Unemployment Benefits and Liquidity Effects

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Abstract

Utilizing variations in cash-on-hand, stemming from epidemic shocks and the accelerated provision of unemployment benefits, this paper estimates their impact on the duration of unemployment. The analysis demonstrates that individuals facing liquidity constraints exhibit a significant increase in the elasticity of the unemployment duration with respect to unemployment benefits. Furthermore, I finds that the additional liquidity provided by the reduced waiting period for Unemployment Insurance (UI) benefits extends the duration of unemployment among the voluntarily unemployed. These findings suggest that the increase in unemployment duration due to unemployment benefits is not solely attributed to moral hazard but is also driven by liquidity effects.

Keywords: Unemployment Benefits, Liquidity Effects, Unemployment Benefits Waiting Period, Voluntary Unemployment.

JEL Codes: J64, J65

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1 Introduction

Unemployment insurance is primarily designed to alleviate the uncertainty faced by workers during periods of unemployment by the provision of transfer payments (Landais et al. [2021]; Chetty [2006]). Unemployment benefits serve to offer financial liquidity to the unemployed, enabling them to sustain basic consumption levels (Schmieder and Von Wachter [2016]). However, empirical studies often reveal that the presence of unemployment benefits influences the job search efforts of individuals[1], resulting in an extended duration of unemployment (Boone et al. [2021]; Farber and Valletta [2015]; Farber et al. [2015]). Prior research has contended that this phenomenon stems from the moral hazard problem inherent in the subsidized model of unemployment insurance (Krueger and Meyer [2002]; De Groot and Van der Klaauw [2019]). Nevertheless, recent studies increasingly emphasize the role of the liquidity effect as a significant driver of these outcomes.

The distinction between the two is relevant for assessing the welfare impact of unemployment benefits. This is because the liquidity effect implies that unemployment benefits are a socially beneficial response that can correct borrowing market failures when the unemployed are unable to smooth consumption. According to Chetty [2008]'s model, under conditions of incomplete credit, unemployment benefits can affect search efforts through liquidity effects. This paper therefore provides a new estimate of the liquidity effect in unemployment insurance.

I use survey data from the Japanese Panel Study of Employment Dynamics to estimate the effect of unemployment benefits on the duration of unemployment. In my empirical strategy, I utilize two indicators, the individual subjective evaluation of whether income or savings satisfy consumption in the past year and the asset situation, to classify the liquidity-constrained and unconstrained groups. Estimating the effect of unemployment benefits on the duration of unemployment in these two clusters separately, I find that unemployment

[1] Recent studies such as Chodorow-Reich et al. [2019] argue that the effect of unemployment insurance on labor supply is not as significant as previously thought.

benefits have a greater impact on the unemployed with restricted liquidity compared to the unemployed with unrestricted liquidity. In the liquidity constrained group, a 10% increase in unemployment payments is associated with a 3-4% increase in the duration of unemployment. This finding implies that unemployment benefits have a stronger impact on the unemployed who are unable to smooth their consumption.

To address the potential variance in preferences across different asset populations as indicated by Card et al. [2007a], I use the COVID-19 epidemic shock as an exogenous variable for the change in cash on hand. Common sense would dictate that the unemployed during the COVID-19 epidemic were more likely to face liquidity problems (Baqaee and Farhi [2022]). It also means that if the duration of unemployment during this period is particularly responsive to cash on hand, it suggests that the estimated liquidity effect would be larger. The results suggest that the effect of unemployment benefits on the liquidity-constrained unemployed is 2-7% larger in the group that has been exposed to an exogenous shock. We can know that the exogenous reduction in cash on hand further exacerbates the effect on the liquidity constrained unemployed. This fact proves that the liquidity effect accounts for a large part of the link between unemployment insurance benefits and the duration of unemployment.

To further validate the robustness of these findings, I utilize a policy change in Japanese unemployment benefits to estimate the effect of cash on hand on the duration of unemployment. According to the Department of Health and Labor Standards, employees who leave for their own reasons after October 1, 2020, will have their benefit restriction period shortened from the previous three months to two months, with a maximum of two uses within five years. This implies that an unemployed individual with the same duration of unemployment receives an additional month of benefits after the policy shock, equivalent to approximately 0.5 to 0.8 months of wages. The empirical results find that the increase in cash on hand due to the policy shock prolongs the duration of unemployment for the voluntarily unemployed and reduces their reemployment hazard by 19%. Overall, this paper verifies that cash on hand has a significant effect on the duration of unemployment through all three of these methods. These findings imply that the extension of unemployment duration attributed to unemployment benefits is predominantly driven by the liquidity effect. This conclusion diverges from prior studies that hinted at a negative impact of unemployment benefits, emphasizing that the welfare effect of such benefits may have been markedly underestimated due to insufficient recognition of the crucial role played by liquidity considerations.

This paper is related to several pieces of literature. In the literature on how cash on hand affects the duration of unemployment, Chetty [2008] begins by presenting a model based entirely on moral hazard and liquidity effects and estimates the elasticity of unemployment duration with respect to cash on hand for U.S. workers. LaLumia [2013] explores this theme further, using seasonal variations in Earned Income Tax Credit (EITC) rebates to assess liquidity effects. Landais [2015] utilizes a kink in the U.S. unemployment insurance benefit schedule to identify the effect of the level of unemployment insurance benefits on the potential duration of unemployment. One of the contributions of this paper is a new estimate of the effect of cash on hand on the duration of unemployment. And the conclusions rely on changes in liquidity conditions due to exogenous epidemics and policy shocks, whereas such changes in cash on hand do not depend on any unobserved endogenous variables.

Second, I examine the impact of unemployment benefits on the voluntarily unemployed, an aspect that has not been previously explored in existing research. Due to legal restrictions in many countries, quitters are often ineligible for unemployment benefits, which has led to their frequent exclusion from previous studies of unemployment (Card et al. [2007b]). In this paper, I exploit the opportunity presented by the policy shift towards the voluntary unemployed in Japan to estimate the impact of unemployment benefits through the change in cash on hand caused by the policy shock. Considering the low rate of unemployment benefits received by the unemployed in Japan (Kitazawa [2015]; Sasaki et al. [2013]), the elasticity estimates of the voluntary unemployed in this paper may be of interest to policy makers[2]. This study also provides an estimate of the effect of unemployment benefits on unemployment

[2]Paying attention to voluntary unemployment is necessary because, especially during the recession, firms have an incentive to get the unemployed to quit their jobs on their own in the form of severance payments.

exit hazard in Japan under general conditions. Consistent with previous research utilizing Japanese data, my findings underscore that unemployment benefits significantly reduce the exit hazard for the unemployed (Ohkusa [2004]; Kohara et al. [2013]).

This paper also expands the literature on the role of unemployment insurance during COVID-19. Debate over the expansion of unemployment benefit programs is inevitable during recessions (Rothstein [2011]; Hagedorn et al. [2013]; Ganong et al. [2020]; Romer and Romer [2022]). Holzer et al. [2021] argue that during COVID-19 more generous unemployment benefit programs in the United States contributed to higher unemployment, and they show that households that were not subject to liquidity constraints were less sensitive to termination of benefits. Conversely, other studies suggest that the U.S. unemployment benefit program during this period provided essential liquidity to low-income households (Bachas et al. [2020]) and played a significant role in stimulating spending (Casado et al. [2020]). In contrast, this paper concludes that during the COVID-19 epidemic, unemployment was a great inequality shock for those who were associated with facing borrowing constraints. In conjunction with Chetty [2008] model, under conditions of intensified liquidity constraints, the extension of the unemployment period due to unemployment benefits indicates an increase in the optimal level of benefits from unemployment insurance.

The rest of the paper progresses as follows. Next Section 2 describes the SIPP data that I use, Section 3 discuss the heterogeneous effects o unemployment benefits on the duration of unemployment. Section 4 explores the effects arising from shortened UI benefits waiting period, and the estimates are used to identify liquidity effects. Section 5 concludes.

2 Context and Data

The data used in this paper are sourced from the Japanese Panel Study of Employment Dynamics (JPSED), generously provided by the Recruit Works Institute in Japan. The dataset encompasses the employment status of Japanese workers across the nation spanning from 2015 to 2021. It comprises information on various aspects, including unemployment insurance, duration of unemployment, demographic characteristics (such as gender, age, education, place of residence, reason for leaving, etc.), household income, and job characteristics (such as location, occupation, industry).

Given the absence of direct data on the duration and amount of unemployment insurance benefits, this study estimated individual unemployment benefits using the formula provided by the Ministry of Health, Labour and Welfare of Japan for calculating unemployment benefits[3]. The daily amount of unemployment benefits is given by the following formula,

$$UB = \gamma_{(age,wage)} * wage \tag{1}$$

where $wage$ represents the daily wage before unemployment and γ represents the benefit rate $(50\% - 80\%)$. The value of γ is determined by age and the daily wage before unemployment. The higher the value of wage, the lower the benefit rate. When $wage \geq 5030$, the benefit formula can be specifically transformed into $UB = 0.9*wage - 0.3(wage - 5030)/7350*wage$. And the data include data on whether or not they receive unemployment benefits, which allows us to accurately identify the impact of unemployment benefits.

In this study, I measure the duration of unemployment using survey data, which are based on individuals' recollections of when they became unemployed and when they subsequently returned to work.[4] To focus my analysis, I exclude individuals who were unemployed for the entirety of the previous year, thereby removing those who may have permanently exited the labor market. The dataset employed in this study offers several advantages for analyzing unemployment duration.

Card et al. [2007b] argue that the perceived impact of unemployment benefits on the duration of unemployment may vary depending on the definition of an 'unemployment spell'. Specifically, defining the unemployment spell as the duration of benefit receipt tends to

[3]The formula is based on the unemployed person's age, six months' income from the previous occupation, and the duration of being an unemployment insurance beneficiary.

[4]This refers to the continuous duration of unemployment over the past year.

yield higher estimates of the impact of unemployment benefit expansion on unemployment duration (Farber and Valletta [2015]). Conversely, if the unemployment spell is defined as the time taken to find a new job, the estimated impact is significantly lower. This distinction is crucial as it implies that unemployment benefits substantially extend the duration of benefit receipt, but have minimal influence on the likelihood of re-employment. The concern is that the moral hazard associated with unemployment benefits might be exaggerated based on how unemployment duration is defined.

In light of this, this study defines the unemployment spell as the period from job departure to re-employment. This approach allows for a more precise estimation of the influence of unemployment benefits on re-employment likelihood.

Additionally, this definition of the unemployment spell offers a more accurate measure of total unemployment duration, especially for those who are voluntarily unemployed. This group is subject to a mandatory two-month waiting period for benefit receipt due to regulatory constraints, meaning that reliance on the length of unemployment benefit payments could underestimate their actual unemployment duration. Descriptive statistics, which include data on the duration of unemployment and unemployment insurance benefits, are presented in Table 1.

To examine the role of liquidity in the impact of benefits on duration, I categorize individuals into liquidity subgroups based on whether their income or savings can cover living expenses. Individuals whose income or savings fall short of meeting basic living expenses in the past year are classified as the liquidity-constrained group. Furthermore, I categorize individuals into liquidity subgroups based on both their ability to meet living expenses and property ownership. Specifically, those with insufficient income to cover expenses and without property ownership are classified as part of the liquidity-constrained group. This classification approach provides a more accurate assessment of individuals' liquidity situation, considering variations in consumption habits and subjective judgments.

Table 1 reveals that there are no significant differences between the two subgroups in terms of individual characteristics such as age, education, spouse, work experience, and skill training. However, when examining unemployment duration trends, it becomes evident that the liquidity-constrained group experiences longer periods of unemployment compared to those with unrestricted liquidity. Additionally, individuals in the liquidity-constrained group receive slightly lower unemployment benefits.

3 Effects of UI Benefits on Unemployment Durations

3.1 Hazard Model Estimates

Given the presence of censored data[5], this paper uses Hazard model estimates to identify the effect of UI benefit on search durations. I estimate hazard models of the following form:

$$h(t,i) = h_0(t) \cdot \exp\left[\beta_1 \log(ub_i) + \beta_2 x_{it}\right] \tag{2}$$

here, $h(t,i)$ denotes the unemployment exit hazard rate for individual i over an unemployment duration of t months, h_0 is the baseline hazard rate for state t, ub_i is the unemployment benefit for individual i, and x_i is a set of control variables. The β_1 provides the elasticity of the hazard rate with respect to unemployment insurance benefits (ub_i). β_2 reports the valuation of the effect of personal characteristics, including gender, age, education, spouse, skill training, and reason for unemployment on the duration of unemployment.

To further investigate the role of liquidity effects in the UI-duration link, similar to Chetty [2008], this study empirically classifies liquidity based on subjective recall judgments of whether the unemployed's income in the past year met their daily consumption and the assets (property) in their personal names. The estimation of equation1 above is repeated separately for the liquidity-constrained and unconstrained groups, which allows us to focus

[5] This refers to instances where individuals are still unemployed in the last month of the survey, implying that their unemployment duration may extend beyond the survey's conclusion, potentially leading to incomplete data.

more on directly comparing the differences between the two groups of unemployed.

3.2 Graphical Evidence and Non-Parametric Tests

To demonstrate the effect of unemployment benefits on the duration of unemployment, I begin by providing graphical evidence based on the Kaplan-Meier curve fitted by The non-parametric maximum likelihood estimator. The Figure 1 shows that in the pooled sample, unemployment benefits are associated with lower unemployment exit rates. As can be seen in the figure, about 70% of the group that receive lower benefits after 3 months of unemployment exited unemployment, compared to 60% in the higher welfare group.

To further illustrate the role of the liquidity effect, this study divides individuals into two groups: liquidity-constrained and non-liquidity-constrained. This classification is based on subjective judgments regarding whether their income, including savings, meets their daily consumption needs. Here the use of subjective income-expenditure evaluations as compared to pre-unemployment wage or income levels minimizes the endogenous effect on the duration of unemployment. Because there is a strong correlation between the pre-unemployment wage level and the amount of the unemployment benefit, it leads to the possibility that the difference in the duration of unemployment between subgroups with different liquidity is simply a difference in the elasticity of the unemployment benefit.

Descriptive statistics for these two groups are reported in Table 1. The data on age, education, and income from their previous occupation do not exhibit significant differences between the two groups, indicating that the level of benefit amounts is roughly similar between them. Consequently, by examining the survival curves of the liquidity-constrained group, it becomes possible to determine the differential impact of unemployment benefits on the unemployed individuals facing liquidity constraints.

Figure 2 shows the effect of unemployment benefits on the duration of unemployment for the unemployed with different liquidity constraints. Figure 2b suggests that unemployment benefits reduce the job finding rate of the liquidity constrained unemployed. And higher unemployment benefits exhibit lower hazard rates. For example, after the third month of unemployment, about 40 percent of the group receiving higher unemployment benefits remain unemployed, while 30 percent of the group with lower unemployment benefits remain unemployed. The liquidity constrained unemployed are more sensitive to the amount of the benefit. In contrast, the job finding rate of the group in Figure 2a, where liquidity is not restricted, is not significantly sensitive to unemployment benefits. In this case, the fact that higher benefit amounts do not lead to greater unemployment suggests that unemployment benefits do not pose a significant moral hazard problem in the liquidity unconstrained group.

3.3 Estimation Results and Liquidity Effects

Taking into account censored data in the analysis, I estimated regression 2 to examine the effect of unemployment benefits on the hazard rate of exiting unemployment across pooled samples. The estimation results are presented in Table 2, where it is observed that a 10% increase in unemployment benefits leads to a decrease of about 2.8% in the hazard rate within the sample[6].

To assess the robustness of the results, this paper examines the effect of unemployment benefits on the duration of unemployment under different Baseline fit regression models. The results, presented in Columns 2 through 5 in Table 2, demonstrate consistent estimates. The first column shows the semi parametric estimates of Eq.2, while the results of the parameter estimates are shown in columns 2 through 5. It shows that regardless of whether the distribution is assumed to be consistent with a weibull or some other form of distribution, the estimates are close to those of the semi parametric model, ranging from about 0.27 to 0.28.

Furthermore, Table 3 presents the elasticity estimate of the hazard rate with respect to unemployment benefits, adjusted for individual characteristics of the unemployed, at ap-

[6]This finding aligns with the outcomes estimated by Sasaki et al. [2013] using administrative data, albeit indicating a lower elasticity of the hazard rate concerning the benefit level compared to observations in other countries, such as the United States (Schmieder and Von Wachter [2016]).

proximately 0.29, with a standard error of 0.02. The control variables reveal several points of interest. Notably, individuals with a partner have a lower likelihood of exiting unemployment, approximately 20% less than their single counterparts. This finding could suggest that single unemployed individuals are more responsive to unemployment benefits, as those with partners might be less vulnerable to the financial pressures of unemployment. Additionally, the data indicates a similar trend among unemployed homeowners. Those owning property have a 4% lower exit hazard from unemployment compared to renters. While there is no direct evidence linking property ownership to individual liquidity, referencing Chetty [2008] we can infer that the potential liquidity constraints faced by unemployed renters—stemming from additional financial burdens during unemployment—may elevate their urgency to exit unemployment. This dynamic potentially contributes to a higher unemployment exit hazard for renters.

To corroborate the insights illustrated in Figures 2, the entire dataset was partitioned into subgroups according to liquidity constraints. This stratification seeks to mitigate the impact of potential confounding variables, thereby enabling a more nuanced analysis of how liquidity interacts with the relationship between unemployment benefits and the duration of unemployment.

First I divided the liquidity subgroups based on whether income or savings met consumption in the past year. Column 1 of Table 4 shows the estimation of Equation 2 for the liquidity-constrained unemployed. The results show that a 10% increase in unemployment benefits leads to a 4.7%[7] reduction in the probability of exiting unemployment in the presence of liquidity constraints, a value that is much higher than the overall average shown in Table 3. In contrast, in Column 2 of Table 4, unemployment benefits have a significantly lower impact on the unemployed with unconstrained liquidity. This is consistent with my hypothesis that the effects of unemployment benefits are heterogeneous for the unemployed with different liquidity statuses.

[7]The 4% estimate of the liquidity effect here in this paper is highly consistent with the results obtained by Landais [2015] using a kink regression.

I consider new liquidity subgroups based on property ownership status to further scrutinize the robustness of the results. Columns 3 and 4 of Table 4 present the impact of unemployment benefits on the duration of unemployment for individuals who owned and rented property, respectively. The findings mirror those discussed earlier, as both Column 1 and Column 3 showcase considerably higher elasticity estimates compared to the group with unconstrained liquidity.

3.4 Estimation Results and COVID-19

Addressing the concern that liquidity-based grouping might introduce issues related to unobserved omitted variables is crucial. For instance, unemployed individuals whose incomes are insufficient to cover their expenses might have a lower preference for leisure, leading to a more significant substitution effect. To circumvent this, I employ changes in liquidity states caused by shifts in the exogenous environment to assess the effect of unemployment benefits on the duration of unemployment.

In this approach, the year 2020 serves as a pivotal demarcation. Numerous studies have substantiated the severe liquidity constraints imposed by the COVID-19 pandemic (Bartik et al. [2020]; Han et al. [2020]). By utilizing this external shock as a natural experiment, it's possible to observe variations in unemployment durations attributable to changes in liquidity, thereby providing a more accurate assessment of the impact of unemployment benefits under different liquidity conditions. This method helps in isolating the effects of unemployment benefits from the confounding influences of individual liquidity preferences.

In the context of my hypothesis, households affected by the shock of the COVID-19 pandemic are anticipated to undergo more pronounced depletion of on-hand liquidity and encounter heightened borrowing constraints. Consequently, it is hypothesized that the hazard rate in relation to unemployment benefits will exhibit greater elasticity for households during the COVID-19 epidemic. Employing an approach akin to equation 2, I proceed to estimate the influence of unemployment benefits on households facing liquidity constraints over time:

$$h\left(t,i,j\right)=h_0\left(t\right)\cdot\exp\left[\beta_1\log(ub_i)+\beta_2 Liquidity*\log(ub_i)+\beta_3 x_{itj}\right] \tag{3}$$

Where β_1 provides the elasticity of the hazard rate with respect to unemployment insurance benefits (ub_i) during period j. $Liquidity = 1$ denotes liquidity constraints, and $beta_2$ corresponds to an estimate of the elasticity of the hazard rate with respect to the ub_i at period j of the liquidity-constrained distribution.

The main concern associated with this methodology is that, within the framework of COVID-19, individuals might undergo extended periods of unemployment influenced by factors unrelated to alterations in liquidity status, such as Medicare sequestration policies. This assumption proves invalid for equation 3, as, regardless of their liquidity status, all households uniformly experience the impact of these policies over the same timeframe. In essence, for $j \geq 2020$, the β_2 estimates gauge the elasticity of unemployment duration concerning benefits for those individuals constrained by liquidity and simultaneously affected by the shocks induced by COVID-19.

Specification 1 of Table 5 presents the estimate of Equation 3 for the full sample without controlling for x_{ij}. The estimate of β_2 is -0.25 for the interaction between liquidity status and unemployment benefits. This finding indicates that unemployment benefits in the same units significantly decrease the probability of exiting unemployment in the liquidity-constrained group compared to the liquidity-unconstrained individuals.

In Column 2, where I exclude the post-2020 sample, the estimates of the interaction term show a decrease under the same set of components as in Column 1. Conversely, in Column 3, which includes data after 2020, the coefficient estimate of the interaction term (β_2) between liquidity status and unemployment benefits is -0.29. This higher estimate indicates that the impact of the same unit of unemployment benefit becomes larger for the liquidity-constrained group among post-2020 individuals. Considering the fact that the post-2020 sample was affected by the epidemic and faced greater liquidity constraints, the results in Column 3 imply that the influence of unemployment benefits on the duration of unemployment stems more from the liquidity effect. Columns 4 and 5 report similar estimates of Equation 3, controlling for individual characteristics.

Contrary to the straightforward classification of liquidity subgroups in the previous section, the application of changes in liquidity resulting from exogenous environmental shifts in this part of the analysis can more effectively mitigate the impact of endogenous variables. This approach strengthens the validity of the findings by isolating the effect of external shocks on liquidity status, thereby providing a clearer view of the relationship between unemployment benefits and unemployment duration under varying liquidity conditions. Simultaneously, echoing the conclusions of most prior research (Catherine et al. [2020]), the results presented in Table 5 suggest that unemployment benefits assume a heightened significance in safeguarding the welfare of the unemployed during the COVID-19 crisis.

4 Effect of Shortened UI Benefits Waiting Period

4.1 Estimation Strategy

To facilitate labor mobility from mature industries to growing ones and respond to evolving work styles, the Japan Senate passed a supplementary resolution during the 2017 ordinary session of the Diet. This resolution called for discussions on shortening the waiting period for individuals who voluntarily become unemployed. Initially set at one month, the waiting period had been extended to three months in 1984 to discourage easy job quitting. Effective from October 1, 2020, a new policy came into effect, reducing the waiting period for voluntarily unemployed individuals from three months to two months (Source: Ministry of Health, Labour and Welfare). While the primary goal of this policy is to promote labor migration, it also provides a quasi-natural experimental setting for this study to examine the liquidity effect.

Unlike traditional policies that lengthen the potential length of benefits, shortening the waiting period seems to be more effective in removing the interference of moral hazard. Because longer benefits imply that individuals need to extend their search duration accordingly to obtain additional benefits, this may twist the individual's marginal incentive to find a new job. In contrast, a shorter waiting period more effectively addresses the liquidity challenges faced by the unemployed during the initial period without income. This approach enables individuals to receive unemployment benefits sooner without necessitating a change in their job search strategy.

On the other hand, a shorter waiting period for benefits is less likely to raise moral hazard concerns. Distinguishing the involuntarily unemployed from the voluntarily unemployed, voluntary unemployment often implies unemployment caused by an individual's dissatisfaction with his or her current job, and usually this type of unemployment implies that the unemployed may strategically look for a replacement before voluntarily quitting their job in order to resist the risk of being unemployed for too long. As can also be seen in Table 3, the dummy variable for voluntary unemployment significantly increases the risk of quitting unemployment. Therefore, shortening the benefit waiting period by just one month is unlikely to incentivize voluntary unemployed of the switching type to change their search strategy by burdening the unemployment cost for 2 months. That is, shortening the benefit waiting period only affects individuals conducting job searches similar to the involuntarily unemployed without creating additional moral hazard problems.

It is also important to note that although the Government has previously discussed shortening the waiting period for unemployment benefits, the exact timing of implementation has not been communicated in advance. Consequently, individuals were unable to strategically plan their time out of work. So it implies that the voluntarily unemployed in 2021 can exogenously receive an extra month of benefits compared to the unemployed in 2020 under the same conditions. Estimates of the liquidity effect can be obtained as accurately as possible by verifying the impact of policy-driven changes in cash on hand on the duration of unemployment. When the estimate is negative, it suggests that an increase in cash on hand significantly reduces the exit hazard of unemployment. A larger effect of cash on hand on the duration of unemployment indicates a larger liquidity effect, implying a better welfare effect of unemployment insurance for liquidity-constrained individuals.

To evaluate the impact of the policy, I analyze the differences in unemployment durations between voluntary and involuntary unemployed individuals before and after the policy's implementation. Mirroring the approach in Equation 3, I estimate the Cox proportional hazards model using the following form:

$$\log(h_{ti}) = \beta_1 p_i + \beta_2 voluntary_i * p_i + \beta_3 x_{it} \tag{4}$$

where h is the hazard rate. The coefficient β_2 represents the average treatment effect of a reduced waiting period ($p_i = 1$) on the hazard rate of exiting unemployment for voluntarily unemployed individuals. Here, a dummy variable for voluntary unemployment is constructed based on individuals' self-reported reasons for unemployment, as captured in the survey data. To refine the analysis, this study specifically excludes individuals who are retired from being classified under involuntary unemployment. Additionally, those who have left their jobs due to pregnancy and childbirth are omitted from the voluntary unemployment category. This exclusion is based on the rationale that these two groups typically have access to alternative welfare support systems. To simplify the analysis, the focus is narrowed down to only those reasons for unemployment that make individuals eligible for unemployment benefits.

4.2 Results

Table 6 presents the estimates derived from Equation 4. In the first column, without adjusting for individual characteristics, the coefficient for voluntarily unemployed individuals is 0.16, aligning with the coefficient reported in Table 3. This reflects a higher exit probability from unemployment for the voluntarily unemployed, potentially due to their dissatisfaction with their current job or having sufficient time to secure a better alternative.

The coefficient estimate for the interaction term under this specification is -0.1925 with a p-value of 0.091, indicating a 19% reduction in the unemployment exit hazard for the voluntarily unemployed affected by the policy. This suggests that the early receipt of unemployment benefits, by increasing the cash at hand for individuals, potentially prolongs unemployment duration in this group. It's important to note that this early receipt of benefits is unconditional, involving a one-time increase in payments equivalent to one month's benefit without altering the individual's job search strategy. This differs from both the increase in unemployment benefits and the extension of benefit duration, which can distort the marginal returns to unemployment by incentivizing longer job searches for additional benefits. However, the early receipt of benefits does not require extending unemployment duration for additional gains, thereby the estimate of the interaction term responds to the stochastic liquidity effect. When controlling for individual characteristics in Column 2, the coefficient estimate on the interaction term is -0.22, with the results remaining robust.

The final three columns of Table 6 examine policy heterogeneity. In Column 3, the sample is restricted to individuals with low education levels (less than 16 years of education, includes two-year vocational schools). The coefficient estimates for the interaction term between the dummy variable for shortening the benefit waiting period and voluntary unemployment are substantially higher compared to the estimates for the full sample, and are associated with a reduction in the reemployment hazard rate of about 26%. This indicates that shortening the waiting period significantly impacts the welfare of voluntarily unemployed individuals with lower education levels.

Column 4 provides estimates for the male sample. In contrast to women, male unemployed individuals appear to be more responsive to the policy, a result that may seem counterintuitive. This could be attributed to the inherently lower hazard rates of females exiting unemployment[8] and their relatively better liquidity status[9], making them less sensitive to immediate cash availability. While the small sample size of male unemployed individuals may raise concerns about estimate accuracy, the results suggest that the policy has different welfare effects for men and women. Machikita et al. [2013] analyzing data from Japan, reached similar conclusions. He concluded that extending unemployment benefits for prime-aged males with longer tenures in their previous occupations would constitute a more effective welfare approach.

In Column 5, the estimates of Equation 4 are presented for single, voluntary unemployed individuals. In this specification, receiving unemployment benefits one month early has an impact approximately 1.94 times greater than the estimate for the full sample, resulting in a decrease of -0.3 in the re-employment hazard rate. This straightforward result highlights the larger liquidity challenge faced by single individuals compared to those with a partner, whose household finances equalize the cost of unemployment. It emphasizes that unemployment benefits prolong the job search for single individuals through liquidity effects.

4.3 Robustness Checks and Falsification Tests

The variation in the duration of unemployment between voluntarily and involuntarily unemployed may not be solely influenced by policy factors in 2021; instead, it could be determined by other unobservable factors. To address this concern, I introduce a random disaggregation of the classifications of voluntarily unemployed individuals, without consideration for the specific reasons for their unemployment. The policy of reducing the waiting period for benefits is effective only for those voluntarily unemployed. However, since the unseen time factor impacts all individuals, randomly disrupting the unemployed categories provides a level of confidence in the results.

Following the incorporation of a dummy variable for artificial voluntary unemployment,

[8] In Table 3, the reported estimates indicate a lower unemployment exit hazard for females compared to males.

[9] In my sample, women constitute as much as 66% of the liquidity unconstrained group, which could suggest a tendency towards higher saving preferences among women.

Table 7 showcases the estimates derived from Equation 4. These results indicate that the previously significant interaction between the policy and the voluntary unemployment dummy variable becomes insignificant. There is also a reversal in the estimate's sign within the same timeframe. This reversal highlights that the policy does not have a significant effect on the randomly categorized unemployed during this period. While this analysis does not fully eliminate the concern regarding omitted variables, it does offer some support for the validity of the policy effect estimates outlined in Table 6.

To provide further evidence of the impact of the policy aimed at reducing the waiting period for benefits on voluntarily unemployed individuals, I utilized data from other years to conduct robustness tests. By accurately maintaining the categorization of voluntary unemployment based on the reasons for unemployment, I employed data from 2019 and 2020 to estimate the difference in the hazard of unemployment exit. The estimates derived from this specification are reported in Column 2 of Table 7.

Firstly, the estimate for the time variable in Column 2 is -0.19, with a standard error of 0.07. This represents a significant 19% decrease in the hazard of exiting unemployment in 2020 for those involuntarily unemployed ($voluntary_i = 0$), potentially reflecting the effects of prolonged unemployment spells due to epidemic shocks. These results do not conflict with the findings presented in Table 6. The samples in Table 6's specification are limited to the post-epidemic shock period, and the external constraints faced by the unemployed, such as diminished job opportunities and heightened search costs, remain consistent both before and after the policy's implementation. More importantly, the estimates of the interaction terms in specification 2 are found to be non-significant, indicating that voluntary and involuntary unemployment do not tend to differ significantly over time outside of the policy period.

Overall, the difference in unemployment exit rates between voluntary and involuntary unemployed individuals disappears when introducing either a fabricated category of voluntary unemployment or an artificial time variable. This result provides evidence that shortening the benefit waiting period does increase the length of unemployment for the voluntarily unemployed. Furthermore, in conjunction with the analysis in the previous section, this effect of cash on hand on the duration of unemployment appears to stem more from liquidity effects.

5 Discussions

The elasticity of unemployment duration with respect to unemployment benefits for individuals facing liquidity challenges significantly rises, especially when their consumption exceeds income, or during an recession triggered by the epidemic. Moreover, the voluntary unemployed after the benefit restriction period is shortened receive the equivalent of 0.8 months of income earlier, which eases the liquidity of the voluntary unemployed in the three months prior to unemployment. I find that the additional cash from the policy shock lengthens the duration of unemployment for the voluntary unemployed and reduces their reemployment hazard by 19%. These findings suggest that providing more generous unemployment insurance benefits to the unemployed is likely to extend the duration of unemployment through liquidity effects.

The results of this study can be used to evaluate the impact of unemployment benefits on individual welfare, particularly as a crucial policy consideration during economic downturns. The results suggest the necessity for society to absorb the costs associated with periods of unemployment, given that the liquidity effect ensures unemployed individuals derive the full welfare benefit from higher quality job matches (Nekoei and Weber [2017]; Shimer and Werning [2008]). However, this study does not address the optimal trade-off between unemployment insurance and moral hazard risks. According to Landais et al. [2018], this requires not only a partial equilibrium analysis of labor supply responses to UI but also an observation of equilibrium employment responses (Landais et al. [2010]).

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Table 1: Descriptive Statistics for full JPSED sample

	Pooled					
	Mean	Std.Dev	Min	Median	Max	N.Valid
	Pre-layoff					
Age	36.82	13.67	18.00	34.00	65.00	40094.00
Female	1.62	0.49	1.00	2.00	2.00	40094.00
Spouse	1.55	0.50	1.00	2.00	2.00	40094.00
Child	1.61	0.49	1.00	2.00	2.00	40094.00
Educ. (graduate)	0.67	0.47	0.00	1.00	1.00	40094.00
	During Unemployment					
Previous Work Experience (months)	60.46	102.71	0.00	19.33	584.40	12304.00
Training	1.68	0.47	1.00	2.00	2.00	40094.00
Voluntary unemp.	0.71	0.45	0.00	1.00	1.00	26095.00
Unemp. duration	4.20	3.03	1.00	3.00	11.00	40094.00
Indiv. unemp. benefits (daily)	4011.19	1759.12	2061.00	4268.37	8328.77	26904.00

	Liquidity-Unconstraint			Liquidity-Constraint		
	Mean	Std.Dev	N.Valid	Mean	Std.Dev	N.Valid
	Pre-layoff					
Age	37.31	13.10	27494.00	35.76	14.78	12600.00
Female	1.66	0.47	27494.00	1.53	0.50	12600.00
Spouse	1.49	0.50	27494.00	1.69	0.46	12600.00
Child	1.57	0.50	27494.00	1.69	0.46	12600.00
Educ. (graduate)	0.66	0.47	27494.00	0.69	0.46	12600.00
	During Unemployment					
Training	1.68	0.47	27494.00	1.68	0.47	12600.00
Previous Work Experience (months)	60.31	99.98	8706.00	60.81	109.03	3598.00
Voluntary unemp.	0.73	0.44	18572.00	0.67	0.47	7523.00
Unemp. duration	3.91	2.89	27494.00	4.81	3.22	12600.00
Indiv. unemp. benefits (daily)	4071.29	1748.29	19174.00	3862.10	1777.07	7730.00

Notes: The sample (JPSED) encompasses all private sector job separations in Japan during the period from 2016 to 2022. Individual characteristics, including age and educational background, were matched using pre-unemployment data. A dummy variable indicating voluntary unemployment was created based on the reason for unemployment. Liquidity was defined according to the description provided in Section 2, and subgroups with restricted and unrestricted liquidity were established. These two subgroups exhibit no significant differences in terms of individual characteristics.

Table 2: UI Benefits and Hazard Rate – Pooled Sample

	Dependent variable:				
	Hazard Rate: h(t,i)				
	(1)	(2)	(3)	(4)	(5)
log(UI Benefit)	-0.2723***	-0.28340***	-0.2742***	-0.2883***	-0.2897***
	(0.02511)	(0.02457)	(0.02404)	(0.02454)	(0.02603)
Baseline fit	semi-parametric	weibull	loglogistic	gamma	weibull
Model	cox ph	cox ph	cox ph	cox ph	cox ph
Controls	N	N	N	N	Y
Iterations	29	7	6	7	5
Observations	12,639	12,639	12,639	12,639	12,427

Notes: Table 2 presents the estimated impact of UI Benefits on the unemployment exit hazard rate in Japan for the period 2016-2022. Parametric models are applied to all columns except the first. In the first column, I used Semi-Parametric models and ran the analysis with 10 bootstrap samples to estimate standard errors. The estimates of the coefficients for the control variables in column 5 are shown in Table 3. Standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 3: UI Benefits and Hazard Rate – Control Variable

	Dependent variable:			
	Hazard Rate: h(t,i)			
	(1)	(2)	(3)	(4)
log(UI Benefit)	-0.2897***	-0.2778***	-0.2804***	-0.2943***
	(0.02603)	(0.02919)	(0.0255)	(0.02605)
Age	-0.004906***	-0.004643***	-0.004808***	-0.005033***
	(0.0009751)	(0.001031)	(0.0009548)	(0.0009756)
Male	0.1228***	0.1061***	0.118***	0.1276***
	(0.02355)	(0.02064)	(0.02302)	(0.02359)
Spouse	-0.2012***	-0.1848***	-0.1887***	-0.2084***
	(0.02269)	(0.02358)	(0.02217)	(0.02272)
Years of Education	-0.0003175	0.002345	0.0003606	-0.0006864
	(0.005804)	(0.006297)	(0.005678)	(0.00001)
Homeownership	-0.04308*	-0.03479*	-0.0383*	-0.04644**
	(0.02222)	(0.03011)	(0.02174)	(0.02223)
Voluntary Unemp.	0.0753***	0.08057***	0.07714***	0.0761***
	(0.0251)	(0.02955)	(0.02453)	(0.02513)
Baseline fit	weibull	semi-parametric	loglogistic	gamma
Model	cox ph	cox ph	cox ph	cox ph
Iterations	5	32	5	5
Observations	12,427	12,427	12,427	12,427

Notes: Table 3 presents the estimated impact of UI Benefits on the unemployment exit hazard rate in Japan for the period 2016-2022. Standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 4: UI Benefits and Hazard Rate – Liquidity

	Dependent variable:			
	Hazard Rate: h(t,i)			
	(1)	(2)	(3)	(4)
log(UI Benefit)	-0.4712***	-0.2303***	-0.3953***	-0.2683***
	(0.04873)	(0.02869)	(0.07804)	(0.03780)
Baseline fit	weibull	weibull	weibull	weibull
Model	cox ph	cox ph	cox ph	cox ph
Liquidity-Constraint	Y	N	Y	N
Iterations	5	7	6	7
Observations	3,226	9,413	1,313	5,192

Notes: Table 4 presents the estimated impact of UI Benefits on the unemployment exit hazard rate in Japan for the period 2016-2022. Contrasting with Table 2, where the sample is segmented based on liquidity constraints to explore the influence of liquidity on the elasticity of unemployment benefits, this section presents a more detailed stratification. In this case, columns 1 and 3 represent the liquidity-constrained group. Columns 1 and 2 categorize individuals based on whether their income sufficed for consumption in the past year. Furthermore, columns 3 and 4 provide additional insight by including information on assets. Standard errors are in parentheses. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 5: UI Benefits and Hazard Rate – Liquidity

	Dependent variable:				
	Hazard Rate: h(t,i)				
	(1)	(2)	(3)	(4)	(5)
log(UI Benefit)	-0.2294***	-0.2487***	-0.1786***	-0.2789***	-0.2298***
	(0.02616)	(0.03061)	(0.05110)	(0.036200)	(0.05502)
Liquidity-Constraint	1.7660***	1.5800***	1.9600**	1.1360*	1.1080
	(0.28400)	(0.32110)	(0.66410)	(0.610200)	(0.78220)
log(UI Benefit) X Liquidity	-0.2571***	-0.2299***	-0.29250***	-0.1799**	-0.1972**
	(0.03445)	(0.03902)	(0.08013)	(0.073890)	(0.09426)
Baseline fit	weibull	weibull	weibull	weibull	weibull
Model	cox ph	cox ph	cox ph	cox ph	cox ph
Sample / Year	[2015,2021]	[2015,2019]	[2020,2021]	[2015,2019]	[2020,2021]
Controls	N	N	N	Y	Y
Iterations	6	7	6	7	7
Observations	12,639	9,057	3,582	8,894	3,533

Notes: Table 5 presents the effect of unemployment insurance benefits on the hazard rate of unemployment exit in Japan across different annual periods within the full sample. In contrast to Table 4, this analysis employs an interaction term between the liquidity-constrained dummy variable and the unemployment benefits portfolio, instead of segmenting into liquidity subgroups. Standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 6: UI Benefits and Hazard Rate - Limitation Period

	Dependent variable:				
	Hazard Rate: h(t,i)				
	(1)	(2)	(3)	(4)	(5)
P	0.1932**	0.2238***	0.3111***	0.2353*	0.3995***
	(0.07878)	(0.08026)	(0.09433)	(0.1248)	(0.10180)
Voluntary Unemp.	0.09118	0.1005	0.113	0.2142**	0.1887**
	(0.06145)	(0.06317)	(0.07379)	(0.0776)	(0.08103)
P X Voluntary Unemp.	-0.1925**	-0.2216**	-0.2693**	-0.2869**	-0.3749***
	(0.09100)	(0.09255)	(0.10910)	(0.1461)	(0.12000)
Baseline fit	weibull	weibull	weibull	weibull	weibull
Model	cox ph	cox ph	cox ph	cox ph	cox ph
Sample / Year	[2020,2021]	[2020,2021]	[2020,2021]	[2020,2021]	[2020,2021]
Controls	N	Y	N	N	N
Educational Duration <16	N	N	Y	N	N
Male sample only	N	N	N	Y	N
Without a spouse	N	N	N	N	Y
Iterations	4	5	5	4	4
Observations	3,553	3,511	2,432	1,310	1,839

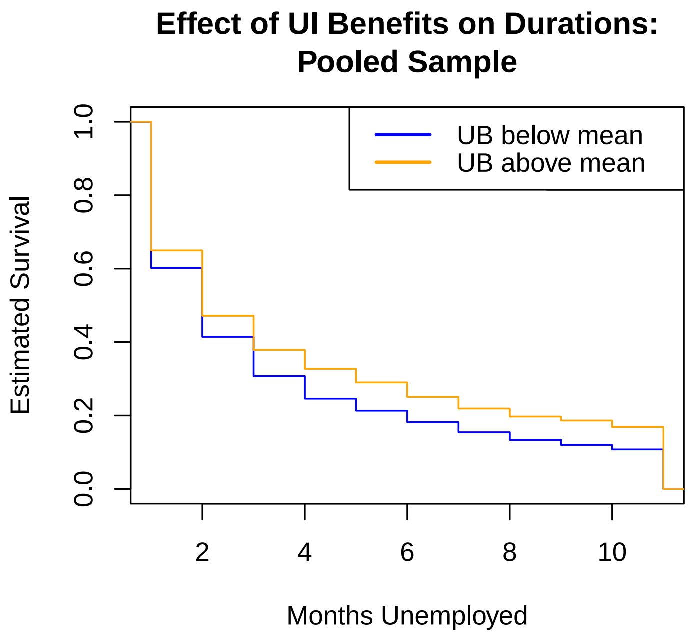
Notes: Table 6 presents the estimates of Equation 4. Columns 3 through 6 introduce specifications controlling for low education, male, and single individuals, respectively. These specifications are employed to assess the heterogeneous effects of policy shocks. Standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 7: UI Benefits and Hazard Rate - Limitation Period (Robustness Checks)

	Dependent variable:	
	Hazard Rate: h(t,i)	
	(1)	(2)
P	0.01085	-0.1988***
	(0.05109)	(0.07113)
Voluntary Unemp.	-0.06192	0.01995
	(0.05312)	(0.06205)
P X Voluntary Unemp.	0.04863	0.1264
	(0.07748)	(0.08407)
Baseline fit	weibull	weibull
Model	cox ph	cox ph
Sample / Year	[2020,2021]	[2019,2020]
Randomized Voluntary Unemp.	Y	N
Iterations	4	4
Observations	3,553	3,772

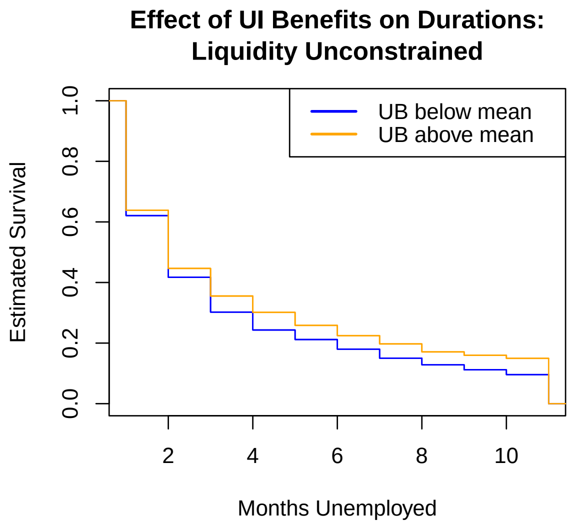
Notes: Table 7 provides estimates of the robust test results for Equation 4. Standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Figure 1: Stratified NPMLE for interval censored data

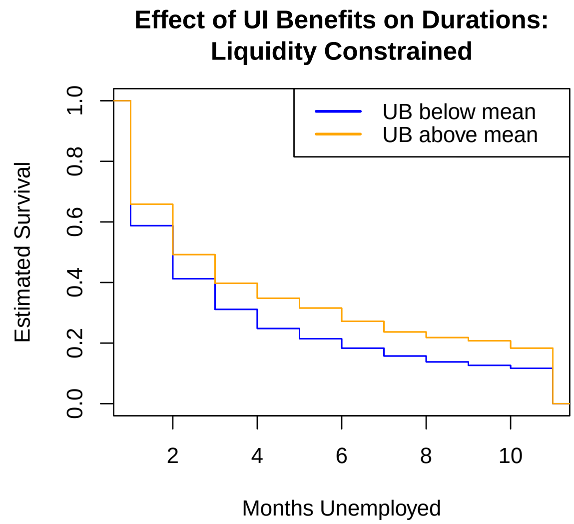


Notes: The figure presents the results obtained from non-parametric estimation of the core sample in the JPSED data. Figure 1 graphically examines the effect of unemployment benefits on the duration of unemployment.

Figure 2: The Effect of Liquidity Effects in The UI-Duration Link



(a) Liquidity-Unconstrained Sample



(b) Liquidity-Constrained Sample

Notes: Figure 2 presents the effect of unemployment benefits on unemployed individuals with different liquidity statuses. Figure 2b visually illustrates the impact of high and low benefit levels on the duration of unemployment within the subgroup characterized by restricted liquidity. Likewise, Figure 2a presents the results for the subgroup with unrestricted liquidity.