Unemployment Benefits and Liquidity Effects*

Qifan Fu†

August 28, 2023

Abstract

I estimate that shorter benefit waiting periods prolong unemployment duration, using Japan's policy changes in UI for voluntary unemployment. I demonstrate this effect depends on two key policy parameters: the effect of liquidity on durations and the effect of moral hazard. My framework implies if benefit waiting period shortening does not affect duration, then liquidity does not bind. I compare changes before and after the policy for voluntary unemployed individuals while using involuntary unemployment as a control group.The effect of UI on duration i find stems mainly from substantial liquidity effects.

Keywords: Unemployment insurance, Liquidity effects

*I am grateful to Social Science Japan Data Archive (SSJDA) for letting me access the JPSED data.
†Graduate School of Economics, Osaka University, fuqifan0310@icloud.com

1 Introduction

The traditional perspective in labor economics suggests that unemployment benefits serve to alleviate the uncertainty faced by individuals during periods of joblessness and provide them with the necessary liquidity to sustain basic consumption (e.g. Hopenhayn and Nicolini (1997);Shimer and Werning (2008)). Recent studies consistently show that these benefits have a negative impact on labor supply, which can be attributed to both moral hazard and liquidity effects (e.g. Bloemen and Stancanelli (2005); Schmieder and Von Wachter (2016)). It is important to distinguish between these two effects because workers who are unconstrained by credit tend to spend more time searching for better-suited employment opportunities, ultimately affecting their future wages (e.g. Landais (2015)).

This paper provides new empirical estimates of the liquidity effect of unemployment benefits using quasi-experimental variation and data from Japan. Firstly, similar to Chetty (2008), it estimates the impact of unemployment benefits on the duration of unemployment for individuals with and without liquidity restrictions separately. Secondly, the Japanese data possesses certain desirable characteristics. Unlike in most regions (e.g. Venn (2012)), voluntary unemployed individuals in Japan can also receive unemployment benefits due to government support for labor transfer from mature to growing industries as part of industrial policy (e.g. Konaga (1988)). Additionally, starting from 2020, the waiting period for benefits has been reduced from three months to two months for voluntary unemployed individuals. This change provides an opportunity for this paper to estimate the causal effect of unemployment benefits in alleviating liquidity issues[1].

The paper presents the main empirical findings as follows. First, to address the problem of censored data for the unemployment period, this study uses cox hazards model to show that an increase in unemployment benefits significantly reduces the hazard rate at which they exit unemployment. Next, I construct an indicator of whether an individual's income savings

[1]Traditional UB policy typically require individuals to remain unemployed until their benefits expire, which can impact the level of effort they put into searching for a job. On the other hand, reducing the benefit period means that individuals receive benefits sooner without affecting their job search strategy.

satisfy consumption during the unemployment period to measure consumption smoothing ability during unemployment. Two subgroups of liquidity-constrained and non-liquidity-constrained individuals are divided according to their consumption smoothing ability. The results of regressing the subgroups separately show that in the liquidity-constrained group, a 10% increase in unemployment benefits leads to an average decrease of 2.9% in the hazard rate. In contrast, the impact of unemployment benefits is much smaller for those who are not constrained by liquidity issues. These findings suggest that liquidity plays a crucial role in determining the relationship between benefits and duration of unemployment.

The division of the liquidity subgroups according to the indicator of consumption smoothing ability may include some unobservable differences in the individual unemployed, which leads to bias in the estimates. Here, I utilize the exogenous policy variable-induced shortening of the benefit waiting period for the voluntarily unemployed to estimate the liquidity effect. Using the involuntary unemployed as a control group, I find that a 1-month reduction in the waiting period leads to an increase in duration of about 1.02 units for the spontaneously unemployed. This result implies that individuals who are spontaneously unemployed simply phase in benefits 1 month earlier in time. This distinguishes it from the traditional UI extensions policy in that the measure of shortening the waiting period does not seem to lead to a moral hazard problem triggering an increase in the duration of unemployment.

This paper is related to several strands of literature. Firstly, it presents new empirical estimates on the impact of liquidity effects in the unemployment benefit-duration Link. The current literature on unemployment benefits primarily examines their impact on wages after reemployment, but it also implicitly acknowledges the presence of liquidity effects (e.g. Schmieder et al. (2016); Nekoei and Weber (2017)). However, apart from Chetty (2008), LaLumia (2013), and Landais (2015), few other empirical studies differentiate between liquidity effects and moral hazard. Our study provides Japan-based estimates of the liquidity effect without requiring additional data such as severance payments, or the income tax refunds. Additionally, we calculate estimates for the elasticity of unemployment benefits with respect to the duration of unemployment following a pandemic. Consistent with the results of other studies, I find a significant increase in the elasticity of unemployment benefits after 2020 (Mitman and Rabinovich (2021)). This result may hint at the liquidity risk of the unemployed in the epidemic era (Bitler et al. (2020); Moffitt and Ziliak (2020)).

Second, there is limited evidence to date on the effect of benefit waiting periods on duration of unemployment, especially in the context of the fact that voluntary unemployment also receive unemployment benefits (Asenjo et al. (2019)). This paper examines the impact of reducing the waiting period for benefits on policy outcomes. The empirical estimates indicate that shortening the waiting period can help alleviate liquidity constraints faced by unemployed individuals. This finding provides valuable insights for regions that have not yet implemented voluntary unemployment benefit subsidies, particularly in the current potentially recessionary climate (Casado et al. (2020); Goda et al. (2022); Gallant et al. (2020); Han et al. (2020)).

The rest of the paper progresses as follows. In next section, I present the data and provide a regression strategy based on the cox proportional hazards model. In Section 3, I discuss the heterogeneous effects of unemployment benefits and the potential duration of unemployment benefits on the duration of unemployment. Section 4 explores the effects arising from Shortened-Waiting Period, and the estimates are used to identify liquidity effects.Section 5 concludes.

2 Empirical implementation

2.1 Institutional Background

Unemployment benefits in Japan are available to workers who have been recognized as unemployed after working for at least 12 months within the past 2 years. This study focuses on individuals between the ages of 18 and 65 who were unemployed during the period of 2016-2022. The daily amount of unemployment benefits is determined by factors such as age and earnings from their previous job. Typically, the benefit amount ranges from approximately 50% to 80% of their previous earnings before becoming unemployed.

The duration of these benefits depends on both the individual's age and the number of years they were employed prior to unemployment. Generally, those with longer employment history or more years insured will receive benefits for a longer period. It is worth noting that unlike many other regions, Japan allows self-initiated unemployed individuals to receive unemployment benefits after a waiting period. The main identification strategy of this paper utilizes the effect of a shorter benefit waiting period on the duration of unemployment.

And as another feature of Japan's unemployment data, only a small percentage of Japan's unemployed receive unemployment benefits. According to the International Labour Organization's 2009 data, Japan has a rate of 77% for unemployed individuals who do not receive unemployment benefits (Delarue (2009); for Economic Co-operation and Development (2007)). This places Japan second only to China, which has a rate of 88%. This phenomenon can be attributed to factors such as the prevalence of informal employment in the Japanese job market and the limited number of unemployed individuals transitioning from regular employment (Sakai (2012); Yu (2012); Kitazawa (2015)).

2.2 Data

The data for this article are from the Japanese Panel Study of Employment Dynamics (JPSED). The data was provided by the Recruit Works Institute in Japan. The dataset contains the employment status of Japanese workers nationwide from 2015 to 2021. The dataset includes data on unemployment insurance, duration of unemployment, demographic characteristics (gender, age, education, place of residence, reason for leaving, etc.), household income, job characteristics (location, occupation. industry).

Since we could not directly observe the duration of unemployment insurance benefits and benefits received by the unemployed, we followed Card et al. (2015) to calculate individual unemployment benefits and potential duration of unemployment based on the Japanese

Ministry of Health, Labour and Welfare's formula for unemployment benefits [2]. 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 $UB = 0.9wage - 0.3(wage - 5030)/7350wage$. And the data include data on whether or not they receive unemployment benefits, which allows us to accurately identify the impact of unemployment benefits.

Here, the duration of unemployment is measured primarily by the survey measure, constructed from individual's recollection of when they became unemployed and when they returned to work [3]. This paper excludes the sample of those who were unemployed for up to a full year during the last year to eliminate those who dropped out of the labor market. Compared to the traditional measure of administrative records based on the length of unemployment benefit receipt, the total duration of unemployment of the unemployed can be more precisely identified. In particular, the spontaneously unemployed group has a mandatory two-month restriction period on benefit receipt due to regulatory restrictions, which could easily lead to an underestimation of the actual length of unemployment for the unemployed if the traditional length of unemployment benefit payment is used. I report descriptive statistics containing data on the duration of unemployment, unemployment insurance benefits, and duration of unemployment benefits in Table 1.

In order to test the role of liquidity in the effect of benefits on duration, I divides liquidity subgroups based on whether an individual's income or savings can meet living expenses. Those whose income or savings cannot meet basic living expenses in the past year

[2] 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.

[3] continuous duration of unemployment in the past year.

are treated as the liquidity constrained group.This classification approach is preferred over relying solely on income and consumption data because it 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 mobility-constrained group experiences longer periods of unemployment compared to those with unrestricted liquidity. Additionally, individuals in the mobility-constrained group receive slightly lower unemployment benefits.

2.3 Hazard Model Estimates

Since the presence of censored data [4], this study used Hazard Model Estimates to identify the effect of UI benefit level and UI potential duration on search outcomes (Ranganathan and Pramesh (2012);Klein et al. (2003)). Let $h\left(t,i\right)$ denote the unemployment exit risk 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 level for individual i, and x_i is a set of control variables. I estimate hazard models of the following form:

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

Here, β_1 provides the elasticity of the hazard rate with respect to unemployment insurance benefits (ubi). 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

[4]For individuals who are still unemployed in the last month of the survey, the duration of unemployment may continue after the survey ends, which may result in data loss.

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

3 Effects of UI Benefits on Nonemployment Durations

3.1 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 1a shows that in the pooled sample, unemployment benefits are associated with lower unemployment exit rates. As can be seen in the figure, about 50% of the group that did not receive benefits after 4 months of unemployment exited unemployment, compared to 30% in the welfare group. In Figure 1b, I construct the effect of high and low benefit levels on the employment rate of each individual based on the mean of the daily benefit amounts. Figure 1b shows that the low welfare group has higher unemployment exit rates. However the two welfare groups at high and low levels do not show as much variability as in Figure 1a.

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. 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 2a reveals that lower levels of unemployment benefits significantly increase the employment rate of individuals facing liquidity constraints. Specifically, when compared to Figure 1b, the 4-month employment rate for the unemployed in the lower benefit level group depicted in Figure 2a experiences a notable 20% increase. This suggests that individuals in Figure 2a, who face liquidity problems, tend to have shorter durations of unemployment.

In contrast, Figure 2b displays the effect of unemployment benefits on the duration of unemployment for the group with unrestricted liquidity. When compared to the restricted group, the disparity in the effect on unemployment duration between the high and low benefit levels in Figure 2b is further reduced. Moreover, the subsequent findings in Table 2 reinforce this observation by demonstrating that unemployment benefits have minimal impact on the duration of unemployment for individuals with unrestricted liquidity. This underscores the significance of liquidity effects in the link between unemployment insurance and duration of unemployment. The above graphical evidence, which is consistent with the results of LaLumia (2013) and Schmieder et al. (2016), suggests that unemployment benefits have a greater impact on individuals with limited liquidity.

3.2 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 risk rate of exiting unemployment across all samples. The estimation results are presented in column d of Table 2[5], where it is observed that a 10% increase in unemployment benefits leads to a decrease of 3% in the hazard rate within the sample[6].

To ensure the reliability and robustness of the Cox estimates, tests were conducted to evaluate the consistency of the coefficients in columns e[7] and f with those in column b when

[5]This finding aligns with the results estimated by Sasaki et al. (2013) for administrative data.

[6]This estimated is slightly lower than the elasticity of the hazard rate with respect to the benefit level observed in other countries, such as the United States (Chetty (2008); Rothstein (2011)).

[7]By controlling for the duration of previous occupation, it is possible to effectively control for the potential

controlling for various factors. These factors include individual characteristic variables such as age, educational background, and voluntary separation, as well as control variables for industry and region.This indicates the stability of the above results. In addition, column a of Table 2 provides linear estimates, demonstrating the impact of unemployment benefits on the duration of unemployment.

To validate the evidence shown in Figures 2, the total sample was further divided into subgroups based on liquiditybility constraints. This division helps minimize potential confounding variables and allows for a clearer examination of the impact of liquidity on the link between unemployment benfits and duration of unemployment.

In Table 3, column b reports the results for households whose income (including savings) in the past year does not cover their daily expenses. It shows that for every 10% increase in unemployment benefits, the risk rate of unemployment decreases by 3.4%. In contrast, the association between unemployment benefits and the risk rate is much smaller for the group without liquidity constraints, which fails to reject the null hypothesis. These results support the income effect mentioned by Chetty (2008).

To assess the robustness of the findings, additional control variables were included in rows 2 and 3 of columns b and c in 3. The results remain robust, indicating the stability of the findings when accounting for other factors. In column d of 3, different definitions of liquidity constraints were explored to test the robustness of the results. The findings remain consistent when using assets (or property) as an alternative measure of liquidity. Furthermore, it is observed that unemployment benefits have minimal effect on the duration of unemployment for individuals with unrestricted liquidity.

Overall, these results further support the relationship between liquidity constraints, unemployment benefits, and the risk rate of unemployment exit, while demonstrating the robustness of the findings across different specifications and control variables.

---

impact of unemployment benefit duration on the duration of unemployment.

4 The Effect of Shortened-Waiting Period

4.1 Estimation Strategy

In order to facilitate labor mobility from mature industries to growing ones and in response to the evolving work styles, the Japan Senate passed a supplementary resolution during the 2017 ordinary session of the Diet, which called for discussions on shortening the waiting period for individuals who become unemployed voluntarily. In Japan, the waiting period was initially one month but was extended to three months in 1984 to discourage easy job quitting. As of October 1, 2020, this policy has come into effect, reducing the waiting period for voluntarily unemployed individuals from three months to two months[8]. While the policy aims to promote labor migration, it also provides a quasi-natural experimental setting for this study to examine the liquidity effect.It is important to mention that although there were discussions about reducing the waiting period for unemployment benefits, the specific timing of its implementation was not communicated in advance. As a result, individuals were unable to plan their time out of work strategically.

The traditional practice of extending unemployment benefits aims to facilitate the liquidity of the unemployed. However, it can also create moral hazard due to factors like state-dependence (Landais (2015)). Shortening the waiting period does not significantly affect unemployed individuals' strategies or distort marginal incentives to search for a new job. In fact, reducing the period without income can improve welfare for those facing liquidity constraints. Therefore, the empirical strategy of this study is based on observing the reduction in waiting periods for voluntary unemployed individuals before and after the policy implementation.

To assess the impact of the policy, I compare the difference in unemployment durations between voluntary and involuntary unemployed individuals before and after the policy[9]. Let define the duration of unemployment for the treatment group and control group unemployed

[8]Source: Ministry of Health, Labour and Welfare.

[9]My specification is similar to that of Kiel and McClain (1995); Archibong and Annan (2017)

before and after the start of policy p_i as

$$Duration_i = \alpha + \beta_1 p_i + \beta_2 T_i + \beta_3 p_i * T_i + \gamma x_i + \varepsilon_i \tag{3}$$

where T_i denotes the voluntary unemployed and involuntary unemployed, and p_i denotes the indicator of policy impact. Additionally, a control variable x_i for individual characteristics is included to account for potential endogeneity related to different types of unemployment caused by individual traits.[10] The coefficient β_3 represents the average treatment effect of shorter waiting Period on the duration of unemployment for the voluntary unemployed.

4.2 Estimation Results

Figure 3 illustrates the changes in the distribution of unemployment duration for both voluntary and involuntary unemployed individuals before and after the policy implementation. In 2022, there is a slight shift back in the peaks of all curves. Notably, there is a clear trend of increased unemployment duration for voluntary unemployed individuals compared to 2020, but this increase is primarily concentrated within the first five months. It is important to consider that interpreting this result as solely due to a policy shock may be problematic due to other time-dependent factors. For instance, unobservable variables in 2022 could also contribute to an increase in unemployment hours for voluntary unemployment.

Table 4 displays the coefficients for specification 3. In Column 1, the coefficient for the voluntary unemployed is reported as 0.36. This indicates that those who are voluntary unemployed tend to experience a longer duration of unemployment compared to those who are not. Columns 2 and 3 show $beta_3$ coefficients ranging from 0.92 to 1.02. Specifically, for the voluntary unemployed, a decrease in the waiting period for UI benefits leads to a significant increase in the length of unemployment by an average of 0.9 units. Reducing the waiting period for benefits for voluntary unemployed seems to be a less morally risky approach

[10]e.g., highly educated individuals may have more bargaining power and opt for voluntary unemployment.

compared to the conventional policy of extending benefits. Consequently, this shorter waiting time results in a longer duration of unemployment, meaning that individuals who are voluntary unemployed receive their unemployment benefits earlier without prolonging their period of joblessness. Based on these statistical findings, we can reject the hypothesis that a policy shock reducing waiting time has an equal effect on both voluntary and involuntary unemployment ($p = 0.0336$).

The estimates above indicate that reducing the waiting period for unemployment benefits leads to longer durations of unemployment for those who become unemployed voluntary. This suggests that easing liquidity constraints significantly increases the length of time individuals remain unemployed. To establish a causal relationship, this study examines two key assumptions: parallel forward tendency and exogeneity of policy entry. In order to test these assumptions, a series of falsification, sensitivity tests are conducted.

Firstly, the parallel pre-trend assumption states that prior to a policy shock, the duration of unemployment should follow a similar trend over time for both voluntary and involuntary unemployed individuals (Roth (2022); Rambachan and Roth (2019)). Specification 3 includes an interaction term between the dummy variable and voluntary unemployed for the years 2019 through 2022 before the policy was implemented ($\sum_{n=2019}^{2022} p_{in} * T_i$). The base period chosen is 2018 in order to balance data before and after the policy change. Table 5 presents the results of these tests. It can be observed that all pre-policy interaction terms have p-values greater than 0.05, satisfying the parallel trend assumption.

Similar to Bertrand et al. (2004)'s approach, this study uses randomly generated reasons for leaving a job to reclassify individuals into randomized subgroups of voluntary and involuntary unemployment. Using randomized subgroups for the estimation of the baseline model yields the results shown in Figure 6. The distribution of the coefficients in the figure tends to be close to 0, indicating that individuals under random generation are almost unaffected by the policy. And the distribution of p-values is always greater than the 0.05 significance level, which can be assumed that the spurious groupings can be considered as measurement errors.

5 Conclusion

The impact of evaluating the liquidity effect of unemployment benefits has significant implications for both individual welfare at the micro level and policy at the macro level. Using a quasi-experimental strategy based on UI waiting period reduction, I found that reducing the waiting period by one month for voluntary unemployed individuals leads to an increase in their unemployment duration by 0.9 units. Considering that voluntary unemployed individuals have no income during a waiting period lasting up to three months, shortening the waiting period can greatly alleviate individual consumption smoothing. In contrast to traditional approaches such as extending the welfare period, this study suggests that estimating the effects of shortening the welfare period on individual unemployment duration identifies potential liquidity effects.

The strategy of this article is based on the following insights. The differences in welfare amounts often include moral hazards and liquidity effects. I found that when individuals are grouped according to liquidity, those with limited liquidity show greater elasticity in welfare. This means that groups with limited liquidity are more sensitive to differences in welfare amounts. Although different groups do not show significant differences in individual characteristics such as age and education, this result does not directly indicate that unemployment benefits increase individuals' liquidity, thereby increasing the duration of unemployment. The ideal approach would be to provide one-time subsidies to unemployed individuals with limited liquidity and then evaluate the effect of liquidity. Although non-voluntary unemployed individuals are more likely to encounter liquidity problems, voluntary unemployed individuals often face more severe limitations due to the absence of income during periods without unemployment benefits waiting period exists. Therefore, the causal effects of shortening the benefit period on the duration of unemployment reflect pure liquidity effects.

The results of this study can be used to evaluate the impact of unemployment benefits on individual welfare, especially as a key policy issue during economic recessions. It also affect policy issues related to job matching and wages for individuals after reemployment. The findings imply that it is necessary for society to bear the costs of unemployment periods for individuals, as the mobility effect means that unemployed individuals gain all the welfare value from higher quality job matches. However, this study does not address the optimal trade-off between unemployment insurance and moral hazard risks. According to Mitman and Rabinovich (2015) and Landais et al. (2010), this requires not only a partial equilibrium analysis of labor supply responses to UI but also an observation of employment responses within a general equilibrium framework.

References

Archibong, B. and F. Annan (2017) "Disease and Gender Gaps in Human Capital Investment: Evidence from Niger's 1986 Meningitis Epidemic," *American Economic Review*, Vol. 107, No. 5, pp. 530–535.

Asenjo, A., C. Pignatti et al. (2019) *Unemployment insurance schemes around the world: Evidence and policy options*: International Labour Office Geneva, Switzerland.

Bertrand, M., E. Duflo, and S. Mullainathan (2004) "How much should we trust differences-in-differences estimates?" *The Quarterly journal of economics*, Vol. 119, No. 1, pp. 249–275.

Bitler, M., H. W. Hoynes, and D. W. Schanzenbach (2020) "The social safety net in the wake of COVID-19,"Technical report, National Bureau of Economic Research.

Bloemen, H. G. and E. G. Stancanelli (2005) "Financial wealth, consumption smoothing and income shocks arising from job loss," *Economica*, Vol. 72, No. 287, pp. 431–452.

Card, D., D. S. Lee, Z. Pei, and A. Weber (2015) "Inference on causal effects in a generalized regression kink design," *Econometrica*, Vol. 83, No. 6, pp. 2453–2483.

Casado, M. G., B. Glennon, J. Lane, D. McQuown, D. Rich, and B. A. Weinberg (2020) "The aggregate effects of fiscal stimulus: Evidence from the COVID-19 unemployment supplement,"Technical report, National Bureau of Economic Research.

Chetty, R. (2008) "Moral hazard versus liquidity and optimal unemployment insurance," *Journal of political Economy*, Vol. 116, No. 2, pp. 173–234.

Delarue, R. (2009) "The ILO and its role in responding to the financial, economic and social crisis, promoting decent work and strengthening the social dimension of globalisation," *Social developments in the European Union*, Vol. 65.

for Economic Co-operation, O. and Development (2007) *Benefits and Wages 2007: OECD Indicators*: Organisation for Economic Co-operation and Development.

Gallant, J., K. Kroft, F. Lange, and M. J. Notowidigdo (2020) "Temporary unemployment and labor market dynamics during the COVID-19 recession,"Technical report, National Bureau of Economic Research.

Goda, G. S., E. Jackson, L. H. Nicholas, and S. S. Stith (2022) Older workers' employment and Social Security spillovers through the second year of the COVID-19 pandemic Journal of Pension Economics & Finance 1–26

Han, J., B. D. Meyer, and J. X. Sullivan (2020) "Income and Poverty in the COVID-19 Pandemic,"Technical report, National Bureau of Economic Research.

Hopenhayn, H. A. and J. P. Nicolini (1997) "Optimal unemployment insurance," *Journal of political economy*, Vol. 105, No. 2, pp. 412–438.

Kiel, K. A. and K. T. McClain (1995) "House prices during siting decision stages: The case of an incinerator from rumor through operation," *Journal of Environmental Economics and Management*, Vol. 28, No. 2, pp. 241–255.

Kitazawa, K. (2015) "International comparison of unemployment compensation programs: focus on recipient ratio to unemployed workers," *Japan labor review*, Vol. 12, No. 2, pp. 124–144.

Klein, J. P., M. L. Moeschberger et al. (2003) *Survival analysis: techniques for censored and truncated data*, Vol. 1230: Springer.

Konaga, K. (1988) "Industrial Policy: The Japan."

LaLumia, S. (2013) "The EITC, tax refunds, and unemployment spells," *American Economic Journal: Economic Policy*, Vol. 5, No. 2, pp. 188–221.

Landais, C. (2015) "Assessing the welfare effects of unemployment benefits using the regression kink design," *American Economic Journal: Economic Policy*, Vol. 7, No. 4, pp. 243–278.

Landais, C., P. Michaillat, and E. Saez (2010) "Optimal unemployment insurance over the business cycle."

Mitman, K. and S. Rabinovich (2015) "Optimal unemployment insurance in an equilibrium business-cycle model," *Journal of Monetary Economics*, Vol. 71, pp. 99–118.

——— (2021) "Whether, when and how to extend unemployment benefits: Theory and application to COVID-19," *Journal of Public Economics*, Vol. 200, p. 104447.

Moffitt, R. A. and J. P. Ziliak (2020) "COVID-19 and the US safety net," *Fiscal Studies*, Vol. 41, No. 3, pp. 515–548.

Nekoei, A. and A. Weber (2017) "Does extending unemployment benefits improve job quality?" *American Economic Review*, Vol. 107, No. 2, pp. 527–561.

Rambachan, A. and J. Roth (2019) "An honest approach to parallel trends," *Unpublished manuscript, Harvard University*.

Ranganathan, P. and C. Pramesh (2012) "Censoring in survival analysis: potential for bias," *Perspectives in clinical research*, Vol. 3, No. 1, p. 40.

Roth, J. (2022) "Pretest with caution: Event-study estimates after testing for parallel trends," *American Economic Review: Insights*, Vol. 4, No. 3, pp. 305–322.

Rothstein, J. (2011) "Unemployment insurance and job search in the Great Recession,"Technical report, National Bureau of Economic Research.

Sakai, T. (2012) "Koyo hoken no jukyusha wariai wa naze teika shite kitanoka [Why have unemployment insurance recipient ratios been declining?],"Technical report, IPSS Discussion Paper.

Sasaki, M., M. Kohara, and T. Machikita (2013) "Measuring search frictions using Japanese microdata," *The Japanese Economic Review*, Vol. 64, pp. 431–451.

Schmieder, J. F. and T. Von Wachter (2016) "The effects of unemployment insurance benefits: New evidence and interpretation," *Annual Review of Economics*, Vol. 8, pp. 547–581.

Schmieder, J. F., T. von Wachter, and S. Bender (2016) "The effect of unemployment benefits and nonemployment durations on wages," *American Economic Review*, Vol. 106, No. 3, pp. 739–777.

Shimer, R. and I. Werning (2008) "Liquidity and Insurance for the Unemployed," *American Economic Review*, Vol. 98, No. 5, pp. 1922–1942.

Venn, D. (2012) "Eligibility criteria for unemployment benefits: quantitative indicators for OECD and EU Countries."

Yu, W.-h. (2012) "Better off jobless? Scarring effects of contingent employment in Japan," *Social Forces*, Vol. 90, No. 3, pp. 735–768.

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
Insured individuals	1.81	0.78	1.00	2.00	3.00	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
Insured individuals	1.73	0.77	27494.00	1.97	0.77	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) covers the universe of private sector job separations in Japan for the period of 2016-2022. Individual characteristics, such as age and educational background, were matched using pre-unemployment data. A dummy variable indicating voluntary unemployment was created based on the reason for unemployment. To account for the potential impact of unemployment benefit duration, the number of years worked prior to unemployment was recorded. Liquidity was defined based on the description provided in Section 2, and subgroups with restricted and unrestricted liquidity were formed. These two subgroups do not demonstrate significant differences in terms of individual characteristics.

Table 2: The Effect of UI Benefits on Non-employment Duration

	(1)	(2)	(3)	(4)	(5)
	Semi-Parametric Cox Hazard Model		Parametric Cox Hazard Model		
Log UI benefit	-0.3137***	-0.336***	-0.3093***	-0.3336***	-0.3336***
	(0.02517)	(0.03718)	(0.02431)	(0.03359)	(0.03356)
Age		-0.005313***		-0.005691***	-0.00569***
		(0.0009899)		(0.001162)	(0.001161)
Female		-0.04805**		-0.04533	-0.04533*
		(0.01972)		(0.03016)	(0.03014)
Educ. (graduate)		0.04972		0.03647	0.03649
		(0.03396)		(0.02883)	(0.02881)
Training		-0.03177		-0.02931	-0.02931
		(0.02915)		(0.02779)	(0.02778)
Spouse		0.1237***		0.1179***	0.1179***
		(0.02751)		(0.02782)	(0.02782)
Voluntary unemp.		-0.002135			-0.001296
		(0.02557)			(0.02745)
Control Variables					
Industry	NO	NO	NO	YES	YES
Region	NO	NO	NO	YES	YES
Bootstrap Samples	100	100			
Final llk	-19937.98	-14201.6	-20577.55	-13236.59	-13236.59
Spells	12639	8999	12639	11469	8160

Notes: Standard errors in parentheses. *** $p < 0.01$,** $p < 0.05$,* $p < 0.1$. This table estimates the effect of UI daily benefits levels on the hazard rate of leaving UI using the complete data from the JPSED for the period of 2015-2021. log (UI benefits) denotes the log-daily UI benefit amount. In the context of the Cox proportional hazards model, the explanatory variable characterizes the hazard rate of individuals exiting unemployment. Controls for regions and industries are added to all estimates except for the 1-3 column.

Table 3: Hazard Model Estimates by Liquidity Status

	(1)	(2)	(3)	(4)	(5)
		Liquidity-Constraint		Covid-19 Pandemic	
	Pooled	Constrained	Unconstrained	2016-2020	2020-2021
Log UI Benefits	-0.3043***	-0.3429***	-0.299***	-0.3042**	-0.3590*
	(0.0244)	(0.0762)	(0.03591)	(0.02608)	(0.06702)
X Constrained	-0.07421**				
	(0.03564)				
Final llk	-19937.98	-1839.434	-8602.488	-13236.59	-13236.59
Spells	12639	1313	5192	10924	1715

Notes: Standard errors in parentheses. *** $p < 0.01$,** $p < 0.05$,* $p < 0.1$. The coefficients reported represent the elasticities of the hazard rate with respect to unemployment insurance benefits.'Full controls' refers to the inclusion of the following variables as additional controls: age, gender, education, marital status, reason for leaving, and participation in skills training. 'R&I Control's' stands for region and industry control, which are also incorporated in the analysis. The criteria for the liquidity subgroup in columns 2 and 3 are determined by comparing an individual's income from work in the past year with their subsistence consumption (Section 2). The UI elasticity under different year intervals is reported in columns 4 and 5.

Table 4: The Effect of Shorten-Waiting Period on Non-employment Duration

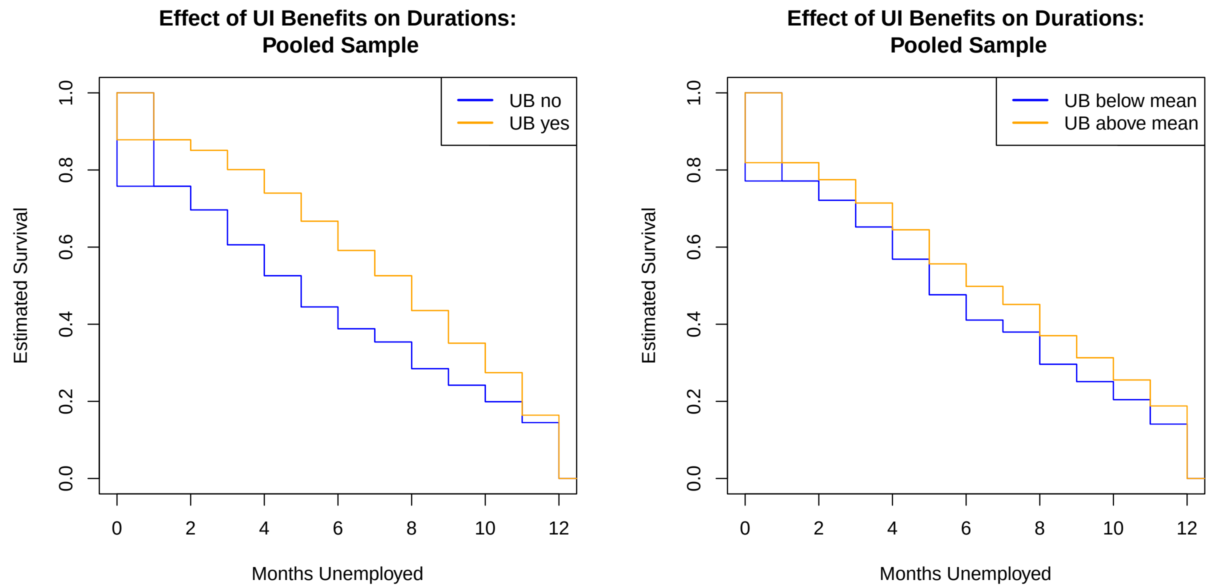
	(1) Parametric OLS Model	(2)	(3)
Voluntary unemployed	0.361139**		
	(0.175194)		
Shorten waiting period	0.342521		
	(0.218415)		
Shorten x Voluntary		0.927188**	1.024597**
		(0.450034)	(0.455358)
Control Variables			
Industry	NO	NO	YES
Region	NO	NO	YES
Spells	3168	3168	3168

Notes: Standard errors in parentheses. *** $p < 0.01$,** $p < 0.05$,* $p < 0.1$. This table presents the coefficient estimates for specification 3, where the duration of unemployment is the dependent variable. It also includes controls for individual characteristics. The sample consists of unemployed individuals who received unemployment benefits between 2020 and 2022. In Column 3, we further control for industry and location variables.

Table 5: Parallel Trends before Shorten-Waiting Period

	(1) Parametric OLS Model	(2)
Voluntary unemployed	0.240527	0.248089
	(0.219)	(0.240173)
Voluntary x Shorten	0.953161**	0.947496**
	(0.465157)	(0.476429)
x 1^{st} year before Shorten	-0.346688	-0.355385
	(0.45603)	(0.466413)
x 2^{nd} year before Shorten		-0.095547
		(0.523856)

Notes: Standard errors in parentheses. *** $p < 0.01$,** $p < 0.05$,* $p < 0.1$. This table presents the coefficient estimates for the dummy variables in Specification 3, before incorporating the policy. The control variables remain consistent with those in Table 4.

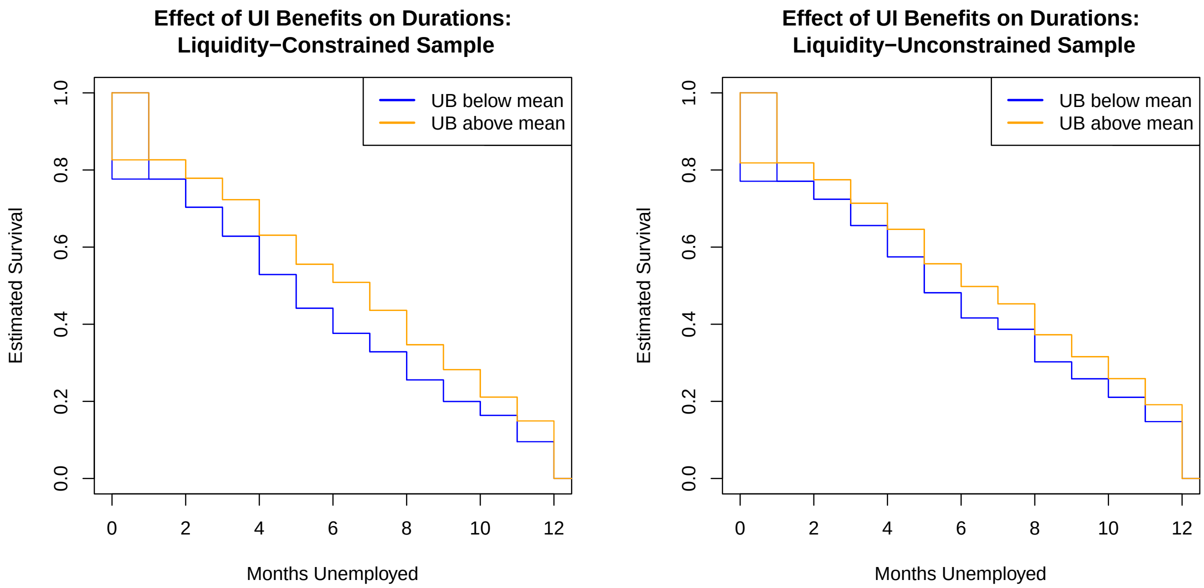


(a) Dummy Variables for unemployment benefits

(b) Dichotomous variables for the mean of unemployment benefits

Figure 1: Effect of UB on Durations:Pooled Sample

Notes: This figure presents the results obtained from non-parametric estimation of the core sample in the JPSED data. Figure 1a graphically examines the effect of unemployment benefits on the duration of unemployment. In Figure 1b, dichotomous clusters are formed based on the mean daily unemployment benefit amounts, and the graphs depict the effects of high and low benefit amount levels on the duration of unemployment for individuals in all samples.



(a) Liquidity-Constrained Sample

(b) Liquidity-Unconstrained Sample

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

Notes: To assess liquidity during unemployment, this study empirically classifies liquidity levels based on a subjective assessment of whether the unemployed individual's income in the past year met their daily consumption needs. Figure 2a visually depicts the effect of high and low benefit levels on the duration of unemployment within the subgroup characterized by restricted liquidity. Similarly, Figure 2b presents the results for the subgroup with unrestricted liquidity.

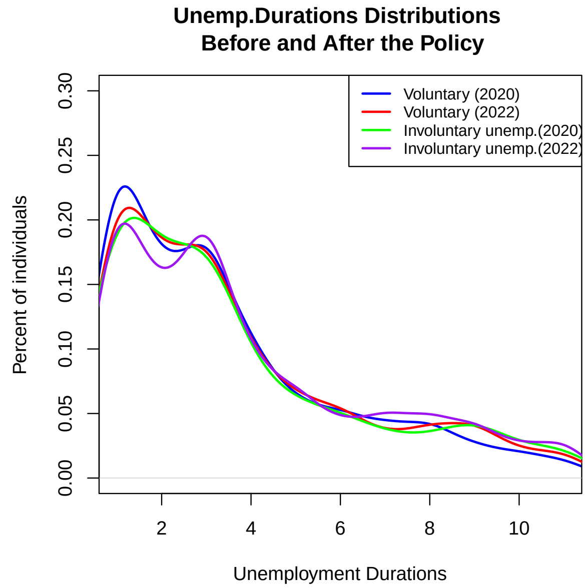
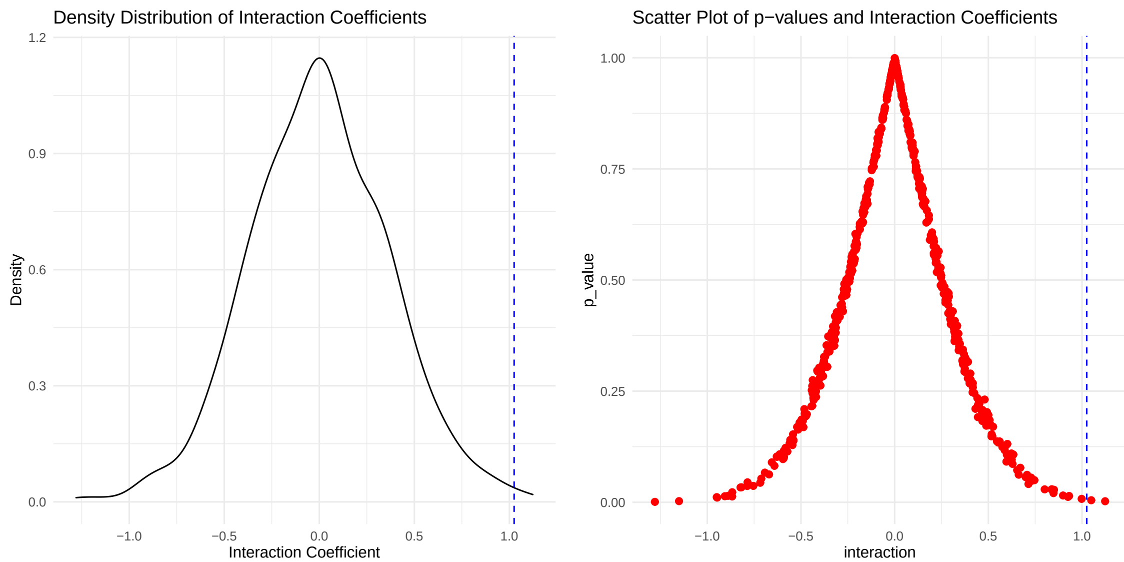


Figure 3: Distribution of Duration of Unemployment Cver Time

Notes: The graph shows the distribution of unemployment duration for both voluntary and involuntary unemployed individuals before and after the policy implementation. The sample used in the graph consists of individuals who received unemployment benefits from 2020 to 2022. It indicates that there is a noticeable shift in the peak of unemployment duration for voluntary unemployed individuals after the policy implementation, while there is no such clear trend observed among involuntary unemployed group.



(a) Coefficient Distribution

(b) P-value Distribution

Figure 4: Placebo Testing: Random Allocation of Spontaneous Unemployment Group

Notes: The figure used 500 samples to randomly divide the treatment group. Figure a shows the distribution of interaction term coefficients under random division, while figure b displays the corresponding p-values for each coefficient. It can be observed that the result for specification 3 is 1.025, which deviates significantly from most of the sampling results.