 1,000	0.11 (0.31)	0.10 (0.30)	0.11 (0.32)	0.10 (0.30)	

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Stars denote significance level of a Difference-in-Differences estimation without control variables. *Source:* Unemployment register 1998-2007 (SECO).

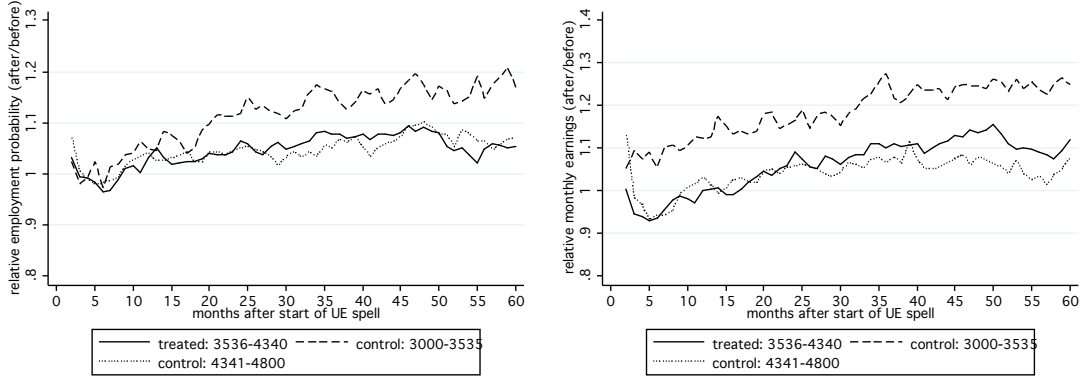
B Additional figures

Figure 5: Monthly post-unemployment outcomes

A. Absolute employment probabilities and earnings



B. Relative employment probabilities and earnings (after/before)



Notes: The figure shows post-unemployment employment probabilities and earnings for the control groups and the treatment group. Earnings are deflated. *Source:* Unemployment register 1998-2007 (SECO).