

Making the Italian Labor Market More Flexible: An Evaluation of the Treu Reform*

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Abstract

The Treu Law introduced temporary contracts and made fixed-term contracts more widely applicable, in order to make the labour market more dynamic and to decrease the unemployment rate. The paper inquires whether the reform has affected the duration dependence related to the out-flow from non-employment, how previous atypical contract experiences affect the probability of finding a stable job and whether the probability of flowing toward a permanent contract is higher moving from a non-working state rather than from an atypical job. Applying a Mixed Proportional Hazard (MPH) model with competing risk to a sub-sample drawn from the WHIP dataset, I estimate the hazard rate for the state transitions. My main findings predict an increase in negative duration dependence for non-working state out-flow, meaning an amplification of the short-term unemployed - long-term unemployed duality. It is a consequence of the larger use of atypical contracts, that would provide a screening instrument for the hiring choices of firms. Previous atypical job experiences play a negative role on the probability of moving toward a stable job if the state of origin is a non-working condition, while they have a positive role in the transition toward an atypical job. Besides, there is no evidence that the probability of finding a permanent contract is higher for workers who move from an atypical contract rather than from a non-working state. Finally, a human capital accumulation effect is found to explain the transition toward a stable job. Policy recommendations include promotion of longer contracts, implementation of training programs and services to facilitate job-search for workers at disadvantage.

Keywords: duration dependence, atypical contract, Treu Law, Mixed Proportional Hazard model
JEL codes: J64, J24, C41, J58

1. Introduction

Since the end of the '70s, the European labour market has been characterized by high and persistent unemployment. A broad consensus exists among economists to consider the high regulation and rigidity of the labour market as the principal reasons of this phenomenon. It is obvious that employment protection will tend to reduce the separation rate from employment into unemployment, and reduce the exit rate from unemployment into work as firms become more cautious about hiring. In order to solve unemployment problem, European countries have adopted a variety of policies concerning employment protection legislation (EPL). Generally, the answers of Governments has consisted in implementing reforms “at the margin”¹, allowing for reduced protection, but only for some new contractual forms (atypical contracts). In fact, in economies

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¹ In countries characterized by high levels of EPL, as France, Italy and overall Spain, over the last two decades the use of atypical contracts is strongly increased. On the contrary countries, as Great Britain, characterized by weak employment protection, the percentage of the workforce in atypical jobs is remained low and stable. Some evidences (see Booth, Dolado and Frank, 2002) confirm that a positive and strong correlation exists between the percentage of atypical contracts and EPL for permanent jobs. Therefore, given that atypical contracts can provide labour market flexibility, their rise in much of European countries can be seen, in part, as arising from deliberate policy.

where permanent workers have high levels of employment protection, atypical contracts (i.e. fixed-term contracts, temporary contracts, etc.) can provide a mechanism enhancing labour market flexibility, since firms can adjust their workforce by varying the number of atypical workers, characterized by lower firing costs. Flexibility policies made the European labour markets more dynamic in terms of higher inflows and outflows between unemployment and employment, but an unclear effect arose with regard to aggregate unemployment rate. Besides, these policies have also affected other dimensions of the labour market, but macroeconomic evidences and growing numbers of analysis do not provide univocal results (see Dolado, Garcia-Serrano and Jimeno, 2002, for a survey).

Spain is a good documented example of this phenomenon; the introduction of temporary contracts goes back to 1984 and the use of these contractual forms has increased during the last twenty years. Today more than thirty percent of the contracts existing in Spain are temporary contracts, and about ninety percent of the new contracts stipulated are of the non-permanent type. The effects on the unemployment rate were not univocal, but a more dynamic labour market has developed with an increase of gross flows between unemployment and employment (cfr. Güell). However, the introduction of fixed-term contracts has generated some effects on other dimensions of the labour market. For example, Maia Güell (2003) shows that these reforms have increased the duration dependence for unemployment spells, creating increased duality between short-term unemployed (STU) and long-term unemployed (LTU). As shown by Blanchard and Diamond (1994), if firms rank unemployed workers and hire those with the shortest spells of unemployment, then the exit rate from unemployment is a decreasing function of duration. Moreover to the extent that firms do not hire randomly, it is quite possible that duration dependence of unemployment might have increased after the introduction of temporary contracts. Furthermore, as showed by Maia Güell (2003) considering an extreme situation in which only certain key individual characteristics (e.g. age, gender, qualification, etc.) make unemployed workers more likely to be re-employed. An analogous ranking model based on characteristics maintain these advantages, they continue to have a higher re-employment probability when they return to unemployment after their temporary contracts finish.

Another important point here discussed considers the effect of previous atypical contract experiences on the probability of moving toward a stable job. Some studies related to the Spanish labour market, Alba-Ramirez (1998) and Amuedo-Dorantes (2000), show that the probability of obtaining a permanent contract decreases after some previous atypical contracts. On this topic, Maia Güell and Barbara Petrongolo (2006) find that the conversion rate from temporary to permanent contract is rather low and concentrates close to the deadline of the temporary contract. In the context of the European labour market, Zijl, van den Berg and Heyma (2004), van den Berg, Holm and van Ours (2002) and Booth, Francesconi and Frank (2002), show that the temporary contract provides a stepping stone effect toward a permanent job. D'Addio and Rosholm (2005) found that larger contract duration increases the probability of reaching a stable job and decreases job instability.

In Italy, the introduction of atypical contracts has been the outcome of numerous laws (see table 1) that yet have left the use of these contractual forms at the margin, at least before the introduction of the Treu Law (L. 196/97) and subsequently of the Biagi Law (L. 30/03).

In this paper I analyze the effects of the introduction of the Treu Law, which was the first attempt to make the Italian labour market more flexible. This reform has introduced temporary contracts (or interim contracts), in addition to some modifications in order to extend and to improve the fixed-term contract regulations (in particular CFL and apprenticeship contracts). The reform has been introduced in years which the Italian labour market was characterized by its highest unemployment rate. Generally, the reform has involved a partial increase of the prevalence of atypical contracts (between 1997 and 1999 the stock of atypical contract has increased by about 20%, see table 2), making the labour market more and contributing to increased employment growth and to a reduced unemployment rate (see table 2). The data show that the number of atypical

contracts has increased by about forty percent, going from twenty to thirty percent of total contracts (table 3).

The growth of atypical contract opportunities, in addition to the effects on employment growth and on the unemployment rate, can affect other labour market dimensions. In particular, some recent studies, by Gagliarducci (2005) and Ichino, Mealli and Nannicini (2005) on the Italian labour market, show that the atypical contract experiences can affect the probability of reaching a permanent contract. Gagliarducci (2005), in a pre-reform study, shows that the probability of obtaining a permanent contract increases with temporary contract duration, but decreases with the number of temporary contract experiences, especially if interrupted by unemployment spells. In another study, related to the post reform period, conducted using Temporary Work Agencies (TWA) data, Ichino et al. (2005), find that TWA employment creates a “springboard” toward permanent jobs, where the TWA jobs are considered as treatment assignment.

The aim of this paper is to address questions linked to the Italian labour market reform, introduced by the Treu Law. The most interesting aspect of this work depends on the availability of data on pre and post reform period. In particular, here I consider whether:

1. Duration dependence related to the non-working spells has changed after the introduction of the Treu Reform;
2. Atypical contract episodes in individual work histories affect the probability of obtaining a stable job;
3. An atypical contract provides a stepping stone effect toward a permanent contract.

To the best of my knowledge, this is the first attempt to evaluate a reform “at the margin” in the Italian labour market (for example Gagliarducci, 2005, investigate the effect of atypical contracts in the pre-reform period and Ichino et al., 2005, in the post-reform period), and to evaluate changes in duration dependence using panel data (Maia Güell, 2003, uses cross-sectional data). Therefore, the first contribution concerns the effects of the reform on the duration dependence. These effects are directly correlated with the increase of the availability of atypical contracts that is characterized by an increase in both inflows and outflows between unemployment and employment. As anticipated, from a theoretical point of view, I predict an increase of the duration dependence, with consequent amplification of the duality between STU and LTU. In a rigid labour market, with few job opportunities, long-term unemployment may not be an indicator of low productivity. On the contrary, in a more flexible labour market, characterized by more probabilities to find a job, long-term unemployment can be an important signal of low productivity, which firms can use in order to select potential employees. In other words, this would lead to an increase in STU’s, and to a reduction in LTU’s probability of leaving unemployment. Given these considerations, if the empirical analysis confirms this prediction, we can conclude that the larger use of atypical contracts would provide a screening instrument for the hiring policy of firms. At the same time, we can also conclude that the increased duality between STU and LTU would require specific job policies in order to provide suitable training for unqualified workers.

With respect to the probability of obtaining a stable job, a negative effect is probably played by previous atypical contract experience. In fact, employment in an atypical contract followed by unemployment can be interpreted as an indicator of bad qualities of the worker in the previous job. It follows that direct hiring with a permanent contract is unlikely. More likely, an individual in non-working state and with previous atypical job experiences will be hired with a new atypical contract so that the firm can test the worker’s ability. As anticipated, some previous studies confirm this tendency (see for instance Gagliarducci (2005), Alba-Ramirez (1998) and Amuedo-Dorantes (2000)).

On the other hand, many authors, as Zijl et al. (2004), van den Berg et al. (2002) and Ichino et al. (2005), find that the probability to move toward a permanent contract is higher if the individual starts from an atypical contract state rather than from a non-working condition. In other words, the atypical contract shows a stepping stone effect toward a stable job, which can be explained in terms of firm preferences to hire workers that have accumulated human capital during the latest situations.

In my analysis I use the WHIP (Work Histories Italian Panel) dataset, provided by the “Laboratorio Revelli” of Turin in their standard version. WHIP is a database of individual working histories, based on the INPS (National Institute of Social Security) administrative archives, that permits to construct the sequence of monthly contiguous spells. I select a sub-sample of young workers (age ranging between 15 and 32), of which I can observe complete individual job histories, so that I avoid initial condition problems. In order to catch the effects linked with the presence of repeated spells and multiple risks, I implement a Mixed Proportional Hazard (MPH) model with competing risk (see Gagliarducci, 2005 and Zijl et al., 2004). The MPH model consists of a specification of the Proportional Hazard Model that allows for the presence of unobserved heterogeneity across individuals.

Anticipating my main results, I show that the duration dependence related to transitions from a non-employment state toward a permanent contract has clearly decreased after the introduction of the Treu Law, while it has slightly decreased for transitions toward atypical contracts. In particular, I find an increase of STU hazard rate and a significant decrease of LTU hazard rate. This evidence seems to confirm that the increase of the availability of atypical contracts could provide a screening instrument for firms. Besides, I find that previous atypical contract experiences have a negative effect on the probability of moving from a non-working condition toward a permanent contract, but that the effect is reduced in the post-reform period. Finally, there are no evidences that the probability of reaching a stable job is higher if the original state is an atypical contract rather than a non-working state. However, positive duration dependence is found for the transitions from an atypical contract toward another contract, confirming that the accumulation of human capital during an AC experience increases the probability of finding a new job.

2. Data and Institutional Background

I define as atypical contracts all the contractual forms that do not provide a permanent work relationship: fixed-term contracts (which I cannot identify in the dataset), apprenticeship contracts, CFL (or on the job training contracts) and temporary contracts (or interim contracts).

In Italy, atypical contracts are regulated by numerous laws introduced since 1955, when the first regulation related to apprenticeship contracts was established. In 1962 the fixed-term contracts used for seasonal jobs and to substitute absent workers were introduced. This regulation was modified in 1983 and 1987. In 1984 the CFL were introduced in order to ease entry in the labour market. As the fixed-term contracts, they have a specified duration: one year in order to acquire low qualifications and two years in order to acquire high qualifications. The CFL legislation was modified in 1987, by a law which extended their applicability to all sectors in the economy, and in 1994, by a law which raised the age limit for their applicability from 29 to 32. As described above, for about forty years the legislation of the atypical contracts in the Italian labour market was characterized by the introduction of several laws that yet have left the use of these contractual forms at the margin. Finally, in 1995 were introduced the Coordinate and continuous collaboration (Co.Co.Co) contracts were introduced. Workers hired as Co.Co.Co. are self-employed presenting specific relationship with the company featuring. Only in 1997 a more widely covering reform, called the Treu Reform, was implemented in order to bring flexibility and dynamism into the Italian labour market. Finally, in 2003 a new reform (called the Biagi Law) was introduced, that provided an important revision of atypical contracts regulation. The aim of the Biagi Law was to increase the employment rate in the space of few years, in the belief that development must be accompanied by

the ability to create additional workplaces. The law has introduced new contractual forms² and has innovated some existing ones, mainly affecting subordinated jobs.

2.1. The Treu Reform

The Treu Law was introduced on June, 24 1997 (law 196/97) with the aim to make the Italian labour market more flexible, in order to make it more dynamic and to promote the decrease of the unemployment rate. The main novelty of the reform consisted in the introduction of temporary contract (without age limitation for hired workers) and in the creation of Temporary Work Agencies, so that job centres were privatized and decentralized³. The reform also modified statutory discipline of fixed-term contracts and changed the apprenticeship relationships. Finally, it extended the CFL applicability for depressed areas and for individuals with invalidity, and it raised from 22 to 24 the age limit for apprenticeship contracts.

Fixed-term contracts. The fixed-term contract permits the hiring of a worker for a pre-determinate duration. They were introduced in Italian legislation in 1962 (law 230/62). Subsequently the fixed-term contract regulation was modified by laws 56/87 and 416/93.

Apprenticeship contracts. The apprenticeship contract is a contractual form which obliges the entrepreneur to give the worker the basic notions necessary to transform him in a qualified worker. The legal duration of an apprenticeship contract ranges between 18 months and 4 years, with some exception for the hand craft sector. They were introduced with law 25/55 and were not modified until the introduction of the Treu reform.

CFL. The CFL were introduced in order ease the entry in the labour market. They have a determined duration: one year in order to acquire low qualifications and two years in order to acquire high qualifications. The CFL were introduced in 1984 with law 863/84, and they were modified with law 56/87, which extended their applicability to all economic sectors, and with law 451/94, which raised from 29 to 32 the age limit for their applicability.

Temporary contracts. They were introduced by the Treu Reform and law 469/97, according to which jobcentres were privatized and decentralized. TWA employment represents a triangular contract, in which an agency hires a worker for the purpose of making him available for a client firm for a temporary assignment.

2.2. The Data

In my study I use the WHIP (Work Histories Italian Panel) data, in its standard version, provided by the “Laboratorio Revelli” of Turin. WHIP is a database of individual working histories, based on the INPS (National Institute of Social Security) administrative archives, and consists of a representative sample with a dynamic population of 370.000 individuals. For each individual it is possible to identify all work relationships, and their contractual forms. The information is inferred by the contributions paid to INPS. From the type of contributions it is possible to distinguish individuals employed with a permanent contract (contributions which do not provide for special term, contributions related to “reintroduction” contracts and contributions related to particular permanent contract) or with an atypical contract (contributions related to CFLs (work training contracts), contributions related to temporary (or interim) contracts and contributions related to apprenticeship contracts). Still unidentifiable are individuals employed with specific atypical contracts: workers employed with a fixed-term contract, and employed with the Continuative and Coordinate Collaboration (Co.Co.Co.) contract, since Italian legislation classifies them as self-employed.

² The Biagi Law introduced new atypical contractual forms as, job on call, job sharing, insertion contracts and modified part-time, apprenticeship and Co.Co.Co legislation.

³ TWA employment represents a triangular contract, in which an agency hires worker for the purpose of making him available for a client firm for a temporary assignment.

Monthly information is available, so that it is possible to determine the monthly duration of each spell, directly from the dataset for the employed, and indirectly the non-working ones (as the difference between the end of the previous contract and the start of the subsequent one).

The database comprises information from 1985 to 1999 for all workers, but I used only the information for individual aged 15 to 32 and having had at least one job relationship in the years included between 1995 and 1999. The availability of information since 1985 and the use of a sub-sample including only young individuals, makes it possible to reconstruct the complete individual work histories with accuracy⁴. It is particularly important because I can observe workers from the beginning of their career, avoiding initial-condition problems.

Constructing my sub-sample, if an individual presents, at the same time, more than one work relationship, I eliminate the shorter job relationship and, if of the same duration, I remove the part-time jobs or the work relationships characterized by fewer days of effective work. Finally, when the second job starts before of the end of the first job but ends after it, I censor at left the second work spell, and so I hypothesize that the second job starts only when the first ends. In this way, the passage from double job to single one is found as a transition from a job to another. This strategy is adopted in order to reconstruct the non-working duration spells with accuracy. By adopting this procedure I implicitly assume that the selection of young individuals and the elimination of multiple jobs leave the final sample to be representative.

The comparison between the pre reform situation and the post reform one, is carried out dividing the selected sub-sample in two sub-groups, the first related to the spells started and ended before June 24th 1997 (day in which the Treu Reform became law), and the second related to the spells started after the introduction of the law. Finally, I consider as right censored spell all the spells started before the Treu Reform introduction and ended after it, censoring them on June 24th 1997. This procedure leaves me 137876 observations for 32483 individuals, of which 94160 spells (37614 permanent contract spells, 14622 atypical contract spells and 41924 non-working spells) related to the pre reform period and 43675 spells (16647 PC spells, 7485 AC spells and 19543 NW spells) related to the post-reform one.

Table 3 reports the evolution of share of new atypical contracts stipulated in Italy from 1985 to 1999 and from 1995 to 1999. As can be noted, a heterogeneous increase of atypical contracts stipulated is found. Clearly a different growth rate is noted if the origin is placed in 1985 or in 1995: in particular it is respectively, meanly, +170% and + 38%. With respect to the period from 1985 and 1999, the higher growth rates of the number of atypical contracts stipulated are found for northern workers (about +245%), women (about +210%) and above all for high skill workers (+1500%). In particular before or up to 1985 only 1.50% of the latter group worked with an atypical contract, against about 25% in 1999. As regards the period between 1995 and 1999, I find that, from a territorial point of view, the North-east of Italy is characterized by a higher atypical job rate (34%), but also by a lower growth rate (25%). The North-west is confirmed as the area characterized by the higher growth in atypical contracts stipulated (54%), while the growth rate in the southern regions is 41%. Stronger differences are found related to gender and qualification variables. In particular, in the post-reform period the growth rate of atypical contracts has been double for women compared to men (55% against 28%), determining an overtake of female rate (in pre-reform period male rate was about 23%-25% against 20%-21% of female rate, while in 1999 this became 30% for men and 32% for women). A very strong difference in growth rate can be noticed referring to the qualification variable. Our data show that the growth rate of high skill workers (or white collars) is about 115% against 32% for low skill workers. The growth rate of the atypical contracts remains higher for the latter (33% against 25%).

The independent variables directly or indirectly available from the dataset concern individual job-related characteristics. In particular, I use information about age, gender (one dummy), territorial area (three dummies), qualification (one dummy), economic sector (two

⁴ I have eliminated individuals whose job relationships began before of 1985.

dummies), tenure, number of previous atypical contract experiences (three dummies), daily wage related to the previous job, part-time job experiences (one dummy), type of first contract in working histories (a dummy). Finally, I introduce a variable related to the annual employment growth in order to capture the business cycle effect. In table 4 I report some descriptive statistics, distinguishing between pre and post reform periods and by state of origin. A first noteworthy evidence consists in the distribution of type of spells over reform periods. In fact, while non-working spells remain unchanged both in pre and post reform periods (at 44.5%), a decrease in permanent job spells (from 40% to 38%) and an increase in atypical job spells (from 15.5% to 17.5%) is shown. With respect to covariates, the individuals included in my sub-sample are 23 years old in the pre-reform period and about 24 years old in the post-reform one. Atypical job spells are characterized by a lower age, meaning that it is more likely that a non-stable contract is experienced by younger workers. About 2/3 of my sample consists of male workers, and they are more likely to live in the northern regions (about 60%), rather in the southern regions (about 22%-23%). Low skilled spells represent about 80% of observations. It is interesting to remark that only 9% of atypical spells are characterized by high skills in the pre-reform period, but this percentage almost doubles in the post-reform one. About 30% of observations are related to individuals who have been employed in the building or in the tourism sectors, both more likely characterized by atypical contracts. A strong difference is found in terms of mean wage according to contractual forms. As expected, workers employed in atypical jobs show a mean wage clearly below that of workers' employed with a permanent contract. The observations related to actual or previous part-time job increase from 8% to 13% in the post reform. The amount of previous work experiences (tenure) is strongly higher for permanent job spells than for atypical job experiences, meaning one more time that younger workers (more likely characterized by lower tenure) are atypical employees. About 58% of observations are characterized by absence of previous atypical job experiences. Multiple previous atypical job experiences seem to be more likely for individuals currently employed with atypical contracts. This evidence can indicate that repeated atypical contracts increase the probability of finding a new atypical job rather than a permanent contract. First contract type variable was included in order to catch possible heterogeneity in working histories between workers beginning with a permanent contract rather than an atypical contract. In my sub-sample, I found that more of 50% of working histories began with a permanent job. Finally the employment growth rate is substantially different between pre and post -reform period, about -0.02% before the introduction of the Treu Reform and about +0.85% after.

3. Econometric specification

The specification of the model is guided by the standard job-search theory. It is assumed that unemployed individuals devote some of their time searching for jobs, but also that once an individual has accepted a job and starts working, he or she could continue searching for a better job. Two types of jobs are considered here: permanent jobs and atypical jobs. In addition I assume that: a permanent employment is always preferred to an atypical job, except for cases in which the conditions are linked to the permanent contract (i.e. job tasks). An individual searching for a permanent employment can accept an atypical contract when the search for a stable job takes too long. I also assume that an individual employee with a permanent contract accepts to move toward an atypical contract, if this offers better working conditions and/or perspectives. Finally, the transition from a job toward a non working state can depend on the end of the contract, dismissal, individual work preferences, etc.

Given the starting hypothesis, it is admissible that an individual stays in one of the possible origin states: permanent contract (PC), atypical contract (AC) or a non working condition (NW), therefore the follow transitions are admissible: *PC-PC*, *PC-AC*, *PC-NW*, *AC-PC*, *AC-AC*, *AC-NW*, *NW-PC*, *NW-AC*.

By providing monthly information, the data allow for the analysis of individual work history, permitting to identify the origin state and, in presence of uncensored spells, the type of transition. Therefore, for each individual it is possible to observe a sequence $t_i = \{t_i^c\}_{c \in \{1 \dots C_i\}}$ of contiguous periods of time (spells) spent in different states. t indicates the elapsed duration in a particular state, c denotes the c th spell of individual i and, following the previous notations the left state indicates the state of origin, denoted by the first subscript (j), while the right state indicated the state of destination, denoted by the second subscript (k).

In order to allow for the presence of repeated spells and multiple risks, I implement a Mixed Proportional Hazard (MPH) model with competing risk⁵. The MPH model consists of a specification of the Proportional Hazard Model that allows for the presence of unobserved heterogeneity between individuals. As noticed, duration analysis ignoring the presence of unobserved heterogeneity can imply biased estimates (Lancaster, 1990). Lancaster (1979) was the first to treat this problem, proposing an estimate of a Proportional Hazard Model with multiplicative unobserved heterogeneity. The main advantage of this empirical specification is its flexibility, which allows me to take account of the following determinants of the employment decision: state dependence, duration dependence and unobserved heterogeneity. State dependence accounts for the possibility that the transition probabilities depend on the origin and the destination states, allowing to test whether the probability of transition into a permanent contract are different for non workers and atypical employed individuals. Duration dependence accounts for the possibility that the time during which an individual has been occupied in the current state affects the transition probabilities. Finally, the unobservable heterogeneity is likely to matter in this context due to differences in tastes, ability, or other characteristics that cannot be observed by the econometrician.

A certain debate exists about the possible assumptions of unobserved heterogeneity distribution, since the MPH model estimates may be biased when the chosen distribution for the unobservable term is incorrect. Heckman and Singer (1984) showed that the problem can be avoided by using the Non-Parametric Maximum Likelihood Estimator (NPMLE) that approximates the distribution function of unobservables with a finite mixture distribution. In this case, as proposed by Heckman and Singer (1984), the estimation is implemented by an EM-algorithm.

Abbring and Van den Berg (2003b) proved that in a large class of hazard models with proportional unobserved heterogeneity, the distribution of heterogeneity among survivors converges, often rapidly, to a gamma distribution. In multiple spells duration analysis, often it is natural and convenient to assume that such duration have identical unobserved heterogeneity terms V . From this, in the MPH models for multiple-spell data, the multiple duration that a single individual spends in the same state are dependent because they are affected by the same realization of V .

Given these considerations, I assume that the hazard rate to state k after a sojourn in state j for the individual i is defined as:

$$\lambda_{ijk}(t_i^c | x_{ijk}, v_{ijk}; \beta) = \lambda_{0ijk}(t_i^c) \exp(x'_{ijk} \beta_{jk}) v_{ijk} \quad (1)$$

where:

1. λ_{0ijk} is a baseline hazard which measures the effect of the elapsed duration (duration dependence). Here assume that the baseline hazard follows a Weibull distribution and therefore it can be expressed as:

⁵ A competing risks model can be thought as a model for multiple durations that start at the same point of time for a given subject, where the subject is observed until the first duration is completed and one also observes which of the multiple durations is completed first. The term 'competing risks' originates from the interpretation that a subject faces different risks i of leaving the state it is in, each risk giving rise to its own exit destination which can also be noted by i , (see van den Berg, 2005).

$$\lambda_{0ijk}(t_i^c) = p_{jk} t_i^{c p_{jk} - 1} \quad (2)$$

with:

- a. Positive duration dependence for $p_{jk} > 1$
 - b. Negative duration dependence for $p_{jk} < 1$
 - c. No duration dependence for $p_{jk} = 1$
2. x_{ijk} is a vector of no-time varying individual covariates, which capture personal, job-related and macroeconomic characteristics;
 3. β_{jk} is a vector of unknown parameters;
 4. v_{ijk} is a random individual effect, which is intended to catch the effect of individual heterogeneity. Here I assume that it is Gamma distributed:

$$V | X \sim \Gamma(1, \theta) \quad (3)$$

The unit of time is one month. The individual covariates x_{ijk} are fixed to their values at the beginning of each spell.

The individual contribution to the likelihood function of an incomplete (right censored) spell, that is, the probability of surviving in state j until time t , can be expressed as follows:

$$S_j(t_i^c | W_i; \Omega) = \exp\{-\Lambda_j(t_i^c | W_i; \Omega)\} \quad (4)$$

where:

$$\Lambda_j = \int_0^{t_j} \sum_{k \neq j} \lambda_{jk}(s | W_i; \Omega) ds^6 \quad (5)$$

is the corresponding integrated hazard function, $W_i = \{x_{ijk}, v_{ijk}\}_{k \neq j}$ is the vector of all observed and unobserved variables and Ω is the vector of all unknown parameters (β, θ) .

The individual contribution to the likelihood function of a completed spell of duration t_i^c spends in state j that ends in state k is therefore:

$$f_{jk}(t_i^c | W_i; \Omega) = S_j(t_i^c | W_i; \Omega) \times \lambda_{jk}(t_i^c | W_i; \Omega) \quad (6)$$

In the first instance, to see how the model works, suppose that there is no unobserved heterogeneity, that is, $(v_{ijk}=0)$. The contribution to the log-likelihood function of an individual with a sequence of spells $\{t_i^1, t_i^2, \dots, t_i^{C_i}\}$, then is:

$$\begin{aligned} & \ln(L_i(\Omega | t_i^1, t_i^2, \dots, t_i^{C_i}; x_i)) = \\ & = \sum_{c=1}^{C_i} \sum_{j=1}^3 \left[\left(\sum_{k \neq j} d_{jk}^c \ln(f_{jk}(t_i^c | x_i; \Omega)) \right) + r_j^c \ln(S_j(t_i^c | x_i; \Omega)) \right] \end{aligned} \quad (7)$$

⁶ It is possible that $j = k$ for *PC-PC* and *AC-AC* transitions.

where d_{jk}^c is an indicator variable which equals one if the individual changed from state j to state k in the c th spell and zero otherwise, and r_j^c is a dummy variable which equals one if the c th spell is incomplete and zero otherwise. The log-likelihood function for each sub-group (the first related to the pre-reform period and the second related to the post-reform one) is the summation of the previous equation over the N individuals. This log-likelihood formulation breaks up into separable contributions from each type of transition. Therefore, given that the hazard rate depends upon disjoint sets of parameters, the sub-likelihood functions can be maximized separately and the parameters of each transition can be estimated independently. In this version, without unobserved heterogeneity, the standard errors are estimated using the Huber-White estimator in order to obtain unbiased estimates of them. Differently, the usual standard error may be incorrect because of the effects of clustered data. In this case, the variance estimator becomes:

$$Var = [I(b)]^{-1} B[I(b)]^{-1} \quad (8)$$

where B is a correction factor.

When the unobserved heterogeneity term is introduced the model becomes more complicated. In this case, in fact, it is not possible to condition the individual probabilities on v_{ijk} since they are unobservable, but it is necessary to integrate v_{ijk} over all possible values to get the unconditional probabilities. In this sense, let us assume that individual effects are identically and independently distributed for all individuals with a joint distribution function:

$$\Gamma(v_{iPCPC}, v_{iPCTC}, v_{iPCNW}, v_{iTCTC}, v_{iTCTC}, v_{iTCNW}, v_{iNWPC}, v_{iNWTC}) \quad (9)$$

This specification imposes that the likelihood function maximization happens jointly, since the unobservable heterogeneity terms are correlated across different transitions. For example, the observed transition rate from atypical contract to permanent contract may be higher than the observed rate from non-working to permanent job just because individuals for whom it is easy to find regular work tend to self-select into atypical job. Then v_{iNWTC} is positively related to v_{iNWPC} and v_{iTCTC} . It is possible that persons who most easily find permanent job find less easily an atypical contract, which means that v_{iNWTC} and v_{iNWPC} are negatively correlated.

Here, in order to simplify the estimation procedure, I assume that the v_{ijk} terms are independent. In this case, then, it is possible to estimate separately the sub-likelihood function by transition type. The individual sub-likelihood function related to origin state j and destination state k , is:

$$\begin{aligned} L_{ijk}(\Omega | t_i^{c_j}, x_{ijk}) &= \\ &= \int_{-\infty}^{+\infty} \left(\prod_{c=1}^{C_{ij}} \prod_{k \neq j} f_{jk}(t_i^{c_j} | x_{ijk}, v_{ijk}; \Omega)^{d_{jk}^{c_j}} \times \prod_{c=1}^{C_{ij}} S_j(t_i^{c_j} | x_{ijk}, v_{ijk}; \Omega)^{r_j^{c_j}} \right) \times d\Gamma(v_{ijk}) \end{aligned} \quad (10)$$

where c_j indicates the c th spell in the state j . The log-likelihood function is obtained by summation of the sub log-likelihood function respect to i , j and k :

$$\ln(L(\Omega | t_i^c, x_{ijk})) = \sum_{c=1}^{C_{ij}} \sum_{j=1}^3 \sum_{k \neq j} \ln(L_{ijk}) \quad (11)$$

4. Results

Figures 1-5 show, as preliminary matter, how the Treu Reform has affected the duration dependence, if the probability of moving from a non-working state to a permanent contract is affected by previous atypical job experiences and, finally, if an atypical job experience provides a stepping-stone effect toward a permanent contract.

At first I analyze the effect of the reform on the duration dependence related to the transitions out of a non-working state (see tables 6a and 6b). In particular, it is interesting to evaluate the effect of the reform on the duration dependence for NW-PC transition. My estimate seems to confirm the theoretical prediction, i.e. a decrease in the duration dependence parameter (p). In fact, I found that no duration dependence exists in the pre-reform period ($p = 1$), while a negative duration dependence exists after the introduction of the Treu reform ($p = 0.89$), meaning that the probability of finding a stable job is negatively related with non-working state duration. This finding seems to suggest that in a more flexible labour market, characterized by higher probabilities to find a job, to be a LTU can be perceived as a signal of low productivity by firms, determining a reduction in the LTU hazard rate and, at the same time, an increase for the STU, who are more likely to receive an offer. In particular, my results show that the probability of moving out of a non-employment state toward a permanent contract is increased for the STU and is decreased for the LTU. I also found a decrease in the duration dependence parameter for NW-AC transitions, but the reform effect is rather small (from 0.94 to 0.92), and the probability of moving from a non-working state toward an atypical contract is overall increased.

However, I also found some territorial differences in NW-PC transitions. In the northern regions (I show the results related to North-West), the hazard rate for transitions toward a permanent contract has increased for individuals less than of 18 months of non-working-state duration, while for southern workers it has increased only for individuals not employed for at most nine months. A possible explanation to the latter evidence consists in the low level of the demand side of the southern labour market. In fact, if firms hire non-employed individuals ranking them according to non-working duration (short duration hired first), then for individuals living in regions characterized by lower labour demand, the hiring selection will stop near the top of the list, and therefore only individuals with short non working durations are hired.

With regard to the effect of previous atypical job experiences on the probability of reaching a permanent contract (see table 5a and 5b and figure 4 and 5), generally I find a negative effect whatever is the origin state. This evidence is not confirmed in the post-reform period, in fact the negative effect of the previous atypical job experiences is found only if the origin state is a non-working condition. Clearly, after the introduction of the Treu reform, in a labour market with higher job turnover, have had previous AC experiences is not necessarily a bad signal, and they do it does not decrease the probability of finding a new job if the origin state is a working condition. Figures 4-5 compare the effect of previous AC experiences on the probability of leaving a non working state toward a permanent job or an atypical job. My results suggest that previous AC experiences decrease the probability of reaching a stable job, but they increase the probability of finding an atypical job (above all in post-reform period). These evidences seem to mean that firms can hire non-working individuals with previous AC experiences for the purpose of testing, once more, their ability and, eventually, of hiring them in a stable position after the atypical job experience.

Do atypical job experiences provide a stepping stone towards a permanent contract? I answer to this question comparing the probability to move toward a stable job, starting from a non-working state or from an atypical contract. The evidence shows that the hazard rate is higher if the state is a non-working condition, a trend confirmed both for the pre-reform period and the post-reform one⁷. However, related to this transition, a positive duration dependence is found, therefore

⁷ In a previous version of this paper (where the firm size variable was included in my analysis, and more of 20000 observations were crossed out, because of missing information for firm dimension, most of them related to 1999), an opposite result is found related to the post-reform period. In particular, there was evidence of a stepping stone effect for

the probability of moving toward a permanent contract increases with the contract duration, confirming the existence of a human capital accumulation effect. However, interpreting the duration dependence parameter, I find that this effect is clearly decreased after the introduction of the Treu reform ($p=1.54$ in the pre-reform and $p=1.10$ in the post-reform). On the one hand, a possible explanation can be related to the introduction of temporary contracts, that differently by CFL and apprenticeship contracts, are not meant to provide specific training to workers, and are more likely to allow for interrupted job relationships, therefore decreasing the probability of reaching a stable job. On the other hand, a non-working state allows for greater search intensity than a working state, yielding a more profitable job-search. In this case the probability of finding a stable job can be higher starting from a non-working state rather than from an atypical job.

In tables 5a, 5b, 6a and 6b, I present the results obtained by MPH model with competing risk and Weibull baseline hazard specification, assuming Gamma distributed unobserved heterogeneity. Generally, in the post-reform period, it emphasizes a decrease of the duration dependence parameter (p) for the transitions out of a non-working state⁸. However, with regard to the transitions out of a job position, results confirm expectations. generally expected results. The probability of leaving a stable job toward a new job tends to increase with the contract duration, whatever are the job separation causes. On the contrary, the probability of losing a stable job, moving toward a non-working state decreases with contract duration. Very similar results are found for the transitions out of an atypical job. These evidences also seem to confirm the existence of the human capital accumulation effect.

The estimated coefficients resulting from the model allow me to interpret the effects of personal and job-related characteristics, and of macroeconomic conditions, on the probability of moving from a state to another. Illustrating my results, I show first the ones related to the transitions starting from a non-working state and subsequently the ones related to the transitions starting from a job position.

With regard to personal characteristics, i.e. age, gender, area of residence and qualification, some evidence appears to be unambiguous (see tables 5a and 5b). The introduction of the Treu reform has increased the duality of the labour market, relatively reducing the probability that disadvantaged workers reach a stable job moving from a non-working state. In fact, the positive effect deriving from being a male worker, who lives in northern regions and is highly skilled has increased in the post-reform period. Similar effects are found for the transitions from a non-working state to an atypical job, but the introduction of the Treu reform has reduced the duality with respect to disadvantaged workers. Therefore, the Treu Law seems to allow for an equal distribution of benefits deriving from the increased probability of leaving a non-working state but, at the same time, these benefits are unequally distributed in terms of job stability and quality, and imply therefore an increase in the duality of the labour market.

Economic sector dummies, one for the building sector and another for the tourism sector (referred to previous employment), show positive effects for the NW-PC transitions and negative effects for the NW-AC transitions in the pre-reform period. After the introduction of the Treu reform being employed in building or tourism negatively affects the probability of reaching a job, confirming, as previously mentioned, that these economic sectors are more likely to be characterized by unstable job relationships and by scarce provision of training. The age level in the previous job shows a positive effect, even if not always significant; the positive sign can be explained in term of a positive relation between level of wage and of qualification. The part-time dummy coefficient, related to previous employment, has a negative effect on the probability of leaving a non working state, and it increases after the Treu Reform. Tenure variable estimates show

atypical contract duration longer than three months. This result was strongly affected by the value of the duration dependence parameter (1.97) for the AC-PC transition in the post-reform period, meaning that one more month of contract duration doubled the probability of moving toward a stable job.

⁸ My estimates show an increase of the duration dependence parameters for the NW-AC transitions, when unobservable heterogeneity is assumed to be equal to zero.

an expected positive effect only in the post-reform period, for both transition types, meaning that the accumulation of on the job as the work knowledge accumulation increases the probability of finding a new job, confirming that firms prefer to hire workers with some work experiences. An unexpected negative effect is found in the pre-reform period. As anticipated, previous atypical contract experiences play a negative role on the probability of reaching a permanent contract, while a positive effect is found related to the transitions toward an atypical job. The introduction of the Treu reform has generally reduced these effects. In both cases, my results seem to confirm that workers in a non-working position and with previous AC experiences, are more likely to be reinserted in a job state although first in an atypical job. This result depends on the fact that atypical jobs allow firms to reduce the cost of testing the workers' skills. Finally, the employment growth variable included in order to catch the business cycle effects, shows a positive sign for the transitions both toward a permanent contract and toward an atypical contract in the post-reform period, meaning that increasing production raises the probability of finding a job. A negative effect of the business cycle variable is found for the NW-AC transitions in the pre-reform period.

With respect to the flow out of a job position, the probability of a PC-AC transition in the post-reform period is not estimated because the maximization likelihood process does not converge. Other transitions show the following results. Estimates related to AC-PC transitions allow to know which characteristics increase the probability of transforming an atypical contract in a stable job, and the effect of the Treu reform on them. In terms of personal characteristics, the usual duality against disadvantaged between advantageous and disadvantaged workers arise. The introduction of the reform seems to have increased overall gender duality. Estimates of the economic sector dummies show expected negative signs. Wage and tenure variables show an expected positive effect but they are significant only in the pre-reform period. On the contrary, part-time and previous AC experiences play a negative role on the probability of finding a stable job starting from an atypical contract. The employment growth indicator shows a non-significant estimate in the pre-reform period and a not expected sign in the post-reform one. Transitions between two atypical contracts are less likely for individuals belonging to the disadvantaged group, even if the introduction of the reform has reduced the differences. Besides some estimates lose their significance after the introduction of the Treu reform. Workers employed in tourism and building show a usual negative effect on the probability of finding a new job. On the contrary the tenure variable appears to increase the probability of repeating an atypical job experiences. The level of Increasing wage negatively affects the transitions between atypical contracts in the pre-reform, but the estimate changes sign in the post-reform. Previous AC experiences show negative or not significant coefficients, confirming that, whatever happens, repeated atypical contracts reduce the probability of reaching a new job. The probability of losing an atypical job seems to be greater for workers living in the North-East regions in the pre-reform period. On the contrary, in the post-reform, it is smaller for workers living in the North-West area. Both in pre and post -reform periods the probability of leaving an AC is negatively affected by living in southern regions. Finally, as expected, the probability of losing an atypical job decreases with increasing production. Transitions starting from a permanent contract seem to be affected in a similar way by variables reasons similar to the previous ones, and explained by similar reasons. The Probability of leaving a permanent contract toward a new job, is positively affected for male workers living in northern regions. Negative signs are shown by the southern area dummies, and by tourism dummies, even if they are not always significant. Unclear effects arise from wage, tenure and variables indicating previous AC experiences. Finally, PC-NW transitions seem more likely for disadvantaged workers, overall in the pre-reform period. However, previous AC experiences decrease the probability of losing a permanent contract.

5. Conclusions

The main purpose of this paper was to address questions related to the Italian labour market reform, introduced by the Treu Law. First, I was interested in possible changes in duration dependence related to the transitions starting from a non-working state. Second, I analyzed the effect of previous atypical contract experience on the probability of moving towards a permanent contract. Finally, I studied if the probability of reaching a permanent contract is higher when starting from a non-working state or from an atypical job.

Empirical analysis was carried out estimating the hazard rates among the possible states: permanent contracts, atypical contracts or a non-employment condition. My estimates are obtained applying a Mixed Proportional Hazard model with competing risk to a sub-sample composed of individuals aged 15 to 32, drawn from the WHIP dataset. I use information between 1985 and 1999, selecting individual with completed work histories, in order to avoid initial condition problem. My main findings are:

1. The larger use of atypical contractual forms, due to the introduction of the Treu Reform, provided a potential screening instrument for the hiring policies of firms. In fact, in a more flexible labour market, with more job opportunities, to be long term unemployed may be an indicator of low productivity. Empirically this finding consists in an increase of negative duration dependence for the spells starting from a non-working state; i.e. a widening of the short-term unemployed - long-term unemployed duality;
2. Previous atypical contract experiences affect negatively the probability of moving towards a permanent job if the state of origin is a non-working condition. Clearly to be in a non-employment position after some job experiences may be a bad signal about the worker's abilities.
3. I do not find evidence that the probability of reaching a stable job is higher starting from an atypical contract rather than from a non-employment position. On the other hand, I find positive duration dependence related to the transition from an atypical contract to a permanent contract. This finding seems to suggest the existence of a positive "human capital accumulation" effect on the probability of obtaining a stable job. The introduction of the reform has reduced this effect.
4. Heterogeneous effects are found related to gender, area and qualification variables. In fact, male, northern and high qualified workers show, generally, a larger probability of finding a job starting both from an atypical contract and a non-working state. The introduction of the Treu reform has increased the duality in the labour market against disadvantaged workers in the probability of reaching a stable job moving from a non-working state.

All these findings suggest that the introduction of the Treu Reform, extending the use of atypical contract, allows for larger efficiency in the hiring process of firms.

On the other hand, atypical job experiences can become an obstacle to the probability of reaching a stable job, if the path to a permanent contract includes periods of inactivity, and if it includes short atypical contract experiences, that do not permit workers to accumulate human capital. Besides, the Treu reform has contributed to increase workers duality.

In terms of policy implications, it can be suggested the desirability of promoting longer contractual durations and facilitating training programs, during inactivity periods, in order to increase human capital accumulation. Besides, policies should provide support to workers while searching for a job, contributing to reduce non-employment state durations. Finally, these policies are necessary above all for disadvantaged workers, as female, southern and low-skilled workers, who have more difficulty in finding a job.

References

- Abbring, J.H. and G.J. van den Berg (2003a) "The identifiability of the mixed proportional hazards competing risks model", *Journal of the Royal Statistical Society B* 65, pp. 701-710;
- Abbring, J.H. and G.J. van den Berg (2003b) "The unobserved heterogeneity distribution in duration analysis", Department of Economics, Free University Amsterdam;
- Alba-Ramirez, A. (1998) "How Temporary is Temporary Employment in Spain?", *Journal of Labor Research* 19 n. 4, pp. 695-710;
- Alba-Ramirez, A. (1999) "Explaining the transition out of unemployment in Spain: the effect of unemployment insurance", *Applied Economics* 31, pp. 183-193;
- Amuedo-Dorantes, C. (2000) "Work transitions into and out of involuntary temporary employment in a segmented market: evidence from Spain", *Industrial and Labor Relations Review* 53, n. 2, pp. 309-325;
- Blanchard, O.J. and P. Diamond (1994) "Ranking, unemployment duration, and wages", *Review of Economic Studies*, n.61, pp. 417-434;
- Booth A.L., J.J. Dolado and J. Frank (2002) "Symposium on Temporary Work: Introduction", *The Economic Journal*, vol. 112 (June), pp. F181-F188;
- Booth A.L., M. Francesconi and J. Frank (2002) "Temporary Jobs: Stepping Stones or Dead Ends?", *The Economic Journal*, vol. 112 (June), pp. F189-F213
- Cleves, M.A., W.W. Gould and R.G. Gutierrez (2004) "An introduction to survival analysis using STATA", Revised Edition, STATA Press;
- D'Addio, A.C. and M. Rosholm (2005) "Exits from Temporary Jobs in Europe: a Competing Risks Analysis", *Labour Economics*, 12 (4), pp. 449-468;
- Dolado J.J., C. Garcia-Serrano and J.F. Jimeno (2002) "Drawing Lessons from the Boom of Temporary Jobs in Spain", *The Economic Journal*, vol. 112 (June), pp. F270-F295;
- Gagliarducci, S. (2005) "The dynamics of repeated temporary jobs", *Labour Economics*, vol. 12, n. 4, pp.429-448;
- Güell, M. (2003) "Fixed-term contracts and the duration distribution of unemployment", IZA Discussion Papers 791, Institute for the Study of Labor (IZA);
- Güell, M. and B. Petrongolo (2006) "How Binding are Legal Limits? Transitions from Temporary to Permanent Work in Spain", *Labour Economics*, forthcoming;
- Heckman, J.J. and B. Singer (1984) "A method for minimizing the impact of distributional assumptions in econometric models for duration data", *Econometrica*, vol. 58, pp. 1411-1441;
- Honorè, B. E., (1993) "Identification results for duration models with multiple spells", *Review of Economic Studies*, n.60, pp. 241-246;

- Ichino, A., F. Mealli and T. Nannicini, (2005) “Temporary Work Agencies in Italy: A Springboard to Permanent Employment?”, forthcoming in *Giornale degli Economisti e Annali di Economia*, 64(1) (September), pp. 1-27;
- Kiefer, N.M. (1988) “Economic duration data and hazard functions”, *Journal of Economic Literature*, vol. XXVI (June), pp. 646-679;
- Lancaster, T. (1979) “Econometric methods for the duration of unemployment” *Econometrica*, July, n. 47(4), pp. 965-979;
- Lancaster, T. (1990) “The econometric analysis of transition data”, Cambridge University Press;
- Martinez-Granado M. (2002) “Self-employment and labour market transitions: a multiple state model”, CEPR discussion paper series, n. 3661;
- Nickell, S.J. (1979) “Estimating the probability of leaving unemployment”, *Econometrica*, n. 47(5), pp. 1249-1266;
- van den Berg, G.J. (2001) “Duration models: specification, identification, and multiple durations. In Handbook of Econometrics, Volume V, Ed. J.J. Heckman and E. Leamer. Amsterdam: North Holland;
- van den Berg, G.J., A. Holm and J.C. van Ours (2002) “Do stepping-stone jobs exist? Early career paths in the medical profession”, *Journal of Population Economics*, n.15, pp. 647-665;
- van den Berg, G.J. (2005) “Competing risks models”, Institute for Labour Market Policy Evaluation (IFAU) Working Paper, n.25;
- Zijl, M. G.J. van den Berg and A. Heyma (2004) “Stepping-stones for the unemployed: the effect of temporary jobs on the duration until regular work“, IZA discussion paper, n. 1241, Institute for the Study of Labor (IZA);

Tables and figures

Table 1. Atypical contract legislation in Italy

Year	Law	Contents
1955	n. 25	Introduction of apprenticeship contracts;
1962	n. 230	Introduction of fixed-term contracts;
1973	c.p.c. 409	Discipline on trial, fiscal and social security related to collaboration contracts;
1983	n. 79	Extension of fixed-term contracts to all economic sectors;
1984	n. 863	Enlargement of part-time criteria; Introduction of CFL;
1987	n. 56	Extension of CFL to all economic sectors; Modifications to fixed-term contract legislation;
1994	n. 236	Stage contracts in apprenticeship;
1994	n. 451	Increase in the limit of age for CFL applicability;
1995	n. 335	Reform of compulsory and complementary social security system;
1997	n. 196 (Treu Law)	Introduction of temporary contracts (art. 1-11); Modification of sanctionary discipline of fixed-term contract (art. 12); Employment in research (art. 14); Variation of CFL applicability fro undeveloped area and invalids (art. 15); Extension of applicability of apprenticeship contracts (art.16);
1997	n. 469	Privatization and decentralization of jobcentre;
2001	d.lgs. n. 368	Extension of applicability of fixed-term contracts;
2003	n. 30	Introduction of the Biagi Law;

Table 2. Macroeconomic indicators in some European countries

		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
UE15	urate	10.0%	10.4%	10.0%	10.1%	9.8%	9.3%	8.5%	7.6%	7.2%	7.6%	8.0%	8.1%
	Young urate	21.4%	21.8%	21.0%	21.2%	20.6%	19.0%	17.1%	15.3%	15.1%	15.6%	16.3%	16.6%
	LTU	44.0%	48.1%	49.0%	48.5%	49.0%	47.3%	45.9%	44.7%	43.1%	40.8%	41.3%	42.0%
	AC	11.0%	11.5%	12.0%	12.0%	12.4%	13.0%	13.4%	13.7%	13.5%	13.1%	13.1%	13.6%
UE25	urate						9.5%	9.1%	8.6%	8.4%	8.7%	9.0%	9.0%
	Young urate						19.4%	18.4%	17.4%	17.6%	18.1%	18.6%	18.7%
	LTU						47.4%	45.1%	45.3%	45.2%	44.8%	44.4%	45.6%
	AC					9.3%	8.9%	8.7%	8.4%	8.0%	8.2%	8.4%	8.3%
Italy	urate	10.1%	10.6%	11.2%	11.2%	11.3%	11.3%	10.9%	10.1%	9.1%	8.6%	8.4%	8.0%
	Young urate	30.1%	29.1%	30.3%	30.4%	30.2%	29.9%	28.7%	27.0%	24.1%	23.1%	23.7%	23.6%
	LTU	56.4%	61.3%	63.4%	65.2%	64.6%	59.3%	61.5%	62.4%	62.6%	59.3%	58.3%	50.0%
	AC	6.2%	6.8%	7.4%	7.4%	7.9%	8.6%	9.5%	10.1%	9.8%	9.9%	9.9%	11.8%
Germany	urate	7.7%	8.3%	8.0%	8.5%	9.1%	8.8%	7.9%	7.2%	7.4%	8.2%	9.0%	9.5%
	Young urate	15.0%	15.6%	14.9%	15.6%	16.2%	15.0%	12.7%	10.6%	12.8%	14.2%	14.7%	15.1%
	LTU	40.3%	44.6%	48.8%	48.2%	50.5%	51.1%	51.9%	51.4%	50.0%	47.6%	50.0%	51.6%
	AC	10.3%	10.4%	10.5%	11.2%	11.8%	12.4%	13.1%	12.7%	12.4%	12.0%	12.2%	12.4%
France	urate	11.1%	11.7%	11.1%	11.6%	11.5%	11.1%	10.5%	9.1%	8.4%	8.9%	9.5%	9.7%
	Young urate	27.1%	28.6%	27.0%	28.5%	28.4%	25.6%	23.4%	20.1%	19.4%	20.0%	21.1%	22.0%
	LTU	35.1%	38.5%	39.6%	38.8%	40.9%	40.5%	39.0%	38.5%	35.7%	34.8%	38.9%	40.2%
	AC	10.9%	11.5%	12.4%	12.8%	13.4%	13.9%	14.5%	15.2%	14.6%	13.5%	12.7%	12.8%
Spain	urate	18.6%	19.8%	18.8%	18.2%	17.1%	15.3%	12.9%	11.5%	10.7%	11.5%	11.5%	11.0%
	Young urate	38.4%	40.2%	37.8%	37.2%	34.6%	31.3%	25.8%	22.9%	21.7%	22.3%	22.7%	22.1%
	LTU	49.5%	55.6%	55.9%	52.7%	52.0%	50.3%	45.7%	41.7%	36.4%	33.9%	33.9%	31.8%
	AC	33.0%	34.2%	35.2%	33.8%	33.5%	33.0%	32.9%	32.2%	32.2%	31.8%	31.8%	32.5%
UK	urate	10.0%	9.3%	8.5%	8.0%	6.9%	6.2%	5.9%	5.4%	5.0%	5.1%	4.9%	4.7%
	Young urate	17.6%	16.4%	15.3%	15.0%	13.7%	13.1%	12.8%	12.3%	11.9%	12.1%	12.3%	12.1%
	LTU	42.0%	44.1%	42.4%	38.8%	36.2%	30.6%	28.8%	25.9%	26.0%	21.6%	22.4%	21.3%
	AC	6.3%	6.9%	7.2%	7.3%	7.6%	7.3%	7.0%	6.9%	6.7%	6.4%	6.1%	6.0%

Source: European Commission, Employment in Europe in 2005

Table 3. Evolution of share of new atypical contracts stipulated, by years and population groups

Year	Area			Gender		Qualification		All
	North-west	North-east	South-islands	Male	Female	Low-skills	High-skills	
<= 1985	9.34%	13.03%	11.95%	12.06%	10.33%	15.23%	1.50%	11.43%
1995	20.91%	27.08%	17.97%	23.51%	20.65%	24.91%	11.44%	22.51%
1996	20.30%	28.76%	18.22%	23.97%	21.04%	25.12%	13.37%	22.94%
1997	20.90%	28.28%	20.09%	24.94%	20.90%	25.93%	14.27%	23.45%
1998	27.75%	35.09%	29.45%	31.98%	29.91%	33.93%	21.93%	31.19%
1999	32.29%	34.08%	25.44%	30.32%	32.15%	32.86%	24.56%	31.00%
growth rate 85-99	245.71%	161.54%	112.90%	151.44%	211.22%	115.77%	1537.30%	171.25%
growth rate 95-99	54.39%	25.85%	41.56%	28.99%	55.72%	31.95%	114.65%	37.74%

Source: my elaboration on WHIP dataset

Table 4. Descriptive Statistics by origin state

Variables	Pre-reform								Post-reform							
	All (obs. 94160)		PC (obs. 37614)		AC (obs. 14622)		NW (obs. 41924)		All (obs. 43675)		PC (obs. 16647)		AC (obs. 7485)		NW (obs. 19543)	
	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.
Age	22.15	4.16	23.17	3.87	18.95	3.21	22.35	4.15	24.25	4.30	25.32	3.88	21.60	3.97	24.36	4.33
Male	0.65	0.48	0.64	0.48	0.67	0.47	0.65	0.48	0.62	0.49	0.62	0.49	0.63	0.48	0.62	0.49
North-West	0.28	0.45	0.30	0.46	0.28	0.45	0.27	0.44	0.30	0.46	0.32	0.47	0.30	0.46	0.29	0.45
North-East	0.31	0.46	0.28	0.45	0.37	0.48	0.31	0.46	0.29	0.45	0.27	0.44	0.33	0.47	0.30	0.46
Centre	0.18	0.38	0.18	0.38	0.17	0.38	0.18	0.38	0.19	0.39	0.18	0.39	0.19	0.39	0.20	0.40
South-Islands	0.23	0.42	0.24	0.43	0.17	0.37	0.25	0.43	0.22	0.41	0.23	0.42	0.19	0.39	0.22	0.42
Low skills	0.82	0.38	0.76	0.42	0.91	0.28	0.84	0.36	0.79	0.41	0.74	0.44	0.84	0.36	0.81	0.39
High skills	0.18	0.38	0.24	0.42	0.09	0.28	0.16	0.36	0.21	0.41	0.26	0.44	0.16	0.36	0.19	0.39
Buildings	0.15	0.36	0.15	0.35	0.15	0.36	0.16	0.37	0.12	0.32	0.11	0.31	0.12	0.32	0.12	0.33
Tourism	0.17	0.37	0.16	0.37	0.13	0.34	0.18	0.39	0.15	0.35	0.14	0.34	0.11	0.31	0.17	0.38
Other sectors	0.68	0.47	0.69	0.46	0.71	0.45	0.66	0.47	0.74	0.44	0.75	0.43	0.77	0.42	0.71	0.45
Wage	45.71	40.88	52.09	43.79	34.81	35.36	43.79	38.93	53.65	49.10	57.06	54.37	43.64	28.53	54.58	50.08
Part-time	0.08	0.26	0.10	0.30	0.03	0.16	0.07	0.26	0.13	0.33	0.15	0.36	0.07	0.26	0.12	0.33
Tenure	19.86	25.96	19.70	26.77	6.89	14.26	24.52	26.82	27.77	34.93	28.97	36.38	12.51	22.51	32.59	35.95
Zero AC exp	0.58	0.49	0.68	0.47	0.63	0.48	0.48	0.50	0.58	0.49	0.66	0.47	0.60	0.49	0.50	0.50
One AC exps	0.25	0.44	0.19	0.39	0.23	0.42	0.32	0.47	0.24	0.43	0.19	0.39	0.23	0.42	0.29	0.45
Two AC exps	0.10	0.30	0.08	0.26	0.09	0.29	0.12	0.33	0.10	0.30	0.08	0.28	0.10	0.30	0.12	0.32
Three AC exps	0.06	0.24	0.05	0.22	0.06	0.23	0.08	0.27	0.08	0.27	0.07	0.25	0.07	0.26	0.09	0.29
First contract	0.51	0.50	0.68	0.47	0.11	0.31	0.51	0.50	0.54	0.50	0.67	0.47	0.21	0.41	0.55	0.50
Empl. Growth	-0.02	1.01	0.02	0.96	0.13	0.97	-0.11	1.05	0.85	0.17	0.85	0.17	0.87	0.16	0.84	0.17

Source: my elaboration on WHIP dataset

Table 5a. MPH model hazard rate estimates with unobserved heterogeneity (Pre-reform)

covariates	PC-PC		PC-AC		PC-NW		AC-PC		AC-AC		AC-NW		NW-PC		NW-AC	
	b	s.e	b	s.e	b	s.e	b	s.e	b	s.e	b	s.e	b	s.e	b	s.e
age	0.54	0.05 ***	0.41	0.21 **	0.22	0.02 ***	0.89	0.11 ***	-0.34	0.17 **	0.19	0.03 ***	0.46	0.02 ***	-0.59	0.04 ***
age square	-0.01	0.00 ***	-0.01	0.00 **	0.00	0.00 ***	-0.02	0.00 ***	0.01	0.00	-0.01	0.00 ***	-0.01	0.00 ***	0.01	0.00 ***
male	0.31	0.05 ***	0.87	0.19 ***	0.04	0.02 **	0.26	0.08 ***	0.43	0.12 ***	0.03	0.02	0.02	0.02	0.14	0.03 ***
north-west	0.31	0.06 ***	0.25	0.23	-0.11	0.02 ***	0.62	0.10 ***	0.34	0.16 **	0.01	0.03	0.19	0.02 ***	0.17	0.05 ***
north-east	0.25	0.06 ***	0.74	0.23 ***	0.07	0.02 ***	0.24	0.10 **	0.55	0.15 ***	0.19	0.03 ***	0.19	0.02 ***	0.31	0.04 ***
south-islands	-0.45	0.07 ***	-0.91	0.31 ***	0.16	0.02 ***	-1.12	0.17 ***	-0.87	0.22 ***	-0.05	0.03 *	-0.12	0.02 ***	-0.57	0.05 ***
low skills	0.01	0.05	0.26	0.22	0.21	0.02 ***	-0.19	0.10 *	-0.03	0.26	-0.02	0.04	-0.04	0.02 *	0.07	0.05
building	0.26	0.05 ***	0.01	0.21	0.31	0.02 ***	-0.17	0.10 *	-0.28	0.15 **	0.07	0.03 **	0.00	0.02	-0.08	0.04 **
tourism	-0.17	0.07 **	-0.94	0.33 ***	0.78	0.02 ***	-0.69	0.19 ***	-0.59	0.23 ***	0.67	0.03 ***	0.18	0.02 ***	-0.27	0.04 ***
wage	0.00	0.00 ***	-0.02	0.00 ***	-0.01	0.00 ***	0.00	0.00 ***	-0.04	0.01 ***	-0.02	0.00 ***	0.00	0.00 ***	0.00	0.00 ***
part-time	0.04	0.07	0.51	0.27 *	0.10	0.03 ***	-0.49	0.23 **	-0.34	0.52	0.06	0.06	-0.18	0.03 ***	-0.09	0.07
tenure	0.00	0.00 **	-0.01	0.00 *	-0.01	0.00 ***	0.00	0.00 **	0.00	0.00	-0.01	0.00 ***	-0.01	0.00 ***	-0.02	0.00 ***
1 AC exp	-0.27	0.06 ***	-0.29	0.27	-0.35	0.03 ***	-1.24	0.10 ***	-0.70	0.14 ***	-0.73	0.04 ***	-0.24	0.02 ***	0.22	0.06 ***
2 AC exp	-0.25	0.08 ***	-0.46	0.36	-0.38	0.04 ***	-1.27	0.13 ***	-1.02	0.22 ***	-0.72	0.07 ***	-0.29	0.03 ***	0.00	0.07
3+ AC exp	-0.16	0.10 *	0.27	0.35	-0.32	0.04 ***	-1.35	0.16 ***	-0.53	0.24 **	-0.69	0.08 ***	-0.11	0.04 ***	-0.07	0.09
first contract	-0.31	0.06 ***	-0.37	0.25	-0.26	0.03 ***	0.65	0.10 ***	0.57	0.19 ***	0.25	0.03 ***	0.02	0.02	-0.56	0.06 ***
empl growth	-0.13	0.02 ***	-0.16	0.07 **	-0.11	0.01 ***	0.01	0.04	-0.06	0.05	-0.06	0.01 ***	-0.01	0.01 *	0.02	0.01
constant	-12.02	0.61 ***	-11.44	2.41 ***	-4.57	0.23 ***	-16.64	1.19 ***	-1.46	1.79	-3.91	0.34 ***	-8.71	0.22 ***	3.99	0.43 ***
log-likelihood	-9730.9		-1148.7		-37913.4		-2874.1		-1915.5		-17581.8		-33177.3		-18670.5	
observations			37614						14622				41924			
individuals			18741						9571				18313			
failures	3340		193		23351		898		457		11647		25949		7256	

Source: my elaboration on WHIP dataset

Table 5b. MPH model hazard rate estimates with unobserved heterogeneity (Post-reform)

covariates	PC-PC		PC-AC		PC-NW		AC-PC		AC-AC		AC-NW		NW-PC		NW-AC	
	b	s.e			b	s.e	b	s.e	b	s.e	b	s.e	b	s.e	b	s.e
age	0.35	0.14 ***			-0.25	0.04 ***	0.89	0.22 ***	0.59	0.24 ***	-0.26	0.04 ***	0.52	0.04	0.10	0.05
age square	-0.01	0.00 **			0.00	0.00 ***	-0.02	0.00 ***	-0.01	0.01 ***	0.01	0.00 ***	-0.01	0.00 ***	0.00	0.00 ***
male	0.11	0.09			-0.06	0.03 **	0.48	0.17 ***	-0.16	0.16	0.08	0.04 **	0.19	0.03 ***	0.03	0.04
north-west	0.13	0.11			-0.14	0.04 ***	0.57	0.22 ***	0.61	0.25 **	-0.09	0.05 *	0.24	0.04 ***	0.14	0.05 **
north-east	0.05	0.11			0.05	0.04	0.69	0.22 ***	0.77	0.25 ***	0.08	0.05	0.32	0.04 ***	0.20	0.05 ***
south-islands	-0.78	0.14 ***			0.05	0.04	-1.16	0.37 ***	-0.47	0.35	-0.14	0.06 **	-0.20	0.04 ***	-0.46	0.07 ***
low skills	0.42	0.10 ***			0.43	0.03 ***	0.29	0.22	-0.09	0.23	0.31	0.07 ***	-0.19	0.03 ***	-0.14	0.06 **
building	0.12	0.12			0.33	0.04 ***	-0.56	0.27 **	-0.24	0.26	0.18	0.05 ***	-0.13	0.04 ***	-0.19	0.06 ***
tourism	0.03	0.13	do not		0.73	0.03 ***	-0.06	0.30	-0.37	0.32	0.86	0.05 ***	0.09	0.04 **	-0.50	0.06 ***
wage	0.00	0.00	converge		0.00	0.00 ***	0.00	0.00	0.00	0.00 ***	0.00	0.00 ***	0.00	0.00	0.00	0.00 **
part-time	-0.12	0.12			0.09	0.03 ***	0.25	0.29	-0.11	0.33	0.06	0.07	-0.27	0.04 ***	-0.27	0.07 ***
tenure	0.00	0.00			-0.01	0.00 ***	0.01	0.00 ***	0.00	0.00	-0.01	0.00 ***	0.00	0.00 ***	0.00	0.00 ***
1 AC exp	0.22	0.13 *			-0.11	0.05 **	-0.13	0.19	-0.05	0.20	-0.07	0.05	-0.10	0.04 **	0.70	0.07 ***
2 AC exp	0.40	0.16 ***			-0.09	0.06	0.15	0.23	0.47	0.23 **	-0.04	0.06	-0.04	0.06	0.80	0.09 ***
3+ AC exp	0.43	0.18 **			0.01	0.07	-0.07	0.26	0.35	0.27	0.04	0.07	-0.03	0.06	0.86	0.09 ***
first contract	0.19	0.13			-0.06	0.04	-0.44	0.19 **	0.21	0.20	0.03	0.05	0.04	0.04	0.06	0.07
empl growth	0.28	0.21			0.12	0.07 *	-0.80	0.41 **	-0.51	0.42	-0.44	0.10 ***	0.17	0.07 **	0.55	0.10 ***
constant	-11.24	1.80 ***			0.57	0.47	-17.49	2.60 ***	-12.13	2.61 ***	0.51	0.50	-9.98	0.46 ***	-4.19	0.58 ***
log-likelihood	-3295.5				-18264.9		-933.4		-902.9		-7998.0		-19386.9		-9148.5	
observations			16647						7485				19543			
individuals			12902						6334				14538			
failures	770				7846		197		184		3251		8029		2968	

Source: my elaboration on WHIP dataset

Table 6a. Duration dependence without Unobserved Heterogeneity

Transition	Duration dependence parameter			
	Pre-reform		Post-reform	
	estimate	s.e.	estimate	s.e.
PC-PC	1.24	0.02	1.09	0.03
PC-AC	0.99	0.06	0.98	0.06
PC-NW	0.80	0.00	0.86	0.01
AC-PC	1.54	0.04	1.10	0.06
AC-AC	1.24	0.05	1.08	0.06
AC-NW	1.02	0.01	0.89	0.01
NW-PC	0.97	0.01	0.86	0.01
NW-AC	0.80	0.01	0.92	0.01

Baseline hazard: Weibull specification

Source: my elaboration on WHIP dataset

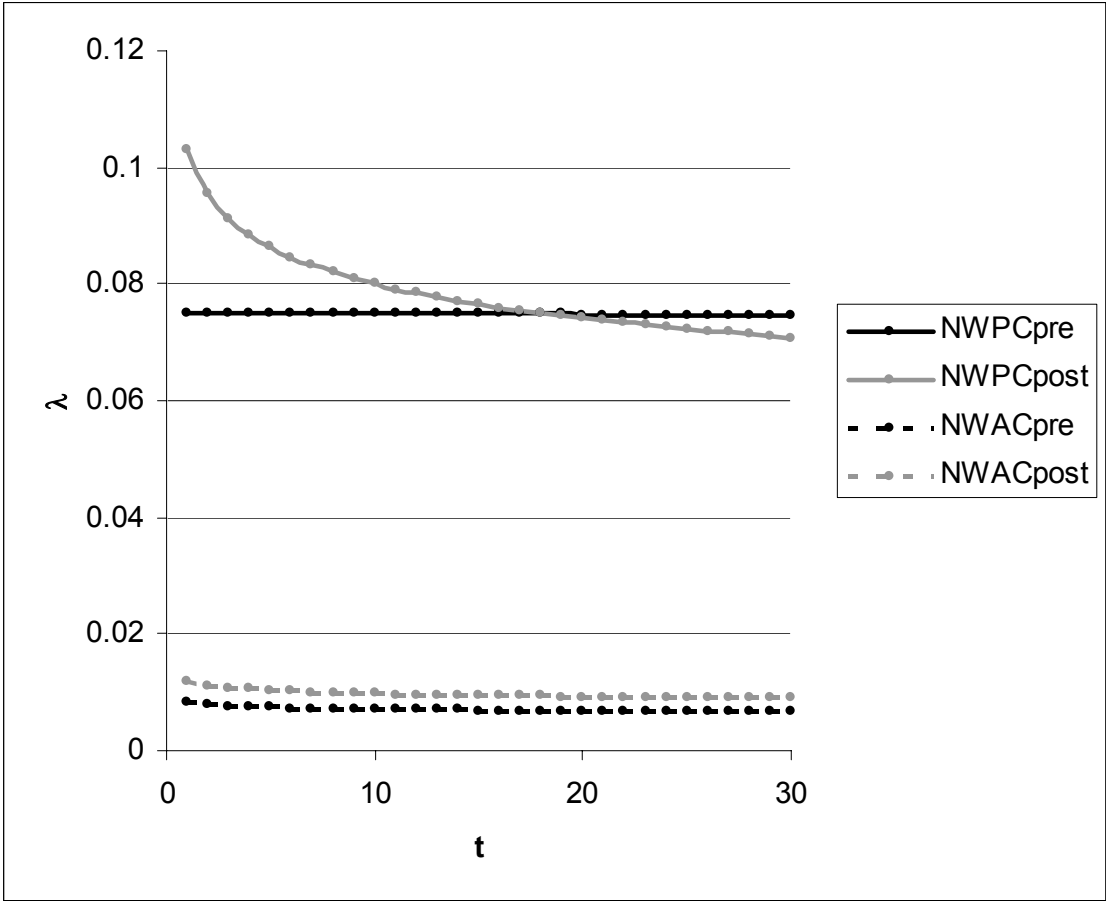
Table 6b. Duration dependence with Unobserved Heterogeneity

Transition	Duration dependence parameter				Unobserved Heterogeneity			
	Pre-reform		Post-reform		Pre-reform		Post-reform	
	estimate	s.e.	estimate	s.e.	estimate	s.e.	estimate	s.e.
PC-PC	1.26	0.02	1.09	0.03	0.47	0.06	1.04	0.24
PC-AC	1.00	0.06	-	-	1.84	1.41	-	-
PC-NW	0.82	0.00	0.89	0.01	0.15	0.01	0.19	0.03
AC-PC	1.54	0.04	1.10	0.07	0.00	0.00	0.00	0.00
AC-AC	1.29	0.05	1.08	0.07	0.83	0.33	0.00	0.01
AC-NW	1.03	0.02	0.89	0.01	0.01	0.02	0.00	0.00
NW-PC	1.00	0.01	0.89	0.01	0.17	0.01	0.39	0.03
NW-AC	0.94	0.01	0.92	0.02	0.70	0.05	0.01	0.06

Baseline hazard: Weibull specification, Unobserved Heterogeneity: Gamma distributed

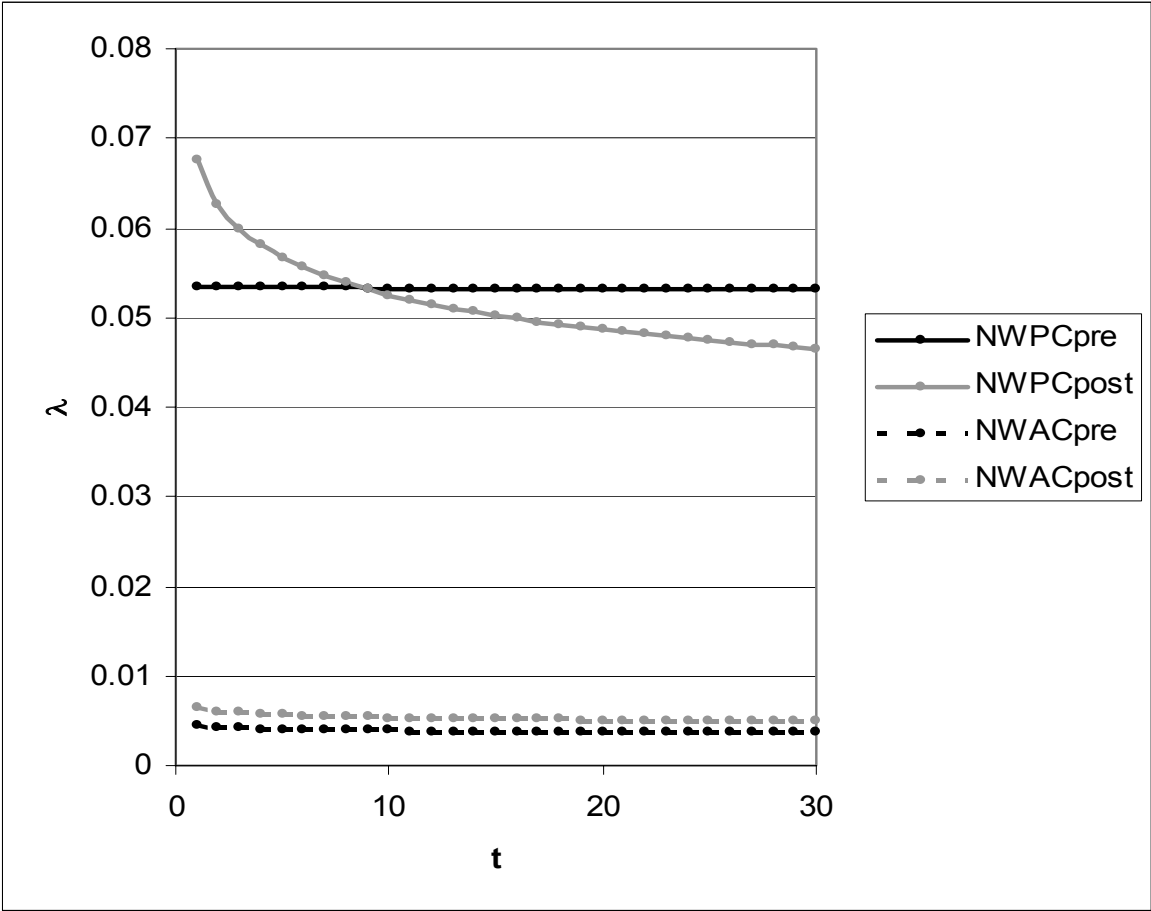
Source: my elaboration on WHIP dataset

Figure 1. Monthly predicted Hazard rate: leaving a NW (North-West)



Reference category: 25 years old, male, low skills, no buildings, no tourism, no part-time, wage: 50 euro per day, tenure: 20 months, no AC previous experiences, first contract: PC, employment growth: 0.6%.
 Source: my elaboration on WHIP dataset

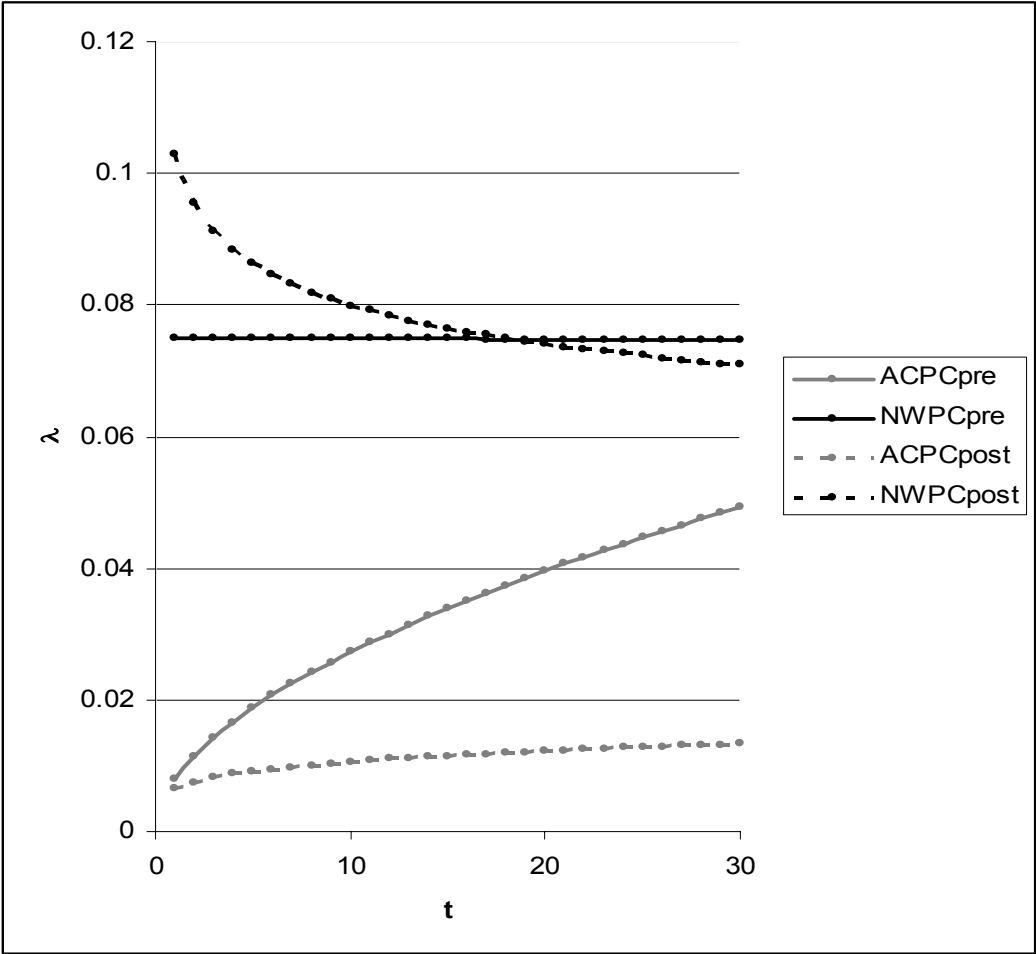
Figure 2. Monthly predicted Hazard rate: leaving a NW (South-Islands)



Reference category: 25 years old, male, low skills, no buildings, no tourism, no part-time, wage: 50 euro per day, tenure: 20 months, no AC previous experiences, first contract: PC, employment growth: 0.6%.

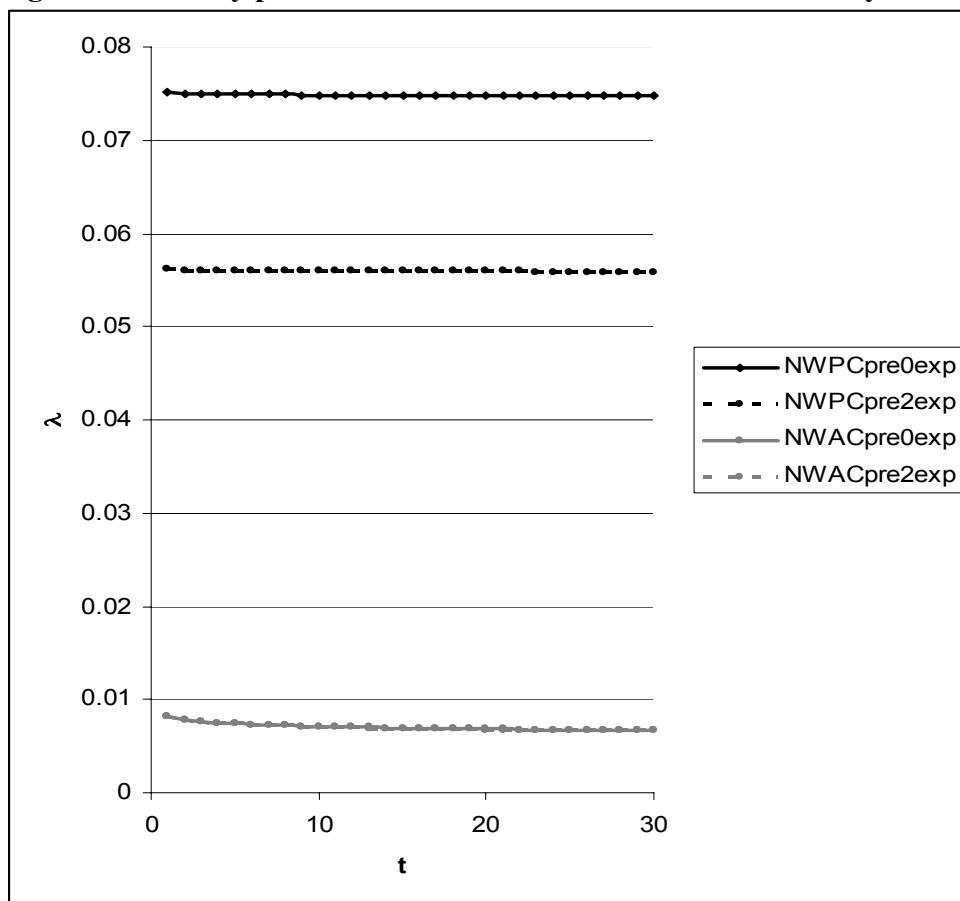
Source: my elaboration on WHIP dataset

Figure 3. Monthly predicted Hazard rate: reaching a PC (North-West)



Reference category: 25 years old, male, low skills, no buildings, no tourism, no part-time, wage: 50 euro per day, tenure: 20 months, no AC previous experiences, first contract: PC, employment growth: 0.6%.
 Source: my elaboration on WHIP dataset

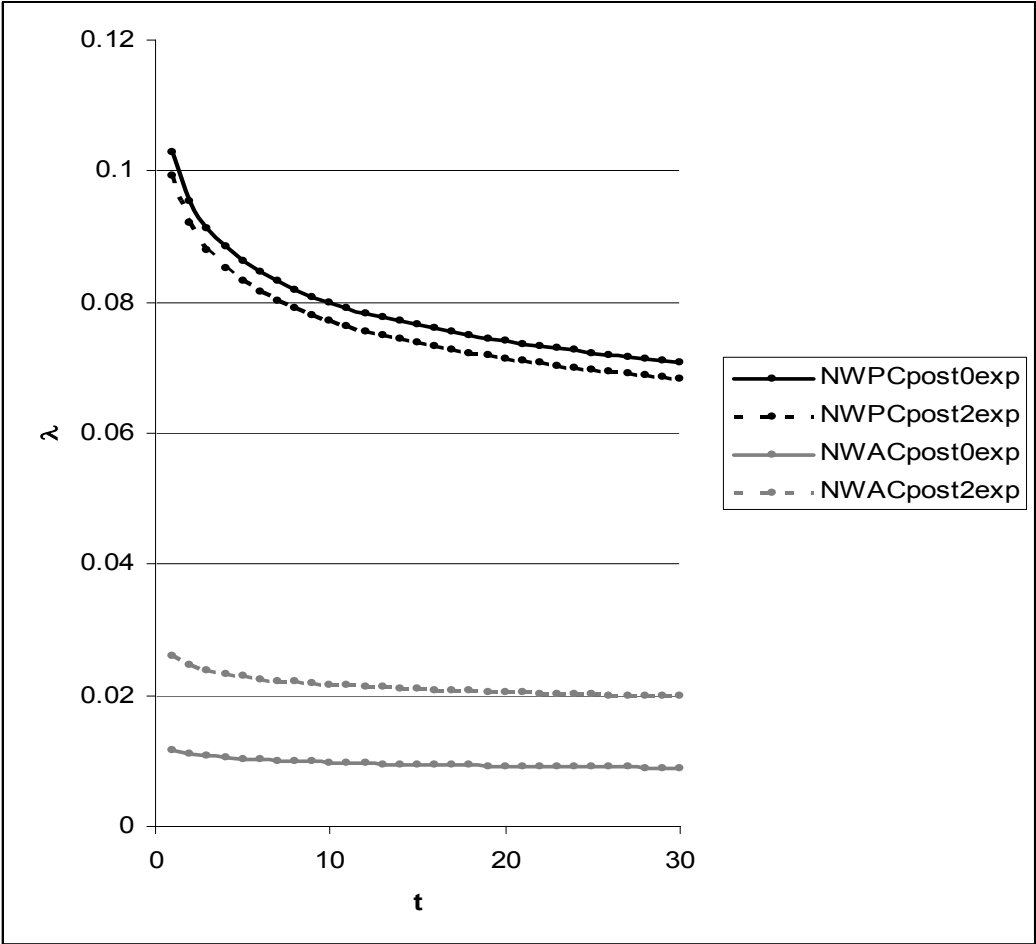
Figure 4. Monthly predicted Hazard rate: NW transitions out by number of previous AC experiences (North-West, Pre-reform)



Reference category: 25 years old, male, low skills, no buildings, no tourism, no part-time, wage: 50 euro per day, tenure: 20 months, first contract: PC, employment growth: 0.6%.

Source: my elaboration on WHIP dataset

Figure 5. Monthly predicted Hazard rate: NW transitions out by number of previous AC experiences (North-West, Post-reform)



Reference category: 25 years old, male, low skills, no buildings, no tourism, no part-time, wage: 50 euro per day, tenure: 20 months, first contract: PC, employment growth: 0.6%.

Source: my elaboration on WHIP dataset