Measuring Unemployment Insurance Generosity

Stéphane Pallage
(Département des sciences économiques,
Université du Québec à Montréal)

Lyle Scruggs
(Department of Political Science,
University of Connecticut)

Christian Zimmermann*
(Department of Economics,
University of Connecticut)

April 10, 2007
VERY PRELIMINARY DRAFT, LOTS OF MISSING PIECES

Abstract

In this paper, we attempt to summarize the various policy parameters of an unemployment insurance scheme into a single generosity parameter. Indeed, unemployment insurance [UI] is typically defined by waiting periods, eligibility duration and benefit levels when eligible, which makes intertemporal or international comparisons difficult. We build a model with such complex characteristics. Our model features heterogeneous agents that are liquidity contrained but can self-insure, as well as moral hazard. We also build a second model that is similar, except that UI has no waiting period and agents are eligible forever. We then determine which level of benefits

*Corresponding author. 341 Mansfield Road, Unit–1063, Storrs CT 06269–1063, USA. Email: christian.zimmermann@uconn.edu

in the second model makes agents indifferent between both models. We apply this strategy for the unemployemnt insurance program in the United Kingdom to study how its generosity evolved over time.

1 Introduction

Labor market policies have many dimensions and thus are difficult to compare through time and space. In this paper, we want to contribute to a better understanding of how generous, in an aggregate sense, labor market policies are. We apply this to unemployment insurance. Specifically, we want to study how the generosity of unemployment insurance has evolved in the United Kingdom by summarizing all dimensions of this policy into one parameter. This methodology can be used for other countries, thus ultimately also to compare different unemployment insurance systems in the world.

Quite obviously, we are not the first ones to try and compare UI systems. Notably, the OECD has a research program that makes international comparisons of UI coverage for very specific types of workers. Martin (1996) summarizes these results. Also Scruggs (2006) compiles various measures of social programs for a specific type of household and looks how they compare, one dimension at a time, through space and time. These works, however, ignore how the local labor market conditions may matter. For example, whether the reduction of the eligibility period for UI benefits matters depends on local unemployment duration. Thus while duration of benefits is much shorter in the United States than in many European countries, this does not necessarily mean that the US unemployment insurance is less generous, as unemployment duration is also much shorter, and US program may be more generous on other dimensions that matter more for its labor market.

The approach we take here is one of economic simulations in which we compare an economy having the complete characteristics of the actual UI program to an economy with a one-dimensional UI program. This single dimension is the level of UI benefits with no time limit. We measure the overall generosity of an unemployment insurance program as the level of benefits in the one-dimensional UI program that makes agents indifferent between that and the actual programs. The base model we use is one of households facing repeated employment lotteries. They are liquidity constrained and they can try to self-insure against these shocks if the UI program is not generous enough. This economy also exhibits moral hazard, which influences the optimal generosity, as seen in Hansen and İmrohoroğlu

(1992) and Pallage and Zimmermann (2001) in a similar set-up.

In the following sections, we first detail the modeling approach, then discuss the parametrization of the households, the labor market and the UI policies. This calibration procedure is crucial, as we want to obtain quantitative answers. We then provide results and conclude.

2 Modeling Approach

We use two models, the first with a detailed unemployment insurance program, the second with a simplified one. For exposition purposes, we want to start by describing the common parts, i.e., the household problem.

2.1 The household problem

Households care about consumption and leisure, and they maximize an infinite stream of expected, discounted utilities. They can accumulate assets, but are not allowed to borrow. Every period, they get an employment opportunity or not, whose likelihood depends on whether the got an opportunity the period before. They may chose to turn down a job opportunity. An unemployment insurance system is in place, which allows households to obtain some benefits under some conditions.

Let us be more precise: The preferences of each household can be represented by the following function

$$\max E_0 \sum_{t=1}^{\infty} \beta^t u(c_t, l_t)$$

where $u(\cdot)$ is a utility function with the usual properties, i.e. increasing in each argument and concave; $l_t = 1$ for someone who does not work, $l_t = 1 - \hat{h}$ for someone who works. Asset holding of the households evolve according to

$$m_{t+1} = m_t + y_t^d - c_t, \quad m_t > 0 \quad \forall t$$

where y_t^d is the disposable income:

$$y_t^d = \begin{cases} (1-\tau)y & \text{if employed} \quad (w = e) \\ (1-\tau)\theta y & \text{if eligible to UI} \quad (w = i) \\ 0 & \text{if unemployed and not eligible} \quad (w = u) \end{cases}$$

where τ is a tax rate used to raise the necessary revenue to finance the unemployment insurance program. Eligibility for unemployment insurance benefits may be dictated by various indicators, summarized by α that will be specified for each model below. For the moment let us simply say that eligibility depends on a vector of variables s_t that evolves according to some, potentially endogenous, law of motion:

$$s_{t+1} = \chi(s_t)$$

Finally, households obtain every period a draw from a job opportunity lottery, following a binomial Markov process. The complete household problem can be represented in recursive form, thus the Bellman equation of a worker with an employment offer is:

$$\begin{aligned} V(m, s|e;\alpha) &= \max \left\{ \begin{array}{l} \max_{m'} u(c, 1-\hat{h}) + \beta \int_{s'|e} V(m', s';\alpha) d(s'|e) \\ \max_{m'} \int_w u(c, 1) dw + \beta \int_{s'|u} V(m', s';\alpha) d(s'|u) \end{array} \right. \\ S.T. \quad & m' = m + y^d(w, s;\alpha) - c \\ & m' \geq 0 \\ & s' = \chi(s) \end{aligned}$$

For a worker without an employment offer, the Bellman equation can be written:

$$\begin{aligned} V(m, s|u;\alpha) &= \max_{m'} u(c, 1) + \beta \int_{s'|u} V(m', s';\alpha) d(s'|u) \\ S.T. \quad & m' = m + y^d(i, s;\alpha) - c \\ & m' \geq 0 \\ & s' = \chi(s) \end{aligned}$$

Equilibrium

An equilibrium is an allocation of work, asset and consumption for all agents, a value function $v(\cdot)$ and a tax rate τ such that:

- agents solve their individual intertemporal problems, given (α, τ);
- the unemployment insurance agency balances its budget;
- there is an invariant distribution of agents.

2.2 The simplified UI program

We need to make specific what makes an unemployed worker eligible for unemployment insurance, that is we need to specify α. For the simplified UI program, we assume that unemployment benefits can be obtained immediately and that unemployed workers stay eligible forever and obtain every period the same proportion θ of their income. Finally, monitoring is characterized by a probability of success in shirking of π only when the worker has been previously unemployed. In other words, a quitter cannot shirk successfully, but a searcher can with probability π. The simplified UI program thus has the following vector of parameters:

$$\alpha = (\theta, \pi).$$

This is the set of parameters we want to map the detailed UI program to.

2.3 The detailed UI program

Now we want to describe a real world UI program as completely as computationally feasible. It has the following components:

1. A waiting period a, i.e., unemployed workers have to wait some time before becoming eligible for benefits.

2. An eligibility period z, i.e., how many periods an unemployed worker can obtain benefits.

3. The proportion of income that unemployed workers obtain as benefits, $\theta(j)$, which may vary through the unemployment spell ($j = a + 1, ..., z$).

4. The probability of shirking success for searchers, π.

Thus, the set of policy parameters we want to use from the data is:

$$\alpha = (a, z, \{\theta(j)\}_{j=a+1,...,z}, \pi).$$

We can now turn to finding those policy parameters for the economies of interest.

3 Parametrization to the United Kingdom

In this first exercice, we want to see how the generosity of the UI program, as summarized by θ in the simplified setup, may change through time. For this purpuse, we use the characteristics α for the United Kingdom for every year, along with the relevant labor market data to parametrize the job opportunities lottery.

For α, we use the data compiled in Scruggs (2006). For the lottery, we note that in a binomial Markov process, the probability of getting a job offer while unemployed is the inverse of unemployment duration, and then the probability of getting a job offer while employed determined the unemployment rate. Thus, we use time series for the unemployment rate and unemployment duration to parametrize the lottery in each year.

One parameter for which we do not have observations is π. Here we want to explore with several values that are plausible, namely 0, .1 and .2.

The remaining parameters and functional forms are standard to the literature. Following Hansen and İmrohoroğlu (1992) and the literature that followed, we let the utility function be

$$u(c,l) = \frac{(c^{\sigma} l^{1-\sigma})^{1-\gamma}}{1-\gamma} - 1$$

with $\sigma = 0.67$ and $\gamma = 2.5$. Also, we set β such that it corresponds to a discount rate of 4% per year.

4 Results

To obtain results, we first solve numerically the model with the detailed UI program for each year in the sample. This is performed by transforming the state space, in particular assets m, into a grid, then using discrete dynamic programming techniques to obtain a solution through iterations on the value function. Given the resulting value function and invariant distribution of agent types, we can obtain the expected value of a UI program, call it W.

The next step is then to solve the model with the simplified UI program with the same π using the same technique. We search through various values of θ until we find the one that provides an expected value that is the closest to W.

Please bear with us, results are not ready for display yet.

5 Conclusion

6 References

Hansen, Gary D. and İmrohoroğlu, Ayse, 1992. ”The Role of Unemployment Insurance in an Economy with Liquidity Constraints and Moral Hazard,” *Journal of Political Economy*, University of Chicago Press, vol. 100(1), pages 118–42, February.

Martin, John P., 1996. “Measures of Replacement Rates for the Purpose of International Comparisons: A Note,” *OECD Economic Studies*, OECD, number 26, pages 99–115.

Pallage, Stephane and Zimmermann, Christian, 2001. ”Voting on Unemployment Insurance,” *International Economic Review*, vol. 42(4), pages 903–23, November.

Scruggs, Lyle, 2006. ”The Generosity of Social Insurance, 1971–2002,” *Oxford Review of Economic Policy*, Oxford University Press, vol. 22(3), pages 349–364, Autumn.