Optimal Unemployment Insurance with Repeated Unemployment*

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Abstract

This paper provides the first systematic analysis of repeated unemployment and its implications for unemployment insurance (UI) design. We document the prevalence of repeated unemployment and that initial unemployment spells differ systematically from subsequent spells in their responses to UI policies. Evidence from Austrian reforms reveals that individuals in repeated spells value higher UI benefits twice as much as first-time unemployed, while the fiscal cost of providing these benefits is three times lower in repeated spells. Our findings highlight significant welfare gains from incorporating unemployment spell dynamics – an aspect largely overlooked in the literature – into UI policy design.

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1 Introduction

The design of unemployment insurance (UI) has been the focus of extensive research (Le Barbanchon, Schmieder and Weber, 2024). As pointed out in many studies, the impact of job loss is dynamic – and so are the costs and benefits of providing UI. While the dynamics within a single unemployment spell have received considerable attention in the literature (e.g., Mueller, Spinnewijn and Topa, 2021; Kolsrud et al., 2018; Kroft, Lange and Notowidigdo, 2013; Shavell and Weiss, 1979), the dynamics across multiple unemployment spells and its implications for the design of UI are not studied in the literature – even though most unemployed individuals experience multiple unemployment spells throughout their careers.[1]

In this paper, we argue – and provide extensive evidence – that the dynamics across multiple unemployment spells are a key feature of unemployment and optimal UI programs should account for spell-dependence. We study repeated unemployment and its consequences for optimal UI in the context of Austria using 50 years of data and leveraging several policy reforms. Our analysis provides novel insights on the incentive costs and insurance value of UI benefits across unemployment spells. We find striking differences in both the incentive cost and the insurance value between first and repeated unemployment spells: Individuals in repeated unemployment spells value higher UI benefits about twice as much as first-time unemployed individuals, while the fiscal cost of providing these benefits is nearly three times lower for repeated spells. Using our reduced-form estimates in an extended sufficient statistics framework, we find that differentiating UI policies between first and repeated spells creates substantial welfare gains – and is potentially more important than differentiating the benefit profile within spells.

In many unemployment insurance systems, the previous labor market history of a worker is an important determinant of the level and potential duration of unemployment benefits: Usually, individuals with more stable labor market careers – more experienced and older workers – receive more generous unemployment benefits. Our results highlight that a substantial fraction of unemployed workers are repeatedly unemployed and have less stable labor market careers. Moreover, our results suggest that rewarding stable careers with more generous UI is not optimal from an insurance perspective. Instead, UI programs should better insure repeatedly unemployed with unstable careers.

In our analysis, we provide five main results: First, we document that repeated unemployment is prevalent: 76% of all individuals, who are at least unemployed once between ages 18 and 55, experience multiple unemployment spells during their careers.

[1] For example, in their excellent and very comprehensive review of job search and UI, Le Barbanchon, Schmieder and Weber (2024) dedicate several pages to duration dependence and within-spell UI benefit profiles but do not mention repeated unemployment.

In the cross-section, about 70% of all unemployment entries between 1989 and 2019 in Austria are workers who already received unemployment benefits before – i.e., workers who are repeatedly unemployed (see Appendix Figure B.1). Moreover, repeated unemployment is prevalent across many industries, not only in seasonal sectors but also in the service and production sector (see Appendix Figure B.2). Importantly, all our analysis excludes recalls because in this paper we are interested in the dynamics and implications of repeated job loss and not in the transitions in and out of the same job.[2]

Second, we provide novel evidence on the insurance value of UI benefits across unemployment spells. Using a double-discontinuity design following Card, Chetty and Weber (2007*a*) we document that repeatedly unemployed compared to first-time unemployed respond more to liquidity (severance pay) and less to potential benefit duration (PBD) extensions with their non-employment duration.[3] Based on these behavioral responses, we infer the insurance value of UI benefits on average and for first-time and repeatedly unemployed. We find the average insurance value to be 1.65, meaning that one Euro in additional UI benefits is valued at 1.65 Euros. The insurance value for repeatedly unemployed is higher with 2.67, while it is lower for first-time unemployed with an insurance value of 1.18.

Third, we estimate the incentive costs of UI across unemployment spells, leveraging three different sources of variation in benefits to document the robustness of our results across various settings. We exploit two benefit generosity reforms in 1985 and 1989 and a kink in the benefit schedule. Our baseline estimates of the 1985 reform imply that providing higher UI benefits is costly: one additional Euro in UI benefits costs 1.66 Euros in total. Again, this average effect hides striking differences between first and repeated spells. In a first spell, one additional Euro in UI benefits costs 2.38 Euros in total, while in a repeated spell, total costs amount to only 0.88 Euros. The high incentive costs in first spells are driven by two effects: (i) large non-employment and unemployment duration elasticities in the first spell and (ii) dynamic effects – higher benefits in the first spell lead to more time spent in unemployment in the following years – that amplify the incentive costs further. The surprisingly low incentive costs in repeated spells arise because of much lower duration elasticities in repeated spells and dynamic effects that lead to less time spent in unemployment in the following years when the current repeated spell becomes more generous. We confirm these patterns by exploiting the kink in the benefit schedule and the 1989 reform. Our evidence from three different sources of variation in benefit generosity at different points in

[2]A recall is an unemployment spell in which an individual is hired again by their previous employer. Recalls are very different from regular unemployment spells (Fujita and Moscarini, 2017; Nekoei and Weber, 2015).

[3]Interestingly, we find that within repeated spells the behavioral responses to liquidity and PBD extensions are very similar, i.e., second spells respond similarly as third and higher spells.

time indicates that the differences in incentive costs between first and repeated spells represent an empirical regularity.

Fourth, we examine mechanisms underlying our results. We do not find evidence that the differential responses to liquidity and UI generosity between first and repeated spells are driven by different worker-types or worker composition based on observables. Rather, the same individual exhibits a differential behavioral response in a repeated unemployment spell compared to their first unemployment entry. Our results are consistent with lower asset levels for individuals in a repeated spell because these individuals depleted their assets during their first unemployment spell, in line with Gruber (2001).

Fifth, combining our insurance value and incentive cost estimates, we find sizable differences in the benefit-cost ratios of increasing UI benefits in first and repeated spells: One additional Euro spent on first spell UI benefits creates a value of only 0.5 Euros, whereas in a repeated spell it creates a six times higher value of 3 Euros. This suggests that reducing benefits in first spells and increasing them in repeated spells produces substantial welfare gains.

Overall, our analysis reveals that repeated spells are a defining element of unemployment, and first unemployment spells differ fundamentally from repeated spells. Our findings have significant implications for the optimal design of UI policies, challenging the widespread practice of rewarding more stable careers with more generous UI and shedding light on an overlooked dimension of unemployment in the literature.

Contribution to Literature. Repeated unemployment – in contrast to the importance of *recall* unemployment pointed out by Fujita and Moscarini (2017) and Nekoei and Weber (2015) – has received almost no attention in the modern empirical UI literature: previous studies on optimal unemployment insurance have mostly focused on behavioral responses to changes in the unemployment insurance system in the current unemployment spell, and neglected the implications of repeated unemployment for optimal unemployment insurance.

An earlier, though seemingly forgotten, literature acknowledged the importance of repeated unemployment. Akerlof and Main (1980) note that focusing on the duration of completed spells is misleading because "...there are many persons who, even over a short period (a calendar year, for example), suffer from multiple spells of unemployment."[4] The OECD (1985) Employment Outlook also emphasizes that repeated unemployment "is of great importance for a proper understanding of the way that the burden of unemployment is shared between individuals."

[4] Akerlof and Main (1980) descriptively study spell lengths in a given year for individuals experiencing single and multiple unemployment spells in the US. They find that repeated spells are, on average, shorter, consistent with our findings in Appendix Table B.1, where we document that first spells are generally longer than repeated spells in our baseline sample.

While a series of early papers examined the underlying causes of repeated unemployment—such as Heckman and Borjas (1980) using U.S. data and Winter-Ebmer and Zweimüller (1992); Steiner (1989) using Austrian data—little progress has been made on the policy implications of repeated unemployment since the 1980s. Our paper aims to fill this longstanding gap in the literature. We seek to refocus attention on this critical aspect of unemployment by analyzing the policy implications of repeated unemployment for the design of UI programs using a modern sufficient statistics approach.

Conceptually, our analysis of repeated unemployment is closely related to the extensive literature on the optimal UI benefit profile – i.e., whether UI benefits should fall over a given unemployment spell. The earlier theoretical literature argues that UI benefits should fall over the unemployment spell to provide dynamic incentives (Shavell and Weiss, 1979; Hopenhayn and Nicolini, 1997). Kolsrud et al. (2018) challenge this wisdom by showing that the key for the optimal benefit profile is to evaluate the incentive costs and insurance value at each point during the unemployment spell. In the Swedish case, they find that incentive costs fall over the unemployment spell and the consumption smoothing benefit increases with unemployment duration, implying that optimal UI benefits should not be falling.

Similarly, Hopenhayn and Nicolini (2009), which is the only theoretical paper we are aware of that studies the optimal level of benefits and optimal eligibility criteria across multiple unemployment spells, find that optimal unemployment benefits decrease with the length of an unemployment spell and with the number of previous unemployment spells based on a dynamic incentives argument for front-loading benefits. Our empirical results, where we estimate the incentive costs and liquidity effect across different unemployment spells, suggest the exact opposite optimal policy.

Another notable paper that takes into account the dynamics of multiple unemployment spells is Schmieder, Wachter and Bender (2012). Studying a discontinuity in the PBD in Germany, they find that non-employment effects in the 5 years after the initial spell start are smaller than the non-employment effects during the spell, implying that PBD extensions reduce future non-employment. Accounting for these dynamic effects reduces the fiscal externality of PBD extensions. Consistent with Schmieder, Wachter and Bender (2012), we find that more generous PBD or UI benefits lead to an overall reduction (pooling first and repeated spells) in future unemployment duration. However, we document that more generous UI benefits during first spells increase future unemployment duration, whereas more generous benefits during repeated spells reduce it.

Our empirical analysis revisits several well-known UI papers using Austrian data (Lalive, Van Ours and Zweimüller, 2006; Card, Chetty and Weber, 2007*a*; Card et al., 2015*b*; Jäger et al., 2020). We go beyond these papers by documenting the striking difference in behavioral responses between first and repeated spells, by estimating

the insurance value and incentive costs of UI benefits on average and across spells, and studying dynamic impacts of UI generosity. Generally, the Austrian UI system has been extensively studied in many papers (e.g., Lalive and Zweimüller, 2004; Card, Chetty and Weber, 2007*b*; Lalive, 2007, 2008; Nekoei and Weber, 2017; Mueller et al., 2024; Jäger, Schoefer and Zweimüller, 2023), and our paper contributes to this literature by highlighting significant heterogeneity in job search behavior across unemployment spells.

Finally, our evidence that the dynamics of multiple unemployment spells are important aligns with a substantial body of literature, starting with studies that highlight the significant and persistent earnings losses experienced by displaced workers (Jacobson, LaLonde and Sullivan, 1993; Couch and Placzek, 2010; Davis and von Wachter, 2011). One proposed explanation for these persistent earnings losses is higher job separation rates among recently hired workers (Krolikowski, 2017) and the loss of job security, which leads to subsequent unemployment spells (Jarosch, 2021). Furthermore, Gruber (2001) argues that assets serve as a consumption-smoothing mechanism alongside UI, helping individuals to cope with income loss during periods of unemployment. This result is consistent with lower asset levels – and, therefore, a higher consumption smoothing benefit of UI – for individuals in a repeated spell. Lastly, examining whether previous work or unemployment experience should be used as a determinant for the UI system relates to the literature on using 'tags' in the social insurance and tax literature (e.g., Akerlof, 1978; Hopenhayn and Nicolini, 2009) and is conceptually similar to Wunsch and Zabrodina (2023).

Our paper proceeds as follows: Section 2 discusses the theoretical framework. Section 3 describes the institutional background, introduces the data, and provides descriptive statistics on repeated unemployment over the life-cycle. Section 4 estimates the insurance value using the sensitivity to cash-on-hand. Section 5 estimates the incentive costs by studying behavioral adjustments to changes in benefit generosity. Section 6 examines different mechanisms that explain the observed differential response to benefit generosity and liquidity. Section 7 analyzes welfare effects of differentiating UI policies across spells, and Section 8 concludes.

2 Theoretical Framework

We assume that each individual i maximizes her utility given the unemployment policy P and denote the resulting indirect utility by $V_i(P)$. Social welfare associated with an unemployment policy P is

$$W(P) = \int V_i(P)di + \lambda \left[G(P) - \bar{G}\right], \tag{1}$$

where λ denotes the Lagrange multiplier on the government's budget constraint, $G(P)$ is fiscal revenue and $\bar{G}$ is an exogenous revenue constraint.

An unemployment policy P can in principle be arbitrarily complicated. Chetty (2006) studies the optimal level of a uniform UI benefit. Kolsrud et al. (2018) study the case when the UI benefit level can depend on the duration of the ongoing unemployment spell. Spinnewijn (2020) discusses the theory behind optimal benefit levels that condition on individual characteristics. The policy P is not limited to the benefit generosity level. Another important policy parameter is how long unemployment benefits are paid out: the potential benefit duration (PBD). Schmieder, Von Wachter and Bender (2012) study the welfare effects of PBD extensions. Eligibility criteria are another dimension of the UI policy P.[5]

We focus on the welfare effects of differentiating benefit levels across UI spells. This dynamic dimension of UI has not received any attention in the sufficient statistics literature. However, the optimal UI benefits across spells are still governed by a Baily-Chetty type formula similar to Chetty (2006), Kolsrud et al. (2018) and Spinnewijn (2020) and we closely follow their standard models and notation. We therefore keep the discussion of the theoretical framework short in the main text. Appendix A provides the full model and proofs.

We assume UI benefits are constant during a given spell, but allow benefits to depend on the number of unemployment spells a worker experienced in the past. The unemployment policy $P = \{b_k\}_{k=1}^{K}$ therefore conditions the benefit level on the number of previous spells. The UI benefit in the first spell, b_1, can be different from the UI benefit in the second spell, b_2, and so on. The welfare effect of a small increase in UI benefits in the s-th spell is

$$\frac{\partial W(P)}{\partial b_s} = \int \frac{\partial V_i(P)}{\partial b_s} di + \lambda \cdot \frac{\partial G(P)}{\partial b_s}, \tag{2}$$

i.e., the optimal benefit level balances the direct gain in insurance $\int \frac{\partial V_i(P)}{\partial b_s} di$ against the fiscal costs, $\frac{\partial G(P)}{\partial b_s}$. Because of the envelope theorem, the direct welfare gain is

$$\int \frac{\partial V_i(P)}{\partial b_s} di = p_s \cdot D_s \cdot E[v'(c_s^u)], \tag{3}$$

where p_s denotes the probability of having an s-th unemployment spell, D_s is the average duration of the s-th spell and $E[v'(c_s^u)]$ denotes the average marginal utility of consumption in spell s.

[5] In Appendix A we provide a general framework that encompasses all potential policies P by modelling UI benefits as a flexible function $b(\omega_{i,t})$ that can condition on the full set of state histories, $\omega_{i,t}$. We show that any optimal policy is guided by a generalized Baily-Chetty formula, and the above discussed papers and our application here are special cases of it.

Assuming a fixed lump-sum tax τ when employed and no discounting, we can write fiscal revenue $G(P)$ as

$$G(P) = \left(T - \sum_{k=1}^{K} p_k \cdot D_k\right) \cdot \tau - \sum_{k=1}^{K} p_k \cdot D_k \cdot b_k. \tag{4}$$

We assume that individuals live for T periods and hence $\left(T - \sum_{k=1}^{K} p_k \cdot D_k\right)$ measures total time in employment, which multiplied by τ yields the tax revenue. The second term in equation (4) measures total UI expenditures.

The fiscal effect of changing UI benefits b_s in the s-th spell is

$$\frac{\partial G(P)}{\partial b_s} = -\underbrace{p_s \cdot D_s}_{=M(b_s)} - \underbrace{\sum_{k=1}^{K} \left(\frac{\partial p_k}{\partial b_s} \cdot D_k + \frac{\partial D_k}{\partial b_s} \cdot p_k\right) \cdot (b_k + \tau)}_{=B(b_s)}. \tag{5}$$

Increasing benefits b_s by one dollar has two distinct effects on fiscal revenue. First, expenditures mechanically increase by $p_s \cdot D_s$ dollars (the mechanical fiscal effect $M(b_s)$). Second, individuals adjust their behavior. The changes in behavior have no first order welfare impact. Only the mechanical effect shows up in the direct welfare impact in equation (3). However, the behavioral changes impact fiscal revenue (the behavioral fiscal effect $B(b_s)$). Because of the more generous benefits in spell s individuals might be longer unemployed, $\frac{\partial D_s}{\partial b_s}$, and are potentially more likely to take up an s-th spell, $\frac{\partial p_s}{\partial b_s}$. Moreover, there can be spillover effects on the duration, $\frac{\partial D_k}{\partial b_s}$, or take-up, $\frac{\partial p_k}{\partial b_s}$, in another spell even though benefits in that spell do not change.

Combining equations (2) – (5), the optimal benefit level in spell s is characterized by the following Baily-Chetty Formula

$$\frac{E[v'(c_s^u)]}{\lambda} = 1 + \varepsilon_{D_s,b_s} \cdot (1 + \frac{\tau}{b_s}) + \Psi, \tag{6}$$

where $\Psi \equiv \frac{1}{p_s \cdot D_s}\left[\sum_{k=1}^{K}\left(\frac{\partial p_k}{\partial b_s} \cdot D_k\right) \cdot (b_k + \tau) + \sum_{k=1,k\neq s}^{K}\left(\frac{\partial D_k}{\partial b_s} \cdot p_k\right) \cdot (b_k + \tau)\right]$. The LHS of (6) captures the value of more generous UI benefits in spell s and the RHS the total fiscal costs (1 + fiscal externality). The fiscal externality consists of two parts: (i) the direct impact in the s-th spell, measured by the duration elasticity ε_{D_s,b_s}, and (ii) the dynamic effects, Ψ, which entail the take-up effects in all spells, $\frac{1}{p_s \cdot D_s}\sum_{k=1}^{K}\left(\frac{\partial p_k}{\partial b_s} \cdot D_k\right) \cdot (b_k + \tau)$, and the cross-spell duration effects, $\frac{1}{p_s \cdot D_s}\sum_{k=1,k\neq s}^{K}\left(\frac{\partial D_k}{\partial b_s} \cdot p_k\right) \cdot (b_k + \tau)$.

Implementation of the Insurance Value. The standard in the literature is to ignore the redistributive value of UI and identify the insurance value by comparing the marginal

utility of consumption when unemployed vs. employed for a given worker (Spinnewijn, 2020).[6] We follow this standard in the literature and estimate in Section 4 the insurance value in the s-th spell using the insight from Card, Chetty and Weber (2007*a*) and Chetty (2008) that search responses to liquidity and benefit changes identify the insurance value of UI benefits.

Implementation of the Fiscal Externality. In Section 5, we estimate the fiscal externality of increasing benefits in spell s with two complementary approaches.

In the first approach, we separately identify the direct impact of more generous benefits on the current spell and the potential dynamic effects. Estimating the direct impact, measured by the duration elasticity for a given spell, is straightforward. Identifying the dynamic effects is more challenging because we do not have the perfect experiment that only changes benefits in the s-th spell. The two benefit reforms and the kink in the benefits schedule that we exploit permanently change UI benefits for all spells. We use the timing of the reforms to shed light on some of the dynamic effects. Empirically, it turns out that both the insurance value and the fiscal externality differ between first and repeated spells but are very similar within repeated spells, i.e., the second spell is comparable to the third spell and so on. Our main comparison is therefore first vs. repeated spells, which reduces the complexity of the dynamic effects. We come back to this point in Section 5.

In the second approach, we directly estimate the total fiscal impact of the benefit variation in the next three years, similar to Lee et al. (2021). This gives us a direct reduced-form estimate of the fiscal externality, including the future dynamic impacts.

3 Institutional Background and Data

In this section, we describe the Austrian labor market, the unemployment insurance system in Austria, the detailed micro-level data from the Austrian social security and unemployment registers, and we provide descriptive evidence on repeated unemployment over the life-cycle.

3.1 The Austrian Labor Market

In the international comparison, Austria is a country with a relatively high rate of job turnover (Stiglbauer et al., 2003). While nearly all private sector jobs are subject to col-

[6] That is, rather than implementing $\frac{E[v'(c_s^u)]}{\lambda}$, which captures the redistributive aspects of UI by considering the wedge between the marginal utility of consumption of the unemployed and the marginal costs of public funds λ, the literature implements the LHS of (6) as the ratio of marginal utility of consumption when unemployed vs. employed for a given worker, $\frac{E[v'(c_s^u)]}{E[v'(c_s^e)]}$.

lective bargaining agreements, the strictness of regulation of individual dismissals for workers with regular employment contracts according to the OECD (2020) is substantially lower than the OECD average and slightly higher than in the US. Furthermore, the unemployment rate between 1993 and 2022 was on average 5.1%, only slightly lower than the corresponding average of 5.7% for the US.[7] Most employment contracts are open-ended, and only discriminatory and socially unfair dismissals can be contested. However, dismissals are subject to notice periods, which differ between white- and blue-collar workers, but only a few cases are brought before the labor court (Hofer, 2007).

3.2 Unemployment Insurance in Austria

The unemployment insurance system in Austria is characterized by a relatively low replacement rate (i.e., the share of previous earnings that is replaced by the unemployment insurance system) and relatively long potential benefit duration (i.e., the period over which unemployed workers can draw "regular" unemployment benefits) that are experience and age dependent. In addition, unemployed workers in Austria are eligible for severance payments that depend on job tenure. Unemployment benefits in Austria are jointly financed by workers and firms through a payroll tax of about 6 percent, with roughly equal contribution rates. Like in many other European countries and in contrast to the US, there is no experience rating. Furthermore, unemployment insurance eligibility is broad and take-up is relatively high (Jäger et al., 2020). We will describe severance pay, potential benefit duration, and replacement rates in more detail below.

Severance Pay. In Austria, severance pay was introduced for white collar workers in 1921 and extended to blue collar workers in 1979. According to the severance pay law, employees laid off by a firm in the private sector were eligible for a lump sum severance payment. Workers who voluntarily left the company and workers dismissed for cause were not eligible. The size of the severance payment was based on the last gross monthly salary and the duration of job tenure (i.e., continuous time worked in the same company). Workers outside the construction sector with strictly more than three years of job tenure were eligible for two monthly wages, while workers with less than three years received no transfer.[8] After five years of tenure, severance payments increased to three monthly salaries and reached a maximum of one year's income after

[7] Source: https://www.oecd.org/en/data/indicators/unemployment-rate.html.

[8] Workers in the construction sector were eligible but were required to have only 92 weeks of employment during the previous three years, irrespective of the employer, to qualify for severance pay.

25 years of job tenure.[9] Severance payments were usually made within one month after job termination as a lump sum transfer directly from the employer, were taxed at a low tax rate of 6 percent and are exempt from social security taxes. The initial severance pay law was reformed in June 2002 because of its (perceived) negative impact on job mobility, the limited number of workers eligible for severance pay and potential liquidity concerns for small and medium-sized firms. Jobs starting as of January 1, 2003, were subject to a new occupational-pension system ("*Abfertigung Neu*") with monthly transfers of 1.53 percent of the current salary to a personal pension account, which was owned by the worker (see Kettemann, Kramarz and Zweimüller (2017) for details).

Potential Benefit Duration. Workers with more than one year of labor market experience (irrespective of the firm) in the two years before job loss are also eligible for unemployment insurance benefits that replace approximately 55% of their previous net wage (see below for a detailed discussion of the replacement rate). While laid off workers are immediately entitled to unemployment benefits, workers who quit (or are fired for cause) have a 28-day waiting period. Potential benefit duration – i.e., the number of weeks that workers were eligible for unemployment benefits – is a stepwise function of labor market experience: Individuals with 52 – 156 weeks of experience in the last five years were entitled to 20 weeks of unemployment benefits, while workers with more than 156 weeks were eligible for 30 weeks.[10] If workers do not comply with the eligibility rules – e.g., actively searching for a new job within the scope of the recipient's qualifications – unemployment benefits can be withdrawn for up to four weeks. Workers who exhaust their regular unemployment benefits are entitled to unemployment assistance ("*Notstandshilfe*"), a (means-tested) program that replaces approximately 38% of prior unemployment benefits, depending on the income of other family members, and has to be extended every six months (Card, Chetty and Weber, 2007*a*).

Replacement Rates. Compared to other European countries, the Austrian unemployment insurance system had a relatively low replacement rate during the 1980s (Lalive, Van Ours and Zweimüller, 2006).[11] Before the benefit generosity reform in 1985, unemployment benefits relative to gross monthly earnings were about 63% for monthly incomes below 2,210 ATS, declined strongly to just below 41% for incomes between

[9] More specifically, workers were eligible for four monthly wages after ten years, six monthly wages after 15 years, and nine monthly wages after 20 years of job tenure.

[10] For workers older than 40 years, potential benefit duration increased to 39 weeks if they were employed for more than 312 weeks in the last 10 years and for workers older than 50 years, benefit duration was 52 weeks if they had more than 468 weeks of experience in the last 15 years.

[11] In contrast to unemployment assistance, unemployment benefits are not means tested and not taxed. However, supplementary family allowances are paid in addition to unemployment benefits.

5,000 and 27,430 ATS and decreased monotonically for previous monthly incomes above 20,000 ATS (Jäger et al., 2020).[12] A national benefit generosity reform in 1985 increased the replacement rate for individuals with previous earnings of more than 20,000 ATS by approximately 16 percentage points and the benefit generosity reform in August 1989 increased unemployment benefits for jobseekers with previous monthly earnings between 5,000 and 10,000 ATS by up to 7.4 percentage points (see Section 5.1 for a detailed discussion of the benefit generosity reforms). The benefit schedule then stayed constant until the next reform in January 2001 which changed reference wages to net instead of gross wages. This reform generated variation in benefit payments due to the income tax (Jäger et al., 2020).

Maximum Benefit Amount. Daily unemployment insurance benefits depend on previous earnings during a "base" period (defined in the Unemployment Insurance Act) but are subject to a maximum benefit level (Card et al., 2015*a*). As a consequence, unemployment insurance benefits increase in base earnings up to the maximum benefit level that is adjusted every year, thereby generating a kink in the benefit schedule.

3.3 Data and Sample Selection

Focusing on the case example of Austria has two main advantages. First, we have daily information on the labor market state and earnings as well as worker and establishment characteristics for approximately 85% of the total workforce for a very long time period, which allows to reliably identify UI benefit take-up of all private-sector employees for more than 50 years. Second, there were many reforms of the UI systems over the last 40 years in Austria, that provide exogenous variation in UI generosity. We use detailed micro-level data from the Austrian social security register (ASSD) that covers individual labor market histories of all private-sector employees in Austria from 1972 until the end of 2022, including information on the establishment and the worker (Zweimüller et al., 2009). We can match the social security data using an anonymized person identifier to data from the unemployment registers of the Austrian labor ministry (AMS), which contain detailed information on the occupation of the worker as well as the exact level of unemployment benefits for the time period 1989 – 2009. We carefully connect consecutive unemployment spells, allowing for intermediate sickness, non-employment, and minor-employment in order to correctly identify repeated unemployment entries, as explained in Appendix Section B.1. Using the full labor market history for workers from the ASSD, we define repeated unemployment entries as unemployment insurance entries from individuals who previously received

[12]One Euro converts to 13.76 Austrian Schilling (ATS). A monthly income of 20,000 ATS therefore corresponds to around 1,500 Euros.

unemployment insurance benefits.

Sample Selection. In our analysis, we focus on the universe of unemployment insurance entries between age 15 and 60 that fulfill the eligibility criteria ("*Anwartschaft*") for unemployment benefits (i.e., entries with actual unemployment insurance benefits receipt). More specifically, we include (i) individuals employed for at least 52 weeks in the last 2 years, (ii) individuals employed for at least 28 weeks in the last year for workers with a repeated unemployment spell, and (iii) individuals employed for 26 weeks in the last year for workers less than 25 years old. Furthermore, we require that individuals were employed for at least one month in the 6 months before their unemployment entry to exclude individuals without UI take-up within 6 months after job loss. Finally, we exclude recalls for our analysis. A recall is an unemployment spell in which an individual is hired again by their previous employer. Recalls are very different from regular unemployment spells (Fujita and Moscarini, 2017; Nekoei and Weber, 2015).[13] In this paper, we are interested in the dynamics and implications of repeated job loss and not in the transitions in and out of the same job. Therefore, we exclude recalls in our analysis. Appendix Table B.1 provides detailed summary statistics for our baseline sample. We will describe additional sample restriction for each empirical design in more detail below.

3.4 Descriptive Statistics

We start by describing some basic patterns of repeated unemployment over the life-cycle in the ASSD. In the sample of male workers from birth cohorts 1957 – 1967 with at least one employment spell between age 20 – 30 over the time period 1972 – 2022, approximately 42% of workers never experience an unemployment spell between age 18 and 55, while 58% have at least one unemployment spell. Among workers with at least one unemployment spell, 24% have one unique spell between age 18 – 55 and 76% have multiple spells.[14] Out of the 24% of individuals with a unique unemployment spell, 31% exit the labor force after their first unemployment entry, while 69% return to employment and never experience an unemployment spell until age 55. In the sample of individuals with an unemployment sample, the average worker experiences approximately 5 unemployment spells between age 18 and 55

[13] Recalls are very common in construction and tourism. In our period of observations, 64 percent of all unemployment spells in construction are recalls. In tourism, 49 percent of all spells are recalls. In these seasonal industries, unemployment is a regular event and to some degree part of the job.

[14] In Panel (a) of Appendix Figure B.2 we show that the corresponding shares are very similar for other birth cohorts and, therefore, these results are not driven by the sample selection. Furthermore, these results are consistent with Morchio (2020), who shows based on the NLSY/79 for the US that about half of his sample has never been unemployed in the reference period and that unemployment is persistent over the life-cycle.

(with a median of 3 spells). It is worth to note that the median unemployed is only 25.4 years old at first unemployment entry and spends on average 11.8 months on unemployment insurance benefits between age 18 and 55. Furthermore, more than 80% of unemployed workers find a job after their first unemployment spell and spend on average approximately 2.3 years in the job after their first unemployment spell. Appendix Table B.2 summarizes these statistics and also provides them separately for seasonal and non-seasonal workers. Finally, Panel (b) of Appendix Figure B.2 confirms that repeated unemployment is prevalent across industries in Austria and not only limited to seasonal sectors.

In the following sections, we show that individuals with previous unemployment respond systematically different to changes in the generosity of the UI system.

4 Insurance Value and the Sensitivity to Cash-on-Hand

We estimate the sensitivity to cash-on-hand using a double-discontinuity for severance pay eligibility and extended potential benefit duration in Austria. Our results show that the job-search behavior of individuals in a repeated spell is more sensitive to cash-on-hand compared to individuals in their first unemployment spell. Because sensitivity to cash-on-hand is informative for the insurance value of UI, this suggests that individuals in a repeated spell benefit more from the consumption-smoothing aspect of UI and value higher UI benefits more than twice as much as first-time unemployed. The differential sensitivity to cash-on-hand is not driven by different worker-types, but rather the same individuals exhibit a stronger sensitivity to cash-on-hand in a repeated unemployment spell compared to their first unemployment entry.

4.1 Empirical Strategy and Sample Selection

In Austria, laid off workers are eligible for two monthly salaries of severance pay as a lump-sum transfer if they were employed for strictly more than three years at the same firm, while they are not eligible for severance payments if they have strictly less than three years of job tenure.[15] At the same time, workers with more than three years of labor market experience (irrespective of the firm), are eligible for an additional 10 weeks of unemployment benefits (i.e., 30 instead of 20 weeks of potential benefit duration).

[15]More specifically, severance pay was introduced to all workers outside the construction industry in 1979 and was abolished for all jobs starting later than 2003. Firms were required to pay laid off workers a lump sum transfer equal to a multiple of their previous salary based on job tenure. Workers who quit are not eligible, and payments are generally made within one month of job termination. See Section 3.2 for details.

Empirical Strategy. The effect of severance pay eligibility and extended benefit duration can be separately identified because severance pay eligibility is a (discontinuous) function of firm (or job) tenure, while eligibility for extended benefit duration is a (discontinuous) function of labor market experience (i.e., months worked irrespective of the firm) in the last five years. Hence, for individuals who changed their jobs or became unemployed in the past five years (approximately 80% of our sample), the job tenure and labor market experience thresholds do not coincide. To estimate the effect of severance pay and benefit duration on average job-finding hazards, we employ a double-discontinuity design with two assignment variables using the regression

$$y_i = \alpha + \beta_{SP} \cdot SP_i + \beta_{EB} \cdot EB_i + g(T_i, E_i) + \varepsilon_i, \tag{7}$$

where SP and EB are indicators for severance pay and extended benefit duration eligibility, respectively. The (unknown) control function $g(T, E)$ is assumed to be continuous at the tenure cutoff $T = 36$ for all values of experience E and continuous at the experience cutoff $E = 36$ for all values of tenure T, which allows identifying the coefficients β_{SP} and β_{EB}. We approximate the control function as a low order polynomial of job tenure T and labor market experience E. Our main outcome of interest, y_i, is the job-finding hazard in the first 20 weeks of unemployment.

Sample Selection. Our sample consists of all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers.[16] In our analysis, we closely follow Card, Chetty and Weber (2007*a*), who study the same double-discontinuity. We first replicate their results for all unemployment spells, and then separately estimate the effects for individuals in a first and a repeated spell.

4.2 Effect of Severance Pay and Benefit Duration on Job-Finding

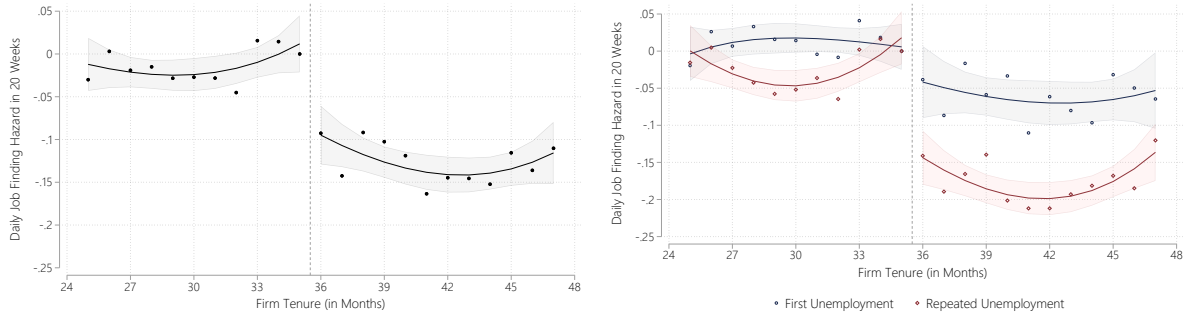
Figure 1 presents a graphical illustration of the regression results and plots average daily job-finding hazards in the first 20 weeks for individuals in the baseline sample around the tenure cutoff of 36 months, controlling for the extended benefit effect. In Panel (a), we replicate the results for all unemployment entries as in Card, Chetty and Weber (2007*a*), while in Panel (b) we split the sample for first and repeated unemployment entries. We see a much larger decrease in average job-finding hazards for repeatedly unemployed compared to first-time unemployed around the tenure cutoff, where individuals with less than 36 months of job tenure are not eligible for sever-

[16] As explained in Section 3.2, workers in the construction sector were eligible but were required to have only 92 weeks of employment during the previous three years, irrespective of the employer, to qualify for severance pay.

ance pay, while individuals above the cutoff are eligible for two monthly salaries of severance pay.[17]

Figure 1
The Effect of Severance Pay on Daily Job-Finding Hazards

(a) All Unemployment Entries **(b) First vs. Repeated Entry**



Notes: This figure plots average daily job-finding hazards in the first 20 weeks for individuals in the baseline sample around the tenure cutoff of 36 months, controlling for the extended benefit effect. Individuals with less than 36 months of job tenure are not eligible for severance pay, while individuals above the cutoff are eligible for two monthly salaries of severance pay. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers.

Table 1 presents the baseline regression results for all unemployment entries and separately for first and repeatedly unemployed. First, in Panel A. we report results from an unweighted regression without any controls. In line with Card, Chetty and Weber (2007*a*), we find that severance pay eligibility decreases the average daily job-finding hazard in the first 20 weeks by approximately 11%, while extended benefit eligibility decreases the job-finding hazard by 8%, as shown in Column (1).[18] However, splitting the sample into individuals in their first unemployment spell and individuals in a repeated spell, reveals important heterogeneity in behavioral responses. Focusing on individuals in their first unemployment spell in Column (2), we see that severance pay eligibility ("liquidity") reduces the average job-finding hazard only by 6.1%, while for individuals with prior unemployment experience, the liquidity effect is much larger (with a point estimate of −14.9% in Column (3)). At the same time, extended benefit duration eligibility reduces the average daily job-finding hazard by only 6.8% for individuals in a repeated spell, compared to 11.5% for individuals in their first spell.

One concern in Panel A. of Table 1 is that individuals in a repeated spell are different from individuals during their first unemployment entry in terms of *observable* characteristics. For instance, repeatedly unemployed are on average older than individ-

[17] Appendix Figure C.3 presents the same results for the effect of extended benefits.

[18] The estimates in Card, Chetty and Weber (2007*a*) are between 9.4 – 12.5% for severance pay eligibility and 6.4 – 9.3% for extended benefit duration eligibility, respectively. The main reason for the small difference is that we ignore individuals without actual unemployment benefit receipt, and we carefully allow for intermediate sickness and minor employment while unemployed, as described in Appendix Section B.1.

Table 1
The Effect of Severance Pay and Benefit Duration

	Daily Job-Finding Hazard		
	All	First	Repeated
	(1)	(2)	(3)
Panel A. Baseline Results			
Severance Pay Eligibility	-0.107	-0.061	-0.149
	(0.019)	(0.028)	(0.027)
Benefit Duration Eligibility	-0.078	-0.115	-0.068
	(0.018)	(0.026)	(0.027)
Observations	567,399	257,336	310,063
Panel B. Inverse Probability Weights			
Severance Pay Eligibility	-0.103	-0.050	-0.141
	(0.021)	(0.031)	(0.029)
Benefit Duration Eligibility	-0.077	-0.135	-0.058
	(0.020)	(0.029)	(0.029)
Observations	567,399	257,336	310,063

Notes: This table reports the effects of severance pay eligibility and extended benefit duration on the average job-finding hazard in the first 20 weeks using the double-discontinuity design from equation (7). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers. Panel A. reports baseline estimates without controls, Panel B. reports estimates using inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, 1-digit occupation code and 3-digit NUTS region, a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the analysis sample.

uals in their first unemployment entry (see Appendix Table C.1 for detailed summary statistics). In Panel B., we therefore report results using inverse probability weights to balance the two samples in terms of age, gender, nationality, previous wages, 1-digit occupation code, 3-digit NUTS region, and seasonal industries. The main result that individuals in a repeated spell react less to benefit duration and more to liquidity is even more pronounced, when accounting for differences in observable characteristics between both samples. It is worth to emphasize that this result is consistent with Michelacci and Ruffo (2015), who show that the liquidity effect is stronger for younger individuals in the US. Because repeatedly unemployed are on average older,

the difference between first and repeatedly unemployed becomes more pronounced after reweighting first unemployed, as we make them on average older (with a smaller liquidity effect).

As emphasized by Card, Chetty and Weber (2007*a*) and confirmed in Appendix C, there is not much evidence for bunching and predicted hazards are smooth at the discontinuity (see Appendix Figures C.1 and C.2). We nevertheless report estimates including additional control variables in Appendix Table C.2 and confirm that all results remain virtually unchanged, even when controlling for observable characteristics in our baseline regression. Furthermore, Appendix Table C.3 confirms that our results are robust to excluding seasonal sectors (Agriculture and Tourism) and dropping observations close to the cutoff.

4.3 Liquidity Constraints and Sensitivity to Cash-on-Hand

Importance of Liquidity Constraints. The main result of Table 1 that repeatedly unemployed react more to liquidity and less to potential benefit duration suggests that repeatedly unemployed are more liquidity constrained than individuals during their first unemployment entry. As confirmed in Column (2) of Table 2, this differential behavioral response to changes in liquidity and benefit generosity is already apparent, when comparing individuals in their first unemployment entry to individuals in a second spell (ignoring later spells) and similar in magnitude. This result could be driven by different worker types (i.e., different workers have different liquidity constraints) that are differentially affected by repeated unemployment or by more binding liquidity constraints across unemployment spells. In Column (3) of Table 2, we provide evidence that even in the subsample of individuals with multiple unemployment spells – i.e., individuals who eventually become repeatedly unemployed – individuals respond much stronger to severance pay eligibility in a repeated spell relative to their first unemployment spell. More specifically, even among unemployed with multiple spells of unemployment, severance pay eligibility reduces the daily job-finding hazard by 3.6% for individuals in their first unemployment spell, while the lump-sum transfer of two monthly salaries decreases the job-finding hazard by 14.9% in a repeated spell, analogous to the overall sample reported in Column (1). Similarly, extended unemployment benefits reduces the job-finding hazard by 12.7% for multiple unemployed in their first unemployment spell but only by 6.8% for repeated unemployment spells.

Finally, if liquidity constraints are indeed the main driver of the differential response to liquidity and benefit duration, we expect that the difference between first and repeatedly unemployed is smaller for individuals that are more liquidity constrained. Unfortunately, the Austrian data does not contain any information on asset holdings of individuals. In columns (3) and (4) of Table 2 we therefore split the sample

Table 2
The Effect of Severance Pay and Benefit Duration: Subsamples

	Daily Job-Finding Hazard				
	All	2^{nd} Spell	Multiple	Age 20-30	Age 30-50
	(1)	(2)	(3)	(4)	(5)
Severance Pay Eligibility	-0.061	-0.061	-0.036	-0.086	-0.030
	(0.028)	(0.028)	(0.033)	(0.034)	(0.051)
Repeated × Severance Pay	-0.087	-0.101	-0.113	-0.049	-0.121
	(0.039)	(0.049)	(0.043)	(0.056)	(0.061)
Benefit Duration Eligibility	-0.115	-0.115	-0.127	-0.084	-0.189
	(0.026)	(0.026)	(0.030)	(0.029)	(0.053)
Repeated × Benefit Duration	0.047	0.043	0.059	-0.003	0.099
	(0.037)	(0.047)	(0.040)	(0.048)	(0.066)
Observations	567,399	392,215	487,458	278,789	288,610

Notes: This table reports the baseline effects of severance pay eligibility and extended benefit duration on the average job-finding hazard in the first 20 weeks, using the double-discontinuity design for different subsamples. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers. Column (1) reports the baseline results for the full sample (cf. Panel A of Table 1), Column (2) restricts to the first two unemployment spells, Column (3) restricts to individuals with multiple unemployment spells, and Column (4) and (5) split the sample by age at unemployment entry (20 – 30 and 30 – 50, respectively.).

into younger (age 20 – 30 at unemployment entry) and older (age 31 – 50 at unemployment entry) workers. If liquidity constraints are indeed important, we expect that for young individuals – who are on average more liquidity constrained – the difference between first and repeatedly unemployed should be small. The results in Table 2 confirm that for young unemployed workers, individuals react similarly in a first and a repeated spell, both for severance pay and extended benefit eligibility. However, for older unemployed workers, the difference is substantial: Individuals in their first unemployment spell barely react to additional liquidity (with an insignificant point estimate of −0.03), while individuals in a repeated spell decrease their job-finding hazard by 15.1%. Similarly, older individuals in their first unemployment spell decrease their job-finding hazard by 18.9% as a response to additional 10 weeks of unemployment benefits, while older individuals in a repeated spell react less (−9.0%), although not

statistically significantly different from zero. These results confirm that moral hazard is on average more severe for older than for younger workers, as emphasized by Michelacci and Ruffo (2015) for the US.[19]

Sensitivity to Cash-on-Hand. Using the reduced-form estimates from the double-discontinuity design in Table 1, we can calculate the sensitivity to cash-on-hand ϕ. Card, Chetty and Weber (2007*a*) show that the sensitivity of search behavior s to assets A ("cash-on-hand") relative to unemployment benefits b is informative of the insurance value of UI

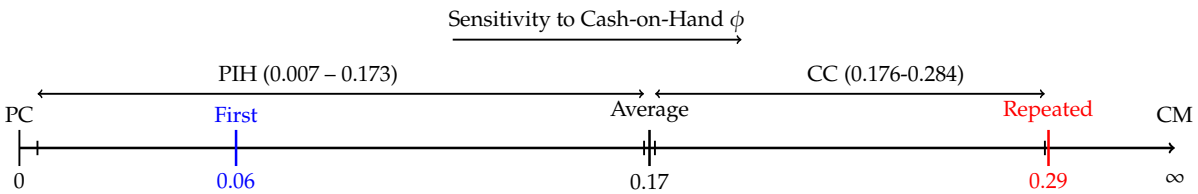
$$\phi \equiv \frac{\partial s/\partial A}{\frac{1}{p}\cdot \partial s/\partial b} = \frac{u'(c_0^u) - u'(c_0^e)}{u'(c_0^u)} \cdot \frac{u'(c_0^u)}{E[u'(c_t^u)]} \cdot (1+\delta)^t, \tag{8}$$

where δ is the time discount rate and c_t^u is consumption when unemployed in period t after job-loss. Given the estimated responses to liquidity A and benefit duration b, we can therefore calculate the implied (empirical) sensitivity to cash-on-hand $\hat{\phi}$ as

$$\hat{\phi} = \frac{\partial s/\partial A}{\frac{1}{p}\cdot \partial s/\partial b} = \frac{\hat{\beta}_{SP}}{\hat{\beta}_{EB}} \times \frac{v_{EB}}{v_{SP}} \times p, \tag{9}$$

where $\hat{\beta}_{SP}$ and $\hat{\beta}_{EB}$ are the empirical estimates of the average job-finding hazard in the first 20 weeks with respect to severance pay SP and extended benefit eligibility EB, and v_{SP} as well as v_{EB} are the cash value of SP and EB, respectively. Finally, p is the probability of receiving extended unemployment benefits. In Appendix C.4, we confirm that, as in Card, Chetty and Weber (2007*a*), $v_{SP} = 2.69$ and $v_{EB} = 0.77$, irrespective of whether individuals are first or repeatedly unemployed.

Figure 2
Implied and Actual Sensitivity to Cash-on-Hand ϕ



Notes: This figure plots the implied sensitivity to cash-on-hand ϕ for the baseline sample based on empirical responses to severance pay and extended benefit duration from Panel A. of Table 1, as well as the theoretical analogue based on a PIH model with unconstrained borrowing and a credit constrained model based on Card, Chetty and Weber (2007*a*).

[19] In Appendix C.2 we also study long-run effects. In line with Card, Chetty and Weber (2007*a*) we find that neither additional liquidity nor longer benefit duration improves future search outcomes significantly.

Table 3 presents the results for our baseline specification from Panel A. in Table 1. The first column again replicates Card, Chetty and Weber (2007*a*) for all unemployment entries and shows that the average unemployed has an implied sensitivity to cash-on-hand of 0.17. As shown by Card, Chetty and Weber (2007*a*), this implies that the average unemployed worker is 70% between a credit-constrained and an unconstrained individual.[20] In contrast, the search behavior of individuals in their first unemployment spell is *less* sensitive to liquidity and *more* sensitive to benefit duration relative to the average unemployed, as shown in Table 1. Using the implied sensitivity to cash-on-hand $\hat{\phi}$ from equation (9) together with $p = 0.42$, this implies that individuals in their first unemployment spell are *less* sensitive to cash-on-hand with a sensitivity $\hat{\phi} = 0.06$, because they have a larger substitution ("moral hazard") effect $\partial s/\partial w = 0.13$ and a smaller liquidity effect $\partial s/\partial A = -0.02$, relative to the average unemployed. On the other hand, individuals in a repeated spell have a lower moral hazard effect $\partial s/\partial w = 0.03$ and a higher liquidity effect $\partial s/\partial A = -0.06$, implying a higher sensitivity of cash-on-hand $\hat{\phi} = 0.29$. Figure 2 plots the implied sensitivity to cash-on-hand and compares the empirical sensitivities to the model predictions based on Card, Chetty and Weber (2007*a*).[21] As illustrated, repeatedly unemployed are much closer to a model with credit-constrained behavior, where $\phi \in [0.176, 0.284]$ depending on the assumption on risk aversion γ and the time discount rate δ.

4.4 Estimating the Insurance Value of UI Benefits

We infer the insurance value of UI benefits in two complementary ways. First, we can invert equation (8) and solve for $\frac{u'(c_0^u)}{v'(c_0^e)}$. This approach depends on assumptions about risk aversion and discount rates, as we detail in Appendix C.4. Assuming $\gamma = 2$ and $\delta = 0.05$, we find an average insurance value of 1.35 – one additional Euro in UI benefits is valued at 1.35 Euros. The insurance value is 1.11 for individuals in their first spell, while individuals in a repeated spell have a much higher consumption smoothing benefit of UI, with an insurance value of 1.76.

Alternatively, we can use the estimates of $\partial s/\partial A$ and $\partial s/\partial b$ to directly infer the welfare gain of more generous unemployment insurance benefits without making assumptions on risk aversion and discount rates, as shown by Chetty (2008). More specifically, because the search response to unemployment benefits consists of a (welfare-

[20] Card, Chetty and Weber (2007*a*) show that in a fully credit-constrained model, we have $\phi \in [0.176, 0.284]$, while in a benchmark permanent income hypothesis model with unrestricted borrowing $\phi \in [0.007, 0.173]$, depending on the assumptions on risk aversion γ and the time discount rate δ in the model.

[21] Appendix Figures C.4 and C.5 plot the implied sensitivity to cash-on-hand ϕ based on the empirical responses to severance pay and extended benefit duration, as well as the theoretical analogue for different subsamples and Appendix Table C.6 reports standard errors for the implied sensitivity to cash-on-hand calculated using the Delta method.

Table 3
Sensitivity to Cash-on-Hand and the Insurance Value of UI

	Unemployment Entry		
	All	First	Repeated
	(1)	(2)	(3)
Benefit Effect: Total Effect			
β_{EB}	-0.078	-0.115	-0.068
v_{EB}	0.772	0.772	0.772
$\partial s/\partial b$	-0.101	-0.149	-0.088
Income Effect: Liquidity Effect			
β_{SP}	-0.107	-0.061	-0.149
v_{SP}	2.686	2.686	2.686
$\partial s/\partial A$	-0.040	-0.023	-0.055
Substitution Effect: Moral Hazard			
$\partial s/\partial w$	0.062	0.126	0.033
Sensitivity to Cash-on Hand			
$p^\star$	0.444	0.422	0.462
ϕ	0.174	0.064	0.291
Insurance Value			
$u'(c_0^u)/v'(c_0^e)$	1.65	1.18	2.67

Notes: This table reports the implied sensitivity to cash-on-hand ϕ as well as the implied insurance value $u'(c_0^u)/v'(c_0^e)$ based on our baseline estimates in Panel A. of Table 1. β_{SP} and β_{EB} are the RD coefficients for severance pay and extended benefit duration eligibility based on equation (7), respectively. v_{SP} and v_{EB} is the cash value of severance pay and benefit duration eligibility (see Appendix C for details). The benefit effect $\partial s/\partial b$ is calculated as $\partial s/\partial b = \beta_{EB}/v_{EB}$, the liquidity effect $\partial s/\partial A$ is calculated as $\partial s/\partial b = \beta_{SP}/v_{SP}$ and the substitution effect is $\partial s/\partial w = \partial s/\partial A - \partial s/\partial b$. The sensitivity to cash-on-hand is $\phi = (\partial s/\partial A)/((1/p^\star) * (\partial s/\partial b))$ and the insurance value is calculated following Chetty (2008): $\frac{u'(c_0^u)}{v'(c_0^e)} = 1 + \frac{-\partial s/\partial A}{\partial s/\partial A - \partial s/\partial b}$.

enhancing) pure wealth (or liquidity) effect and a (welfare-reducing) substitution (or moral hazard) effect, i.e.

$$\frac{\partial s}{\partial b} = \frac{\partial s}{\partial A} - \frac{\partial s}{\partial w} \tag{10}$$

we can assess the moral hazard efficiency cost of unemployment insurance by calculating the liquidity to moral hazard ratio

$$\frac{-\partial s/\partial A}{\partial s/\partial A - \partial s/\partial b} = \frac{u'(c_0^u) - v'(c_0^e)}{v'(c_0^e)} \quad \Leftrightarrow \quad \frac{u'(c_0^u)}{v'(c_0^e)} = 1 + \frac{-\partial s/\partial A}{\partial s/\partial A - \partial s/\partial b} \tag{11}$$

Chetty (2008) shows that the liquidity effect accounts for 60% of the marginal effect of UI benefits on unemployment durations in the US. In Austria, our estimates imply that on average, the liquidity effect accounts for approximately $-0.040/-0.101 = 40\%$ of the total benefit effect, implying an average insurance value of 1.65 (see Table 3). However, because the liquidity effect is much stronger for repeatedly unemployed, the moral hazard efficiency cost of unemployment insurance is much lower for repeatedly unemployed, where the liquidity effect accounts for $-0.055/-0.088 = 63\%$ compared to only $-0.023/-0.149 = 15\%$ for first unemployed. This implies that the insurance value is 1.18 for individuals in a first spell, compared to 2.67 for individuals in a repeated spell.[22]

5 Incentive Costs and the Sensitivity to UI Generosity

We now explore the incentives costs of more generous UI benefits across spells by exploiting two policy reforms and a kink in the benefit schedule. Section 5.1 describes the policy variation and our empirical strategies. Section 5.2 presents the results.

5.1 Policy Variation and Empirical Strategies

1985 Reform: Change in Benefit Generosity. UI benefits in Austria increase with pre-unemployment income but are capped at a maximum benefit. A reform in 1985 substantially increased the cap on UI benefits, as illustrated in Figure 3, Panel (a). The cap in the benefit schedule is regularly adjusted to account for nominal wage changes. These adjustments are generally small. The change in 1985 was particularly large because the Parliament had switched the maximum contribution to the UI system

[22] As highlighted by Schmieder and Von Wachter (2016), the welfare gains based on the liquidity to moral hazard ratio tend to be larger than the insurance values implied by consumption-based approaches and, therefore, are only consistent with larger values of γ. In our case, the implied coefficient of relative risk aversion γ that is consistent with our estimated insurance value is $\gamma = 3.5$ (for a discount rate of $\rho = 0.05$), see Appendix Figure C.6.

from that used for the national health insurance system to that used for the old-age pension system, which has a higher maximum. The timing of the reform was the following: the Austrian Ministry of Social Affairs published a decree on October 16, 1984, and the new unemployment benefit schedule went into effect on January 1, 1985.

The cap extension increased UI benefits for individuals whose unemployment spell starts after January 1, 1985, and have pre-unemployment monthly earnings above 1350 Euros.[23] We exploit this variation in benefit generosity with a difference-in-difference approach. Treatment is determined by monthly earnings. Our treatment group consists of individuals with monthly earnings between 1351 and 3000 Euros before they become unemployed. For those individuals, the reform increased daily UI benefits by around 3 Euros – a 16 percent increase in benefit generosity. Our control group are individuals with monthly earnings between 500 and 1350 Euros for whom UI benefits did not change, as Figure 3, Panel (a) shows.

We implement our difference-in-difference strategy with the following regression

$$Y_{it} = \alpha + \beta \cdot \text{Treat}_{it} \cdot \text{Post}_{it} + \text{Treat}_{it} + \pi_t + \theta_{it} + X_{it}'\delta + \varepsilon_{it}. \tag{12}$$

Our unit of observation is an unemployment spell of individual i that starts at time t. Y_{it} is an outcome variable such as the (log) non-employment duration of that spell. Treat_{it} is a dummy equal to 1 if pre-unemployment earnings are high enough to be in the treatment group, Post_{it} is a dummy equal to 1 for spells starting in 1985 or later, and π_t are time fixed effects at monthly frequency. Moreover, θ_{it} is a vector of fixed effects to control for individual characteristics and $X_{it}'\delta$ controls flexibly for pre-unemployment income with a third order polynomial. In our main specification θ_{it} include fixed effects for gender, being Austrian, occupational codes (1-digit), region and whether the last job was in a seasonal industry. If the parallel trend assumption holds, β identifies the causal effect of more generous UI benefits on the outcome variable Y_{it}. To probe the parallel trend assumption before the reform, we estimate the event-study regression:

$$Y_{it} = \alpha + \sum_{y=1982, y\neq 1984}^{1988} \beta_y \cdot \text{Treat}_{it} \cdot \text{I}[\text{year}(t) = y] + \text{Treat}_{it} + \pi_t + \theta_{it} + X_{it}'\delta + \varepsilon_{it}, \tag{13}$$

where $\text{I}[\text{year}(t) = y]$ is a dummy equal to 1 if the spell starts in year y. β_y then identifies the causal effect of the reform in year y and we would expect that the estimates before 1985 are around zero and insignificant. We cluster standard errors at the start date of the unemployment spell.

[23] In 1984 the currency in Austria was Austrian Schilling (ATS). For consistency across periods, we express everything in Euros. We use a conversion rate of 1 Euro to 13.76 ATS. In 1984 the cap was at ATS 18590 (≈ EUR 1350), in 1985 the cap was increased to ATS 23790 (≈ EUR 1730).

1989 Reform: Change in Benefit Generosity and PBD. In July 1989, the Austrian government decreed two important changes to the unemployment insurance rules ("*Arbeitslosenversicherungsgesetz, BGBl. Nr. 364/1989*"). First, the potential benefit duration became dependent on age at the beginning of the unemployment spell – in addition to the contribution requirement. We describe this policy variation and document the impacts of this PBD extension in Appendix D.2. The second important change was that UI benefits became more generous for individuals with monthly earnings between 250 and 916 Euros, as illustrated in Figure 3, Panel (b). These changes affect all jobseekers as of August 1, 1989. We can isolate the benefit generosity effect by focusing on those younger than 40, as the PBD increase only applies to individuals aged 40 and above.

We exploit the variation in benefit generosity by income with a difference-in-difference approach analogous to the difference-in-difference approach for the 1985 reform discussed above. We run the same specification as in equation (12) for the average effects. Our treatment group consists of individuals with pre-unemployment monthly earnings between 250 and 916 Euros, our control group consists of individuals with monthly earnings between 917 and 1750 Euros as illustrated in Figure 3, Panel (b). In our treatment group, the reform increased daily UI benefits by around 1.2 Euros – a 13 percent increase in benefit generosity. The Post dummy is equal to 1 if the unemployment spell starts after August 1, 1989. Our post-period is limited by another change in the benefit formula that takes effect for spells starting in July 1990 or later. In July 1990 benefits also increased for our control group with monthly earnings between 960 and 1750 Euros because in June 1990 the Austrian government decided to phase out the benefit increase from the 1989 reform less abruptly as Appendix Figure D.1 illustrates. We therefore can only study the treatment effects for UI spells that start between August 1989 and June 1990. We also estimate the event-study regression (13) for the 1989 reform. In this case, we estimate the yearly effects between 1986 and 1989. Because the reform change happened mid-year we define a year to run from August to July, i.e., β_{1987} measures the treatment effect for spells starting between August 1987 and July 1988, β_{1988} measures the effect for spells starting between August 1988 and July 1989 and so on.

Kink in the Benefit Formula. The daily UI benefit is capped at a maximum benefit level. This cap in the benefit amount creates a kink in the benefit schedule, as illustrated in Figure 3, Panel (c). We exploit this kink in the Austrian benefit schedule with a fuzzy regression kink design (RKD) similar to Card et al. (2015*b*). We use a fuzzy RKD approach because we do not observe the number of dependent family members and UI recipients with dependent family members are eligible for supplemental benefits. These supplemental benefits explain why the benefit schedule is not completely flat to

the right of the kink in Figure 3, Panel (c). We exploit the kink in the benefit schedule for UI claimants between 1989 and 1998 when the UI benefit schedule was stable around the top kink, and we observe actual unemployment benefit payments between 1989 and 1998 for most spells.[24] We find no evidence of sorting into unemployment around the kink, as Appendix Figure D.6 shows, which speaks to the validity of our RKD.

Sample Selection We start from our baseline sample described in Section 3.3. For the analysis in Section 5.2 we furthermore exclude quits and add different restrictions for age, start date of unemployment, and pre-unemployment income for the different reforms and the RKD as displayed in Appendix Table D.1. Moreover, for the 1985 and 1989 reform samples we drop observations that have missing values in our main control variables (gender, being Austrian, occupational codes (1-digit), region, seasonal industry). Appendix Table D.2 provides summary statistics for the three analysis samples.

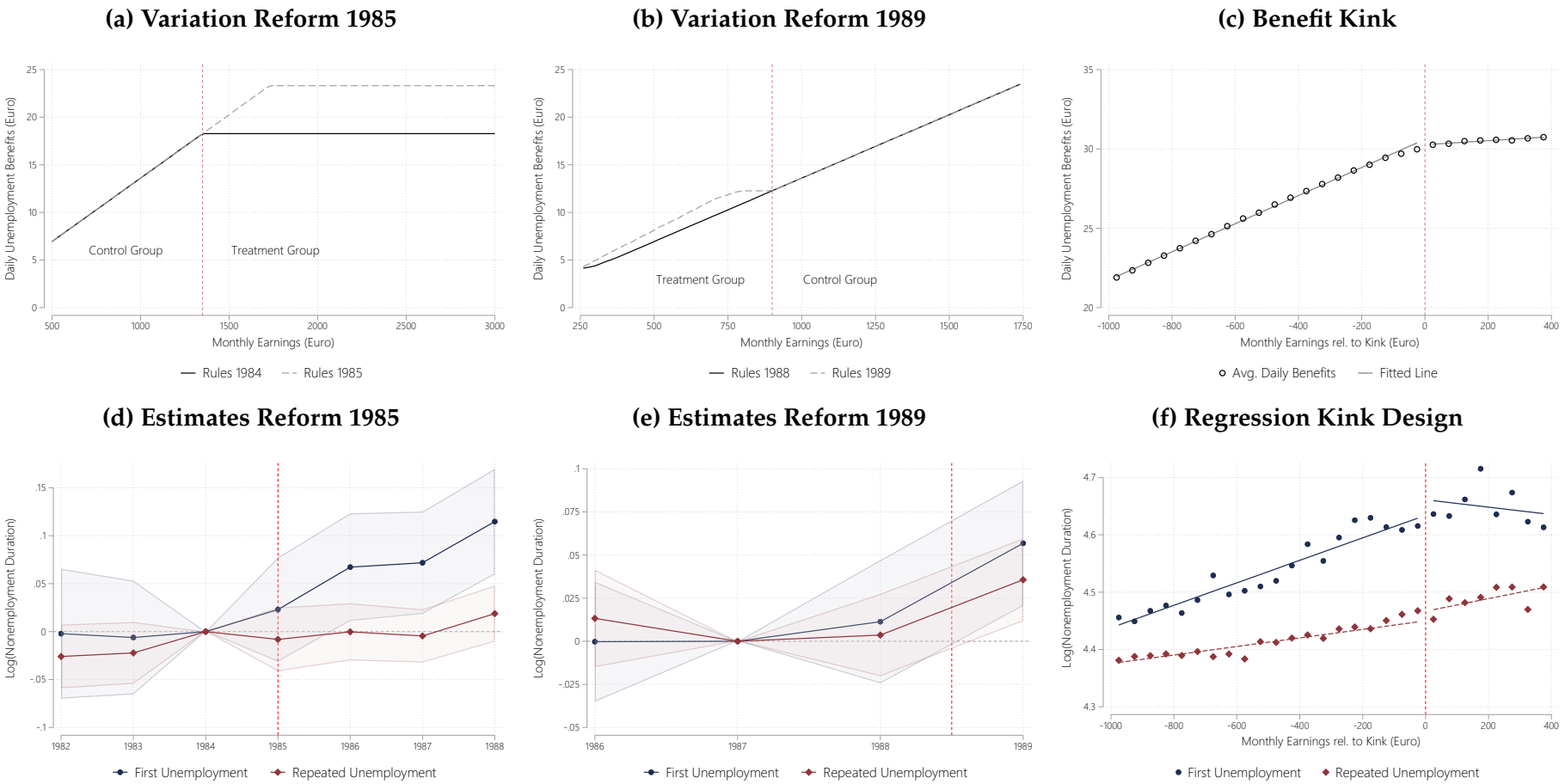
5.2 Behavioral Responses to Changes in Benefit Generosity

Direct Effect in Current Spell. Figure 3, panels (d) – (f) graphically summarize our main findings for the effect of benefit generosity on (log) non-employment duration in first and repeated unemployment spells.

Panel (d) plots the yearly β-coefficients from regression (13) for the 1985 reform. We run separate regressions for first spells (blue dots) and repeated spells (red diamonds). For both first and repeated spells, the coefficients are insignificant and around zero before the reform, suggesting that our treatment and control groups have parallel trends in (log) non-employment before the reform. In 1985 non-employment duration increases by around 3 percent for first spells and in the following three years the effect becomes bigger with 7-10 percent higher non-employment duration. For repeated spells, we see no notable change in (log) non-employment duration in the years after the reform.

[24] We stop in 1998 for two reasons. First, we have a break in our data on UI benefit payments in 1999. In 1999, we see unemployment benefit payments for only 10 percent of all spells (before 1999 we observe payments for around 85 percent of all spells). Moreover, in the year 2000 the benefit schedule was again changed and the relevant income for the benefit calculation was changed from gross income to net income. Card et al. (2015*b*) estimate a fuzzy RKD in Austria for UI claimants between 2001 and 2012. In our data we do not observe UI benefit payments for all claims between 2001 and 2012 and therefore cannot replicate their analysis. We observe UI benefit payments for most claims between 2001 and 2008, but not in later years. When we run the RKD for claims between 2001 and 2008 we find qualitatively the same effects as for the years 1989-1998, i.e., that first spells are more responsive than repeated spells. However, the elasticity estimates are generally noisy and sensitive to the exact bandwidth specification. For 1989 – 1998, the elasticity estimates are not sensitive to bandwidth choices, as Appendix Figure D.7 shows.

Figure 3
Non-Employment Responses to Benefit Generosity



Notes: This figure plots the difference-in-differences (DiD) and regression kink (RKD) estimates for the non-employment response to benefit generosity. Panels (a) – (c) show the policy variation described in Section 5.1, while Panels (d) – (f) show the corresponding DiD event studies and RKD figure for first and repeatedly unemployed. The red vertical line indicates the year of reform for the DiD design and the kink in unemployment benefits for the RKD. See Section 5.1 for a detailed discussion of the benefit generosity reforms and the corresponding samples.

Panel (e) plots the yearly coefficients for the 1989 reform. For first spells (blue dots) and repeated spells (red diamonds) we see again parallel trends in the years before the reform. Because of a benefit change in 1990 in our control group, we can only study one post-reform year. Non-employment duration increases by around 6 percent in first spells. In repeated spells, we observe an increase of around 3 percent. While the effect size is half in repeated spells compared to first spells, we have limited statistical power and cannot reject that the effects are the same at the conventional levels.

Panel (f) plots the average (log) non-employment duration by income bins. Non-employment duration is increasing with income to the left of the kink in both first (blue dots) and repeated (red diamonds) spells. At the kink in the benefit schedule, the slope in first spells turns from positive to negative, implying a strong response in terms of non-employment duration to the kink in the benefit schedule. In repeated spells, we do not observe a change in the slope of non-employment duration at the kink, indicating that non-employment duration is not responding to a change in benefits in repeated spells.

Table 4 reports the non-employment and unemployment duration elasticities for first and repeated spells. To obtain the non-employment elasticity for the 1985 and 1989 reform, we divide the estimated average treatment effect for (log) non-employment from regression (12) by the average percent change in benefit generosity in the treatment group. For the fuzzy RKD, we directly estimate the elasticity by using log(UI benefits) in our first stage. Across all reforms, we find that first spells are much more responsive to benefit generosity than repeated spells in terms of their non-employment and unemployment duration. The differences in the elasticities are not only economically meaningful but also statistically significant, as the reported p-values in Table 4 indicate (except for non-employment duration in the 1989 reform where we have limited power).

While we see striking differences in non-employment responses between first and repeated spells, there are little to no differences in duration responses within repeated spells. Second spells respond as little as third spells, fourth or higher order spells, as Appendix Figure D.2 illustrates. This suggests that the main difference in duration responses happens between first and repeated spell, and we therefore focus on this comparison for the rest of this section.

Our results so far indicate that providing more generous UI benefits is more costly in first spells than in repeated spells. Plugging the non-employment duration elasticities from Table 4 into the simple model from Section 2 (equation (6)) ignoring dynamic effects suggests that increasing UI benefits by 1 Euro costs in total 1.6-2.5 Euros in a first spell.[25] In repeated spells the implied total cost of a 1 Euro benefit increase is

[25]The total static costs of 1 Euro benefit increase is $1 + \varepsilon_{D_k,b_k} \cdot (1 + \frac{\tau}{b_k})$. We use $1 + \frac{\tau}{b_k} \approx 1 + \frac{.28}{.55} = 1.5$ and the elasticities from Table 4 that range from 0.4 to 1 in first spells.

Table 4
Elasticity Estimates of Benefit Generosity:
1985 Reform, 1989 Reform, and RKD

	Policy Variation		
	1985 Reform	1989 Reform	RKD
	(1)	(2)	(3)
Panel A. Non-Employment Duration Elasticity			
First Spells	0.44	0.40	1.01
	(0.09)	(0.12)	(0.32)
Repeated Spells	0.11	0.22	-0.32
	(0.06)	(0.08)	(0.28)
P-value Diff.	0.00	0.22	0.00
Panel B. Unemployment Duration Elasticity			
First Spells	0.50	0.85	1.32
	(0.08)	(0.13)	(0.29)
Repeated Spells	0.15	0.51	-0.44
	(0.06)	(0.08)	(0.27)
P-value Diff.	0.00	0.02	0.00

Notes: This table reports the difference-in-differences (DiD) and regression kink (RKD) estimates for the non-employment and unemployment duration elasticity with respect to benefit generosity for different policy variations. Columns (1) – (3) report different policy variations described in Section 5.1, while Panels report different outcomes.

much lower, ranging between 1 and 1.3 Euros.[26] This back-of-the-envelope incentive cost calculation is, however, too simplistic. Dynamic effects might overturn the relative incentive costs. Spillovers to other programs and wage effects might create additional fiscal externalities that the simple model from Section 2 ignores. The rest of this section addresses these two issues by studying dynamic effects and directly estimating the fiscal externality of more generous UI benefits for first and repeated spells.

Dynamic Effects. We now turn to studying potential dynamic effects of differentiating benefit generosity across spells. In the model from Section 2 the dynamic effects to

[26]The RKD elasticity estimate for repeated is even negative in Table 4 but statistically not different from 0. So, we consider the elasticities to range between 0 and 0.22 for repeated spells for this simplified cost calculation.

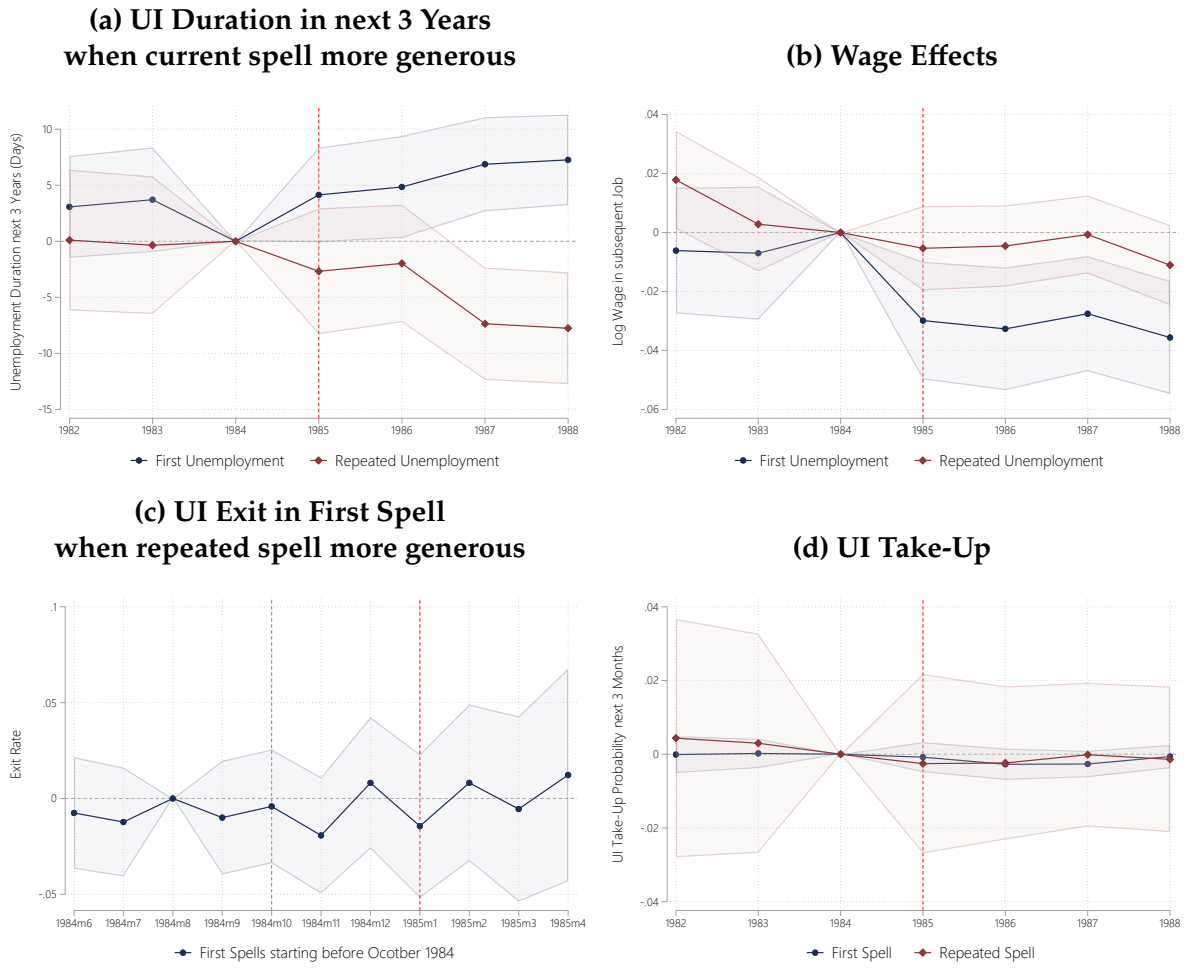
consider are take-up effects, $\frac{\partial p_k}{\partial b_s} \quad \forall k$, and cross-spell duration effects, $\frac{\partial D_k}{\partial b_s} \quad \forall k \neq s$, (see equation (6)). Studying these dynamic effects across spells empirically is challenging because we do not have the perfect experiment where only benefits in the s-th spell change. The two benefit reforms and the kink in the benefits permanently change UI benefits for all spells. To shed light on the dynamic effects, we restrict attention to a benefit schedule that differentiates generosity only between first and repeated spells. This simplification is motivated by the presented evidence that the incentive costs and the insurance value do not differ within repeated spells. A schedule differentiating benefits only between first and repeated spells simplifies the dynamic effects. In this case we need to estimate the following three effects: (i) spillovers to future unemployment spells if the current spell is more generous, i.e., $\frac{\partial}{\partial b_{\text{first}}} \sum_{k=2}^{K} (p_k \cdot D_k)$ for more generous first spells and $\frac{\partial}{\partial b_t} \sum_{k>t}^{K} (p_k \cdot D_k)$ for more generous repeated spells, (ii) spillovers to first spells if repeated unemployment spells become more generous, i.e., $\frac{\partial}{\partial b_{\text{repeated}}} (p_1 \cdot D_1)$, and (iii) take-up effects in the directly affected spell, $\frac{\partial p_1}{\partial b_{\text{first}}}$ and $\frac{\partial p_{k\geq 2}}{\partial b_k}$.

To quantify effect (i) we take individuals in a given spell and use the 1985 reform to study the impact of more generous benefits in the current spell on future time spent in unemployment in the next three years. Figure 4, Panel (a) plots the β-coefficients from regression (13) for total unemployment duration of all future spells starting in the next three years (excluding the current spell). The idea is to compare future time spent in unemployment of individuals with a first spell in 1984, who have the less generous benefits in their first spell, with individuals with a first spell in 1985 or later, who experience more generous benefits in their first spell. For both groups, all future spells are more generous because of the reform, but the generosity in their first spell differs. Figure 4, Panel (a) makes this comparison and shows that if the first spell is more generous, there are negative spillovers to future spells. Individuals with more generous first spells spend 5 – 7 days more unemployed in the next three years, corresponding to a 5 percent increase. We decompose this total effect into the change in the number of spells and the change in the average duration of each spell, i.e., $\frac{\partial}{\partial b_{\text{first}}} \sum_{k=2}^{K} (p_k \cdot D_k) = \sum_{k=2}^{K} \left(\frac{\partial p_k}{\partial b_{\text{first}}} \cdot D_k + p_k \cdot \frac{\partial D_k}{\partial b_{\text{first}}} \right)$. Appendix Figure D.3 shows that the increase in total time spent in unemployment in the next three years in case of a more generous first spell is driven by an increase in the number of future spells, while the average duration of a given future spell does not change. For individuals in a repeated spell, we observe the opposite dynamic effects (red squares in Figure 4, Panel (a)). More generous benefits in the current spell reduces time spent unemployed in the next three years between 3 – 8 days for individuals in a repeated spell. Again, this reduction in future unemployment duration is driven by fewer future spells and not by shorter duration of spells (see Appendix Figure D.3).[27] Appendix Figure D.4 plots

[27]We unfortunately cannot do the same analysis for the 1989 reform. Already in 1990 the benefit schedule changed in our control group, and we can therefore not study the long-run impacts on future

FIGURE 4

DYNAMIC EFFECTS OF BENEFIT GENEROSITY: 1985 BENEFIT GENEROSITY REFORM



Notes: This figure plots the difference-in-differences (DiD) estimate for the dynamic effects using the 1985 benefit generosity reform. Panel (a) reports total UI duration in the next 3 years (excluding the current spell), Panel (b) reports wage effects, Panel (c) reports unemployment exit in the first spell when the next spell is more generous, and Panel (d) reports results for UI take-up. See Section 5.1 for a detailed discussion of the benefit generosity reform in 1985 and the corresponding sample.

the estimates for total duration of all future spells in the next 20 years. We see the same pattern as in Figure 4 though more noisily estimated.[28]

Panel (b) of Figure 4 looks at another dynamic aspect of UI generosity: re-employment wages. The figure shows that after a more generous first spell, individuals take-up lower paying jobs (around 3 percent lower wages). More generous benefits in a repeated spell have no effect on re-employment wages. In the simple model in Section 2 we kept wages and tax revenue constant. However, the lower re-employment wages

spells because this comparison would be contaminated by the change in the benefits in the control group. In the RKD we can neither study the dynamic effects because the kink is permanent, and we therefore do not have variation in generosity in just one specific spell.

[28]The reduction in future unemployment duration when benefits are more generous – we find an overall reduction when we pool first and repeated spells – is consistent with Schmieder, Wachter and Bender (2012), who find that PBD extensions in Germany reduce future time spent in unemployment.

translate to lower tax revenue and matter for the fiscal externality of more generous benefits.[29]

To estimate effect (ii) we exploit the timing of the 1985 reform to assess how duration responds in a first spell when repeated spells become more generous, $\frac{\partial D_1}{\partial b_{\text{repeated}}}$. The reform was announced on October 16, 1984, and went into effect on January 1, 1985. Hence, individuals in a first spell learn in October 1984 that a potential future spell will be more generous. We would therefore expect that exit rates in first spells react after October 1984 if $\frac{\partial D_1}{\partial b_{\text{repeated}}}$ is non-zero. To test this empirically, we take first unemployment spells that started between January and September 1984, which are not directly treated by the reform, and divide them into treatment and control based on their previous earnings. The idea is that previous earnings predict reemployment earnings, and lower income individuals are more likely to experience the change in benefit generosity in a future spell. We then estimate our event study specification (equation (13)) at monthly frequency, with exit from unemployment as the outcome variable. Figure 4, Panel (c) plots these event-study estimates. Before the reform was announced in October 1984 we observe no difference between treatment and control, which indicates parallel trends between treatment and control groups before the reform announcement. In the months after the announcement of the benefit change in October (dashed gray line) we see no effect on exit rates, which suggests that there are no strong spillover effects from more generous benefits in future spells to the duration of the first spell, i.e., $\frac{\partial D_1}{\partial b_{\text{repeated}}} = 0$.

To quantify effect (iii) we look at UI take-up across the income distribution around the 1985 reform. We follow all 20-49 year olds, who are employed and eligible for UI, over time at quarterly frequency. We divide them into treatment and control group according to their last earnings and then estimate the difference-in-difference specification. Our main outcome of interest is whether an individual takes up UI benefits in the next three months. Figure 4, Panel (d) plots the β-coefficients from regression (13) for UI take-up separately for individuals, who have not been unemployed before (blue dots), and for individuals, who have had an unemployment spell before (red squares). In both cases, we observe no significant take-up effects when benefits become more generous.[30]

The dynamic effects documented in Figure 4 amplify the differences in incentive costs between first and repeated spells. The increased future unemployment duration makes providing more generous UI benefits in a first spell even more costly, beyond the direct fiscal externality of longer first spells. For repeated spells, the reduced future unemployment duration lowers the fiscal costs of more generous benefits in

[29]The reduction in re-employment wages is consistent with Schmieder, von Wachter and Bender (2016), who document lower re-employment wages for German PBD extensions.

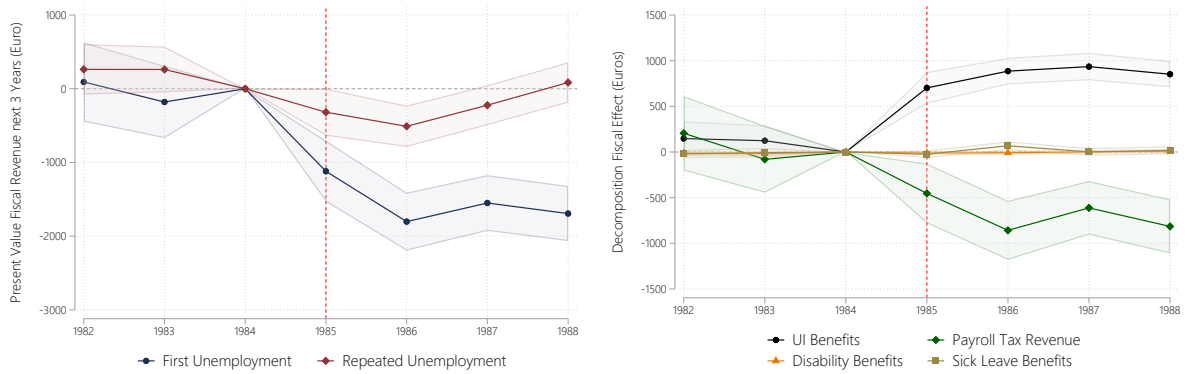
[30]The literature on separation effects of more generous UI is mixed, ranging from zero effects to large positive effects. For an excellent review see Le Barbanchon, Schmieder and Weber (2024). Our separation estimates are consistent with Jäger et al. (2020), who also find zero effects on separations in Austria.

those spells. Beyond these dynamic effects, other behavioral adjustments – such as substitution to other social insurance programs – might also affect the fiscal externality of providing more generous benefits. As a next step, we therefore directly estimate the fiscal externality.

Figure 5

Fiscal Externality of Benefit Generosity: 1985 Benefit Generosity Reform

(a) Fiscal Revenue in next 3 Years **(b) Decomposition Fiscal Effect (First Spells)**



Notes: This figure plots the difference-in-differences (DiD) estimate for total fiscal revenue in the next 3 years using the 1985 benefit generosity reform.

Fiscal Externality. We leverage the 1985 reform to directly estimate the fiscal multiplier (=1+fiscal externality) of more generous UI benefits in first and repeated spells. To identify the fiscal multiplier, we estimate the total fiscal impact of the 1985 reform in the next three years. We measure fiscal revenue as payroll taxes minus unemployment benefits, disability benefits, sick leave benefits and old-age pensions. We discount fiscal revenue at an annual rate of 5 percent. To obtain the fiscal multiplier, we then divide this total fiscal cost estimate by the mechanical effect of the reform. We calculate the mechanical effect by multiplying the pre-reform unemployment duration with the change in the benefit level.

Figure 5, Panel (a) plots the total fiscal impact. The 1985 reform reduces fiscal revenue in the next 3 years by around 1500 Euros for individuals in their first spell. In repeated spells, the fiscal externality is smaller and fiscal revenue is decreased by around 300 Euros per UI recipient. Panel (b) decomposes fiscal revenue in its parts for first spells. The fiscal revenue effect is driven by an increase in UI spending of around 900 Euros and a decrease of around 600 Euros in Payroll tax revenue. Substitution to other benefits is quantitatively not important.[31] Table 5 presents the total fiscal effect of the reform in the subsequent three years, the mechanical effect of the reform and the fiscal multiplier for all spells (column 1), first spells (column 2), and repeated spells

[31] Appendix Figure D.5 shows the fiscal revenue decomposition for repeated spells.

Table 5
Fiscal Multiplier of 1985 Benefit Generosity Reform

	Fiscal Revenue		
	All	First	Repeated
	(1)	(2)	(3)
Reduction Fiscal Revenue	875	1528	386
	(84)	(130)	(84)
Mechanical Effect of Reform	528	643	437
	(10)	(11)	(9)
Fiscal Multiplier	1.66	2.38	0.88
	(0.15)	(0.21)	(0.19)
p-value First vs. Repeated			0.00
Observations	652,316	236,778	415,538

Notes: This table reports the difference-in-differences (DiD) estimate for the fiscal multiplier using the 1985 benefit generosity reform. See Section 5.1 for a detailed discussion of the benefit generosity reform in 1985 and the corresponding sample. Fiscal revenue is calculated using payroll tax revenue, UI benefits, disability and sick leave benefits as well as old-age pension over the next 3 years using detailed information on the labor market history of the worker from the ASSD (see Panel (b) of Figure 5 for a decomposition).

(column 3). Pooling all spells we find a fiscal multiplier of 1.66 meaning that one additional Euro of UI benefits costs in total 1.66 Euros, which is in line with findings in the literature.[32] This average effect, however, hides the substantial cost differences between first and repeated spells. One additional Euro in UI benefits in a first spell costs in total 2.39 Euros. In a repeated spell, one additional Euro only costs 0.88 Euros. The high incentive costs in first spells stem from the higher duration elasticities and the negative dynamic effects as documented above. The lower costs in repeated spells are driven by lower duration elasticities and a reduction in future unemployment duration when UI benefit become more generous.

In Appendix Table D.3 we report the fiscal multiplier for the RKD. The average fiscal multiplier identified with the RKD is 1.53. We find again that providing more generous UI benefits is much more costly during a first spell (with a fiscal multiplier

[32] Schmieder and Von Wachter (2016) report a median fiscal multiplier of 1.6 from surveying 18 studies from five different countries.

of 3.26) compared to a repeated spell (with a fiscal multiplier of 0.70).[33] In summary, our results suggest that providing more generous UI benefits in first spells is three to four times as costly as in repeated spells.

6 Explanations for the Differential Search Response

In this section, we examine different mechanisms underlying our main finding that individuals in a repeated spell respond systematically differently to changes in benefit generosity and liquidity. We start with the most straightforward possible explanation: a purely compositional effect. Repeatedly unemployed individuals might simply differ significantly from those in their first spell in terms of observable or (fixed) unobservable characteristics. However, we demonstrate that the differential responses to cash-on-hand and benefit generosity are not driven by different worker-types, but rather the same individuals exhibit a stronger sensitivity in a repeated unemployment spell compared to their first unemployment entry. Furthermore, we show that differential responses are not due to composition based on observables. In contrast, our results are consistent with lower asset levels for individuals in a repeated spell because these individuals depleted their assets during their first unemployment spell, in line with Gruber (2001).

Non-Importance of Worker Heterogeneity and Composition. We first investigate the (fixed) worker "types" story: individuals who get repeatedly unemployed react on average differently than individuals with unique unemployment spells, even in their first spell. In this case, the average behavioral response in a repeated spell is different because there is a selection of worker types across spells. In order to investigate whether workers who eventually are repeatedly unemployed react systematically different in their first spell, we restrict our analysis to individuals with multiple unemployment spells, and compare their behavioral response to changes in benefit generosity in their first and repeated spell.

Table 6 makes this comparison for the 1985 reform. Column (1) reports the baseline results on (log) non-employment for the 1985 reform. In repeated spells, non-employment duration increases by 1.7 percent (coefficient on "Treat x Post"). The response in first spells is 5.6 percentage points higher (coefficient on "Treat x Post x

[33] The cost differences are again a combination of differences in duration elasticities and dynamic effects. We find the same pattern for dynamic effects in the RKD as for the 1985 reform, as Appendix Figure D.8 illustrates. As discussed above, the interpretation of these dynamic effects is less clear than for the 1985 reform. The kink is permanent and does therefore not directly speak to changing benefits in a first spell only. Lastly, note that we cannot estimate the fiscal externality of the 1989 reform because of the change in the control group's UI benefits in 1990.

Table 6
Non-Employment Response of 1985 Benefit Generosity Reform:
Worker Heterogeneity and Worker Composition

	(Log) Non-Employment Duration			
	Baseline	Multiple	Ind. FE	Reweighted
	(1)	(2)	(3)	(4)
Treat x Post	0.017	0.017	0.015	0.023
	(0.009)	(0.009)	(0.026)	(0.009)
Treat x Post x First	0.056	0.046	0.062	0.037
	(0.017)	(0.017)	(0.034)	(0.018)
p-value First vs. Repeated	0.001	0.007	0.069	0.038
Observations	554,628	511,465	123,965	554,628

Notes: This table reports the effect of the 1985 benefit generosity reform on non-employment duration for different subsamples. Column (1) reports the baseline results for the full sample, Column (2) restricts the sample to individuals with multiple unemployment spells, Column (3) includes worker fixed effects, and Column (4) reports estimates using inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, 1-digit occupation code and 3-digit NUTS region, a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the analysis sample.

First").[34] In Column (2) of Table 6, we show that, compared to our baseline results in Column (1), the non-employment response is virtually unchanged in the subsample of individuals with multiple unemployment spells – i.e., individuals who eventually become repeatedly unemployed. Including worker fixed effects in Column (3) – and thereby comparing the same individual in a first and a repeated spell – actually amplifies the difference between first-time and repeatedly unemployed individuals. These results suggest that the different behavioral responses between first and repeated spells are not driven by a "type story" but rather that behavioral adjustments happen within individuals across unemployment spells.

Nevertheless, differences in behavioral responses could still be primarily driven by observable characteristics that change over time. Individuals in a repeated spell

[34]Table 6 reports the results from regressions of the form: $Y_{it} = \alpha + \beta \cdot \text{Treat}_{it} \cdot \text{Post}_{it} + \gamma \cdot \text{First}_{it} \cdot \text{Treat}_{it} \cdot \text{Post}_{it} + \text{Treat}_{it} + \text{First}_{it} \cdot \text{Treat}_{it} + \pi_t + \theta_{it} + X_{it}'\delta + \varepsilon_{it}$, where First_{it} is a dummy equal to one if individual i at time t is in their first spell. Moreover, all fixed effects and controls are also interacted with the First_{it}-dummy. β then measures the duration response in a repeated spell and γ measures the difference in response between repeated and first spells (the total response for first spells is $\beta + \gamma$). Table 6 separately reports the β estimates ("Treat x Post") and γ estimates (Treat x Post x First).

are observationally different from individuals during their first unemployment entry – for instance, repeatedly unemployed are on average older and have higher wages than individuals in their first unemployment entry (see Appendix Table B.1 for detailed summary statistics). To test this channel we reweight the sample by using inverse probability weights to make first spells observationally identical to repeated spells in terms of observable characteristics (such as age, previous wages, gender, nationality, 1-digit occupation code and 3-digit NUTS region). Column (4) of Table 6 reports the results for the reweighted sample and shows that the observed differences between workers cannot fully explain the systematic differences in behavioral responses between repeated and first unemployed. While reweighting reduces the difference between individuals in a first and a repeated unemployment spell, the difference remains substantial and significant.[35]

For the 1989 reform and the RKD we arrive at the same conclusions that worker types or heterogeneity cannot explain the difference in behavioral responses. Appendix Figure E.1 confirms that individuals with multiple unemployment spells respond similarly in their first spell as uniquely unemployed. Appendix Table E.2 reports the estimates for the baseline, multiple spell and reweighted sample for the 1989 reform. Appendix Table E.3 reports the RKD elasticity estimates for these subsamples.

For the behavioral responses to liquidity we already confirmed in Column (3) of Table 2 that in the subsample of individuals with multiple unemployment spells, individuals respond much stronger to severance pay eligibility in a repeated spell relative to their first unemployment spell and that reweighting the samples amplifies the difference between first-time and repeatedly unemployed individuals in Panel B. of Table 1.[36] In sum, neither fixed worker heterogeneity nor observed differences between workers can explain the systematic differences in behavioral responses between repeated and first unemployed.

Since worker composition does not explain the differences in behavioral responses, what else could drive our results? Importantly, potential explanations have to account for the fact that these behavioral adjustments happen within an individual across unemployment spells. Moreover, potential mechanisms need to explain that search effort reacts stronger in first spells compared to repeated spells $\left(\frac{\partial s}{\partial b}|_{\text{First}} < \frac{\partial s}{\partial b}|_{\text{Repeated}}\right)$ *and* that search effort reacts stronger to liquidity in repeated spells compared to first spells $\left(\frac{\partial s}{\partial A}|_{\text{First}} > \frac{\partial s}{\partial A}|_{\text{Repeated}}\right)$.

[35]Interestingly, reweighting increases the difference in insurance values. Hence, the overall welfare effects remain unchanged in the reweighted sample.

[36]Moreover, Appendix Tables E.1 and E.4 replicate the baseline results in Table D.4 for the potential benefit duration reform in 1989 in the subsample of individuals with multiple unemployment spells (Table E.1) and in the reweighted sample (Table E.4) and shows that all results are virtually unchanged.

Potential Role of Liquidity Constraints. Our results are consistent with lower asset levels for repeatedly unemployed if $\frac{\partial s}{\partial b \partial A} < 0$ and $\frac{\partial^2 s}{\partial A^2} > 0$. While the sign of $\frac{\partial s}{\partial b \partial A}$ and $\frac{\partial^2 s}{\partial A^2}$ is theoretically ambiguous, we provide suggestive evidence that empirically $\frac{\partial s}{\partial b \partial A} < 0$ holds.[37] Unfortunately, we do not observe asset levels in the Austrian data, and therefore cannot directly exploit heterogeneity in treatment effects by liquid assets. Instead, we use severance pay to study differences in responses to benefit generosity when more liquidity is available. Appendix Table E.5 estimates a triple difference-in-differences, interacting the 1985 reform difference-in-difference with whether an individual is eligible for severance pay at the start of their unemployment spell. Consistent with $\frac{\partial s}{\partial b \partial A} < 0$ we find that individuals who receive severance pay respond stronger to the increase in benefit generosity. Moreover, younger individuals, who might be more liquidity constrained in the first place, show bigger duration responses when eligible to severance pay compared to older individuals, who might be less liquidity constrained.[38] Hence, our results are consistent with lower asset levels for individuals in a repeated spell because these individuals depleted their assets during their (first) unemployment spell, in line with Gruber (2001).

Alternative Explanations. Of course, many alternative mechanisms could drive our results. However, we will argue that neither differences in job search costs nor variations in the marginal utility between first and repeatedly unemployed – the two main factors driving job search responses in the canonical model of Chetty (2008) – are likely to fully explain our findings. In Chetty (2008), the search response to benefit generosity is determined by $\frac{\partial s}{\partial b} = -\frac{u'(c^u)}{\psi''(s)}$ and the search response to liquidity is $\frac{\partial s}{\partial A} = \frac{u'(c^e)-u'(c^u)}{\psi''(s)}$. Hence, any mechanism which lowers $u'(c^u)$ and/or increases $\psi''(s)$ between first and repeated spells is consistent with our empirical result that $\frac{\partial s}{\partial b}|_{\text{First}} < \frac{\partial s}{\partial b}|_{\text{Repeated}}$. Potential changes in job search costs, search efficiency or job finding probabilities between first and repeated spells would show up in changes in $\psi''(s)$ (either through changing the optimal search level s or directly changing the search cost function $\psi(\cdot)$). However, such mechanisms do not square with our liquidity results because changes in $\psi''(s)$ move $\frac{\partial s}{\partial b}$ and $\frac{\partial s}{\partial A}$ in the same direction while empirically we find that $\frac{\partial s}{\partial b}$ and $\frac{\partial s}{\partial A}$ move in the opposite direction for first and repeated spells. Put differently, any mechanism that operates only through changes in search strategies or search costs between first and repeated spells will not be able to explain why repeated spells respond less to benefit

[37] In the simple search model in Chetty (2008) we have $\frac{\partial s}{\partial b \partial A} = -\frac{u''(c^u)\psi''(s) - u'(c^u)\psi'''(s)\frac{\partial s}{\partial A}}{\psi''(s)^2}$ and $\frac{\partial^2 s}{\partial A^2} = \frac{(u''(c^e)-u''(c^u))\psi''(s) - (u'(c^e)-u'(c^u))\psi'''(s)\frac{\partial s}{\partial A}}{\psi''(s)^2}$. The sign of $\frac{\partial s}{\partial b \partial A}$ and $\frac{\partial^2 s}{\partial A^2}$ is ambiguous and depends on the size and sign of $\psi'''(s)$. If $\psi'''(s) > 0$ and large enough, then $\frac{\partial s}{\partial b \partial A} < 0$ and $\frac{\partial^2 s}{\partial A^2} > 0$.

[38] Individuals with and without severance pay naturally differ in many other ways. Ideally, we would use the sharp cutoff in severance pay eligibility by tenure, as discussed in Section 4, to compare treatment effects just to the left and right of the cutoff. However, this approach is highly demanding, and we lack sufficient statistical power to make such a comparison meaningful.

generosity but more to liquidity.[39]

7 Welfare Evaluation of Spell-Dependent UI Benefits

This section brings our theoretical and empirical analysis together to provide an evidence-based assessment of differentiating UI benefits across spells. We use our empirical estimates to implement our sufficient-statistics formula and calculate the welfare gains of redistributing between first and repeated spells. Moreover, we compare the implied welfare gains of changing benefits across spells to estimates from the literature of changing benefits within a given spell (i.e., adjusting the benefit profile).

Table 7
Welfare Evaluation of Spell-Dependent UI Benefits

	Incentive Costs	Insurance Value	Benefit-Cost Ratio
	(1)	(2)	(3)
All Spells	1.66	1.65	0.99
First Spells	2.38	1.18	0.50
Repeated Spells	0.88	2.67	3.03

Notes: This table reports the implied incentive costs and the insurance value based on the reduced form estimates from Sections 4 and 5.

Table 7 summarizes our estimates for the insurance value and incentive costs of more generous benefits from Sections 4 and 5. We report the welfare consequences of a marginal increase in UI benefits in all spells, in first spells, and in repeated spells. Column (1) reports the total costs of increasing UI benefits by 1 Euro, column (2) reports the gain in insurance of the more generous benefits, and column (3) displays the ratio of the insurance value to incentive costs, which corresponds to the marginal value of

[39] To make this point more specific: Repeatedly unemployed could learn that finding a job is more difficult than they expected during their first unemployment spell, especially for long-term unemployed. In this case, repeatedly unemployed would be more reluctant to decrease their search intensity even if they are eligible for more generous UI benefits. Importantly, for the behavioral adjustment in search intensity it is not important whether actual or expected job-finding probabilities are lower – i.e., whether employers actually discriminate against repeatedly unemployed (and, therefore, actual job-finding probabilities are lower) or whether workers in a repeated spell *think* that they will face lower (expected) job-finding probabilities (e.g., because they had biased beliefs about their job-finding probabilities in their first spell as in Mueller, Spinnewijn and Topa (2021) or because they expect firms to discriminate against repeatedly unemployed). While this mechanism would explain that the search response to more generous benefits is less pronounced in a repeated spell, it would also predict that individuals in a repeated spell should respond less to liquidity, which is empirically not the case.

a (tax-funded) Euro spent on unemployment benefits, accounting for the behavioral responses (the MVPF in Hendren and Sprung-Keyser (2020)). As discussed in Section 5.2 increasing UI benefits uniformly is costly. One additional Euro costs 1.66 Euros in total. However, these average incentive costs are driven by the strong behavioral responses in first spells: one additional Euro in UI benefits in first spells costs 2.38 Euros. In a repeated spell, one additional Euro costs just 0.88 Euros (the dynamic effects discussed in Section 5.2 push the total costs below 1). While the incentive costs are high on average, the insurance value is equally high. One additional Euro in UI benefits is valued at 1.65 Euros, implying that on average, UI benefit generosity is optimal. However, if we look at the value of more generous UI benefits between first and repeated spells, we see the inverse of the cost differential. While one additional Euro of UI benefits in a repeated spell is valued at 2.67 Euros, it is valued at only 1.18 Euros in a first spell. Column (1) and (2) together imply that UI benefits are too generous in first spells and not generous enough in repeated spells.

The sizable difference in the benefit-cost ratios between first and repeated spells means that reducing benefits in first spells and increasing them in repeated spells produces substantial welfare gains. One additional Euro spent on first spell UI benefits creates a value of only 0.5 Euros, in a repeated spell it creates a six times higher value of 3 Euros.

Our results are consistent with Kolsrud et al. (2018), who study the costs and benefits of providing more generous UI benefits early vs. late in a given spell. They find that early in the spell incentive costs are higher than later in the spell and that the insurance value is lower early in the spell compared to later in the spell. However, our differences in incentive costs and insurance values between first and repeated spells are much more pronounced than the estimated differences within a spell.[40] This suggests that there is potentially more to gain from differentiating UI benefits across spells than within a given spell.

8 Conclusion

Despite the extensive literature on unemployment insurance, repeated unemployment and its consequences for optimal unemployment insurance have not been systematically studied. In this paper, we demonstrate that ignoring spell-dependence – i.e., neglecting the dynamics across unemployment spells – represents a significant shortcoming of the existing literature when designing optimal unemployment insurance systems.

[40] Table 3 in Kolsrud et al. (2018) reports the incentive costs and insurance values early and later in a spell for the Swedish case. They find that incentive cost are 2.82 early in the spell and 2.45 late in the spell, while the insurance value is 1.1 early in the spell and 1.19 later in the spell for risk aversion = 2.

Our comprehensive analysis of repeated unemployment in Austria reveals that both the insurance value – i.e., the benefits of the unemployment insurance system – and the incentive costs – i.e., the additional costs due to behavioral adjustments of individuals resulting from changes in unemployment benefits – are strikingly different for individuals in a first unemployment spell and for individuals who previously received unemployment benefits. Our results suggest large welfare gains from increasing UI generosity in repeated spells while reducing in it in first spells in Austria.

More generally, our paper demonstrates that previous unemployment spells, in fact, affect behavior during the current unemployment spell – in contrast to the assumption in canonical models of optimal unemployment insurance. While our analysis has excluded recalls, our results highlight that repeated unemployment – and liquidity constraints more generally – are pivotal when designing unemployment insurance systems, especially as many unemployment insurance systems tend to favor workers with more stable labor market careers. As a consequence, policymakers should place greater emphasis on insuring workers who are in need, while, at the same time, minimizing the incentives for seasonal – and recall – unemployment. Future research should address in more detail the welfare effects of a spell-dependent UI system, allowing for general equilibrium effects, and extend our analysis of repeated unemployment to other settings.

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Online Appendix

Online Appendix of: Optimal Unemployment Insurance with Repeated Unemployment

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A Theoretical Framework

In this Appendix, we provide the generalized dynamic model to study the welfare effects of UI benefits that differentiate across the number of spells. Our framework closely follows Chetty (2006) and Kolsrud et al. (2018). Incorporating repeated unemployment spells into these optimal UI frameworks is a straightforward extension.[1]

A.1 General Model

Individual Problem. Consider a continuum of agents with mass 1, who live for T periods. Let $\omega_{i,t}$ denote a vector of state variables that contain all relevant past information for determining agent i's labor market status and behavior at time t. $F_{i,t}$ denotes the unconditional distribution of $\omega_{i,t}$ given information available at time 0, and Ω denotes the support of $F_{i,t}$.

We restrict attention to two labor market states: employed and unemployed. We allow for multiple unemployment spells over an individual's life-cycle. In each period t, an agent decides how much to consume and how much effort to exert ($s_{i,t}$ denotes search effort when unemployed, which determines the probability to find a job, and $e_{i,t}$ denotes on-the-job effort when employed, which determines the job loss probability). For a given state history $\omega_{i,t}$, the law of motion of assets in the employment and unemployment state are,

$$a_{i,t+1}(\omega_{i,t}) = (1+r)\cdot a_{i,t}(\tilde{\omega}_{i,t-1}) + w(\omega_{i,t}) - \tau(\omega_{i,t}) - c^e_{i,t}(\omega_{i,t}) \tag{A.1}$$

$$a_{i,t+1}(\omega_{i,t}) = (1+r)\cdot a_{i,t}(\tilde{\omega}_{i,t-1}) + b(\omega_{i,t}) - c^u_{i,t}(\omega_{i,t}), \tag{A.2}$$

where $\tilde{\omega}_{i,t-1}$ denotes the vector of state variables at time $t-1$ that precedes the state $\omega_{i,t}$. We also impose a borrowing constraint $a_{i,t+1}(\omega_{i,t}) \geq \bar{a}_i$ for each agent i. Unemployment benefits $b(\omega_{i,t})$ depend on the individual's state-history $\omega_{i,t}$, which means that UI benefits can depend among other things on the number of previous unemployment spells, the length of the current unemployment spell, age, and earnings history. Let $\theta_{i,t}(\omega_{i,t})$ denote an agent's labor market status at time t in state $\omega_{i,t}$. The agent is employed if $\theta = 1$, and unemployed if $\theta = 0$. Each agent i makes a state-contingent

[1] Chetty (2006) provides a general dynamic model that allows for multiple unemployment spells. However, he only studies the case when benefits do not vary with the spell length and the number of spells. Kolsrud et al. (2018) extend Chetty (2006) to study benefits that vary with unemployment duration (spell length). They discuss in Appendix A.2.2 a model with multiple spells but restrict their analysis to benefit profiles that are not differentiated across the number of spells, i.e. the same benefit profiles apply in the first and repeated spells.

plan (c_i^u, c_i^e, s_i, e_i) with

$$c_i^u = \{c_{i,t}^u(\omega_{i,t})\}_{t\in\{1,\dots,T\},\omega_{i,t}\in\Omega,\theta(\omega_{i,t})=0}, \tag{A.3}$$

$$c_i^e = \{c_{i,t}^u(\omega_{i,t})\}_{t\in\{1,\dots,T\},\omega_{i,t}\in\Omega,\theta(\omega_{i,t})=1}, \tag{A.4}$$

$$s_i = \{s_{i,t}^u(\omega_{i,t})\}_{t\in\{1,\dots,T\},\omega_{i,t}\in\Omega,\theta(\omega_{i,t})=0}, \tag{A.5}$$

$$e_i = \{e_{i,t}^u(\omega_{i,t})\}_{t\in\{1,\dots,T\},\omega_{i,t}\in\Omega,\theta(\omega_{i,t})=1}, \tag{A.6}$$

in order to solve

$$\begin{aligned}
V_i(P) = \max & \sum_{t=1}^{T} \beta^{(t-1)} \int v_i^u(c_{i,t}^u(\omega_{i,t}), s_{i,t}(\omega_{i,t}))[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t}) \\
& \sum_{t=1}^{T} \beta^{(t-1)} \int v_i^e(c_{i,t}^e(\omega_{i,t}), e_{i,t}(\omega_{i,t}))\theta(\omega_{i,t})dF_{i,t}(\omega_{i,t}) \\
& \sum_{t=1}^{T} \beta^{(t-1)} \int \mu_{i,t}^u(\omega_{i,t})[ra_{i,t}(\tilde{\omega}_{i,t-1}) + b(\omega_{i,t}) - c_{i,t}^u(\omega_{i,t}) - a_{i,t+1}(\omega_{i,t})][1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t}) \\
& \sum_{t=1}^{T} \beta^{(t-1)} \int \mu_{i,t}^e(\omega_{i,t})[ra_{i,t}(\tilde{\omega}_{i,t-1}) + w(\omega_{i,t}) - \tau(\omega_{i,t}) - c_{i,t}^e(\omega_{i,t}) - a_{i,t+1}(\omega_{i,t})]\theta(\omega_{i,t})dF_{i,t}(\omega_{i,t}) \\
& \sum_{t=1}^{T} \beta^{(t-1)} \int \mu_{i,t}^a(\omega_{i,t})[\bar{a}_i - a_{i,t+1}(\omega_{i,t})]dF_{i,t}(\omega_{i,t}).
\end{aligned} \tag{A.7}$$

Government Problem. The government solves

$$\max W(P) = \max \int V_i(P)di + \lambda \left[G(P) - \bar{G}\right] \tag{A.8}$$

where λ denotes Lagrange multiplier on the government's budget constraint, $G(P)$ is fiscal revenue and $\bar{G}$ and exogenous revenue constraint. Fiscal revenue is given by

$$G(P) = \sum_{t=1}^{T} \left(\frac{1}{1+r}\right)^{(t-1)} \int \int \tau(\omega_{i,t})\theta(\omega_{i,t}) - b(\omega_{i,t})[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di. \tag{A.9}$$

Optimal UI Benefits. How the optimal UI benefit system (that solves (A.8)) looks depends on what the government can condition the UI benefits on. In the most general version the government can condition on the full state history of an agent and the UI system is a benefit function $b(\omega_{i,t})$ mapping state histories into benefit payments. In this case the optimal benefit function $b(\omega_{i,t})$ ensures that there is no potential welfare improvement from any reform that changes the current benefit function $b(\omega_{i,t})$ in direction $h(\omega_{i,t})$. That is, the optimal benefit function fulfills the following Baily-Chetty

type formula

$$\frac{-\frac{1}{M(h)}\sum_{t=1}^{T}\beta^{(t-1)}\int\int\frac{\partial v_i^u(c_{i,t}^u(\omega_{i,t}),s_{i,t}(\omega_{i,t}))}{\partial c_{i,t}^u}h(\omega_{i,t})[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di}{\lambda}=\frac{\delta G(P;h)}{M(h)} \tag{A.10}$$

where $\delta G(P;h)$ is the total fiscal impact of perturbation $h(\cdot)$ and $M(h)$ denotes the mechanical fiscal effect (the fiscal impact absent any behavioral changes). The mechanical fiscal effect is given by

$$\mathrm{M}(h)=\sum_{t=1}^{T}\left(\frac{1}{1+r}\right)^{(t-1)}\int\int -h(\omega_{i,t})[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di. \tag{A.11}$$

The RHS of equation (A.10), $\frac{\delta G(P;h)}{M(h)}$, measures the fiscal multiplier of a given reform $h(\cdot)$, i.e., the total cost of a one dollar increase in UI benefits. This can also be expressed as $1+\frac{B(h)}{M(h)}$ where the behavioral fiscal effect, $B(h)$, measures the fiscal costs of behavioral responses to the policy change.

One can think of Chetty (2006) as a special case of equation (A.10) where the government can only condition benefits on unemployment status. In this case, $h(\omega_{i,t})=1$ for all unemployed and zero otherwise. (A.10) then becomes $\frac{E[v'(c^u)|\text{unemployed}]}{\lambda}=1+\frac{B(h)}{M(h)}$.[2] Kolsrud et al. (2018) study a situation where the government can condition UI benefits on the time spent in unemployment within that spell. That is, $h(\omega_{i,t})=1$ for all unemployed in the kth period of unemployment and zero otherwise. (A.10) then becomes $\frac{E[v'(c_k^u)|\text{unemployed for k periods}]}{\lambda}=1+\frac{B(k)}{M(k)}$. Another special case of (A.10) are PBD extensions, as for example studied in Schmieder, Von Wachter and Bender (2012). In this case, $h(\omega_{i,t})=b$ for all unemployed at the PBD (at benefit exhaustion, individuals get b higher benefits) and zero otherwise. The next section presents the simplified version of (A.10) when the government differentiates benefits across the number of unemployment spells.

Proof of Formula (A.10). The proof of (A.10) is a straightforward application of the "differentiable sandwich lemma" from Clausen and Strub (2020), which generalizes the envelope theorems in Milgrom and Segal (2002).

The welfare effect of changing unemployment policy P, i.e., tilting the benefit function $b(\cdot)$, in direction of function $h(\cdot)$ is given by

$$\delta W(P;h)=\int\delta V_i(P;h)di+\lambda\delta G(P;h), \tag{A.12}$$

[2] where $E[v'(c^u)|\text{unemployed}]=\frac{1}{M(h)}\sum_{t=1}^{T}\beta^{(t-1)}\int\int\frac{\partial v_i^u(c_{i,t}^u(\omega_{i,t}),s_{i,t}(\omega_{i,t}))}{\partial c_{i,t}^u}[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di$ and $M(h)=\sum_{t=1}^{T}\left(\frac{1}{1+r}\right)^{(t-1)}\int\int[1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di$, and $\frac{B(h)}{M(h)}=\varepsilon_{D,b}$ corresponds to the unemployment duration elasticity in the simplest version of Chetty (2006)'s UI model.

where $\delta W(P;h)$ denotes the Fréchet derivative. At the optimal policy $\delta W(P;h) = 0$ holds as there is no deviation that could increase welfare.

We now construct a lower and upper support functions for $W(P)$ and then apply the differentiable sandwich lemma of Clausen and Strub (2020). As an upper support function, we take $C(P) = W(P^*)$, where $W(P^*)$ is the welfare associated with the optimal UI policy P^*. By definition, we have $W(P^*) \geq W(P)\ \forall P$. This upper support function is therefore simply a constant and $C'(P) = \delta W(P^*;h) = 0$. The lower support function is given by $L(P) = \int \bar{V}_i(P;P^*)di + \lambda \left[G(P) - \bar{G}\right]$ where $\bar{V}_i(P;P^*)$ is the indirect utility of the agent, holding his behavior for policy P^* fixed (even if the actual policy P is not the optimal policy P^*). This corresponds to the idea of a lazy decision maker who uses a completely unresponsive policy rule as in Benveniste and Scheinkman (1979). We have $\bar{V}_i(P;P^*) \leq V_i(P)\ \forall P$ and $L(P)$ is therefore a lower support function. Assuming that the planner's budget constraint is differentiable, $L(P)$ is differentiable, and the derivative is given by $L'(P) = \int \sum_{t=1}^{T} \beta^{(t-1)} \int \mu^u_{i,t}(\omega_{i,t})[h(\omega_{i,t})][1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di + \lambda\delta G(P^*;h)$. By the differentiable sandwich lemma of Clausen and Strub (2020), we have $\delta W(P^*;h) = C'(P) = L'(P)$.

Using $C'(P) = 0$, the expression for $L'(P)$, and the individuals first-order condition for their consumption choice $\mu^u_{i,t}(\omega_{i,t}) = \frac{\partial v^u_i(c^u_{i,t}(\omega_{i,t}),s_{i,t}(\omega_{i,t}))}{\partial c^u_{i,t}(\omega_{i,t})}$ we obtain

$$\delta W(P^*;h) = \sum_{t=1}^{T} \beta^{(t-1)} \int \int \frac{\partial v^u_i(\cdot)}{\partial c^u_{i,t}}[h(\omega_{i,t})][1-\theta(\omega_{i,t})]dF_{i,t}(\omega_{i,t})di + \lambda\delta G(P^*;h) = 0 \tag{A.13}$$

and equation (A.10) is simply rearranging this expression.

A.2 Optimal Spell-Dependent UI Benefits

Here we let the UI system differentiate UI benefits between spells but not within spells. To simplify notation we assume no discounting $\beta = \frac{1}{1+r} = 1$, and a fixed lump-sum tax τ, which every employed individual pays.

Notation. Let D denote total time spent in unemployment

$$D = \sum_{k=1}^{\bar{K}} \Pr[\text{Spell} = k] \cdot D_k, \tag{A.14}$$

where D_k denotes the average duration of the kth unemployment spell, $\Pr[\text{Spell} = k]$ is the probability to experience a kth unemployment spell, and $\bar{K} = \lfloor \frac{T+1}{2} \rfloor$ is the maximum number of spells in T periods (unemployment and employment spells are

at least one period long).[3] D_k depends on search effort in the kth spell and Pr[Spell = k] is a function of both past effort on the job (which influences the probability of layoff) and search effort in previous spells (which influences the probability to leave unemployment). The time spent in employment is simply $E = T - D$.

Assuming a fixed lump-sum tax τ when employed and a constant UI benefit b_k during the kth spell, we can write fiscal revenue as

$$G(P) = (T - D) \cdot \tau - \sum_{k=1}^{\bar{K}} \Pr[\text{Spell} = k] \cdot D_k \cdot b_k. \tag{A.15}$$

Optimal UI Benefits by Spell-Type. The optimal UI benefit level in the s-th spell is determined as a special case of equation (A.10), where we only consider variation in benefit levels across spells (i.e., we only consider reforms where $h(\omega_{i,t}) = 1$ if individual i in period t is in her s-th unemployment spell and $h(\omega_{i,t}) = 0$ otherwise). In this case optimal UI benefits in the s-th spell, b_s, solve

$$\frac{E\left[\frac{\partial v_i^u(c_{i,t}^u, s_{i,t})}{\partial c_{i,t}^u} | i, t \in \text{s-th spell}\right]}{\lambda} = \frac{\partial G(P)/\partial b_s}{M(b_s)} \tag{A.16}$$

The fiscal impact of changing UI benefits in spell s is given by

$$\frac{\partial G(P)}{\partial b_s} = -\Pr[\text{Spell} = s] \cdot D_s - \sum_{k=1}^{\bar{K}} \left(\frac{\partial \Pr[\text{Spell} = k]}{\partial b_s} \cdot D_k + \frac{\partial D_k}{\partial b_s} \cdot \Pr[\text{Spell} = k] \right) \cdot (b_k + \tau) \tag{A.17}$$

The first term is the mechanical fiscal effect, $M(b_s) = -\Pr[\text{Spell} = s] \cdot D_s$, of changing benefit generosity in spell s (holding everything constant). The second term captures the behavioral fiscal effect $B(b_s)$ of changing benefit generosity in spell s. The behavioral fiscal effect depends on both changes in take-up ($\frac{\partial \Pr[\text{Spell}=k]}{\partial b_s}$) and changes in UI duration ($\frac{\partial D_k}{\partial b_s}$) in all unemployment spells.

The optimal UI benefit in spell s solves

$$\frac{E[v'(c_s^u)]}{\lambda} = 1 + \frac{B(b_s)}{M(b_s)} \tag{A.18}$$

where $\frac{E[v'(c_s^u)]}{\lambda}$ denotes the insurance loss with $E[v'(c_s^u)] \equiv E\left[\frac{\partial v_i^u(c_{i,t}^u, s_{i,t})}{\partial c_{i,t}^u} | i, t \in \text{s-th spell}\right]$ as a short notation for the conditional average marginal utility of consumption of

[3] In the notation of Section A.1 the total unemployment duration D is $D = \sum_{t=1}^{T} \int \int [1 - \theta(\omega_{i,t})] dF_{i,t}(\omega_{i,t}) di$., i.e., we always aggregate across states and individuals in the notation here.

unemployed in their s-th spell. Lastly, we can write the fiscal externality as

$$\begin{aligned}\frac{B(b_s)}{M(b_s)} &= \frac{\sum_{k=1}^{\bar{K}} \left(\frac{\partial \Pr[\text{Spell}=k]}{\partial b_s} \cdot D_k + \frac{\partial D_k}{\partial b_s} \cdot \Pr[\text{Spell} = k] \right) \cdot (b_k + \tau)}{\Pr[\text{Spell} = s] \cdot D_s} \\ &= \varepsilon_{D_s, b_s} \cdot (1 + \frac{\tau}{b_s}) \dots \\ &\quad + \frac{1}{-M(b_s)} \left(\sum_{k=1}^{K} \left(\frac{\partial p_k}{\partial b_s} \cdot D_k \right) \cdot (b_k + \tau) + \sum_{k=1, k \neq s}^{K} \left(\frac{\partial D_k}{\partial b_s} \cdot p_k \right) \cdot (b_k + \tau) \right)\end{aligned} \tag{A.19}$$

where $\varepsilon_{D_s, b_s} \equiv \frac{\partial D_s}{\partial b_s} \frac{b_s}{D_s}$.

B Institutional Background and Data

B.1 Data and Sample Selection

In this section, we describe in detail how we connect consecutive unemployment spells, allowing for intermediate sickness, non-employment, and minor-employment in order to correctly identify repeated unemployment entries. Based on daily labor market spells in the ASSD, we iteratively connect unemployment spells, separately for unemployment benefits and unemployment assistance if individuals have

- two subsequent unemployment spells that start within 1 day,
- no intermediate labor market spell in between two unemployment spells up to 182 days,
- intermediate sickness in between two unemployment spells up to 62 days,
- intermediate minor employment in between two unemployment spells up to 4 weeks.

We then search for the unemployment assistance spell that follows on each unemployment benefit spell and allow individuals to have unemployment assistance in between two unemployment spells, i.e. we treat UI - UA - UI spells as one single unemployment entry. However, unemployment benefit (UI) duration and unemployment assistance (UA) duration is calculated as the actual number of days with benefit/assistance receipt, while non-employment duration is calculated as the time between jobs (i.e., days between the end of the previous job and the start of the subsequent job), where we consider time on vacation and termination compensation after the official employment end date as employment, while registered job search (without unemployment benefit receipt) is treated as non-employment.

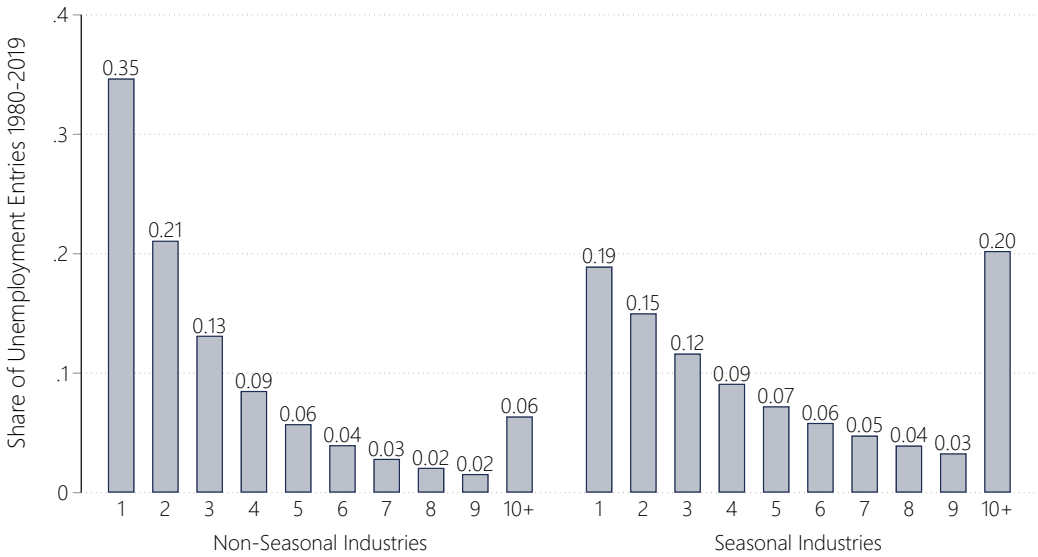
B.2 Descriptive Statistics

Figure B.1
Descriptive Statistics: Share of Unemployment Entries

(a) First vs. Repeated Unemployment



(b) Number of Unemployment Spell



Notes: This figure plots the share of unemployment entries between 1980 and 2019 for workers aged 20−55 by spell type (first vs. repeated unemployment) in Panel (a) and by unemployment entry (number of unemployment spell) in Panel (b). The sample are all unemployment spells in our baseline sample (see Section 3.3), excluding recalls.

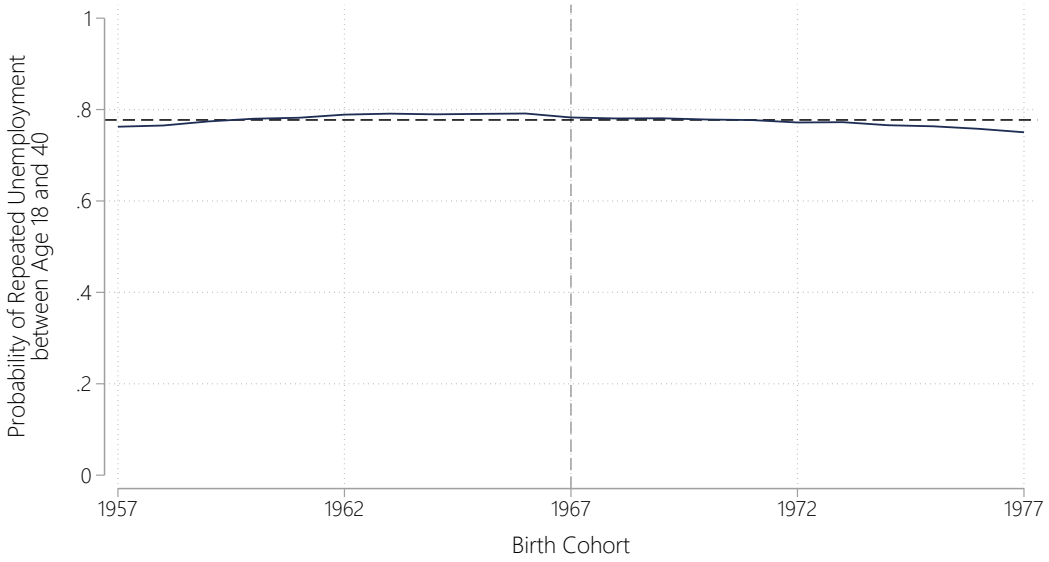
Table B.1
Descriptive Statistics: Summary Statistics by Unemployment Entry

	Unemployment Entry		
	First	Repeated	Total
Unemployment Insurance Duration (in Weeks)	16.8 (14.9)	14.9 (13.6)	15.5 (14.1)
Non-Employment Duration (in Weeks)	22.4 (20.7)	19.9 (19.1)	20.6 (19.6)
Age at Unemployment Entry	31.2 (9.7)	35.2 (9.5)	34.0 (9.7)
Share Female (in Percent)	48.1 (50.0)	40.0 (49.0)	42.4 (49.4)
Share Austrian (in Percent)	71.3 (45.3)	76.3 (42.6)	74.8 (43.4)
Share White-Collar Worker (in Percent)	47.0 (49.9)	28.7 (45.2)	34.2 (47.4)
Share of Seasonal Industries (in Percent)	19.2 (39.4)	35.1 (47.7)	30.3 (46.0)
Share Voluntary Quit (in Percent)	21.3 (40.9)	15.4 (36.1)	17.1 (37.7)
Share with UA Take-Up (in Percent)	9.4 (29.2)	11.2 (31.6)	10.7 (30.9)
Daily Previous Wage (in EUR)	73.3 (37.7)	74.3 (33.8)	74.0 (35.0)
Daily Entry Wage (in EUR)	71.6 (31.3)	73.9 (29.0)	73.3 (29.7)
Wage Change (in Percent)	-4.7 (42.0)	-3.9 (38.3)	-4.1 (39.3)
Tenure in Previous Firm (in Months)	36.2 (52.4)	15.6 (26.5)	21.8 (37.5)
Labor Market Experience (in Years)	7.2 (7.0)	10.1 (6.4)	9.2 (6.7)
Number of Unemployment Entries	2,504,636	5,873,457	8,378,093
Number of Individuals	2,504,636	837,457	3,342,093

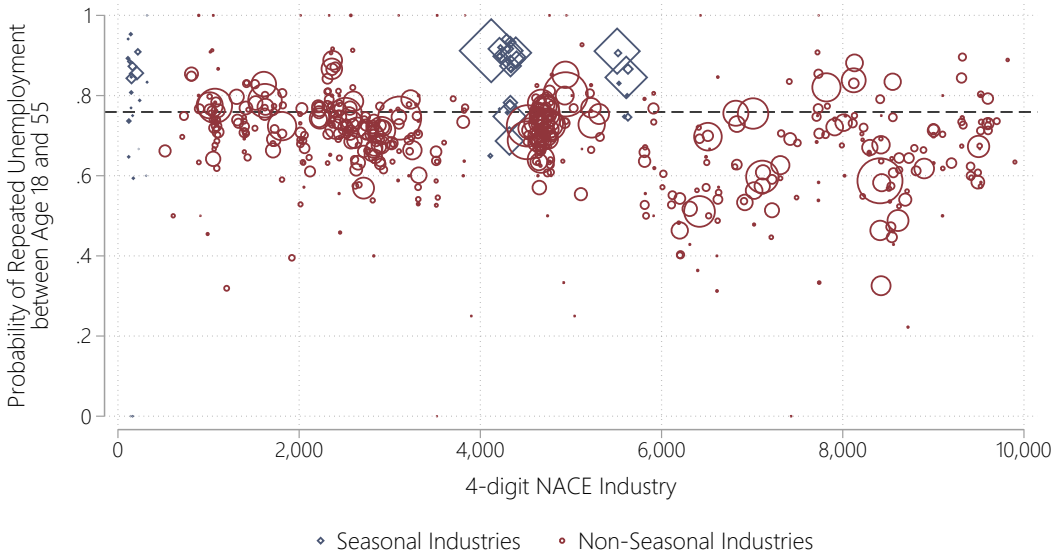
Notes: This table reports descriptive statistics in the baseline sample of all unemployment entries between 1980 – 2019 for individuals aged 20 – 55 at unemployment entry, excluding recalls (see Section 3.3).

Figure B.2
Descriptive Statistics: Repeated Unemployment over the Life-Cycle

(a) Probability of Repeated Unemployment by Birth Cohort



(b) Probability of Repeated Unemployment by Industry



Notes: This figure plots the probability of being repeatedly unemployed in our baseline sample (see Section 3.3), excluding recalls. Panel (a) plots the probability of being repeatedly unemployed between age 18 and 40 by birth cohort in the sample of male workers from cohorts 1957 – 1977 with at least one employment spell between age 20 – 30 over the time period 1977 – 2007. Panel (b) plots the probability of being repeatedly unemployed between age 18 and 55 by 4-digit NACE industry in the sample of male workers from birth cohorts 1957 – 1967 with at least one employment spell between age 20 – 30 over the time period 1977 – 1997.

Table B.2
Descriptive Statistics: Repeated Unemployment over the Life-Cycle

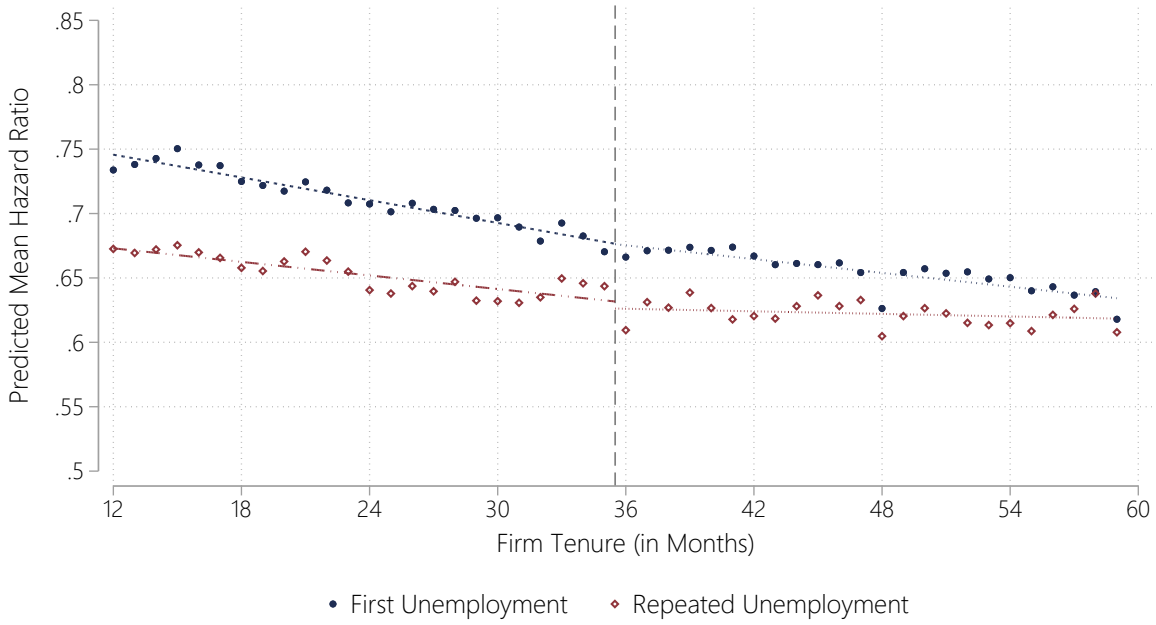
	Sample		
	Non-Seasonal	Seasonal	Total
Baseline Sample Excluding Recalls			
Share with UI Benefits 18 - 55	0.55	0.69	0.58
Share with Repeated Spell 18-55	0.72	0.86	0.76
Number of Unemployment Spells (Mean)	4.20	7.89	5.16
Number of Unemployment Spells (Med.)	2.0	5.0	3.0
Age at Unemployment Entry (Mean)	28.82	25.35	28.02
Age at Unemployment Entry (Med.)	26.28	22.74	25.37
UI Duration of First Spell (Months)	3.85	2.96	3.66
Total Time on UI Benefits (Months)	11.82	11.57	11.76
Job Duration before First Spell (Years)	2.63	1.31	2.33
Job Duration after First Spell (Years)	2.55	1.49	2.30
Job-Finding Prob. after First Spell	0.81	0.86	0.82
Share of Individuals	78.22	21.78	100.00
Number of Individuals	566,581	157,787	724,368

Notes: This table reports descriptive statistics in the sample of male workers from birth cohorts 1957 – 1967 with at least one employment spell between age 20 – 30 over the time period 1972 – 2022 and separately for seasonal and non-seasonal workers excluding recalls as in our baseline sample.

C Insurance Value and the Sensitivity to Cash-on-Hand

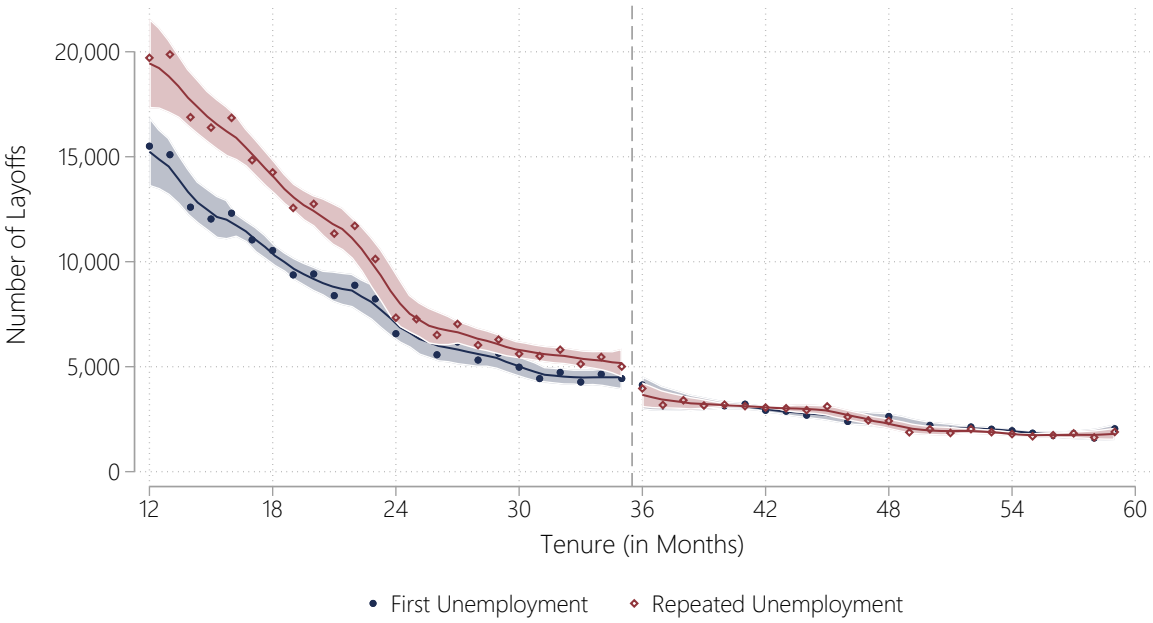
C.1 Effect of Severance Pay and Benefit Duration

Figure C.1
Predicted Hazards by Monthly Tenure



Notes: This figure plots predicted hazard ratios around the tenure cutoff at 36 months separately for first and repeated unemployed in our baseline sample from Section 4 for years 1981 – 2001. We use the year and month of unemployment entry, dummies for gender, nationality and worker type (blue/white collar), as well as quadratic age, previous log wage and labor market experience in the last 25 years and fixed effects for 1-digit NACE industry and NUTS region to predict the average job finding hazard in the first 20 weeks.

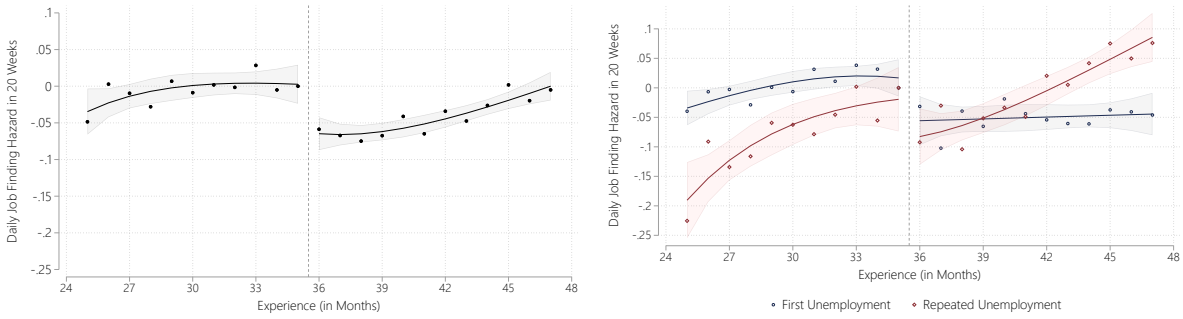
Figure C.2
Number of Layoffs by Monthly Tenure



Notes: This figure plots the number of layoffs for first and repeated unemployed around the tenure cutoff at 36 months in our baseline sample from Section 4 for years 1981 – 2001.

Figure C.3
The Effect of Benefit Duration on Daily Job-Finding Hazards

(a) All Unemployment Entries **(b) First vs. Repeated Entry**



Notes: This figure plots average daily job-finding hazards in the first 20 weeks for individuals in the baseline sample around the experience cutoff of 36 months, controlling for the severance pay effect. Individuals with less than 36 months of labor market experience are eligible for 20 weeks of UI benefits, while individuals above the cutoff are eligible for 30 weeks of UI benefits.

Table C.1
The Effect of Severance Pay and Benefit Duration: Summary Statistics

	Unemployment Entry		
	First	Repeated	All
	(1)	(2)	(3)
Panel A. Unweighted			
Male (in %)	0.46	0.50	0.48
Austrian (in %)	0.75	0.78	0.76
Age at Unemployment Entry (in Years)	28.92	33.69	31.52
Log Yearly Earnings	8.45	8.53	8.50
Blue-Collar Worker (in %)	0.57	0.61	0.59
Seasonal Industries (in %)	0.10	0.11	0.11
Job Finding Probability (in %)	0.46	0.44	0.45
Unemployment Duration (in Weeks)	17.50	19.29	18.48
Observations	257,336	310,063	567,399
Panel B. Reweighted			
Male (in %)	0.47	0.47	0.47
Austrian (in %)	0.76	0.76	0.76
Age at Unemployment Entry (in Years)	31.62	31.66	31.64
Log Yearly Earnings	8.48	8.49	8.49
Blue-Collar Worker (in %)	0.59	0.59	0.59
Seasonal Industries (in %)	0.11	0.11	0.11
Job Finding Probability (in %)	0.43	0.45	0.44
Unemployment Duration (in Weeks)	18.42	18.66	18.54
Observations	257,336	310,063	567,399

Notes: This table reports unweighted and reweighted summary statistics for the baseline sample used in Section 4. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers. Panel A. reports unweighted summary statistics, Panel B. reports estimates using inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, worker type (blue/white collar worker), a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the full sample.

Table C.2
The Effect of Severance Pay and Benefit Duration

	Daily Job-Finding Hazard		
	All	First	Repeated
	(1)	(2)	(3)
Basic Controls			
Severance Pay Eligibility	-0.102	-0.068	-0.125
	(0.019)	(0.028)	(0.027)
Benefit Duration Eligibility	-0.067	-0.103	-0.072
	(0.018)	(0.026)	(0.027)
Observations	567,399	257,336	310,063

Notes: This table reports the effects of severance pay eligibility and extended benefit duration on the average job-finding hazard in the first 20 weeks using the double-discontinuity design as explained in Section 4. This specification reports estimates with basic controls (dummies for year and month of unemployment entry, gender, nationality, blue/white collar worker, quadratic polynomials of age and log wage).

Table C.3
The Effect of Severance Pay and Benefit Duration: Subsamples

	Daily Job-Finding Hazard					
	(1)	(2)	(3)	(4)	(5)	(6)
Severance Pay Eligibility	-0.061	-0.060	-0.065	-0.061	-0.061	-0.061
	(0.028)**	(0.029)**	(0.034)*	(0.028)**	(0.028)**	(0.028)**
Repeated × Severance Pay	-0.087	-0.084	-0.095	-0.101	-0.073	-0.077
	(0.039)**	(0.041)**	(0.048)**	(0.049)**	(0.046)	(0.040)*
Benefit Duration Eligibility	-0.115	-0.126	-0.143	-0.115	-0.115	-0.115
	(0.026)***	(0.027)***	(0.031)***	(0.026)***	(0.026)***	(0.026)***
Repeated × Benefit Duration	0.047	0.063	0.086	0.043	0.050	0.039
	(0.037)	(0.040)	(0.044)*	(0.047)	(0.046)	(0.038)
Observations	567,399	507,290	551,363	392,215	432,520	552,698

Notes: This table replicates Table 2 for different subsamples. Column (1) replicates the baseline results, Column (2) excludes seasonal industries (Agriculture and Tourism), Column (3) excludes workers with tenure and labor market experience +/- 14 days around the cutoffs ("donut hole"), Column (4) restricts to the first two unemployment spells, Column (5) excludes the second unemployment spell, and Column (6) restricts to repeated unemployment within 10 years.

C.2 Long-Run Effect of Severance Pay and Benefit Duration

Whether more generous unemployment benefits improve job-search outcomes is a long debated question. While Card, Chetty and Weber (2007*a*) do not find any evidence for improved job-match quality, Schmieder, Von Wachter and Bender (2012) find that more generous UI benefits decreases the probability of future unemployment take-up for Germany. In columns (1) and (2) of Table C.4 we confirm the absence of subsequent job-duration and wage effects for both severance pay eligibility and extended benefit duration, despite the large short-run effects on the job-finding probability in the first 20 weeks reported above, consistent with Card, Chetty and Weber (2007*a*). Furthermore, columns (3) and (4) investigate whether more liquidity and longer potential benefit duration decreases (or increases) the probability of unemployment take-up in the next 5 and 10 years. While there is some evidence that more liquidity decreases the unemployment take-up probability for individuals in a repeated spell in the next 5 years, these effects become smaller and statistically insignificant after 10 years. We therefore conclude that additional liquidity has limited long-run effects, consistent with Card, Chetty and Weber (2007*a*).

Table C.4
The Effect of Severance Pay and Benefit Duration: Additional Outcomes

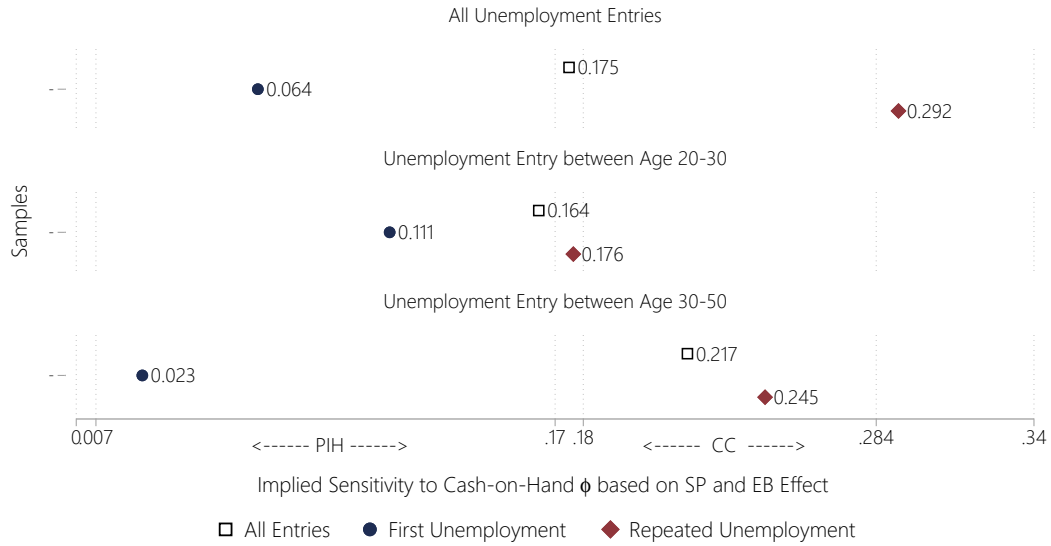
	Additional Outcomes			
	Job-Dur.	Δ Wage	Unemployment	
			< 5 Yrs.	< 10 Yrs.
	(1)	(2)	(3)	(4)
Severance Pay Eligibility	-0.020	0.004	0.008	-0.007
	(0.088)	(0.008)	(0.009)	(0.009)
Repeated × Severance Pay	0.168	-0.019	-0.032	-0.017
	(0.120)	(0.012)	(0.013)	(0.012)
Benefit Duration Eligibility	0.091	0.003	-0.012	-0.004
	(0.081)	(0.008)	(0.009)	(0.008)
Repeated × Benefit Duration	-0.040	-0.013	0.008	0.003
	(0.114)	(0.011)	(0.012)	(0.012)
Observations	490,316	431,214	567,399	567,399

Notes: This table reports the baseline effects of severance pay eligibility and extended benefit duration on additional outcomes using the double-discontinuity design as explained in Section 4. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1981 – 2001 with job tenure and labor market experience between 1 and 5 years, excluding construction workers. Column (1) reports the results for job-duration in the new job (in years), Column (2) reports results for the wage change between jobs, Column (3) and (4) report results for unemployment take-up within 5 and 10 years, respectively.

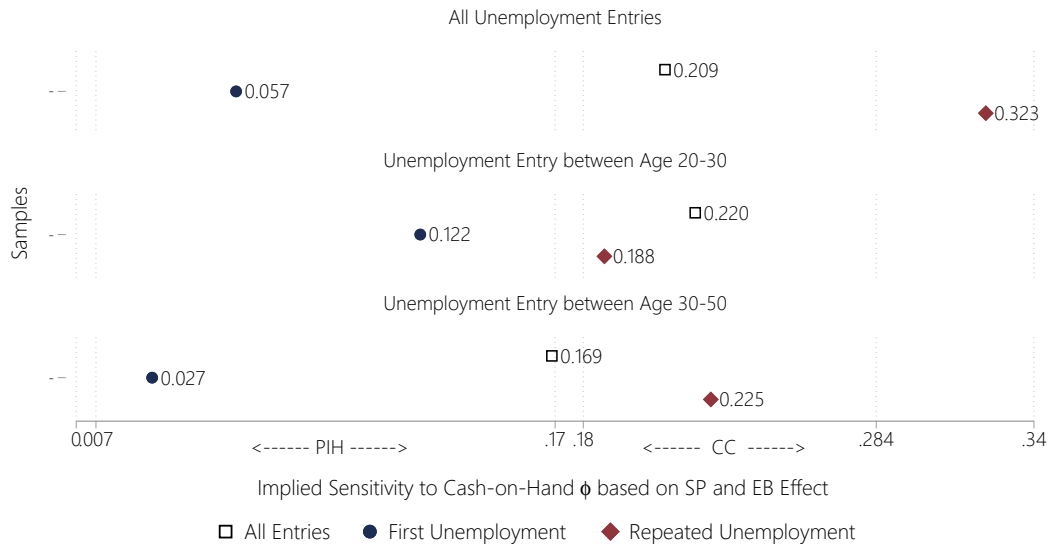
C.3 Importance of Liquidity Constraints

Figure C.4
Implied and Theoretical Sensitivity to Cash-on-Hand ϕ: Subsamples

(a) Baseline Results



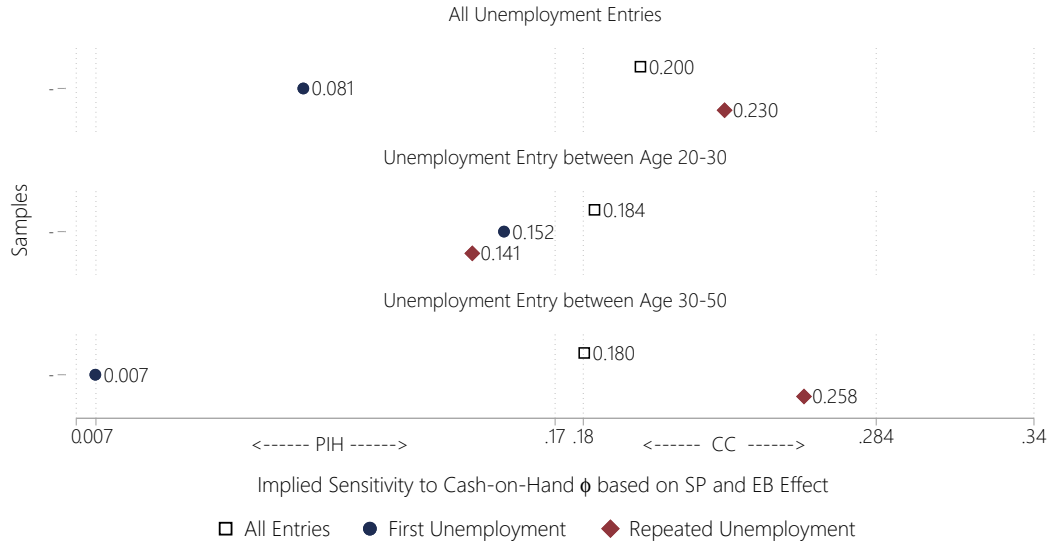
(b) Inverse Probability Weights



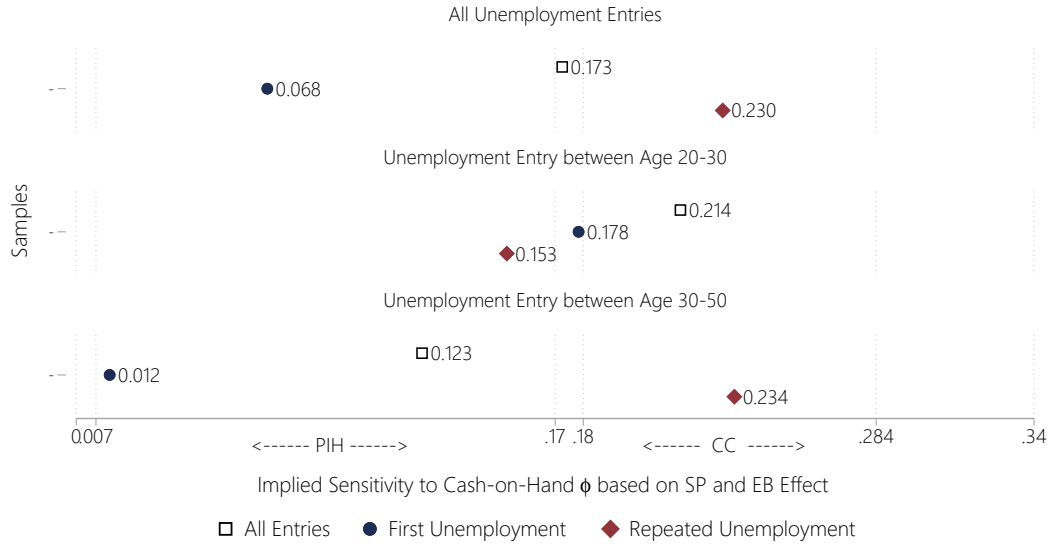
Notes: This figure plots the implied sensitivity to cash-on-hand ϕ from Table 3 based on the empirical responses to severance pay and extended benefit duration in Panel A. of Table 1, as well as the theoretical analogue based on a PIH model with unconstrained borrowing and a credit constrained model based on Card, Chetty and Weber (2007*a*). The top Panel plots the sensitivity for all unemployment entries (see Table 3), while the middle and bottom Panel shows the sensitivity for young and old workers. The sensitivity to cash-on-hand is calculated as $\phi = (\partial s/\partial A)/((1/p^{\star}) * (\partial s/\partial b))$, where $\partial s/\partial b = \beta_{EB}/v_{EB}$ and the liquidity effect is $\partial s/\partial A = \beta_{SP}/v_{SP}$. β_{SP} and β_{EB} are the RD coefficients for severance pay and extended benefit duration eligibility based on equation (7), respectively. v_{SP} and v_{EB} is the cash value of severance pay and benefit duration eligibility (see Appendix C for details).

Figure C.5
Implied and Theoretical Sensitivity to Cash-on-Hand ϕ: Subsamples with Controls

(a) Baseline Results (with Controls)



(b) Inverse Probability Weights (with Controls)



Notes: This figure plots the implied sensitivity to cash-on-hand ϕ from Table 3 based on the empirical responses to severance pay and extended benefit duration in Panels C. of Table 1, as well as the theoretical analogue based on a PIH model with unconstrained borrowing and a credit constrained model based on Card, Chetty and Weber (2007*a*). The top Panel plots the sensitivity for all unemployment entries (see Table 3), while the middle and bottom Panel shows the sensitivity for young and old workers. The sensitivity to cash-on-hand is calculated as $\phi = (\partial s/\partial A)/((1/p^{\star}) * (\partial s/\partial b))$, where $\partial s/\partial b = \beta_{EB}/v_{EB}$ and the liquidity effect is $\partial s/\partial A = \beta_{SP}/v_{SP}$. β_{SP} and β_{EB} are the RD coefficients for severance pay and extended benefit duration eligibility based on equation (7), respectively. v_{SP} and v_{EB} is the cash value of severance pay and benefit duration eligibility (see Appendix C for details).

C.4 Sensitivity to Cash-on-Hand and Insurance Value of UI

Cash Value of Severance Pay and Extended Benefits. Here we calculate the cash value of severance pay v_{SP} and extended benefits v_{EB} following Card, Chetty and Weber (2007*a*) and show that the cash values are the same for individuals in a first and a repeated spell.

Laid-off workers above the tenure threshold receive 2 monthly gross wages of severance pay. Severance pay is taxed at approximately 6%, while the average earnings tax rate is roughly 30% in Austria. We can therefore benchmark the cash value of severance pay eligibility by

$$v_{SP} = 2 \cdot \frac{(1 - 0.06)}{(1 - 0.3)} \cdot w = 2.686 \cdot w \tag{C.1}$$

where w is the net monthly wage before unemployment entry.

Similarly, extended benefit duration eligibility gives unemployed workers additional 10 weeks (or 2.3 months) of unemployment insurance benefits. The average replacement rate for unemployment insurance benefits is 55%. However, workers are eligible for unemployment assistance (UA) if they exhaust their unemployment benefits. UA benefits replace on average 92% of previous UI benefits. However, because UA benefits are means-tested, they also depend on other family members income F and dependent allowances C. Hence, UA benefits are calculated according to

$$b^{UA} = 0.92 \cdot b^{UI} - F + C \tag{C.2}$$

Based on the data from the 2004 Survey of Income and Living Conditions, Card, Chetty and Weber (2007*a*) show that F is approximately equal to w for the average worker in the sample. Additionally, assuming that the average worker has one partner and 2 children, dependent allowances are approximately $423 + 2 \cdot 213 = 849$ Euros. With an average wage w of approximately $1,200$ Euros, this gives approximately $b^{UA}/b^{UI} = 0.39$. Hence, the cash value of extended benefit duration eligibility is roughly

$$v_{EB} = 2.3 \cdot \left(1 - \frac{b^{UA}}{b^{UI}}\right) \rho w = 0.772 \cdot w \tag{C.3}$$

While b^{UA}/b^{UI} could potentially be different for first and repeated unemployed (because they have on average different other family members income F and child allowances C), Appendix Figure C.7 shows the insurance value for first and repeated unemployed using our baseline estimates for different values of v_{EB} (i.e., for the range of v_{EB} that is consistent with $b^{UA}/b^{UI} \in [0, 0.92]$).

Insurance Value of UI. As illustrated in equation (8), the sensitivity to cash-on-hand is informative of the insurance value of UI. However, the sensitivity to cash-on-hand also depends on the path of consumption during the unemployment spell $u'(c_0^u)/E[u'(c_t^u)]$ as well as the parameters of the utility function (u and δ). Card, Chetty and Weber (2007*a*) show that the change in marginal utility over the unemployment spell assuming constant relative risk aversion (CRRA) utility is approximately

$$\frac{u'(c_0^u)}{E[u'(c_t^u)]} = \frac{u'(\rho^{UI} \cdot w + F)}{u'(\rho^{UA} \cdot w + F)} = \left(\frac{1.55}{1.21}\right)^{-\gamma} \tag{C.4}$$

because the replacement rates $\rho^j = b^j/w$ are $\rho^{UI} = 0.55$ and $\rho^{UA} = 0.21$ in Austria. Furthermore, the average share of earnings in total family income is approximately 0.5 in survey data for Austria and, therefore, $F \approx w$ (Card, Chetty and Weber, 2007*a*). Suppose for simplicity that individuals in a first and a repeated spell have the same coefficient of relative risk aversion γ and the same time discount rate δ, then the ratio of the sensitivity to cash-on-hand for first and repeated spells is equal to

$$\frac{\phi^R}{\phi^F} = \frac{0.29}{0.06} = 4.8 \tag{C.5}$$

and the sensitivity to cash-on-hand is 4.8 times larger for repeatedly unemployed.[4] Appendix Table C.5 confirms that the sensitivity to cash-on-hand for repeatedly unemployed is always at least twice as large, even if first and repeated spells have different coefficients of relative risk aversion (Panel A.) or different time discount rates (Panel B.).

In order to directly infer the insurance value of UI, we note that the sensitivity to cash-on-hand ϕ can be written as

$$\begin{aligned}\phi &= \frac{u'(c_0^u) - v'(c_0^e)}{v'(c_0^e)} \cdot \frac{v'(c_0^e)}{u'(c_0^u)} \cdot \frac{u'(c_0^u)}{E[u'(c_t^u)]} \cdot (1+\delta)^t, \\ &= \left(1 - \frac{v'(c_0^e)}{u'(c_0^u)}\right) \cdot \frac{u'(c_0^u)}{E[u'(c_t^u)]} \cdot (1+\delta)^t.\end{aligned}$$

Hence, the insurance value can be directly inferred using the estimated sensitivity to

[4]This assumption seems to be plausible given that the differential sensitivity to cash-on-hand is not worker-type driven but rather the sensitivity to cash-on-hand changes across unemployment spells within individuals. Hence, if the parameters of the utility function are individual-specific but time-invariant, this assumption is satisfied.

cash-on-hand $\hat{\phi}$ and the assumptions for γ and δ from above using

$$\frac{u'(c_0^u)}{v'(c_0^e)} = \left(1 - \frac{\hat{\phi}}{\frac{u'(c_0^u)}{E[u'(c_t^u)]} \cdot (1+\delta)^t}\right)^{-1}. \tag{C.6}$$

Our estimated sensitivity to cash-on-hand $\hat{\phi}$ together with $\gamma = 2$ and $\delta = 0.05$ imply an insurance value of 1.11 for individuals in their first spell, while individuals in a repeated spell have a much higher consumption smoothing benefit of UI, with an insurance value of 1.76. Figure C.6 plots the insurance value for different values of γ and ρ and confirms that the insurance value is always substantially larger for repeatedly unemployed, irrespective of the time discount rate and the coefficient of relative risk aversion.

Table C.5
Sensitivity to Cash-on-Hand: Risk Aversion and Time Discounting

Ratio of Sensitivity to Cash-on-Hand: ϕ^R/ϕ^F				
A. Coefficient of Risk Aversion σ				
	Repeated			
First	1	2	3	4
1	4.8	6.2	7.9	10.2
2	3.8	4.8	6.2	7.9
3	2.9	3.8	4.8	6.2
4	2.3	2.9	3.8	4.8
B. Time Discount Rate δ (in Percent)				
	Repeated			
First	5	10	15	20
5	4.8	4.4	4.0	3.7
10	5.3	4.8	4.4	4.1
15	5.8	5.3	4.8	4.4
20	6.3	5.8	5.3	4.8

Notes: This table reports the ratio of the sensitivity to cash-on-hand for first and repeated spells ϕ^R/ϕ^F for different coefficients of relative risk aversion γ (Panel A.) and different time discount rates δ (Panel B.) based on our baseline estimates from Panel A. of Table 1. Our baseline assumption in the main text is $\gamma^R = \gamma^F = 2$ and $\delta^R = \delta^F = 0.05$ and the sensitivity to cash-on-hand is approximately 4 times larger for individuals in a repeated spell.

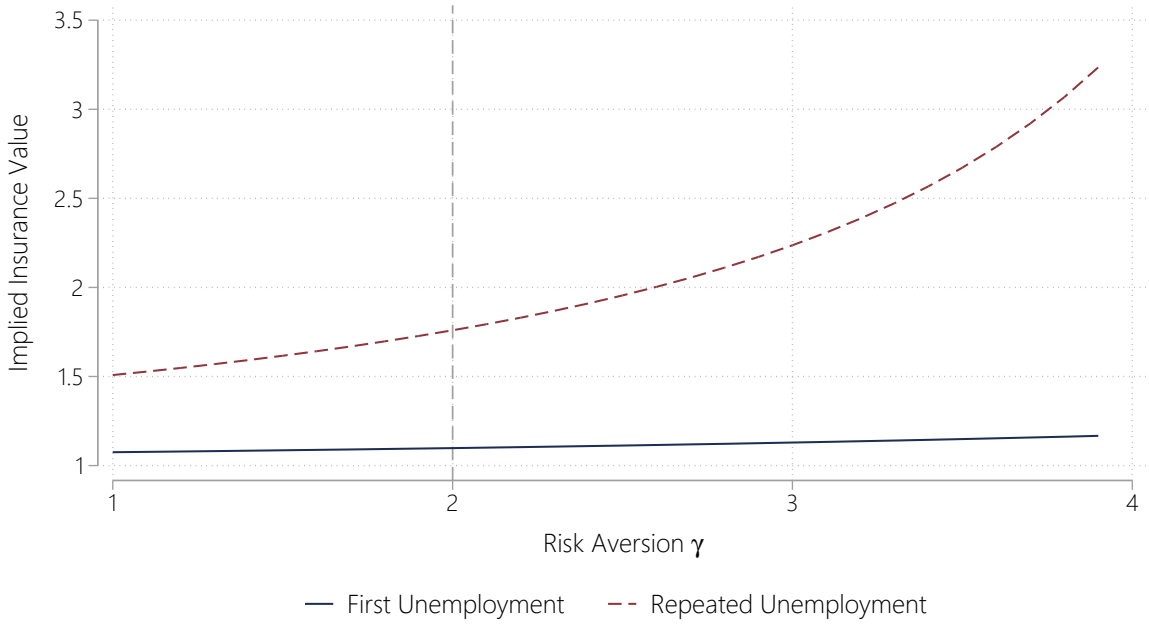
Table C.6
Sensitivity to Cash-on-Hand ϕ: Standard Errors and p-Values

	Sensitivity to Cash-on-Hand ϕ		
	All	First	Repeated
	(1)	(2)	(3)
Panel A. Baseline Results			
Estimate	0.175	0.064	0.292
Standard Error	0.056	0.037	0.131
p-Value (Diff.)	.	.	0.095
Panel B. Inverse Probability Weights			
Estimate	0.209	0.057	0.323
Standard Error	0.079	0.039	0.173
p-Value (Diff.)	.	.	0.134
Panel C. Basic Controls			
Estimate	0.200	0.081	0.230
Standard Error	0.072	0.044	0.101
p-Value (Diff.)	.	.	0.177

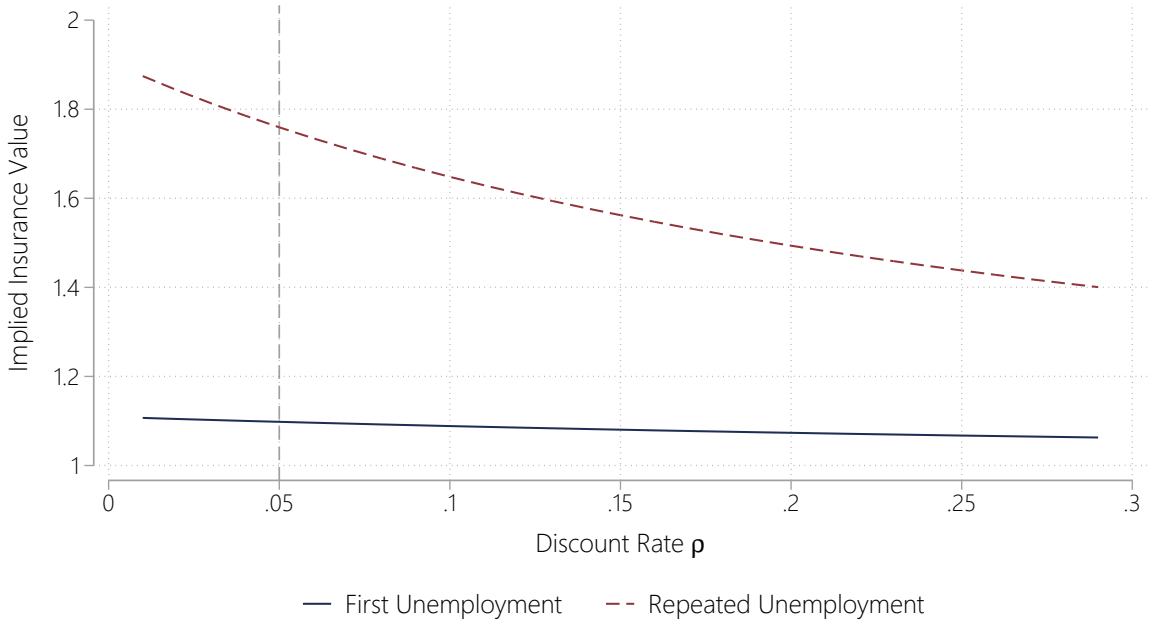
Notes: This table reports the implied sensitivity to cash-on-hand ϕ from Table 3 based on the empirical responses to severance pay and extended benefit duration in Panel A. of Table 1 including standard errors and the p-value testing whether first and repeated spells have the same sensitivity to cash-on-hand. The top Panel shows the sensitivity for all unemployment entries (cf. Table 3), while the middle and bottom Panel shows the sensitivity for young and old workers. The sensitivity to cash-on-hand is calculated as $\phi = (\partial s/\partial A)/((1/p^\star) * (\partial s/\partial b))$, where $\partial s/\partial b = \beta_{EB}/v_{EB}$ and the liquidity effect is $\partial s/\partial A = \beta_{SP}/v_{SP}$. β_{SP} and β_{EB} are the RD coefficients for severance pay and extended benefit duration eligibility based on equation (7), respectively. v_{SP} and v_{EB} is the cash value of severance pay and benefit duration eligibility (see Appendix C for details). Standard errors are calculated using the Delta method.

Figure C.6
Insurance Value of UI: Risk Aversion and Time Discounting

(a) Coefficient of Relative Risk Aversion γ

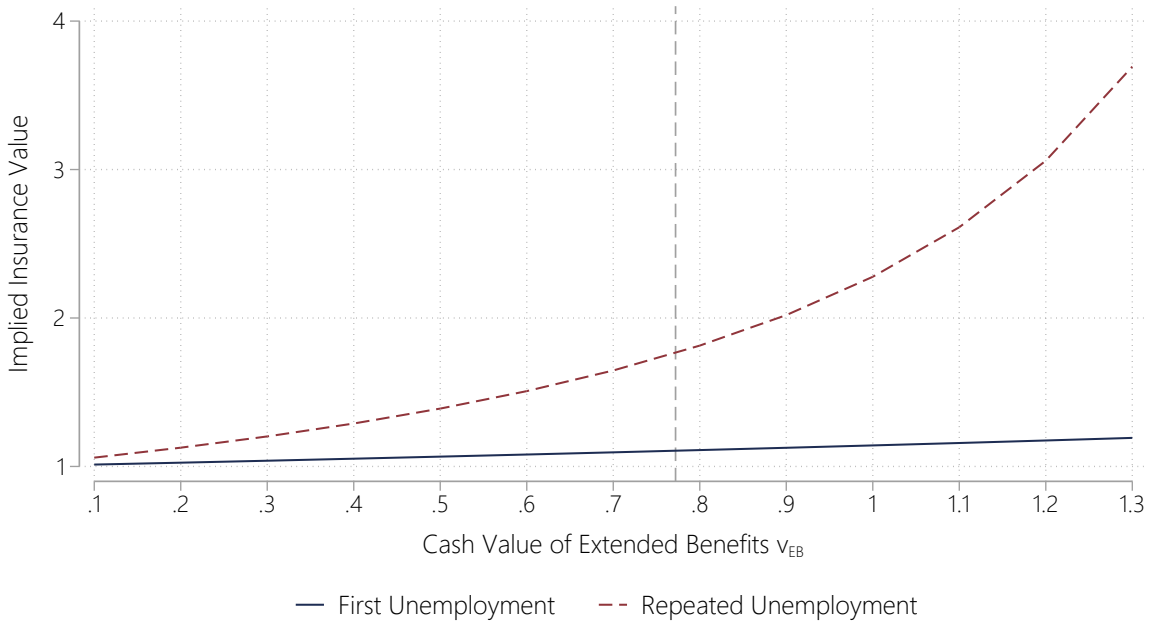


(b) Discount Rate ρ



Notes: This figure plots the implied insurance value based on our baseline estimates from Table 3 for different values of γ and δ, for first and repeated unemployed. In Panel (a) we plot the insurance value $u'(c_0^u)/v'(c_0^e)$ for $\rho = 0.05$ as a function of the coefficient of relative risk aversion γ, while in Panel (b) we plot the insurance values for $\gamma = 2$ for different values of the discount rate ρ. The baseline values are $\rho = 0.05$ and $\gamma = 2$. For details how the insurance value is calculated, see equation (C.6).

Figure C.7
Insurance Value of UI: Cash Value of Extended Benefits v_{EB}



Notes: This figure plots the implied insurance value based on our baseline estimates from Table 3 for different values of v_{EB}, for first and repeated unemployed. More specifically, we plot the insurance value $u'(c_0^u)/v'(c_0^e)$ for $\rho = 0.05$ and $\gamma = 2$ for different values of the cash value of extended benefit duration eligibility v_{EB} that are consistent with $b^{UA}/b^{UI} \in [0, 0.92]$ (larger values of v_{EB} correspond to smaller values of b^{UA}/b^{UI}). The baseline value is $v_{EB} = 0.77$, assuming $b^{UA}/b^{UI} = 0.39$. For details how the insurance value is calculated, see equation (C.6).

D Incentive Costs and the Sensitivity to UI Generosity

D.1 Behavioral Responses to Changes in Benefit Levels

Table D.1
Sample Restrictions 1985 Reform, 1989 Reform, and RKD

	Sample Restrictions		
	1985 Reform	1989 Reform	RKD
Age	20-50	20-39	20-50
Start Dates	1982-1988	1986-June 1990	1989-1998
Monthly Income (Euros)	500-3000	250-1750	[Kink-1000,Kink+400]

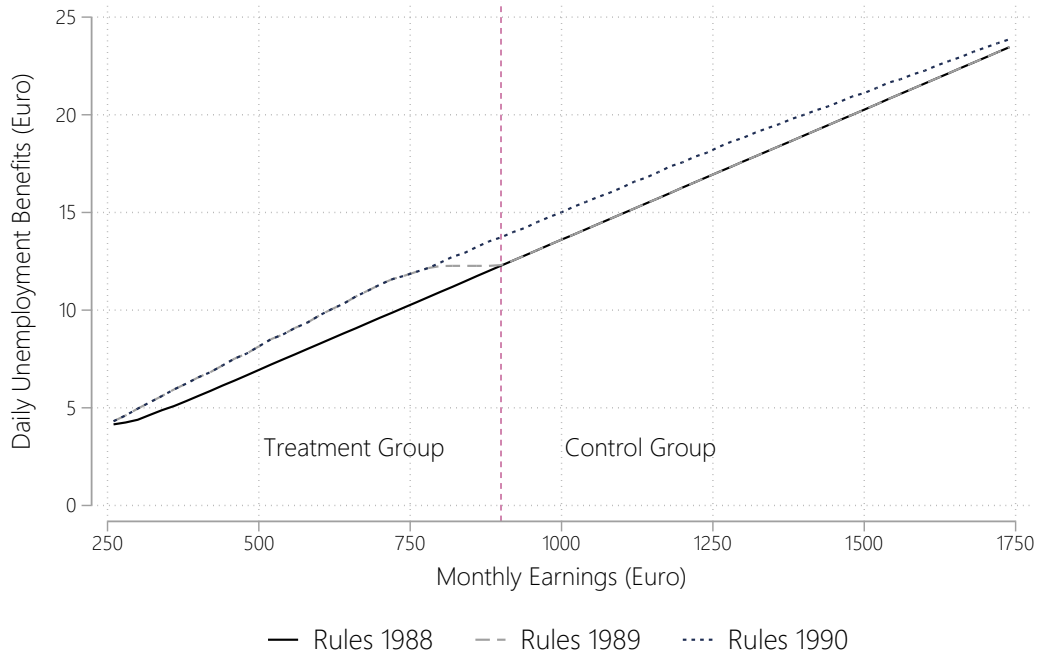
Notes: This table reports the sample restrictions for age, start date and income for the samples used to evaluate the 1985 Reform, 1989 Reform and the kink in the benefit schedule. For the 1989 Reform, we focus on 20-39 year olds because individuals above age 40 also experienced a change in their PBD in 1989, which we exploit in Appendix D.2.

Table D.2
Descriptive Statistics: Summary Statistics Benefit Generosity Samples

	Sample		
	1985 Reform	1989 Reform	RKD
Unemployment Insurance Duration (in Weeks)	15.9	14.5	15.1
	(13.7)	(13.3)	(13.8)
Non-Employment Duration (in Weeks)	19.0	17.8	18.0
	(17.2)	(17.0)	(17.0)
Age at Unemployment Entry	30.3	27.3	32.6
	(8.3)	(5.5)	(7.8)
Share Repeated Spells (in Percent)	63.7	67.1	71.1
	(48.1)	(47.0)	(45.3)
Share Female (in Percent)	38.7	44.8	22.0
	(48.7)	(49.7)	(41.4)
Share Austrian (in Percent)	83.4	86.5	82.3
	(37.2)	(34.1)	(38.1)
Share White-Collar Worker (in Percent)	27.8	27.1	33.8
	(44.8)	(44.5)	(47.3)
Share of Seasonal Industries (in Percent)	37.1	36.7	38.1
	(48.3)	(48.2)	(48.6)
Daily Previous Wage (in EUR)	71.9	65.9	98.0
	(24.9)	(22.6)	(25.7)
Daily Entry Wage (in EUR)	67.4	65.5	87.6
	(24.7)	(23.2)	(26.7)
Wage Change (in Percent)	-8.1	-2.6	-14.8
	(35.3)	(37.2)	(34.2)
Tenure in Previous Firm (in Months)	20.2	15.4	24.6
	(32.4)	(24.8)	(40.3)
Labor Market Experience (in Years)	8.8	6.5	10.0
	(6.7)	(4.8)	(6.7)
Number of Individuals	429,581	279,471	336,237
Number of Unemployment Entries	652,316	391,935	469,606

Notes: This table reports descriptive statistics for the three samples used to evaluated the 1985 reform, the 1989 reform and the kink in the benefit schedule.

Figure D.1
Benefit Formula in 1988, 1989 and 1990



Notes: This figure plots UI benefits by income for periods before August 1989 (Rules 1988), between August 1989 and June 1990 (Rules 1989), and after June 1990 (Rules 1990). Because UI benefit changes occurred in the control group in July 1990, we can only estimate the effects of the 1989 reform for one year following the change. This change in 1990 also prevents us from estimating dynamic effects and long-term fiscal externalities for the 1989 reform.

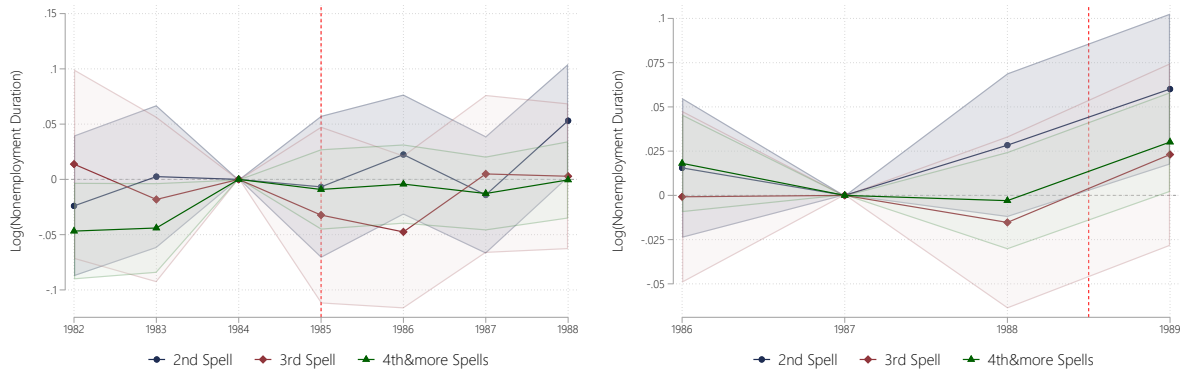
Table D.3
Fiscal Multiplier RKD

	Fiscal Revenue		
	All	First	Repeated
	(1)	(2)	(3)
Reduction Fiscal Revenue	310	634	146
	(61)	(106)	(75)
Mechanical Effect	202	194	207
	(1)	(2)	(1)
Fiscal Multiplier	1.53	3.26	0.70
Observations	469,606	135,647	333,959

Notes: This table reports the RKD estimate for the fiscal multiplier. See Section 5.1 for a detailed discussion of the kink in the benefit schedule and the corresponding sample. Fiscal revenue is calculated using payroll tax revenue, UI benefits, disability and sick leave benefits as well as old-age pension over the next 3 years using detailed information on the labor market history of the worker from the ASSD.

Figure D.2
Non-Employment Responses to Benefit Generosity: Number of Spells

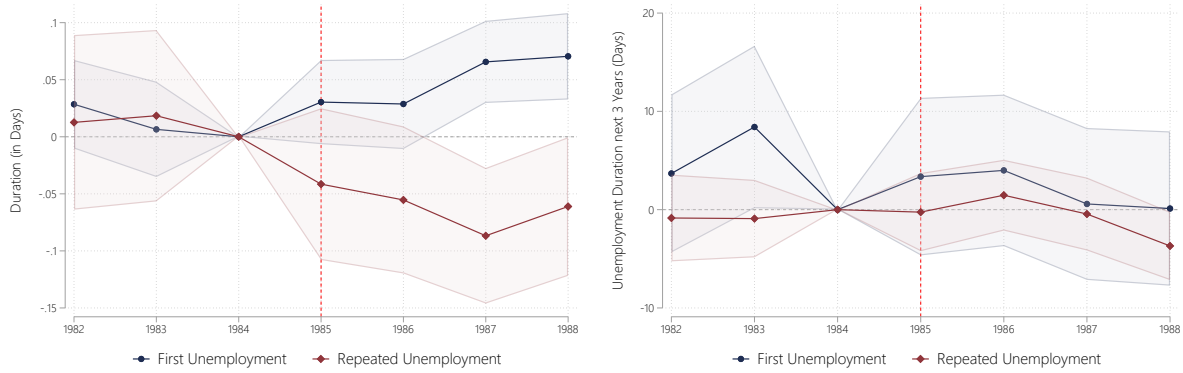
(a) Reform 1985 **(b) Reform 1989**



Notes: This figure plots the difference-in-differences (DiD) estimates for the non-employment response to benefit generosity by the number of unemployment spells. Panel (a) shows results for the benefit generosity reform in 1985, while Panel (b) shows the corresponding results for the reform in 1989. See Section 5.1 for a detailed discussion of the benefit generosity reforms and the corresponding samples.

Figure D.3
Decomposition of Dynamic Effects of Benefit Generosity: 1985 Benefit Generosity Reform

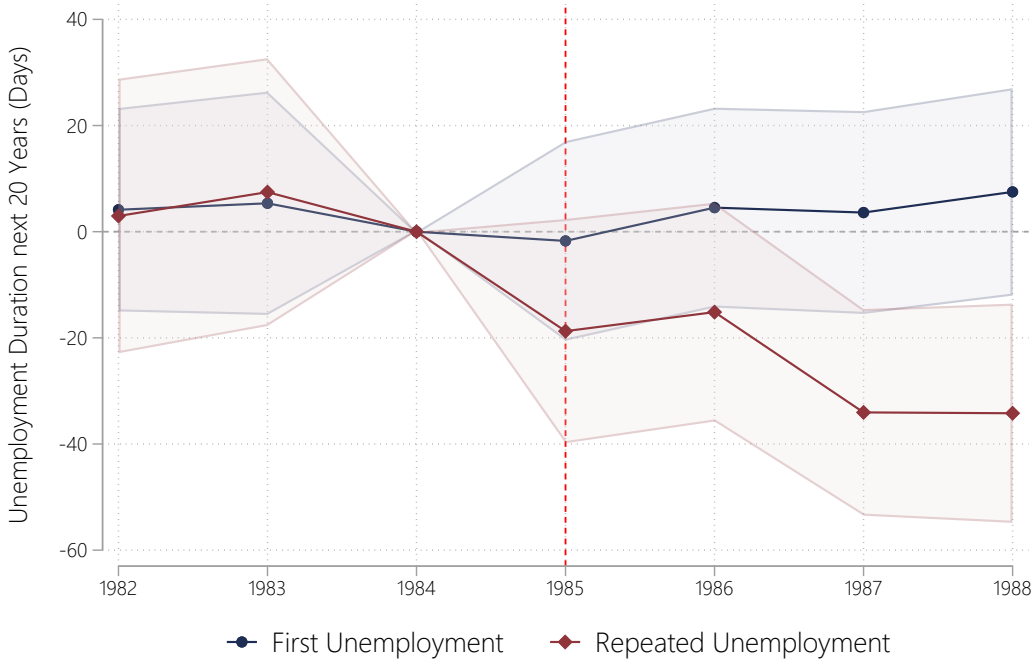
(a) Number of UI Spells next 3 Years **(b) Avg. Duration of Spells in the next 3 Years**



Notes: This figure decomposes the dynamic effects of the 1985 benefit generosity reform from Figure 4 into the total number of UI spells in the next 3 years (excluding the current spell) in Panel (a), and the average UI duration of all spells in the next 3 years (excluding current spell) in Panel (b). See Section 5.1 for a detailed discussion of the benefit generosity reform in 1985 and the corresponding sample.

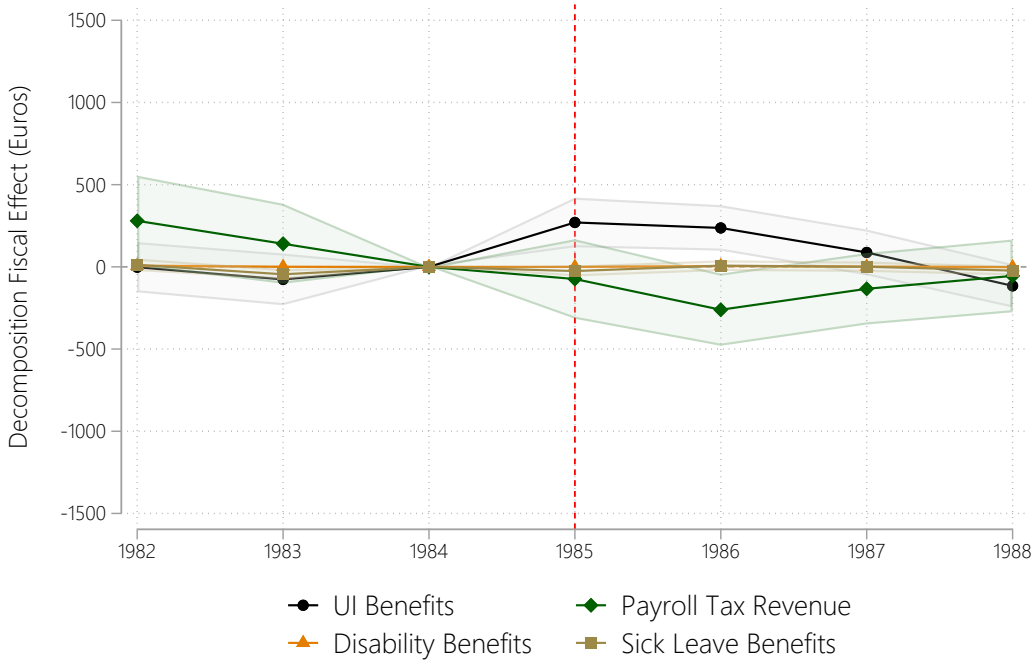
Figure D.4
Long-Run Dynamic Effects of Benefit Generosity:
1985 Benefit Generosity Reform

(a) UI Duration next 20 Years



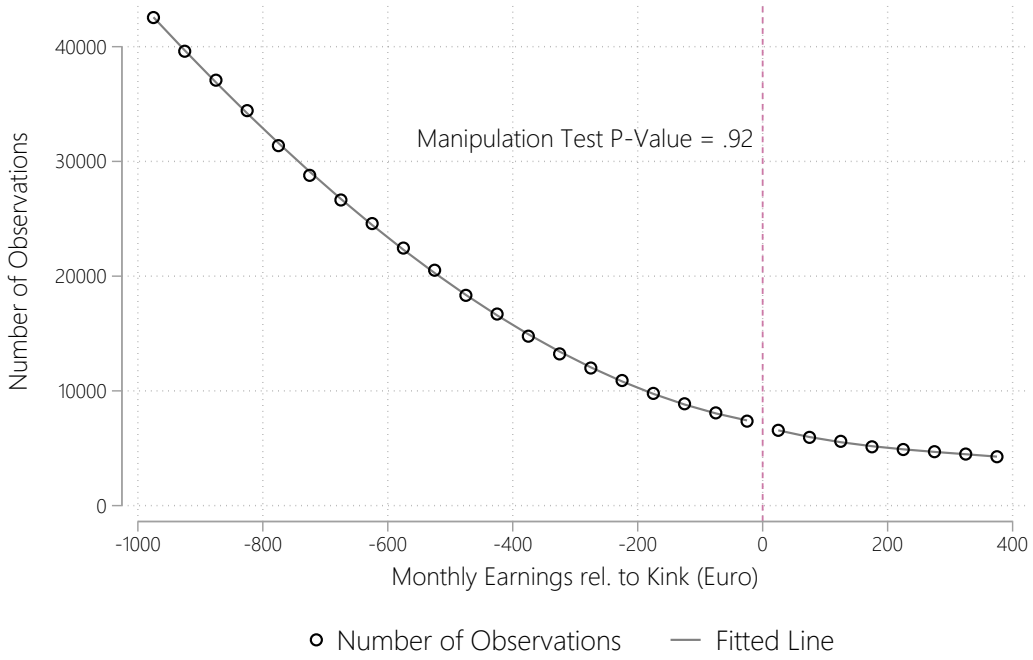
Notes: This figure plots the difference-in-differences (DiD) estimate for the long-run dynamic effects using the 1985 benefit generosity reform. More specifically, the figure reports total UI duration in the next 20 years (excluding the current spell), compared to total UI duration in the next 3 years in Figure 4.

Figure D.5
Decomposition Fiscal Effect (Repeated Spells):
1985 Benefit Generosity Reform



Notes: This figure plots the difference-in-differences (DiD) decomposition of the fiscal revenue effect for repeated unemployment spells. See Section 5.1 for a detailed discussion of the benefit generosity reform in 1985 and the corresponding sample.

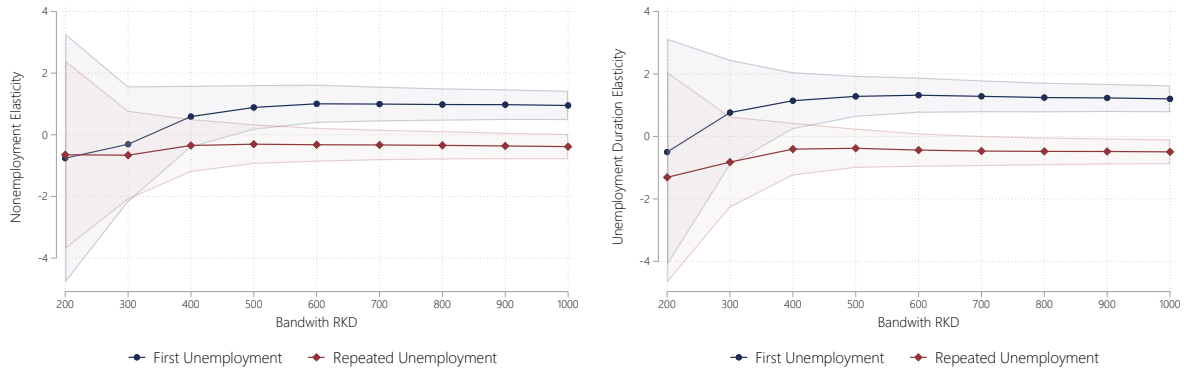
Figure D.6
Number of Observations in RKD



Notes: This figure plots the number of observations by income relative to the kink. The p-value of the manipulation test is 0.92. Therefore, there is no statistical evidence of systematic manipulation of the running variable.

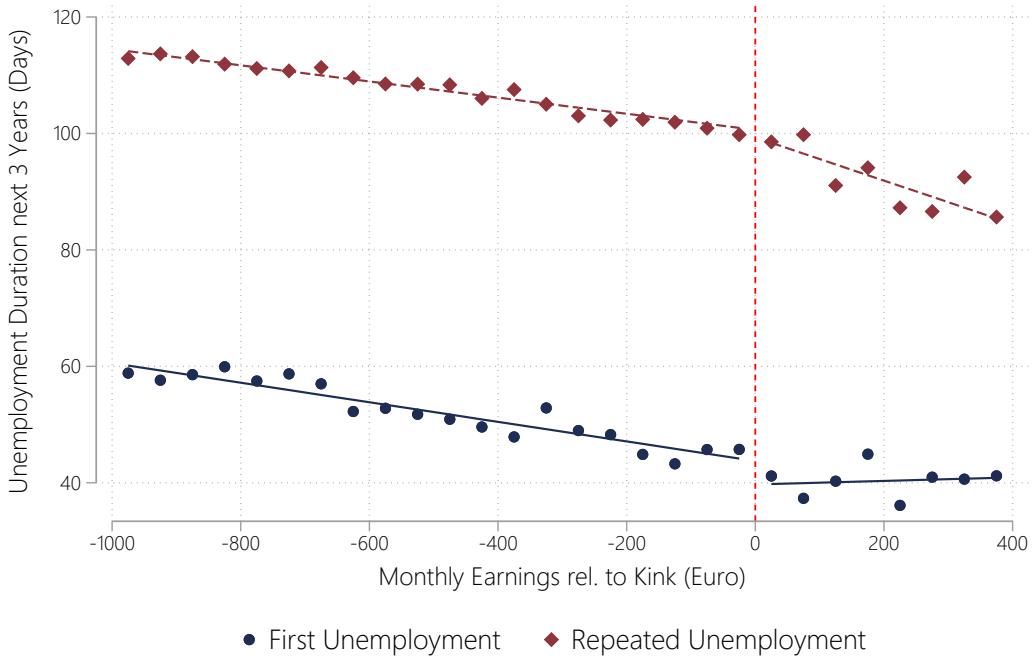
Figure D.7
Elasticity Estimates by Bandwidth
RKD

(a) Non-Employment Elasticity **(b) Unemployment Duration Elasticity**



Notes: This figure plots the non-employment elasticities (Panel, a) and unemployment duration elasticities (Panel, b) by bandwidth. For small bandwidths the elasticity estimates are noisy and vary, but they are stable for bandwidths above 400 Euros.

Figure D.8
Dynamic Effects RKD



Notes: This figure plots the unemployment duration in the next three years (excluding the current spell) by income bins. Consistent with the evidence from the 1985 reform we find that more generous UI benefits lead to more future UI days in first spells and reduced future UI days in repeated spells.

D.2 Behavioral Responses to Changes in Potential Benefit Duration

For PBD extensions, we add to our analysis from Section 4 another reform in 1989 that introduced a sharp cutoff in the PBD by age: for workers older than 40 years the reform increased the PBD from 30 to 39 weeks. We estimate the behavioral responses to changes in the PBD using a regression-discontinuity design. We find that, consistent with our benefit level results in Section 4, individuals in their first unemployment react more to extended benefit duration, relative to individuals in a repeated spell.

The 1989 Potential Benefit Duration Reform. In July 1989, the Austrian government decreed in the unemployment insurance rules ("*Arbeitslosenversicherungsgesetz, BGBl. Nr. 364/1989*") that potential benefit duration became dependent on age at the beginning of the unemployment spell – in addition to the contribution requirement (see also Lalive, Van Ours and Zweimüller (2006)). More specifically, while previously all workers with more than 312 weeks of contributions in the last 10 years have been eligible for 30 weeks of unemployment benefits (see Section 3.2 for details), potential benefit duration was increased to 39 weeks for workers in the age group 40–49 after the 1989 reform.[5]

Empirical Strategy and Sample Selection. As a consequence of the 1989 reform, there is a sharp discontinuity in potential benefit duration at age 40 for all unemployment spells beginning after August 1, 1989. We use a sharp regression discontinuity (RD) design to estimate the impact of extended benefit duration on unemployment and non-employment duration. More specifically, the policy reform in August 1989 increased potential benefit duration from 30 to 39 weeks for workers older than 40 with at least 6 years of work experience in the last 10 years. Hence, focusing on the group of workers fulfilling the minimum contribution requirement, age is the only determinant of extended benefit eligibility, and we can use the sharp discontinuity at age 40 that entitled workers to 9 more weeks of unemployment benefits in a RD design. Empirically, we use the regression model

$$Y_{it} = \gamma \cdot EB_{it} + f^l(A_{it}) + f^r(A_{it}) \cdot EB_{it} + \varepsilon_{it} \tag{D.1}$$

where Y_{it} is the outcome for individual i at time t, $EB_{it} = \mathbb{I}(A_{it} \geq 40)$ is an indicator for extended benefit duration, and A_{it} is age measured at the beginning of the unemployment spell. The functions $f^l(\cdot)$ and $f^r(\cdot)$ are unknown but assumed to be smooth in

[5]Potential benefit duration increased to 52 weeks for workers above age 50 with at least 468 weeks of employment within the last 15 years. We focus on individuals between age 31 – 49 and do not analyze the cutoff at age 50, because in June 1988 a regional extended benefit program was introduced for workers aged 50 or older working in regions with a dominant steel industry (Inderbitzin, Staubli and Zweimüller, 2016).

age. The coefficient of interest in equation (D.1) is γ, an estimate of the treatment effect of extended benefit duration. In order to empirically estimate equation (D.1), we use all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 years and age 31–49 at unemployment entry. We confirm that observable characteristics are smooth at the discontinuity, there is no evidence for sorting around the threshold, and that there is no discontinuity in the outcome of interests in the pre-policy period, where potential benefit duration did not change discontinuously at age 40.

The Effect of Extended Potential Benefit Duration. Table D.4 reports the baseline elasticity estimates for the effect of extended benefit duration using the RD design from equation (D.1). In Panel A. of Table D.4, we show results for unemployment duration. The extension of potential benefit duration by 9 weeks increases unemployment duration by 5.4% (see Appendix Table D.5), implying an elasticity of unemployment duration with respect to potential benefit duration of 0.181 for all unemployment spells in Column (1). However, there is again a striking difference in behavioral responses for individuals in their first and repeated spell. Column (2) confirms that individuals in a first spell react more strongly to extended benefit duration, with an estimated elasticity of 0.276. In contrast, individuals in a repeated spell react much less, with an elasticity that is about half as large (0.151) and statistically significantly different from the elasticity of individuals in a first spell at the 10% level. While we do not find statistically significant effects for non-employment duration in Panel B., the elasticity is again much smaller for individuals in a repeated spell relative to individuals in a first spell. Finally, Panel C. of Table D.4 reports results for the job-finding probability within 30 weeks. We find that in our full baseline sample, an increase in potential benefit duration by 1% decreases the job-finding probability in the first 30 weeks by approximately 0.08%. However, consistent with our results in Section 4, extended benefit duration decreases the job-finding probability for individuals in their first unemployment spell much more (with an estimated elasticity of −0.120) than for individuals in a repeated spell (−0.075). However, these elasticity estimates are not statistically significantly different from each other at conventional significance levels.

Fiscal Externality. We also directly estimate the fiscal impact of the PBD extension with the RDD. Appendix Table D.11 presents the results of this exercise. We calculate the mechanical cost effect of the PBD extension for individuals below age 40, who are not treated by the reform. We find that a PBD extension generates a fiscal multiplier of 1.3 on average. In first spells the fiscal multiplier is slightly higher with 1.39 and in repeated spells it is slightly lower with 1.29. The fiscal cost differences of extending the PBD between first and repeated spells is much smaller then the cost differences of

Table D.4
The Effect of Extended Benefit Duration: 1989 PBD Reform

	Unemployment Entry		
	All	First	Repeated
	(1)	(2)	(3)
Panel A. Unemployment Duration			
Elasticity	0.181	0.276	0.151
	(0.029)	(0.068)	(0.032)
p-Value			0.10
Observations	1,173,472	192,938	980,534
Panel B. Non-Employment Duration			
Elasticity	0.037	0.089	0.011
	(0.024)	(0.072)	(0.028)
p-Value			0.31
Observations	982,826	147,453	835,373
Panel C. Job-Finding Probability in 30 Weeks			
Elasticity	-0.082	-0.120	-0.075
	(0.017)	(0.051)	(0.019)
p-Value			0.41
Observations	1,173,472	192,938	980,534

Notes: This table reports the baseline elasticity estimates for the effect of extended benefit duration using the RD design from equation (D.1). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

providing more generous benefits.

Robustness and Validity of RD Design. We confirm the robustness of our results and the validity of the RD design: Figures D.9 – D.11 show the corresponding RD plots for the pre- and post-reform. Furthermore, Tables D.6 – D.8 shows that the results are robust to alternative bandwidth selections and insensitive to the choice of the

functional form, while there is no discontinuity in the outcome of interests in the pre-policy period, where potential benefit duration did not change discontinuously at age 40.[6] Figure D.12 confirms that there is no evidence for sorting around the threshold. In Table D.9, we show that observable characteristics are smooth at the discontinuity, and Table D.10 confirms that controlling for observable characteristics does not change the results.

[6] In Column (1) of Table D.6, we find a negative and significant effect in the pre-period. However, this effect is not robust to alternative bandwidth and functional form choices.

Table D.5
The Effect of Extended Benefit Duration: RD Estimates

	(1)	(2)	(3)
	All	First	Repeated
Panel A. Log Unemployment Duration			
RD Estimate	0.054	0.083	0.045
	(0.009)***	(0.020)***	(0.010)***
Observations	1,173,472	192,938	980,534
Bandwidth Below	2.1	2.6	2.0
Bandwidth Above	2.1	2.6	2.0
Panel B. Log Non-Employment Duration			
RD Estimate	0.011	0.027	0.003
	(0.007)	(0.022)	(0.009)
Observations	982,826	147,453	835,373
Bandwidth Below	3.4	2.9	2.8
Bandwidth Above	3.4	2.9	2.8
Panel C. Job-Finding Probability in 30 Weeks			
RD Estimate	-0.017	-0.020	-0.016
	(0.003)***	(0.008)**	(0.004)***
Observations	1,173,472	192,938	980,534
Bandwidth Below	2.6	3.3	2.4
Bandwidth Above	2.6	3.3	2.4
Kernel Type	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	mserd
Polynomial	1	1	1

Notes: This table reports the RD estimates for the effect of extended benefit duration using the RD design from equation (D.1) for the elasticity estimates in Table D.4. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

Table D.6
The Effect of Extended Benefit Duration: Robustness - Unemployment Duration

	Pre-Reform			Post-Reform		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. All Unemployment Spells						
RD Estimate	-0.021	-0.004	-0.012	0.054	0.055	0.061
	(0.014)	(0.029)	(0.010)	(0.009)***	(0.015)***	(0.006)***
Observations	310,808	310,808	310,808	1,173,472	1,173,472	1,173,472
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.7	3.8	5.0	2.1	3.9	5.0
Bandwidth Above	2.7	3.8	5.0	2.1	3.9	5.0
Polynomial	1	4	1	1	4	1
Panel B. First Unemployment Spells						
RD Estimate	0.004	-0.023	-0.008	0.083	0.111	0.075
	(0.022)	(0.043)	(0.017)	(0.020)***	(0.039)***	(0.015)***
Observations	112,157	112,157	112,157	192,938	192,938	192,938
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	3.1	4.6	5.0	2.6	4.1	5.0
Bandwidth Above	3.1	4.6	5.0	2.6	4.1	5.0
Polynomial	1	4	1	1	4	1
Panel C. Repeated Unemployment Spells						
RD Estimate	-0.041	-0.002	-0.017	0.045	0.039	0.056
	(0.020)**	(0.037)	(0.013)	(0.010)***	(0.016)**	(0.006)***
Observations	198,651	198,651	198,651	980,534	980,534	980,534
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.2	3.6	5.0	2.0	4.2	5.0
Bandwidth Above	2.2	3.6	5.0	2.0	4.2	5.0
Polynomial	1	4	1	1	4	1

Notes: This table reports RD estimates for the effect of extended benefit duration on unemployment duration using the RD design from equation (D.1) for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Columns report results for different polynomials and bandwidth selection approaches (manual and optimal bandwidth based on Calonico, Cattaneo and Farrell (2020)).

Table D.7
THE EFFECT OF EXTENDED BENEFIT DURATION: ROBUSTNESS - NON-EMPLOYMENT DURATION

	Pre-Reform			Post-Reform		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. All Unemployment Spells						
RD Estimate	-0.020	-0.006	-0.010	0.011	0.010	0.014
	(0.014)	(0.029)	(0.011)	(0.007)	(0.017)	(0.006)**
Observations	255,719	255,719	255,719	982,826	982,826	982,826
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.7	3.8	5.0	3.4	3.7	5.0
Bandwidth Above	2.7	3.8	5.0	3.4	3.7	5.0
Polynomial	1	4	1	1	4	1
Panel B. First Unemployment Spells						
RD Estimate	0.015	0.013	0.003	0.027	0.021	0.024
	(0.024)	(0.047)	(0.019)	(0.022)	(0.042)	(0.016)
Observations	86,847	86,847	86,847	147,453	147,453	147,453
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	3.2	4.6	5.0	2.9	4.5	5.0
Bandwidth Above	3.2	4.6	5.0	2.9	4.5	5.0
Polynomial	1	4	1	1	4	1
Panel C. Repeated Unemployment Spells						
RD Estimate	-0.050	-0.027	-0.019	0.003	0.004	0.010
	(0.020)**	(0.035)	(0.013)	(0.009)	(0.017)	(0.006)
Observations	168,872	168,872	168,872	835,373	835,373	835,373
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.1	3.8	5.0	2.8	3.8	5.0
Bandwidth Above	2.1	3.8	5.0	2.8	3.8	5.0
Polynomial	1	4	1	1	4	1

Notes: This table reports RD estimates for the effect of extended benefit duration on non-employment duration using the RD design from equation (D.1) for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Columns report results for different polynomials and bandwidth selection approaches (manual and optimal bandwidth based on Calonico, Cattaneo and Farrell (2020)).

Table D.8
The Effect of Extended Benefit Duration: Robustness - Job-Finding within 30 Weeks

	Pre-Reform			Post-Reform		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. All Unemployment Spells						
RD Estimate	-0.002	-0.010	-0.002	-0.017	-0.028	-0.015
	(0.007)	(0.013)	(0.005)	(0.003)***	(0.007)***	(0.003)***
Observations	310,808	310,808	310,808	1,173,472	1,173,472	1,173,472
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.9	4.2	5.0	2.6	3.5	5.0
Bandwidth Above	2.9	4.2	5.0	2.6	3.5	5.0
Polynomial	1	4	1	1	4	1
Panel B. First Unemployment Spells						
RD Estimate	-0.015	-0.005	-0.007	-0.020	-0.022	-0.018
	(0.012)	(0.020)	(0.008)	(0.008)**	(0.018)	(0.007)***
Observations	112,157	112,157	112,157	192,938	192,938	192,938
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.5	5.0	5.0	3.3	3.9	5.0
Bandwidth Above	2.5	5.0	5.0	3.3	3.9	5.0
Polynomial	1	4	1	1	4	1
Panel C. Repeated Unemployment Spells						
RD Estimate	0.008	-0.006	0.002	-0.016	-0.026	-0.013
	(0.008)	(0.016)	(0.006)	(0.004)***	(0.007)***	(0.003)***
Observations	198,651	198,651	198,651	980,534	980,534	980,534
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth Selection	mserd	mserd	Manual	mserd	mserd	Manual
Bandwidth Below	2.9	3.9	5.0	2.4	3.8	5.0
Bandwidth Above	2.9	3.9	5.0	2.4	3.8	5.0
Polynomial	1	4	1	1	4	1

Notes: This table reports RD estimates for the effect of extended benefit duration on the job-finding probability within 30 weeks using the RD design from equation (D.1) for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Columns report results for different polynomials and bandwidth selection approaches (manual and optimal bandwidth based on Calonico, Cattaneo and Farrell (2020)).

Table D.9
The Effect of Extended Benefit Duration: Validity - Smoothness of Covariates

	(1)	(2)	(3)	(4)
	Gender	Austrian	Log Wage	Experience
Panel A. First Unemployment Spell				
RD Estimate	0.016	0.002	0.025	-0.286
	(0.010)*	(0.009)	(0.021)	(0.307)
Observations	192,938	192,938	192,938	192,938
Panel B. Repeated Unemployment Spell				
RD Estimate	0.008	0.005	0.012	0.345
	(0.004)**	(0.004)	(0.009)	(0.133)***
Observations	980,534	980,534	980,534	980,534

Notes: This table reports RD estimates for the effect of extended benefit duration on different covariates using the RD design from equation (D.1). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

Table D.10
The Effect of Extended Benefit Duration: Including Controls

	(1)	(2)	(3)
	All	First	Repeated
Panel A. Unemployment Duration			
Elasticity	0.138	0.262	0.113
	(0.031)***	(0.066)***	(0.033)***
p-Value			0.04
Observations	1,173,472	192,938	980,534
Panel B. Non-Employment Duration			
Elasticity	0.010	0.087	-0.014
	(0.025)	(0.070)	(0.030)
p-Value			0.18
Observations	982,826	147,453	835,373
Panel C. Job-Finding Probability in 30 Weeks			
Elasticity	-0.058	-0.104	-0.051
	(0.017)***	(0.051)**	(0.018)***
p-Value			0.32
Observations	1,173,472	192,938	980,534

Notes: This table reports the baseline elasticity estimates with covariates for the effect of extended benefit duration using the RD design from equation (D.1). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. The control variables include dummies for gender, Austrian nationality, worker-type (blue/white collar), seasonal industries, labor market experience and previous log wage.

Table D.11
Fiscal Effects of PBD Extension of 1989 Reform

	(1)	(2)	(3)
	All	First	Repeated
Reduction Fiscal Revenue	298	443	274
	(63)	(190)	(65)
Mechanical Effect of Reform	230	318	212
	(1)	(2)	(1)
Fiscal Multiplier	1.30	1.39	1.29

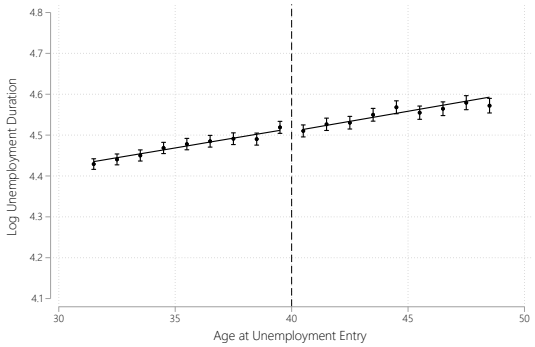
Notes: This table reports the fiscal effects for the effect of extended benefit duration using the RD design from equation (D.1). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

Figure D.9

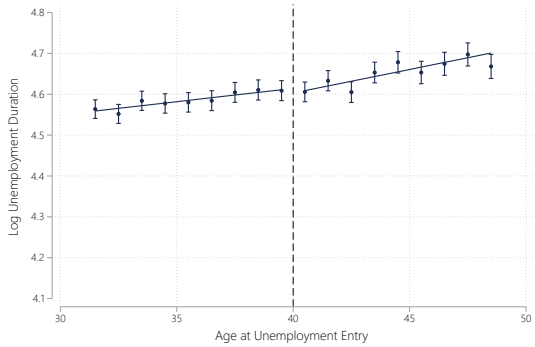
The Effect of Potential Benefit Duration: Pre- and Post-Reform - Unemployment Duration

Pre-Reform: 1980 – 1988

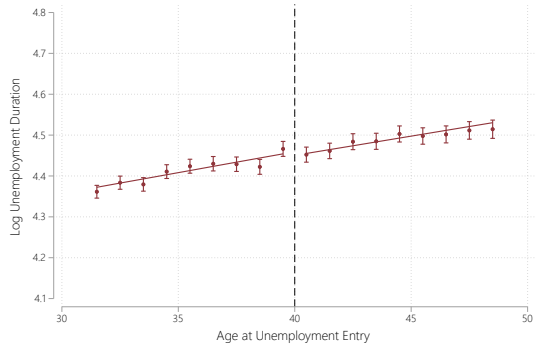
(a) Pre-Reform: All Spells



(b) Pre-Reform: First Spells

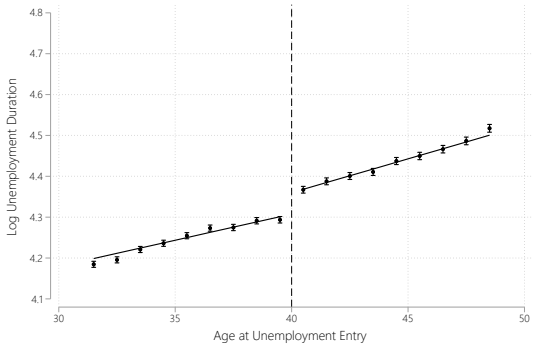


(c) Pre-Reform: Repeated Spells

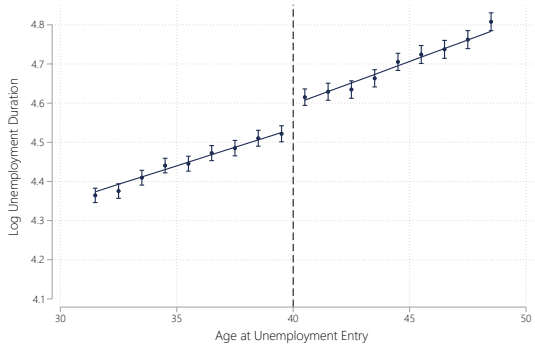


Post-Reform: 1989 – 2009

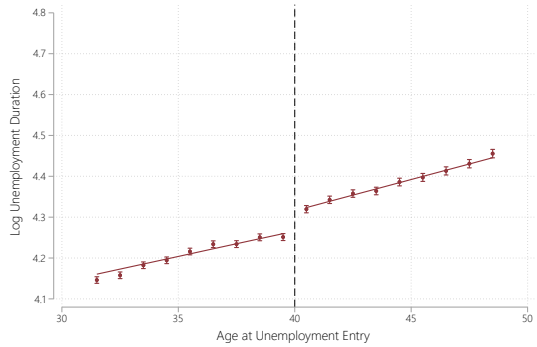
(d) Post-Reform: All Spells



(e) Post-Reform: First Spells



(f) Post-Reform: Repeated Spells



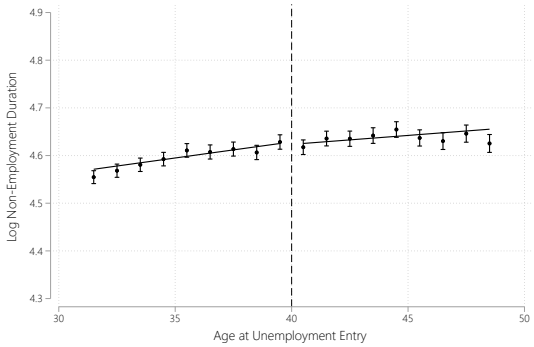
Notes: This figure shows the corresponding RD plots from Table D.6 for the effect of extended benefit duration on unemployment duration for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1980 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Panels (a)-(c) show results for the pre-reform period, while Panels (d)-(f) show results for the post-reform period.

Figure D.10

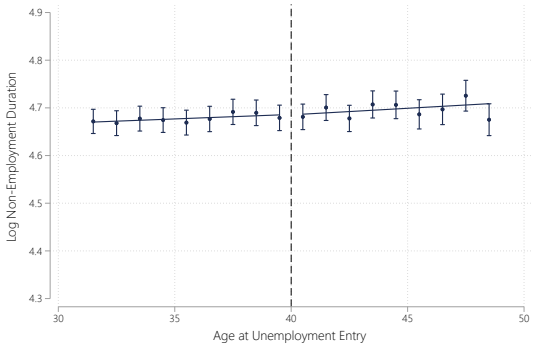
The Effect of Potential Benefit Duration: Pre- and Post-Reform - Non-Employment Duration

Pre-Reform: 1980 – 1988

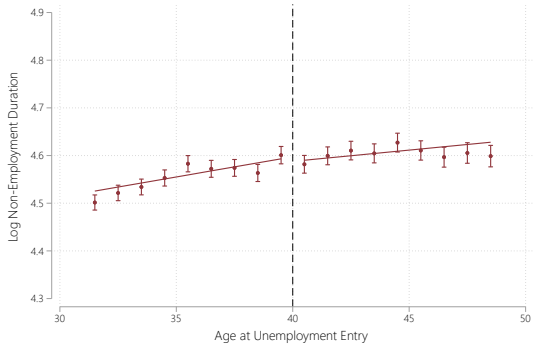
(a) Pre-Reform: All Spells



(b) Pre-Reform: First Spells

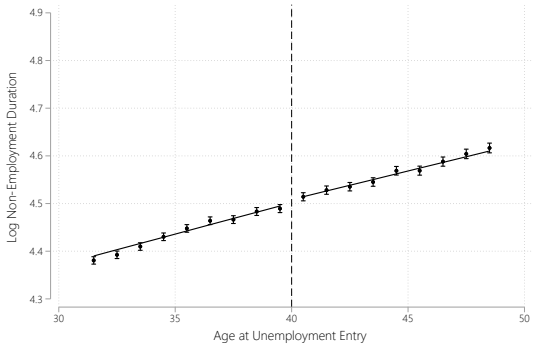


(c) Pre-Reform: Repeated Spells

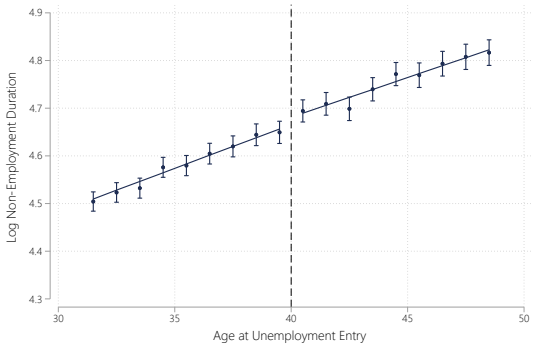


Post-Reform: 1989 – 2009

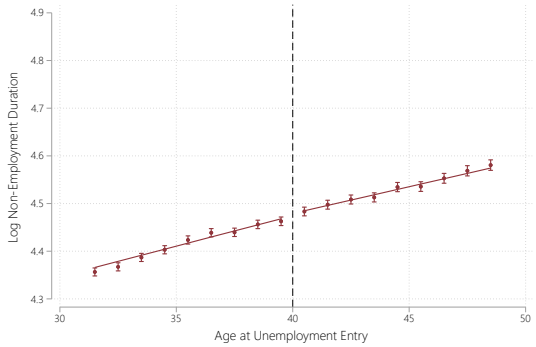
(d) Post-Reform: All Spells



(e) Post-Reform: First Spells



(f) Post-Reform: Repeated Spells



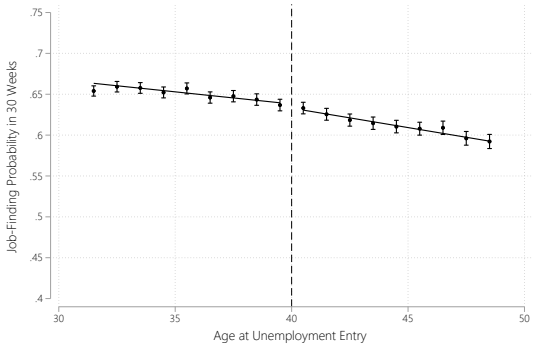
Notes: This figure shows the corresponding RD plots from Table D.7 for the effect of extended benefit duration on non-employment duration for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1980 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Panels (a)-(c) show results for the pre-reform period, while Panels (d)-(f) show results for the post-reform period.

Figure D.11

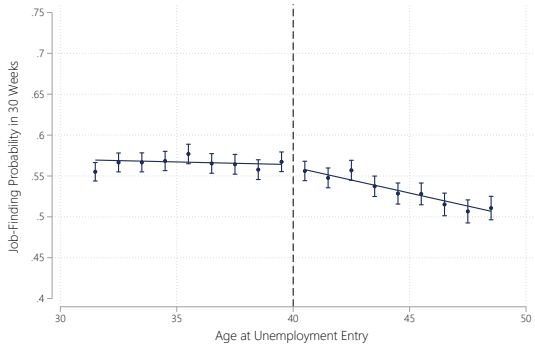
The Effect of Potential Benefit Duration: Pre- and Post-Reform - Job-Finding Probability within 30 Weeks

Pre-Reform: 1980 – 1988

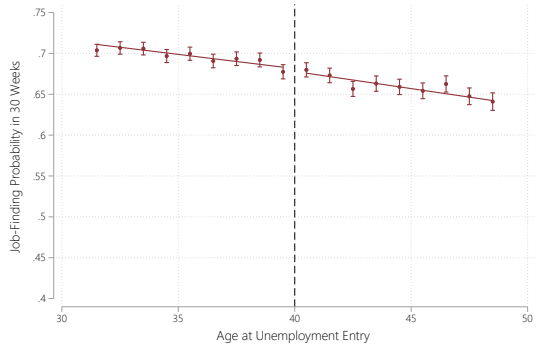
(a) Pre-Reform: All Spells



(b) Pre-Reform: First Spells

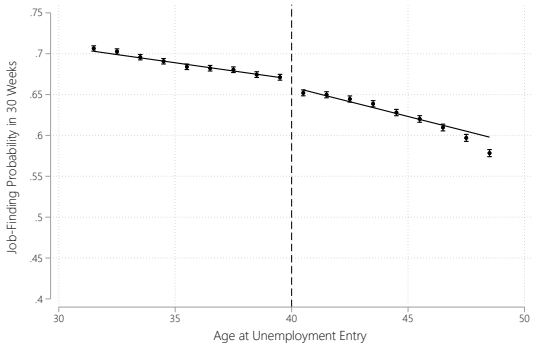


(c) Pre-Reform: Repeated Spells

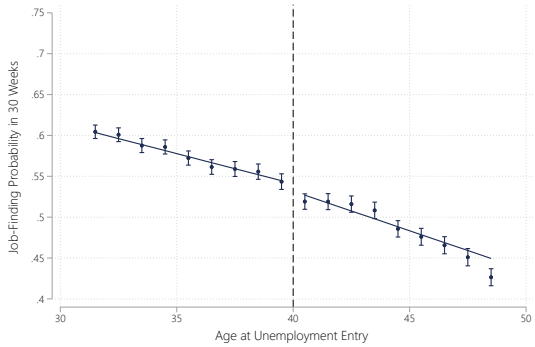


Post-Reform: 1989 – 2009

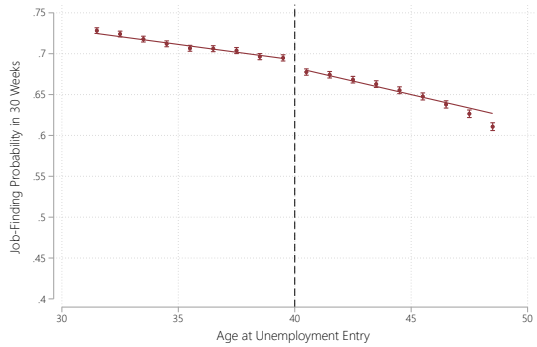
(d) Post-Reform: All Spells



(e) Post-Reform: First Spells



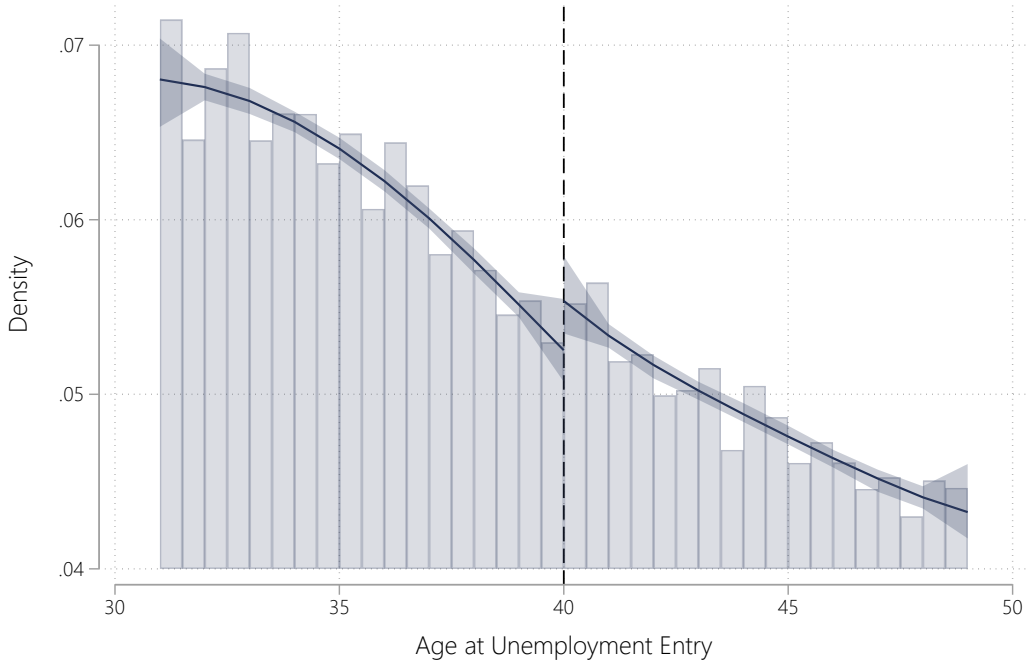
(f) Post-Reform: Repeated Spells



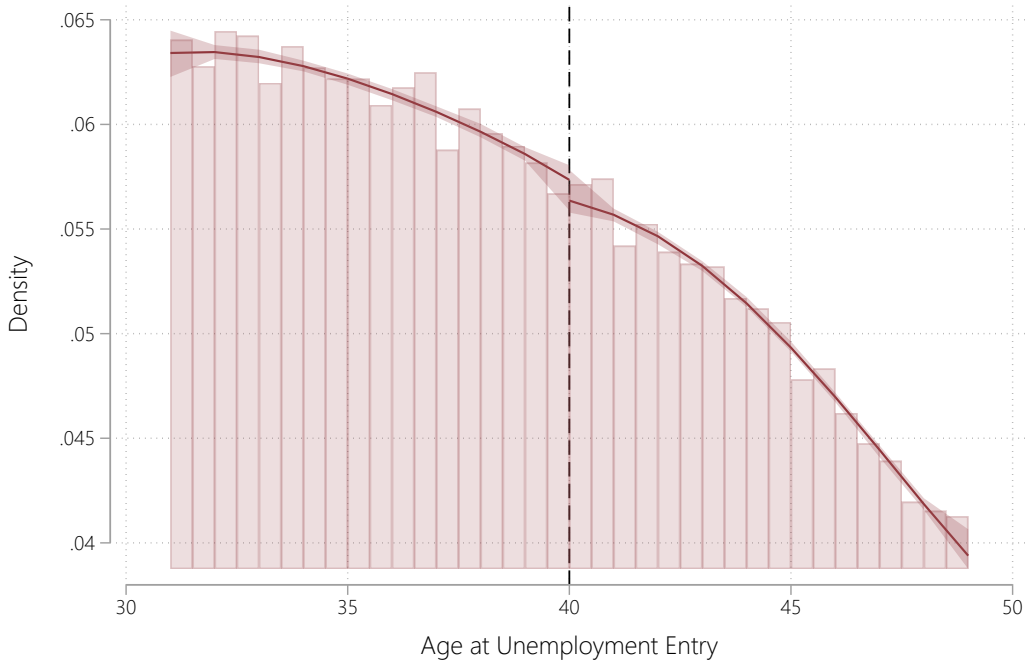
Notes: This figure shows the corresponding RD plots from Table D.8 for the effect of extended benefit duration on the job-finding probability within 30 weeks for the pre-reform period (1980 – 1989) and the post-reform period (1989 – 2009). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1980 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry. Panels (a)-(c) show results for the pre-reform period, while Panels (d)-(f) show results for the post-reform period.

Figure D.12
The Effect of Potential Benefit Duration: Manipulability

(a) First Unemployment Spell



(b) Repeated Unemployment Spell



Notes: This figure plots McCrary (2008) density estimates for the effect of extended benefit duration using the PBD reform in 1989 that increased potential benefit duration from 30 to 39 weeks for workers older than 40 with at least 6 years of work experience in the last 10 years. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1989 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

E Explanations for the Differential Search Response

E.1 Worker Heterogeneity and Composition

Table E.1
The Effect of Extended Benefit Duration: Individuals with Multiple Spells

	(1)	(2)	(3)
	All	First	Repeated
Panel A. Unemployment Duration			
Elasticity	0.164	0.300	0.151
	(0.032)***	(0.096)***	(0.032)***
p-Value			0.14
Observations	1,086,907	106,373	980,534
Panel B. Non-Employment Duration			
Elasticity	0.028	0.088	0.011
	(0.025)	(0.101)	(0.028)
p-Value			0.46
Observations	927,121	91,748	835,373
Panel C. Job-Finding Probability in 30 Weeks			
Elasticity	-0.077	-0.081	-0.075
	(0.018)***	(0.068)	(0.019)***
p-Value			0.93
Observations	1,086,907	106,373	980,534

Notes: This table replicates Table D.4 from the main text for individuals with multiple unemployment spells – i.e., individuals who eventually become repeated unemployed. More specifically, the table reports baseline elasticity estimates for the effect of extended benefit duration using the RD design from equation (D.1). The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1980 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry, excluding individuals with unique unemployment spells.

Table E.2
1989 Benefit Generosity Reform:
Worker Heterogeneity and Worker Composition

	Baseline	Multiple	Reweighted
	(1)	(2)	(3)
Panel A. (Log) Non-employment Duration			
Treat x Post	0.030	0.030	0.033
	(0.011)	(0.011)	(0.011)
Treat x Post x First	0.024	0.038	0.016
	(0.018)	(0.019)	(0.019)
p-value First vs. Repeated	0.187	0.050	0.406
Observations	293,423	272,869	293,423
Panel B. (Log) Unemployment Duration			
Treat x Post	0.068	0.068	0.068
	(0.011)	(0.011)	(0.012)
Treat x Post x First	0.045	0.052	0.053
	(0.018)	(0.020)	(0.019)
p-value First vs. Repeated	0.013	0.008	0.005
Observations	346,820	317,139	346,820

Notes: This table reports the effect of the 1989 benefit generosity reform on (log) non-employment duration (Panel A.) and (log) unemployment duration for different subsamples. Column (1) reports the baseline results for the full sample, Column (2) restricts the sample to individuals with multiple unemployment spells, Column (3) reports estimates using inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, 1-digit occupation code and 3-digit NUTS region, a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the analysis sample. The difference in observations between Panel A. and B. arises because we censor non-employment duration at two years following Card, Chetty and Weber (2007*a*) meaning that we drop observations which never find a job or have a non-employment spell that is longer than 2 years.

Table E.3
RKD Benefit Generosity:
Worker Heterogeneity and Worker Composition

	Baseline	Multiple	Reweighted
	(1)	(2)	(3)
Panel A. Non-employment Elasticity			
First Spells	1.01	0.86	1.12
	(0.32)	(0.37)	(0.40)
Repeated Spells	-0.32	-0.32	-0.07
	(0.28)	(0.28)	(0.29)
Panel B. Unemployment Elasticity			
First Spells	1.32	1.05	0.91
	(0.29)	(0.34)	(0.38)
Repeated Spells	-0.44	-0.44	-0.17
	(0.3)	(0.3)	(0.3)

Notes: This table reports RKD elasticity estimates for non-employment duration (Panel A.) and unemployment duration for different subsamples. Column (1) reports the baseline results for the full sample, Column (2) restricts the sample to individuals with multiple unemployment spells, Column (3) reports estimates using inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, 1-digit occupation code and 3-digit NUTS region, a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the analysis sample.

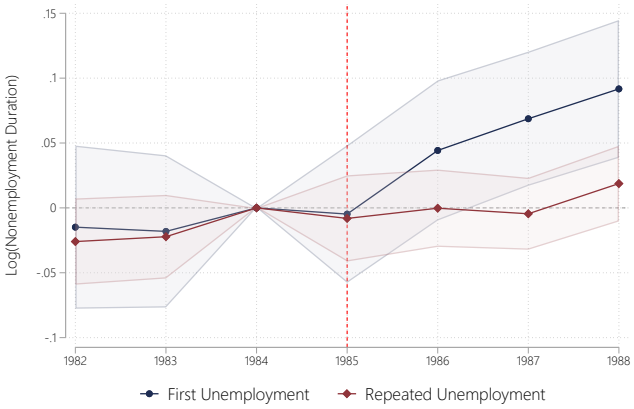
Table E.4
The Effect of Extended Benefit Duration: Inverse Probability Weights

	(1)	(2)	(3)
	All	First	Repeated
Panel A. Unemployment Duration			
Elasticity	0.218	0.265	0.165
	(0.039)***	(0.084)***	(0.032)***
p-Value			0.27
Observations	1,173,472	192,938	980,534
Panel B. Non-Employment Duration			
Elasticity	0.047	0.066	0.022
	(0.034)	(0.086)	(0.027)
p-Value			0.62
Observations	982,826	147,453	835,373
Panel C. Job-Finding Probability in 30 Weeks			
Elasticity	-0.062	-0.033	-0.076
	(0.024)**	(0.064)	(0.019)***
p-Value			0.52
Observations	1,173,472	192,938	980,534

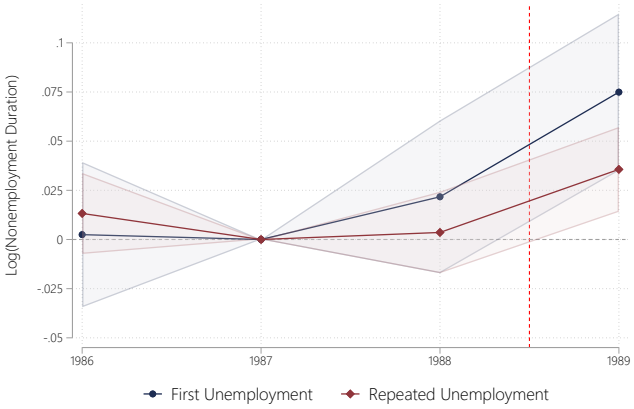
Notes: This table replicates Table D.4 from the main text using inverse probability weights. More specifically, the table reports elasticity estimates for the effect of extended benefit duration using the RD design from equation (D.1) with inverse probability weights, where we predict the probability to be repeatedly unemployed based on gender, nationality, worker type (blue/white collar worker), a dummy for seasonal industries, a quadratic polynomial of age and previous log wage in the full sample. The sample contains all unemployment spells in our baseline sample (see Section 3.3 for details) for years 1980 – 2009 with more than 312 weeks of contributions in the last 10 year and age 31–49 at unemployment entry.

Figure E.1
Non-Employment Responses to Benefit Generosity: Individuals with Multiple Spells

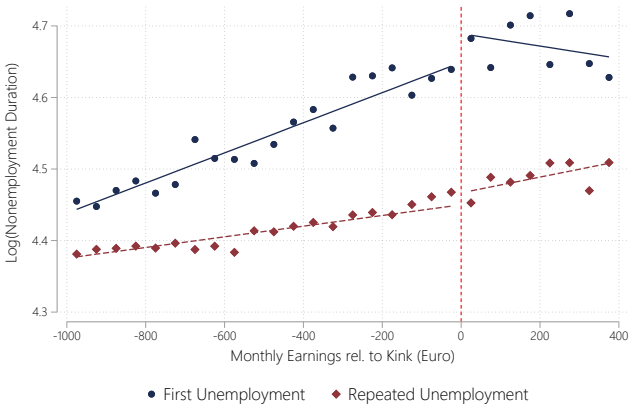
(a) Reform 1985



(b) Reform 1989



(c) RKD



Notes: This figure plots the difference-in-differences (DiD) and RKD estimates for the non-employment response to benefit generosity for individuals with multiple spells. Panel (a) shows results for the benefit generosity reform in 1985, while Panel (b) shows the corresponding results for the reform in 1989. Panel (c) illustrates the RKD graphically. See Section 5.1 for a detailed discussion of the benefit generosity reforms and the corresponding samples. The figures show that even individuals with multiple spells react more to benefit generosity in their first spell than in a repeated spell. Hence, selection of different worker types cannot explain the differential responses to benefit generosity.

E.2 Potential Role of Liquidity Constraints

Table E.5
Severance Pay as a Measure of Liquidity Constraints:
Non-Employment Response of 1985 Benefit Generosity Reform

	(Log) Non-Employment Duration				
	Baseline	All	Restricted	Young	Old
	(1)	(2)	(3)	(4)	(5)
Treat x Post	0.047	0.024	0.055	0.017	0.053
	(0.009)	(0.009)	(0.022)	(0.012)	(0.013)
Treat x Post x Severance	—	0.074	0.014	0.078	0.032
		(0.024)	(0.032)	(0.044)	(0.028)
p-value Severance Pay	—	0.002	0.672	0.076	0.254
Observations	460,026	460,026	126,474	273,342	186,684

Notes: This table reports the effect of the 1985 benefit generosity reform on non-employment duration for different subsamples. Column (1) reports the baseline results for the main sample excluding construction workers, Column (2) estimates the interaction with severance pay eligibility in the baseline sample, Column (3) restricts the sample to individuals with tenure around the severance pay eligibility cutoff of 3 years (i.e., between 1 and 5 years as in Card, Chetty and Weber (2007*a*)), Column (4) and Column (5) split the sample by age at unemployment entry (young = 20 – 30, old = 30 – 50).

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For other references, see reference list in main text.