1. Introduction

The role that unemployment insurance (UI) schemes have on unemployment duration has attracted considerable research effort. From a theoretical point of view, unemployment benefits (UB) should increase unemployment duration. This is due to their effect on reservation wages, which increase with the level of benefits, and on job search effort, which decreases with benefits (see Rogerson *et al.*, 2005 for an analytical discussion of these effects). Given that higher reservation wages reduce the number of acceptable job offers and that lower search effort reduces the overall number of offers, there should be a positive relationship between benefits and unemployment duration. However, current UI schemes usually impose eligibility criteria on unemployed workers in the form of active search and they also provide some re-employment assistance. These latter aspects may mitigate or even overturn the perverse effect of benefits on unemployment duration.

A recent strand of research on UB has focused on the consideration that the relationship between benefits, reservation wages and search effort is conditioned by the role that liquidity constraints have in the job search process. Unemployed workers are greatly constrained in their consumption and this prevents proper consumption smoothing and greatly reduces their utility (see for example, Browning and Crossley, 2001a and Browning and Crossley, 2008): under these circumstances, workers are eager to prevent the fall in consumption and are ready to accept any job offer they receive and to put great effort into job search.

It is clear that unemployment benefits can mitigate liquidity constraints and allow workers to stay closer to their optimal consumption path without having to accept the very first job offer they receive (for analyses of the role of benefits in affecting consumption smoothing see Browning and Crossley, 2001b and Bloemen and Stancanelli, 2005). This increases unemployment duration but also allows a longer search, possibly leading to a better and more efficient job match. These issues are particularly important: if unemployment duration is increased due to mitigation of liquidity constraints, then unemployment benefits increase social welfare, allowing better consumption smoothing and possibly a more efficient job match. However, individuals receiving benefits could also simply search less, trying to extract the most from the scheme because, to some extent, they are basically paid while being out of work and only as long as they stay out of work. In practice, there could be moral hazard behaviour that strictly diminishes search effort and social welfare. The liquidity constraints component and that of moral hazard are probably both induced by benefits but depending on their relative importance an optimal level of unemployment insurance can be designed (see Cahuc and Zylberberg, 2004).

That said, the above discussion also raises the consideration that wealth, and possibly household wealth, might strongly affect the degree of liquidity constraints and hence unemployment duration. Even more so, the effect of unemployment benefits on search effort and reservation wages may well depend on how important the UB are in mitigating liquidity constraints and the effect of UB might thus differ among unemployed individuals living in households of different wealth and under different degrees of financial stress. This consideration is also supported by Browning and Crossley (2001b) who show that benefits are effective at mitigating the fall in consumption for unemployed workers only if their household had scarce financial assets at the time of job loss.

The focus of this paper is precisely to test whether or not the empirical data support this theoretical reasoning, thus seeking to assess the role of wealth and benefits and, specifically, the existence of an interaction between wealth and benefits in determining unemployment duration.

Among previous works that explored the issue of wealth and unemployment duration, Bloemen and Stancanelli (2001) find wealth has a positive effect on reservation wage and, consequentially, a negative effect on re-employment probability. An analysis of the role of wealth on the transition from unemployment to employment is contained in Bloemen (2002), where a proxy variable for wealth is computed and its effect on the probability of obtaining a job is tested. However, these analyses do not focus directly on the relationship between wealth and unemployment duration and do not investigate possible interactions between benefits and wealth. A comparative analysis for Finland, Italy and Poland is developed by Corsini (2012), whose findings indicate that wealth and financial pressure directly affect duration though the interaction between benefits and wealth is not explored. While not directly focusing on wealth, Pellizzari (2006) highlights how the effect of UB may be influenced by other concurrent welfare schemes, further indicating the relevance of liquidity constraints in unemployment duration. The role of wealth on benefits is tackled more closely by Chetty (2005) and Chetty (2008) where evidence from the US is used to disentangle moral hazard and liquidity constraint effects implied by UI. For this purpose, Cox hazard models are used to perform estimations for different groups of people, which are identified by the presence or absence of liquidity constraints. An estimation using data on lump sum severance payment only is also used: since no moral hazard effect can derive from such payments, the data are used to focus explicitly on liquidity constraints: the conclusions seem to indicate that the latter motive is more important than that of moral hazard. On a similar topic, Card *et al.* (2007) use a regression discontinuity approach on Austrian data in an attempt to evaluate the effect of lump sum benefits and maximum potential duration of benefits on search behaviour and unemployment duration, where the discontinuity stems from the eligibility criteria for the unemployment benefit scheme in Austria. Since the effect of severance payment and maximum duration appears to be similar, they conclude that the liquidity constraints motive plays a greater role than that of moral hazard (which should actually be absent in the case of severance payments).

Our paper aims to contribute to this line of research, starting from considerations on the role of liquidity constraints and extending them to include the role of household wealth in determining unemployment duration. In particular, we investigate the interaction between benefits and wealth. Indeed, it is quite possible that unemployment benefits are not so important in mitigating the liquidity constraints of wealthier recipients and thus, for this kind of recipient, the effect of benefits on duration should be milder or even negligible. The existence of an interaction of wealth and benefits is particularly important when designing UI schemes and should be taken into account for policy indications.

Our investigation focuses on the Italian case, using data on employment, income and wealth for the year 2007 from the EU-SILC survey (the same data that were used in the comparative analysis developed in Corsini, 2012). We perform survival analyses of newly unemployed workers (where the non-survival condition is actually finding a job) and we use Cox hazard models to estimate the determinants of unemployment duration, trying to disentangle the role of unemployment schemes and household wealth and also searching for the presence of interactions between benefits and wealth and financial conditions. We use three main variables to assess household wealth and financial conditions: mortgage interest payments, taxation on wealth (which is a proxy for actual wealth) and the self-assessed degree of economic problems within the household (which, in the database, is obtained from the answer to a question on whether the household was able to make ends meet). A fourth variable is added to assess the impact and the relative importance of job loss on overall household income: to assess this aspect, we use the ratio between the net earned income of the newly unemployed in the previous year over the total disposable income of the household in the same period. According to Browning and Crossley (2001b) this ratio is extremely important in determining the fall in consumption that is produced by the job loss and hence the extent of the liquidity constraints. We end up

with four variables which cover aspects that are different, but still essential, in determining the financial stress and household wealth: an accurate measure of financial pressure (mortgage to be repaid), a proxy for household actual wealth (tax on wealth), the subjective perception of economic problems and the impact of the job loss within the household economy. In truth, while taxation on wealth might not proxy wealth perfectly, it does have a very useful property: this variable is a very good proxy of the "recorded" (and observable) wealth, and thus can be profitably used to formulate some policy indications.

To start with, we assess the direct effect that these measures of wealth/financial conditions and unemployment benefits have on unemployment duration. Then we move to the core of our analysis and we partition the individuals into groups, first on the basis of their wealth class and then on the basis of their perception of economic problems. Once we have obtained this partition, we perform Cox regressions allowing for the effect of benefits on unemployment duration to be different between these groups, and we then test whether such an effect statistically differs among the various groups.

The results we obtain are interesting both as regards the direct effect of household wealth and the interaction of the latter with unemployment benefits. In particular, our analysis not only confirms the fact that wealth and financial conditions have a positive effect on duration but highlights a complex interaction between wealth and benefits: we find that individuals belonging to households of different wealth react differently to unemployment benefits, and in particular the effect of benefits on unemployment duration is milder and in some case negative for individuals from households that are better off. This has important policy consequences as it shows that granting UB to wealthier individuals is not merely a waste of money as it enhances their re-employment probabilities (through the employment services offered) and it does not produce a significant increase in unemployment duration.

Our empirical analysis also shows that the baseline hazard function (the function that determines the probability of leaving unemployment at a given moment conditional upon still being unemployed at that moment) is increasing with respect to time: this can be interpreted as an effect of liquidity constraints which, as time in unemployment passes, become ever tighter and induce individuals to search harder or to accept any job. From this point of view the analysis of different groups sheds further light: the baseline hazard function for individuals from the better-off group still increases through time but at a slower pace. This further indicates 1) that the rising pattern of the baseline hazard rate is due to the liquidity effect and 2) that differences in the tightness of liquidity constraints between the groups are relevant in determining unemployment duration.

The paper is organized as follows: in section two we outline the Italian unemployment insurance scheme, in section three we describe the data used in the analysis, and in section four we perform the empirical analysis and discuss possible interpretations of the results. Section five summarises our findings and concludes with some policy implications.

2. The Italian unemployment insurance scheme

According to the Italian UI scheme (in the year 2007) unemployed workers are entitled to receive ordinary unemployment benefits that amount to 50% of the average wage computed during the three months prior to losing their last job. The standard maximum duration is six months but workers receive lower benefits (40% of their wage) during the seventh month. Workers over fifty receive benefits also after the seventh month for a maximum of ten months (but during the tenth month the benefits are reduced to 30% of wages).

In any case, the maximum benefit is set at 844 EUR or at 1014 EUR if the past average gross wage was above 1826 EUR. Eligibility criteria dictate that workers should: a) not have voluntarily left their last job, b) have held a job during the last two years, c) have paid social security contributions as an employee for at least 52 weeks during the last two years[1] and d) have registered at the local employment centre (EC) and stated their willingness to work and to be effectively searching. In addition, the worker has to draw up and sign, together with counsellors from EC, an individual action plan (IAP) describing specific action that he/she agrees to undertake. While Italian legislation specifies that search efforts should be monitored, it does not include any sanctions in the event of lack of search effort nor does it exactly determine how monitoring should be carried out. Hence deciding whether and how to monitor such effort depends on the EC's initiatives. In addition, individuals who are not eligible for benefits can register at the EC and receive counselling. However, this is a voluntary decision and the EC does not necessarily have to implement an IAP for them.

There are two other specific schemes in Italy which are worth mentioning: what is known as the *Cassa Integrazione Guadagni* (CIG) and mobility unemployment benefit (MUB). The CIG is given to workers temporarily laid off or to workers who are forced to work reduced hours. This scheme is reserved to private sector employees in some selected industries (most of the industrial sectors are covered) and has to be agreed between firms and the INPS (the Italian social security agency) which authorizes it in the case of unfavourable economic circumstances. Under the CIG workers receive 80% of their gross wage for the work time lost. They retain their job contract (their contract is not terminated) and are not classified as unemployed. Thus, even if they receive a form of income support, they do not enter our analysis.

By contrast, MUB is given to workers previously on CIG whose firms have made collective dismissals or have gone bankrupt. In the former case, if the firm that has laid-off the workers hires new employees, it is forced to hire workers currently on mobility unemployment benefits. Workers receiving MUB are therefore slightly more likely than others to get a new job. The duration of these benefits is particularly long (from 12 to 48 months, depending on the sector and geographical area) and recipients are given 80% of their gross wage. That said, the programme is not very extensive: only 3% of unemployed workers received this kind of benefit in 2007 according to the Bank of Italy survey on household income and wealth (SHIW).

Under Italian legislation, the UI scheme is thus the main scheme that directly targets unemployed workers. There exist, however, some other income support schemes to which unemployed workers can, in some cases, be entitled: 1) social assistance, a means-tested transfer for individuals over 65; 2) family allowances, a means-tested transfer on household income and restricted to married individuals who are working, are receiving unemployment benefits or are retired; 3) child allowances, a transfer for households with at least three children under 18, means tested on household income. It should be pointed out these three schemes are not specifically conceived for unemployed workers and can only be accessed under specific conditions. Once UI has run its course, there is no widely available support scheme which is directly available to unemployed workers (even if, in some rare cases, they can apply for social assistance and child allowances).

3. Data description

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[1] Given this requirement, also individuals who were self-employed before becoming unemployed are, in principle, eligible for benefits. This happens if, at some point in the previous two years, they were also in paid employment and had thus paid enough social security contributions.

Our analysis relies on Italian data from the EU-SILC survey. In particular, we focus on the 2008 survey which contains detailed data on individuals and households in 2007. In some cases, we also use information from the 2007 survey to obtain data for 2006. We use the survey to identify newly unemployed individuals and perform our analysis specifically on them. A worker is termed *newly unemployed* if he/she is currently unemployed and was in paid employment or self-employed during the previous month. The survey allows us to obtain the working status for each calendar month and we use this information to identify the newly unemployed and to compute unemployment duration (in months) for those individuals that end up finding a job. Following the EU-SILC survey classification, an individual is termed *unemployed* if they have specifically stated that they are unemployed, that they are not currently in paid work nor in self-employment, and that they do not fall in the following categories: retired, students, armed forces or other forms of inactivity. According to the EU-SILC classification, individuals on temporary lay-off are reported as employed if they receive at least 50% of their gross wage. This means that workers who are on the CIG scheme are not considered unemployed. In computing unemployment duration we also include workers who were still unemployed during December 2007, but their condition is censored as we do not know when and if they end up finding a job. In all, there are 555 newly unemployed workers in the survey, with 232 of them finding a job by December 2007.

Apart from working status, the survey contains detailed information on the demographic (age, gender, education and so on) and economic characteristics both of the individual and the household (income from unemployed benefits, past unemployment, past income and some measures of the household wealth). The information on income from unemployed benefits takes the form of the total income from ordinary unemployment benefits, mobility benefits and severance payments: we divide this amount by the total months of unemployment in 2007 to obtain average monthly benefits[2]. As we mentioned above, our definition of unemployment does not include workers on CIG benefits (as they receive 80% of their wage): therefore the unemployment income for the individuals we are analysing does not contain any CIG benefit.

The EU-SILC survey also contains some information on household wealth and financial conditions that are useful in our analysis. As a proxy for the level of household wealth we use the amount of taxes on wealth per equivalized household component[3]. The EU-SILC describes this variable as "taxes that are payable periodically on the ownership or use of land or buildings by owners[4], and current taxes on net wealth and on other assets (jewellery, other external signs of wealth)" and is computed at the household level. Clearly, taxes on wealth do not exactly mirror wealth. However, ownership of land, building and financial assets are not easily concealed and thus the relationship between taxes paid and actual wealth should be quite tight. In addition, this proxy has a very useful property: the variable is a very good proxy for the "recorded" (and observable) wealth, such that it is a particularly effective basis for formulating some policy indications. To further measure financial pressure we also use the yearly interests on mortgages (if any) paid. Finally, we use some qualitative information on the household economic situation[5]. In the survey, this took the form of a question on whether

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[2] We also correct for the fact that maximum duration of benefits is seven months (ten for older workers) and benefits are therefore zero after this threshold: this means that unemployment benefits are a time-varying variable.

[3] We use the equivalizing scale provided by EU-SILC. This scale takes into account the age of household components giving more weight to adults. A full description of the scale can be found in Eurostat (2007).

[4] Note that in Italy in 2007 there was a (progressive) tax on the individual's main residential property, whereas the tax in question was abolished the following year.

[5] This information gives also partial insight into whether individuals received some severance payments: indeed, such payments are likely to improve the household's economic condition.

the household was able to make ends meet[6] and individuals could give six different answers: "with great difficulty", "with difficulty", "with some difficulty", "fairly easily", "easily" and "very easily". Finally, we compute the ratio between personal labour net earnings in 2006 over household disposable net income in 2006. This variable should capture the impact of job loss on the household's economic conditions and, as suggested in Browning and Crossley 2001b, it measures the extent of the fall in household consumption during the spell of unemployment.

4. Empirical analysis

We now proceed to estimate the key determinants of unemployment duration and to assess the role of UB and household wealth. As we stated in the previous section, we identified 555 individuals who became unemployed in 2007. However, our sample drops to 527 because there are variables missing for some individuals. In the analysis we use the sampling weights provided by the EU-SILC database. To obtain a more homogeneous group of observations, we focus only on workers who have just become unemployed, such that the duration of unemployment before the period of observation is the same (being equal to zero) for all individuals (see Petrongolo, 2001).

In particular, we perform a survival analysis, that is, we estimate the probability of an unemployed worker finding (and accepting) a job and how this probability changes through time, trying to assess how selected covariates affect the transition probability: this procedure is quite standard when dealing with unemployment duration (see Petrongolo 2001 and Pellizzari 2006 for analyses with similar empirical strategies). We estimate a function $h(t)$ that determines the probability that individuals become employed at time t, conditional upon the fact that they were still unemployed at time t: this is called the hazard function. Let $F(t)$ be the probability of not being unemployed after period t and $S(t)=1-F(t)$ the probability of still being unemployed after period t. Then if $f(t)=F'(t)$ (that is, $f(t)$ is the probability of switching from employed to unemployed at exactly time t), we have:

1) $h(t) = f(t)/S(t).$

Given the above equation for $h(t)$, the average duration of unemployment may be given by *1/h(t).* To perform our estimation, we assume that $h(t)$ depends on a set of parameters and on a set of covariates that influence the probability of leaving unemployment: the hazard function then takes the form $h(t,\theta,x)$ where θ is a set of parameters to be estimated and x is a vector of explanatory variables. We assume that the effect of the covariate is the same in each period, thereby obtaining the Proportional Hazard Model:

2) $h(t) = h_0(t, \theta_0) \cdot \rho(x, \theta_x)$

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[6] The exact form of the question present in the EU-SILC questionnaire is: "Concerning your household's total monthly or weekly income, with what degree of ease or difficulty is the household able to make ends meet?"

where $h_0(t, \theta_0)$ is known as the baseline hazard function, which only depends on time (and the parameters θ_0) and where $\rho(x, \theta_x)$ determines the effects of the covariates. In the first step of our econometric analysis we use equations (1) and (2) to obtain, through Cox semi-parametric and parametric models, estimates of the parameters θ_x and this allows us to determine which parameters are relevant to explaining duration. Preliminarily, we perform estimations considering that the baseline hazard function and the effect of benefits on duration are the same for the whole population; then we specify Cox-regression models where these two factors are specific to groups defined on the basis of their wealth class and on the degree of their economic problems.

This preliminary regression follows closely what was done by Corsini (2012): in fact, we allow for the effect of benefits (measured in hundreds of euros) on duration to be time-varying (adding another variable which is given by the interaction of unemployment benefits and time) and we include directly some measures of wealth and financial stress within the regressors. In particular, the following variables are included: 1) the amount paid for the mortgage (in hundreds of euros), 2) taxes paid on wealth (in hundreds of euros and divided by the equivalized size of households) and 3) a qualitative variable that represents, according to the individuals, whether the household is "having problems in making ends meet"[7]. In addition, unlike previous analyses on duration, we also include the ratio of individual net earned income[8] to household net disposable income in the previous year. We also include a "house ownership" dummy which indicate whether the ownership of the main dwelling belong to a household member. Several other variables were also added as regressors, though only age, education and to, some extent, region of origin[9] seem to be relevant. On the contrary, other "standard" controls were not significant: neither gender, marital status, past income, being in self-employment in the past nor household size had a statistically significant effect. Finally, to allow for some unobserved characteristics that could make individuals more likely to stay in unemployment we add a variable which measures months spent in unemployment in 2006.[10]

In principle, it would be interesting also to include some data on the industry/sector where individuals are searching for a job: this would add some information on the demand-side part of the searching process. While the dataset contains information on the last job held (which could be a proxy for the future job sector) this is information is actually missing for almost half of the individuals. Therefore, we cannot add this aspect to our analysis and we have to rely on information on education and on past unemployment to partly include the demand-side component.

Results for this preliminarily regression are reported in Table 1, model (i): in the table, a coefficient that is statistically greater than 1 implies that the variable increases the probability of finding a job, while a coefficient lower than 1 implies the opposite effect. In particular, the coefficients tell us the ratio between the baseline hazard rate and the new hazard rate after one unit increase in the independent variable. All the

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[7] This latter variable takes the form of a dummy which is one if the household is experiencing great difficulty or difficulty in making ends meet

[8] Since our sample is made only of workers that *became* unemployed in 2007, earned income in the previous year is not affected by the current spell of unemployment.

[9] In particular, we use age and age squared to allow for the non-linear effect of age. Education enters the regression as two dummies: the first is one if individuals have lower than upper secondary education (ISEC degree 3 or higher) and zero otherwise; the second is one if individuals have higher than upper secondary education (ISEC degree 5 or higher) and zero otherwise; having upper secondary education is thus considered the baseline. The region of origin is expressed as a dummy which is one if individuals comes from the south of Italy (which is the least developed part of the country) and zero otherwise.

[10] Since our sample is made only of newly unemployed, the months spent in unemployment in 2006 necessarily belong to another spell of unemployment and thus are not already included in the actual unemployment duration.

monetary variables are measured in hundreds of Euros and therefore a unit increase corresponds to a 100 Euro increase. Similarly, subtracting one from the coefficients we obtain the percentage change in average duration. The significance level is related to the probability of rejecting the hypothesis that the coefficient is different from 1. That is, significance implies that the regressor has an effect on re-employment.

[TABLE 1: Cox estimations of re-employment probabilities]

The results confirm the main findings of Corsini (2012): unemployment benefits have an immediate positive effect on the probability of finding a job, and the requirement of actively searching and the employment services offered within the UI scheme appear to be the driving forces behind this result. Consequentially, the effects related to liquidity constraints and moral hazard appear to be, initially, of second order. In any event, this total positive effect is very mild: the coefficients tell us that, initially, an increase in benefits of 100 euros increases the hazard rate by 1% (i.e. duration would be reduced by 1%). However, the interaction between time and benefits has a significant negative effect on transition probabilities. We interpret this as an indication that re-employment counselling and search requirements are restricted only in the very first period. Indeed, the Italian system does not indicate any sanction in the event of lack of search and while search effort should be monitored, no explicit indication is given as to how this monitoring should take place. Therefore we interpret this as an indication that, as time passes, the incentives in the quantity and quality of search disappear and liquidity constraints and moral hazard motives resurface and possibly prevail: thus, with time, the positive effect of benefits on the probability of finding a job becomes smaller and eventually turns negative.

As for the initial positive effect on re-employment probabilities, it should be stressed that our results indicate that job counselling (and search requirements) is effective for recipients of benefits but, in principle, it could be effective even for non-recipients if they were strictly compelled to receive counselling (and to have search requirements). However, given that ECs already offer some non-compulsory counselling to non-recipients, our results suggest that non-recipients certainly do not take great advantage of the (optional) job counselling that is offered to them. This also implies that: i) receiving benefits appears to be a good instrument to make job counselling effective even if, obviously, they are not necessarily the only instrument and 2) it may well be the presence of benefits rather than their level which is important, though excessively low benefits would probably cease to be a good incentive. The point here is that not-too-low benefits appear to be good incentives to receive counselling and, to a lesser extent, to search actively, such that devising an equally effective form of incentive could be difficult.

Our results also show that the variables capturing the effect of liquidity constraints confirm that the latter reduce unemployment duration: individuals with mortgages to pay, from poorer households or facing problems in making ends meet, have a higher probability of finding a job. Interestingly enough, house ownership alone does not affect re-employment: this implies that what matter it is its wealth dimension and the mortgage that, in some cases, is paid for it. An even more relevant effect concerns the ratio between past individual net earned income and past household net disposable income: its effect is positive and its magnitude very large. From this point of view, our results tell us that a change from a ratio of zero (i.e. an individual who was not contributing at all to the household income) to a ratio of one (i.e. an individual who was the sole source of income within the household) more than halves the duration of unemployment. This result is perfectly compatible with the findings of Browning and Crossley (2001b) on the determinants of falls in consumption during unemployment spells.

The rest of the results are quite standard: young and old individuals stay unemployed longer as well as individuals with lower education, those living in the south of Italy and those previously unemployed, though the latter two are slightly above the 10% significance threshold. Hence, while possibly relevant in capturing unobserved characteristics, they have no statistically relevant effects. As for the role of education, it is interesting to note that individuals with a college degree have a higher probability of finding a job than workers with upper secondary education, but this difference is not statistically significant. Clearly, we are still missing from the picture the role that demand-driven factors can play in the searching process: while education and past unemployment can partly capture these factors, our results are not able to cover and to fully control for the demand-side effects.

To test for the robustness of these results we also estimate the model in parametric form, assuming that $h_0(t, \theta_0)$ takes the form of a Weibull distribution. The results, described in regression (ii) in Table 1, confirm qualitatively all the above findings. The parametric model also allows us to estimate the logarithm of the ancillary parameter that defines the shape of the Weibull distribution. Within this distribution, a value of the logarithm of the ancillary parameter greater than 0 implies an increasing baseline hazard rate. This result that we obtain in our analysis is particularly interesting because it can be interpreted as the direct effect of liquidity constraints that, as time in unemployment passes, become even tighter and induce individuals to search harder or to accept any job.

Finally, to further allow for possible unobserved heterogeneity we estimate a frailty model (regression *iii* in Table 1) where we control for heterogeneity, adding in the estimation of the hazard rate a random multiplicative factor which is inverse Gaussian distributed: also in this case the results are qualitatively the same and the coefficients related to wealth actually are more significant.[11]

A final check of robustness was done using only observations of individuals whose level of benefits lies below the maximum allowed by law. This was done because individuals whose benefits exactly correspond to the maximum can have a replacement ratio that is lower than the rest of the unemployed and a lower replacement ratio may act as a further incentive to search and accept jobs. The analysis of this sub-sample is contained in appendix A and confirms the main results.

4.1 The effect of benefits on different wealth classes

The above findings on the role of wealth and financial constraints suggest that UI schemes could work differently on individuals belonging to households of different wealth and different degrees of economic conditions. To explore this possibility, we estimate again the semi-parametric Cox hazard model allowing for the baseline hazard function, the coefficient for benefits and the interaction of time and benefits to be different across some given groups of individuals. In particular, we first estimate a model where the groups are identified by their belonging, or otherwise, to the fourth quartile of wealth distribution (which identifies richer individuals that should not experience consistent liquidity constraints). Then we estimate a similar model where the groups are identified by households with problems making ends meet. We present the results in Table 2 below.

[TABLE 2: Semi-parametric Cox estimations of re-employment

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[11] To further check for the robustness of the result on the effect of benefits on duration, we also sought to use, in place of the actual amount of benefits, a dummy variable that was 1 if the individual was on benefits and 0 otherwise. Even in this case, the role of benefits remained the same. Since we believe that the actual amount is more informative in capturing the role of liquidity constraints we chose to use the amounts instead of the dummy.

1   probabilities with group-specific baseline hazard and coefficients]

2 When we partition the individuals on the basis of wealth (regression *i* in Table 2) we observe that the initial
3 effect of benefits is still positive for both groups. Specifically, the coefficient is larger for richer individuals,
4 possibly because the liquidity constraint effect is smaller for them, but the difference of the coefficients in
5 the two groups is not significant such that we cannot be too certain of this. On the contrary, a clear-cut
6 difference between the two groups emerges in the effect of the interaction of benefits with time: for poorer
7 individuals, this interaction has a negative effect on re-employment probabilities but it is not significant for
8 the richer. This can be interpreted as a clear indication of the liquidity constraints effect: richer households
9 do not have major liquidity constraints and therefore unemployment benefits do not increase their
10 unemployment duration. On the contrary, liquidity constraints are important for the rest of the households
11 such that benefits mitigate these constraints and, with time, reduce re-employment probabilities. The lack
12 of increase in unemployment duration for richer families also indicates that moral hazard effects are, at least
13 for this category, hardly present.

14 Interesting findings are also obtained when we partition individuals on the basis of their problems "making
15 ends meet" (regression *ii* in Table 2). In this case we observe that, for individuals with more problems, there
16 is no significant positive effect of benefits on re-employment probabilities and, to all extents, UB only
17 increases unemployment duration. By contrast, re-employment probabilities for individuals without
18 particular financial problems are only enhanced by UI schemes, something that indicates that these
19 individuals face milder liquidity constraints and are therefore less affected by the liquidity constraint
20 mitigation from benefits. In truth, the non-significance of the direct effect of benefits for the worse-off
21 households should be taken with caution: first, as the coefficients of these variables do not significantly differ
22 in the two groups (see the test on equality of coefficients in Table 2), the lack of a significant effect is due
23 mostly to the high standard error of the coefficient; secondly, in different specifications of the model the
24 direct effect of benefits appears to be significantly positive (see below). As for the interaction of benefits with
25 time, even with this partition, we obtain a clear-cut difference between the two groups: the interaction has
26 a negative effect on re-employment probabilities for individuals from households that claim to have
27 problems while, for individuals from households that are faring better, the interaction does not exhibit a
28 similar negative effect. This result has the same interpretation as in the other case and it further shows that
29 the liquidity constraint effect of benefits is less marked for individuals with milder economic problems.

30 To obtain further insights and to check the robustness of the analysis on different groups we again perform
31 estimation using a parametric model (with Weibull distribution)[12]: the results are contained in Table 3.

32   [TABLE 3: Parametric Cox estimations of re-employment probabilities

33   with group-specific baseline hazard and coefficients]

34 The results are robust to this specification and the parametric model confirms the clear-cut difference
35 between the two groups in the effect that benefits have on duration. To all extents, the better off group (for
36 both possible partitions) is exempt from any perverse effect from UB on duration. The only result that is
37 slightly different in this specification is related to the coefficient of direct effect of benefits for individuals

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[12] In appendix A we also report the results of an estimation of a frailty model that takes into account possible unobserved
heterogeneity. However, given the stratified approach we are following, we have to estimate the frailty model
separately for each group. All the coefficients related to unemployment benefits and to their interaction with time
maintain both the same sign and the same statistical significance as the results in Table 2 and Table 3. Therefore the
results on this aspect appear to be fully robust.

from households that stated they had problems: according to this specification, the coefficient is still positive but it is now even significant. Parametric analysis highlights another interesting aspect: we find that the ancillary parameter is smaller for individuals in the better off group, though the difference between the ancillary parameters for the two groups is statistically significant only when the partition is made on the basis of self-assessed perception of economic well-being. A smaller ancillary parameter for the better-off categories means that workers in these categories have a less steep baseline hazard function, strongly pointing to the fact that liquidity constraints are less relevant to this kind of individual. This is also a strong indication that the increasing pattern of the baseline hazard function that we found is due to the liquidity constraints effect and, indeed, it appears to be less steep for individuals who are not particularly liquidity constrained.

All our results thus highlight considerable interaction between benefits and wealth and, interestingly enough, the results are similar for the two variables we use to make the partition: the subjective perception gives probably a clear indication of the liquidity constraints effect but also the "recorded" variable seems to capture quite well this dimension.

As a final check for robustness we replicate the strategy followed in the previous sub-section and perform the clustered estimation using only observations of individuals whose level of benefits is below the maximum allowed by law: the results of this case are contained in Table 6 in appendix A and they confirm the main results.

Summing up, we find that UI schemes affect workers from different groups in different ways: for individuals from richer households or with fewer economic problems, UB does not produce an increase in unemployment duration and actually reduces it. On the contrary, for workers from households that are worse off there may be a positive effect of benefits on unemployment duration. These findings have important policy consequences as they suggest that the inclusion of wealth criteria within the eligibility rules for UB is not always a good idea. Indeed, recipients from richer households have only beneficial effects from UB with no clear sign of an increase in unemployment duration and if anything, with an actual reduction in it. Obviously, these individuals are in less need of benefits but in any case, public resources spent to support them cannot be considered as wasted.

4.2 Clustering on wealth and education

The last possibility we have to explore is whether this clustering on wealth and financial pressure is actually a proxy for a clustering on other correlated variables. The prime suspect in this case would be education, and we thus try to split the sample into four distinct groups, taking into account the degree of economic problems *and* degree of education (upper secondary degree or more and the rest)[13]. We thus have individuals with: *i)* high education with no problems, *ii)* high education with problems, *iii)* low education with no problems, *iv)* low education with no problems. The results for parametric regression estimated with this clustering scheme are contained in Table 4.

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[13] It was not possible to split the sample using also the "tax on wealth" variable because the "rich" group was already small and splitting it in two would produce a cluster with not enough observation (28 in the worst case) to perform the estimation.

[TABLE 4: Parametric Cox estimations of re-employment probabilities with baseline hazard and coefficients that differ across groups defined on the level of education and the degree of economic problems]

What mainly emerges from the above table is that, for a given level of education, the interaction of benefits and time is more negative for individuals from households with worse economic conditions: this basically confirms our finding obtained with clustering on economic conditions alone. There is, however, another result which emerges less starkly: for individuals with lower education the interaction between benefits and time is less negative. This cannot compromise analysis with wealth-only clusters as it is very unlikely that good economic conditions are a proxy for low-education and therefore, if anything, we are picking a distinct effect. A possible interpretation is that low educated individuals have more to gain from employment services: we can imagine that they find training courses on offer more useful and therefore attend for longer. In any case, this is just a possible explanation of mild evidence: further research could better investigate this aspect.

5. Conclusions

Our analysis investigated the interaction that wealth and unemployment benefits have in determining unemployment duration. We performed a duration analysis, partitioning individuals according to their wealth class and their self-assessed perception of economic well-being. We found that individuals from households that are wealthier or that are not experiencing problems in "making ends meet" have an increasing but less steep baseline hazard function than those from other groups. These findings yield two main insights: 1) liquidity constraints have an important effect on unemployment duration and this effect is fully displayed through time and 2) the two groups of individuals differ significantly in terms of liquidity constraints and this is relevant in determining unemployment duration. We also show that the duration largely decreases when the lost job was a major source of income for the household economy: something that points to the fact that the loss in household consumption is extremely important in determining search effort, reservation wage and duration.

The other important result is related to the effect that unemployment benefits have on duration within the two groups of individuals: our analysis shows that, for wealthier individuals, there is no sign that benefits increase unemployment duration (and they actually reduce duration) whereas, for the rest of individuals, we find some evidence of this effect.

Our analysis highlights several factors that concur in the determination to unemployment duration but we could not fully account for demand-side factors (like the occupational dynamics of specific industries): this is an aspect that could be relevant and that should be included in future research on this topic.

From a policy point of view, our results on the interaction between wealth and benefits imply complex indications and pose doubts on eligibility rules that include wealth among the criteria. Indeed, according to our analysis, unemployment benefits given to individuals from richer households bring only beneficial effects with no clear sign of an increase in unemployment duration. If anything, they actually reduce it. Albeit clearly in less need of benefits, UI schemes appear to bring only beneficial effects to such households. Therefore

their eligibility for UB should not be ruled out altogether and public resources spent to support these individuals cannot be considered wasted.

Appendix A: Frailty models and estimations on sub-samples

We present below in Table 5 the estimation results when we include unobserved heterogeneity in the form of a random multiplicative factor on the error term which is inverse Gaussian distributed. Given the stratified approach we want to follow, once we introduce the error term, we have to estimate different regressions for different groups. This implies smaller sample size and thus, some of the coefficients, while maintaining the usual sign, lose statistical significance.

[TABLE 5: Frailty model estimations of re-employment probabilities]

on different groups of individuals]

We present below in Table 6 the estimation results using only observations of individuals whose level of benefits is below the maximum allowed by law. Obviously this implies smaller sample size and thus, some of the coefficients, while maintaining the usual sign, lose statistical significance.

[TABLE 6: Cox estimations of re-employment probabilities on a sub-sample of individuals]

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	(i) Semi-Parametric	(ii) Paremetric Regression with Weibull distribution	(iii) Paremetric Regression with Weibull distribution and frailty
Unemployment benefits	1.0094*** (0.0023)	1.0125*** (0.0021)	1.0191*** (0.0035)
Interaction of benefits with time	0.9949** (0.0025)	0.9910*** (0.0022)	0.9862*** (0.0045)
Age	1.0810** (0.0419)	1.0797* (0.0438)	1.1317** (0.0690)
Age squared	0.9991* (0.0005)	0.9992* (0.0005)	0.9986* (0.0007)
Education below upper secondary	0.6884* (0.1362)	0.5764** (0.1348)	0.4763** (0.1619)
Education above upper secondary	1.2845 (0.2287)	1.2894 (0.2742)	1.3917 (0.4521)
Living in a southern region	0.7931 (0.1332)	0.7808 (0.1588)	0.6535 (0.1873)
House ownership	1.0250 (0.1832)	1.0554 (0.2299)	1.1970 (0.3783)
Payments for mortgage	1.0085** (0.0043)	1.0092* (0.0052)	1.0139* (0.0072)
Wealth	0.9290* (0.0411)	0.9298 (0.0457)	0.8750* (0.0629)
Problems in making ends meet	1.3013 (0.2231)	1.4500* (0.3065)	1.7517* (0.5377)
Income in 2006 as a share of household income	2.5374*** (0.6864)	3.0834*** (1.0260)	5.7193*** (2.9009)
Months of unemployment in 2006	0.9861 (0.0193)	0.9923 (0.0217)	0.9857 (0.0338)
Log of ancillary parameter		0.4103*** (.0513)	.8596 *** (.0562)
Observations	527	527	527

Standard errors in parentheses   * significant at 10%; ** significant at 5%; *** significant at 1%

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2   [TABLE 1: **Cox estimations of re-employment probabilities**]

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	(i) Group 1: Individuals from households in the fourth quartile of wealth distributions (wealthier)	(ii) Group 1: Individuals from households not having problems making ends meet

	Group 2: Rest of individuals	Group 2: Rest of individuals
Unemployment benefits for individuals from group 1	1.0127** (0.0052)	1.0111*** (0.0019)
Unemployment benefits for individuals from group 2	1.0088*** (0.0026)	1.0067 (0.0043)
Interaction of benefits with time for individuals from group 1	0.9982 (0.0056)	1.0025 (0.0063)
Interaction of benefits with time for individuals from group 2	0.9930*** (0.0027)	0.9931*** (0.0025)
Age	1.0849** (0.0421)	1.0795* (0.0426)
Age squared	0.9991** (0.0005)	0.9991* (0.0005)
Education below upper secondary	0.6830* (0.1344)	0.7037* (0.1376)
Education above upper secondary	1.2132 (0.2289)	1.2418 (0.2330)
Living in a southern region	0.7925 (0.1327)	0.7995 (0.1347)
House ownership	0.9942 (0.1727)	1.0672 (0.1913)
Payments for mortgage	1.0087** (0.0043)	1.0084* (0.0044)
Wealth		0.9990* (0.0005)
Problems in making ends meet	1.3154 (0.2217)	
Income in 2006 as a share of household income	2.5055*** (0.6829)	2.4890*** (0.7083)
Months of unemployment in 2006	0.9837 (0.0192)	0.9875 (0.0195)
Test of equality for the effect of benefits for different groups	chi2(1)=0.72	chi2(1)= 0.86
Test of equality for the effect of interaction of benefits and duration for different groups	chi2(1)= 0.46	chi2(1)=2.70 *
Observations	527	527

Standard errors in parentheses   * significant at 10%; ** significant at 5%; *** significant at 1%

1 [TABLE 2: **Semi-parametric Cox estimations of re-employment probabilities**
2 **with group-specific baseline hazard and coefficients**]
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	(i) Group 1: Individuals from households in the fourth quartile of wealth distributions (wealthier) Group 2: Rest of individuals	(ii) Group 1: Individuals from households not having problems making ends meet Group 2: Rest of individuals
Unemployment benefits for individuals from group 1	1.0155*** (0.0036)	1.0134*** (0.0016)
Unemployment benefits for individuals from group 2	1.0117*** (0.0026)	1.0108** (0.0043)

Interaction of benefits with time for individuals from group 1	0.9982 (0.0046)	0.9989 (0.0048)
Interaction of benefits with time for individuals from group 2	0.9882*** (0.0032)	0.9864*** (0.0037)
Age	1.0841** (0.0438)	1.0799* (0.0444)
Age squared	0.9991* (0.0005)	0.9991* (0.0005)
Education below upper Secondary	0.5671** (0.1321)	0.5899** (0.1357)
Education above upper Secondary	1.2354 (0.2803)	1.2260 (0.2716)
Living in a southern region	0.7793 (0.1584)	0.7787 (0.1588)
House ownership	1.0170 (0.2174)	1.0871 (0.2379)
Payments for mortgage	1.0096* (0.0051)	1.0088* (0.0052)
Wealth		0.9211* (0.0461)
Problems in making ends meet	1.4844* (0.3114)	
Income in 2006 as a share of household income	3.0761*** (1.0383)	2.9360*** (0.9990)
Months of unemployment in 2006	0.9880 (0.0216)	0.9935 (0.0217)
Log of ancillary parameter for group 1	0.4193*** (0.0535)	0.3251*** (0.0802)
Log of ancillary parameter for group 2	0.4931*** (0.0535)	0.4876*** (0.0523)
Difference between the ancillary parameters	-.08370 (0.1001)	-0.1625** (0.0811)
Test of equality for the effect of benefits for different groups	chi2(1)=0.75	chi2(1)= 0.32
Test of equality for the effect of interaction of benefits and duration for different groups	chi2(1)= 3.49*	chi2(1)=4.72**
Observations	527	527

Standard errors in parentheses   * significant at 10%; ** significant at 5%; *** significant at 1%

1   [TABLE 2: **Semi-Parametric Cox estimations of re-employment Probabilities with group-specific baseline hazard and**
2   **coefficients**]

	Paremetric Regression with Weibull distribution
Unemployment benefits for individuals with high education and without problems	1.0126*** (0.0025)
Unemployment benefits for individuals with high education and with problems	1.0096** (0.0044)

Unemployment benefits for individuals with low education and without problems	1.0132***
	(0.0014)
Unemployment benefits for individuals with low education and problems	1.0341***
	(0.0118)
Interaction of benefits with time for individuals with high education and without problems	0.9967
	(0.0043)
Interaction of benefits with time for individuals with high education and with problems	0.9842***
	(0.0051)
Interaction of benefits with time for individuals with low education and without problems	1.0156
	(0.0158)
Interaction of benefits with time for individuals with low education and with problems	0.9800
	(0.0134)
Age	1.0820*
	(0.0443)
Age squared	0.9991*
	(0.0005)
Living in a southern region	0.7754
	(0.1581)
House ownership	0.9961
	(0.2004)
Payments for mortgage	1.0095*
	(0.0052)
Months of unemployment in 2006	0.9916
	(0.0219)
Income in 2006 as a share of household income	3.0736***
	(0.9940)
Test of equality for the effect of interaction of benefits and time for individuals of high education and different degree of problems	chi2(1)=3.97**
Test of equality for the effect of interaction of benefits and time for individuals of low education and different degree of problems	chi2(1)=3.21*
Observations	527

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2 [TABLE 4: **Parametric Cox estimations of re-employment probabilities with baseline hazard and coefficients that differ**

3 **across groups defined on the level of education and the degree of economic problems**]

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	Degree of Wealth		Ability of making ends meet	
	Households in the fourth quartile of wealth distributions	Rest of individuals	Households not having problems making ends meet	Rest of individuals
Unemployment benefits	1.0297***	1.0185***	1.0188***	1.0174**
	(0.0084)	(0.0043)	(0.0028)	(0.0084)
Interaction of benefits with time	1.0031	0.9804***	1.0014	0.9758***
	(0.0116)	(0.0066)	(0.0101)	(0.0062)
Age	1.1309	1.1347*	1.1338	1.1225
	(0.2881)	(0.0780)	(0.0884)	(0.1089)
Age squared	0.9974	0.9986*	0.9984*	0.9988

	(0.0031)	(0.0008)	(0.0009)	(0.0012)
Education below upper secondary	1.3249	0.4730**	0.5698	0.3798**
	(1.5531)	(0.1713)	(0.2770)	(0.1822)
Education above upper secondary	1.9577	1.2679	1.1235	1.1302
	(2.2252)	(0.4859)	(0.5019)	(0.5568)
Living in a southern region	0.01833*	0.8501	0.6895	0.6708
	(0.0421)	(0.2603)	(0.3083)	(0.2611)
House ownership	0.4166	1.0440	1.4221	0.9510
	(0.5741)	(0.3259)	(0.7287)	(0.3684)
Payments for mortgage	1.0760***	1.0099	1.0168*	1.0107
	(0.0292)	(0.0076)	(0.0096)	(0.0113)
Income in 2006 as a share of household income	6.1623	6.5498***	6.2595**	6.1384***
	(9.1404)	(3.6143)	(5.3657)	(3.8284)
Months of unemployment in 2006	0.7107***	0.9980	0.9620	1.0074
	(0.0919)	(0.0379)	(0.0502)	(0.0444)
Ancillary parameter	0.7539***	0.8155***	0.8144***	0.8934***
	(0.1869)	(0.0647)	(0.0796)	(0.0754)
Observations	87	440	290	237

Standard errors in parentheses   * significant at 10%; ** significant at 5%; *** significant at 1%

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3   [TABLE 5: **Frailty model estimations of re-employment probabilities on different groups of individuals**]
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	(i) Parametric Regression with Weibull distribution	(ii) Parametric Regression with Weibull distribution	(iii) Parametric Regression with Weibull distribution and frailty
Unemploymnet benefits	1.2147***		
	(0.0520)		
Unemploymnet benefits for better-off group		1.1509*	1.2163***
		(0.0985)	(0.0626)
Unemploymnet benefits for worse-off group		1.2198***	1.2224***
		(0.0577)	(0.0762)
Interaction of benefits with time	0.9130***		
	(0.0304)		
Interaction of benefits with time for better-off group		0.9834	0.9811
		(0.0535)	(0.0479)
Interaction of benefits with time for better-off group		0.9035***	0.8698***
		(0.0340)	(0.0418)
Age	1.0214	1.0253	1.0142
	(0.0435)	(0.0431)	(0.0443)
Age squared	0.9997	0.9997	0.9998
	(0.0005)	(0.0005)	(0.0005)
Education below upper secondary	0.6222*	0.6075**	0.6388*
	(0.1545)	(0.1491)	(0.1593)
Education above upper secondary	1.3073	1.2845	1.3556
	(0.3246)	(0.3280)	(0.3262)

Living in a southern region	0.6309**	0.6353**	0.6329**
	(0.1426)	(0.1442)	(0.1440)
House ownership	1.1721	1.1090	1.2345
	(0.2910)	(0.2718)	(0.2988)
Payments for mortgage	1.0066	1.0066	1.0059
	(0.0059)	(0.0060)	(0.0058)
Wealth	0.8973*		0.9004*
	(0.0527)		(0.0547)
Problems in making ends meet	1.4420	1.4664	
	(0.3516)	(0.3564)	
Income in 2006 as a share of household income	2.9333**	3.0155**	3.4105***
	(1.2564)	(1.3090)	(1.3652)
Months of unemployment in 2006	0.9998	0.9947	0.9984
	(0.0240)	(0.0238)	(0.0243)
Observations	453	453	453

Standard errors in parentheses   * significant at 10%; ** significant at 5%; *** significant at 1%

[TABLE 6: **Cox estimations of re-employment probabilities on a sub-sample of individuals**]