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Abstract

We quantitatively evaluate the effects of UI on bankruptcy in an equilibrium model of labor market search and defaultable debt. First, we ask whether a standard unsecured credit model extended with labor market search and matching frictions can account for the negative correlation between UI caps and bankruptcy rates observed in the data. The model can account for this fact only if estimated with the employment rate among bankruptcy filers as a target. Not matching this employment rate underestimates the consumption smoothing benefits of UI cap increases, as the model assigns too much importance to unemployment shocks for driving default, and implies large welfare losses from increasing the cap rather than negligible gains. Second, with bankruptcy available, there are significant welfare gains from increasing the replacement rate above the calibrated value, but not in the absence of default.

Keywords: consumer bankruptcy, unsecured credit, unemployment insurance

JEL Classification Codes: J65, K35, E21, E24, J64

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Introduction

Consumer bankruptcy filers tend to be middle- to low-income individuals with mostly labor income as a source of income. Sullivan, Warren, and Westbrook (2000) report that 67.5 percent of bankruptcy filers cite lower labor income as one of the main reasons for filing for bankruptcy.[1] Lower labor income can result either from low earnings or periods of nonemployment. Using data from the Administrative Office of the US Courts from 2007, we find that the employment rate among Chapter 7 bankruptcy filers was 73.8 percent, lower than the population counterpart of around 80 percent.[2] Labor market policies such as unemployment insurance (UI) aim to reduce sharp drops in income during unemployment, affecting income and default risk. Using county-level data on the total number of Chapter 7 filings and state differences in UI generosity in terms of the total amount of UI available during a given unemployment spell (UI weekly cap times the total number of weeks), we find that overall bankruptcy rates are negatively correlated with UI generosity, though the magnitude is small.

In this paper, we quantitatively evaluate the effects of UI on bankruptcy from an equilibrium perspective, using these facts as estimation targets. Theoretically, the small correlation between UI generosity and bankruptcy rates arises because UI has countervailing effects. Higher UI benefits reduce default risk since they imply a smaller decline in income. However, higher UI reduces precautionary savings, encourages borrowing and unemployment, and requires more tax revenue, all of which tend to increase default risk.

1. The focus of this paper is labor income risk. Other sources of risk, such as unexpected health expenditures, can influence bankruptcy decisions. However, Dobkin et al. (2018) find evidence that hospital admissions are responsible for only 4 to 6 percent of bankruptcies. Also, as discussed by Athreya, Tam, and Young (2012), it seems unlikely that bankruptcy is the best way to deal with such events; perhaps it should be considered in the context of public health policy, such as Medicaid.

2. Consumer bankruptcies almost entirely fall under Chapter 7 or Chapter 13 of the US Bankruptcy Code, with Chapter 7 representing around 70 percent of all consumer bankruptcies (see Section 1.2.1).

Our goal is to answer two questions. First, we ask whether the standard unsecured credit model extended with labor market search and matching frictions can account for the negative correlation between UI caps and bankruptcy observed in the data. The model can account for this fact only when it is estimated with the employment rate of bankruptcy filers as a target to match. Not matching this employment rate underestimates the consumption smoothing benefits of UI cap increases, as it implies that almost all filers are unemployed. Second, we consider different policy counterfactuals regarding the UI replacement rate to study the effect of UI on the bankruptcy rate, interest rate, debt, and welfare.

We document empirical evidence that overall bankruptcy rates are lower in states with more generous UI caps.[3] We use county-level data on the total number of Chapter 7 filings and state differences in UI generosity from 1991-2007. Since the same economic shock can affect both state-level UI and bankruptcy decisions, we compare neighboring counties that belong to different states and exploit policy discontinuities at the state borders to identify the effect of UI on bankruptcy. Relative to the sample mean, a 10 percent increase in the total amount of UI available during a given unemployment spell reduces the Chapter 7 bankruptcy rate by 1.87 percent. At the aggregate level, this result extends and is quantitatively consistent with the results of Fisher (2005), who, based on the Panel Study of Income Dynamics (PSID), finds that a 10 percent increase in UI benefits reduces the filing rate by 2.2 percent.

We then construct a life-cycle incomplete markets model of heterogeneous agents based on Aiyagari (1994), extended to include unsecured consumer credit, a frictional labor market, bankruptcy modeled as Chapter 7, and a detailed UI formula. Labor frictions are modeled using a Diamond-Mortensen-Pissarides (DMP) search and matching framework. Combining

3. We follow Hsu, Matsa, and Melzer (2018) and define UI generosity as the maximum amount of UI available during a given unemployment spell, i.e., the UI weekly cap times the total number of weeks (with most of the differences coming from the UI caps).

an unsecured credit model with a frictional labor market model allows us to study the joint decisions of borrowing, default, and labor supply while considering the general equilibrium effects of policy changes on these markets.[4] The life-cycle framework matters, as explained by Livshits, MacGee, and Tertilt (2007), to capture how agents smooth consumption across time through credit markets. The explicit focus on UI is important because it partially ensures the relatively transitory shock of unemployment. The details of UI imply that the amount of benefits received by unemployed workers depends on their earnings and is limited in amount and duration. These considerations are essential, since they determine the extent to which different workers are partially insured against labor risk; this imperfect insurance then translates to different credit and labor market decisions and determines the welfare effects of policies.

The model frequency is set to a quarter to balance the life-cycle properties of borrowing and default with the high frequency of unemployment episodes and duration of UI benefits.[5] Since earnings are endogenous in the model, the labor productivity stochastic process is such that when simulating a sample of workers over their life cycle, the estimated earnings process in the simulated data matches the same estimated process obtained using the PSID. Thus, the model is estimated via a simulated method of moments to match key statistics of unsecured credit and labor markets, including sub-population statistics for employed and bankruptcy filers and household earning profiles over the life cycle.

We find that matching the employment rate among bankruptcy filers is necessary for the model to capture the negative relationship between bankruptcy and UI caps observed in

4. In the model, default happens only through bankruptcy decisions, so the two terms are used interchangeably.

5. Life-cycle considerations are relevant for welfare purposes given that, for example, bankruptcy is mostly concentrated among young individuals, and they are more interested in borrowing against expected future higher income.

the data. The version of the model matching this fact is called the alternative (versus the benchmark, in which the employment rate for bankrupts is not targeted). In the data, the change in the bankruptcy rate corresponding to the maximum amount available is negative and statistically significant, although very small. The model explains this fact because of the countervailing effects of increasing UI mentioned before and because the cap is binding only for some workers. The negative correlation arises because the effect that dominates from a higher cap is the improvement in expected income for a fraction of employed borrowers who would otherwise default, allowing them to refinance their loans at lower interest rates. In addition, overall debt-to-income increases more in the alternative calibration, so not matching this fact would underestimate the overall consumption smoothing of increases in UI caps.

We also present policy experiments in terms of the replacement rate component of the UI formula.[6] Replacement rates are more relevant to the fraction of the population that is more likely to use unsecured credit markets and bankruptcy. With bankruptcy, borrowing is costly, especially for young low-income households that are more likely to be willing to borrow but at the same time pose a higher default risk. UI can alleviate the credit distortions of bankruptcy. Under all model versions, increasing the replacement rate from 35 percent to 60 percent implies an initial increase in debt, bankruptcy rate, and interest rates, followed by a decrease. The effects are more pronounced in the alternative calibration, which supports more debt.

In terms of welfare, there is some room for increasing the UI caps beyond current levels without affecting overall welfare under the alternative calibration. This result comes from the consumption-smoothing gains experienced by borrowers. Under the benchmark calibra-

6. In simple terms, the replacement rate is the fraction of earnings given as a UI benefit. According to the US Department of Labor, most states target a 50 percent replacement rate.

tion, however, further increases in the UI cap would reduce overall welfare. Both calibrations predict that increasing the replacement rate from 50 to 55 percent would improve welfare by around 3.5 percent. This welfare result aligns with Chetty (2008) that finds small welfare gains from increasing the replacement rate above 50 percent. Chetty (2008) acknowledges that an important caveat to his policy conclusion is that it does not consider other policy instruments to resolve credit and insurance market failures.[7] Here, we find that, with bankruptcy available, there are positive welfare gains from increasing the replacement rate, which can be significant.

We contribute to the literature on the interaction between unsecured credit and explicit forms of insurance, such as the work of Athreya (2003), Athreya and Simpson (2006), Athreya (2008), Mahoney (2015), and Braxton, Herkenhoff, and Phillips (2019).[8] Athreya and Simpson (2006) study bankruptcy and UI in a partial equilibrium infinite horizon model. Their model predicts that higher replacement rates imply more bankruptcy. This prediction is inconsistent with the county-level evidence presented here and also the study done by Fisher (2005). Braxton, Herkenhoff, and Phillips (2019) focus on the role of aggregate public insurance in sustaining access to credit markets among the unemployed when adverse selection may limit credit access and the implications of credit access for the optimal provision of overall public insurance. We extend this work by explicitly considering facts about bankruptcy, the correlation between UI caps and bankruptcy, and the trade-off implied by UI; we include labor supply decisions, the moral hazard associated with UI, and finer details regarding the UI formula.[9]

7. The result of Chetty (2008) has been so influential that it is still commonly cited in this literature. See Schmieder and von Wachter (2016) for a recent survey.

8. Also, a related literature exists on the interaction between credit and labor markets, such as the study by Herkenhoff (2014), Athreya et al. (2015), Bethune, Rocheteau, and Rupert (2015), Bethune (2017), and Kehoe, Midrigan, and Pastorino (2019).

9. A more detailed review of the relevant literature is in Section 1.1.

1 Theoretical framework

1.1 Related literature

Labor income is a main source of income for most households, which makes labor market risks a main source of income risk. Labor market policies such as unemployment insurance (UI) reduce the exposure to such a risk, and it is widely recognized that it protects workers from sharp drops in income resulting from job loss. However, the moral hazard in terms of work incentives limits the value of UI. Far less appreciated is the fact that households more likely to be vulnerable to labor risk are also the main users of unsecured credit markets.[10] Bankruptcy filers tend to be middle- to low-income individuals whose income is mostly labor income. Sullivan, Warren, and Westbrook (2000) report that 67.5 percent of bankruptcy filers cite lower labor income as one of the main reasons for filing for bankruptcy.[11] Athreya and Simpson (2006) pointed out that the bankruptcy rate among unemployed workers is four times the population counterpart, and the unemployment rate among bankruptcy filers is more than twice the population counterpart. Keys (2018) finds that households are three times more likely to file for bankruptcy in the year immediately following a job loss. These facts imply that UI will likely alter default risk by affecting labor income risk.

The literature on consumer bankruptcy, as explained in Livshits, MacGee, and Tertilt (2007), stresses that default implies a trade-off between the benefits of smoothing consumption across income states (by not repaying debt obligations) and the cost of smoothing consumption over time (from paying higher interest rates).[12] Moreover, the life-cycle pro-

10. Around 40 percent of US households hold credit card debt.

11. The focus of this paper is labor income risk. Other sources of risk, such as unexpected health expenditures, can influence bankruptcy decisions. See Footnote 1 for references.

12. We build on the quantitative literature on personal bankruptcy such as Athreya (2002), Chatterjee et al. (2007), and Livshits, MacGee, and Tertilt (2007). See also Livshits (2015) for a recent survey and

file of earnings quantitatively matters for the implications of this trade-off on consumption smoothing and welfare. The trade-off for UI is between the consumption smoothing benefit and the moral hazard. When agents face idiosyncratic uninsurable unemployment shocks, UI has a role in increasing welfare by transferring resources from the larger and higher-income group of employed workers to the smaller and lower-income group of unemployed, which is beneficial because the unemployed have higher marginal utilities of consumption. This UI benefit can be limited in the presence of moral hazard.[13]

In this paper, we study how the trade-offs of UI interact with bankruptcy over the life cycle in general equilibrium with the relevant labor income risks and details of UI. The model prediction is consistent with the cross-state differences in UI and county bankruptcy rates, which allows us to use the model as a laboratory for policy counterfactuals. The life-cycle framework matters, as explained by Livshits, MacGee, and Tertilt (2007), and the general equilibrium setup accounts for changes in risks resulting from policy changes. The explicit focus on UI is important because it partially insures the relatively transitory income shock caused by unemployment. The details of the UI imply that the amount received by unemployed workers depends on their earnings, and they are limited in the amount of benefit and duration. These considerations are essential since they determine to what extent different workers are partially insured against labor risk and will shape their credit and labor decisions as well as the welfare implications of policies.

The empirical section of the paper contributes to the literature that empirically studies the relationship of labor market policy to households' financial outcomes, such as Fisher

Gordon (2017) for recent work on optimal bankruptcy policy. This approach uses the basic sovereign default model of Eaton and Gersovitz 1981. For more theoretical treatments of default, see Zame (1993) and Dubey, Geanakoplos, and Shubik (2005).

13. The literature on optimal UI is vast. We build on the literature that uses calibrated structural models such as Hansen and Imrohoroglu (1992), Young (2004), Krusell, Mukoyama, and Sahin (2010), Mitman and Rabinovich (2015), Koehne and Kuhn (2015), and Michelacci and Ruffo (2015).

(2005), Angel and Heitzmann (2015), Hsu, Matsa, and Melzer (2018), Legal and Young (2024), and Arslan, Degerli, and Kabas (2019). Fisher (2005) finds that higher UI benefits reduce the probability of filing for bankruptcy. Fisher (2005) uses individual data from the PSID. The study's limitation is that the total number of bankruptcy filers is low (there are only 196 cases). A natural question is whether this result holds at some level of aggregation. We extend this result by finding that Chapter 7 and UI are also negatively correlated when considering the total bankruptcy filings at the county level.

1.2 Institutional background

In this section, we provide only a brief description of the institutional aspects of bankruptcy and UI and invite interested readers to see the appendix for more details.

1.2.1 Overview of the consumer bankruptcy policy

Bankruptcy is a legal procedure through which borrowers can formally default on their unsecured debts. Consumer bankruptcies almost entirely fall under Chapter 7 or Chapter 13 of the US Bankruptcy Code (only about 1 percent of personal bankruptcy cases are filed under Chapter 11, which generally covers business defaults). We focus on Chapter 7 since it represents around 70 percent of all consumer bankruptcies. Under this chapter, debtors obtain the full discharge of their total qualifying unsecured debts and their current and future earnings are protected from any debt collection action (a "fresh start").[14] Chapter 7 is a liquidation type of bankruptcy since it requires the liquidation of all nonexempt assets in order to repay lenders. However, at most 5 percent of Chapter 7 cases yield assets that

14. Some debts, such as alimony and most tax debts, cannot be discharged. Student loans can only be discharged under severe economic distress on the part of the borrower.

could be liquidated to repay creditors, as noted by Livshits, MacGee, and Tertilt (2007); using court case data we find that number is likely essentially zero.

The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA) was the most recent significant change to the US Bankruptcy Code. BAPCPA resulted from the expansion in consumer bankruptcy filings during the 1980s and early 2000s. Two main changes introduced by BAPCPA were the introduction of means-testing to Chapter 7 and more complicated paperwork requirements that resulted in higher court and legal fees (yielding a 50 percent increase on average, from \$921 to \$1,377, see US GAO (2008)).

The introduction of means-testing did not significantly contribute to the decline in Chapter 7 bankruptcy after BAPCPA, whereas the higher fees played a prominent role (Albanesi and Nosal (2018)). This result is consistent with the idea that the stated means-test is not generally binding. To qualify directly for Chapter 7, filers' income should be below their state median income for a household of their size. If not, the means-testing provision requires the filer's disposable income to be calculated. A filer will not pass the means test if her disposable income is beyond a certain threshold. Using 2007 administrative data from the US Courts, we find that 99 percent of filers would pass the means test. For these reasons, we abstract from means-testing in the model developed in Section 3.

1.2.2 Overview of the unemployment insurance policy

The federal and state unemployment insurance (UI) programs provide temporary income benefits to workers who lose their jobs. The number of workers covered by UI represents around 90 percent of the civilian labor force (employed plus unemployed workers).[15] These programs include the Regular Unemployment Compensation (UC), the permanent Extended

15. U.S. Department of Labor: https://oui.doleta.gov/unemploy/data_summary/DataSum.asp

Benefits (EB), and the temporary Emergency Unemployment Compensation (EUC08). The EB is implemented during periods of high unemployment, and the EUC08 was an extraordinary extension of benefits implemented during the Great Recession.

This paper focuses on regular UC for two reasons. First, the theoretical trade-off explained before is focused on a steady-state environment. Second, the empirical analysis is more challenging when considering EB, since this part of the policy change is in response to the unemployment rate, which in turn is the result of changes in underlying economic conditions, posing serious endogeneity concerns.

As shown in Table 10 in the appendix, under the regular UI program, most states have 26 weeks as the maximum number of weeks that UI benefits can be collected; as a result there is not much variation under this measure. Only 14 states plus DC changed the weeks available for regular benefits (see Table 10 in the appendix). However, there is more variation in terms of the maximum dollar amount of weekly benefits, which can allow us to detect the empirical relationship between UI generosity and consumer bankruptcy.

2 Evidence on UI caps and consumer bankruptcy

Theoretically, a more generous UI system could lead to either more or less bankruptcy. While we discuss this issue at length below, it is useful here to point out why (in broad terms). First, by reducing income variation UI should induce fewer bankruptcies by directly mitigating the harm in the unemployed state. Second, since UI makes unemployment less painful, it can induce an equilibrium reduction in employment rates, leading to more default. That is, UI decreases the likelihood of default conditional on unemployment, but since it makes unemployment more likely, the overall effect is unclear.[16]

The goal of this section is to investigate if US data are informative about which one of the two opposing effects of UI on bankruptcy is stronger. Additionally, the empirical result regarding the maximum amount of UI benefits available will serve as a testable implication of the model. Next, we describe the data sources and provide summary statistics of the main variables we use in the empirical analysis.

2.1 Data sources

The empirical analysis of the relationship between unemployment insurance and Chapter 7 bankruptcy is done by considering a sample of US counties from 1991-2007. In line with the theoretical framework of Section 3 and the empirical challenges described in Subsection 2.2, we focus on UI under the regular program (UC), not the extended benefits that are triggered during periods of high unemployment.[17] In what follows, we describe the sources of the main variables used in the empirical analysis.

The data on annual county-level Chapter 7 bankruptcy rates come from US court records. We updated the data provided by Keys (2018). The data for state-level UI come from different issues of the "Significant Provisions of State UI Laws" of the US Department of Labor. These publications contain records on the maximum number of weeks and the maximum weekly benefit amount (WBA) that is available under the regular UI.[18] We follow Hsu, Matsa, and Melzer (2018) by defining UI generosity in a given state as the maximum

16. There is also an indirect effect that operates through precautionary savings. As noted in Young (2004), higher UI reduces precautionary savings so that households borrow more and therefore could default more frequently.

17. For the same reason, the sample stops in 2007, which excludes the Great Recession and the unusually slow recovery that followed.

18. Available at https://oui.doleta.gov/unemploy/statelaws.asp

amount of benefits available during an unemployment spell (i.e., the maximum number of weeks times the maximum weekly benefit amount). These reports are available twice a year, for January and July. Since the data on bankruptcy are available only at an annual frequency, we use the average to compute the UI values for a given year.[19]

Data on state-level homestead exemption levels come from Pattison (2020). The county unemployment rate comes from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. County-level income comes from the Bureau of Economic Analysis (BEA) website.

Comparative sample statistics. For the empirical analysis of the next subsection, we use only neighboring county-pairs that belong to different states. The total number of counties is $1,136$, which represents around 36 percent of the total number of counties in the mainland US and contains almost one-third of the population.

A concern with the bordering-counties specification is that this sample may not contain the same information as the all-counties sample. Table 1 shows that both samples are similar in terms of the variables of interest, which mitigates the potential concern about the information cost of reducing the number of counties. As seen in the table, most of the variation in our measure of UI generosity comes from the maximum weekly benefit amount (WBA), which we will refer to as the UI cap.

19. This approach differs from Hsu, Matsa, and Melzer (2018), who use only the values contained in the July report (though it is unlikely that these small differences would make much difference).

Table 1: Comparative sample statistics

	All counties				
	Mean	Std. Dev.	25th perc.	Median	75th perc.
Chap. 7 BK rate (%)	0.266, 0.303*	0.17	0.14	0.23	0.36
Max. num. of weeks	26.05	0.43	26.00	26.00	26.00
Max. WBA	290.71	81.95	230.50	279.50	337.00
Max. Benefits	7,580	2,188	5,993	7,280	8,775
Unemp. Rate (%)	5.74	2.72	3.90	5.20	6.90
Income	2,588,422	9,758,054	216,688	514,524	1,422,771
	Bordering counties				
Chap. 7 BK rate (%)	0.27, 0.303*	0.17	0.14	0.23	0.36
Max. num. of weeks	26.06	0.46	26.00	26.00	26.00
Max. WBA	290.95	86.48	230.00	276.00	339.00
Max. Benefits	7,592	2,326	5,980	7,202	8,827
Unemp. Rate (%)	5.74	2.65	3.90	5.20	7.00
Income	2,503,086	8,862,479	206,564	518,677	1,420,862

*The first value of the mean is unweighted; the second is the population-weighted mean. The annual county-level Chapter 7 bankruptcy rate data comes from US court records. We updated the data provided by Keys (2018). The data for state-level UI come from different issues of the "Significant Provisions of State UI Laws" of the US Department of Labor. Data on state-level homestead exemption levels come from Pattison (2020). The county unemployment rate comes from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. County-level income comes from the Bureau of Economic Analysis (BEA) website.

2.2 Empirical analysis

We proceed to study the empirical relationship between UI and bankruptcy rates. We show that the bankruptcy rate is significantly negatively correlated with UI generosity. We run two regressions of the Chapter 7 county bankruptcy rate on UI benefits from 1991–2007. Using all counties and exploiting the variation in UI policy across states is daunting since states differ in many dimensions, and these relative differences evolve differently over time.

Using all counties then poses severe challenges to estimating the effect of policy differences on the outcomes of interest. As discussed in Dube, Lester, and Reich (2010), using all counties raises an endogeneity concern, since UI policy is determined at the state level and may well depend on state economic or political conditions that can also influence bankruptcy.

We addressed the concern mentioned above by considering a sample of neighboring counties that belong to different states and exploiting the discontinuity of UI policy at the border (see, for example, Dube, Lester, and Reich (2010) and Hagedorn et al. (2019)). Neighboring counties constitute better control groups assuming that the state-level shock does not stop at the border and affects county-pairs symmetrically. Also, since the policy is determined at the state level, it is regarded as exogenous from the county-pair perspective.

We follow Hsu, Matsa, and Melzer (2018) and define UI generosity as the total amount of benefits that are available under the regular UI program during a given unemployment spell (in particular, log(# of weeks $\times$ max WBA)). Consistent with the steady-state equilibrium model developed in the next section, we focus only on the regular UI program, since the extended benefits are available only during periods of high unemployment (which, in turn, worsens the endogeneity concern).

As explained in Dube, Lester, and Reich (2010), considering all counties can be misleading since states are very different in terms of observables and unobservables, both in terms of levels and how they evolve over time. Using county fixed effects controls for any heterogeneity as long as it is constant over time. However, changes in underlying state conditions can influence both UI and bankruptcy; a regression using all counties would erroneously attribute changes in bankruptcy to changes in UI because the specification would not control for those underlying changes.

To control for changes in underlying state-level conditions that may drive both UI and bankruptcy, we examine the difference in UI generosity between bordering counties that belong to different states with different levels of UI (since UI is determined at the state level). We refer to such counties as county-pairs (see, for example, Dube, Lester, and Reich (2010) and Hagedorn et al. (2019)). The basic idea is that state-level changes in underlying conditions do not stop at the border and affect neighboring counties symmetrically. Also, bordering counties are similar in geography, climate, labor market conditions, routes, etc., so it is more plausible that unobserved heterogeneity between contiguous counties evolves similarly, making them a better control group. Then, the discontinuity of the UI policy at the border can be exploited to identify if differences in UI across county-pairs are associated with differences in bankruptcy rates. The identifying assumption for the border-discontinuity specification is that conditional on covariates and county fixed effects, within-pair differences in the generosity of UI are uncorrelated with the differences in the residual bankruptcy rate in either county, i.e., shocks affect the counties on the two sides of the state border similarly. For this exercise, we estimate the following difference-in-difference (DID) type regression:

$$BK_{cpt} = \alpha + \eta \ln\left(\max UI_{s(c)t}\right) + \phi_c + \tau_{pt} + X_{ct} + \varepsilon_{cpt} \tag{1}$$

Here BK_{cpt} represents the Chapter 7 bankruptcy rate (in percentage terms) in county c belonging to pair p at time t. $\ln\left(\max UI_{s(c)t}\right)$ represents the measure of UI generosity for county c that belongs to state s. The term ϕ_c represents a county fixed effect that controls for observable and unobservable characteristics that are constant over time. The variable τ_{pt} is a pair-specific time fixed effect that controls for changes in state-level underlying conditions, which is a key element in the identifying assumption of this setup.[20] To control for time-varying differences observed, X_{ct} includes county-level unemployment rates and income as well as other relevant state policies such as homestead exemptions and minimum wages. Controlling for these policies addresses the potential simultaneous treatment effect that is a concern in DID specifications.

Standard errors are two-way clustered at the state level and at the border segment.[21] First, UI is constant across counties within a state. Second, each county is repeated as often as it can be paired with a neighboring county in the other state. As explained in Dube, Lester, and Reich (2010), a single county in more than one pair induces a mechanical correlation across county-pairs and potentially across the entire border segment. In addition, all standard errors are corrected for heteroskedasticity.

Table 2 shows the regression results. In addition to $\ln\left(\max UI_{s(c)t}\right)$, we also consider as a measure of UI generosity the maximum weekly benefit amount ($\ln\left(\max WBA\right)$) and the regular maximum number of weeks that the UI benefit can be collected (max weeks). Since most of the variation in the total UI benefit that can regularly be collected comes from variations in the WBA, it is not surprising that the effect is significant under both $\ln\left(\max UI_{s(c)t}\right)$ and $\ln\left(\max WBA\right)$. There is no evidence that the regular number of weeks for which UI can be collected has a significant effect.

20. More specifically, the comparison is between bordering counties at a given time in which county-level variables were demeaned by their average.

21. A border segment is defined as the set of all counties on both sides of a border between two states.

Table 2: The effect of UI on Chapter 7 consumer bankruptcy (1991-2007)

	Chapter 7 bankruptcy rate		
	Bordering counties		
	$\ln(\max UI_{s(c)t})$	ln(max WBA)	max weeks
Depend. var: BK_{cpt}	-0.06015**	-0.05964**	-0.00211
	(0.026)	(0.027)	(0.0029)
Controls:			
Unempl. $\text{rate}_{c,t}$	Y	Y	Y
$\log(\text{income}_{c,t})$	Y	Y	Y
Other state policies	Y	Y	Y
County FE	Y	Y	Y
Pair-specific time FE	Y	Y	Y
N. Obs.	38,504	38,504	38,504

The dependent variable is BK_{cpt}. We consider three specifications for UI: $\ln\left(\max UI_{s(c)t}\right) = \ln\left(\max \text{weeks} \times max.WBA\right)$, $\ln\left(\max WBA\right)$, and max weeks. Standard errors are in parentheses and are two-way clustered at the state and border segment. All monetary values are in 2017 dollars. Significance levels: *10%, **5%, ***1%.

There is a statistically significant negative correlation between UI benefits and Chapter 7 bankruptcy rates for the bordering counties considered. In particular, a 10 percent increase in the generosity of UI decreases the Chapter 7 bankruptcy rate by 1.9 percent from an average base rate of 0.303 percent per inhabitant.

A common concern in this methodology is the spillover associated with the fact that workers in the low-UI benefit state can commute to the higher-UI benefit state (the effect of the policy is not concentrated on one side of the border). However, this spillover is not a concern for the problem addressed in this paper, since a worker receives the UI benefit from the state where she or he was laid off but has to file for bankruptcy in the state of residence. Assuming it is true that higher UI reduces the probability of filing for bankruptcy, if some workers from the relatively low-UI state are commuting to the high-UI state, we would expect reduced bankruptcy filings in the low-UI state, which would attenuate the differences in bankruptcy across county-pairs.

3 The model

Motivated by the results in Section 2, we develop a model that helps us rationalize the underlying mechanisms connecting UI to bankruptcy rates. The model allows us to evaluate which of the different theoretical mechanisms quantitatively dominate and the welfare implications of combining UI with bankruptcy for the US economy.

3.1 Environment

We consider a life-cycle incomplete markets model with heterogeneous agents à la Aiyagari (1994) extended to include a frictional labor market and defaultable consumer credit.[22] Time is discrete; the economy runs forever and is populated by workers, firms, financial intermediaries, and the government.

3.2 Labor market

We model labor market frictions using the search and matching framework of Diamond-Mortensen-Pissarides. We consider risk-averse workers who differ in their labor productivity, ε, and whether they are matched with a firm. We denote the match status by $m \in \{0, 1\}$, where $m = 0$ means unmatched and $m = 1$ means matched.

22. The life-cycle framework is particularly relevant in light of the fact reported by Athreya et al. (2018) that the bankruptcy decision is decreasing in age, with around 55 percent of filers being between the ages of 25 and 34 and around 30 percent between 35 and 44. These facts highlight the important life-cycle component of using credit and bankruptcy to smooth consumption.

Labor market frictions are summarized by a Cobb-Douglas matching technology that takes as inputs unemployed workers and job vacancies. The match is random, and the matching function is $M(u,v) = \chi u^{\eta} v^{1-\eta}$, in which u and v represent the number of unemployed workers and vacancies posted in a given period, $\eta \in (0,1)$ is the elasticity of new matches with respect to unemployment, and χ is the matching efficiency parameter. Job market tightness is defined by $\theta = v/u$.

Only unemployed workers engage in costless random job search and get matched with a firm with a probability of $\gamma^m = \frac{M(u,v)}{u} = \chi\theta^{1-\eta}$. Firms are identical; each pays a fixed flow cost, κ, to post one vacancy and employ one worker. Vacancies are filled with probability $\gamma^v = \frac{M(u,v)}{u} = \chi\theta^{-\eta}$.

Wages are bilaterally determined between the worker and the firm by splitting what is left of the firm's current period revenue after the capital rent payment. In every period, a worker with a job offer (a matched worker) decides whether she will accept the job offer at the negotiated wage (wages are determined in every period). At the end of each period, employed workers are exogenously separated with probability γ^s.

3.3 Unemployment insurance and social programs

The unemployment insurance policy is modeled to resemble the main features of the United States UI system. Only unemployed workers may receive UI benefits. The indicator variable I^B represents the UI qualification status. UI recipients keep their benefits with a probability π_k next period, such that UI benefits are collected on average for two quarters.[23] Unemployed

23. This modeling choice is a simplified way to capture the fact that regular UI benefits are available for at most 26 weeks in most states. The stochastic UI qualification avoids the computational burden of having the number of unemployed periods as another state variable and is consistent with the low take-up rate among qualified unemployed workers (although obviously not the same as allowing for costly take-up).

workers not qualifying for UI receive social benefits, z, to ensure an income floor.

The following formula determines the amount of UI benefits:

$$b(\varepsilon) = \max\left\{\min\left(\theta_R \times w_p\left(\varepsilon\right), C_{UI}\right), z\right\} \tag{2}$$

where θ_R is the replacement rate over a proxy for past wages, $w_p(\varepsilon)$. For simplicity, this proxy is assumed to be equal to the wage that the worker would receive if he were employed. The UI cap C_{UI} is the maximum amount of UI benefits available in a given period.[24]

Retired workers receive social security benefits, z_R, which are equal to 34 percent of average earnings in the economy.[25] Labor income taxes, τ, are levied on employed workers. The total amount of taxes collected finances the UI benefits plus the social benefit programs for the unemployed and retirees.

Moral hazard. In principle, moral hazard concerns regarding UI can come from workers rejecting job offers or from suboptimal job-searching behavior by unemployed workers without a job offer. As argued in Hansen and Imrohoroglu (1992), it may be easier for the government to monitor search effort while households are unemployed. We therefore abstract from search intensity and consider job rejections as the only source of moral hazard, meaning that the government does not monitor job rejection decisions. Another way to interpret these assumptions is that the government can monitor search behavior only coarsely and that unemployed workers search just enough to be eligible to receive UI (regulations that require a minimum number of job applications are common; our assumption is that the

24. States vary in how they calculate the amount of UI benefits. According to the US Department of Labor website, most formulas aim to replace around 50 percent of the unemployed worker's earnings over a 52-week period (up to a maximum weekly benefit amount).

25. We calculate this replacement rate by dividing the average Social Security retirement benefits available on the Social Security Administration website.

searcher cannot influence the matching rate by sending more applications).

3.4 Credit market and financial intermediaries

The credit market is incomplete. Perfectly competitive financial intermediaries have access to the international credit market, where they can borrow or save at the exogenous risk-free interest rate, r.[26] Financial intermediaries trade with workers one-period uncontingent defaultable discount assets with face value $a' \in \mathcal{A}$.[27] Workers start with zero assets, and they can buy (save, $a' \in \mathcal{A}^{+} \subset \mathbb{R}^{+}$) or sell (borrow, $a' \in \mathcal{A}^{--} \subset \mathbb{R}^{--}$) from financial intermediaries. We denote the asset space by $\mathcal{A} = \mathcal{A}^{--} \cup \mathcal{A}^{+}$, which includes zero. Physical capital is owned by the intermediaries, who rent it to the firms.

Intermediaries maximize expected profits every period. Perfect competition in the financial market implies that they make zero expected profits on each loan. Each intermediary holds a sufficiently large number of loans of any given size, and there is a continuum of agents. Thus, by a law of large numbers, realized profits are also equal to zero.[28] Financial intermediaries incur a transaction cost ι proportional to the loan size.[29]

The bond price will depend on the face value, a', and household characteristics that inform lenders about next-period default risk. Let $q_t^W(a', \boldsymbol{e})$ be the bond price for an employed worker and $q_t^U(a', \boldsymbol{e})$ for an unemployed worker. A borrower receives $q_t(a', \boldsymbol{e})\, a'$ units of consumption goods in the current period and repays a' next period unless she defaults.

26. Chatterjee et al. (2007) show that there is not much gain from determining the risk-free interest rate endogenously in models of consumer default, so the consideration of an open economy does not compromise the results for the question at hand.

27. The credit market is exogenously incomplete; this assumption can be justified by some underlying informational friction, such costly state verification, that prevents intermediaries from offering contingent loans.

28. Financial intermediaries absorb losses and gains resulting from deaths.

29. Livshits (2015) argues that this is necessary to match the gap between the average interest rate on unsecured credit and the risk-free rate. This gap is too large to be explained by the risk premium.

Intermediaries receive nothing if the household files for bankruptcy.

The zero expected profit condition implies the following loan price schedule for households as

$$
\begin{aligned}
q_t^W(a',\boldsymbol{\varepsilon}) &= \varphi_t \mathbb{E}_{\varepsilon'|\varepsilon}\left[(1-\gamma^s)p_{t+1}^M(a',\boldsymbol{\varepsilon}') + \gamma^s p_{t+1}^N(a',\boldsymbol{\varepsilon}')\right]/(1+r+\iota) \\
q_t^U(a',\boldsymbol{\varepsilon}) &= \varphi_t \mathbb{E}_{\varepsilon'|\varepsilon}\left[\gamma^m p_{t+1}^M(a',\boldsymbol{\varepsilon}') + (1-\gamma^m)(\pi_k p_{t+1}^N(a',\boldsymbol{\varepsilon}') + (1-\pi_k)p_{t+1}^S(a',\boldsymbol{\varepsilon}'))\right]/(1+r+\iota) \\
q_t^S(a',\boldsymbol{\varepsilon}) &= \varphi_t \mathbb{E}_{\varepsilon'|\varepsilon}\left[\gamma^m p_{t+1}^M(a',\boldsymbol{\varepsilon}') + (1-\gamma^m)p_{t+1}^S(a',\boldsymbol{\varepsilon}')\right]/(1+r+\iota)
\end{aligned}
\tag{3}
$$

where $\varphi_t/(1+r+\iota)$ is the price of a risk-free loan that takes into account the survival probability and transaction cost. The loan prices depend on current employment status, so (q^W, q^U, q^S) correspond to prices for employed, unemployed, and under social benefits. Tomorrow's repayment decisions are (p^M, p^N, p^S) for matched, unmatched with UI benefits, and unmatched with social benefits.

The price for saving is just $\varphi_t/(1+r)$. Note that the loan pricing function considers the individual's unemployment risk, since it affects her income prospects. For example, for an employed worker pricing takes into account the exogenous separation rate, γ^s. For an unemployed worker, it takes into account the probability $1-\gamma^m$ of starting the next period with a job offer. Also, if the unemployed worker qualifies for UI, the loan price includes the probability of keeping the UI benefits if she remains without a job.

3.5 Bankruptcy policy

Default is modeled as Chapter 7 of the United States Bankruptcy Code, following the institutional background described in Section 1.2.1 and as is standard in the literature. In the model, the government allows workers to default on their debt by filing for bankruptcy, in which case their current asset holdings are set to zero and their current and future income are protected from any debt collection. Workers cannot borrow or save during the period of default but are not restricted in later periods.[30]

The bankruptcy cost includes a filing fee that depends on individual employment status (Δ_W, Δ_U, Δ_S), for employed, unemployed with UI, and unemployed collecting social benefits. These fees are set to zero if they would imply negative consumption. This assumption captures the fact that these fees are sometimes waived for low-income individuals. Bankruptcy costs also include a direct utility cost, λ, which represents other explicit and implicit costs associated with default that are not explicitly modeled.

3.6 Workers

Workers are born into the model at the age of 22, work for 44 years, then retire when they turn 66 years old and live for 21 years as retirees, after which they die on their 87th birthday, leaving no bequest. Workers die with probability $1 - \varphi_t$ in any period. When a worker dies, she is replaced by a new one with zero assets; the population is therefore constant and we can normalize it to one.

Each working-age household is endowed with one unit of time for labor and a random labor efficiency of $\varepsilon \in \mathcal{E}$. Labor efficiency is strictly positive and independent across workers and follows the process

$$\log \varepsilon_t = a_0 t + a_1 t + a_2 t^2 + u_t, \tag{4}$$

30. Some papers impose an exogenous period of exclusion following a default, calibrated to between 6 and 8 years. Such an exclusionary period is not consistent with competitive pricing, does not conform to evidence that bankrupt households frequently borrow after one or two years (Han and Li 2011), and conflates the exclusionary period for borrowing with the exclusionary period for filing under Chapter 7 again.

$$u_t = \rho_u u_{t-1} + \xi_t, \tag{5}$$

$$\xi_t \sim \mathcal{N}\left(0, \sigma_\xi^2\right). \tag{6}$$

Labor efficiency is the sum of a deterministic and a stochastic component. The deterministic component is quadratic in the worker's age, which captures experience gains over the worker's life cycle. The stochastic component follows an AR(1) process. A newborn worker draws its initial labor efficiency from the invariant distribution associated with this stochastic component.

Workers dislike working and derive utility from consuming the single good available. The expected lifetime utility of a worker is time-separable, with the period utility given by

$$U(c, l) = \frac{\left(c \times \exp\{\phi l\}\right)^{1-\sigma}}{1-\sigma}$$

with $\sigma > 0$ as the coefficient of relative risk aversion, $l \in \{0, 1\}$ with $l = 1$ if the household works and zero otherwise, and $\phi > 0$ is the parameter governing the disutility of working.

Each household discounts the utility from future consumption by $\beta \in (0, 1)$, which is the common discount factor, and attaches disutility from filing for bankruptcy, λ, which, as explained before, includes the social stigma of being a defaulter.[31]

31. See Fay, Hurst, and White (1998) and Gross and Souleles (2002) for evidence about these nonpecuniary costs of default and the unexplained variability in the probability of default across households even after controlling for many observables. As explained in Athreya, Tam, and Young (2010), these results suggest the presence of implicit unobserved collateral that is heterogeneous across households, including (but not limited to) any "stigma" associated with bankruptcy.

3.7 Workers' problem

The problem faced by a working-age agent is presented below. Retirees face the same problem except that rather than wages, they receive social security benefits and face no employment risk.

Every period, a worker decides whether to default, how much to consume, and whether to save or borrow. Workers take the loan price schedule, the bankruptcy system, and the public insurance framework as given. Figure 7 in Appendix B shows the timing within a period. At the beginning of each period, the state variables $\left(m, a, \varepsilon, t, I^B\right)$ are realized. Since there is perfect foresight within the period, a household will know the value of being solvent or not and being employed or unemployed.

Value functions. Let $\boldsymbol{e} = \left(\varepsilon, I^B\right)$. The value functions for matched and unmatched households are denoted by $V_t^M(a, \boldsymbol{e})$ and $V_t^N(a, \boldsymbol{e})$, respectively. The value of being matched is

$$V_t^M(a, \boldsymbol{e}) = \max\left\{B_t(\boldsymbol{e})\ ,\ S_t(a, \boldsymbol{e})\right\},$$

where $B(\boldsymbol{e})$ and $S(a, \boldsymbol{e})$ denote, respectively, the value of filing for bankruptcy and being solvent, taking into account the optimal job offer acceptance decision in each case.

The values of being bankrupt and solvent are given by:

$$B_t(\boldsymbol{e}) = \max\left\{W^B(\boldsymbol{e})\ ,\ U^B(\boldsymbol{e})\right\},$$
$$S_t(a, \boldsymbol{e}) = \max\left\{W_t^S(a, \boldsymbol{e})\ ,\ U_t^S(a, \boldsymbol{e})\right\},$$

where, conditional on going bankrupt, $W^B(\boldsymbol{e})$ and $U^B(\boldsymbol{e})$ represent the value of working and being unemployed, respectively. Similarly, conditional on being solvent, $W_t^S(a, \boldsymbol{e})$ and $U_t^S(a, \boldsymbol{e})$ represent the corresponding values of working and being unemployed.

Since wages are bilaterally determined, we first define $\hat{W}^S(a, \boldsymbol{e}|w)$ and $\hat{W}^B(\boldsymbol{e}|w)$ as the corresponding values of being employed-solvent and employed-bankrupt at any given wage w. These values are given by

$$\hat{W}_t^B(\boldsymbol{e}|w) = U(c, l) - \lambda + \beta\varphi_t\left[\gamma^s \mathbb{E}V_{t+1}^N(0, \boldsymbol{e}') + (1-\gamma^s)\mathbb{E}V_{t+1}^M(0, \boldsymbol{e}')\right] ,$$
$$\text{s.t. } c = (1-\tau)w - \Delta_W$$

$$\hat{W}_t^S(a, \boldsymbol{e}|w) = \max\nolimits_{c,a'} \left\{U(c, l) + \beta\varphi_t\left[\gamma^s \mathbb{E}V_{t+1}^N(a', \boldsymbol{e}') + (1-\gamma^s)\mathbb{E}V_{t+1}^M(a', \boldsymbol{e}')\right]\right\} .$$
$$\text{s.t. } c_t + q_t^W(a', \boldsymbol{e})a' = (1-\tau)w + a.$$

Let w^* be the equilibrium wage. Then, $W_t^S(a, e) = \hat{W}_t^S(a, e\,;\ w = w^*)$ and $W_t^B(a, e) = \hat{W}_t^B(a, e\,;\ w = w^*)$.

Similarly, the value for an unmatched household equals the maximum value of being unemployed after the bankruptcy decision is made:

$$V_t^N(a, \boldsymbol{e}) = \max\left\{U_t^B(\boldsymbol{e})\ ,\ U_t^S(a, \boldsymbol{e})\right\},$$

where $U_t^B(\boldsymbol{e})$ and $U_t^S(a, \boldsymbol{e})$ are given by

$$U_t^B(\boldsymbol{e}) = u(c) - \lambda + \beta\varphi_t\left[\gamma^m \mathbb{E}V_{t+1}^M(0, \boldsymbol{e}') + (1-\gamma^m)\mathbb{E}V_{t+1}^N(0, \boldsymbol{e}')\right]$$
$$\text{s.t. } c_t = b(\varepsilon) - \Delta_U$$

$$U_t^S(a, \boldsymbol{e}) = \max\nolimits_{c_t,a'}\left\{u(c) + \beta\varphi_t\left[\gamma^m \mathbb{E}V_{t+1}^M(a', \boldsymbol{e}') + (1-\gamma^m)\mathbb{E}V_{t+1}^N(a', \boldsymbol{e}')\right]\right\}$$
$$\text{s.t. } c_t + q_t^U(a', \boldsymbol{e})a' = b(\varepsilon) + a.$$

Note that this case corresponds to that of an unemployed worker collecting UI.

3.8 Firms' problem

Firms decide whether to post a vacancy and, if so, how much to produce. Each firm can post one vacancy at most. Let $F_t(\varepsilon)$ be the value of a firm that is matched with a worker and J^V the value of a vacant job. First, define $\hat{F}_t(\varepsilon|w)$ as the value of a filled job at any wage w. This function is given by

$$\hat{F}_t(\varepsilon|w) = \max_k \left\{ k^{\alpha}\varepsilon^{1-\alpha} - w - rk + \frac{1}{1+r}\left\{(1-\gamma^s)\left[\varphi_t \mathbb{E}F_{t'}(\varepsilon) + (1-\varphi_t) J^V\right] + \gamma^s J^V\right\}\right\}.$$

$F_t(\varepsilon)$ is then given by

$$F_t(\varepsilon) = l \times \hat{F}_t(\varepsilon|w = w^*).$$

Note that, from the firm's perspective, the value of being matched with a worker is either $\hat{F}_t(\varepsilon|w = w^*)$ or zero if the worker declines to work at w^* (recall $l \in \{0,1\}$ is the indicator variable of a worker's employment decision).

The value of a vacancy, J^V, is given by

$$J^V = -\kappa + \frac{1}{1+r}\left\{(1-\gamma^v) J^V + \gamma^v \sum_{t,a,\boldsymbol{e}} \left[\varphi_t \mathbb{E}F_{t+1}(\varepsilon') + (1-\varphi_t) J^V\right] \frac{f_u(t,a,\boldsymbol{e})}{u}\right\}.$$

In order to fill a vacant position, a firm has to pay a fixed flow cost κ. New matches form at the end of the period, so production will start in the next period if the worker accepts the offer. Firms take into account the aging process as well as the survival probability of the workers (they may match with a worker who dies before beginning employment). The population of unemployed workers with characteristics $(t, a, \boldsymbol{e})$ is given by $f_u(t, a, \boldsymbol{e})$; thus, the current density of the unemployed workers with these characteristics is $\frac{f_u(t,a,\mathbf{e})}{u}$. Since there is free entry, firms in equilibrium post vacancies until $J^V = 0$.

Wage determination. Wages are determined by a sharing rule between the worker and the firm. In particular, the worker's wage will be a fraction of the firm's pre-wage-payment current profit, $w = \omega \times (k^{\alpha}\varepsilon^{1-\alpha} - rk)$, where ω is the worker's share.

3.9 Equilibrium

The definition of a recursive competitive equilibrium is standard. Given the risk-free interest rate, r, the bankruptcy system, the UI system, and social benefits, a recursive competitive equilibrium consists of

- loan price functions $\{q_t^W (a', e), q_t^U (a', e), q_t^S (a', e)\}$
- wage functions $\{w (\epsilon_t)\}$
- value functions for workers $\{V^M (a, e), V^N (a, e), V^S (a, e)\}$ and for firms $\{F_t (\epsilon), J^V\}$
- distribution of workers $\mathcal{H}$ over (t, a, e) and employment status.
- consumption, saving, default, labor decisions $\{c_t (a, e), a'_t (a, e), d_t (a, e), l_t (a, e)\}$

such that

- $\{q (\cdot)\}$ are such that intermediaries make expected zero profits;
- $\{w (\cdot)\}$ is consistent with the sharing surplus rule between workers and firms;
- $\{c (\cdot), a' (\cdot), d (\cdot), l (\cdot)\}$ solve the household problem given loan prices and wages;
- firms enter until the value of posting a vacancy is zero, $J^V = 0$;
- the government budget constraint is satisfied.

4 Calibration and estimation

The model period is set to 1 quarter to approximate the high frequency of unemployment events and the period over which regular UI is available (26 weeks, or 2 quarters, in most states).[32]

We use a two-step procedure to determine the parameter values. First, some parameters can be directly observed in the data; these parameters are set to their corresponding values, while others are set to standard values in the literature. Second, parameters that play a key role in the question at hand are estimated such that the model replicates as closely as possible key empirical moments of the credit and labor markets.

4.1 Parameters determined independently

The coefficient of relative risk aversion is set to 2, which is in the range of values typically used in the literature. The quarterly risk-free interest rate, r, is set to 0.3729 percent (corresponding to 1.5 percent annually). The transaction cost for making loans, ι, is set to imply a 3 percent annual markup of loan rates over deposit rates (see Athreya et al. (2018)).

In the model, average quarterly earnings are normalized to 1 and equal $\$16,266$ in 2007 dollars. This latter value corresponds to average household earnings in the PSID sample used to construct the targets related to earnings. Annual average household earnings (head of household + spouse) in the PSID sample are $\$65,064$ in 2007 dollars, which translates to $\$16,266$ in quarterly terms.

The UI replacement rate, θ_R, is set to 0.50, replicating what most states target in their benefit formulas (as reported by the US Department of Labor). In 2007, the population-

32. The postwar average unemployment duration is more than 4 months.

weighted average of the maximum weekly UI benefits across states was \$407.40. The UI cap, C_{UI}, is then set to $\$407.4 * 13/16,266 \approx 0.33$ per quarter.

Unemployed workers not eligible for UI receive a social benefit—an income floor—that is set to match the average household monthly transfer from the Supplemental Nutrition Assistance Program (SNAP), which was \$216.10 in 2007, as reported by the US Department of Agriculture. Thus the income floor, z, is set to 0.04. According to the Social Security Administration, the average monthly Social Security retirement benefit in 2007 was \$1,100 (including spousal and child support); therefore, the retirement benefit in the model is $z_r = 0.2$.[33]

The separation rate is set to $\gamma^s = 0.06$, matching the monthly separation rate of 2.03 percent estimated by Shimer (2012). The elasticity of the matching function with respect to unemployment, η, is set to 0.72, following Shimer (2005). Job-market tightness, θ, is normalized to 1 in the benchmark model. The cost of entry, κ, is set such that the value of posting a vacancy is zero in equilibrium.

The level of assets in the model represents the household's net worth. As explained by Livshits (2015), negative net worth is the most natural measure of households' indebtedness in a model with a single asset, which we consider more relevant than using revolving credit when focusing on bankruptcy because almost 90 percent of filers under Chapter 7 have a negative net worth (Administrative Office of US Courts, 2007). As pointed out by Athreya et al. (2018), if one subtracts home equity from net worth to construct liquid net worth, the share of filers with negative liquid net worth rises to 98 percent. Also, if we subtract the value of exemptions, all bankruptcy filers would likely have a negative net worth; consistent with this idea, 99 percent of filers state that no assets would be available for liquidation

33. This consumption floor is likely conservative, given that other benefits such as Medicaid and subsidized housing are also available.

(Administrative Office of US Courts, 2007).

According to the US GAO (2008), average attorneys' fees for Chapter 7 bankruptcy in 2007 were $\$1,078$ and the filing fee was $\$299$; the total pecuniary cost of filing was therefore $\$1,377$. We then set $\Delta_W = 0.085$. Considering that these fees can be waived in cases of very low income, Δ_U and Δ_S are set to 50 and 25 percent of Δ_W, respectively. Also, any of these fees are set to zero if that implies a negative level of consumption. Table 3 summarizes the calibrated parameters.

Table 3: Summary of parameters determined independently

Parameter	Description	Value	Source
σ	Coefficient of relative risk aversion	2.0	Standard in the literature
r	Risk-free interest rate (quarterly)	0.373%	Athreya et al. (2018)
ι	Transaction cost for loans (quarterly)	0.742%	Athreya et al. (2018)
θ_R	UI replacement rate	50%	US Department of Labor
C_{UI}	Normalized max quarterly UI benefits	0.33	US Department of Labor
z	Income floor (social benefits)	0.04	US Department of Agriculture
z_r	Social Security retirement benefits	0.20	Social Security Administration
γ^s	Job separation rate (quarterly)	0.06	Shimer (2012)
η	Matching elasticity w.r.t unempl.	0.72	Shimer (2005)
χ	Matching efficiency	0.69	Low, Meghir, and Pistaferri (2010)
Δ_W	Filing fee	0.085	US GAO (2008)
α	Capital share	0.33	Standard in the literature

Set of parameters for which values can either be observed directly in the data or are based on the literature. All monetary values are in 2007 dollars and normalized by average quarterly earnings.

4.2 Estimated parameters

Next, we estimate 8 parameters to match 8 targets corresponding to some of the main population statistics regarding bankruptcy, unemployment, and earnings. The estimated parameters are the utility cost of default (λ), the disutility from working (ϕ), the discount factor (β), the coefficients of the quadratic age trend of the log of labor productivity (a_0, a_1, a_2), and the autocorrelation and conditional variance of the stochastic component of labor productivity (ρ_u, σ_ξ). We refer to the resulting estimated model as the benchmark model.

We also consider an alternative estimation of the model in which we estimate it by adding a sub-population statistic as an additional moment. In particular, we add the fraction of bankruptcy filers that are not employed as a target. Around 74 percent of bankruptcy filers report having a job at the time of filing, which is substantially lower than the population average. Unfortunately, without targeting this moment explicitly, the model overestimates the fraction of filers without a job, and thus attributes a disproportionate fraction of filing to job loss. This result distorts the welfare implications of the policies we consider.

We stack the parameters we want to estimate in a vector θ. We estimate θ using the simulated method of moments (SMM), i.e., by minimizing a weighted squared sum of differences between model and data moments (equation 7). The minimum distance estimator solves

$$\min_{\theta \in \Theta} \left[M - m(\theta)\right]^T W \left[M - m(\theta)\right], \tag{7}$$

where M and $m(\theta)$ are the data-based and model-based moments, respectively. The weighting matrix, W, is a diagonal matrix with $1/M_i$ in the diagonal element corresponding to row i. The targeted moments have different units (and therefore differ substantially in magnitude); the estimator therefore minimizes the percentage deviation between the data and model moments so as to eliminate scaling concerns and treat all moments symmetrically.

4.2.1 Targeted moments

The first set of targeted moments contains some key statistics about unsecured credit and labor markets, and the second set contains moments that capture the evolution of households' earnings over the life cycle. The first set of moments are as follows:

- In the 2007 Survey of Consumer Finances (SCF 2007), the annual bankruptcy rate was 1.18 percent (Athreya et al. (2018)).
- An annual household employment rate of 80 percent, estimated using the 2007 SCF in which a household is categorized as employed if either the head of the household or the spouse or both are employed. Only households with a head between 22 and 65 years old are considered.
- Annual average debt-to-income ratio for the population, which is 1.64 percent (Athreya et al. (2018)), where debt is defined as $Debt = \max\{0, -Networth\}$.
- In the alternative model, we add the annual employment rate among Chapter 7 bankruptcy filers of 74 percent (US Courts, 2007).[34]

The moments related to the earnings process are calculated using data from the PSID from Heathcote, Perri, and Violante (2010) and range from 1967 to 2002. This data set has been cleaned and processed such that missing or miscoded observations are dropped, top-coded values are extrapolated using a Pareto distribution, observations with implausible consumption levels or earnings are dropped (e.g., positive labor earnings with zero hours worked), and reported wage rates below half of the prevailing federal minimum wage are excluded.

In this sample, we calculate total household annual earnings as the sum of the earnings of the head of household and his wife.[35] All monetary values are expressed in 2007 dollars.

34. Unfortunately, there are no demographic characteristics in this sample, so we cannot constrain the sample to ages 22 to 65 years old. To get a proxy for the working-age population to calculate the employment rate, we only consider those filers who (i) are not receiving a pension, or (ii) if receiving a pension, also have positive labor income.

35. If a woman is the head of the household (i.e., there is no husband), we consider her earnings.

We restrict the sample to households where the head is between 22 and 65 years old and the combined number of hours worked is above 260. As is standard in the literature, we assume that the household earnings process in the data is the sum of a deterministic component that depends on age and a stochastic component.[36] The earnings process is given by

$$\begin{aligned} \log w_{i,t} &= b_0 + b_1 t + b_2 t^2 + z_{i,t} \\ z_{i,t} &= \rho_z z_{i,t-1} + \zeta_{i,t} \\ \zeta_{i,t} &\sim \mathcal{N}\left(0, \sigma_\zeta^2\right). \end{aligned} \tag{8}$$

The age coefficients (b_0, b_1, b_2) are obtained using ordinary least squares. The shock process parameters (ρ_z, σ_ζ) are identified by the method of moments using the variance $E_t\left(\hat{z}_{i,t}^2\right)$ and the second-order autocovariance $E_t\left(\hat{z}_{i,t}, \hat{z}_{i,t+2}\right)$ of the residuals from the regression of log earnings, $\hat{z}_{i,t}$, on past values. As explained by Heathcote, Perri, and Violante (2010), the second-order autocovariance is used because, after 1995, the PSID became biannual.

The remaining targets for the estimation are

- Quarterly mean earnings equal 1 (which is a normalization).
- The estimated age coefficients for the deterministic component of the log of annual household earnings in the PSID sample: $(b_1, b_2) = (0.14, -0.0016)$.
- The persistence parameter of the residual of log earnings, $\rho_z = 0.83$.
- The standard deviation of the i.i.d. shock to the residual log earnings, $\sigma_\zeta = 0.41$.

Although the parameters above are estimated jointly to match all targets, there is a close relationship between the utility cost of bankruptcy and bankruptcy rates, as the first directly

36. For tractability, this process is a parsimonious version of the process used, for example, in Heathcote, Perri, and Violante (2010) and Gordon (2017).

affects the decision to declare bankruptcy. The discount factor is strongly related to the debt-to-income ratio, as a lower discount factor makes agents more impatient and willing to take on debt. Similarly, the disutility of working and the matching efficiency are closely related to the unemployment rate. These relationships form the basis of our identification argument.

Importantly, since earnings are endogenous in the model, the coefficients of the quadratic age trend in the labor efficiency are estimated such that the model delivers a hump-shaped earnings profile over the lifecycle by matching (b_1, b_2). In particular, for each set of parameters, we simulate a sample of 10,000 workers over their entire lifecycle, store the simulated annual earnings, and repeat the same estimation procedure used with the PSID data to estimate $(b_0, b_1, b_2, \rho_z, \sigma_\zeta)$.

The estimated parameters are obtained by minimizing equation 7. The discrete nature of default and job acceptance decisions and the discretization of labor efficiency translate into potential nonmonotonicities of the targeted moments that create local minima and require a global optimizer; we employ DiRect (Divided Rectangles), which is a form of "smart"grid search that is guaranteed to find the global minimum to a given tolerance.[37] Table 4 lists the estimated parameter values.

37. See Jones, Perttunen, and Stuckman (1993) for a discussion of DiRect.

Table 4: Jointly estimated parameters

Parameter		Benchmark	Alternative
Utility cost of default	λ	0.16	0.003
Discount factor	β	0.88	0.85
Disutility from working	ϕ	-0.41	-0.53
Intercept in ϵ age trend	a_0	-2.75	-2.81
Linear coef. in ϵ age trend	a_1	0.0848	0.0914
Quadratic coef. in ϵ age trend	a_2	-0.00179	-0.00158
Autocorrelation of u_t	ρ_u	0.985	0.992
Std. Dev. of ξ_t	σ_ξ	0.155	0.094

Estimated parameters by SMM. The benchmark calibration uses the moments listed in Table 5. The alternative calibration adds as a target the fraction of bankruptcy filers who are not employed.

As we noted above, λ and β are closely related to the moments related to unsecured credit, such as the debt-to-income and bankruptcy rates. Employment rate moments are more informative for ϕ and χ. The probability of receiving a job offer is determined by χ, which in this model is not the same as the job-finding probability; the latter also depends on ϕ, since the job-finding probability is the probability of being matched with a firm where the worker will accept a job.

4.3 Model fit

Table 5 shows that the model fits the population targets relatively well under both estimation alternatives. This result means that a workhorse unsecured credit model, combined with a workhorse DMP search and matching model, can account for the main population statistics regarding unsecured credit and labor markets.

Table 5: Estimation: Data vs. model moments

Name	Data	Benchmark	Alternative
Annual bankruptcy rate (2007 SCF)*	1.18%	1.187%	1.182%
Employment rate (2007 SCF)	80%	78%	81%
Annual debt-to-income ratio (2007 SCF)*	1.64%	1.61%	1.83%
Mean earnings	1.0	0.998	1.026
b_1	0.14	0.124	0.131
b_2	-0.0016	-0.0014	-0.0013
ρ_z	0.83	0.838	0.876
σ_ζ	0.41	0.47	0.35

*See Athreya et al. (2018). These statistics correspond to borrowers ages 25-65. Debt=max(0,-Networth).

Table 6 shows how well the model performs on some untargeted statistics. In terms of population statistics, we consider the elasticity of potential benefit duration on unemployment duration, the mean interest rate on loans, and the fraction of bankrupt debt. Sub-population statistics include the share of bankruptcy by age, the annual bankruptcy rate for the unemployed, and the employment rate for bankruptcy filers.

The model-implied unemployment duration elasticity with respect to changes in the potential benefit duration is in the range of values in the literature. In the benchmark calibration, and as is typically the case with this class of models of unsecured credit, the average interest rate on loans is lower than in the data. The alternative calibration improves the model's performance in this latter dimension, highlighting the importance of considering the employment characteristics of bankruptcy filers for the average interest rate on loans. The fraction of bankrupt debt – the ratio of debt discharged in bankruptcy to the total amount of outstanding debt – is lower than the data indicate, which is also a common problem in bankruptcy models. As is the case for the aggregate bankruptcy rate, a lower fraction of bankrupt debt is the result, at least partially, of just focusing on labor income risk.

There is a trade-off between the benchmark calibration and the alternative regarding subpopulation statistics.[38] A trade-off emerges since the benchmark does better regarding the bankruptcy rate for the unemployed (3.9 percent vs. 1.7 percent). However, the benchmark fails catastrophically in matching the employment rate among filers (27.7 percent in the model, while in the data it is 73.8 percent). As a result, a disproportionate fraction of bankruptcies come from unemployment in the benchmark calibration. Forcing the model to improve on this fact by explicitly including it as a target (the alternative calibration) naturally comes at the expense of other bankruptcy statistics, such as the bankruptcy rate among the unemployed, the fraction of bankrupt debt, and the share of bankruptcy by age. However, since we are considering only labor income risk, the lower performance in the aforementioned statistics need not reflect a failure of the model.[39]

Table 6: Untargeted statistics

Name	Data	Benchmark	Alternative
Elasticity potential benefit duration on unemployment duration**	(0.10 , 0.41)	0.32	0.18
Mean interest rate on loans*	13.7%	10.7%	16.2%
Bankrupt debt*	2.74%	1.03%	0.76%
Share of bankruptcy by age*			
- Ages 25-34	55% ; 29%	37%	61%
- Ages 35-44	30% ; 36%	39%	27%
- Ages 45-54	15% ; 24%	15%	8%
- Ages 55-64	0% ; 11%	9%	4%
Annual bankruptcy rate for unemployed	4%	3.9%	1.7%
Employment rate for bankrupts	73.8%	27.7%	72.4%

*The first reported number corresponds to Athreya et al. (2018), and the second number corresponds to Fisher (2019). **See Schmieder and von Wachter (2016). The employment rate among bankruptcy filers was explicitly targeted in the alternative calibration.

38. Recall that in the alternative calibration, we explicitly target the employment rate among bankrupts, which is included in Table 6 to ease comparison.

39. Chatterjee et al. (2007) find that a substantial fraction of filers cite other causes, including divorce and medical bills, as contributing factors to bankruptcy. See also Sullivan, Warren, and Westbrook (2000).

5 Accounting for the negative relationship between UI caps and bankruptcy

In the empirical analysis, we proxied the generosity level of UI with the maximum amount that can be collected in a given spell of unemployment. Since most variation in the data comes from differences in these caps, we would like to know if our model can capture the negative relationship between UI caps and bankruptcy. The result of this exercise is relevant only qualitatively, since the empirical exercise uses the bankruptcy rate in the population, while the model is calibrated using the household bankruptcy rate (as is standard in the literature).

We find that matching the employment rate among bankruptcy filers is important for getting the model to capture the negative relationship between bankruptcy and UI caps observed in the data. Figure 1 shows that the model under the benchmark calibration does not capture this negative relationship, but it can be seen with the alternative calibration in which the employment rate among bankruptcy filers was explicitly targeted.

We saw in Table 6 that the benchmark calibration substantially underestimates the employment rate among bankruptcy filers, making the unemployment state a predominant characteristic of workers declaring bankruptcy. Once we force the model to get the correct composition of employed workers among bankruptcy filers, default happens more because of employed workers with low-income realizations and less because of unemployment spells. In this way, we have employed workers among bankruptcy filers for whom higher UI caps could benefit if they become unemployed, letting them face lower interest rates on their loans and reducing the incentives to default.

Moreover, under the alternative calibration, overall debt-to-income increases from 1.7

percent to 2.1 percent as we increase the UI cap, while in the benchmark calibration it only increases from 1.5 to 1.6 percent. The overall consumption smoothing benefits of increasing the UI cap are underestimated in the benchmark calibration, again because it attributes filing almost entirely to job loss rather than to persistently low wages.

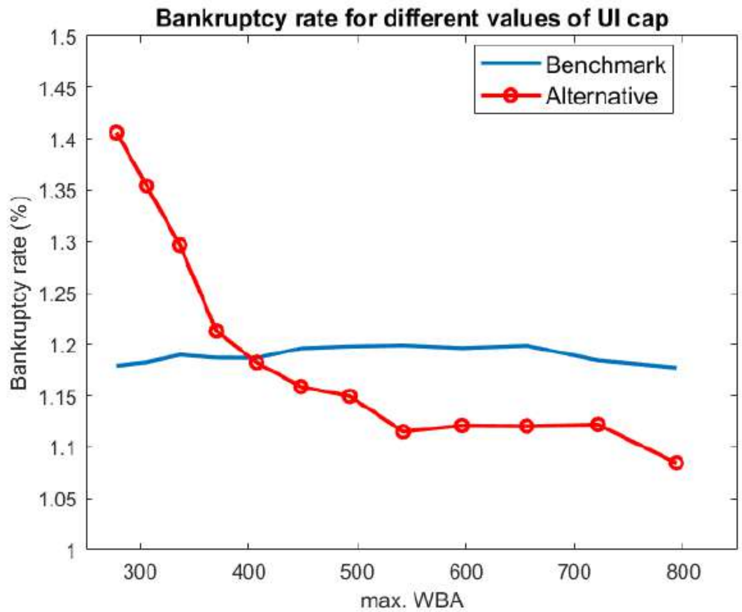

Figure 1: Bankruptcy rate across different values of UI caps (or maximum WBA) for the benchmark and alternative calibrations. The employment rate among bankruptcy filers was not explicitly targeted in the benchmark. In the alternative calibration, we explicitly target the employment rate among bankrupts.

6 UI replacement rate and consumer bankruptcy

In this section, we present some policy counterfactuals regarding steady-state comparisons between different levels of UI. In terms of the model, it is most appropriate to define UI generosity in terms of replacement rates (with or without a cap on UI benefits). In the data, studying UI generosity in terms of replacement rates is challenging, as most states target a replacement rate of 50 percent or do not diverge much from that. Also, the earnings distribution varies across states. It could be the case that some states with a higher earnings distribution may choose lower replacement rates, making these states seem less generous even though they still provide more benefits in terms of dollar amounts. We do not have such problems in the model, so we can analyze UI generosity by considering different levels of replacement rates.

6.1 Changes in the replacement rate

We consider different levels of the replacement rate θ_R keeping other policy parameters constant, as in the benchmark case with bankruptcy. Note that keeping the UI cap would mean that increases in θ_R would represent higher benefits for only the fraction of the population for whom the cap is not binding (those below the UI cap, such as young or low-productivity workers). Figure 9 in Appendix B shows the UI benefit schedule for the first eight productivity levels across ages for different values of θ_R.

Average effects

In our context, we focus on the fact that the availability of bankruptcy not only lowers overall access to credit but also limits the effectiveness of UI at smoothing consumption over time through unsecured debt. As Figure 2 shows, in the absence of bankruptcy, the household would increase its debt relative to income, since UI is more generous. With bankruptcy, under both calibrations, debt (and the bankruptcy rate) increases initially and then decreases, as more debt would imply a higher bankruptcy rate and, therefore, a higher interest rate. As debt decreases, the bankruptcy rate also decreases. In particular, when considering replacement rates, θ_R, between 35 and 45 percent, the overall bankruptcy rate and debt-to-income ratio increase; after that, they both fall with a higher replacement rate. The same pattern is translated into the average loan interest rate in Figure 3. These results are more pronounced under the alternative calibration.

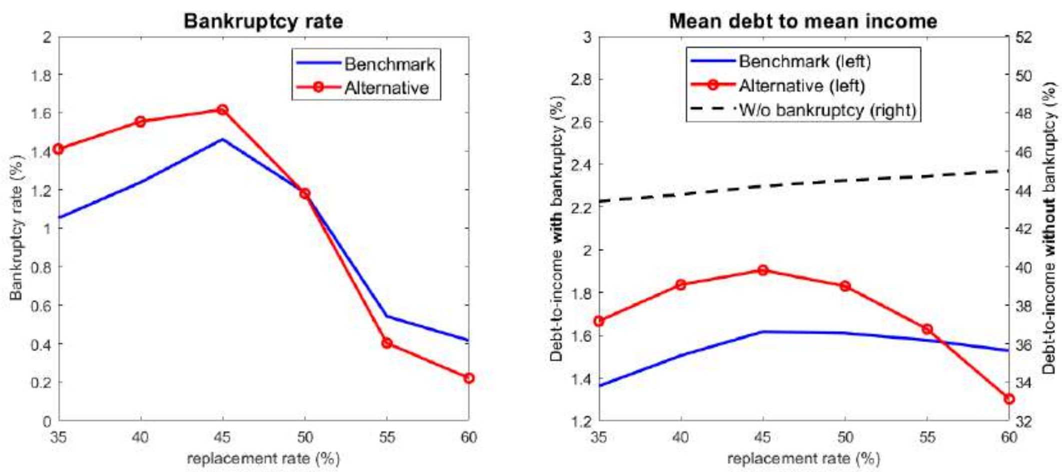

Figure 2: Comparison of the bankruptcy rate and mean-debt to mean-income ratio across different replacement rates while keeping the cap on UI benefits. The model was estimated using $\theta_R = 50$ percent.

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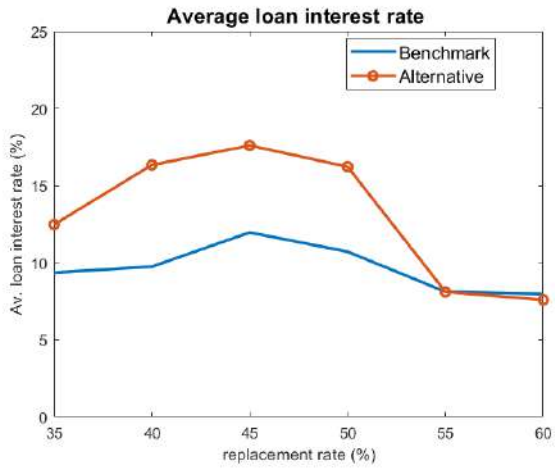

Figure 3: Comparison of the bankruptcy rate and average loan interest rate across different replacement rates while keeping the cap on UI benefits. The model was estimated using $\theta_R = 50$ percent.

Effects across age and employment status groups. Increases in the replacement rate have different implications depending on the initial level of UI and workers' age and employment status. Figures 12, 13, and 14 in the appendix show the average loan price schedule for employed and unemployed workers across different ages and replacement rates.

In terms of differential effects across employment status, increasing the replacement rate tends to improve the loan price faced by the unemployed and worsen the price faced by the employed, as the latter pay higher taxes and the employment rate falls with the increase in the replacement rate. For employed workers, the lower the replacement rate, the better in terms of the loan price they face. The opposite holds for the unemployed, i.e., the higher the replacement rate, the better credit access.

For the sub-population of unemployed workers, the bankruptcy rate falls more significantly over the range $\theta_R = 35$ percent to $\theta_R = 60$ percent under the benchmark calibration. This result implies that increasing the generosity of the UI in this manner increases the pool of the unemployed but reduces its relative default risk. The last result holds under the benchmark calibration, since most bankruptcy filers are unemployed. In the alternative calibration, where we capture a more realistic employment status composition among bankrupts, the bankruptcy rate among unemployed remains relatively constant (or slightly increases) in the range from $\theta_R = 35$ percent to $\theta_R = 45$ percent and starts falling only above $\theta_R = 45$ percent (see Figure 10 in the appendix).

As a fraction of the total population, the fraction of workers who are both unemployed and filing for bankruptcy falls for replacement rates above 45 percent under both calibrations. The fraction of workers who are both employed and filing for bankruptcy increases for the range $\theta_R = 35$ percent to $\theta_R = 45$ percent, since debt increases in this range, and decreases above $\theta_R = 45$ percent under both calibrations (see Figure 11 in the appendix).

Changes in the replacement rate without cap. A natural question is how the previous analysis would changed if there were no cap on UI benefits. We documented empirically that more generous benefits in terms of higher UI caps are associated with lower bankruptcy rates, though the magnitude is small; we turn now to whether the model captures this fact.

Figure 4 shows that not having a UI cap shifts down the bankruptcy rate curve for different values of the replacement rate considered, except for $\theta_R = 60$ percent, under the alternative calibration. This shift is absent under the benchmark calibration; as we discussed before (see Figure 1), the benchmark calibration does not capture this relationship in the data. The model with the alternative calibration also predicts that not having a cap on UI benefits has important consequences for the mean debt-to-income ratio, allowing for more debt relative to income and improving consumption smoothing relative to having a cap.

Under the benchmark calibration, the debt-to-income level starts at 1.4 percent (with and without the UI cap) for $\theta = 35$ percent and keeps increasing up to around 1.7 percent without the cap, but falls above $\theta = 45$ percent to a debt-to-income of 1.5 percent at $\theta = 60$ percent. In the alternative calibration, debt-to-income starts at 1.68 percent. Without the cap, debt-to-income peaks at 2.1 percent for $\theta = 50$ percent and falls to 1.9 percent at $\theta = 60$ percent. With the cap, debt-to-income peaks at 1.9 percent for $\theta = 45$ percent and falls to 1.3 percent at $\theta = 60$ percent.

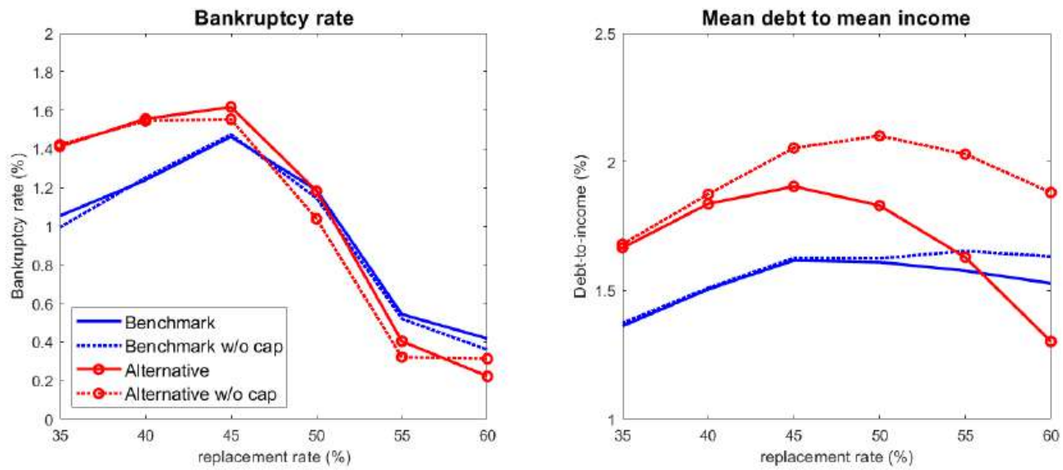

Figure 4: Comparison of the bankruptcy rate and mean-debt to mean-income ratio across different replacement rates with and without the UI cap.

7 Welfare

In terms of ex-ante welfare, welfare is lower at any level of replacement rate considered when bankruptcy is available compared to when it is prohibited; this result obtains independent of the calibration. As we noted above, this result is common in the bankruptcy literature and is not the focus of this paper. However, it is worth mentioning that the cost in terms of smoothing consumption over time associated with bankruptcy surpasses any of its benefits of smoothing consumption across states of income realization; a more generous UI does not overturn this welfare result.

Figure 5 shows that there are welfare benefits of more generous UI in terms of replacement rates under both calibrations. For the range of values considered, both calibrations yield the result that a higher replacement rate improves welfare, and the magnitudes are similar as well. In terms of lifetime consumption equivalents, the welfare gain of increasing the replacement rate from $\theta = 50$ percent to $\theta = 55$ percent is 3.6 percent in the benchmark calibration and 3.4 in the alternative; these numbers are very large compared to the literature.

The different components of UI play key roles in determining the welfare implications of increasing the generosity of UI, as they imply different distributional effects across income and age groups. Increasing the WBA has little effect on overall welfare under the alternative calibration, while it would imply a reduction in welfare under the benchmark. Figure 6 shows that a 10 percent increase in the UI cap (from the benchmark value of \$407.40) keeps welfare relatively constant in the alternative calibration (with a marginal increase of 0.0002 percent in terms of lifetime consumption), but would reduce welfare by 0.07 percent in terms of lifetime consumption in the benchmark calibration. Not matching the composition of bankrupts by employment status leads to qualitatively different implications for policy, not merely quantitative ones.

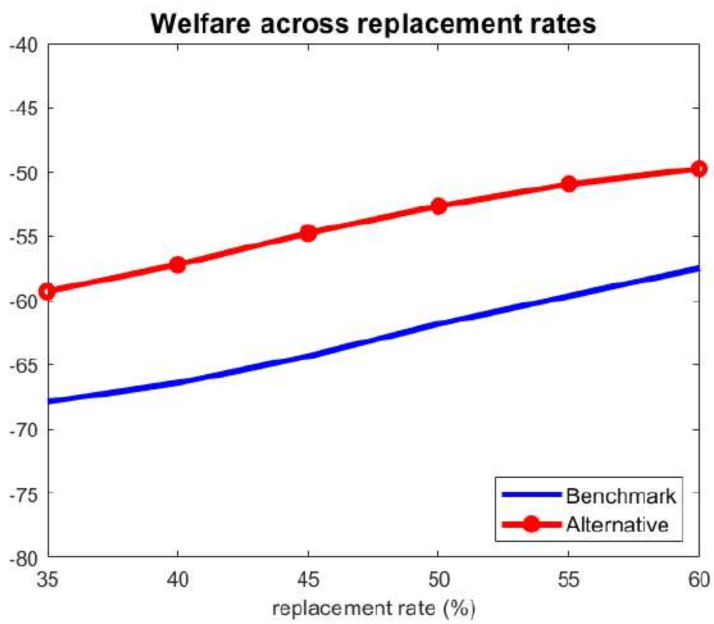

Figure 5: Ex-ante welfare across replacement rates for the benchmark and alternative calibration.

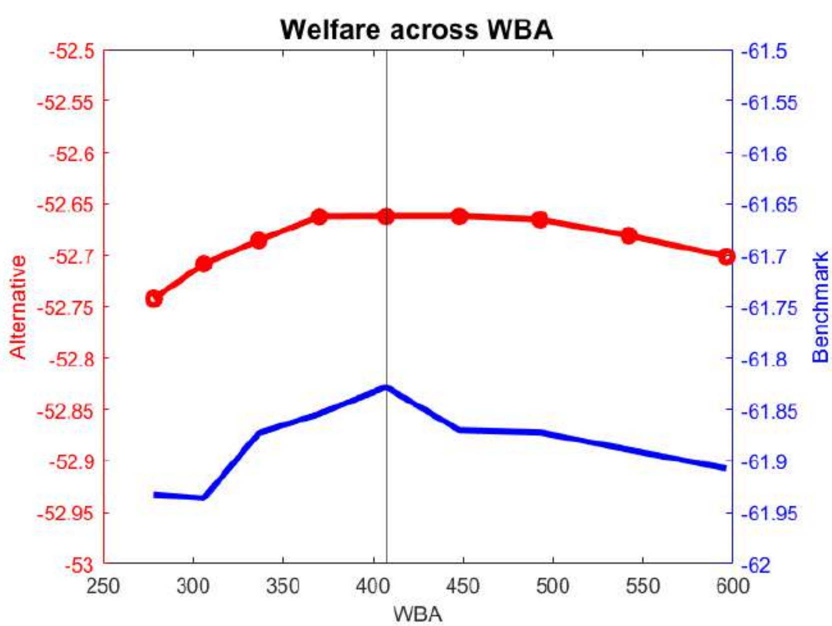

Figure 6: Ex-ante welfare across different maximum WBA for the benchmark and alternative calibration.

8 Conclusion

In this paper, we quantitatively evaluate the effects of UI on consumer bankruptcy from a general equilibrium perspective. Though theoretically the sign of this effect is not obvious, we find evidence that there is a negative relationship between UI caps and Chapter 7 consumer bankruptcy. We find that the workhorse unsecured credit model extended with labor market frictions is not able to account for this negative correlation without disciplining the model to match the employment rate among bankruptcy filers of around 74 percent (most bankruptcy filers report having a job at the moment of filing). Not matching this employment rate underestimates the consumption smoothing benefits of increases in the UI cap. The calibration that overstates the role of job loss in bankruptcy implies that raising the cap generates large welfare losses, while the calibration that respects this moment generates negligible welfare gains.

We also perform policy experiments with the replacement rate. We consider a range of replacement rates from 35 percent to 60 percent. Increasing the replacement rate initially increases the average interest rate, debt, and bankruptcy; all these variables start falling after around a 45 percent replacement rate. The effects are more pronounced in the version of the model that matches the employment rate among bankrupts. With bankruptcy available, we also find positive welfare gains from increasing the replacement rate, as in Chetty (2008). Moreover, these gains can be significant, as we find that increasing the replacement rate from 50 to 55 percent increases welfare in terms of lifetime consumption by around 3.5 percent.

References

Aiyagari, S. Rao. 1994. “Uninsured Idiosyncratic Risk and Aggregate Saving.” *The Quarterly Journal of Economics* 109 (3): 659–684. https://ideas.repec.org/a/oup/qjecon/v109y1994i3p659-684..html.

Albanesi, Stefania, and Jaromir Nosal. 2018. “Insolvency after the 2005 Bankruptcy Reform.” *National Bureau of Economics Working Paper No. 24934.*

Angel, Stefan, and Karin Heitzmann. 2015. “Over-indebtedness in Europe: The relevance of country-level variables for the over-indebtedness of private households.” *Journal of European Social Policy* 25 (3): 331–351. doi:10.1177/0958928715588711.

Arslan, Yavuz, Ahmet Degerli, and Gazi Kabas. 2019. *Unintended consequences of unemployment insurance benefits: the role of banks.* BIS Working Papers 795. Bank for International Settlements, July. https://ideas.repec.org/p/bis/biswps/795.html.

Athreya, Kartik. 2002. “Welfare implications of the Bankruptcy Reform Act of 1999.” *Journal of Monetary Economics* 49, no. 8 (November): 1567–1595. https://ideas.repec.org/a/eee/moneco/v49y2002i8p1567-1595.html.

———. 2003. “Unemployment Insurance and Personal Bankruptcy.” *Federal Reserve Bank of Richmond Economic Quarterly Volume 89/2 Spring 2003.*

———. 2008. “Default, insurance, and debt over the life-cycle.” *Journal of Monetary Economics* 55, no. 4 (May): 752–774. https://ideas.repec.org/a/eee/moneco/v55y2008i4p752-774.html.

Athreya, Kartik, Juan M. Sánchez, Xuan S. Tam, and Eric R. Young. 2015. "Labor market upheaval, default regulations, and consumer debt." *Review of Economic Dynamics* 18 (1): 32–52. doi:http://doi.org/10.1016/j.red.2014.08.001. http://www.sciencedirect.com/science/article/pii/S1094202514000453.

Athreya, Kartik, Juan Sánchez, Xuan S. Tam, and Eric R. Young. 2018. "Bankruptcy and Delinquency in a Model of Unsecured Debt." *International Economic Review* 59 (2): 593–623. https://www.jstor.org/stable/45018866?seq=31.

Athreya, Kartik, and Nicole B. Simpson. 2006. "Unsecured debt with public insurance: From bad to worse." *Journal of Monetary Economics* 53, no. 4 (May): 797–825. https://ideas.repec.org/a/eee/moneco/v53y2006i4p797-825.html.

Athreya, Kartik, Xuan S. Tam, and Eric R. Young. 2010. "Personal Bankruptcy and the Insurance of Labor Income Risk." Manuscript.

———. 2012. "Debt default and the insurance of labor income risk." *Federal Reserve Bank of Richmond. Economic Quarterly* 98 (4): 255–307.

Bethune, Zachary. 2017. "Consumer Credit, Unemployment, and Aggregate Labor Market Dynamics." Manuscript.

Bethune, Zachary, Guillaume Rocheteau, and Peter Rupert. 2015. "Aggregate Unemployment and Household Unsecured Debt." *Review of Economic Dynamics* 18, no. 1 (January): 77–100. doi:10.1016/j.red.2014.08.002. https://ideas.repec.org/a/red/issued/14-29.html.

Braxton, Carter, Kyle Herkenhoff, and Gordon Phillips. 2019. "Can the Unemployed Borrow? Implications for Public Insurance." Manuscript.

Chatterjee, Satyajit, Dean Corbae, Makoto Nakajima, and José-Víctor Ríos-Rull. 2007. "A Quantitative Theory of Unsecured Consumer Credit with Risk of Default." *Econometrica* 75 (6): 1525–1589. doi:10.1111/j.1468-0262.2007.00806.x. http://dx.doi.org/10.1111/j.1468-0262.2007.00806.x.

Chetty, Raj. 2008. "Moral Hazard versus Liquidity and Optimal Unemployment Insurance." *Journal of Political Economy* 116 (2): 173–234. doi:10.1086/588585. eprint: https://doi.org/10.1086/588585. https://doi.org/10.1086/588585.

Dobkin, Carlos, Amy Finkelstein, Raymond Kluender, and Matthew J. Notowidigdo. 2018. "The Economic Consequences of Hospital Admissions." *American Economic Review* 108, no. 2 (February): 308–52. doi:10.1257/aer.20161038. http://www.aeaweb.org/articles?id=10.1257/aer.20161038.

Dube, Arindrajit, T. William Lester, and Michael Reich. 2010. "Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties." *The Review of Economics and Statistics* 92 (4): 945–964. ISSN: 00346535, 15309142. http://www.jstor.org/stable/40985804.

Dubey, Pradeep, John Geanakoplos, and Martin Shubik. 2005. "Default and Punishment in General Equilibrium." *Econometrica* 73 (1): 1–37. https://EconPapers.repec.org/RePEc:ecm:emetrp:v:73:y:2005:i:1:p:1-37.

Eaton, Jonathan, and Mark Gersovitz. 1981. "Debt with Potential Repudiation: Theoretical and Empirical Analysis." *Review of Economic Studies* 48 (2): 289–309. https://EconPapers.repec.org/RePEc:oup:restud:v:48:y:1981:i:2:p:289-309..

Elias, Stephen. 2007. *The New Bankruptcy: Will It Work for You?* Nolo Press.

Elias, Stephen, Robin Leonard, and Albin Renauer. 1989. *How to File for Bankruptcy.* Nolo Press.

Fay, Scott, Erik Hurst, and Michelle J. White. 1998. *The Bankruptcy Decision: Does Stigma Matter?* Working Papers. Michigan - Center for Research on Economic & Social Theory. http://EconPapers.repec.org/RePEc:fth:michet:98-01.

Fisher, Jonathan D. 2005. "The Effect of Unemployment Benefits, Welfare Benefits, and Other Income on Personal Bankruptcy." *Contemporary Economic Policy* 23 (4): 483–492. ISSN: 1465-7287. doi:10.1093/cep/byi036. http://dx.doi.org/10.1093/cep/byi036.

———. 2019. "Who Files for Personal Bankruptcy in the United States?" *Journal of Consumer Affairs* 53, no. 4 (December): 2003–2026. doi:10.1111/joca.12280. https://ideas.repec.org/a/bla/jconsa/v53y2019i4p2003-2026.html.

Gordon, Grey. 2017. "Optimal bankruptcy code: A fresh start for some." *Journal of Economic Dynamics and Control* 85 (C): 123–149. doi:https://doi.org/10.1016/j.jedc.2017.10.005.

Gross, David B., and Nicholas S. Souleles. 2002. "Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data." *The Quarterly Journal of Economics* 117 (1): 149–185. http://EconPapers.repec.org/RePEc:oup:qjecon:v:117:y:2002:i:1:p:149-185..

Hagedorn, Marcus, Fatih Karahan, Iourii Manovskii, and Kurt Mitman. 2019. "Unemployment Benefits and Unemployment in the Great Recession: The Role of Macro Effects." *Mimeo* (January).

Han, Song, and Geng Li. 2011. "Household Borrowing after Personal Bankruptcy." *Journal of Money, Credit and Banking* 43 (2-3): 491–517. ISSN: 1538-4616. doi:10.1111/j.1538-4616.2010.00382.x. http://dx.doi.org/10.1111/j.1538-4616.2010.00382.x.

Hansen, Gary, and Ayse Imrohoroglu. 1992. "The Role of Unemployment Insurance in an Economy with Liquidity Constraints and Moral Hazard." *Journal of Political Economy* 100, no. 1 (February): 118–142. https://ideas.repec.org/a/ucp/jpolec/v100y1992i1p118-42.html.

Heathcote, Jonathan, Fabrizio Perri, and Giovanni L. Violante. 2010. "Unequal We Stand: An Empirical Analysis of Economic Inequality in the United States: 1967-2006." *Review of Economic Dynamics* 13, no. 1 (January): 15–51. doi:10.1016/j.red.2009.12.001. https://ideas.repec.org/a/red/issued/09-214.html.

Herkenhoff, Kyle. 2014. *The Impact of Consumer Credit Access on Unemployment.* 2014 Meeting Papers 448. Society for Economic Dynamics. https://ideas.repec.org/p/red/sed014/448.html.

Hsu, Joanne W., David A. Matsa, and Brian T. Melzer. 2018. "Unemployment Insurance as a Housing Market Stabilizer." *American Economic Review* 108, no. 1 (January): 49–81. doi:10.1257/aer.20140989. http://www.aeaweb.org/articles?id=10.1257/aer.20140989.

Jones, Donald R., Cary D. Perttunen, and Bruce E. Stuckman. 1993. "Lipschitzian Optimization Without the Lipschitz Constant." *Journal of Optimization Theory and Applications* 79:157–181.

Kehoe, Patrick J., Virgiliu Midrigan, and Elena Pastorino. 2019. "Debt Constraints and Employment." *Journal of Political Economy* 127 (4): 1926–1991. doi:https://doi.org/10.1086/701608.

Keys, Benjamin J. 2018. "The Credit Market Consequences of Job Displacement." *The Review of Economics and Statistics* 100, no. 3 (July): 405–415. https://ideas.repec.org/a/tpr/restat/v100y2018i3p405-415.html.

Koehne, Sebastian, and Moritz Kuhn. 2015. "Should unemployment insurance be asset-tested?" *Review of Economic Dynamics* 18, no. 3 (July): 575–592. doi:10.1016/j.red.2014.09.005. https://ideas.repec.org/a/red/issued/13-151.html.

Krusell, Per, Toshihiko Mukoyama, and Aysegul Sahin. 2010. "Labour-Market Matching with Precautionary Savings and Aggregate Fluctuations." *The Review of Economic Studies* 77 (4): 1477. doi:10.1111/j.1467-937X.2010.00700.x. eprint: /oup/backfile/Content_public/Journal/restud/77/4/10.1111/j.1467-937X.2010.00700.x/2/77-4-1477.pdf. +%20http://dx.doi.org/10.1111/j.1467-937X.2010.00700.x.

Legal, Diego, and Eric R. Young. 2024. "The effect of minimum wages on consumer bankruptcy." Inequality in Consumer Credit and Payments, *Journal of Economics and Business* 129:106171. ISSN: 0148-6195. doi:https://doi.org/10.1016/j.jeconbus.2024.106171. https://www.sciencedirect.com/science/article/pii/S0148619524000134.

Livshits, Igor. 2015. "Recent Developments in Consumer Credit and Default Literature." *Journal of Economic Surveys* 29 (4): 594–613. ISSN: 1467-6419. doi:10.1111/joes.12119. http://dx.doi.org/10.1111/joes.12119.

Livshits, Igor, James MacGee, and Michèle Tertilt. 2007. "Consumer Bankruptcy: A Fresh Start." *American Economic Review* 97, no. 1 (March): 402–418. https://ideas.repec.org/a/aea/aecrev/v97y2007i1p402-418.html.

Low, Hamish, Costas Meghir, and Luigi Pistaferri. 2010. "Wage Risk and Employment Risk over the Life Cycle." *American Economic Review* 100, no. 4 (September): 1432–67. doi:10.1257/aer.100.4.1432. http://www.aeaweb.org/articles?id=10.1257/aer.100.4.1432.

Mahoney, Neale. 2015. "Bankruptcy as Implicit Health Insurance." *American Economic Review* 105, no. 2 (February): 710–46. doi:10.1257/aer.20131408. http://www.aeaweb.org/articles?id=10.1257/aer.20131408.

Michelacci, Claudio, and Hernán Ruffo. 2015. "Optimal Life Cycle Unemployment Insurance." *American Economic Review* 105, no. 2 (February): 816–59. doi:10.1257/aer.20111559. http://www.aeaweb.org/articles?id=10.1257/aer.20111559.

Mitman, Kurt, and Stanislav Rabinovich. 2015. "Optimal unemployment insurance in an equilibrium business-cycle model." *Journal of Monetary Economics* 71 (C): 99–118. doi:https://doi.org/10.1016/j.jmoneco.2014.11.009.

Pattison, Nathaniel. 2020. "Consumption Smoothing and Debtor Protections." *Journal of Public Economics* 192. https://www.sciencedirect.com/science/article/pii/S0047272720301705?via%3Dihub.

Schmieder, Johannes, and Till von Wachter. 2016. *The Effects of Unemployment Insurance Benefits: New Evidence and Interpretation.* Working Paper 22564. National Bureau of Economic Research, August. doi:10.3386/w22564. http://www.nber.org/papers/w22564.

Shimer, Robert. 2005. "The Cyclical Behavior of Equilibrium Unemployment and Vacancies." *American Economic Review* 95, no. 1 (March): 25–49. https://ideas.repec.org/a/aea/aecrev/v95y2005i1p25-49.html.

———. 2012. "Reassessing the Ins and Outs of Unemployment." *Review of Economic Dynamics* 15, no. 2 (April): 127–148. doi:https://doi.org/10.1016/j.red.2012.02.001.

Sullivan, Teresa A., Elizabeth Warren, and Jay Westbrook. 2000. *The Fragile Middle Class: Americans in Debt.* Yale University Press, New Haven.

US GAO. 2008. "Bankruptcy Reform: Dollar Costs Associated with the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005." *Report to Congressional Requesters GAO-08-697. US Government Accountability Office.*

Young, Eric R. 2004. "Unemployment insurance and capital accumulation." *Journal of Monetary Economics* 51, no. 8 (November): 1683–1710. https://ideas.repec.org/a/eee/moneco/v51y2004i8p1683-1710.html.

Zame, William R. 1993. "Efficiency and the Role of Default When Security Markets Are Incomplete." *American Economic Review* 83, no. 5 (December): 1142–1164. https://ideas.repec.org/a/aea/aecrev/v83y1993i5p1142-64.html.

Appendix

A Additional details on consumer bankruptcy and UI in the US

A.1 Consumer bankruptcy in the US

Bankruptcy is a legal procedure through which borrowers can formally default on their unsecured debts. Consumer bankruptcies almost entirely fall under Chapter 7 or Chapter 13 of the US Bankruptcy Code. We focus on Chapter 7, since it represents around 70 percent of all consumer bankruptcies. Under this chapter, debtors obtain the full discharge of their total qualifying unsecured debts, and their current and future earnings are protected from any debt collection action.[40] Chapter 7 is a liquidation type of bankruptcy, since it requires the liquidation of all nonexempt assets in order to repay lenders. However, at most 5 percent of Chapter 7 cases yield assets that could be liquidated to repay creditors, as noted in Livshits, MacGee, and Tertilt (2007). Chapter 13 is a reorganization type of bankruptcy. Debtors keep their assets and repay all or a fraction of their debts through a repayment plan. The final amount paid back to lenders will depend on the debtor's income, expenses, and type of debt.

The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA) was the last major change to the US Bankruptcy Code. BAPCPA increased the barriers for individuals to file for bankruptcy by *(i)* introducing means-testing of income into Chapter 7 regulations, *(ii)* adding more complicated paperwork requirements that resulted in higher

40. Some debts, such as alimony, student loans, and most tax debts, generally cannot be discharged.

court and legal fees (a 50 percent increase on average, from \$921 to \$1,377; see US GAO (2008)), *(iii)* requiring mandatory credit counseling at the expense of the filer, *(iv)* adding two-year residency requirements within a state, *(v)* increasing the waiting period to file again for Chapter 7 from 6 to 8 years (provided discharge was received the first time), and *(vi)* adding a cap to the state homestead exemption by requiring that, in order to take advantage of the exemption fully, the filer had to have purchased her home at least 1,215 days (around 3.3 years) before filing, or otherwise imposing a cap of around \$160,000.

In order to qualify directly for Chapter 7, a filer's income should be below the state median income for a household of her size. If not, the means-testing provision requires the filer's disposable income to be calculated. A filer will not pass the means test if her disposable income is beyond a certain threshold. Using administrative data from the US Courts (2007), we find that 99 percent would pass the means test, suggesting that this provision played little role.

Bankruptcy Exemptions. Exemptions are state and federal laws specifying types and amounts of assets protected from liquidation to pay creditors. In Chapter 7 bankruptcies, exemptions are used to determine how much property filers are allowed to keep. In Chapter 13 bankruptcies, debtors keep all their property but must pay unsecured creditors an amount that is at most equal to the value of nonexempt assets, so exemptions help keep debtors' plan payments low.

Exemptions include homesteads, personal property, retirement accounts, and public benefits (Social Security, unemployment, veterans benefits, public assistance, and disability or illness benefits), among others. Wildcard exemptions may be applied to any property. The amount of exempt assets varies widely across states. Table 7 in Appendix C shows different asset exemption levels in 2007. For example, some states are very generous, providing unlimited homestead exemptions, while others do not offer such exemptions at all. In addition, some states allow filers to choose between state or federal exemptions, presumably choosing the more generous option in their particular case.

States often update their exemption levels. Table 8 in Appendix C shows homestead exemption levels for 1989 and 2017 and the years when they were updated.

B Figures

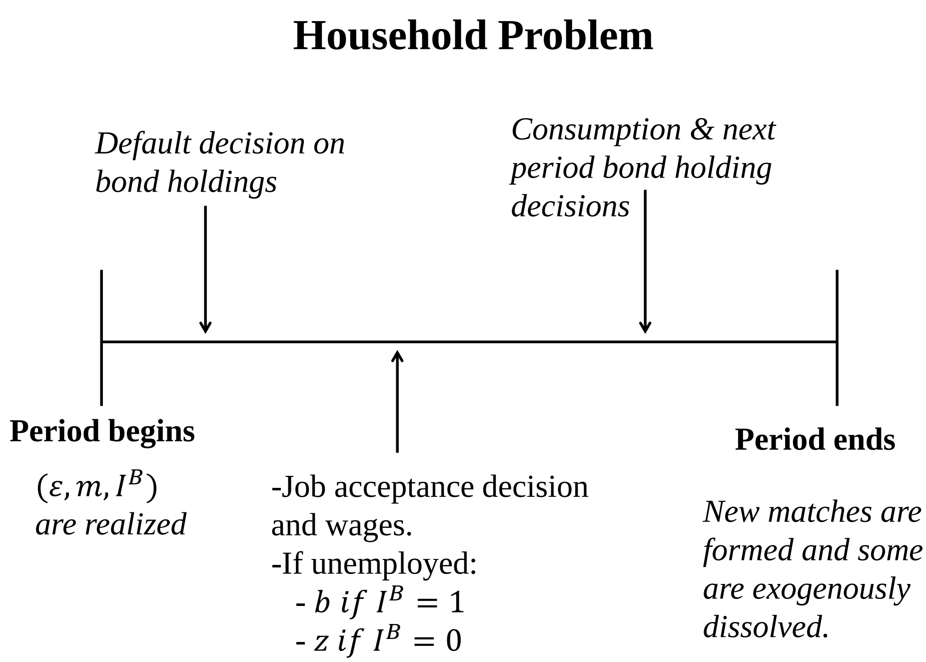

Figure 7: Timing within a period. Note that since all the uncertainty is resolved at the beginning of the period, this timing is irrelevant and is just an artifact to present the model in an organized way.

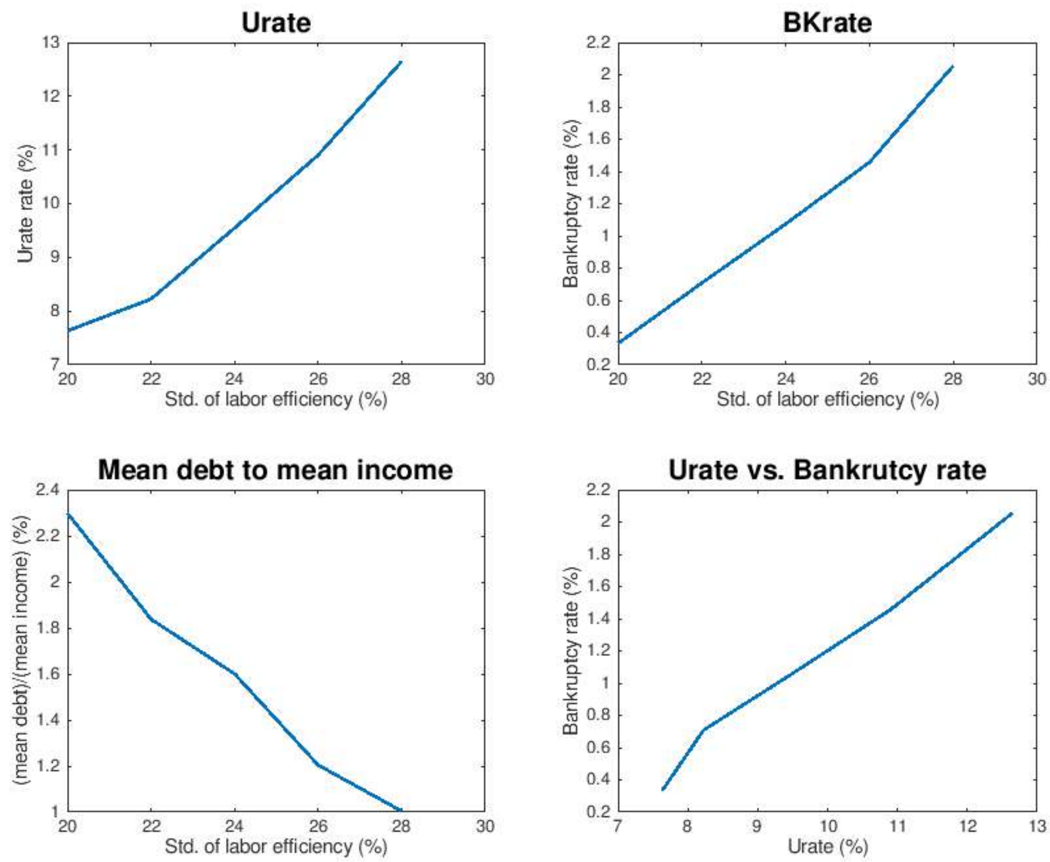

Figure 8: Steady state comparison for different levels of standard deviation of labor productivity (the implied log wage standard deviations are 0.40, 0.43, 0.47, 0.51, and 0.55).

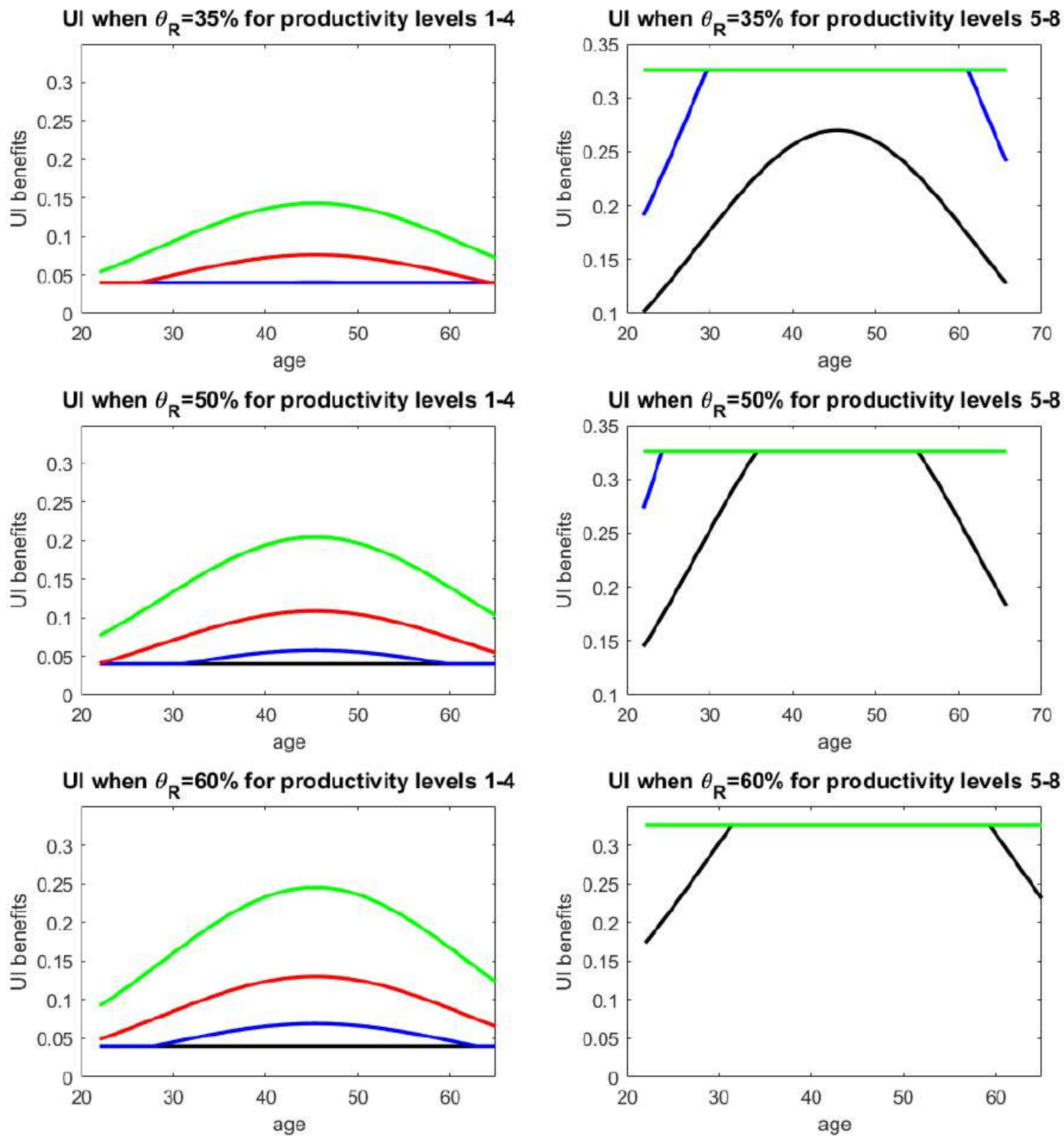

Figure 9: Steady-state comparison of UI benefits (normalized units) across age, labor productivity, and different replacement rates.

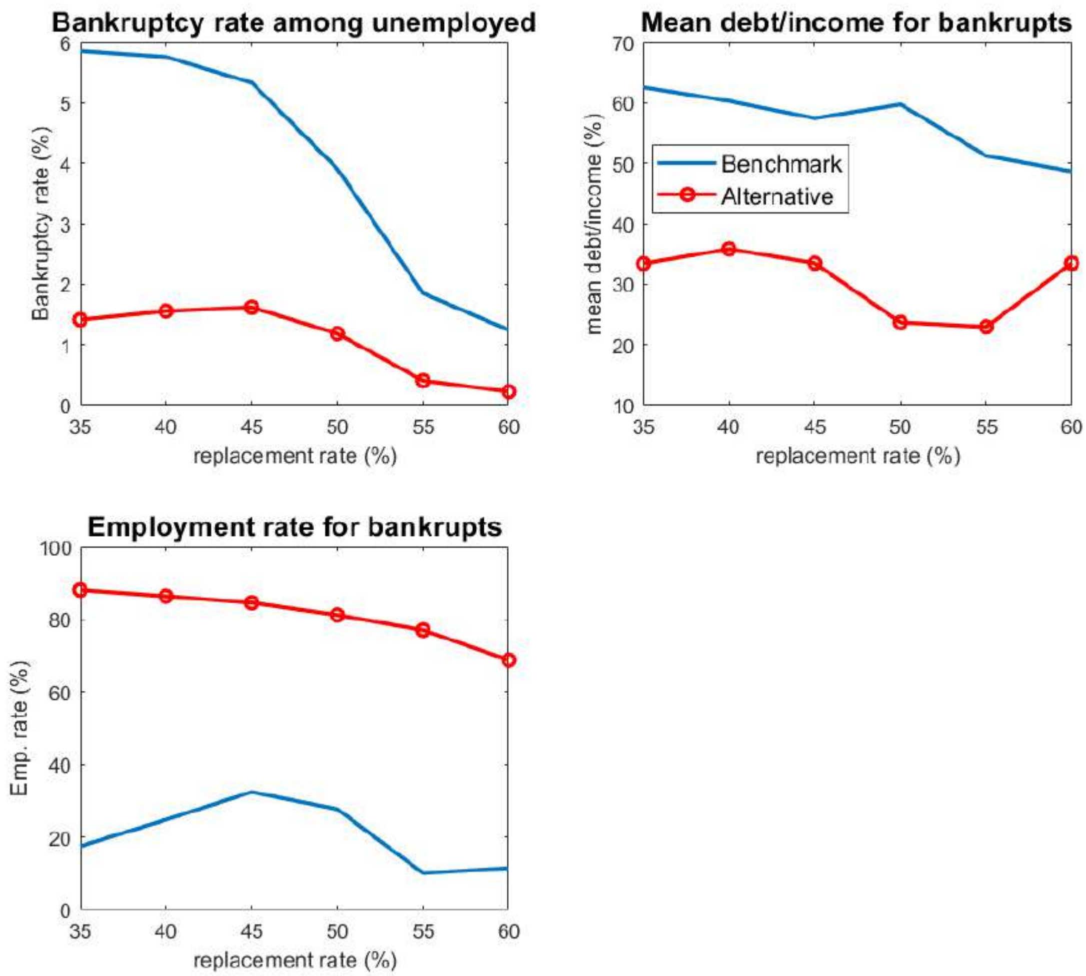

Figure 10: Comparison of the bankruptcy rate among the unemployed, the mean debt-to-income ratio, and the employment rate for bankruptcy filers across different replacement rates.

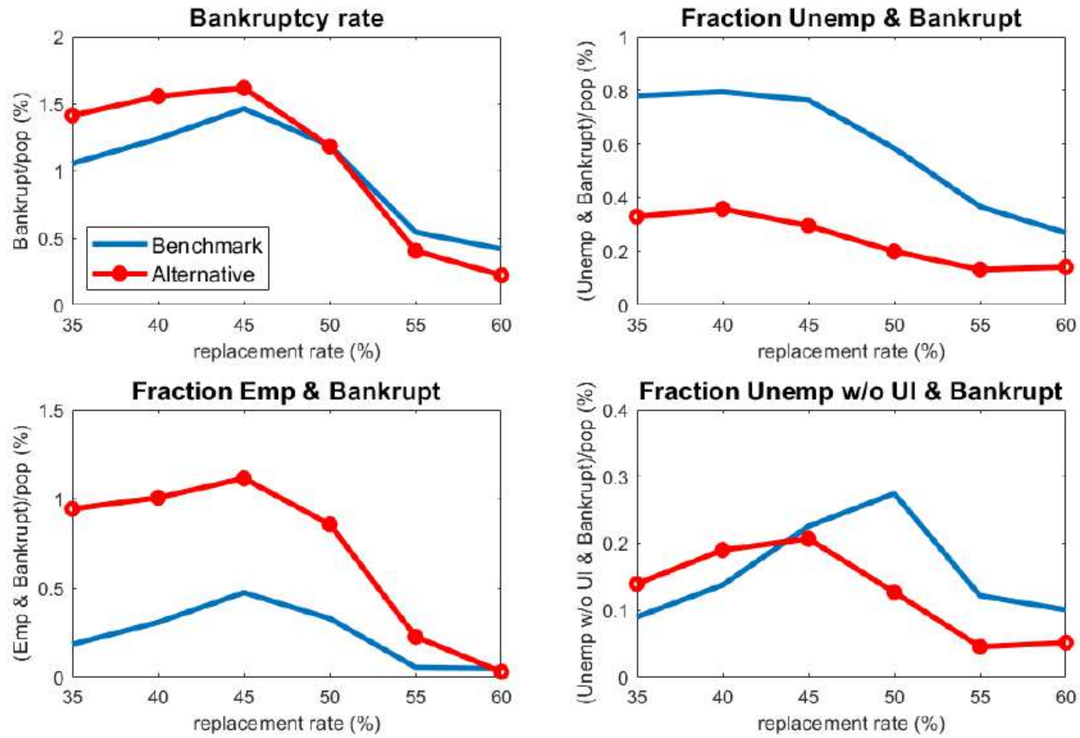

Figure 11: Bankruptcy rate, fraction of the population unemployed and bankrupt, fraction of the population employed and bankrupt, and fraction of the population unemployed without UI and bankrupt across different replacement rates under both calibrations.

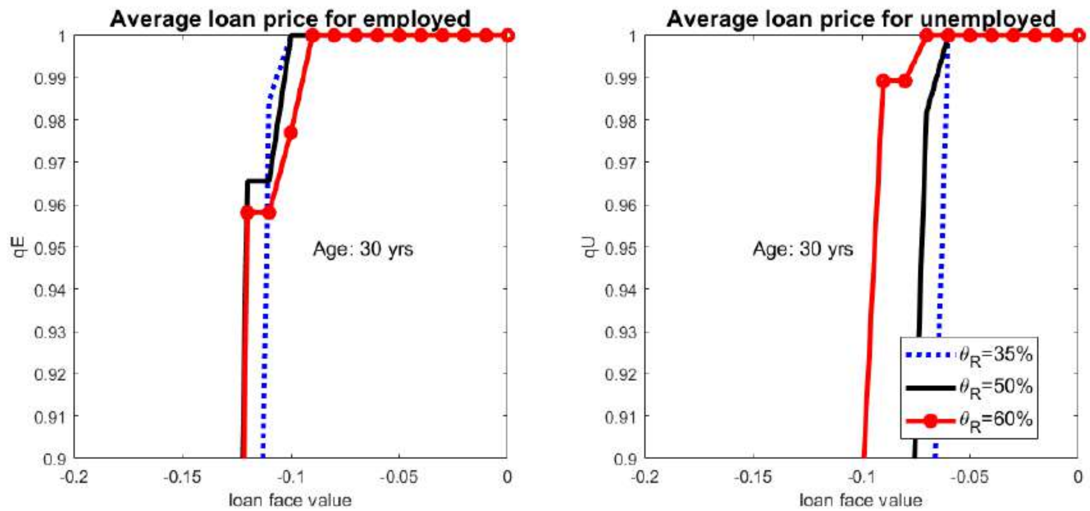

Figure 12: Comparison of loan price schedules for employed and unemployed workers across different replacement rates.

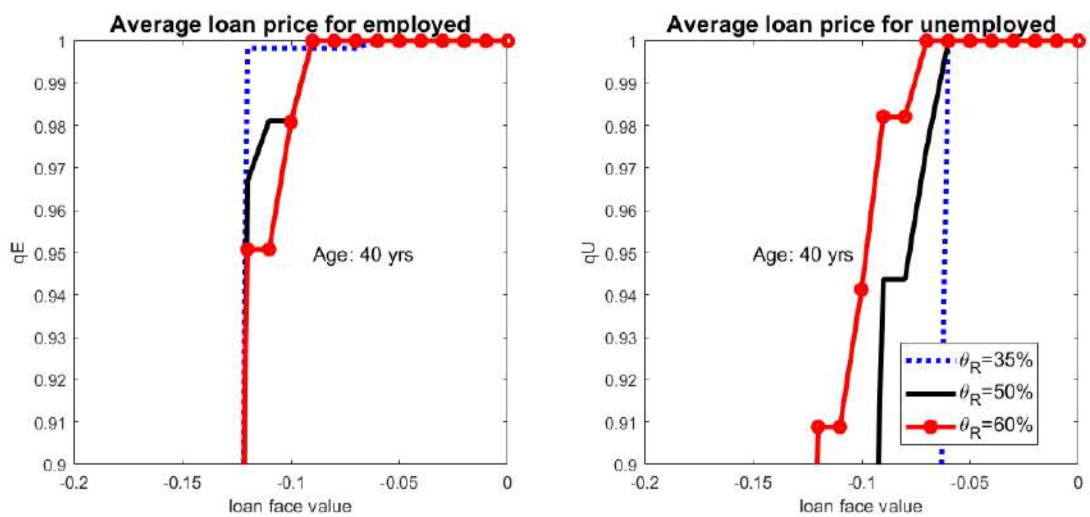

Figure 13: Comparison of loan price schedules for employed and unemployed workers across different replacement rates.

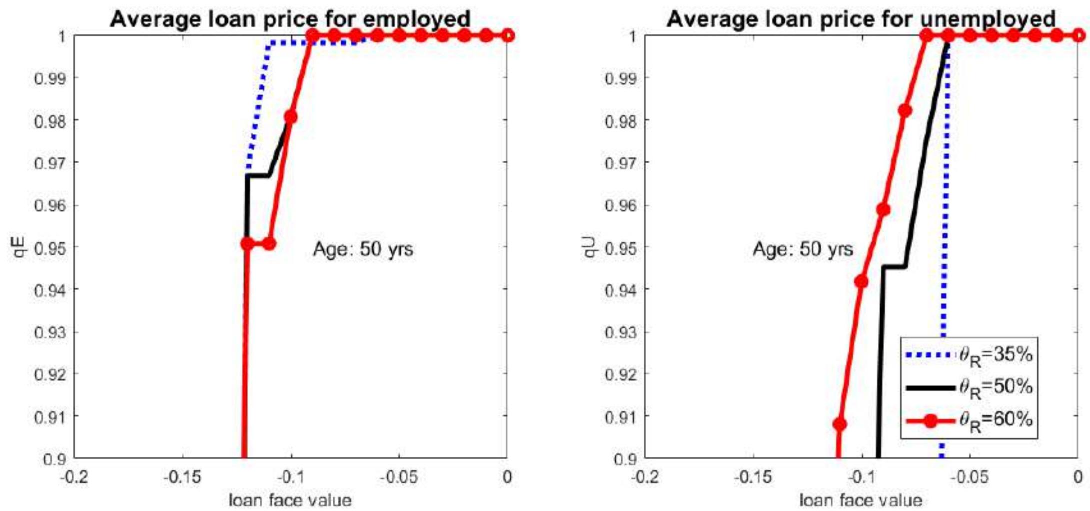

Figure 14: Comparison of loan price schedules for employed and unemployed workers across different replacement rates.

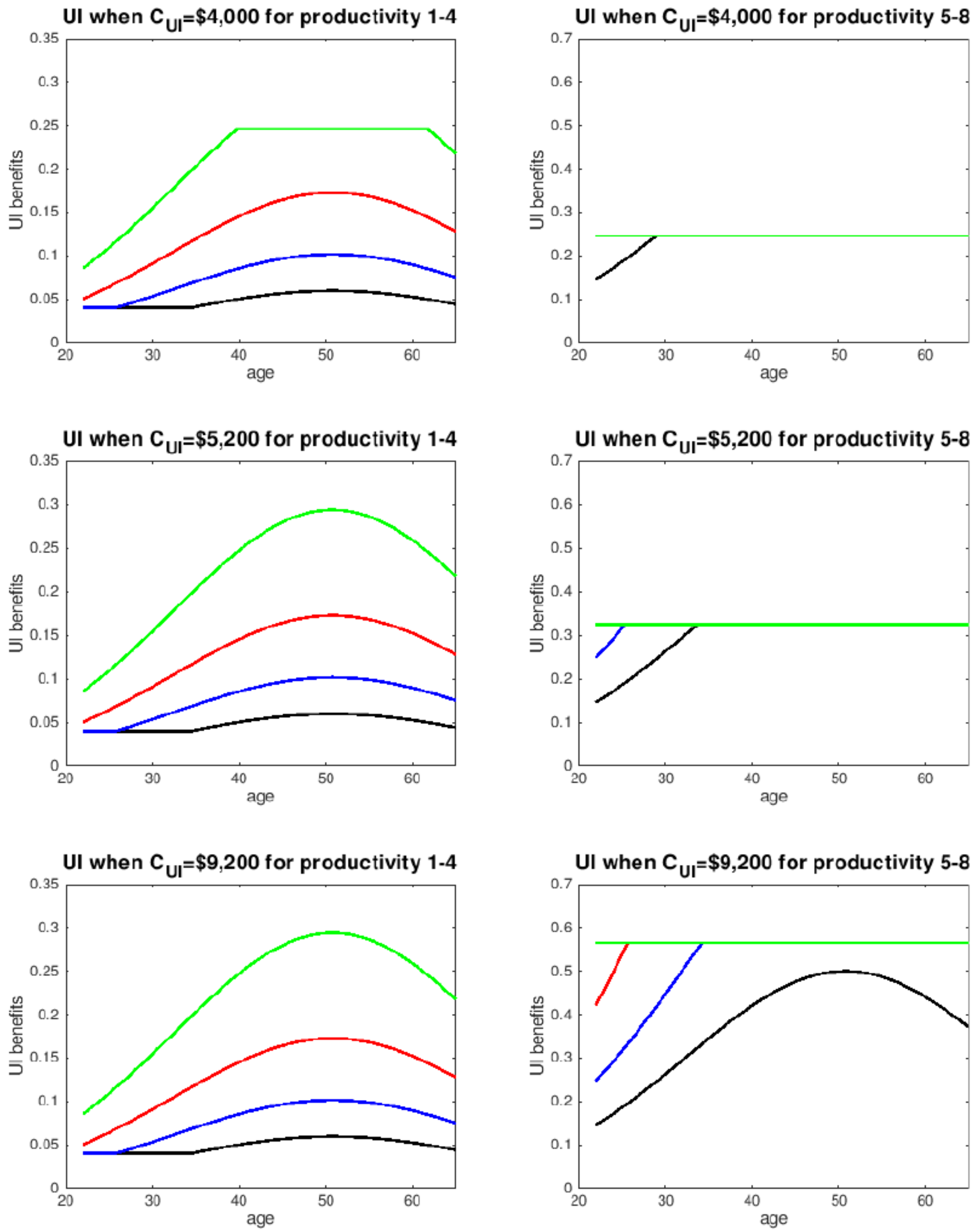

Figure 15: Steady-state comparison of UI benefits (normalized units) across age, labor productivity, and different levels of the UI cap.

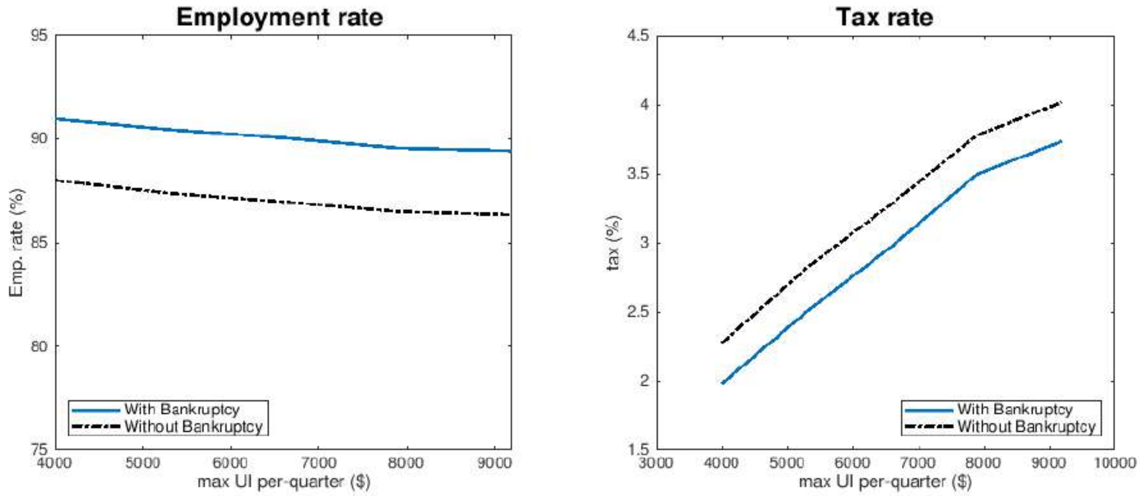

Figure 16: Steady-state comparison for employment rate and labor tax across different UI caps for scenarios with and without bankruptcy.

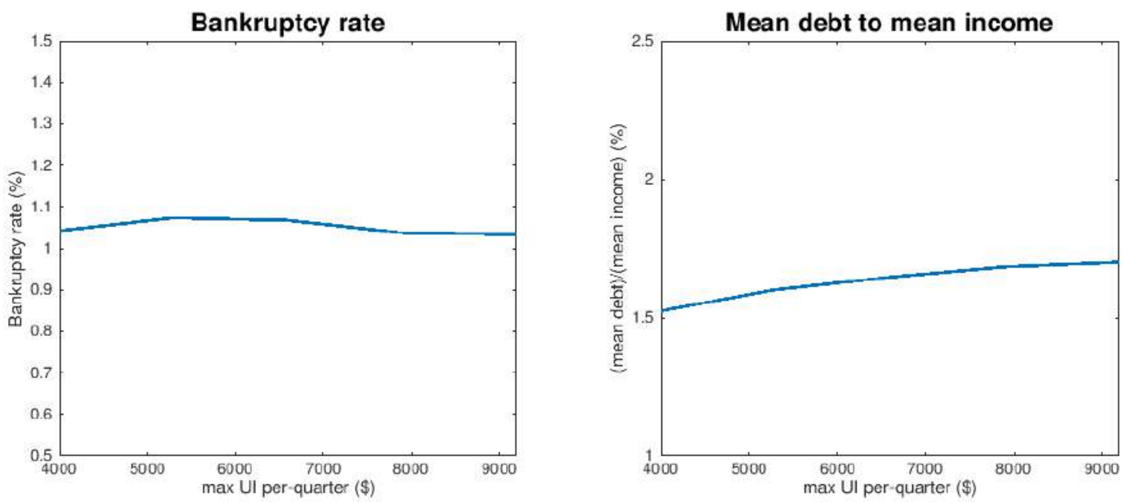

Figure 17: Steady-state comparison for bankruptcy rate and mean-debt to mean-income ratio across different UI caps for scenarios with and without bankruptcy.

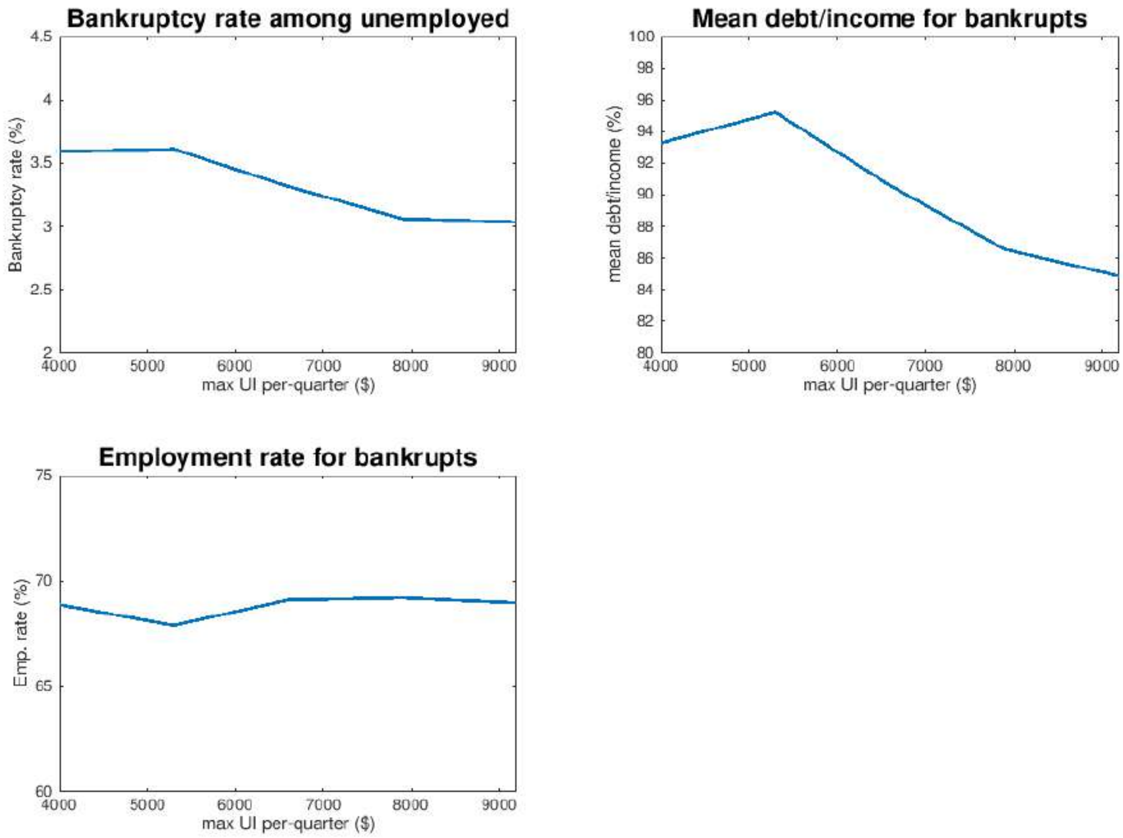

Figure 18: Steady-state comparison of the bankruptcy rate among the unemployed, the mean debt-to-income ratio, and the employment rate for bankruptcy filers for different values of UI caps.

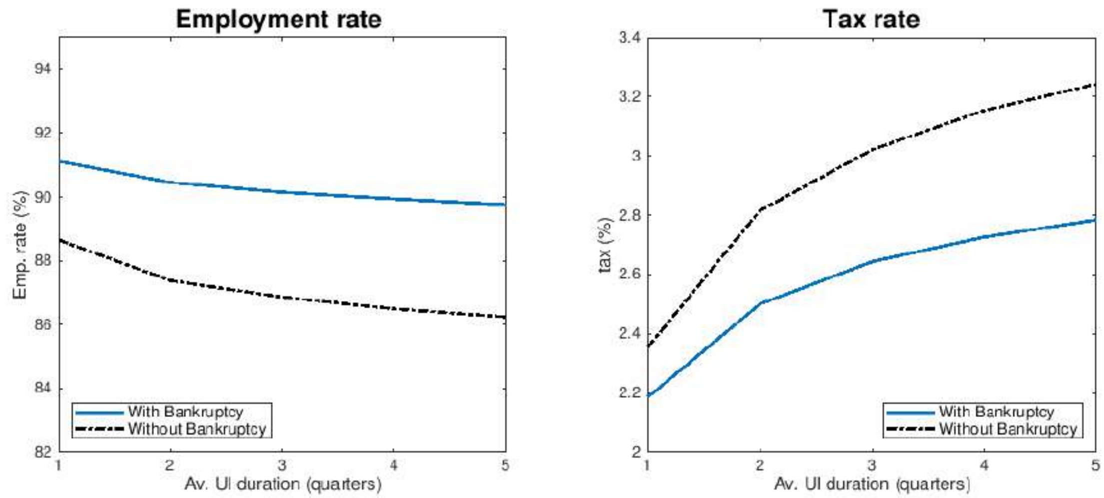

Figure 19: Steady-state comparison for employment rate and labor tax across different UI average durations (in quarters) for scenarios with and without bankruptcy.

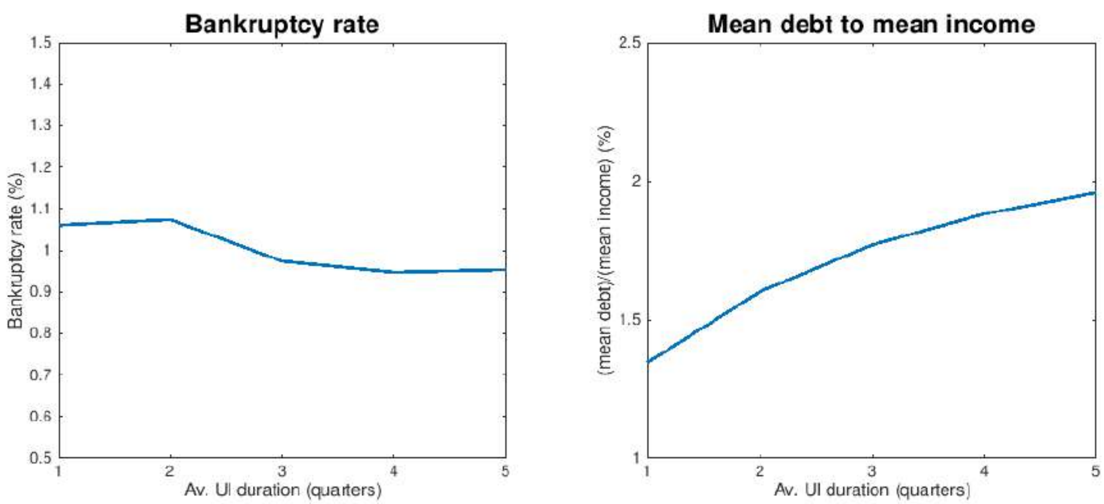

Figure 20: Steady-state comparison for bankruptcy rate and mean-debt to mean-income ratio across different UI average durations (in quarters) for scenarios with and without bankruptcy.

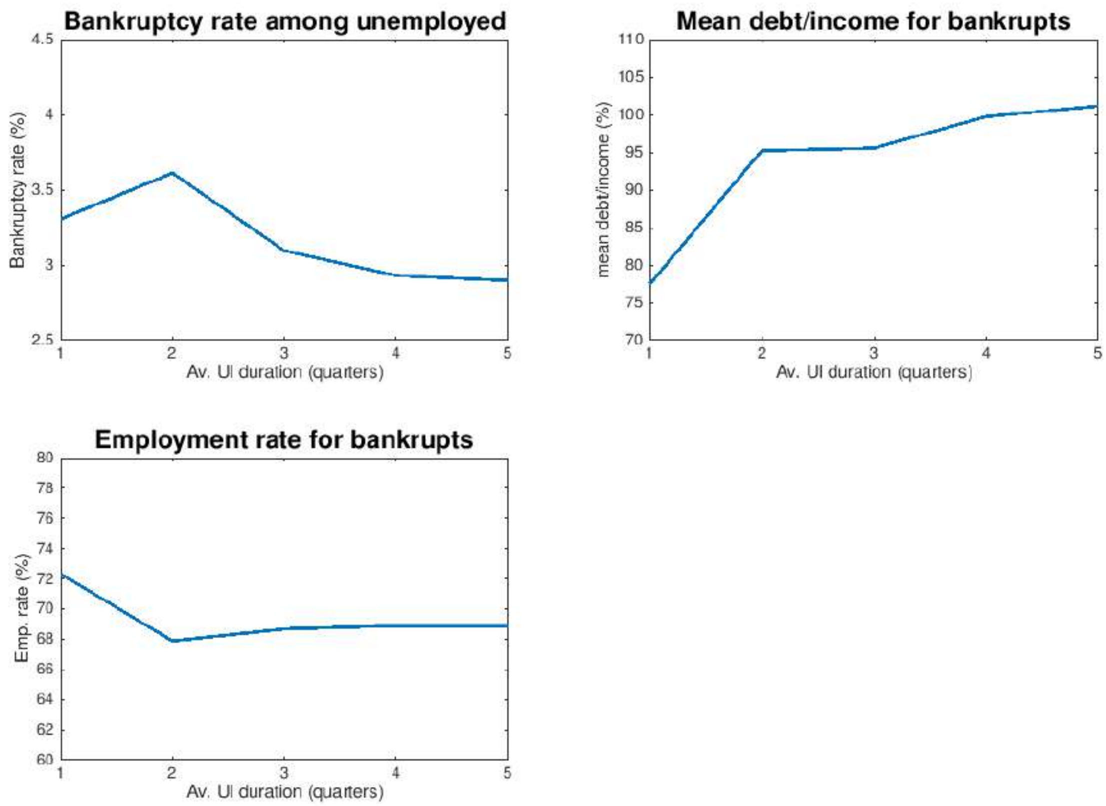

Figure 21: Steady-state comparison: bankruptcy rate among unemployed, mean debt-to-income ratio, and the employment rate for bankruptcy filers for different values of the average duration of UI benefits.

C Tables

Table 7: Asset exemptions (2007)

State	Homestead	Vehicle	Retirement	Other Financial Assets	Wildcard	Federal Available
Alabama	10,000	0	Unlimited	0	6,000	No
Alaska	67,500	7,500	Unlimited	3,500	0	No
Arizona	150,000	10,000	Unlimited	300	0	No
Arkansas	Unlimited	2,400	40,000	0	500	Yes
California, system 1	75,000	4,600	Unlimited	1,825	0	No
California, system 2	0	2,975	Unlimited	0	19,675	No
Colorado	90,000	6,000	Unlimited	0	0	No
Connecticut	150,000	3,000	Unlimited	0	2,000	Yes
Delaware	0	0	Unlimited	0	500	No
District of Columbia	Unlimited	5,150	Unlimited	0	17,850	Yes
Florida	Unlimited	2,000	Unlimited	0	2,000	No
Georgia	10,000	7,000	Unlimited	0	11,200	No
Hawaii	40,000	5,150	Unlimited	0	0	Yes
Idaho	50,000	6,000	Unlimited	0	1,600	No
Illinois	15,000	2,400	Unlimited	0	4,000	No
Indiana	0	0	Unlimited	0	20,000	No
Iowa	Unlimited	1,000	Unlimited	0	200	No
Kansas	Unlimited	40,000	Unlimited	0	0	No
Kentucky	10,000	5,000	Unlimited	0	2,000	No
Louisiana	25,000	0	Unlimited	0	0	No
Maine	70,000	10,000	Unlimited	0	12,800	No
Maryland	0	0	Unlimited	0	22,000	No
Massachusetts	1,000,000	1,400	Unlimited	1,250	0	Yes
Michigan	7,000	0	Unlimited	0	0	No
Minnesota	200,000	7,600	Unlimited	0	0	Yes
Mississippi	150,000	0	Unlimited	0	10,000	No
Missouri	15,000	6,000	Unlimited	0	1,250	No
Montana	200,000	5,000	Unlimited	0	0	No
Nebraska	12,500	0	Unlimited	0	0	No
Nevada	400,000	30,000	1,000,000	0	0	No
New Hampshire	200,000	8,000	Unlimited	0	8,000	Yes
New Jersey	0	0	Unlimited	0	2,000	Yes
New Mexico	60,000	8,000	Unlimited	0	1,000	Yes
New York	20,000	0	Unlimited	0	10,000	No
North Carolina	13,000	3,000	Unlimited	0	8,000	No
North Dakota	80,000	2,400	200,000	0	0	No
Ohio	10,000	2,000	Unlimited	800	800	No
Oklahoma	Unlimited	6,000	Unlimited	0	0	No
Oregon	33,000	3,400	15,000	15,000	800	No
Pennsylvania	0	0	Unlimited	0	600	Yes
Rhode Island	200,000	20,000	Unlimited	0	0	Yes
South Carolina	10,000	2,400	Unlimited	0	0	No
South Dakota	Unlimited	0	500,000	0	4,000	No
Tennessee	7,500	0	Unlimited	0	8,000	No
Texas	Unlimited	0	Unlimited	0	60,000	Yes
Utah	40,000	5,000	Unlimited	0	0	No
Vermont	150,000	5,000	Unlimited	1,400	8,400	Yes
Virginia	0	4,000	35,000	0	32,000	No
Washington	40,000	5,000	Unlimited	0	4,000	Yes
West Virginia	0	4,800	Unlimited	0	51,600	No
Wisconsin	40,000	0	Unlimited	2,000	10,000	Yes
Wyoming	20,000	4,800	Unlimited	0	0	No
Federal	18,500	5,900	Unlimited	0	20,450	n/a
Averages*	58,821	4,884	298,333	501	6,592	0

Source: Mahoney (2015). Note: Contemporaneous exemptions for couples filing jointly are from Elias (2007). Under contemporaneous law, California residents can choose between systems 1 and 2, and residents can choose federal exemptions in states where state exemptions are not available. States that do not have homestead exemptions are assigned a value of zero.
*Excludes states with unlimited or n/a exemptions.

Table 8: Homestead exemptions 1989 and 2017

State	1989	2007	Years of change
Alabama	5000	15000	2015
Alaska	54000	72900	1992, 1999, 2004, 2008, 2012
Arizona	100000	150000	2004
Arkansas	999999	999999	
California	30000	75000	1990, 2010
Colorado	20000	60000	1991, 2000, 2007
Connecticut	0	75000	1993
Delaware	0	125000	2006, 2010, 2011, 2012
Florida	999999	999999	
Georgia	5000	21500	2001, 2012
Hawaii	20000	20000	
Idaho	30000	100000	1992, 2006
Illinois	7500	15000	2006
Indiana	7500	17600	2005, 2010
Iowa	999999	999999	
Kansas	999999	999999	
Kentucky	5000	5000	
Louisiana	15000	35000	2000, 2009
Maine	7500	47500	1991, 2001, 2003, 2008
Maryland	0	23675	2011, 2013, 2016
Massachusetts	100000	500000	2000, 2004
Michigan	3500	38225	2005, 2008, 2011, 2017
Minnesota	999999	390000	1993, 2007, 2010, 2012
Mississippi	30000	75000	1991
Missouri	8000	15000	2003
Montana	40000	250000	1997, 2001, 2007
Nebraska	10000	60000	1997, 2007
Nevada	95000	550000	1995, 2003, 2005, 2007
New Hampshire	5000	100000	1992, 2002, 2004
New Jersey	0	0	
New Mexico	20000	60000	1993, 2007
New York	10000	75000	2005, 2011
North Carolina	7500	35000	1991, 2006, 2009
North Dakota	80000	100000	2009
Ohio	5000	132900	2008, 2010, 2013
Oklahoma	999999	999999	
Oregon	15000	40000	1993, 2006, 2009
Pennsylvania	0	0	
Rhode Island	0	500000	1999, 2001, 2004, 2006, 2012
South Carolina	5000	59100	2006, 2010, 2012, 2016
South Dakota	999999	999999	
Tennessee	5000	5000	
Texas	999999	999999	
Utah	8000	30000	1997, 1999, 2013
Vermont	30000	125000	1997, 2009
Virginia	5000	5000	
Washington	30000	125000	1999, 2007
West Virginia	7500	25000	1996, 2002
Wisconsin	40000	75000	2009
Wyoming	10000	20000	2012

Source: Pattison (2020) constructed from Elias, Leonard, and Renauer (1989) and state statutes.

Table 9: Annual bankruptcy rates by state 1991-2017

	Chapter 7				Chapter 13				
state	mean	sd	min	max	mean	sd	min	max	N. Obs.
Alabama	0.274	0.107	0.141	0.614	0.398	0.055	0.280	0.481	27
Alaska	0.133	0.065	0.043	0.309	0.016	0.004	0.009	0.025	27
Arizona	0.334	0.121	0.102	0.609	0.073	0.027	0.022	0.109	27
Arkansas	0.290	0.147	0.146	0.716	0.231	0.073	0.117	0.368	27
California	0.324	0.122	0.076	0.515	0.084	0.033	0.027	0.161	27
Colorado	0.323	0.158	0.166	0.849	0.060	0.017	0.036	0.102	27
Connecticut	0.229	0.078	0.101	0.382	0.039	0.009	0.025	0.060	27
DC	0.168	0.098	0.049	0.369	0.073	0.042	0.016	0.145	27
Delaware	0.190	0.062	0.077	0.348	0.095	0.034	0.041	0.173	27
Florida	0.277	0.101	0.087	0.494	0.092	0.036	0.035	0.150	27
Georgia	0.285	0.088	0.163	0.500	0.389	0.085	0.250	0.525	27
Hawaii	0.191	0.115	0.060	0.436	0.031	0.015	0.006	0.063	27
Idaho	0.353	0.153	0.157	0.738	0.070	0.030	0.024	0.117	27
Illinois	0.347	0.118	0.146	0.697	0.133	0.034	0.071	0.176	27
Indiana	0.457	0.182	0.224	1.042	0.126	0.046	0.050	0.203	27
Iowa	0.243	0.109	0.117	0.585	0.020	0.004	0.014	0.030	27
Kansas	0.289	0.133	0.126	0.692	0.094	0.018	0.057	0.123	27
Kentucky	0.379	0.140	0.196	0.812	0.104	0.024	0.060	0.141	27
Louisiana	0.207	0.121	0.080	0.545	0.206	0.046	0.096	0.257	27
Maine	0.204	0.099	0.074	0.461	0.026	0.008	0.016	0.042	27
Maryland	0.302	0.114	0.084	0.489	0.122	0.044	0.076	0.214	27
Massachusetts	0.198	0.073	0.076	0.366	0.045	0.013	0.029	0.083	27
Michigan	0.332	0.139	0.160	0.725	0.100	0.037	0.060	0.183	27
Minnesota	0.241	0.070	0.111	0.405	0.060	0.020	0.027	0.096	27
Mississippi	0.303	0.131	0.140	0.596	0.226	0.043	0.157	0.330	27
Missouri	0.314	0.126	0.170	0.743	0.122	0.026	0.076	0.178	27
Montana	0.242	0.114	0.101	0.565	0.038	0.016	0.017	0.077	27
Nebraska	0.249	0.097	0.135	0.554	0.076	0.025	0.035	0.117	27
Nevada	0.478	0.189	0.138	0.816	0.154	0.064	0.062	0.291	27
New Hampshire	0.241	0.084	0.095	0.387	0.038	0.018	0.018	0.081	27
New Jersey	0.260	0.078	0.091	0.426	0.111	0.037	0.066	0.172	27
New Mexico	0.255	0.113	0.109	0.567	0.039	0.028	0.013	0.117	27
New York	0.221	0.089	0.106	0.489	0.053	0.014	0.029	0.077	27
North Carolina	0.120	0.062	0.057	0.302	0.146	0.047	0.080	0.232	27
North Dakota	0.205	0.105	0.069	0.508	0.013	0.007	0.002	0.027	27
Ohio	0.371	0.169	0.191	0.984	0.110	0.031	0.070	0.181	27
Oklahoma	0.382	0.197	0.145	0.999	0.067	0.020	0.038	0.113	27
Oregon	0.356	0.149	0.157	0.764	0.086	0.026	0.048	0.127	27
Pennsylvania	0.194	0.095	0.095	0.485	0.085	0.029	0.048	0.147	27
Rhode Island	0.327	0.107	0.117	0.506	0.038	0.019	0.016	0.082	27
South Carolina	0.104	0.044	0.038	0.173	0.122	0.044	0.079	0.219	27
South Dakota	0.208	0.092	0.097	0.475	0.015	0.007	0.005	0.038	27
Tennessee	0.333	0.116	0.177	0.623	0.433	0.077	0.308	0.565	27
Texas	0.127	0.070	0.045	0.353	0.119	0.038	0.065	0.194	27
Utah	0.347	0.148	0.132	0.667	0.186	0.068	0.075	0.314	27
Vermont	0.169	0.079	0.067	0.363	0.026	0.014	0.003	0.055	27
Virginia	0.301	0.112	0.092	0.468	0.121	0.026	0.072	0.156	27
Washington	0.334	0.135	0.128	0.629	0.088	0.024	0.053	0.128	27
West Virginia	0.309	0.189	0.139	0.925	0.025	0.005	0.017	0.034	27
Wisconsin	0.288	0.102	0.148	0.595	0.067	0.026	0.023	0.104	27
Wyoming	0.268	0.132	0.104	0.590	0.026	0.009	0.013	0.042	27
Total	0.272	0.142	0.038	1.042	0.104	0.099	0.002	0.565	1377

Summary statistics for consumer bankruptcy by state constructed using bankruptcy filing data from the US Courts and population data from the Census.

Table 10: Unemployment insurance statistics 1991-2017

	Regular number of weeks				**Maximum weekly benefit amount**				
state	mean	sd	min	max	mean	sd	min	max	N. Obs.
Alabama	26	0	26	26	217.22	39.69	150	265	27
Alaska	26	0	26	26	352.67	65.90	284	442	27
Arizona	26	0	26	26	215.83	25.69	170	240	27
Arkansas	25.33	1.62	20	26	357.50	81.65	225	454	27
California	26	0	26	26	350.74	107.06	210	450	27
Colorado	26	0	26	26	400.65	107.90	234	570.5	27
Connecticut	26	0	26	26	512.48	118.54	320	691	27
DC	25.93	0.38	24	26	341.07	28.19	293	425	27
Delaware	26	0	26	26	309.72	31.01	225	330	27
Florida	23.85	4.47	12	26	266.67	15.50	225	275	27
Georgia	23.93	4.22	14	26	278.43	55.93	185	330	27
Hawaii	25.89	0.58	23	26	438.54	97.79	275	592	27
Idaho	25.74	1.29	21	28	311.30	58.30	210.5	410	27
Illinois	25.78	0.42	25	26	443.39	106.81	270	613	27
Indiana	26	0	26	26	314.41	85.82	166	390	27
Iowa	26	0	26	26	381.30	99.52	233	553.5	27
Kansas	24.81	3.00	16	26	358.41	85.77	226.5	474	27
Kentucky	26	0	26	26	338.63	80.28	204	431.5	27
Louisiana	26	0	26	26	233.70	33.10	181	284	27
Maine	26	0	26	26	439.41	112.62	288	621	27
Maryland	26	0	26	26	323.13	81.79	219	430	27
Massachusetts	28.90	1.71	26	30	762.70	218.40	423	1103	27
Michigan	24.69	2.51	20	26	333.17	33.94	276	362	27
Minnesota	26	0	26	26	470.02	135.37	262.5	683	27
Mississippi	26	0	26	26	204.81	26.93	155	235	27
Missouri	24.52	2.58	20	26	254.56	59.96	170	320	27
Montana	27.09	1.00	26	28	334.91	103.16	197	514	27
Nebraska	26	0	26	26	267.39	81.76	144.5	400	27
Nevada	26	0	26	26	324.17	74.52	206.5	432.5	27
New Hampshire	26	0	26	26	336.54	94.26	173.5	427	27
New Jersey	26	0	26	26	489.00	120.10	291	677	27
New Mexico	26	0	26	26	336.09	116.74	177	503	27
New York	26	0	26	26	371.48	52.44	270	427.5	27
North Carolina	24	4.62	12	26	379.22	83.37	245	522	27
North Dakota	26	0	26	26	365.52	136.19	202	631.5	27
Ohio	26	0	26	26	437.96	97.53	291	592.5	27
Oklahoma	26	0	26	26	328.50	89.76	204.5	510	27
Oregon	26	0	26	26	416.57	102.31	253	597	27
Pennsylvania	26	0	26	26	466.74	100.69	299	581	27
Rhode Island	26	0	26	26	556.48	129.36	345	707	27
South Carolina	24.56	2.55	20	26	274.44	51.70	180.5	326	27
South Dakota	26	0	26	26	256.89	72.24	147	385	27
Tennessee	26	0	26	26	256.39	45.32	165	325	27
Texas	26	0	26	26	342.24	82.84	224	493	27
Utah	26	0	26	26	369.35	96.52	221	524	27
Vermont	26	0	26	26	337.76	95.65	187	462	27
Virginia	26	0	26	26	302.44	73.56	198	378	27
Washington	27.33	1.92	26	30	483.48	123.68	257	697	27
West Virginia	26	0	26	26	357.87	60.87	257	424	27
Wisconsin	26	0	26	26	319.30	47.41	225	370	27
Wyoming	26	0	26	26	335.28	102.42	200	490	27
Total	25.85	1.58	12	30	357.97	131.32	144.5	1103	1377

Summary statistics for UI.