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Optimal unemployment insurance: Consumption versus expenditure☆

Rodolfo G. Campos [a,*], Iliana Reggio [b]

[a] CEMFI, Casado del Alisal 5, 28014 Madrid, Spain
[b] Department of Economics, Universidad Carlos III de Madrid, Calle Madrid 126, 28903 Getafe, Madrid, Spain

HIGHLIGHTS

- We study optimal unemployment insurance if the unemployed pay lower prices.
- We derive a sufficient statistics formula in terms of observable variables.
- We compare our results to the standard Baily–Chetty formula.
- Lower insurance is optimal if relative risk aversion is greater than one.
- We calculate optimal replacement ratios for the United States.

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ABSTRACT

We study the optimal provision of unemployment insurance (UI) in a framework that distinguishes between consumption and expenditure. We derive a "sufficient statistics" formula for optimal UI that is expressed in terms of observable variables and can therefore be used in applied work. Recent research has shown that unemployed households pay less per unit of consumption than employed households. This finding has two counteracting effects on the optimal level of UI. On the one hand, consumption smoothing benefits identified from expenditure data overestimate the true marginal benefits of UI. On the other hand, UI benefits become more valuable because they buy more consumption when unemployed. In an optimal design, which effect dominates depends on the curvature of the utility function. We show that for relative risk aversion larger than one the first effect dominates, leading to lower levels of optimal UI.

1. Introduction

A central question in an unemployment insurance scheme is how generous the program should be. Because providing consumption insurance distorts incentives to search for a new job, optimal insurance design takes into account the efficiency costs induced by moral hazard. These costs must be balanced against the welfare gains brought about by insuring workers against consumption drops due to unemployment. From an empirical perspective, the potential welfare gains of consumption-smoothing can be quantified by the drop in consumption experienced upon unemployment. The size of this drop has been estimated time and again—sometimes without a direct reference to unemployment insurance—for example by Cochrane (1991), Gruber (1997), Browning and Crossley (2001), and Stephens (2001). A characteristic shared by these studies is that, because of the data available, they focus on consumption expenditure (price times quantity) rather than on consumption (quantity).

There is now a host of evidence that indicates that the unemployed pay lower prices than their employed counterparts. This evidence suggests that activities such as shopping and searching for bargains play a role in lowering prices. Using time use surveys, Aguiar et al. (2013) find that the unemployed devote more time to shopping: in the United States, roughly 7% of the time freed up from work is dedicated to activities such as shopping for groceries and other household items, comparison shopping, coupon clipping, and buying goods online. In comparison, only between 2 and 6% of the time freed up is used to increase job search. Krueger and Mueller (2012) corroborate this finding in an international sample by studying time use surveys from 14 different countries.

Increased shopping time translates into lower prices. Using supermarket scanner data, Aguiar and Hurst (2007) verify that increased shopping effort lowers the price paid for grocery items

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* Corresponding author.
E-mail addresses: rodolfo.g.campos@gmail.com (R.G. Campos), ireggio@eco.uc3m.es (I. Reggio).

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while maintaining quality constant in the general population. Aguiar and Hurst (2005) focus specifically on the unemployed and find that expenditure by the unemployed falls more than consumption, indicating a reduction in the price paid per unit of consumption.

In this paper we study how distinguishing between expenditure and consumption affects the level of optimal unemployment insurance. Acknowledging that expenditure is not the same as consumption has two countervailing effects on the optimal benefit level. On the one hand, optimal unemployment insurance takes into account that the unemployed have access to lower prices in the unemployed state. Because a given dollar amount buys more consumption in the unemployed state, from the perspective of a benevolent social planner, it becomes worthwhile to transfer income from the good to the bad state. This effect tilts the balance in favor of more generous unemployment benefits. On the other hand, estimations that rely on expenditure data will overestimate the consumption-smoothing benefit of unemployment insurance because they disregard the change in prices. A correct measurement therefore tilts the balance in the direction of lower optimal unemployment benefits.

We formalize these ideas by adapting the standard normative model of social insurance originally due to Baily (1978). Chetty (2006) showed that Baily's setup captures the main trade-offs that arise in fully intertemporal settings in the style of those considered by Shavell and Weiss (1979) and Hopenhayn and Nicolini (1997). The Baily–Chetty model is part of a general class of models in public economics in which optimal policies can be computed from a reduced number of sufficient statistics.[1] In this model, optimal unemployment benefits are described by a simple formula that involves only three sufficient statistics: the magnitude of the consumption drop experienced at unemployment, the level of relative risk-aversion, and the elasticity of unemployment duration with respect to the benefit level.

We depart from the Baily–Chetty model by allowing agents to endogenously choose how much of the time freed up by not working they devote to shopping activities. By increasing shopping time they reduce prices paid for consumption. The social planner sets optimal unemployment benefits taking into account responses by workers, in particular the endogenous choice of shopping time. As usual in this literature, because of the Envelope Theorem, several endogenous choices do not have a first-order effect on optimal benefit levels. An important feature of our model is that shopping affects state-prices and therefore the implicit return of transferring resources across states faced by the social planner.

In comparison to the standard first order condition of the social planner in the Baily–Chetty model, marginal utility of the worker in the unemployed state is scaled upward by the gross return of transferring resources across states. This first order condition could be used to inform policy on the optimal level of unemployment insurance if consumption was directly observable. Because consumption is usually not observed in real-world data, we show how the optimality condition can be re-expressed in terms of expenditure.

If the worker's preferences can be described by a constant relative risk-aversion (CRRA) utility function, then optimal policy can be expressed in terms of expenditure in a generalized version of the standard Baily–Chetty formula. Whether optimal benefit levels obtained from expenditure data should be revised upward or downward depends exclusively on the degree of relative risk aversion. We show that, under the usual assumption of relative risk aversion greater than one, estimations based on expenditure data systematically overestimate the level of optimal unemployment benefits.

To illustrate the empirical relevance of our theoretical result, we calibrate our formula to US data following the approach of Gruber (1997). We find that, when compared to the standard Baily–Chetty formula, if the price paid by the unemployed is 5% lower than what the employed pay for their consumption, then, for levels of risk aversion slightly above two, replacement rates are at least 10 percentage points lower. For example, for a level of relative risk-aversion of 3, the optimal replacement rate according to the standard formula is 38.6% whereas it is 25.7% in the formula that takes into account the distinction between consumption and expenditure.

Because of the way the distinction between consumption and expenditure enters the social planner's maximization problem, it will be of relevance not only for the canonical Baily–Chetty model but also for the class of social insurance models that generalize their environment and obtain similar "sufficient statistics" formulas. We show how the wedge introduced by the distinction between consumption and expenditure can inform these related models. Notably, this wedge does not depend on the elasticity measuring the behavior that leads to moral hazard by the insured population. It is, however, influenced by the difference in prices paid in the good and the bad state of the world. Therefore, empirical research on economic shocks that distinguishes between consumption and expenditure holds important insights for social insurance in general.

The remainder of the paper is organized as follows. In the next section we develop the model, derive a "sufficient statistics" formula for optimal unemployment insurance, and show how this formula can be expressed in terms of observable variables with CRRA preferences. In Section 3 we apply the model to calculate the optimal replacement ratio for the US. In Section 4 we explore whether some of our assumptions can be relaxed and their likely effect on our results. We conclude in Section 5. All proofs are given in the Appendix.

2. Model

We build on the two-period model used by Baily (1978) and Chetty (2006) to derive their formula for optimal unemployment insurance. We extend the Baily–Chetty model by distinguishing between consumption and expenditure and by allowing for additional uses of free time. Unemployed workers can choose to use their free time on activities that lower the price they pay for consumption.

2.1. The environment

There are two dates: 0 and 1. A risk-averse worker, who derives utility from consumption and leisure, arrives at date 0 with assets A and lives for one period until date 1. At date 0, the worker may become unemployed with exogenous probability π and stays employed with probability $1-\pi$. If employed, the worker supplies one unit of labor and obtains a wage rate w. A worker who becomes unemployed stays unemployed for a fraction of time $D \in [0, 1]$, the unemployment duration, during which labor earnings are zero.

As in the Baily–Chetty model, unemployment insurance is parameterized by the pair (b, τ), where b denotes the benefit received by an unemployed agent and τ is the tax paid (only by fully employed workers) to sustain the insurance scheme. To maintain a balanced budget, the unemployment insurance scheme must satisfy

$$(1-\pi)\tau = \pi b D. \tag{1}$$

A benevolent planner chooses the parameters of the social insurance scheme so as to maximize the worker's welfare while maintaining budget balance and taking into account the worker's optimal response to the social insurance parameters b and τ.

2.2. Time allocation

Unemployed workers can influence the unemployment duration D by varying their job search effort. Chetty (2006) did not directly

[1] A detailed analysis of the advantages and disadvantages of the "sufficient statistics" approach, as well as the history of its use in public economics, is provided by Chetty (2009). The famous dead-weight loss calculation by Harberger (1964) is an early example of this approach.