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JEL Codes: J65, J63, C55

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Regression discontinuity effects of unemployment benefit eligibility on prior employment duration*

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August 5, 2015

Abstract

In most countries, the unemployed are entitled to unemployment benefits only if they have previously worked a minimum period of time. This institutional feature creates a sharp change at eligibility in the disutility from unemployment and may distort the duration of jobs. In this paper, we show that this effect can be evaluated using a regression discontinuity approach. Our evidence is based on longitudinal social security data from Portugal, where the unemployed are required to work a relatively long period to collect benefits. We find that monthly transitions from employment to unemployment increase by 10% as soon as the eligibility condition is met. This result is driven entirely by transitions to subsidised unemployment, which increase by 20%, as non-subsidised unemployment is not affected. The effects are even larger for the unemployed with high replacement ratios or those who meet the eligibility condition from multiple employment spells.

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1 Introduction

Unemployment benefits (UBs) are an important labour market institution, as they provide income insurance against negative employment shocks, support aggregate demand during downturns, and may improve the quality of new matches (Acemoglu & Shimer 2000, Card et al. 2007, Chetty 2008). However, unemployment benefits can also lead to moral hazard, erode human capital and increase unemployment by delaying transitions back to employment (Meyer 1990, Lalive et al. 2006). These negative effects can be particularly important when UBs are too generous and or not coupled with appropriate activation practices.

This paper examines an additional potential effect of UBs on the labour market: the duration of employment spells prior to unemployment. The effect arises from the minimum prior employment duration requirements for the unemployed to be entitled to benefits, which are applicable in most countries. For instance, according to Venn (2012), in France, an unemployed person is only entitled to benefits if she worked four months over the previous 28 months. In Germany and Japan, the requirement is of at least 12 months of work. In the UK and the US (its seven largest states), the average requirement is of 26 or 27 weeks over the previous two years or four quarters, respectively.

Such potential provision of UBs, once the applicable eligibility conditions are met, can impact negatively on the duration of employment spells. In fact, a worker that just meets the employment duration threshold for unemployment benefit eligibility will see her unemployment outside option improve dramatically, from zero to a potentially large value determined by the applicable replacement ratio. This abrupt change will potentially create an important additional moral hazard margin complementary to the far more discussed jobsearch moral hazard.

This potential shortened employment effect has been confirmed in a number of empirical studies, even if these have focused almost exclusively on the case of Canada (Christofides & McKenna 1996, Green & Riddell 1997, Baker & Rea 1998, Green & Sargent 1998).[1] Identification in these studies is based on changes in minimum employment duration requirements across Canadian provinces in different periods between 1986 and 1990, in some cases focusing on adjustments in requirements presumably unantecipated by economic agents. Using sur-

[1] See also Solon (1984), Jurajda (2002) on the US, Rebollo-Sanz (2012) on Spain, and Kyyra & Pesola (2014) on Finland, and the theoretical analysis Hopenhayn & Nicolini (2009)

vey data, the studies find significant increases in the employment hazard exactly when the eligibility requirement is met.

This paper contributes to this literature by adopting a novel identification approach, based on a regression discontinuity design, that can be widely applicable. Instead of considering cross-sectional or time (reform-related) variation in eligibility conditions, we infer the causal impact of UB eligibility from the intrinsic discontinuity that such requirements entail. Indeed, as indicated above, employed workers with employment durations up to the applicable threshold are not entitled to UBs. This ensures a considerable contrast of otherwise similar workers around the eligibility threshold that can be used for the purpose of identifying the effect of interest. This regression discontinuity approach is applicable in other countries where suitable data is made available to researchers, in order to broaden the currently very limited international evidence on this issue.

Our findings are obtained from longitudinal, monthly administrative (social security) data for Portugal, covering the period 2005-2012. The case of Portugal is interesting not only because of its high unemployment rates over the last years but also because, in contrast to Canada, it is characterised by restrictive UB eligibility. Given that job matches are subject to positive duration dependence (due to human capital and selection effects), eligibility effects may fall considerably or even disappear under more demanding eligibility requirements. On the other hand, if eligibility effects also exist under this different institutional setup, their economic consequences may be more negative, as more productive matches, of greater potential, will be terminated.

In our results, we find negative, significant effects of eligibility in terms of employment durations, consistent with the limited available evidence for other countries despite the institutional differences. Moreover, the moral hazard dimension of the findings is highlighted by the fact that there is no substitution between UB and non-UB transitions at eligibility: our effects are driven exclusively by transitions to UBs, while transitions to non-subsidised unemployment are not affected at all by the eligibility condition.

Moreover, we exploit the richness of the data to investigate the robustness and heterogeneity of the main effects depending on the characteristics of the workers. In important results also from a policy perspective, we find that individuals with high replacement ratios and who meet their eligibility thresholds from multiple employment spells (i.e. that have job

breaks over the qualifying period) exhibit much higher (subsidised) unemployment effects. The latter result is also an important robustness check to disentangle the direct effect from UB eligibility from cases in which the duration of the employment contract coincides with the eligibility requirement.

The structure of the remaining of the paper is as follows: The next section describes the unemployment benefit eligibility practices across different countries and then focuses on the case of Portugal. Sections 3 and 4 present the data set and its descriptive statistics, respectively, including graphical previews of the results. The main results and their robustness checks are presented in Section 5. Finally, Section 6 discusses the results, in particular in terms of policy recommendations.

2 Unemployment benefits eligibility

In general, not all individuals that become unemployed are entitled to unemployment insurance. First of all, countries that provide unemplyment insurance tend to require a minimum period of employment, a dimension which we analyse in this paper. A second related dimension of eligibility concerns the sanctions applicable for voluntary unemployment.

In order to provide an international overview of UB eligibility criteria, we draw closely on Venn (2012). In her analysis of eligibility requirements across OECD countries, Venn (2012) considers five types of employment (or contribution) requirements. These are 'No employment or contribution requirements' (value 1), '1-10 months employment/contribution record' (2), '11-13 months employment/contribution record' (3), '14-24 months employment/contribution record' (4), and 'More than 24 months employment/contribution record' (5). Venn (2012) also considers five types of voluntary unemployment sanctions, in terms of the availability and time delay from unemployment until the unemployed can start collecting benefits: '0-4 weeks' (including benefit reductions, value 1), '5-9 weeks' (value 2), '10-14 weeks' (3), 'More than 14 weeks' (4), and 'Ineligible for benefits' (5).

Venn (2012) then presents a comparative analysis of UBs eligibility across the OECD, giving equal weight to the two dimensions above. Figure 1 lists OECD countries in this regard, considering a weight of 50% to each one of the two criteria. The Figure indicates that some countries exhibit considerably generous unemployment benefit access, namely Australia, New Zealand, Norway, Austria, Denmark, Cyprus and the Czech Republic. On the other hand,

Italy, Portugal and Turkey are particularly strict. Spain, Estonia, Romania and Slovenia also come close. All the last seven countries (plus seven other countries) exhibit maximum restrictiveness regarding involuntary unemployment (benefits are only available to the involuntary unemployed), the difference amongst them concerning the employment requirements.

Focusing on the employment requirements dimension alone, Slovakia requires more than 24 months, followed by a group of six countries, Turkey, Portugal, Italy, Belgium, Ireland and Latvia, in the 14-24 months category. In contrast, Canada, the country which for which most evidence is available, is in the second most generous category (1-10 months of employment). This highlights the potential interest from an external validity perspective from our study that focuses on the case of Portugal, a country with far more stringent UBs.

2.1 The case of Portugal

After providing an international overview, we now zoom in on the case of UBs in Portugal, considering as well other aspects of its labour market. As most other Southern European countries, the Portuguese labour market institutions can be characterised as sub-optimal in their different dimensions, in particular during the period covered in our analysis (2005-2011). Some of the features of these institutions are: restrictive employment law, in particular in terms of permanent contracts (Blanchard & Portugal 2001, Martins 2009); generally restrictive UBs (Addison & Portugal 2008, Venn 2012), as described below; moderate levels of public employment services activation (Martins & Pessoa e Costa 2014, Martins 2015*b*); high tax wedges; and high (general and job-specific) minimum wages, including widespread extensions of unrepresentative collective agreements (Martins 2014). This institutional setup tends to favour segmentation between permanent and temporary or informal workers, slow adjustments to shocks, high levels of long-term unemployment, and low overall productivity (OECD 2012).

Focusing on the characteristics of UBs, during the period studied in this paper these were regulated by a new law published in November 2006 (Decree-law 220/2006).[2] The main aspect of interest of this law from the perspective of this paper is the eligibility period that it establishes, of 450 days of work over the previous 24 months.[3] Previously, eligibility was

[2]The law, available at `https://dre.pt/application/file/546137`, was published in November 3rd, 2006, and came into force on January 1st, 2007.

[3]These 450 days (or 15 months) are also convenient from an econometric identification perspective as that of this paper as this duration does not coincide with any of the most common durations of employment contracts, such as 1, 3, 6, or 12 months.

540 days over the previous 24 months (Decree-Law 119/99) and 270 days over the previous 12 months (Decree-Law 84/2003). After the 2006 law, the eligibility regime was changed only in April 2012 (Decree-Law 64/2012), four months after the end of our period of analysis, when eligibility was lowered to 360 days over the previous 24 months.

Other relevant aspects of UBs provision in Portugal (according to the 2006 law, in force until early 2012) are the following:

1. As indicated in Venn (2012), UBs (*Subsídio de desemprego*) are only provided in the case of involuntary unemployment following an employment contract (including the termination of fixed term contracts).[4] UBs can also be provided in the case of 'mutually agreed separations', a hybrid between a quit and a layoff, although these are subject to some constraints (UB-entitled mutually agreed dismissals are available in general to only up to 25% of the workforce or 80 workers, whichever lower, every three years, for firms facing difficult economic conditions).

2. UBs are conditional on enrolment with the public employment service and availabity to participate in active labour market policies (including training and wokfare programmes), reasonable levels of jobsearch, and to accept job offers of certain characteristics (including in terms of their salaries and locations). UBs are also conditional on fortnightly visits to jobcentres or, most commonly, local councils, although the latter typically involve very little activation, even in terms of jobsearch monitoring.[5]

3. The replacement ratio varies significantly depending on the previous employment income of the unemployed, from less than 65% for those than earned more than 4.6 minimum wages to nearly or 100% for those that earned less than 1.5 minimum wages. In general, the UB corresponds to 65% of the average monthly gross pay earned over the 12 months before the second month before unemployment (the 'reference pay'). However, if the reference pay is below the minimum wage, which is common for individuals with interrupted employment spells, then the UB is equal to the reference pay (100% replacement rate).[6]

[4]UBs are not provided for individuals whose labour contracts are terminated for subjective (performance) reasons, unless the dismissal is challenged at an employment tribunal. UBs are also not available for service providers (contractors).

[5]In preliminary results, covering a similar period to this study, 2005-2011, (Martins 2015*b*) finds that less than 70% of the subsidised unemployed have more than two jobcentre meetings with caseworkers over their unemployment spell, despite the prevalence of long-term unemployment. Such meeting occurs, on average, only more than seven months after the first meeting.

[6]The UB is also subject to two cummulative and binding ceilings (three times the minimum wage and the after tax equivalent of the reference pay), not subject to income tax, and taken into account in terms of the ammount of a future retirement pension. In July 2010, the second ceiling was lowered significantly for new unemployment spells, to 75% of the 'social support reference value' (Decree-law 70/2010). This 'reference value' corresponded to 88% of the minimum wage at the time.

4. UBs can be provided over relatively long periods, even for individuals who just meet the employment eligibility threshold. The exact maximum UB durations depend nonlinearly on the age of the unemployed and the duration of period worked before unemployment, ranging from 9 months (for the unemployed of age 29 or younger who have previously worked up to two years) to 38 months (unemployed of age 45 or above who have previoulsy worked at least 20 years).

5. There is a means-tested component to UB (*Subsídio social de desemprego*). This is made available for the unemployed who worked at least 180 days over the previous 12 months and whose household income per capita is below 80% of the minimum wage. This UB corresponds to the minimum wage (for the unemployed living with relatives) or 80% of the minimum wage (for the unemployed living alone), subject to a ceiling that corresponds to the net value of the reference pay (defined in this case as the average monthly gross pay earned over the six months before the second month before unemployment).

3 Data

We draw on a novel social security data set with monthly records of employment and UBs from January 2005 up to March 2012. The data set was made available by IISS,[7] and records all social-security related observations of a given 1% stratified random sample of all individuals with social-security records over the period considered. In total, the data set records over nine million individual-month observations or approximately 100,000 different individuals per month. Moreover, the data set also includes variables such as the individual's identifier, gender, date of birth, nationality, region of birth and residence, monthly earnings and contributions made by employers and employees, UBs, days of work, and the firm's identifier and location (if applicable).

Using the information described above, we define an individual to be in employment in a given month if there is a registration of employment contributions in that month corresponding to at least one day of work. Moreover, we define an individual to be in subsidised unemployment in a given month if there is no registration of employment contributions in that month and a positive level of UBs. Finally, we define an individual to be in non-subsidised

[7] IISS stands for *Instituto de Informática da Segurança Social*, or Social Security Information Technology Institute. The data is originally collected and processed by the Social Security Institute, another public agency.

unemployment in a given month if the individual has no record of employment contributions and no record of UBs in that same month.

It is important to note that, given the administrative nature of our dataset, we use the same information as the social security agency when UBs are processed, including the previous employment periods and salaries. This implies that we are not subject to issues that may potentially arise in survey data based on retrospective questions (such as the data sets used in the Canadian studies mentioned above), namely if respondents round previous employment durations in such a way that they happen to coincide with eligibility thresholds.

Our analysis is based on three different employment transition dummy dependent variables. The first variable records transitions from employment to subsidised unemployment, the second records transitions from employment to non-subsidised unemployment, and a third records both types of transitions from employment to unemployment. In order to account for situations in which the UBs are not paid immediately after the end of employment, we consider a two-month window in these transitions. Specifically, our employment to subsidised unemployment dummy variable is one for individual i in month t if that individual is employed in month t and receives UBs in either month $t+1$ or month $t+2$. Similarly, our employment to non subsidised unemployment dummy variable is one for individual i in month t if that individual is employed in month t and does not work and does not receive UBs in both month $t+1$ or month $t+2$.

We also create a variable denoting the number of days each individual works over the previous 24 months (the time window considered for the purpose of UBs eligibility). The period of reference will therefore, in general, be different for each person over time, as the 24-month window will move by one month every month (including one additional, new month and dropping the oldest month of the period). Another variable indicates if the previous 15 months include months without employment. This will allow us to distinguish between individuals that meet their elibility condition fully from their current employment spell or, alternatively, meet such condition from multiple employment spells (for instance, five months of work, followed by a nine-month period without employment, followed by ten more months of work). We also create a proxy for the replacement ratio, based on the ratio between the highest unemployment benefit of each worker and her mean salary, and a dummy for foreign individuals.

In the context of our regression discontinuity approach, described below, we construct our main running (or forcing) variables as the number of months worked over the previous two years. This variable is obtained from the sum of all days worked over the previous 24 months, transformed into months by dividing by 30 (a full month of work corresponds to 30 days, in terms of social security definitions).

After computing the variables above using data from January 2005 up to March 2012, we conduct our analysis on observations only from January 2007 up to December 2011. The choice of the first month is to ensure that we have information on the 24-month time window prior to the current employment for all observations. The choice of the last month is so we can follow individuals for at least two more months after the last period considered, to characterise transitions to unemployment which, in our definition, can occur over months $t+1$ and $t+2$. At the same time, this choice allows us to stop before the new eligibility requirements introduced in April 2012 are in force.

Moreover, we drop individuals aged below 18 and above 60 (the latter given the scope for early retirement), with more than 30 days of work per month or more than 720 days of work over the previous two years, or who die over the sample period. Given our focus on the employment ranges around the 15-month threshold, we also drop observations of individuals with fewer than 180 days of work over the previous two years. Given our interest in transitions from employment, we of course also disregard observations when individuals are not employed (after using such observations for the computation of the transition variables).

4 Descriptive statistics

Table 1 presents the descriptive statistics of the main data set used for our results. The observations are restricted to spells ranging between the 10th and 20th month of employment over the previous 24 months. We consider this to be an appropriate time window around the margin of interest, the 15th month of employment, at which unemployment benefit eligibility will be secured during the period under study. The observations are also restricted to the period from January 2007 up to December 2011, when the 15-month eligibility rule was in force. These restrictions result in a total of nearly one million individual-month observations (976,034) for analysis.

The descriptive statistics indicate that 52.2% of the (individual-month) observations are

women, the average age is 34.7 and 9.6% are foreign. The average salary is 671.6 euros while the average 24-month equivalent salary is 476.4 euros. The latter measurement is lower than the former because of months in which the unemployed is not employed, as indicated by the mean days worked statistic, at 485.8 days, in a maximum of 600. As expected, the mean UBs are lower than the mean salary, at 288.3 euros. The mean replacement ratio is 66.2%, very close to the benchmark replacement ratio of 65%.[8]

More specifically on the time dimension of the data, the mean observation corresponds to month number 53, or April 2009, given the scale adopted that ranges from 1 (2005:m1) to 84 (2011:m1). This is approximately half-way in the period considered in the data (2007:m1 to 2011:m12). The month of the spell (our running variable) averages at 15.75, very close to the eligibility threshold and mean point of the range selected (10-20). 63.6% of the (individual-month) observations refer to employment spells of 15 months or more, i.e. observations when eligibility applies. 35.5% of the observations concern discontinuous spells, i.e. employment spells that exhibit gaps over the previous (up to) 15 months.

Finally, we find that the monthly transitions probability from employment to unemployment (again, over the 10th to 20th month of employment) is 4.1%. This is split approximately equally between transitions to subsidised unemployment (2.1%) and non-subsidised unemployment (2.0%).

We also present graphically these probabilities across an extended employment duration range (6 to 24 months of employment, again over the previous 24 months), while highlighting the eligibility threshold (15 months) with a vertical dashed line. Figure 2 considers transitions to both types of unemployment, which exhibit a clear downward pattern, from around 5% up to the 11th month to less than 2% at the end of the range. However, the Figure also indicates an interruption of the downward relationship between employment duration and the unemployment transition probability at precisely the eligibility threshold, where the probability even increases slightly. The downward pattern only reappears at the 18th month of employment.

We now decompose the transitions to unemployment in their two components: transitions to subsidised and non-subsidised unemployment. Figure 3 presents the former case, in which again a very clear downward trend is found from the 18th month onward. However, transition

[8]When considering the mean UBs and 24-month equivalent salaries, the ratio is a bit lower, 60.5%, which reflects the role of sample composition effects.

probabilities up the 10th month are low and scattered, while from that point onwards the relationship appears to be downward again, except for a significant push upwards at the threshold 15th month of employment. This upward push at exactly the threshold level can be regarded as suggestive evidence of a positive effect of UB eligibility on the transition from employment to subsidised unemployment.[9]

Finally, we present the probability of transitions from employment to non-subsidised unemployment in Figure 4. In this case, we observe a nearly fully monotonic relationship between the probabilities and the duration of the employment spell. These probabilities fall from a peak of around 5% at the 6th employment month to a trough of around 0.02% at the 24th month. Unlike in the previous Figure, there is no evidence of a spike in transitions out of employment at the UB elibility level. This asymmetry between subsidised and non-subsidised transitions can be interpreted as evidence of no substitution between quits and layoffs at eligibility, consistent with moral hazard in employment durations.

It is important to reiterate that, given the design of the sample, these individuals are eligible to collect UBs when they meet the employment duration threshold at 15 months. The fact that no downward movement in non-subsidised transitions is observed at or shortly after that threshold can potentially be explained by a number of factors, other than moral hazard of UB eligibility. These factors include ignorance of UB provisions, UB stigma effects, perspectives of finding a new job very quickly (Anderson & Meyer 1997), or unwillingness to engage with activation measures that follow UB provision. However, in the case of Portugal, these reasons may not be particularly relevant, especially the last three, given the high and increasing level of unemployment over most of the period covered (in particular from 2008) and the poor activation practices in place at the time, as described in Section 2.1 and Martins (2015*b*). On the first reason, ignorance of UB provisions, there is also considerable anecdotal evidence about unemployed individuals that carefully count the number of working days required to reach UB eligibility.

[9]Transitions before eligibility can be interpreted as driven by means-tested UBs, given their employment duration requirement of only 180 days in the previous 12 months, as described in Section 2.1. On the other hand, the still higher percentage of transitions at months 17 and 18 can reflect the time taken to induce a dismissal, uncertainty about the exact number of days of previous employment, or efforts to improve the reference pay used to compute the future UB.

5 Results

After the suggestive but important graphical evidence presented above, we now estimate regression discontinuity models (Hahn et al. 2001, Lee & Lemieux 2010) for the three dependent variables we consider, using equations as follows:

$$T_{it} = \alpha + \beta D_{it} + S(\widetilde{Z}_{it}) + \epsilon_{it}, \tag{1}$$

in which T_{it} is a dummy variable that denotes for the transition to unemployment (all types, subsidised or non-subsidised unemployment), D_{it} is a dummy variable equal to one if the employment spell is ongoing for 15 months or more, and $S(\widetilde{Z}_{it})$ is a polynomial of the (centered) running variable (the month of the employment spell). In our benchmark specification we consider the (centered) running variable and the interaction of the (centered) running variable and the threshold dummy variable.[10]

As mentioned above, all observations concern individuals in months in which they are employed, in particular between the 10th and 20th month of employment over the previous 24 months. This implies that we do not consider employment observations of individuals that have been (continuously) employed for a long period and focus instead on those that have entered or re-entered employment recently - as stated above, no observation has worked more than 20 months over the previous 24 months. These are the individual-observations of interest from the perspective of a study of the effects of eligibility requirements.

Table 2 presents the results of equation 1, focusing on the coefficients of interest, namely those of the threshold dummy D_{it} (β). Consistent with the graphical evidence of Figures 2 and 3, we find that the transitions to unemployment and to subsisided unemployment increase significantly by .0047 or .0048 - approximately 0.5% - in both cases (with t-ratios of 5 or above). On the other hand, again consistently with the graphical evidence (Figure 4), the transitions to non-subsisided unemployment do not increase significantly (coefficient of -.0001, with a t-ratio of -0.16).

From a relative perspective, taking into account the general probabilities of transitions, the results on unemployment and, in particular, subsidised unemployment are even more noteworthy. For instance, the intercept coefficients of those dependent variables are, respec-

[10] See Martins (2015*a*) for another illustration of a regression discontinuity analysis based on eligibility thresholds.

tively, .0425 and .0221. From this perspective, the increases in transitions to unemployment at the eligibility threshold range between approximately 10% and 20%, the latter in the case of subsidised unemployment.

The striking asymmetry between the subsidised and non-subsidised effects highlight the moral hazard interpretation of the results. If transitions are not affected by the availability of UBs, then one would expect an increase in UB transitions and a corresponding decrease in non-UB transitions. The fact that the latter follows a very stable path across the 24-month range considered indicates that the spike in UB transitions arises from job spells whose termination is induced by the availability of UBs. In other words, there is no evidence of substitutability between the two types of transitions at UB eligibility.

We also extend the previous results by considering alternative regression-discontinuity specifications. Table 3 considers, for each one of the three dependent variables discussed so far, three additional specifications. These are: 'linear' (linear control of the forcing variable), 'quadratic' (quadratic controls of the forcing variable) and 'quadratic spline' (quadratic controls of both the forcing variable and the interaction of the forcing variable and the threshold dummy).

We find very similar results to those presented in Table 2. In particular, all results based on the transitions to unemployment and subsidised unemployment are significant, with point estimates ranging from .0044 and .0106. Moreover, with one exception (when the coefficient is positive), all results regarding the transitions to non-subsidised unemployment are insignificant.

5.1 Robustness checks

In order to check the robustness of our findings and test further the causal interpretation of the results, we replicate our benchmark specification on different subsamples of our data. These results are presented in Table 4 and again support the earlier results. For instance, we find very similar estimates to the .0047 obtained in Table 2 when considering only women or younger workers - below 40 - with coefficients of .0044 and .0053, respectively.

Moreover, we find that the estimates for the more recent period, since 2009:m1, when unemployment was higher and increasing, are also significantly positive, of a similar magnitude, and somewhat higher than the benchmark results, at .0059. This increase may also reflect

fewer voluntary transitions up to the eligibility threshold, given the reduction in job creation and hirings.

The estimates for individuals with high replacement rates - defined at 75% or above, ten percentage points above the reference replacement rate - are also significantly positive, of a similar magnitude, and again somewhat higher than the bechmark results, at .0056. This difference is consistent with the motivation for the study, as a worker that just meets the employment duration threshold for unemployment benefit eligibility will see her unemployment outside option improve dramatically, and more so the higher the applicable replacement ratio.

We also find that individuals with interrupted employment spells, i.e. that have job breaks over the qualifying period, are significantly positive. The coefficient for this group indicates an even stronger responsiveness to the eligibility threshold in terms of their transitions to unemployment, with a coefficient of .0104. This result is a particularly important robustness check, as it disentangles the direct effect from UB eligibility from cases in which the duration of the employment contract coincides with the eligibility requirement.

Moreover, in all cases reported in Table 4, similar findings are obtained when focusing exclusively on the transitions to subsidised unemployment, consistently with our previous results about the strong asymmetry between subsidised and non-subsidised unemployment.

Another important robustness check in regression discontinuity analyses concerns possible jumps in observable variables at the threshold of interest. Figure 5 presents some evidence in this regard by focusing on the key 10-20 month range and considering four variables: the female ratio, the mean age, the percentage of non-continuous employment spells, and the mean replacement ratio. From a visual perspective, we find no evidence of jumps in these observable characteristics at the threshold.[11] Figure 6 presents additional evidence, in this case considering the mean monthly salary, the mean 24-month equivalent salary, the mean unemployment benefit, and the mean total number of days worked. Once again, none of these variables exhibits jumps at the threshold employment duration.

Finally, we also conducted several additional robustness checks which further support the main results (not reported here but available upon request). These checks include the analysis of any jumps in the number of observations at the threshold, consideration of longer ranges of the employment spells (from 6 to 24 months instead of from 10 to 20 months), analyses based

[11] A minor exception may be the mean age variable, which jumps slightly at month 16. However, this was also the case at month 12 and perhaps month 10 as well.

on days (and not on months) as the running variable, analyses including control variables, and analyses based on collapsed data (both at the month and day level) - instead of the individual data.

6 Discussion

In most countries, the unemployed are entitled to insurance only if they have previously worked a minimum period of time. In this paper, we evaluate the impact of this sharp change in the disutility from unemployment on the duration of jobs prior to unemployment. We contribute to the existing literature by conducting our analysis using an increasingly adopted quasi-experimental methodology, regression discontinuity. Our analysis also draws on rich, longitudinal social security data from Portugal, where the unemployed are required to work a relatively long period of time, in contrast with the case of Canada, the country for which most evidence on this topic is available so far (Christofides & McKenna 1996, Green & Riddell 1997, Baker & Rea 1998, Green & Sargent 1998).

We find that monthly transitions from employment to unemployment increase by at least 10% as soon as the eligibility condition is met. These results are driven entirely by transitions to subsidised unemployment, as transitions to non-subsidised unemployment are not affected by the eligibility threshold. Moreover, in our robustness checks and extensions, we find that the increase in transitions from employment to (subsidised) unemployment is even higher for individuals subject to high replacement ratios or those who meet the eligibility condition from multiple employment spells.

Overall, our results stregthen the evidence about moral hazard in UBs, also before individuals become unemployed. In the same way that the provision of UBs may inefficiently increase the duration of unemployment spells (Meyer 1990, Lalive et al. 2006), the provision of UBs may also prompt inefficiently short employment spells. These effects may not invert an overall cost-benefit evaluation of UBs but may provide useful suggestions for policy in different countries, towards optimal UB design.

One policy recommendation that can be extracted from these findings concerns the considerable potential from more intensive activation of the unemployed that responded to the eligibility threshold. Individuals that become unemployed and collect UBs exactly at eligibility (or shortly after) should receive greater attention by public employment services in

terms of jobsearch assistance and monitoring or workfare, for instance. Amongst these unemployed, those that benefit from higher replacement ratios or that become unemployed following non-continuous employment spells should be the focus of even greater attention. Public dissemination of these targeted activation practices may also be relevant in terms of reducing any underlying potential moral hazard.

Another policy recommendation that follows from our results concerns the optimal threshold for eligibility. To the extent that the exogenous end of job matches - in our case because of the influence of eligibility - is more (socially) costly at longer employment durations - because of greater loss in firm-specific human capital and or greater disruption related to layoffs, for instance -, then lower eligibility thresholds may improve welfare. This argument can also be taken further to a possible conclusion that the optimal UB eligibility requirement would be zero, i.e. no minimum qualification period.

A third policy recommendation is about the sanctions applicable in the cases of voluntary separations. Although Portugal and at least twelve other OECD countries (including Canada) do not formally provide UBs in these cases (Venn 2012), our evidence suggests that these constraints are circumvented in practice, perhaps at a cost in terms of firm performance. In this case, the optimal UB sanction applicable in voluntary separations may be a given finite delay in UB provision rather than inelegibility.

The findings presented here also contribute to the European debate on labour market segmentation. This debate has been framed by the perceived negative economic and social effects from large percentages of workers under fixed term or other non-permanent employment contracts, as observed in many countries, including Portugal. Such segmentation is regarded by many as being driven essentially by labour demand choices of employers facing rigid employment law. Given our results, other researchers may need to consider also the labour supply dimension of labour market segmentation, in particular that stemming from potentially perverse incentives enshrined in specific UB design models.

Our evidence also raises a number of questions left for future research. These include the role of eligibility requirements in terms of the incentives to both formal work (when undeclared, informal work is an alternative) and longer short jobs (so to meet UB eligibility). Another question concerns the bargaining between employers and employees to label separations as involuntary when this is a requirement for UB provision. Yet another question concerns

the interplay between eligibility requirements and (fixed-term) contract duration, again in particular in environments where UBs are restricted to involuntary unemployment.

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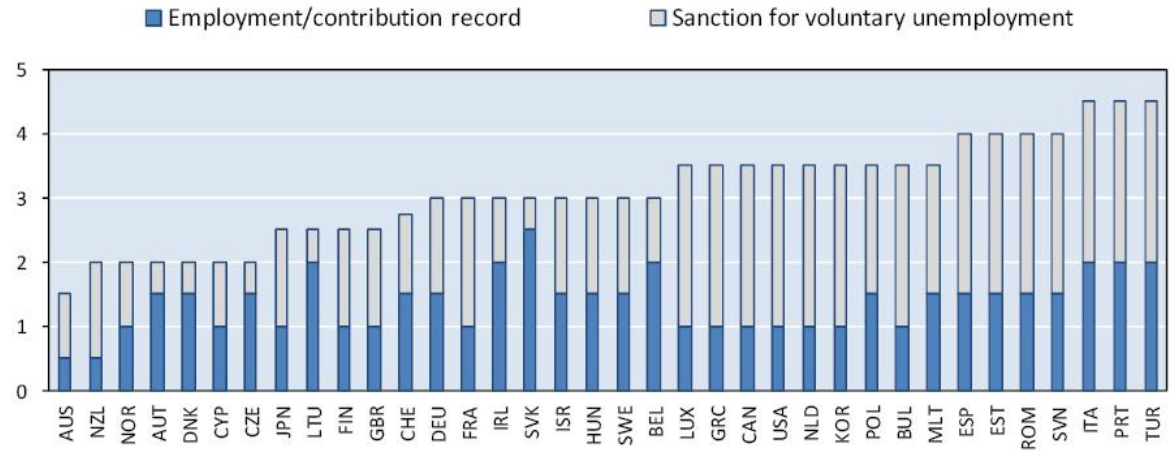
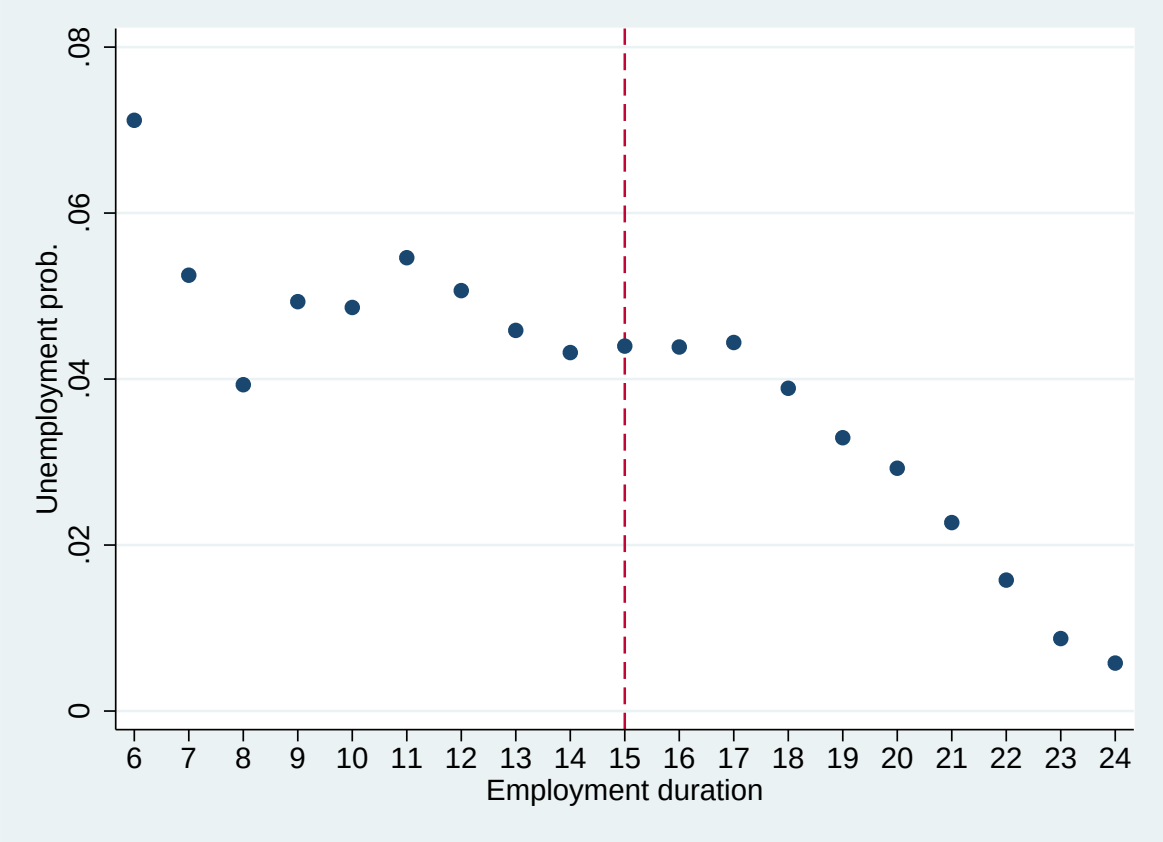
Figure 1: **Unemployment benefit eligibility across the OECD**



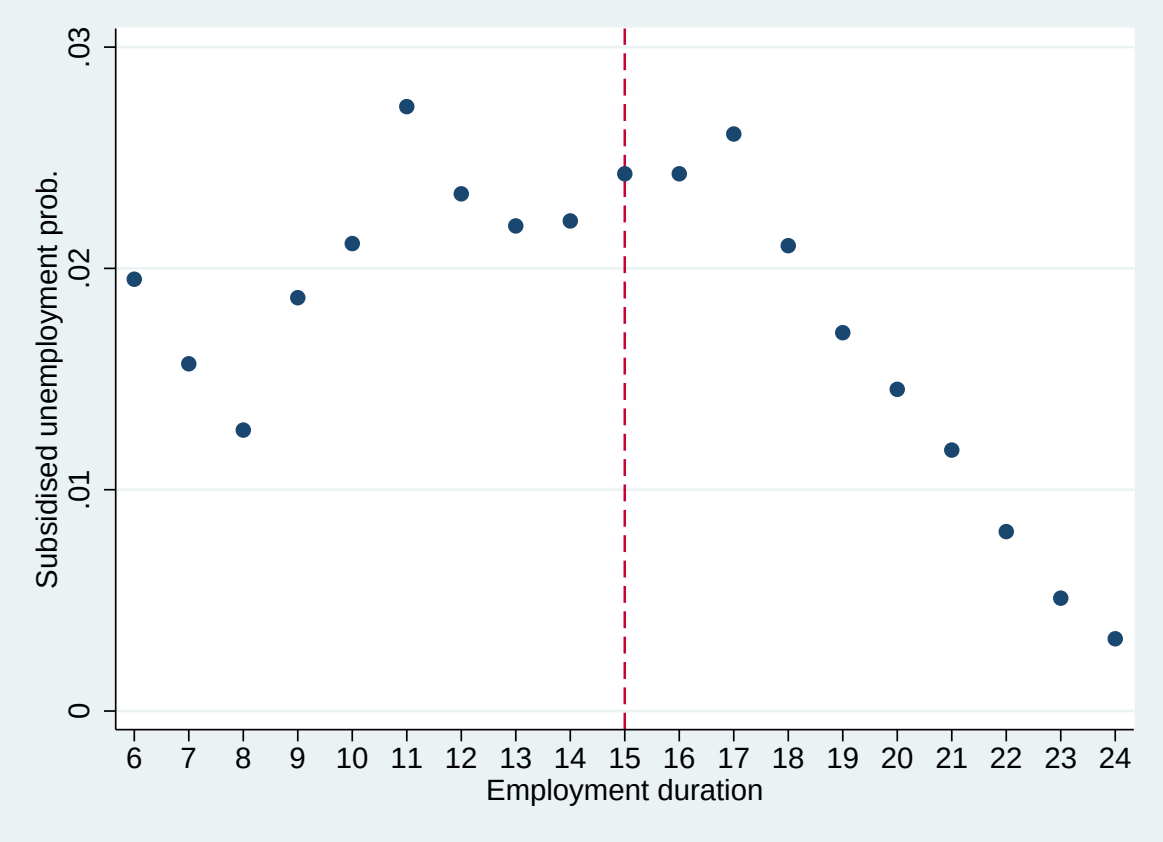
Notes: The figure presents two indicators of unemployment benefit eligibility: employment records (as studied in this paper) and sanctions for voluntary unemployment. Each indicator ranges from 0 to 2.5, in which 0 is the most flexible and 2.5 the most rigid. In particular, the coding of employment records is: 'No employment or contribution requirements' (value 0.5), '1-10 months employment/contribution record' (1), '11-13 months employment/contribution record' (1.5), '14-24 months employment/contribution record' (2), and 'More than 24 months employment/contribution record' (2.5). On the other hand, the coding of sanctions is as follows: '0-4 weeks' (including benefit reductions, value 0.5), '5-9 weeks' (value 1), '10-14 weeks' (1.5), 'More than 14 weeks' (2), and 'Ineligible for benefits' (2.5). Source: OECD (Venn 2012).

Figure 2: **Unemployment probabilities, by employment duration**



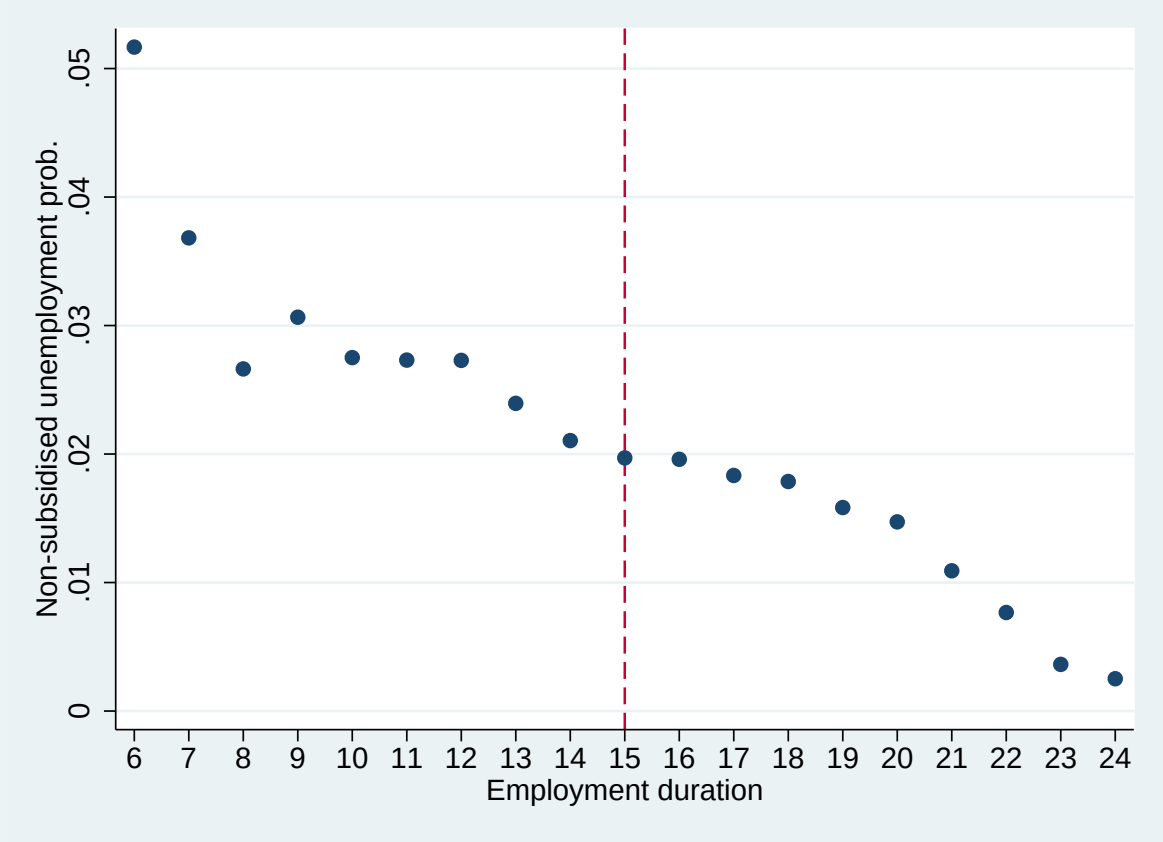
Notes: The horizontal axis indicates the values of employment duration over the previous 24 months. The vertical axis indicate the percentage of observations that become unemployed (either subsidised or non subsidised).

Figure 3: **Subsidised unemployment probabilities, by employment duration**



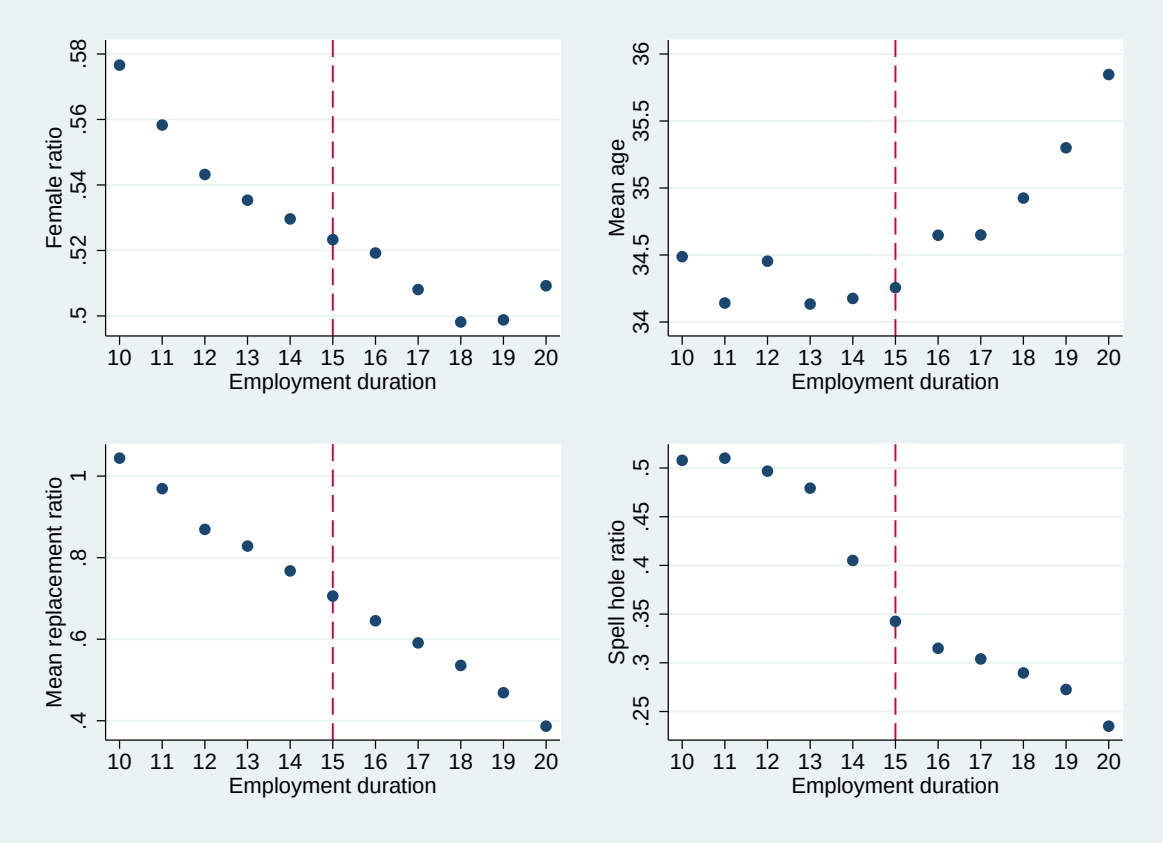
Notes: The horizontal axis indicates the values of employment duration over the previous 24 months. The vertical axis indicate the percentage of observations that become unemployed (either subsidised or non subsidised).

Figure 4: **Non subsidised unemployment probabilities, by employment duration**



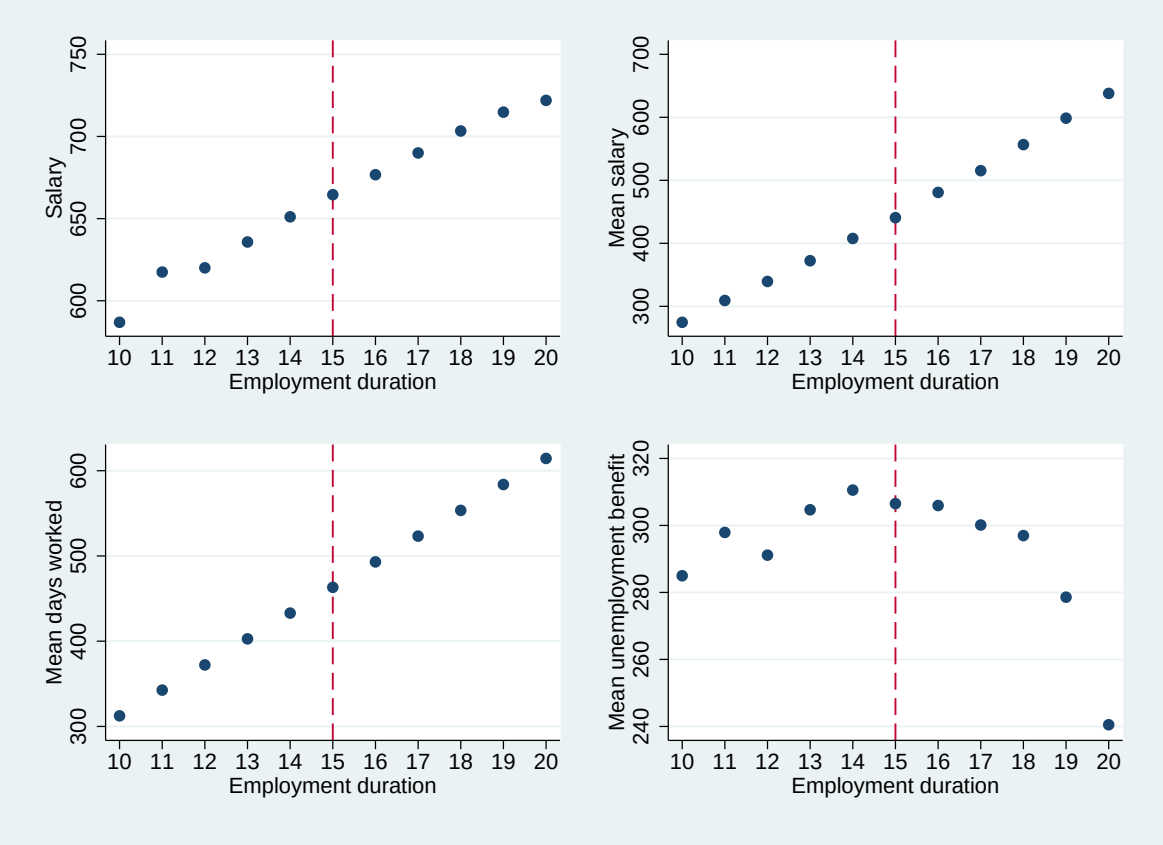
Notes: The horizontal axis indicates the values of employment duration over the previous 24 months. The vertical axis indicate the percentage of observations that become unemployed (either subsidised or non subsidised).

Figure 5: **Sample averages, different variables, by employment duration**



Notes: The horizontal axis indicates the values of employment duration over the previous 24 months. The vertical axis indicates (clockwise, from top left corner) the female ratio, the mean age, the percentage of individuals whose employment duration is not continuous over the previous 15 months and the mean replacement ratio.

Figure 6: **Sample averages, different variables, by employment duration II**



Notes: The horizontal axis indicates the values of employment duration over the previous 24 months. The vertical axis indicates (clockwise, from top left corner) the mean monthly salary, the mean 24-month equivalent salary, the mean unemployment benefit, and the mean total number of days worked.

Table 1: Descriptive statistics.

Variable	Mean	StDev
Female	.522	.499
Age	34.77	10.12
Foreigner	.096	.294
Salary	671.6	533.6
Mean (24-month) salary	476.4	338.3
Days worked	485.8	98.08
Mean unemployment benefits	288.3	397.4
Replacement ratio	.662	.861
Month number	53.41	17.07
Month of duration	15.75	3.23
Employment spells of 15 months or more	.636	.480
Discontinuous spells	.355	.478
Transition probability (from employment) to unemployment	.041	.199
Transition probability (from employment) to subsidised unemployment	.021	.144
Transition probability (from employment) to non-subsidised unemployment	.020	.140

Notes: Number of observations: 976,034. Number of individuals: 119,560. Only employment spells observed from 10th to 20th month of (continuous or interrupted) duration, over previous 24 months, during period 2007:m1 to 2011:m12. *Salary*, *mean (24-month) salary* and *mean unemployment benefits* measured in monthly nominal euros. *Mean salary* corresponds to the sum of all salaries over the previous (up to 24) months, divided by 24. *Days worked* corresponds to the number of days worked in the previous (up to 24) months. Given that the sample considers only spells up to the 20th month, the maximum number of days worked is 600 (30x20). *Mean unemployment benefits* corresponds to the mean unemployment benefits of each individual over all months in which the individual appears in the data. *Replacement ratio* is the ratio between the mean unemployment benefit and the mean salary. *Month number* is a variable in which 1 corresponds to 2005:m1 and 84 corresponds to 2011:m12. *Month of duration* indicates the month of the spell (ranging from 10th to 20th). *Employment spells of 15 months or more* is a dummy variable which highlights individual-month observations that correspond to the 15th or later month of employment (over the previous 24 months). *Discontinuous spells* is a dummy equal to one for individual-months in which the previous (up to 15) months of employment are not continuous. *Transitions to (subsidised, non-subsidised) unemployment* correspond to individual-months in which the following month or second month is in (subsidised, non-subsidised) unemployment. Own calculations based on IISS data.

Table 2: Main results

Dependent variable	Coefficient	t-ratio	p-value
Transition to unemployment	.0047	5.13	0.000
Transition to subsidised unemployment	.0048	7.23	0.000
Transition to non-subsidised unemployment	-.0001	-0.16	0.873

Notes: Each row reports the coefficient of the (centered) threshold dummy in a different regression discontinuity spline specification (i.e. controlling also for the forcing variable and an interaction between the forcing variable and the (centered) threshold dummy). Each row considers a different dependent variable. The coefficients of the constants in each specification are, respectively, .0425, .0221, and .0204. Number of observations in each regression: 976,034. Only employment spells observed from 10th to 20th month of (continuous or interrupted) duration, over previous 24 months, during period 2007:m1 to 2011:m12.

Table 3: Alternative specifications

Transitions to unemployment

Specification	Coefficient	t-ratio	p-value
Linear	.0065	7.81	0.000
Quadratic	.0044	5.03	0.000
Quadratic spline	.0106	6.23	0.000

Transitions to subsidised unemployment

Specification	Coefficient	t-ratio	p-value
Linear	.0074	12.20	0.000
Quadratic	.0049	7.71	0.000
Quadratic spline	.0069	5.63	0.000

Transitions to non-subsidised unemployment

Specification	Coefficient	t-ratio	p-value
Linear	-.0008	-1.47	0.141
Quadratic	-.0004	-0.79	0.427
Quadratic spline	.0036	3.05	0.002

Notes: Each row reports the coefficient of the (centered) threshold dummy in a different regression discontinuity specification: linear (linear control for the forcing variable), quadratic (quadratic control for the forcing variable) and quadratic spline (quadratic control for both the forcing variable and the interaction of the forcing variable and the threshold dummy). Each group of three rows considers a different dependent variable. Number of observations in each regression: 976,034. Only employment spells observed from 10th to 20th month of (continuous or interrupted) duration, over previous 24 months, during period 2007:m1 to 2011:m12.

Table 4: Robustness checks

Subsamples	Coefficient	t-ratio	p-value	observations
Women	.0044	3.51	0.000	510,332
Age below 30	.0053	3.81	0.000	393,445
Period starting in 2009:m1	.0059	4.71	0.000	559,784
Replacement ratio above 75%	.0056	3.78	0.000	421,766
Interrupted employment spells	.0104	6.50	0.000	347,161

Notes: Each row reports the coefficient of the (centered) threshold dummy in the benchmark regression discontinuity specification: linear spline (control for both the forcing variable and the interaction of the forcing variable and the threshold dummy) and transitions to unemployment. Only employment spells observed from 10th to 20th month of (continuous or interrupted) duration, over previous 24 months, during period 2007:m1 to 2011:m12.