

Unemployment Benefits Caused Jobless Recoveries!?!*

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PRELIMINARY AND INCOMPLETE

Abstract

The last three recessions in the United States were followed by jobless recoveries: while labor productivity recovered, unemployment remained high. In this paper we propose and quantitatively evaluate a new explanation for this fact, namely that extensions of unemployment benefits in recessions slow down the recovery of employment. We are motivated by the fact that the duration of unemployment benefits is extended when the unemployment rate is high, and these extensions have become progressively more generous over time. We construct and calibrate an equilibrium search model of the labor market that incorporates these key features of the US unemployment insurance system. We find that the calibrated model is consistent with the facts that recoveries were not jobless prior to 1990 and became jobless thereafter.

Keywords: Unemployment Insurance, Business Cycles, Jobless Recoveries

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1 Introduction

A striking feature of the US labor market is the emergence of jobless recoveries: the phenomenon whereby aggregate output grows following a recession, but aggregate employment remains low. Jobless recoveries are a prominent feature of the recessions of 1990-1991, 2001 and 2007-2009, but were absent during the previous recessions, in which the recovery of productivity was matched by a recovery in employment. This empirical fact has attracted significant attention among economists, with a variety of explanations including structural change, labor hoarding by firms and sluggish recovery of aggregate demand.¹ In this paper, we propose and quantitatively evaluate a new hypothesis: unemployment benefit extensions during recessions slow down the recovery of employment.

The unemployment insurance system in the United States is characterized by countercyclical generosity of unemployment benefits. Both automatic triggers in existing legislation and discretionary federal policies extend the maximum duration of unemployment benefits in times when the unemployment rate is high. Moreover, we document that such extensions in times of high unemployment have become progressively more generous over the last 40 years. In other words, the generosity of unemployment insurance in recessions has increased relative to its generosity in booms.

To study the implications of this policy change for the cyclical behavior of the labor market, we use a variant of the Diamond-Mortensen-Pissarides equilibrium search model with aggregate shocks to labor productivity. Workers and firms in the model match pairwise to produce and bargain over wages. Unemployment benefits increase the unemployment rate through two channels - they discourage firms from posting vacancies by raising the worker outside option, and they discourage workers from searching for existing job vacancies.

If unemployment insurance had been constant, a recovery in productivity in the model would imply a drop in unemployment. However, the actual unemployment insurance system extends the duration of unemployment benefits when unemployment is high. Because unemployment is high in the aftermath of a productivity drop, a recovery in productivity is likely to coincide with an extension of unemployment benefits, which can slow down or even prevent the recovery of employment. We argue that this channel became stronger over time because the extensions of unemployment benefits in recessions became progressively more

¹Aaronson, Rissman, and Sullivan (2004) discuss existing explanations that have been proposed for jobless recoveries. Bernanke (2003) attributes jobless recoveries to sluggish aggregate demand. Groshen and Potter (2003) propose structural change as an explanation, and Bachmann (2011) studies the role of labor hoarding. This is by no means an exhaustive list.

generous, thereby leading to jobless recoveries we now observe.

We evaluate the importance of this channel in our calibrated model by simulating the series of productivity shocks observed in the 1950-2011 and sequentially introducing the unemployment benefit extensions enacted during this period. The advantage of using a structural model to conduct the analysis is that it enables us to conduct counterfactual experiments with respect to changes in unemployment insurance policy. Specifically, we can quantify the importance of the extensions by asking how the cyclical behavior of unemployment would have been different had the extensions not occurred.

Our paper is related to a recent literature attempting to quantify the importance of unemployment benefit extensions for unemployment in the 2007-2009 recession: Valletta and Kuang (2010), Fujita (2010), Nakajima (2011), Rothstein (2011). However, our paper is the first to link the growing generosity of extensions to the emergence of jobless recoveries, in particular to explain the unemployment experience of the 1990-1991 and 2001 recessions as well as the most recent one.

2 The Post-War US Unemployment Insurance System: An Overview

By the late 1950s, most unemployment insurance systems in U.S. states offered 26 weeks of benefits to newly displaced workers. The deep recession of 1957-58, however, prompted the federal government to lengthen the duration of benefits available. Under the Temporary Unemployment Compensation Act (TUC), the federal government offered interest free loans to states in order to provide up to 13 additional weeks of benefits. Seventeen states opted to participate in the program, which lasted from June of 1958 until June of 1959.

The first federally financed extension of unemployment benefits occurred during the 1960-1961 recession. The federal government passed the Temporary Extended Unemployment Compensation Act (TEUC). Whereas TUC was a voluntary program, TEUC was mandatory for all states and provided up to 13 weeks of additional benefits to unemployed workers from April 1961 until June 1962. The extra weeks of benefits were entirely financed by the federal government (which raised the Federal Unemployment Tax to offset the extensions).

Guided by TUC and TEUC the federal government sought to develop an automatic system of extending unemployment benefits during recessions. In 1970 the Employment Security Amendments developed the Extended Benefits (EB) program, which would provide additional weeks of benefits to states experiencing high unemployment. The EB program is

a state-federal partnership, with the costs of the extended benefits shared equally between the state and federal government. The EB program provided up to 13 weeks of additional benefits. The extended benefits can be "triggered" nationally when the unemployment rate crossed certain thresholds, or triggered within individual states when the state level unemployment crosses certain thresholds².

Following the recession of 1969-1970, in addition to additional benefits provided by the EB program, the federal government passed the Emergency Unemployment Compensation Act of 1971 (EUCA) which provided for an additional 13 weeks of benefits to states with high unemployment financed fully by the federal government. Thus, unemployed workers could receive up to 52 weeks of benefits under the regular, EB and EUCA programs³. The EUCA provided benefits from January 1972 through March 1973.

During the 1973-1975 recession the federal government passed the Federal Supplemental Benefits (FSB) program, which was in effect from January 1975 through October 1977. The program initially provided for 13 weeks of additional benefits financed from the federal government, but was amended to provide 26 weeks of benefits in March 1975. The EB program triggered on nationwide from February 1975 through December 1977. Thus, from March 1975 through October 1977 displaced workers could receive a total of 65 weeks of benefits (26 state + 13 EB + 26 FSB).

In 1980 and 1981 through the Omnibus Reconciliation Acts of those years, the federal government altered the EB program. It eliminated the national trigger for EB, and raised the thresholds for the state level triggers. In addition, it imposed stricter eligibility requirements for unemployed workers to receive benefits under the EB program.

During the 1981-1982 recession, the federal government established the Federal Supplemental Compensation (FSC) program in September of 1982. The tightening of the EB program under the OBRA legislation made roughly half of states ineligible to additional benefits under that program. FSC was amended several times from 1982 through early 1985. For the majority of the program duration, it provided up to 14 additional weeks of benefits financed by the federal government. Thus, the maximum weeks of benefits that could be received were 53 (26 state + 13 EB + 14 FSC).

After the 1990-1991 recession, the federal government passed the Emergency Unemployment Compensation (EUC) Act of 1991. The extension was amended several times from 1991 through 1994 providing at various times an additional 20, 26, 33 or 15 additional weeks

²Full details: To be completed.

³The triggers under EUCA were different than under the EB program. Thus some states only qualified for EB, others only for EUCA and some for both EB and EUCA.

of benefits. The benefits were financed entirely by the federal government. The maximum weeks of benefits that an individual could have received was 72 (26 state + 13 EB + 33 EUC). In addition, the EB program was amended to increase the maximum number of weeks payable. States with unemployment rates above 8% would now receive 20 weeks of benefits instead of 13.

In March 2002, after the 2001 recession, the federal government passed the Temporary Extended Unemployment Compensation (TEUC) act. The act provided up to 26 additional weeks of federally financed unemployment benefits through March of 2004. The maximum weeks of benefits that an individual could have received was 72 (26 state + 13 EB + 26 EUC).

During the 2007-2009, the federal government passed the Emergency Unemployment Compensation (EUC08) Act of 2008. The program initially provided up to 13 weeks of additional benefits financed by the federal government. The EUC08 has been amended 8 times to day, gradually raising the maximum additional benefits provided by the federal government to 53 weeks, making to total compensation that an unemployed worker could receive 99 weeks (26 state + 20 EB + 53 EUC08). The program is currently set to expire at the end of February 2012, but at the time of this writing the federal government seemed poised to extend the benefits through the end of 2012.

Beginning in the 1950s, federal unemployment benefit extensions in recessions have become increasingly generous. This is illustrated in Figure 1, where we plot the time path of maximum benefit duration from 1950 to 2011. In Figure 2 we plot the time path of maximum benefit duration together with the time series for aggregate labor productivity. This figure illustrates that, in the recessions following the 1981-1982 recession, benefit extensions were more likely to occur *after* productivity had already begun to recover. As explained above, increasing generosity of benefits during a rise of productivity can potentially offset the effects of a productivity recovery. It is exactly this increasing generosity and how it has affected unemployment that we investigate quantitatively in this paper.

3 Model Description

3.1 Economic Environment

We consider a Diamond-Mortensen-Pissarides model with aggregate productivity shocks. Time is discrete and the time horizon is infinite. The economy is populated by a unit measure of workers and a larger continuum of firms.

Agents. In any given period, a worker can be either employed (matched with a firm) or unemployed. Workers are risk-averse expected utility maximizers and have expected lifetime utility

$$U = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t [u(x_t) - c(s_t)],$$

where $\mathbb{E}_0$ is the period-0 expectation operator, $\beta \in (0, 1)$ is the discount factor, x_t denotes consumption in period t , and s_t denotes search effort exerted in period t if unemployed. Only unemployed workers can supply search effort: there is no on-the-job search. The within-period utility of consumption $u : \mathbb{R}_+ \rightarrow \mathbb{R}$ is twice differentiable, strictly increasing and concave. The cost of search effort for unemployed workers $c : [0, 1] \rightarrow \mathbb{R}$ is twice differentiable, strictly increasing, strictly convex, and satisfies $c'(0) = 0$, $c'(1) = \infty$. An unemployed worker produces h , which stands for the combined value of leisure and home production. There do not exist private insurance markets and workers cannot save or borrow.

Firms are risk-neutral and maximize profits. Workers and firms have the same discount factor β . A firm can be either matched to a worker or vacant. A firm posting a vacancy incurs a flow cost k .

Matching. Unemployed workers and vacancies match in pairs to produce output. The number of new matches in period t equals

$$M(S_t(1 - L_{t-1}), v_t),$$

where $1 - L_{t-1}$ is the unemployment level in period $t-1$, S_t is the average search effort exerted by unemployed workers in period t , and v_t is the measure of vacancies posted in period t . The quantity $N_t = S_t(1 - L_{t-1})$ represents the measure of efficiency units of worker search.

The matching function M exhibits constant returns to scale, is strictly increasing and strictly concave in both arguments, and has the property that the number of new matches cannot exceed the number of potential matches: $M(N, v) \leq \min\{N, v\} \forall N, v$. We define

$$\theta_t = \frac{v_t}{N_t}$$

to be the market tightness in period t . We define the functions

$$\begin{aligned} f(\theta) &= \frac{M(N, v)}{N} = M(1, \theta) \quad \text{and} \\ q(\theta) &= \frac{M(N, v)}{v} = M\left(\frac{1}{\theta}, 1\right) \end{aligned}$$

where $f(\theta)$ is the job-finding probability per efficiency unit of search and $q(\theta)$ is the probability of filling a vacancy. By the assumptions on M made above, the function $f(\theta)$ is increasing in θ and $q(\theta)$ is decreasing in θ . For an individual worker exerting search effort s , the probability of finding a job is $sf(\theta)$. When workers choose the amount of search effort s , they take as given the aggregate job-finding probability $f(\theta)$.

Existing matches are exogenously destroyed with a constant job separation probability δ . Thus, any of the L_{t-1} workers employed in period $t-1$ has a probability δ of becoming unemployed in period t .

Production. All worker-firm matches are identical: the only shocks to labor productivity are aggregate shocks. Specifically, a matched worker-firm pair produces output z_t in period t , where z_t is aggregate labor productivity. We assume that $\ln z_t$ follows an AR(1) process

$$\ln z_t = \rho \ln z_{t-1} + \sigma_\varepsilon \varepsilon_t, \quad (1)$$

where $0 \leq \rho < 1$, $\sigma_\varepsilon > 0$, and ε_t are independent and identically distributed standard normal random variables. We will write $z^t = \{z_0, z_1, \dots, z_t\}$ to denote the history of shocks up to period t .

3.2 Government Policy

The government levies a constant lump sum tax τ on firm profits and uses its tax revenues to finance unemployment benefits b . We assume stochastic benefit expiration, similarly to Fredriksson and Holmlund (2001). In each period t , there is a probability $e_t \in [0, 1]$ that an unemployed worker eligible for benefits becomes ineligible the following period. The eligibility status of a worker evolves as follows. A worker employed in period t is automatically eligible for benefits in case of job separation. An unemployed worker eligible for benefits in period t becomes ineligible the following period with probability e_t , and an ineligible worker does not regain eligibility until he finds a job. All eligible workers receive the same benefits b ; ineligible workers receive no unemployment benefits.

To parallel the way unemployment benefits are administered in the US economy, we assume that the expiration rate of benefits is business cycle dependent: specifically, $e_t = e(L_{t-1})$, a function of the previous period's employment level.

3.3 Timing

1. The economy enters period t with a level of employment L_{t-1} . Of the $1 - L_{t-1}$ unemployed workers, a measure $D_{t-1} \leq 1 - L_{t-1}$ are eligible for benefits, i.e. will receive benefits in period t if they do not find a job.
2. The aggregate shock z_t then realizes. Firms observe the aggregate shock and decide how many vacancies to post, at cost k per vacancy. At the same time, workers choose their search effort s_t at the cost of $c(s_t)$. Letting S_t^E and S_t^I be the search effort exerted by an eligible unemployed worker and an ineligible unemployed worker, respectively, the aggregate search effort is then equal to $S_t^E D_{t-1} + S_t^I (1 - L_{t-1} - D_{t-1})$, and the market tightness is therefore equal to

$$\theta_t = \frac{v_t}{S_t^E D_{t-1} + S_t^I (1 - L_{t-1} - D_{t-1})} \quad (2)$$

3. $f(\theta) (S_t^E D_{t-1} + S_t^I (1 - L_{t-1} - D_{t-1}))$ unemployed workers find jobs. At the same time, a fraction δ of the existing L_{t-1} matches are exogenously destroyed.
4. All the workers who are now employed produce z_t and receive a bargained wage w_t (below we describe wage determination in detail). Workers who (i) were employed and lost a job, or (ii) were eligible unemployed workers and did not find a job, consume h plus unemployment benefits, $h + b$ and lose their eligibility for the next period with probability e_t . Ineligible unemployed workers who have not found a job consume h and remain ineligible for the following period.

This determines the law of motion for employment

$$L_t = (1 - \delta) L_{t-1} + f(\theta_t) [S_t^E D_{t-1} + S_t^I (1 - L_{t-1} - D_{t-1})] \quad (3)$$

and the law of motion for the measure of eligible unemployed workers:

$$D_t = (1 - e(L_{t-1})) [\delta L_{t-1} + (1 - S_t^E f(\theta_t)) D_{t-1}] \quad (4)$$

Thus, the measure of workers receiving benefits in period t is

$$\delta L_{t-1} + (1 - S_t^E f(\theta_t)) D_{t-1} = \frac{D_t}{1 - e(L_{t-1})}$$

3.4 Worker Value Functions

We characterize the problem of the worker recursively. The aggregate state of the economy in period t is denoted by $\Omega_t \equiv (z_t, L_{t-1}, D_{t-1})$. The aggregate state includes L_{t-1} because the period- t benefit expiration probability depends on L_{t-1} ; furthermore, it includes D_{t-1} because this affects the evolution of L_t through the law of motion (3). The evolution of the aggregate state is then determined by equations (1), (3), (4).

A worker entering period t employed retains his job with probability $1 - \delta$ and loses it with probability δ . If he retains his job, he consumes his wage $w(\Omega_t)$ and proceeds as employed to period $t + 1$. If he loses his job, he consumes $h + b$ and proceeds as unemployed to period $t + 1$. With probability $1 - e(L_{t-1})$ he then retains his eligibility for benefits in period $t + 1$, and with probability $e(L_{t-1})$ he loses his eligibility. Denote by $W(\Omega_t)$ the value for a worker who enters period t employed.

A worker entering period t unemployed and eligible for benefits chooses search effort s^E and suffers the disutility $c(s^E)$. He finds a job with probability $s^E f(\theta_t(\Omega_t))$ and remains unemployed with the complementary probability. If he finds a job, he earns the wage $w(\Omega_t)$ and proceeds as employed to period $t + 1$. If he remains unemployed, he consumes $h + b$, and proceeds as unemployed to the next period. With probability $1 - e(L_{t-1})$ he retains his eligibility for benefits in period $t + 1$, and with probability $e(L_{t-1})$ he loses his eligibility. Denote by $U^E(\Omega_t)$ the value for a worker who enters period t as eligible unemployed.

Finally, a worker entering period t unemployed and ineligible for benefits chooses search effort s^I and suffers the disutility $c(s^I)$. He finds a job with probability $s^I f(\theta_t(\Omega_t))$ and remains unemployed with the complementary probability. If he finds a job, he earns the wage $w(\Omega_t)$ and proceeds as employed to period $t + 1$. If he remains unemployed, he consumes h and proceeds as ineligible unemployed to the next period. Denote by $U^I(\Omega_t)$ the value for a worker who enters period t as ineligible unemployed.

The Bellman equations for the three types of workers are then:

$$W(\Omega_t) = (1 - \delta) [u(w(\Omega_t)) + \beta \mathbb{E}W(\Omega_{t+1})] + \delta [u(h + b) + \beta (1 - e(L_{t-1})) \mathbb{E}U^E(\Omega_{t+1}) + \beta e(L_{t-1}) \mathbb{E}U^I(\Omega_{t+1})] \quad (5)$$

$$U^E(\Omega_t) = \max_{s^E} -c(s^E) + s^E f(\theta(\Omega_t)) [u(w(\Omega_t)) + \beta \mathbb{E}W(\Omega_{t+1})] + (1 - s^E f(\theta(\Omega_t))) [u(h + b) + \beta (1 - e(L_{t-1})) \mathbb{E}U^E(\Omega_{t+1}) + \beta e(L_{t-1}) \mathbb{E}U^I(\Omega_{t+1})] \quad (6)$$

$$U^I(\Omega_t) = \max_{s^I} -c(s^I) + s^I f(\theta_t(\Omega_t)) [u(w(\Omega_t)) + \beta \mathbb{E}W(\Omega_{t+1})] + (1 - s^I f(\theta(\Omega_t))) [u(h) + \beta \mathbb{E}U^I(\Omega_{t+1})] \quad (7)$$

3.5 Firm Value Functions

A matched firm retains its worker with probability $1 - \delta$. In this case, the firm receives the output net of wages and taxes, $z_t - w(\Omega_t) - \tau$, and then proceeds into the next period as a matched firm. If the firm loses its worker, it gains nothing in the current period and proceeds into the next period unmatched. A firm that posts a vacancy incurs a flow cost k and finds a worker with probability $q(\theta(\Omega_t))$. If the firm finds a worker, it gets flow profits $z_t - w(\Omega_t) - \tau$ and proceeds into the next period as a matched firm. Otherwise, it proceeds unmatched into the next period.

Denote by $J(\Omega_t)$ the value of a firm that enters period t matched to a worker, and denote by $V(\Omega_t)$ the value of an unmatched firm posting a vacancy. These value functions satisfy the following Bellman equations:

$$J(\Omega_t) = (1 - \delta) [z_t - w(\Omega_t) - \tau + \beta \mathbb{E}J(\Omega_{t+1})] + \delta \beta \mathbb{E}V(\Omega_{t+1}) \quad (8)$$

$$V(\Omega_t) = -k + q(\theta(\Omega_t)) [z_t - w(\Omega_t) - \tau + \beta \mathbb{E}J(\Omega_{t+1})] + (1 - q(\theta(\Omega_t))) \beta \mathbb{E}V(\Omega_{t+1}) \quad (9)$$

3.6 Wage Bargaining

We make the assumption, standard in the literature, that wages are determined according to Nash bargaining: the wage is chosen to maximize a weighted product of the worker's surplus

and the firm's surplus. The worker's surplus from being employed is denoted

$$\Delta(\Omega_t) = [u(w(\Omega_t)) + \beta \mathbb{E}W(\Omega_{t+1})] - [u(h+b) + \beta(1-e(L_{t-1}))\mathbb{E}U^E(\Omega_{t+1}) + \beta e(L_{t-1})\mathbb{E}U^I(\Omega_{t+1})] \quad (10)$$

The firm's surplus from employing a worker in period t is denoted

$$\Gamma(\Omega_t) = z_t - w(\Omega_t) - \tau + \beta \mathbb{E}J(\Omega_{t+1}) - \beta \mathbb{E}V(\Omega_{t+1}) \quad (11)$$

The worker-firm pair therefore chooses the wage $w(\Omega_t)$ to maximize

$$\Delta(\Omega_t)^\xi \Gamma(\Omega_t)^{1-\xi}, \quad (12)$$

where $\xi \in (0, 1)$ is the worker's bargaining weight.

3.7 Equilibrium

We define the recursive equilibrium of the model, taking as given a government policy $(\tau, b, e(\cdot))$.

Definition 1 *Given a policy $(\tau, b, e(\cdot))$, an equilibrium is a set of functions for wages $w(\Omega_t)$, search effort $S^E(\Omega_t)$, $S^I(\Omega_t)$, market tightness $\theta(\Omega_t)$, and value functions*

$$\{W(\Omega_t), U^E(\Omega_t), U^I(\Omega_t), J(\Omega_t), V(\Omega_t), \Delta(\Omega_t), \Gamma(\Omega_t)\}$$

such that:

1. *The value functions satisfy the worker and firm Bellman equations (5), (6), (7), (8), (9), (10), (11)*
2. *Optimal search: The search effort S^E solves the maximization problem in (6) for s^E , and the search effort S^I solves the maximization problem in (7) for s^I*
3. *Free entry: The value $V(\Omega_t)$ of a vacant firm is zero for all Ω_t*
4. *Nash bargaining: The wage $w(\Omega_t)$ maximizes equation (12)*
5. *Laws of motion: The aggregate state Ω_t evolves according to equations (1), (3), (4).*

4 Calibration

The model period is taken to be 1 week. We normalize mean weekly productivity to one. We set $b = 0.4$ to match the average replacement rate of unemployment insurance. We pick the tax rate $\tau = 0.023$ so that the government balances its budget if the unemployment rate is 5.5%. We will vary the function $e(\cdot)$ to mimic the variation in benefit duration in the US economy.

We assume log utility: $u(x) = \ln x$. For the cost of search, we assume the functional form

$$c(s) = \frac{A}{1+\psi} \left[(1-s)^{-(1+\psi)} - 1 \right] - As \quad (13)$$

This functional form is chosen to ensure that the optimal search effort will always be strictly between 0 and 1. In particular, the functional form above guarantees that, for any $A > 0$, we have $c' > 0, c'' > 0$, as well as $c(0) = c'(0) = 0, c(1) = c'(1) = \infty$.

For the matching function, we follow den Haan, Ramey, and Watson (2000) and pick

$$M(N, v) = \frac{Nv}{[N^\chi + v^\chi]^{1/\chi}}$$

The choice of the matching technology is likewise driven by the requirement that the job-finding rate and the job-filling rate always be strictly less than 1. We obtain:

$$f(\theta) = \frac{\theta}{(1 + \theta^\chi)^{1/\chi}}$$

$$q(\theta) = \frac{1}{(1 + \theta^\chi)^{1/\chi}}$$

Following Shimer (2005), labor productivity z_t is taken to mean real output per person in the non-farm business sector. This measure of productivity is taken from the quarterly data constructed by the BLS. We also use the seasonally adjusted unemployment series constructed by the BLS, and measure vacancies using the seasonally adjusted help-wanted index constructed by the Conference Board.

We set the discount factor $\beta = 0.99^{1/12}$, implying a yearly discount rate of 4%. The parameters for the productivity shock process are estimated, at the weekly level, to be $\rho = 0.9895$ and $\sigma_\varepsilon = 0.0034$. The job separation parameter δ is set to 0.0081 to match the average weekly job separation rate. We set $k = 0.58$ following Hagedorn and Manovskii (2008), who estimate the combined capital and labor costs of vacancy creation to be 58% of weekly labor productivity.

This leaves five parameters to be calibrated: (1) the value h of non-market activity; (2) the worker bargaining weight ξ ; (3) the matching function parameter χ ; (4) the level coefficient of the search cost function A ; and (5) the curvature parameter of the search cost function ψ . We calibrate these parameters following the procedure in Mitman and Rabinovich (2011)⁴. Table 1 reports the calibrated parameters.

Table 1: Internally Calibrated Parameters

	Parameter	Value
h	Value of non-market activity	0.574
ξ	Bargaining power	0.130
χ	Matching parameter	0.492
A	Disutility of search	0.0035
ψ	Search cost curvature	2.836

5 Policy Experiment

In order to determine to what extent unemployment benefit extensions played a role in the jobless recoveries from 1992 onwards, we simulate our model from 1951 forward. Over that time period, as discussed in Section 2, there were 19 changes to UI benefit duration (excluding extensions and reauthorizations). In order to deal with this large number of policy changes and still solve a stochastic weekly model we make the following simplifying assumptions: 1) We assume that all policy changes are unanticipated, or equivalently zero probability events and 2) We assume that all agents in the model believe that the policy changes are permanent when enacted. We will, however, investigate the consequences of relaxing these two assumptions.

The exogenous input to the model is labor productivity. We construct the labor productivity series using output per worker as reported by the BLS. We HP filter the quarter data with a smoothing parameter of 1600, then compute the log deviation from the filtered series. We then construct a smooth weekly series such that the quarterly average of the weekly series matches the quarterly detrended series. We take the unemployment rate in December 1950 as the initial condition and then simulate the model forward feeding in the constructed series for productivity. The equilibrium is thus a rational expectations one, but not one with future foresight over productivity realizations. At dates which correspond to

⁴Calibration details: To be completed.

policy changes, we implement the policy change and simulate the model forward allowing the unemployment rate to evolve endogenously.

6 Results

6.1 Jobless Recoveries

The simulated model is able to account for key features of the post-war labor market. In figure 3, we plot the unemployment rate generated from the model and that observed in the data. The model with the implemented US unemployment benefit policy generates volatility of unemployment on the order of what is seen in the data. The correlation between the two series is 0.67; however, restricting attention from 1970 onwards the correlation between model unemployment and data is 0.80.

We next investigate whether the model is consistent with the emergence of jobless recoveries. In figure 4, we plot the change in employment - actual and predicted by the model - relative to the NBER peak before the 1973-1975, 1980 and 1981-1982 recessions. The model replicates the response of employment over those periods quite well. Next, in figure 5, we similarly plot the change in employment for the 1990-1991, 2001 and 2007-2009 recessions. The model is able to replicate the observation that, unlike the previous three recessions, the recovery of productivity was not matched in this case by a rapid rise in employment.

Finally, we examine the role of unemployment benefit extensions in generating this result. To do so, we perform a counterfactual experiment where we shut down all the extensions except the EB program (which results in extensions of up to 13 or 20 weeks). The result is shown in Figure 6 for the 1990-1991, 2001 and 2007-2009 recessions. The figure illustrates that the model without the additional extensions cannot generate jobless recoveries: employment recovers much faster in the model than it does in the data. Unemployment benefit extensions are thus quantitatively important for explaining the cyclical behavior of employment.

6.2 The Beveridge Curve in the Great Recession

The model is also able to successfully replicate the counterclockwise movement in the Beveridge curve in the Great Recession. The model and data curves are plottined in figure 7. (DISCUSSION TO BE COMPLETED.)

6.3 Robustness

TO BE COMPLETED.

7 Conclusion

TO BE COMPLETED.

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A Tables and Figures

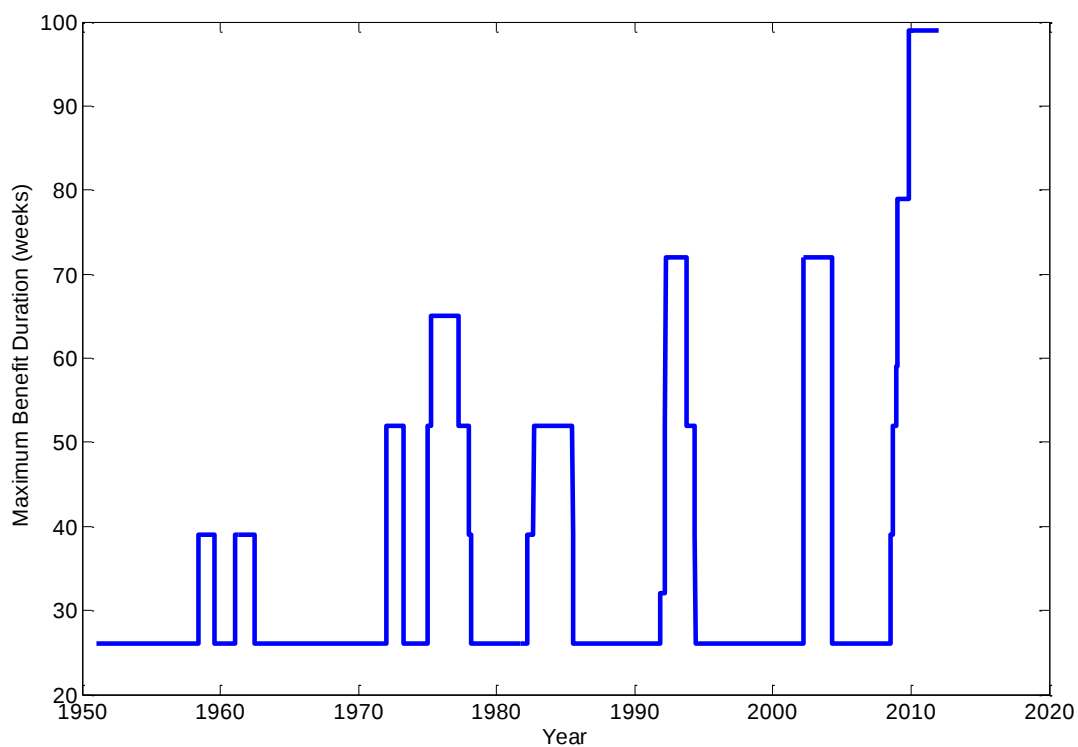


Figure 1: Maximum possible benefit duration available during the Post-War period. The extensions include a combination of discretionary federal extensions and the state-federal extended benefits program.

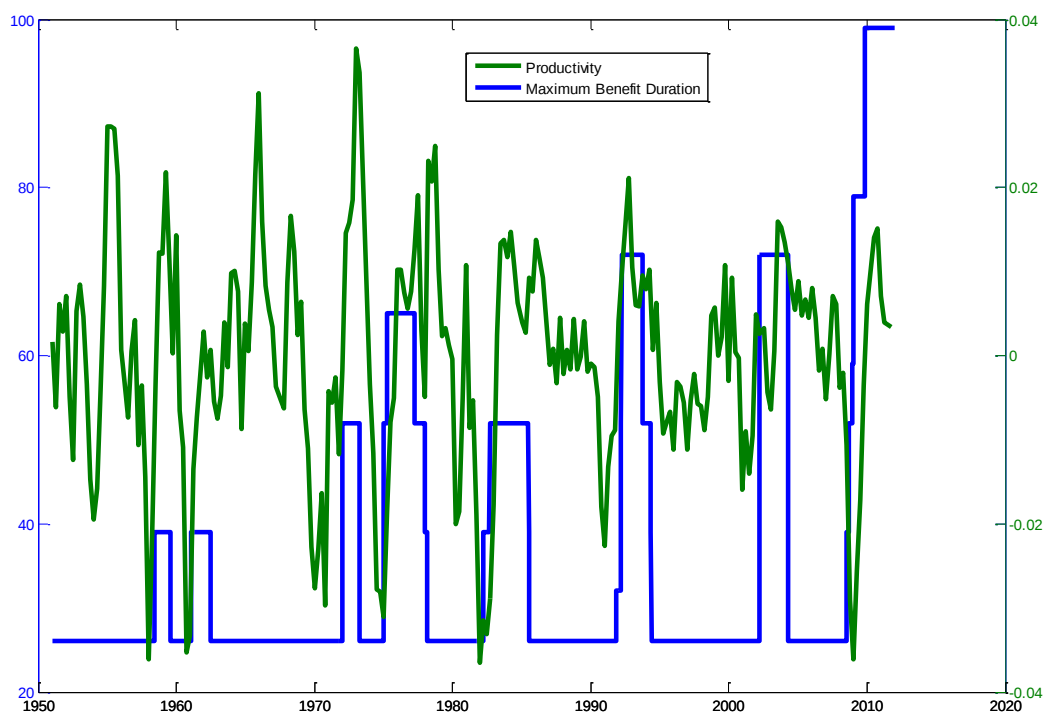


Figure 2: Maximum possible benefit duration available during the Post-War period and productivity. Productivity is calculate as log deviation from HP filtered trend of output per worker in the non-farm business sector reported by the Bureau of Labor Statistics. In the recessions follow the 1981-1982 recession, benefit extensions were more likely to occur after productivity had already begun to recover.

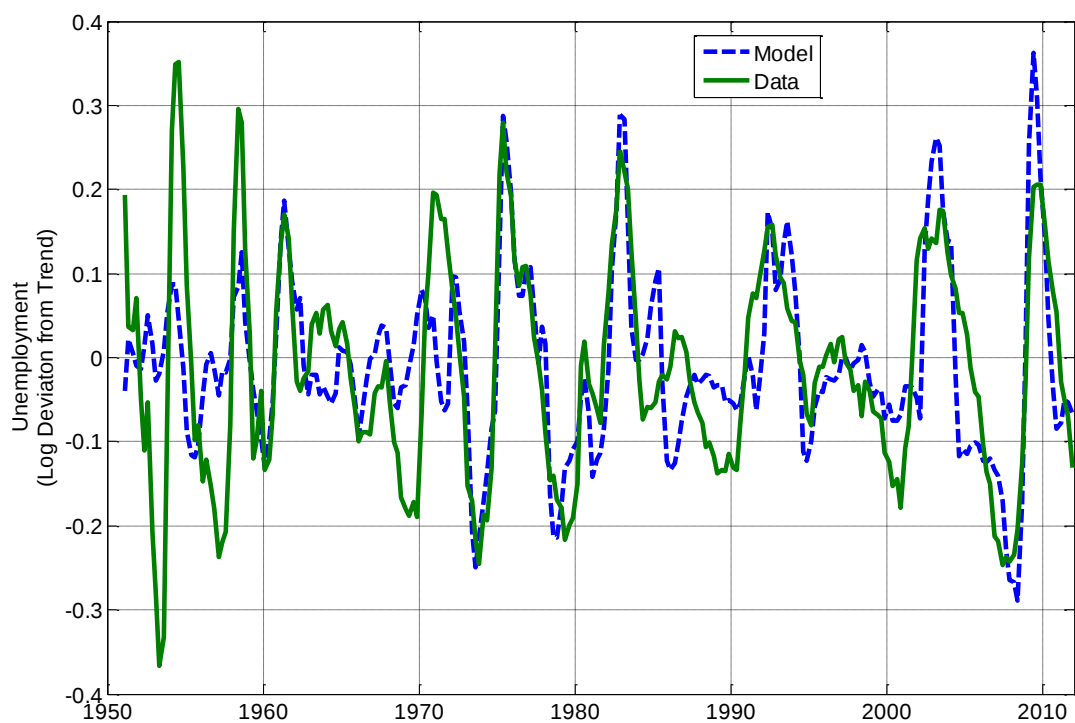


Figure 3: Simulated and actual unemployment from January 1951 through December 2011. Both series are quarterly averages of log deviations from HP filtered trend. The correlation between the two series is 0.67, from 1970 onwards the correlation is 0.80.

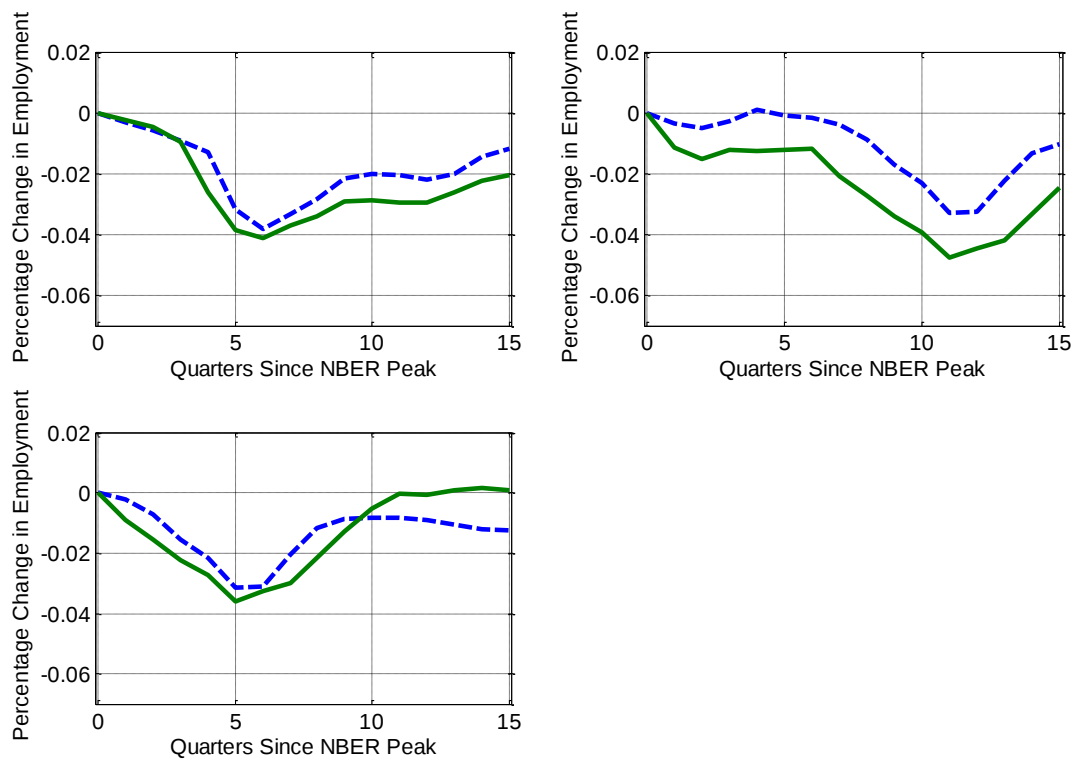


Figure 4: Simulated and actual percentage change in employment from NBER peak before the 1973-75, 1980 and 1981-82 recessions. The dashed blue line is the model and green line is the data. Data and model are not filtered.

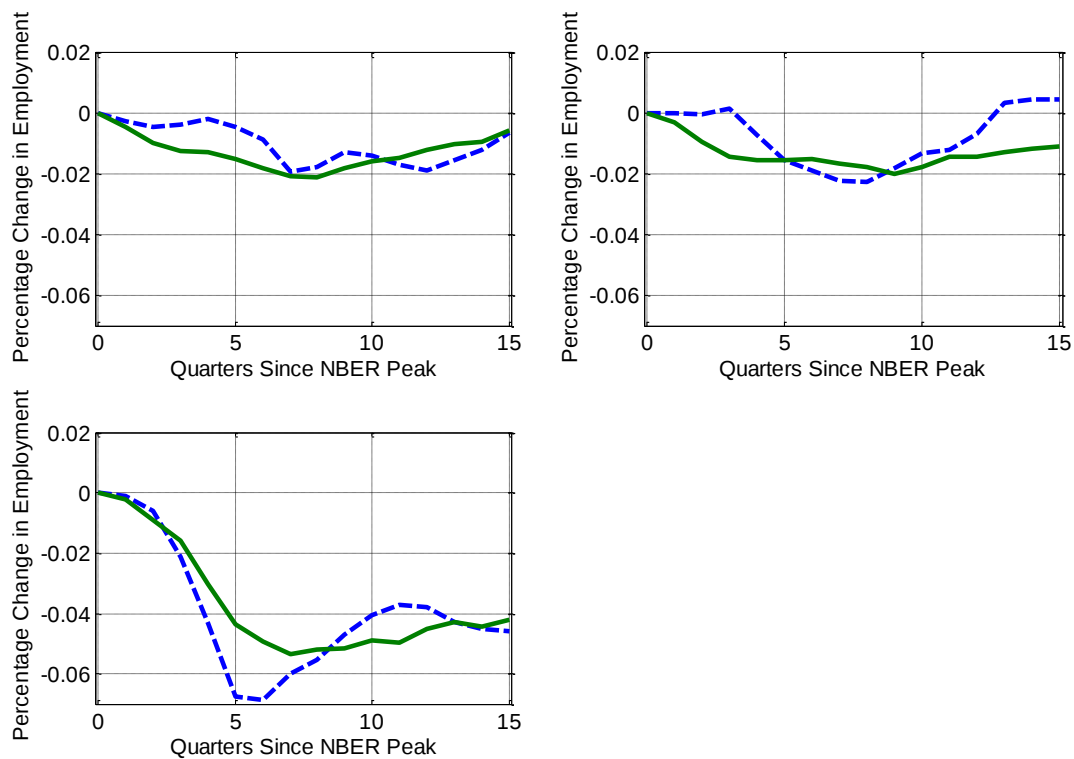


Figure 5: Simulated and actual percentage change in employment from NBER peak before the 1990-91, 2001 and 2007-09 recessions. The dashed blue line is the model and green line is the data. Data and model are not filtered.

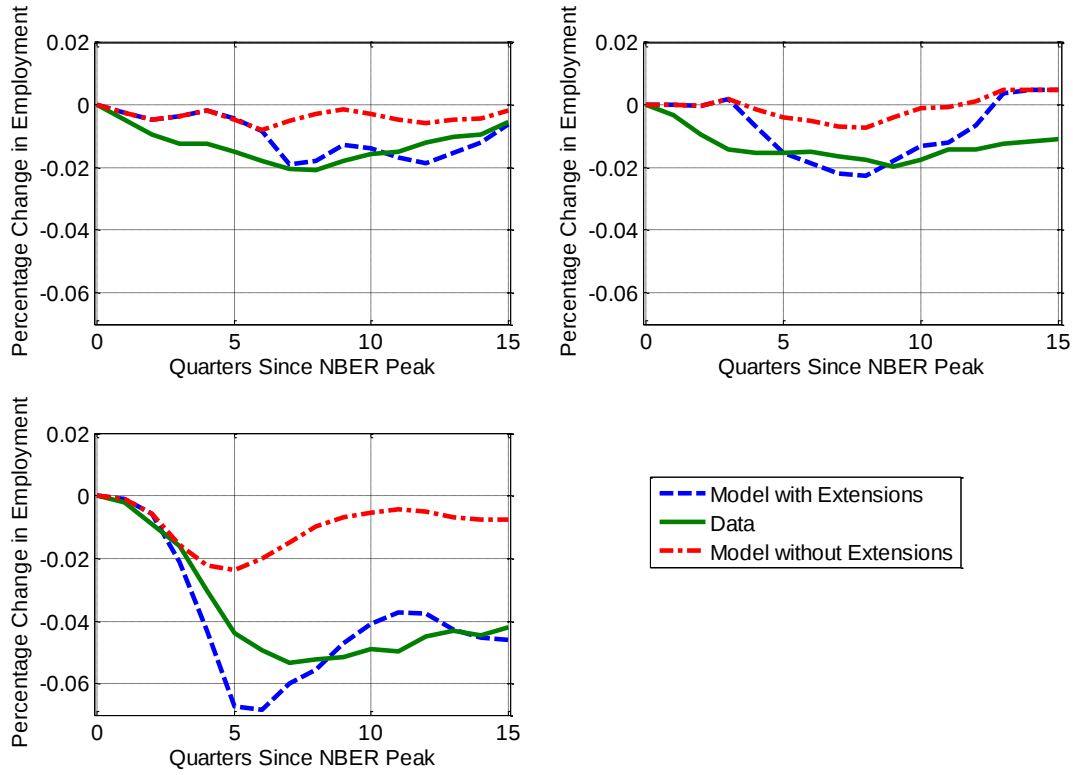


Figure 6: Simulated, actual and counterfactual percentage change in employment from NBER peak before the 1990-91, 2001 and 2007-09 recessions. In the counterfactual simulation only the EB program is active (resulting in extensions of up to 13 or 20 weeks). The difference between the model and counterfactual plots represents the contribution of the discretionary extensions to the change in employment. The dashed blue line is the model with discretionary extensions, the green line is the data and the dot-dashed red line is the counterfactual model. Data and model are not filtered.

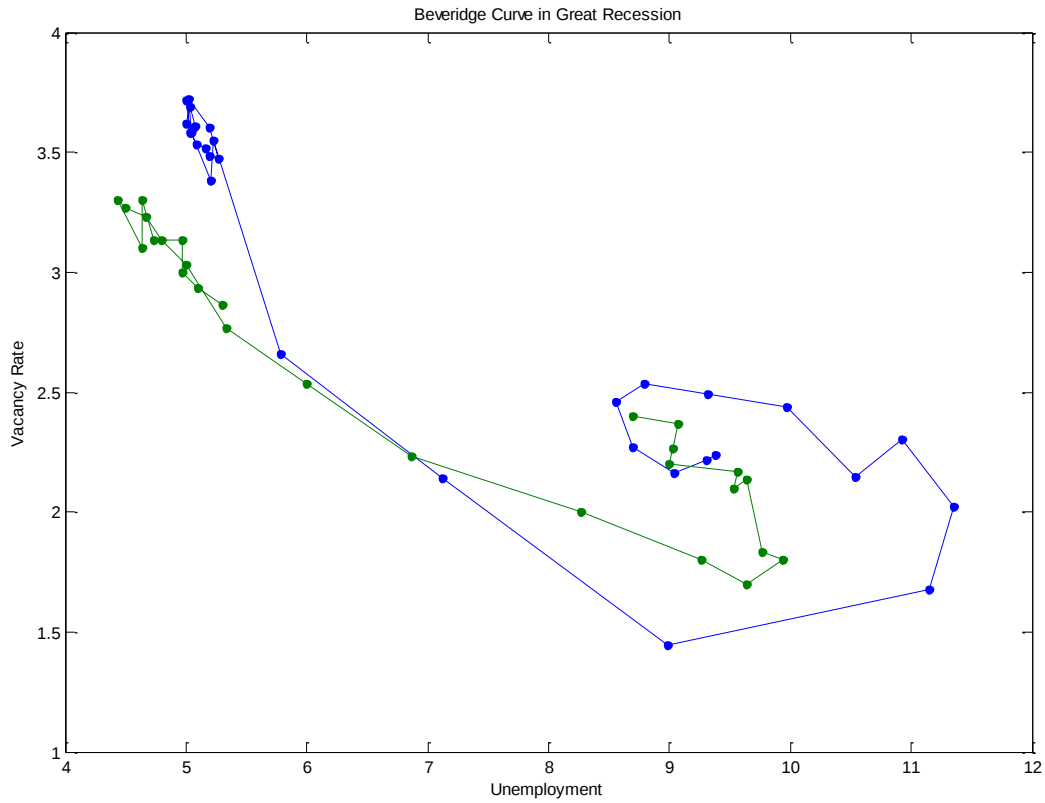


Figure 7: Simulated and actual Beveridge curve from January 2005 through December 2011. The unemployment and vacancy rates come from the BLS JOLTS database. Both series are plotted as quarterly averages of monthly (JOLTS) and weekly (model) data. Data and model are not filtered.