Reforms at the margin and labour market segmentation:
Evidence from unemployment duration distribution

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Abstract:

We analyse the effects of the Italian labour market reforms "at the margin" on unemployment spells distribution by using WHIP data. We find that the reforms strengthen the duration dependence parameter meaning a stronger labour market segmentation. We suggests that, in a flexible labour market, long term unemployment is used by firms as a screening device to detect bad quality workers. Our results indeed show that unemployment duration partially replaced previous job experiences as a screening device. We also found evidence of greater gender duality and of slightly increased regional labour market duality.

1. Introduction

A broad consensus exists among economists to consider the high regulation of the labour market as the principal reason of high and persistent unemployment in Europe since the '70s. Bentolila and Bertola (1990) argued that high employment protection legislation (EPL) tends to reduce separation rates from employment into unemployment and *vice-versa*, as firms become more cautious about hiring and dismissals are expensive because of high firing costs. In order to reduce EPL, policy makers have implemented reforms "at the margin" introducing new contractual forms (temporary

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contracts) characterized by lower firing costs. These flexibility policies affected not univocally European labour markets in terms of unemployment duration (Blanchard and Landier, 2002), job destruction and job creation (Cahuc and Postal-Vinay, 2002), desirability of temporary jobs in terms of wage, job satisfaction and training (for instance Booth, Francesconi and Frank, 2002), and the probability of transiting into permanent employment (Amuedo-Dorantes, 2000 or van den Berg, Holm and van Ours, 2002). [1]

Boeri and Garibaldi (2007) argue that labour market reforms increasing flexibility at the margin have a transitional honeymoon job creating effect which contributes to explain the progress made by many countries (Italy as well) towards the Lisbon employment target. Nonetheless this job creation effect is only temporary and therefore other reforms are needed to make further and permanent progress. Flexibility polices also have been found to increase labour market segmentation (for instance Güell, 2003) with implication in terms of investment in human capital, wage pressure, wage dispersion, labour mobility and fertility rates, as Dolado, Garcia-Serrano and Jimeno (2002) argued. However whilst the implications of stronger labour market segmentation have been investigated, its underlying motives have been less explored.

The present study uses data from the Work Histories Italian Panel (WHIP) on young workers in the age range 15-35 and for the period from 1985 to 2004[2] to analyse the effects of the labour market reforms on the duration dependence distribution in Italy. Given the availability of interval-censored data and the possibility to identify the exit

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[1] Other studies on "dead end" or "springboard" effects of temporary contracts include Alba-Ramirez (1998), D'Addio and Rosholm (2005), Güell and Petrongolo (2007), Ichino, Mealli and Nannicini (2005) and Gagliarducci (2005).
[2] For details on the WHIP data, see http://www.laboratoriorevelli.it/whip/documentazione .

contract types, we apply discrete time hazard models with competing risks. We also control for unobserved heterogeneity.

During the period 1985-2004 the Italian economy incurred in very important structural and institutional changes. The former includes the recession of the beginning of the nineties (especially 1992 and 1993).[3] With regards to the institutional change, the Italian labour market went through important reforms during the period under analysis, which essentially made it easier to create flexible, atypical, and part-time job contracts.[4]

Since 1997, Italy has undertaken major steps towards "flexibility" by way of labour market reforms that have liberalized the use of flexible and atypical contracts. Law No. 196/1997 ("Treu Package"),[5] Legislative Decree No. 368/2001, Law No. 30/2003 ("Biagi's Law"), and the subsequent Legislative Decree No. 276/2003 have indeed legitimized temporary work agencies and fixed-term contracts under general conditions and given rise to the expansion of flexible and atypical work arrangements.[6] Nonetheless, the liberalisation of the working contracts was fairly gradual and occurred as a sequence of incremental reforms not only in Italy but also in other European Countries (Boeri and Garibaldi, 2007).

In Italy the most significant reform took place in 1997, but temporary contracts had been introduced at least ten years before that date. The initial low take up of these contracts was due to the fact that their introduction was conditional on collective

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3 Nonetheless, in Italy the average GDP annual growth rate was around 1.9% during the period examined (Eurostat). The economic growth was positive in all the period examined with the partial exception of 1993, due to the recession of the beginning of the nineties (gdp growth rate negative and around -0.83%).

[4] A description of the main reforms introduced in Italy over the period examined (1985-2004) is offered in Appendix 1.

[5] The Treu reform has been assessed by, among others, Ichino, Mealli and Nannicini (2005), Jimenez-Rodriguez and Russo (2008), Montanino and Sestito (2003), Schindler (2009), Destefanis and Fonseca (2007). Specifically, the latter have found that the Reform has improved the matching efficiency in Northern regions, particularly for skilled workers.

[6] Up to the second half of the nineties, the Italian standard work arrangement had been full-time, open-ended, and characterized by one of the strictest employment protection legislation, mostly again dismissals, in the OECD area (Lazear, 1990; Kugler and Pica, 2008; OECD, 1999).

agreements. Also, the intensification of temporary contracts was constrained by the timing of the renewals of collective agreements and by the rigidity and resistance of the unions to the expansion of new contractual arrangements. For these and other reasons, there is not a unique date for these reforms but these were implemented gradually.[7]

The main question addressed by this article is whether and how duration dependence distributions have changed in Italy in the face of the important labour market developments of the period examined, especially since the Treu Package of the late nineties.

The analysis of the effects of the reforms on duration dependence distribution is relevant for a host of reasons. Firstly, Italy is characterized by a high presence of long-term unemployed (ISTAT)[8] and therefore the legislations might had affected their probabilities to leave the state of unemployment. In addition, the analysis is also relevant for short-term unemployed, especially to examine whether their opportunities to leave unemployment were affected by those regulations. All in all, we claim that the analyses allow investigating also whether the reforms affected structural factors which characterize the Italian labour market. In detail, attention will be devoted to gender and geographical differences/gaps in the hazard of leaving unemployment. Understanding the impact of the regulations and their effect on structural factors is policy relevant to assess the effectiveness of the reforms introduced and also to design additional interventions.

The main finding of this study is that the introduction of the Treu Reform significantly raised the negative duration dependence parameter especially for

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[7] For details on the main reforms introduced in Italy, see Appendix 1.
[8] The incidence of LTU on total unemployment increased in almost all the period analysed. The indicator was almost 50% in 2001, and thereafter decreased. The LTU rate also increased to 5,1% in 2001 (ISTAT LFS data).

transitions to permanent employment for long-term unemployed. Conversely, short-term unemployed increased their probability of leaving the state for employment (especially permanent contracts) after the reforms. Therefore the legislation of the nineties lead to a stronger labour market segmentation.[9]

We also find that the Treu Reform reduced the positive effect of previous job experiences both in permanent and temporary employment. This possibly indicates that the role of unemployment duration as a screening device, has partially replaced the signalling role of previous job experiences in the firms' hiring policies. Finally, we find that the Treu Reform has increased the gender duality in the transitions to permanent contracts, and slightly increased the territorial duality/gaps in the transitions to temporary contracts.

The remainder of this paper is organized as follows. Section 2 describes the data and the samples. Section 3 provides the empirical specification for this study. The results of the econometric analyses and a discussion of our findings are offered in Section 4. Section 5 concludes.

2. Data

WHIP is a database of individual working histories, based on the National Institute of Social Security (INPS) administrative archives, and consists of a representative sample with a dynamic population of 370.000 individuals, which provides full information for the period from 1985 to 2004.[10]

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[9] Blanchard and Diamond (1994) argued that unemployment pool may be segmented because firms rank unemployed workers and hire those with the shortest spells of unemployment, since long-term unemployed are suspected to suffer from job skills deterioration. Similar considerations arise in ranking model based on characteristics (Güell, 2003).

[10] WHIP data does not present attrition problems. In fact, if the worker or the firm are enrolled at INPS, they must provide INPS with all the information (LABORatorio Revelli, 2009).

The database allows the identification of job relationships on the basis of the social security contributions monthly paid to INPS by employers and workers, therefore non working spells[11] (NW thereafter) are indirectly recognizable as complementary information. Since the survival time occurs in continuous time but the spell lengths are observed only at monthly intervals, the data are actually interval-censored. Even though the data only reach 2004, the use of this dataset is recommended for at least two reasons. First, it provides monthly information on private employment relationships, that allows to reconstruct the time of the transitions with good precision. Second, the data allows a comparison between pre and post reform periods. From the type of contribution rebates it is possible to identify the contractual forms held by individuals, i.e. permanent contracts (PC) or temporary contracts (including on-the-job training contracts -OJTC- and temporary agency contracts -TAC-), that allow for a competing risks analysis. Still unidentifiable are individuals employed with a fixed-term contract (FTC), since social security contributions are identical to those of PC, and therefore they are counted as a permanent relationship. However, since the Treu Package and successive reforms only brought very negligible changes on FTC legislation, it is plausible to believe that no significant estimation bias arises from their un-identification. Finally, individuals employed with the Continuative and Coordinate Collaboration (Co.Co.Co.) contract, that Italian legislation classifies as self-employed, are also excluded from our sample since only yearly information are available on them.[12]

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[11] For convenience we treat non working spells as unemployment spells. Nonetheless, as argued by Contini and Grand (2012), the estimates of unemployment durations obtained by WHIP data are quite close to the estimates obtained by using ISTAT LFS data. This confirms the good quality of WHIP data especially for investigations of the unemployment duration.

[12] However, the dataset allows controlling for individuals employed at least once with a Co.Co.Co. contract. They represent about 2% of individuals. Eliminating the latter individuals from our sample does

From the original sample, we select information for young individuals aged 15-35 in the analyzed period, since flexibility policies were primarily targeted to young workers. This selection leads to a sub-sample of 108757 spells corresponding to 2335277 times at risk. This selection also allows to reconstruct the complete individual working histories with accuracy and, since we can observe workers from the beginning of their career, the impact of the initial-condition problems is reduced.[13] The first month of a new employment relationship allows to identify the time of exit from unemployment status, and the type of contract that characterizes the new job makes it possible to identify the multiple failures that characterize this competing risks analysis. Since TAC only represent a minor part of the exit contracts, they are considered together with OJTC as indistinct temporary contracts (TC).[14] The WHIP data makes available a set of individual and job related variables, including in time-varying form. Specifically, information is provided on age, gender, working area at macro regional level, profession, firm-size, illness condition, part-time, wage, sector of economic activity and cumulated previous work experience in permanent and on the job training contracts. In the case of the working characteristics, they are referred to the conditions held during the previous work experience. Finally, the business-cycle effect is controlled for by introducing the expected employment growth rate and assuming

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not involve changes in the presented results. Nonetheless, estimates without Co.Co.Co. employees are available upon request.

[13] Constructing our sub-sample, if an individual, at the same time, is in more than one work relationship, we eliminate the shorter job relationship and, if of the same duration, we remove the part-time jobs or the work relationships characterized by fewer days of actual work. Finally, when the second job starts before the end of the first job but ends after it, we censor the second work spell to the left, and so we hypothesize that the second job starts only when the first ends. In this way, the passage from a double job to a single one is found as a transition from a job to another. This strategy is adopted to reconstruct the non-working duration spells with accuracy.

[14] The TAC contracts only represent the 1.8% of the failures over the period 1985-2004.

rational expectations.[15] Descriptive statistics, both referred to the full sample and distinguishing between pre and post reform periods and by failure types[16], are reported in Table 1 in the usual manner.

Table 1. Descriptive statistics

	full sample		censored				permanent contract				temporary contract			
			pre reform		post reform		pre reform		post reform		pre reform		post reform	
	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev
Age	23,64	4,50	21,19	2,95	25,55	4,70	21,36	2,73	25,90	4,15	18,96	2,36	22,23	4,14
Age square	579,02	221,58	457,71	127,10	675,11	240,26	463,60	118,51	687,90	214,61	365,05	95,81	511,20	197,58
Male	0,61	0,49	0,60	0,49	0,57	0,50	0,61	0,49	0,61	0,49	0,68	0,47	0,63	0,48
North-west	0,28	0,45	0,23	0,42	0,25	0,43	0,28	0,45	0,30	0,46	0,27	0,44	0,32	0,47
North-east	0,29	0,45	0,21	0,41	0,24	0,42	0,30	0,46	0,28	0,45	0,40	0,49	0,35	0,48
Centre	0,19	0,39	0,20	0,40	0,21	0,41	0,17	0,38	0,19	0,39	0,17	0,38	0,18	0,38
South-islands	0,24	0,43	0,36	0,48	0,30	0,46	0,24	0,43	0,23	0,42	0,16	0,37	0,15	0,36
Blue-collar	0,80	0,40	0,83	0,37	0,76	0,42	0,82	0,39	0,75	0,43	0,94	0,24	0,87	0,34
Missing firm size	0,18	0,39	0,02	0,13	0,48	0,50	0,01	0,12	0,20	0,40	0,01	0,11	0,22	0,41
Firm size [0-9]	0,37	0,48	0,56	0,50	0,22	0,42	0,48	0,50	0,31	0,46	0,61	0,49	0,34	0,47
Firm size [10-19]	0,13	0,33	0,15	0,35	0,07	0,26	0,16	0,37	0,12	0,32	0,17	0,37	0,11	0,32
Firm size [20-199]	0,20	0,40	0,21	0,41	0,12	0,33	0,24	0,43	0,22	0,42	0,17	0,37	0,18	0,39
Firm size [200, over]	0,12	0,32	0,06	0,24	0,10	0,30	0,10	0,30	0,14	0,35	0,04	0,20	0,15	0,35
Bad health	0,08	0,27	0,07	0,25	0,09	0,28	0,07	0,26	0,09	0,28	0,06	0,24	0,08	0,27
Wage	51,20	46,13	41,49	38,63	61,21	67,58	42,13	35,44	58,34	45,35	32,02	20,25	48,73	35,91
Part-time	0,12	0,32	0,07	0,26	0,20	0,40	0,07	0,25	0,14	0,35	0,04	0,19	0,12	0,32
Manufacturing	0,31	0,46	0,36	0,48	0,25	0,43	0,35	0,48	0,27	0,44	0,44	0,50	0,33	0,47
Building	0,13	0,33	0,15	0,36	0,12	0,33	0,13	0,34	0,12	0,33	0,15	0,36	0,12	0,32
Commerce	0,13	0,34	0,15	0,36	0,15	0,36	0,12	0,33	0,12	0,33	0,14	0,34	0,14	0,35
Tourism	0,16	0,36	0,13	0,33	0,15	0,36	0,17	0,38	0,16	0,36	0,17	0,37	0,14	0,34
Transport	0,04	0,19	0,02	0,15	0,03	0,18	0,03	0,17	0,05	0,22	0,01	0,11	0,03	0,17
Intermediary/Real estate	0,13	0,34	0,07	0,26	0,17	0,38	0,06	0,25	0,17	0,37	0,03	0,17	0,18	0,38
Other sectors	0,11	0,31	0,11	0,32	0,11	0,32	0,11	0,32	0,13	0,34	0,07	0,25	0,07	0,25
Cumulated PC experience	17,45	27,85	12,29	21,66	22,46	33,84	11,98	19,07	24,48	31,91	3,76	11,13	9,32	19,71
Cumulated PC square	1080,02	3194,64	620,04	1822,42	1649,73	4401,79	507,31	145,81	1617,36	3885,41	138,05	742,59	475,13	1921,11
Cumulated OJTC experienc	6,34	11,56	6,51	12,11	5,04	11,13	6,82	11,60	6,05	11,87	7,77	10,44	7,17	11,28
Cumulated OJTC square	173,83	531,00	188,98	585,89	149,19	539,59	181,03	502,47	177,48	565,15	169,29	435,37	178,66	489,06
Expected employment grow	0,67	1,55	-0,30	1,43	1,04	1,47	-0,05	1,48	1,10	1,39	-0,05	1,59	1,10	1,35
Treu	0,64	0,48	0,00	0,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	1,00	0,00
Spells	108757		5080		17535		25762		40543		7968		11869	

Note: Treu is a dummy variable which takes the value 0 before the introduction of the Treu reform (June 1997) and 1 thereafter.
Source: our elaborations on WHIP data

3. Econometric specification

The duration analysis is developed using the standard job search tools, according to which unemployed individuals start their job search process immediately after losing their job. Since available data are interval censored, discrete-time hazard models are estimated (Prentice and Gloecker, 1978). According to hazard models, the conditional

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[15] The employment growth is measured with respect to the next quarter employment level using data from the "Rilevazione sulle Forze di Lavoro" by ISTAT.

[16] The failure types at the bottom line of Table 1 are calculated at the last month observed in our dataset.

probability that a transition to employment takes place in a given interval $[a_{j-1}, a_j)$, conditional on the time already spent in it, is estimated as a reduced form equation that resumes the product of two probabilities: the probability of receiving a job offer, and the probability of accepting it. The probability of accepting a job offer corresponds to the probability that the wage offer exceeds the reservation wage. The hazard of leaving unemployment can vary over the spell according to changes in the offer probability and to changes in the reservation wage; this change is explained by the duration of the time at risk and other exogenous variables that affect the hazard rates, i.e. individual and job related characteristics. Generally, the hazard of exit in the j_{th} period is defined as follows:

$$h_j \equiv \Pr\{T \in [a_{j-1}, a_j) \mid T \geq a_{j-1}\} \tag{1}$$

Assuming unit length intervals, the realization j of the discrete random variable T is the recorded spell duration. A discrete-time hazard model requires that data are organized into a "sequential binary form", that is, the data form an unbalanced panel of individuals with the i_{th} individual contributing $j = 1, 2, \ldots\ldots t$ observations, i.e. j indicates the number of periods at risk of the event.[17] Since some individuals transit to employment and possibly revert back to unemployment, multiple spells may be observed, $q = 1, 2, \ldots Q$. Models are estimated assuming independent competing risks, that permits to separately estimate models for each destination state (Narendranathan and Stewart, 1993).

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[17] Specifically, a binary dependent variable was created. If the individual i's survival time is censored then the dependent binary variable always takes value zero, if the individual i's survival time is not censored then the dependent binary variable takes value zero in the first j-1 observations and value one in the last one.

The cloglog specification consists in the discrete time representation of a continuous time proportional hazard model. The hazard function without unobserved heterogeneity for each destination state (PC or TC) reads:

$$h(j,X) = 1 - \exp\left\{-\exp\left[\alpha'X + \beta'(R*X) + \gamma_j + (R*\gamma_j)\right]\right\} \qquad (2)$$

where, X is a set of covariates, also time varying, including a dummy variable, R, which capture the labour market reforms and takes that takes value one in 1997. A full set of interaction dummy variables ($R*X$) are introduced to identify the effects of the labour market reforms on the duration dependence parameters and on other explanatory variables. α and β are vectors of unknown parameters, including intercepts, to be estimated that refer, respectively, to X and ($R*X$). The effect of the variables in the post-reform period is summarized by ($\alpha + \beta$) and, finally, γ_j and $\left(R*\gamma_j\right)$ summarize the baseline hazard and the interaction of the baseline hazard with the dummy for the labour market reforms, respectively.

The baseline hazard γ_j consists on the log of the difference between the integrated baseline hazard (θ_0) evaluated at the end and the beginning of each interval:

$$\gamma_j = \log\left[\int_{a_{j-1}}^{a_j} \theta_0(w)dw\right] \qquad (3)$$

In our analysis, we estimate a piecewise constant baseline hazard, that is estimated non parametrically, using a piecewise constant exponential specification, i.e. groups of months are assumed to have the same hazard rate, but the hazard may differ among groups.[18] The total spell of non employment is therefore divided into specifics sub

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[18] We also estimated a monotonic baseline hazard, which might be interpreted as the discrete time analogue of a continuous time Weibull model. Nonetheless, we preferred to use a more flexible piecewise constant specification. The Weibull model, indeed, assumes hazard rates monotonically increasing, decreasing or constant. This assumption is somehow restrictive for the wide range of subgroups of

spells D for specific group of months (e.g. D1_3 for the spells of non employment with duration from 1 to 3 months, D4_6 for a duration from 4 to 6 months, and so forward). [19]Each sub spell is also interacted with the dummy for labour market reform, R (e.g. D1_3*R for the first spell, D4_6 for the second spell)

The model is estimated by maximum likelihood, and the partial log-likelihood function for each destination, permanent contract (PC) or temporary contract (TC) is:

$$\log L\left(\beta,\gamma\right) = \left[\sum_{i=1}^{N}\sum_{q=1}^{Q}\sum_{j=1}^{t}\left[y_{iqj}\log h_{iqj} + \left(1-y_{iqj}\right)\log\left(1-h_{iqj}\right)\right]\right]_{PC} + \left[\sum_{i=1}^{N}\sum_{q=1}^{Q}\sum_{j=1}^{t}\left[y_{iqj}\log h_{iqj} + \left(1-y_{iqj}\right)\log\left(1-h_{iqj}\right)\right]\right]_{TC}$$

$$(4)$$

where y_{ij} is an indicator assuming value one if the individual transition takes place in month j (i.e. the spell is uncensored) and zero otherwise. Because of the independence assumption, the total log-likelihood function $\log L(\beta,\gamma)$ is the sum of the partial log-likelihood function derived for the contract of destinations PC and TC.

The model presented above assumes that all differences between individuals are captured by observed explanatory variables. However, as well known, it may be relevant to use a model that allows for unobservable individual effects in order to prevent estimation bias deriving, for example, from omitted variables and/or measurement errors in the observables.[20] Unobserved heterogeneity is modeled assuming a Gaussian distribution. By avoiding any assumption about the functional form of the baseline hazard, i.e. by adopting the piecewise constant specification,

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months (pieces) of unemployment durations in our dataset. Nonetheless, according to the Akaike's Information Criterion (AIC) the piecewise model is preferable.

[19] The complete set duration dependence estimates is reported in Table 2.

[20] If unobserved heterogeneity is a relevant issue but neglected a number of relevant problems may arise. First, duration dependence estimates are biased. In detail, the degree of negative duration dependence in the hazard is over-estimated or the degree of positive duration dependence in the hazard is under-estimated (i.e. the so called spurious duration dependence). Second, the proportionate response of the hazard rate to a change in a regressor declines with time. Third, the proportionate response of the hazard to a change in a regressor is possibly under-estimated (Jenkins, 2005).

estimation bias problems are reduced, and estimation results may be considered reliable.[21] The hazard function assuming a complementary log-log specification with Gaussian unobserved heterogeneity is defined as:

$$h(j, X \mid v) = 1 - \exp\{- \exp[\alpha' X + \beta'(R*X) + \gamma_j + \log(v_i)]\} \tag{5}$$

where $\log(v) \equiv u$ has a Normal distribution with zero mean and finite variance.

To estimate this model it is necessary that both the survival and the density function expressions, which enter in the likelihood function, are not conditioned on unobserved effects. Therefore, the likelihood contributions are obtained by integrating out the random terms, as appropriate for the Gaussian case, since the integral has not a simple

4. Results

Tables 2 and 3 illustrate the duration dependence parameter and coefficient estimates for the total sample examined over the period 1985-2004.

In detail, Table 2 shows duration dependence parameters for each piece/spell of unemployment duration. We divided the total duration in eight pieces. Each duration dependence parameter is interacted with a dummy variable, Reform, to obtain the impact of the regulations introduced in Italy since 1997 (since the 'Treu Package'). According to Table 2 and Figure 1, we find a negative relationship between the hazard rate and the time spent in unemployment. This is consistent with the hypothesis of ranking of Blanchard and Diamond (1994) and also by Güell (2003).

We also find a non monotonic pattern of the hazard rate with two peaks respectively for 1 to 3 months (D1_3) and for 10 to 12 months duration (D10_12);

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[21] Nicoletti and Rondinelli (2010) show that, for discrete time hazard model, the misspecification of the error distribution, assuming Gaussian unobserved heterogeneity, only leads to an equiproportional rescaling of the covariate coefficients.

however, after one year of unemployment the probability of finding a job (permanent or temporary) quite strongly falls.

Table 2. Duration dependence estimates, total sample 1985-2004

	NW-PC			NW-TC		
	b	s.e.		b	s.e.	
D1_3	0,793	0,026	***	0,490	0,046	***
D1_3*Reform	0,442	0,032	***	0,379	0,057	***
D4_6	0,139	0,029	***	-0,153	0,052	***
D4_6*Reform	0,353	0,037	***	0,396	0,064	***
D7_9	0,224	0,030	***	0,025	0,052	**
D7_9*Reform	0,369	0,038	***	0,254	0,065	***
D10_12	0,596	0,029	***	0,811	0,048	***
D10_12*Reform	0,155	0,038	***	0,017	0,061	
D19_24	-0,198	0,035	***	-0,129	0,063	**
D19_24*Reform	0,043	0,045		0,035	0,078	
D25_36	-0,446	0,035	***	-0,501	0,069	***
D25_36*Reform	0,057	0,045		0,047	0,084	
D37_60	-0,709	0,038	***	-0,904	0,087	***
D37_60*Reform	-0,091	0,048	**	0,064	0,101	
D_ov60	-1,051	0,058	***	-1,603	0,170	***
D_ov60*Reform	-0,353	0,064	***	-0,147	0,181	

Notes: D is for duration dependence followed by the unemployment duration in months. For instance D1_3 is the duration dependence for spells of unemployment with a duration from 1 to 3 months. Each duration dependence parameter is interacted with the dummy variable Reform (0 before Treu, 1 thereafter).
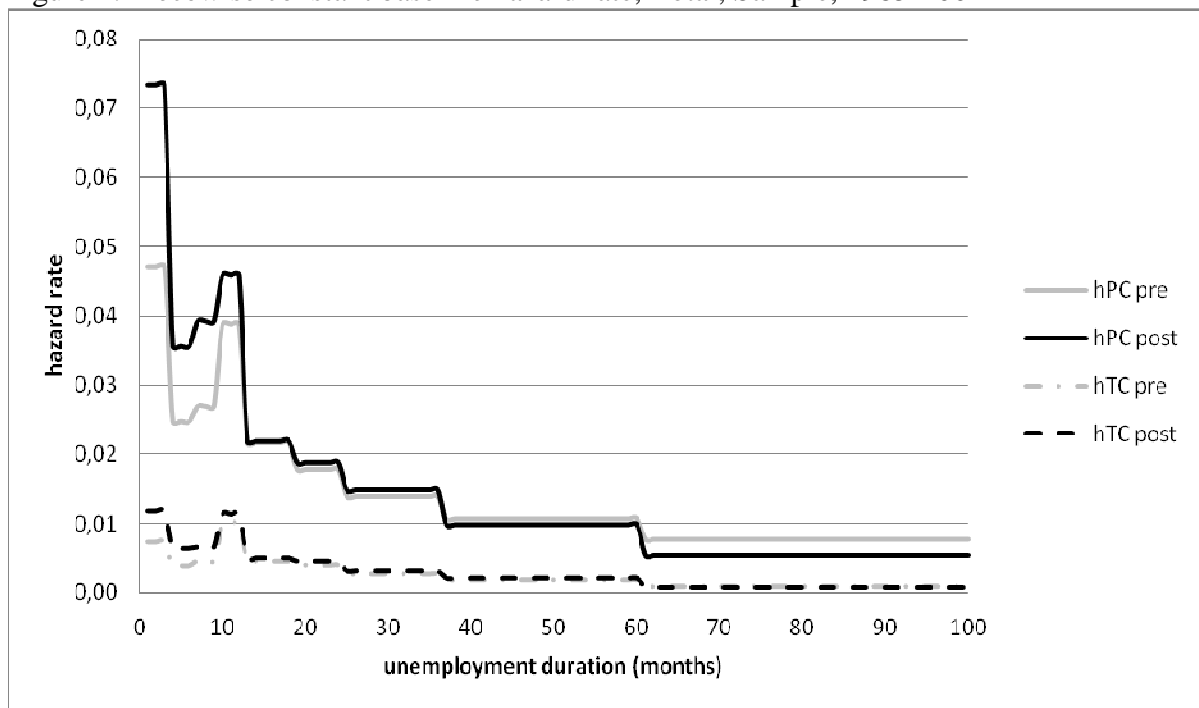* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaboration on WHIP data

Overall, according to the estimation results, we find that the introduction of the Treu Reform has significantly affected the duration dependence parameters.

Specifically, we find positive interaction dummies coefficients for STU and smaller positive or negative interaction dummies coefficients for LTU, i.e. the piecewise constant parameters has increased for short-term unemployed and has decreased (or has remained unchanged) for long-term unemployed. This points in the direction of a strengthening of the negative duration dependence for LTU. Graphical analysis (Figure 1) helps to clarify that the Treu Reform, in addition to strengthen the negative duration dependence, also slightly moved up the positioning of the hazard rates. This finding is possibly explained by the positive effects both of the business cycle, up swinging in the post-reform period, and of greater job creation due to flexibility policies.

Figure 1. Piecewise constant baseline hazard rate, Total, Sample, 1985-2004

Source: our elaboration on WHIP data

Estimation results are consistent with the hypothesis of a stronger STU/LTU duality due to the introduction of Treu Reform. The stronger negative duration dependence parameter in the more flexible labour market, may be seen as the empirical consequence of the use (by firms) of unemployment duration as a screening device in

the hiring process.[22] In fact, since the Reform has increased the job opportunities, it is unlikely that a "good" worker experiments LTU and long term unemployment is very likely to identify a "bad" workers. From firms' point of view, using this information reduces the probability of making a first-type error,[23] hence it may increase the hiring efficiency. The changes in the duration dependence parameters may be also seen as the specific effect attributable to the signalling role of the observed unemployment duration that is added to the possibly pre-existing ranking effect. This is supported by the evidence regarding the role of previous job experiences in explaining the reemployment probabilities into a PC (Table 3). To control for this point, we introduce a set of explanatory variables measuring the (non linear) effect on the hazard rates of previous time spent in PC or OJTC. Estimates of NW-PC transitions show that, while previous job experience always increases (at a decreasing rate) reemployment probabilities, the introduction of the Treu Reform has reduced this effect. this is also true for NW-TC transitions. As there is no reasons to believe that the Reform has reduced the effectiveness of previous job experience to increase workers ability, this finding possibly indicates that in the post reform period previous job experience has reduced its signalling role of workers' quality since the Reform has transformed unemployment duration into a more effective screening device.

Table 3. Cloglog coefficients estimates, total sample, 1985-2004

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[22] The use of unemployment duration as a screening device - signalling hypothesis - is explained in Section 4.1 which offers a link to the literature and revisits the hypothesis to explain our findings for Italy.

[23] The second-type error consists in not hiring a good worker.

	NW-PC			NW-TC		
	b	s.e.		b	s.e.	
age	1,052	0,040	***	-1,044	0,068	***
age*Reform	-0,529	0,043	***	0,981	0,072	***
age square	-0,023	0,001	***	0,018	0,002	***
age square*Reform	0,013	0,001	***	-0,019	0,002	***
male	-0,003	0,020		0,098	0,031	***
male*Reform	0,151	0,021	***	-0,106	0,037	***
North-west	0,344	0,026	***	0,146	0,042	***
North-west*Reform	-0,079	0,029	**	0,236	0,049	***
North-east	0,357	0,026	***	0,282	0,040	***
North-east*Reform	-0,098	0,029	**	0,143	0,048	***
South-islands	-0,236	0,027	***	-0,735	0,047	***
South-islands*Reform	0,141	0,030	***	0,358	0,056	***
blue-collar	-0,185	0,024	***	0,169	0,058	***
blue-collar*Reform	0,006	0,028		-0,079	0,064	
Missing firm size	-0,127	0,073	**	0,056	0,134	
Missing firm size*Reform	0,135	0,075	***	0,128	0,137	
Firm size [0-9]	-0,183	0,029	***	0,253	0,067	***
Firm size [0-9]*Reform	0,141	0,034	***	-0,359	0,074	***
Firm size [10-19]	-0,007	0,032		0,184	0,072	**
Firm-size [10-19]*Reform	0,042	0,038		-0,322	0,081	***
Firm size [20-199]	0,001	0,030		0,117	0,070	
Firm size [20-199]*Reform	0,074	0,035	**	-0,252	0,078	***
Bad health	-0,105	0,030	***	0,184	0,054	***
Bad health*Reform	0,041	0,035		-0,115	0,064	**
Wage	0,000	0,000		-0,003	0,001	***
Wage*Reform	0,000	0,000		0,001	0,001	
Part-time	-0,136	0,032	***	-0,027	0,071	
Part-time*Reform	-0,021	0,036		-0,143	0,076	**
Building	-0,092	0,027	**	-0,065	0,041	
Building*Reform	0,030	0,032		-0,183	0,052	***
Commerce	-0,121	0,027	***	-0,107	0,042	**
Commerce*Reform	0,040	0,033		0,112	0,052	**
Tourism	0,133	0,025	***	-0,207	0,040	***
Tourism*Reform	-0,142	0,029	***	-0,178	0,050	***
Transport	0,153	0,048	***	-0,212	0,118	**
Transport*Reform	0,018	0,054		0,077	0,130	
Intermediary/Real estate	0,015	0,036		-0,166	0,079	**
Intermediary/Real estate*Reform	0,042	0,039		0,249	0,084	***
Other sectors	-0,053	0,029	***	-0,257	0,057	***
Other sectors*Reform	-0,163	0,034	***	-0,011	0,068	
Cumulated PC	0,019	0,001	***	-0,004	0,003	
Cumulated PC*Reform	-0,017	0,001	***	-0,007	0,003	**
Cumulated PC square	0,000	0,000	***	0,000	0,000	
Cumulated PC square*Reform	0,000	0,000	***	0,000	0,000	
Cumulated OJTC	0,018	0,002	***	0,052	0,003	***
Cumulated OJTC*Reform	-0,006	0,002	***	-0,023	0,004	***
Cumulated OJTC square	0,000	0,000	***	-0,001	0,000	***
Cumulated OJTC square*Reform	0,000	0,000		0,000	0,000	***
Expected employment growth	0,107	0,005	***	0,228	0,007	***
Expected employment growth*Reform	-0,071	0,006	***	-0,127	0,010	***
Constant	-15,723	0,447	***	-11,054	0,763	***
Constant*Reform	4,760	0,486	***	8,355	0,706	***
Observations	2335277			2335277		
Failures	44333			44333		
Log-likelihood	-270180,2			-104254,8		
Wald test	26973,3			21125,4		

Table 3 also shows the effects of the Treu Reform on other individual, job related and macroeconomic characteristics, on reemployment probabilities. All estimates must be interpreted as the relative effect with respect to the base-category outcome, i.e. the state of unemployment.[24] With respect to the age variable, we find evidence of a reverse U shaped effect in the NW-PC transition and a U shaped effect in the NW-TC one. The Treu Reform has reverted the effect of age both on NW-PC and on NW-TC transitions. This latter possibly reflects both the age extension of TC applicability, due to the introduction of the Reform, and a greater possibility of experimenting repeated temporary jobs, since their extension. Moreover, it possibly testifies the change in the role of TC from a simple introductive role in the labour market to alternative contractual forms of employment. Important results emerge with respect to the role of gender and macro-regional area of residence, which have both historically represented main sources of labour market segmentation against Southern workers and females. Estimation results in the pre-reform period confirm the duality. Nonetheless, to better assess whether duality between gender and geographical area of residence has changed in some respects we replicated our estimates for some meaningful sample cuts (men versus women; North versus Centre and versus South).

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[24] It follows that an estimated coefficient with a positive sign indicates that the explanatory variable positively affects the reemployment probability rather than to favour the permanence into the unemployment state. Moreover, as the unemployment state is the common base-category, the sign and the magnitude of the same explanatory variable estimated on different transition channel (NW-PC or NW-TC), defines the differential effect due to a specific covariate on the transition probability into alternative employment statuses.

The results of our exercises (duration dependence parameters and cloglog coefficients) and the graph of the related hazard rates are reported in Appendix 2.[25]

We find that the Treu Reform has increased the gender duality with respect to the NW-PC transitions, and slightly increased the territorial duality, especially increasing the employment probability with TC. This indicates that, while TC are valid instruments to avoid unemployment, they also may represent a substitute to PC.[26]

Blue-collars are less likely to transit into a PC than white-collars, whilst they are more likely to transit into a TC, at least in the pre-reform period. The reform did not affect the role of blue collar on the transitions to both PC and TC contracts.

Firm size of previous job experience contributes to explain re-employment probabilities. Taking large firm size (200 employees or more) as the base-category dummy, we find that transition toward PC is reduced by previous job experience in small firms. Conversely, those workers are more likely to transit toward a TC. We also find that, while the Treu Reform has not significantly changed the role of firm size for NW-PC transitions, it has acted with respect to the NW-TC transitions, reducing the positive effects of small firm dummies and making negative the effects of the medium firm dummy. A period of illness (bad health dummy variable in Table 3) during the previous job experience significantly reduces the permanent employment probabilities

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[25] In addition we also replicate our estimates on the very young (15-24) and young (25-35). Nonetheless we did not find remarkable differences between the impacts of the reforms on these age groups. We therefore decided to not report these results. The estimates are nonetheless available upon request.

[26] As shown by the estimates (Tables A1 and A2) and by Figure A1 the gender duality increased after the reforms. The hazard rate of women for the transition NW-PC strongly reduced after the reforms especially for STU category. The hazard rate of STU decreased from 0,038 before the reform (dashed grey line) to 0,006 after the reform (dashed black line). Conversely, men enhance their hazard of leaving NW for PC after the reforms (black line). NW-TC transitions do not show remarkable gender disparities both before and after the reforms. In terms of geographical duality/gaps, Figure A2 shows that the hazard rates of the transition NW-PC of the most relevant geographical areas (North, Centre and South) were almost equally affected by the reforms. Indeed the geographical gaps between the hazard rates remained almost stable after the introduction of the labour market reforms. On the other hand, we find increased probability of employment in TC in all the areas after the regulations.

and favours the transition toward TC. We find that the Treu Reform has not brought significant changes. Previous wage negatively affects the transition toward temporary employment, possibly because of the lower wage that characterizes temporary job relationships and not sufficient low reservation wages of displaced workers. A negative effect is also found for NW-TC transitions, for part-time, confirming the depreciation role in terms of job career of some atypical works. A set of seven dummy variables controls for the role of economic sector specialization on reemployment probabilities, keeping manufacturing as the reference category. With respect to transitions toward a PC, a positive effect is found for experience in the tourism and transport sectors, while previous experience in building, commerce and other minor sectors significantly reduces the probability of permanent employment. With respect to NW-TC transitions previous experience in economic sectors different from manufacturing, increases the length of unemployment spells. We also find that the Treu Reform worsened the situation of individuals in building, tourism and other minor economic sectors. Finally, we find that the expected employment growth variable shows, when significant, a positive effect on reemployment probabilities. Interestingly, a relatively greater effect is found for NW-TC rather than for NW-PC transitions. This is in accordance with the theoretical predictions (Bertola and Ichino, 1995), that for temporary jobs both creation and destruction rates will be higher than for permanent jobs, respectively in an upturn and a downturn.

4.1 The signalling hypothesis "revisited"

Our findings suggest that the reforms at the margin increased labour market duality between STU and LTU. We find that the reforms strengthen the negative duration dependence for LTU and also slightly moved up the positioning of the hazard rates for

this category. The STU, instead, increased their probability of leaving unemployment after the reforms (especially for PC). These changes in the slope and positioning of the hazard (e.g. Figure 1) therefore suggest that the legislation of the nineties lead to a stronger labour market segmentation.[27]

We also find that the Treu Reform reduced the positive effect of previous job experiences both in permanent and temporary employment. This possibly indicates that the role of unemployment duration as a screening device, has partially replaced the signalling role of previous job experiences in the firms' hiring policies.

In this Section we aim at explaining the reasons behind this change in the shape of the hazard and therefore the change of the screening device from previous work experience before the reforms – in a tight labour market – to unemployment duration after the reforms – in a more flexible labour market.

We hinge on the screening device hypothesis and our contribution is in revisiting this theoretical assumption to explain our findings for Italy. According to the signaling hypothesis, potential employers use the unemployment duration as a signal on the productivity of their applicants.[28] The general consensus now is that screening plays a role in hiring decisions and a substantial literature – such as Lynch (1985), Lynch (1989), Van den Berg and Ours (1996) and especially Omori (1997) - show that firms use unemployment duration as a screening device.

The signaling hypothesis is modeled (e.g. Welters and Muysken, 2002 and 2003) by assuming a competitive labour market in which there are J identical firms. Close to

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[27] Blanchard and Diamond (1994) argued that unemployment pool may be segmented because firms rank unemployed workers and hire those with the shortest spells of unemployment, since long-term unemployed are suspected to suffer from job skills deterioration. Similar considerations arise in ranking model based on characteristics (Güell, 2003).

[28] For details on the screening device hypothesis see, among others, Welters and Muysken (2002 and 2003).

the firms there are J jobseekers who differ in terms of their ability level α_j. Firms want to secure a certain minimum productivity level p^h. Nonetheless, information asymmetry prevents firms from observing the ability of the jobseekers. The true ability of the candidates can be determined only by costly assessment procedures. The hiring procedure can be summarized as follows. The firm posts a vacancy and this announcement will yield applications from a certain number of candidates. Given that firms is not able to immediately assess the abilities of candidates (information asymmetry), it will screen applicants by using some easily obtainable (and possibly less costly) device t (screening device). As explained above, literature shows that quite often firms use unemployment duration as a screening devise and arguments that it is a relevant practice. An applicant who does not meet the minimum screening device standard t^h (e.g., less than one year unemployed) will be rejected immediately; otherwise the candidate enters the assessment procedure and her true ability level will be revealed. Once the ability level is sufficient and hence productivity exceeds the level p^h, the applicant will be accepted for the job and the hiring procedure ends up. Otherwise, the applicant will not be accepted and the firm has to start the hiring procedure with another applicant.

We revisit the signaling hypothesis by suggesting that the quality of such a signal[29] - unemployment duration - is very low when the labour market are tight (before the reforms at the margin): individuals do not have government helps/instruments/incentives to leave their condition of unemployment. Conversely the

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[29] A similar argument is emphasized by Decreuse and Kazbakova (2008) which explain the relationship between unemployment duration and unemployment benefits for the OECD Countries which deliver such a kind of benefits. The authors rivisit the signalling hypothesis by suggesting that the quality of unemployment duration as a signal is very low when the unemployed get unemployment benefits: individuals have good reasons to stay unemployed. Conversely, the signal becomes much more efficient once benefits are elapsed: skilled workers should not stay unemployed in such a case. Therefore, the potential duration of unemployment benefits should drive employers' expectations and their recruitment practices.

signal becomes more efficient when labour market are flexible (at least less tight, after the reforms at the margin): skilled workers – more likely short term unemployed - should not stay unemployed in such a case. Therefore it is the degree of labour market tightness which drive unemployed decision and employers' recruitment practices. Once the labour markets are more flexible, the unemployment duration acts as a screening device. Short term unemployed are employed first, whilst long-term unemployed are seen as less productive. The relevance of unemployment duration in recruitment decisions was also emphasized by, among others, Blanchard and Diamond (1994) and Güell (2003), which argued that employers rank potential employees with respect to their unemployment duration and therefore hire those with the shortest spells of unemployment, since long-term unemployed are suspected to suffer from job skills deterioration. Nonetheless, a negative relationship between productivity and unemployment duration has also been found by Albrecht et al. (1998).

We therefore find that the unemployment duration as a screening device, based on the signaling hypothesis, is confirmed and revisited for Italy after the introduction of the labour market reforms of the late nineties. In tight labor market conditions the need to use unemployment duration as a selection mechanism is less urgent as in such conditions anyone who wants to participate can be considered unable to find a job without help. In slack labor market conditions, instead, the interest to participate is large, the entrance condition should be high (unemployment duration as screening device).

5. Conclusions

This paper investigates the effects of the first Italian reform "at the margin" on the unemployment spells distribution, applying discrete time hazard models with competing risks and unobserved heterogeneity to a sub-sample of young workers aged 15-35 drawn from WHIP data.

Empirical evidence shows a strengthening of the duration dependence parameter after the introduction of the Treu Reform, meaning an increase of labour market segmentation. The paper suggests that it derives from the negative signal on workers quality that firms receive from the observation of long term unemployment. In fact, while in a tight labour market "good" workers as well may face LTU because of few job opportunities, in a more flexible one the increase of job opportunities reduces the probability that "good" workers experience LTU. According to this explanation, flexibility policies reduce the probability of hiring "bad" workers leading to an improvement of the hiring efficiency. Our findings also suggest that this new screening device partially reduced the signalling role of previous job experiences. This substitution possibly indicates that in their hiring process firms consider unemployment duration as a more reliable screening device in their hiring policies rather than previous job experiences. Finally, we found evidence of greater gender duality and of slightly higher geographical labour market duality/gaps after the introduction of the reform.

In summary, according to these considerations, flexibility policies may have four main implications. First, firms have a new screening device in the hiring process - unemployment duration - possibly increasing the hiring efficiency. Second, and as a consequence, the labour market segmentation increases (STU versus LTU). Third, if in a tight labour market previous job experiences were used as a screening device, their

role it is likely to be reduced in a flexible labour market and replaced by the unemployment duration (revisited signalling hypothesis). Fourth, suitable policies should be addressed to reduce the labour market segmentation of disadvantaged workers.

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Appendix 1: Reforms of the Italian labour market in the period from 1985 to 2004

1987: Law N. 56 introduced a wider use of fixed term contracts whether allowed by sectoral collective agreements. Reorganisation of public employment agencies.

1989: Employment threshold guarantees in case of dismissal on disciplinary ground are extended to small firms (less than 16 employees).

1990: Law 11/5/1990 extended compulsory reinstatement and compensation in case of unfair dismissal to employers of non-commercial organizations with more than 15 employees in the same production unit and to companies with more than 60 employees.

1991: Law No. 223 established standards related to notice and consultation.

1997: Law No. 196/1997, 'Treu Package', is introduced: legislation of temporary working agencies. Atypical labour contracts are encouraged by reducing social security contributions and by removing the automatic transformation of fixed term contracts in open ended contracts. The package eases regulation on new apprenticeship and work-training contracts. Incentives for on the job training (e.g. stages), temporary work with

private agencies and intra regional labour mobility are set. Private employment and temporary work agencies are allowed.

1998: Flexibility of working time, labour mobility and the right to implement performance-related pay are increased by the labour agreement for Civil Service.

2000: The EU part-time work directive No. 97/81/EC introduced more flexibility on part-time work.

2001: Legislative Decree No. 368/2001 and the EU Directive 1999/70/EC on fixed term are implemented through a joint statement signed by CISL and UIL (despite CGIL). The new legislation removes the explicit list of the detailed circumstances in which the use of fixed-term employment is legal.

2002: Liberalisation of private placement services.

2003: Law No. 30/2003, 'Biagi Law', and subsequent Legislative Decree No. 276/2003 introduced new types of labour contracts, such as job-on-call, job sharing, staff leasing, supplementary work, 'lavoro a progetto'.

Appendix 2

Table A1. Duration dependence by Gender and Geographical Area, 1985-2004

	NW-PC		NW-TC		NW-PC			NW-TC		
	men	women	men	women	north	centre	south	north	centre	south
	b	b	b	b	b	b	b	b	b	b
D1_3	0,634***	1,084**	0,381***	0,733***	0,930***	0,781***	0,318***	0,584***	0,400***	0,124
D1_3*Reform	0,547***	0,232***	0,428**	0,228**	0,512***	0,346***	0,433***	0,422***	0,353***	0,368***
D4_6	-0,068**	0,504**	-0,345***	-0,250**	0,159***	0,244***	0,031	-0,165**	-0,137	-0,107
D4_6*Reform	0,496***	0,089	0,491***	0,148	0,415***	0,173**	0,347***	0,478***	0,363**	0,176
D7_9	0,014	0,602***	-0,089	0,291***	0,143***	0,353***	0,341***	-0,053	0,117	0,243*
D7_9*Reform	0,480***	0,143**	0,288***	0,121	0,417***	0,215**	0,298***	0,327***	0,214	0,026
D10_12	0,471***	0,847***	0,759***	0,936***	0,611***	0,493***	0,644***	0,831***	0,884***	0,575***
D10_12*Reform	0,268***	-0,078	0,121	-0,220**	0,187***	0,129	0,115	0,133*	-0,229*	-0,046
D19_24	-0,226***	-0,116**	-0,164**	-0,028	-0,247***	-0,204**	-0,107	-0,123	-0,064	-0,234
D19_24*Reform	0,061	-0,021	-0,034	0,093	0,057	-0,049	0,075	0,117819	-0,168	-0,033
D25_36	-0,496***	-0,315***	-0,590***	-0,282**	-0,553***	-0,322***	-0,352***	-0,526***	-0,472***	-0,443***
D25_36*Reform	0,090	-0,041	0,077	-0,071	0,043	-0,122	0,182**	0,053	0,024	-0,010
D37_60	-0,760***	-0,577***	-0,936***	-0,812***	-0,821***	-0,766***	-0,514***	-0,961***	-1,009***	-0,674***
D37_60*Reform	-0,049	-0,205**	0,011	0,110	-0,132**	-0,107	-0,026	0,059	0,160	-0,062
D_ov60	-1,124***	-0,879***	-1,715***	-1,361***	-1,169***	-1,104***	-0,880***	-1,704	-1,926***	-1,300***
D_ov60*Reform	-0,397***	-0,340**	-0,256	-0,075	-0,374***	-0,386**	-0,336**	-0,107	0,258	-0,404

Notes: * Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaboration on WHIP data

Table A2. Cloglog coefficients estimates by Gender and Geographical Area, 1985-2004

	NW-PC		NW-TC		NW-PC			NW-TC		
	men	women	men	women	north	centre	south	north	centre	south
	b	b	b	b	b	b	b	b	b	b
age	1,123***	0,874***	-1,224***	-0,715***	1,178***	0,014***	0,296***	-0,739***	-1,409***	-1,725***
age*Reform	-0,579***	-0,400***	1,191***	0,589***	-0,591***	0,121***	0,169***	0,655***	1,269***	1,894***
age square	-0,024***	-0,019***	0,023***	0,010***	-0,026***	1,184***	0,567***	0,011***	0,027***	0,035***
age square	0,014***	0,014***	-0,024***	-0,010***	0,015***	-0,699***	-0,143	-0,011***	-0,027***	-0,041***
male	_	_	_	_	-0,100***	-0,025***	-0,012***	0,122***	-0,055	0,081
male*Refor	_	_	_	_	0,144***	0,017***	0,005**	-0,195***	0,018	0,179*
North-west	0,290***	0,413***	0,195***	0,039	_	_	_	_	_	_
North-west	-0,062	-0,100**	0,148**	0,398***	_	_	_	_	_	_
North-east	0,300***	0,426***	0,297***	0,236***	_	_	_	_	_	_
North-east*	-0,093**	-0,099**	0,080	0,256***	_	_	_	_	_	_
South-islan	-0,158***	-0,457***	-0,692***	-0,816***	_	_	_	_	_	_
South-islan	0,165***	0,141**	0,366***	0,328***	_	_	_	_	_	_
blue-collar	-0,056	-0,287***	0,316***	0,078	-0,196***	-0,061	-0,132**	0,176**	0,265*	0,053
blue-collar*	-0,027	0,029	-0,120	-0,085	-0,008	-0,062	0,018	-0,029	-0,223	-0,158
Missing firn	-0,128	-0,152	0,081	0,069	-0,135	-0,602**	0,016	-0,087	0,114	0,525
Missing firn	0,107	0,197	0,135	0,074	0,154	0,552**	0,020	0,342**	-0,259	-0,433
Firm size [0-	-0,143***	-0,244***	0,198**	0,355***	-0,138***	-0,263***	-0,252**	0,274***	0,128	0,334
Firm size [0-	0,045	0,275***	-0,290***	-0,469***	0,141***	0,159**	0,108	-0,355***	-0,263	-0,580**
Firm size [1(	-0,013	0,001	0,164**	0,217**	0,042	-0,161**	-0,037	0,219***	-0,033	0,317
Firm-size [1(	-0,006	0,111**	-0,260**	-0,404***	0,038	0,116	-0,005	-0,299***	-0,191	-0,669**
Firm size [2(	0,025	-0,026	0,087	0,158	0,022	-0,022	-0,028	0,121	0,139	0,139
Firm size [2(	0,006	0,166**	-0,210**	-0,293**	0,080**	0,084	0,022	-0,254***	-0,301	-0,315
Bad health	-0,039	-0,218***	0,217***	0,100	-0,177***	-0,095	-0,120	0,217***	0,069	0,070
Bad health*	-0,040**	0,167**	-0,133**	-0,068	0,039	0,078	0,015	-0,146**	0,117	-0,223
Wage	0,000**	-0,001**	-0,002**	-0,003**	0,000	0,000	0,001	-0,003***	-0,002	-0,003
Wage*Refo	0,000	0,000	-0,001	0,002	0,000	-0,001	-0,001	0,000	0,001	0,003
Part-time	-0,151**	-0,110**	-0,169	0,072	-0,171***	-0,089	-0,155	0,011	-0,259	0,063
Part-time*R	-0,043	-0,018	0,011	-0,242**	-0,035	-0,052	0,105	-0,208**	0,098	-0,151
Building	-0,122***	-0,212	-0,074**	0,160	-0,198***	-0,187**	0,103**	-0,145***	-0,103	0,252***
Building*R	0,016	0,126	-0,211***	-0,362	0,028	0,241	0,002	-0,189***	-0,091	-0,291**
Commerce	-0,108***	-0,142**	-0,063	-0,190**	-0,049	-0,252***	-0,248***	-0,097*	-0,278***	0,060
Commerce*	-0,031	0,129**	0,009	0,271***	-0,060	0,221***	0,180**	0,090	0,203*	0,082
Tourism	0,127***	0,117**	-0,214***	-0,213***	0,092***	0,095**	0,298***	-0,232***	-0,388***	0,306***
Tourism*R	-0,163***	-0,100**	-0,260***	-0,068	-0,159***	-0,091	-0,096	-0,226***	-0,052	-0,354***
Transport	0,167***	0,031	-0,158	-0,531	0,118**	0,133	0,250**	-0,174	-0,611*	0,083
Transport*	-0,026	0,108	-0,103	0,700**	0,012	0,016	0,078	-0,112	0,767**	-0,002
Intermediar	0,010	0,007	-0,237**	-0,130	0,059	-0,278	0,081	-0,116	-0,598***	0,100
Intermediar	0,001	0,097**	0,348**	0,198**	-0,009	0,295**	-0,041	0,197**	0,427**	0,257
Other secto	-0,042	-0,075**	-0,320***	-0,225***	-0,075**	-0,192**	0,109**	-0,224***	-0,541***	-0,103
Other secto	-0,258***	-0,068	-0,008	0,013	-0,263***	0,016	-0,065	-0,085	0,044	0,201
Cumulated	0,023***	0,016***	-0,010**	0,004	0,018***	0,022***	0,024***	-0,006*	0,001	0,000
Cumulated	-0,021***	-0,015***	-0,001	-0,014***	-0,016***	-0,018***	-0,020***	-0,005	-0,009	-0,008
Cumulated	0,000***	0,000***	0,000**	0,000	0,000***	0,000***	0,000***	0,000	0,000	0,000
Cumulated	0,000***	0,000***	0,000***	0,000	0,000***	0,000***	0,000***	-0,000	0,000	0,000
Cumulated (	0,016***	0,022***	0,055***	0,046***	0,021***	0,014**	0,007	0,046***	0,047***	0,081***
Cumulated (	-0,004**	-0,012**	-0,027***	-0,015**	-0,010***	-0,005	0,001	-0,016***	-0,017*	-0,051***
Cumulated (	0,000	0,000**	-0,001***	-0,001***	0,000***	0,000	0,000	-0,001***	-0,001***	-0,002***
Cumulated (	0,000	0,000**	0,000***	0,000	0,000	0,000	0,0000	0,000	0,000*	0,001***
Expected er	0,109***	0,105***	0,241***	0,201***	0,112***	0,109***	0,090***	0,251***	0,171***	0,167***
Expected er	-0,068***	-0,076***	-0,150***	-0,086***	-0,064***	-0,086***	-0,042**	-0,105***	-0,064***	-0,149***
Constant	5,509***	3,368***	-13,254***	-6,995***	5,306***	6,830***	0,637	-7,711***	-13,674***	-20,089***
Constant*F	-16,637***	-13,648***	10,156***	5,040***	-16,769***	-17,287***	-10,689***	5,519***	12,238***	14,332***
Observatior	1403283	931994	1403283	931994	1134007	464128	737142	1134007	464128	737142
Failures	26202	18131	26202	18131	25651	9727	12752	25651,000	9727	12752
Log-likeliho	-140852	-105012	-65755	-38375	147979	-5109	-70275	-65565	-19672	-18763
Wald test	16249,7	11723	13525	7682	17631	4124	4225	13095	3399	2544

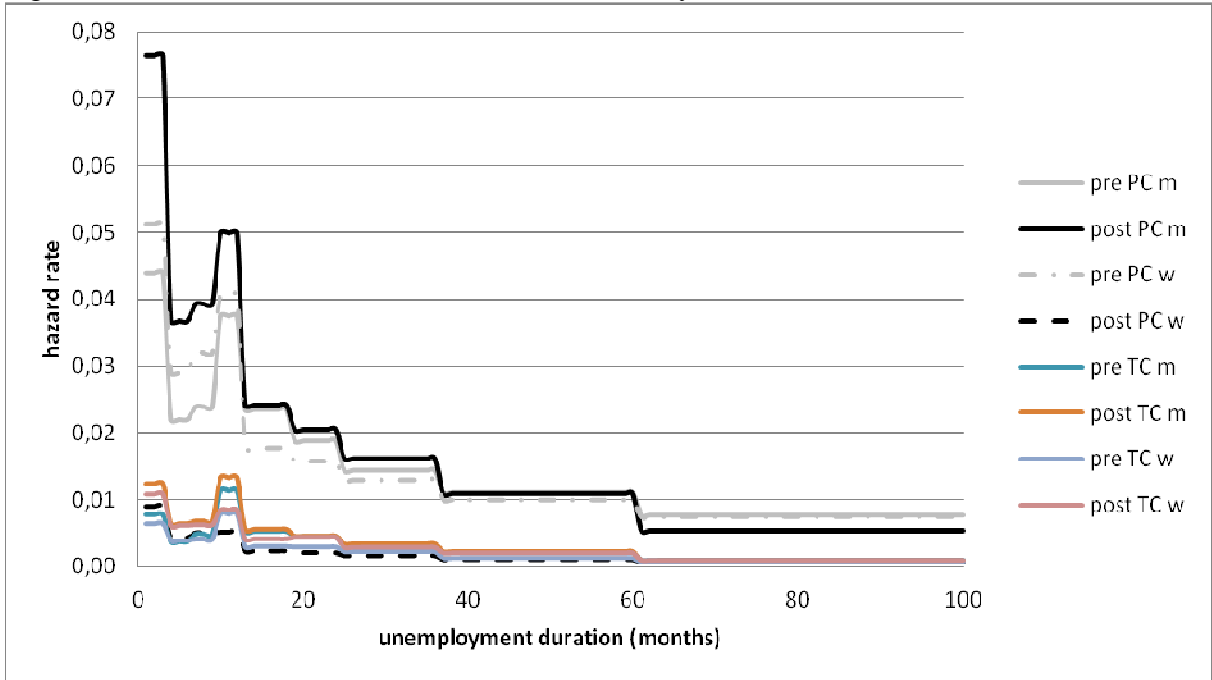Figure A1. Piecewise constant baseline hazard rate by Gender, 1985-2004

Figure A1. Piecewise constant baseline hazard rate by Geographical Area, 1985-2004