1 Social Insurance: Introduction

So far we have been looking primarily at “welfare program” where by welfare programs we mean means-tested programs designed to effectively alleviate poverty. We will now turn our attention to a different class of government expenditure programs that can be labelled “social insurance” programs. Although there seems to be no widely accepted definition of social insurance Krueger and Meyer (2002) choose to define social insurance quite broadly as “compulsory, contributory government programs that provide benefits to individuals if certain conditions are met”. Typically, social insurance are paid out conditional on specific “adverse” events.

Most countries have social insurance programs of the following sort:

- Social security/public pensions which provides insurance against “earnings loss” due to retirement.
- Unemployment insurance which provides insurance again against “earnings loss” due to job loss
- Disability/sickness insurance which provides insurance again against “earnings loss” due to disability/illness.

There is also some programs that are country-specific. E.g. a major U.S. program is Medicare which provides insurance against medical expenditures in old age. Medicare, unlike Medicaid, is contributory in that eligibility requires that the individual has worked in Medicare covered employment for at least 10 years.
The typical structure of social insurance programs is thus that workers participate by “buying” insurance through payroll taxation (or ”national insurance contributions”); these contributions make them eligible to receive benefit if some pre-specified measurable event occurs. Eligibility is typically not means-tested.

Why Social Insurance?

Main theoretical argument for government intervention: **adverse selection**

- **Adverse Selection**: Asymmetric information between the insurer and the insured regarding the underlying level of risk.

- At this stage review the standard *Akerlof adverse selection model* and interpret in an insurance context.

- What can be achieved by government policy?
  - Make private insurance compulsory
  - Public provision of insurance
  - Subsidisation of private insurance.

- Direct provision is the most common policy approach.

- Most options involve implicit redistribution from low-risk individuals to high-risk individuals.

**Behavioural Responses to Insurance: Moral Hazard**

- **Moral Hazard**: Adverse behaviour encouraged by insuring adverse events.

- Forms of moral hazard:
  - The standard microeconomics model of “moral hazard” is that insurance reduces the incentives to take precautions to reduce the probability of adverse event. (Review this) This form of moral hazard may be relevant in the case of unemployment insurance; e.g. workers may be able to affect their layoff probability by adjusting their efforts on the job.
However, it is not the only relevant form of behavioural response. A common type of moral hazard occurs when insurance reduces the incentives to take costly actions to reduce the size of the loss. E.g. unemployment insurance may reduce the incentives to search for a new job, thereby increasing the length of unemployment spells, and hence the size of the earnings loss that is being insured. Similarly, access to disability insurance may imply that workers do not work as hard to rehabilitate after injuries.

- A third form of moral hazard occurs when the event is difficult to verify. This is particularly a problem in relation to disability insurance. A worker can, in principle, claim to have suffered an adverse event.

- Moral hazard creates a key tradeoff for social insurance policy: by providing insurance the government affects the behaviour of the insured increasing the earnings losses to be insured.

- The severity of moral hazard differ from one type of adverse event to another.
  - How much can individuals affect the probability of an adverse event occurring?
  - How much can individual affect the size of the loss?
  - How easily can the event be verified?

The Value of Social Insurance

- Individuals value insurance because they are risk averse: they prefer consumption to be smoothed over time and states of the world.

- What are alternative mechanisms for consumption smoothing:
  - Use savings/borrow
  - Compensating labour supply by other family members
  - Income transfers from other individuals/organizations.

- When evaluating the value of having social insurance we would like to know how much it contributes to consumption smoothing.
2 Unemployment Insurance

Unemployment Insurance (UI) provides insurance benefits for workers who lose their jobs, hence partially replacing the earnings losses that are due to job losses. What makes UI distinct from other social insurance programs? It is designed to assist people who are considered able-bodied and who are generally expected to return to work (e.g., unlike retirement).

There are a number of research questions concerning UI:

• What are the behavioural responses to UI systems?
• How does UI contribute to consumption smoothing?
• What is the appropriate design of UI?

Before we consider these questions we will however start by looking at some generic features of UI systems and also at how UI looks in the US and in the UK.¹

3 Unemployment Insurance: Basic Design Features

We will start by listing a number of features that would be shared by most UI systems (see Atkinson and Mickelwright, 1991). These features include:

1. Benefits are not available for “job-quitters” (or workers who are fired “for cause”).

2. Benefits are conditional on active job-search and refusal to accept a job offer can result in the individual being disqualified for benefits.

3. Benefits are “contributory”, i.e. requiring a qualifying period of prior work (during which the individual has made “contributions” in the form of payroll taxes or national insurance contributions).

4. Benefits are available for a limited duration.

¹There are several available surveys covering some or all the above research questions, including Meyer (2002), Krueger and Meyer (2002), Holmlund (1998) and Atkinson and Micklewright (1991)
5. Benefits are related to past earnings e.g. in the form of a fixed replacement ratio.

Indeed, most of these features are quite natural if we think about UI as “insurance” whereas they wouldn’t be natural features for a welfare system aimed at “poverty relief”. Most countries have some form of system of benefits for unemployed workers that have some or all of the above features. We will now look in some closer detail at the UK and the US.

3.1 The UK Unemployment Compensation System

In an international comparison the UK provides an extreme example with very little in way of provision of UI. Two types of benefits are available to unemployed workers, both going under the name of “Job-Seeker’s Allowance”.\(^2\) The first is the “contribution-based” JSA and the second is the “income-based JSA”. Of the two types of JSA it is only the former that fits the description of an UI system.

The features of the contribution-based JSA are:

- **Limited duration**: Contribution-based jobseeker’s allowance can be paid for up to six months.

- **Contributory**: The individual must have paid sufficient (Class 1) National Insurance Contributions in each of the two tax years prior to the beginning of the year in which they sign on and claim benefit.

- **Not means-tested**: If the claimant qualifies for benefits, he/she can receive contribution-based JSA irrespective of savings, capital or partner’s earnings.

- **Flat rate**: The benefit amount is not related to previous earnings and, above a small earnings disregard, the benefit is withdrawn pound-for-pound if the individual has earnings.\(^3\) Moreover, the flat rate is the same as the basic rate of Income Support.

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\(^2\)Jobseeker’s allowance (JSA) replaced unemployment benefit and income support for unemployed people from 7 October 1996.

\(^3\)It does however vary with the age of the individual.
• **Job search requirement:** In addition, claimant cannot work for more than 16 hours/week, must be capable of and prepared to starting work for up to 40hrs/week immediately and of actively search for a job.

JSA cannot be combined with Income Support. In February 2006 the *contribution-based* JSA program had 171,000 claimants at an annual expenditure of little less than £500 million.

Income-based JSA may be available to those who do not qualify for contribution-based JSA. The features of the *income-based* JSA are:

• *No limited duration:* Income-based JSA is payable for as long as the qualifying conditions are met.

• *Job search requirement:* The same restrictions on own hours of work and the same job-search requirements as in the *contribution-based* JSA apply.

• *Mean-testing:* Income-based JSA is means-tested against savings and against partner’s earnings (in addition the partner cannot work for more than 24hrs/week).

• *Flat rate:* The benefit amount is not related to previous earnings and the calculation of benefit is practically identical to Income Support.

In February 2006 the *contribution-based* JSA program had 707,500 claimants at an annual expenditure of little less than £1.8 billion.

From the above description is it clear that only the contribution-based JSA fits most of the generic features of an UI system outlined above whereas the Income-based JSA would be more naturally labelled as a pure “welfare program” rather than as a “social insurance”.

### 3.2 The US Unemployment Insurance Program

UI in the US is a federally mandated program that is administrated at the state level. The states are free to set their benefit levels and other features of the program. As in the UK not all workers qualify for benefits. To be eligible workers must meet three criteria.
First, a worker must have earned a minimum amount over the previous year. Second, workers who quit or are fired for cause will not be eligible. Third, workers must actively search for a job (and show proof of this) and be willing to accept a job comparable to the one that they lost.

Approximately 97 percent of all workers are in jobs that are covered by unemployment insurance; nevertheless, less than 40 percent of unemployed workers receive UI benefits. This low rate is a combination of the eligibility rules, which imply that less than half of unemployed workers are eligible for benefits, and non-takeup of benefits.

The benefit amount is a function of pre-unemployment earnings (in the year prior to the filing the UI claim); the function has three “parameters”. First, the weekly benefit amount is a fixed proportion (the “replacement rate” $\rho$) of pre-unemployment earnings. Second, there is however minimum weekly amount, $WBA_{\text{min}}$ available to any worker who qualifies for benefits. Finally, there is a maximum weekly amount, $WBA_{\text{max}}$. Hence if we let $y$ denote pre-unemployment weekly earnings (and ignoring the minimum earnings eligibility condition) the weekly benefit amount can be written as

$$WBA(y) = \max(WBA_{\text{min}}, \min(WBA_{\text{max}}, \rho \times y))$$  (1)

E.g. for Florida in 2000 the parameters were $WBA_{\text{min}} = 32$, $WBA_{\text{max}} = 275$ and $\rho = 1/2$ (Figure 1).

FIG 1 (Florida00.jpg)

In almost all states, benefits last up to 26 weeks; however, there is also an automatic rule that extends that duration by an additional 50 percent (13 weeks) when the state’s unemployment rate exceeds some (quite high) threshold. In addition, in times of high unemployment Congress has typically passed ad hoc laws temporarily extending benefits further; this happened e.g. in December 2002.

There is large variation across states in the level of, in particular, the maximum weekly benefit amount $WBA_{\text{max}}$. In 2000, the $WBA_{\text{max}}$ varied from a low of $190$ in Mississippi to over $600$ in Massachusetts if dependents’ allowances are included (Meyer, 2002). As we will see below, this variation has played a key role for identification in empirical studies.
A particular feature of the US UI system relates to its financing. UI is financed by a payroll tax that is levied on employers (and averages 2.5 percent across states) up to a certain level of earnings. However, what is particular is that the payroll tax is partially “experience-rated”: in particular, a firm’s tax rate depends on its layoff history. This feature, which is unique to the US, is intended the make firms that tend to layoff many in worker bear the cost of this in terms of high tax liability.

4 Labour Supply Responses: Theory

As we will see, one of the most empirically researched questions regarding UI is the whether UI erodes the incentives for unemployed workers to find new jobs? This focus of research is natural since it is generally perceived that one of the most important distortionary effects of UI is that it reduced the speed with which workers return to work. It should however be noted that this is not the only “flow” that UI may affect. Recall (from basic labour economics) that the population is generally partitioned into three groups: those who are:

1. In work
2. Unemployed
3. Out of the labour force.

Flows occur between all states (Figure 2). Moreover, one can imagine that UI potentially affects all flows. In addition to affecting the rate of entry into employment, we see that

- It can increase the probability of a job loss e.g. by affecting the actions taken by firms and workers.
- It can make it more attractive for some individual to join the labour force.

FIG 2 (flows.jpg)
4.1 Basic Job Search Theory

In order to provide some theoretical background to the analysis of the effect of UI on exits from unemployment, we will briefly review some basic job search theory. The theory of job search is a tool for studying the behaviour of unemployed workers. The theory depicts an unemployed worker as facing a decision problem: they have to choose which offers to accept and which offers to reject. The reason why a worker would reject an offer is because she prefers to wait for a better offer. The theory can be used to study how workers can be expected to respond to variations in UI parameters (e.g. the benefit level and the duration of benefits), to the arrival rate of job offers etc.

The classical references on job search theory are McCall (1970), Lippman and McCall (1976), Burdett (1979). See Ljungqvist and Sargent (2000, p. 85-93) for an exposition.

4.2 A Simple Model

Consider an unemployed worker who searches for a job under the following circumstances. Each period the worker obtains a wage offer \( w \), drawn from a distribution \( F(w) \) with support \([w_L, w_H]\) with corresponding density \( f(w) \). The worker has the option of rejecting the offer in which case she receives a fixed unemployment benefit \( b \) in the current period (and continues to search in the next period), where \( b < w_H \). Alternatively, she can accept the offer \( w \), in which case she receives a wage \( w \) per period forever. There are no quits or lay-offs and no recalls of offers.

We assume that the worker is risk-neutral and maximizes the expected discounted future stream of income

\[
E \sum_{t=0}^{\infty} \beta^t y_t,
\]

where \( y_t \) is the income in period \( t \) (either the unemployment benefits or the earnings from labour) and where \( \beta \) is a discount factor.

Let \( v(w) \) be the expected value of the objective function for the worker when he has the offer \( w \) in hand and is contemplating whether or not to accept this specific offer. If the worker accepts the offer, her discounted future income will be

\[
\sum_{t=0}^{\infty} \beta^t w = \frac{w}{1 - \beta},
\]

where \( \beta \) is the discount factor.
If, on the other hand, she *rejects* the offer, her expected discounted earnings are

\[ b + \beta \int_{w_L}^{w_H} v(w') f(w') \, dw', \quad (4) \]

since she gets the benefit $b$ this period and then gets a new random wage offer $w'$ next period. Given that she makes the acceptance/rejectance decision rationally, we see that the discounted value $v(w)$ satisfies

\[ v(w) = \max \left\{ \frac{w}{1 - \beta}, b + \beta \int_{w_L}^{w_H} v(w') f(w') \, dw' \right\}. \quad (5) \]

Note that (i) the value of accepting the current offer increases (linearly) in the value of current wage offer $w$, and (ii) the value of rejecting does not depend on the current wage offer. These two simple fact imply that there must exist a reservation wage $w^r$ such that the worker accepts the current $w$ offer if and only if it is no smaller than $w^r$. This is illustrated in Figure 3 (ResWage1.jpg).

FIG 3 (ResWage1.jpg)

Since the wage $w^r$ makes the worker indifferent, we have that the value of the two options (accepting/rejecting) is the same when the wage offer at hand is exactly $w^r$. This gives the following characterisation of the reservation wage $w^r$,

\[ \frac{w^r}{1 - \beta} = b + \beta \int_{w_L}^{w_H} v(w') f(w') \, dw' \quad (6) \]

After some manipulations of this equation we can obtain the following more illuminating expression for the reservation wage\(^4\)

\[ w^r - b = \frac{\beta}{1 - \beta} \int_{w^r}^{w_H} (w - w^r) f(w') \, dw' \quad (7) \]

Note that the left hand side of equation (7) has a natural interpretation as the marginal cost of foregoing the current wage offer, i.e. the marginal cost of search (at the wage offer $w^r$). The right hand side on the other hand represents the marginal benefit to continued search in terms of the expected present value of getting a better wage offer $w' > w^r$ in

\(^4\)To see this, note that, as can be seen from Fig 1, it must be that $v(w) = w^r / (1 - \beta)$ at $w \leq w^r$ and $v(w) = w / (1 - \beta)$ at $w \geq w^r$.\]
the next period. Hence the worker’s reservation wage is set so that the marginal cost and the marginal benefit to continued search is equalized. Figure 4 illustrates by plotting the two sides of equation 7 for different wage and indicating the optimal reservation wage. Note that the right hand side of 7 is indeed downward sloping in the reservation wage.\(^5\)

FIG 4 (Reswage2.jpg)

Our interest lies with the unemployment benefit \( b \).

**Result 1:** The reservation wage \( w^r \) is higher than the unemployment benefit: \( w^r > b \).

To see this, note that \( w^r \leq b \), then the left hand side of (7) would be non-positive while the right hand side would be strictly positive. A contradiction.

**Result 2:** The reservation wage \( w^r \) is increasing in the benefit \( b \): \( \partial w^r / \partial b > 0 \).

To see this, note that an increase in the UI benefit reduces the marginal costs of search but does not affect the marginal benefit. In terms of Fig. ??, an increase in \( b \) shifts the \( w - b \) locus to the right, increasing the wage at which the loci intersect.

**Result 3:** The expected post-reemployment earnings are increasing in the benefit \( b \).

This follows immediately from the fact that a higher UI benefit \( b \) increases the reservation wage.

**Result 4:** The expected duration of unemployment is increasing in the benefit \( b \).

This too is an immediate consequence of the fact that a higher UI benefit \( b \) increases the reservation wage.

### 4.3 Extensions to the Simple Model

The current model has been extended in numerous directions. Two extensions are of particular interest for our purposes.

\(^5\)In particular, the derivative of the right hand side with respect to \( w^r \) is \( \frac{\partial}{\partial w^r} \left( \frac{\beta}{1 - \beta} \right) (1 - F(w^r)) < 0 \).
Variable Job-Search Intensity  In the simple model UI affects the duration of unemployment spells by affecting the set of jobs that unemployed workers will accept. One can also imagine that UI will affect the effort that unemployed workers devote to job search. One simple way of extending the model to incorporate this feature is by assuming that an unemployed worker obtains a wage offer in any given period with some probability $s \in [0, 1]$ and that this probability is larger the more effort the worker puts into job search. Effort on the other hand has a utility cost (which is increasing and convex in $s$). In this case, the probability of entering employment in any one period will be $s [1 - F (w^r)]$ (whereas before we had $s = 1$).

In this extension it can be shown that the unemployment benefit $b$ not only increase the reservation wage $w^r$ but also reduces the search effort (reflected in the probability $s$). This extension also highlights how the probability of leaving unemployment to enter employment is the product of two probabilities: (i) $s$, the probability of receiving an offer, and, (ii) $1 - F (w^r)$ which is the probability of accepting a random offer. Hence a low job finding rate can be either because a worker receives few offers ($s$ is low) or because the acceptance rate is low. In fact, empirical evidence suggests that this differ across skill groups with the acceptance rate being particularly high for high skilled workers.

Limited Benefit Duration  The simple model above assumes that the benefit $b$ is available for as long as the worker remains unemployed. However, in reality benefits tend to have limited duration. An unemployed worker will take this into account in determining her optimal search strategy. In particular, it can be show that the worker will reduce her reservation wage along the unemployment spell until the benefits expire. Once the benefits have expired she will maintain a constant low reservation wage. Consequently, the re-employment probability should increase as the benefit expiry date gets closer (and should stay high after the benefits have expired) as illustrated in Fig. 5.

FIG 5 (Reswage3.jpg)
5 Unemployment Insurance: the Empirical Agenda

The empirical literature on UI has focused both on its costs and the benefits. The most studied aspect is the impact of UI on the workers’ labour supplies and on unemployment. The focus on labour supply is a natural one since it is generally perceived that the main distortionary cost of UI is the above mentioned moral hazard effect that it may reduce the speed with which workers who fall unemployed return to work. As we will see below, the impact on unemployment adds another dimension, viz. the impact of UI on layoffs.

However, a number of other dimensions of the effects of UI have been explored in the literature. Some of these consider the potential impact on UI on other mechanisms for consumption smoothing; work in the vein has looked at the impact of UI on the savings and the labour supply of other family members (the so-called “added worker effect”). A main question for these studies is whether UI “crowds out” these other potential mechanism. Relatedly, a number of studies have looked at the potential reasons for non-complete takeup of benefits.

There is also a smaller literature that considers the benefits of UI in terms of consumption smoothing and in terms of the quality of job matches. This literature seeks to establish whether more generous UI implies that (i) transitions into UI are associated with lower drops in consumption, and (ii) transitions back into work are associated with higher paid jobs.

5.1 The Effect of UI on Labour Supply

We will start our overview of the empirical work on UI by considering the key question of its impact on labour supply. We now to turning to the empirical question of the effect UI on labour supply. Before trying to answer this question we may however ask whether it is a question that could be answered by drawing on the evidence from the voluminous evidence on the effect of taxes and transfers on labour supply. Why can’t we simply use the labour supply estimates obtained from that literature and plug it into the social insurance formulas to back out the labour supply effect of UI (and other social insurance programs)? Are there any particular features of UI that would necessitate an empirical analysis of its particular labour supply effects?
Krueger and Meyer (2002) list several reasons why studying the labour supply incentive effects of social insurance programs are justified:

- Labour supply responses may be heterogeneous in the population and the people who are on the margin of social insurance programs may well have very different labour supply responses than the wider population.

- The range of labour supply responses estimated in the general labour supply literature is quite wide. Indeed, as noted in the previous lecture, finding exogenous variation in taxes and transfers that can be used to identify labour supply effects is not a trivial task. Hence, social insurance programs may offer “natural experiments” that can provide useful variation for the purpose of estimating labour supply parameters.

- Social insurance programs have particular design features that generate potential responses – e.g. entitlement effects, job search intensities – that are not applicable in the context of the standard labour supply model.

The Identification Problem

The empirical analysis of the behavioural responses to UI poses well-known identification problem: How can we disentangle the effect of UI from the effect of individual characteristics? E.g. a natural summary measure of the generosity of UI is the effective replacement ratio. Hence, suppose that we e.g. relate the duration of unemployment spells to the individual replacement ratio, past wage or earnings and other demographic variables. A problem with this is that the replacement ratio may be a function of past earnings; this is e.g. the case in the US system where all eligible workers obtain the same replacement ratio unless their previous earnings are such that they are receiving the minimum or the maximum benefit level. Hence such an approach would not be able to distinguish between the effect of UI and the effect of previous earnings. This identification problem, which obtains as a result of the dependence of the generosity of the program on an individual’s previous earnings, is common to many social insurance programs besides UI, including social security and disability insurance. Similarly, variation in individual benefit entitle-
ment can obtain as a result of e.g. family composition; however, such factors themselves plausibly affect the outcome and hence do no generate appropriate exogenous.

Formally, variation in benefits across individuals are typically related to individual characteristics (e.g. past earnings, family structure etc.), i.e. $b_i = b(x_i)$ where $b_i$ is the benefit available to individual $i$ and $x_i$ are her characteristics. We want to determine whether e.g. the probability of finding a job $\pi$ depends on the benefit level $b$. But the individual characteristics may play an independent role, i.e. the probability $\pi_i$ generally depends both on $b_i$ and on $x_i$. Hence we have that $\pi_i = \pi(b_i, x_i)$ with $b_i = b(x_i)$ implying that, without further information, we cannot tell whether the individual’s job-finding probability is driven by the benefit $b_i$ or directly by her characteristics $x_i$. In order to be able to identify the effect of the benefit $b$ on the job-finding probability $\pi$ we need some source of exogenous variation in the benefit level. In mathematical terms, we need the mapping from $x$ to $b$ to vary in our data so that we can find individuals with the same $x$ but with different $b$. There are two plausible sources of identification

- Variation in the policy over time
- Variation in the policy across space.

As noted above, in the US context there is substantial variation across space since states vary substantially in the benefit parameters. Meyer (2002) however argues that although one can use the fact that the policy parameters differ across US state in order to achieve identification, the most credible evidence comes from policy changes that allows for identification to come from within-state variation.

Consider e.g. an increase in the maximum benefit. This changes the relationship between past earnings and the benefit from the solid line to the dashed line. For this example one can use individuals with past earnings above $E_3$ as the “treatment group” – a group for whom benefit generosity increased.

For people in this group (the “high earnings group”), one can compare the mean weeks of UI received and reemployment earnings of people who filed for UI benefits just prior to and just after the change in the benefit schedule. Those who file before the increase receive $WBA_{\text{max}}^B$ while those filing afterwards receive $WBA_{\text{max}}^A$. 

15
One may also need to control for changes across time that is unrelated to policy. One can then use as a comparison group those with earnings between $E_1$ and $E_2$ (the “low earnings group”) who file just before and just after the benefit increase as the benefits these individuals receive are unaffected by the policy change. In this case a straightforward difference-in-difference estimator can be used, comparing the change in outcome (e.g. spell lengths) for the treatment group and the control group (see below).

FIG 6 (MeyerFig3.jpg)

A much researched question is the impact of UI benefits on the duration of unemployment (or the duration of UI benefit receipt). The early literature typically did not explicitly use policy changes to identify the labour supply effect. Indeed, in a typical study the length of unemployment would be regressed on the benefit level or the replacement rate, the past wage or earnings, and demographic characteristics. This approach is, however, problematic: within a given state at a point in time, the weekly UI benefit is a constant fraction of previous earnings except when an individual receives the minimum or maximum weekly benefit. Hence the approach would generally not be able to disentangle the effect of UI from non-linear effects of previous earnings (Welch, 1977).

Here we will focus on the more modern literature that base its identification strategy explicitly on policy changes. The main question that we will be interested in is whether the provision of UI increases the duration of unemployment spell lengths. Note that this is not the same as asking about the effect of UI on the level of unemployment. The level of unemployment can conveniently be thought of as the product of probability of becoming unemployed and the average spell length. Hence in order to assess the impact on UI on the level of unemployment we would need to know not only the impact on unemployment duration but also the impact on the incidence of job losses. We will return to this issue below. We will start here by considering the more narrow question of the impact UI on spell lengths.

The impact of UI on spell lengths can be thought of as a test of the basic job search model presented above; that model predicted that more generous UI would be associated with, on average, longer durations. However, the model also has other predictions, notably that higher UI should be associated with higher earnings/wages post
re-employment. This is a much less studied question. Nevertheless, it is an important question for shedding light on (i) the moral hazard cost of UI, and (ii) the potentially efficiency enhancing properties of UI.

As our leading example of a study that exploits policy changes to identify the effect of UI we will consider the seminal paper by Bruce Meyer (1989). However, before proceeding we should also note that even the fairly narrow question of the impact UI on spell lengths is somewhat vague. What aspects of UI are we interested in? Is it the average replacement ratio? The maximum duration of benefits? Or maybe some other measure of benefit generosity? Also, not all spell length end with the worker finding a new job. Some unemployment spells end with the worker leaving the labour force. Are we concerned about the way that spell lengths end? In the paper by Meyer these questions have precise answers: Meyer considers the impact of an increase in the maximum level of UI benefit on the duration of UI benefit receipt. This specification may not be exactly the one that would be the most interesting but is one that is feasible given the data and research designs available and should provide a close enough answer to the question that we would be really interested in.

### The Impact of Benefit Generosity on Unemployment Duration

Here we will consider in some detail the study by Meyer (1989) which was the first to apply a difference-in-difference approach exploiting changes in the parameters of the UI system to estimate the effect of UI. Meyer’s analysis contains sixteen increases in the maximum weekly benefit amount ($WBA^{\text{max}}$) across five states (Idaho, Louisiana, New Mexico, Pennsylvania, and Washington) between 1979 and 1983. Most of the sixteen increases in the $WBA^{\text{max}}$ were in the order of 10 percent.

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6 An earlier paper by Solon (1985) exploited a change in the tax code in 1979 whereby UI benefits became taxable income. A key feature of the policy change was that taxes on UI benefits were only introduced on individuals with a (family) income above a certain threshold. Hence there would be a group of low income individuals who would be unaffected by the policy change and group of high income individuals who would be affected by having their net-of-tax benefits reduced. Hence this policy change was very similar to a reduction in the maximum benefit. Solon’s findings suggest that the elasticity of unemployment duration with respect to the weekly benefit is close to unity.
The data used comes from the Continuous Wage and Benefit History (CWBH) project and provides information about spell lengths and basic demographic characteristics such as age, sex, race and education. Moreover, the data is matched with administrative data that allows Meyer to compute previous and subsequent earnings over a 21 quarter period around the beginning of the individual’s unemployment spell.

As outlined above the empirical strategy involves comparing workers who file for UI benefits just before an increase in the $WBA^{\text{max}}$ to those workers who file just after the increase. Since an individual’s filing date generally determines his or her UI benefit amount for his or her entire benefit year (the one-year period following the date of claim) two individuals, both with previous earnings above $E_2$ in the above figure, one of whom files just before the date of the benefit increase and one of whom file after the date, will generally receive different weekly benefits for their entire period of benefit receipt.\(^7\)

In addition, and in order to control for other unrelated changes that may have happened between the before- and after period Meyer forms a “treatment” and a “control” group where the former contains individuals whose previous earnings are high enough that they would be entitled to the maximum weekly benefit amount $WBA^{\text{max}}$ (those with previous earnings above $E_3$ in the figure above) while the latter group contain individuals whose previous earnings are such that they are unaffected by an increase in the $WBA^{\text{max}}$ (those with previous earnings between $E_1$ and $E_2$ in the figure above). The main outcome considered by Meyer is the duration of benefit receipt; however, he also considers the individuals’ earnings in the year immediately following the claim and in the year after that.

In order to further the confidence in the estimates Meyer also consider a number of “placebo” treatments; in particular, he computes corresponding difference-in-difference estimates using the same dates but using states where there was no policy change. The expectation would be that no “treatment effect” should be found in these placebo cases.

\(^7\)In practice, Meyer takes treatment group to be those workers who file for benefits in the month and a half starting two weeks after the benefit increase; similarly he takes control group to be those workers who file for benefits in the month and a half ending two weeks before the benefit increase. Hence he leaves out the months just around the data in case there might be e.g. some strategic delaying of claims by workers.
Consider first the impact on the weeks of UI benefit receipt. Since Meyer’s data contains sixteen increase in the $WBA_{\text{max}}$ he reports sixteen difference-in-difference estimates. Figure 7 below (which reproduces a part of Meyer’s Table 4) shows the difference-in-difference computations for the four benefit increases observed in Idaho. (The difference-in-difference estimate of the impact of the benefit increase is the column labelled $High - Low$ whereas the column denoted $High$ is simply the change in average duration in the treatment group.) Most estimates are positive, suggesting that an increase in benefits increases the number of weeks of benefit receipt.

FIG 7 (MeyerTab4.jpg).

Meyer then combines the sixteen estimate into a single estimate by taking a weighted average; the results are shown in Fig 8 (Table 5 in Meyer)

FIG 8 (MeyerTab5.jpg).

The results suggests that, on average, an increase in the $WBA_{\text{max}}$ increased the duration of benefit receipt by little over a week. Given that the initial average duration was 16.8 weeks, this amounts to an increase of 6.5 percent. The corresponding average percentage increase in the $WBA_{\text{max}}$ was 9.32, this implies an elasticity of duration of benefit receipt with respect to the (maximum) benefit level of around 0.7.

In order to control for covariates Meyer also places his difference-in-difference approach in a regression framework; the estimate of the impact on duration of benefit receipt is very similar only slightly higher, overall implying an elasticity of duration of benefit receipt with respect to the (maximum) benefit level of around 0.8 - 1.0.

The results summarized above was for weeks of benefit receipt. A number of issues remain to be resolved. First, how do weeks of benefit claim relate to week of unemployment. Meyer argues that it is unlikely that there would have been a significant increase in weeks of benefit receipt without a corresponding increase in the duration of unemployment. Indeed, by analysing the incidence of benefit receipt, he concludes that there was no increase in the propensity to file a claim. Hence, the results are generally interpreted as showing the effect of UI on duration of unemployment spells.
As noted above, Meyer also presents results for subsequent earnings (in the first and second year after the filing of an UI claim). The result do not indicate that higher UI benefits are associated with higher subsequent earnings. In other words, the results do not suggest that more generous UI leads the workers to find better paid jobs. This finding, which does not lend support to the theoretical prediction of the basic job search model that more generous UI should lead to higher post re-employment wages, is important for interpreting the results from a moral hazard/efficiency perspective. It suggests that more generous UI does not affect the type of jobs that the unemployed workers find, only that it implies that they find those jobs more slowly. In other words, UI has a moral hazard cost in that it effectively subsidizes “leisure” with no counteracting efficiency gains in terms of improved job matches.

A number of other studies have applied changes in benefits to estimate the impact on durations, both in the US and elsewhere. E.g. Moffitt (1985), Solon (1985), Meyer (1990), Katz and Meyer (1990) find elasticities of unemployment duration with respect to benefit in the range of 0.4 -1.0, while Roed and Zhang (2001) and Carling, Holmlund and Vejsui (2001) obtain more disperse finding of 0.35 and 1.6 for Norway and Sweden respectively. (See Krueger and Meyer, 2002) for a survey.

The Impact of Benefit Duration on Unemployment Duration

As noted above, the question “what is the impact of UI?” is vague since UI has several dimensions. One important dimension is the duration of benefits. Indeed, both in the US and in the UK (as well as in many other countries) benefits have limited duration of e.g. six months. Whether this a “desirable design feature” will be considered below. Partly the answer will of course depend on the impact that limited duration has on behaviour. Hence it is important to understand the impact of benefit duration.

As usual, identification is an issue. If it were true that all eligible workers had six months of benefits available then it would be hard to estimate the effect of the limited duration – in particular it would be hard to separate out the effect of approaching benefit exhaustion from the direct time pattern of workers’ exit rates from unemployment.

An elegant study of the impact of potential benefit duration is Meyer (1990). Meyer notes that although most US states operate UI programs with a benefit duration of 26
weeks there is, for three reasons, nevertheless substantial variation of benefit duration across unemployed workers. First, some states have standard lengths other than 26. Second, in time of high unemployment, as noted above, the potential duration of benefits is increased by 50 percent up to a maximum of 39 weeks. Third, within a state at a point in time the length of benefits may depend on an individual’s work history. Furthermore, for some workers the maximum duration of benefits are extended during the unemployment spell. This variation across unemployed workers allows Meyer to consider whether the job finding rate is affected by the potential duration of benefits.

The data used by Meyer comes from Continuous Wage and Benefit History (CWBH) covering twelve US states over the period 1978-1983 and containing information about 3,365 individual unemployment spells. Meyer approach involves identifying how time left to benefit exhaustion affects the job finding probability. Hence he works with various versions of “duration/hazard models”. While an effect of a fixed potential benefit duration of benefits might well be “visible” in the data even if all unemployed workers faced the same maximum length, having exogenous variation in the duration of benefits is crucial for separating out the effect of approaching benefit exhaustion from any direct duration dependence of exit rates; in particular, the job finding rate can be expected to vary with the duration of the unemployment spell for reason unrelated to UI (e.g. due to unobserved heterogeneity).

Figure 9 provides a first indication of the impact of benefit duration. The figure shows the empirical hazard rate by week: i.e. the fraction of spells ongoing at the start of a week which end during the week. The figure shows how the hazard rate is high at the start of the unemployment spell – many workers find new jobs very quickly. The hazard then falls but picks up again as the number of weeks approaches 26; this obviously suggests an effect of the common 26 week duration of benefits. For workers who are still unemployed after 26 weeks the hazard drops somewhat again, but picks up again as the spell length approaches 39 weeks.

FIG 9 (Meyer90Fig3.jpg)

Figure 10 displays the same information in a different way. It shows the weekly job finding hazard against the number of weeks left until benefit exhaustion. The most
noticeable aspect of the figure is how much higher is the job finding hazard for workers with less than five weeks of benefits left. Note also that the hazard is slightly higher at around 24 - 25 weeks; this corresponds to workers with a standard maximum duration of 26 weeks who find new jobs within 1-2 weeks of benefit receipt.

FIG 10 (Meyer90Fig4.jpg)

Simple empirical hazards such as the Kaplan-Meier hazard displayed in Figure 9 however does not account for any differences across the individuals in the sample. In order to do so Meyer proceed to analyze the data using a version of a a hazard model. In order not to bias the analysis it is important that the hazard model is as flexible as possible; hence Meyer chooses a non-parametric specification of the baseline hazard, letting the job finding hazard for individual \( i \) at time (i.e. duration of spell) \( t \) be

\[
\lambda_i (t) = \theta_i \lambda_0 (t) \exp [z_i (t) \beta] \tag{8}
\]

where \( \lambda_0 (t) \) is the baseline hazard, \( z_i (t) \) contains time-varying characteristics of the individual, \( \beta \) is a parameter vectors, and \( \theta_i \) represents unobserved individual heterogeneity. The model is estimated, using maximum likelihood, by censoring at \( T = 39 \) weeks; flexibility of the hazard function is obtained by treating each \( \lambda_i (t) \), \( t = 1, ..., 30 \) as a separate “parameter”.\(^8\) As noted by Meyer, the alternative of specifying a parametric assumption for the baseline hazard, e.g. a Weibull specification, has the drawback that the estimates of \( \beta \) would be inconsistent if the assumed baseline hazard was incorrect.

Meyer includes not only time left to benefit exhaustion as a variable that can affect the hazard rate; he also includes the workers’ pre-unemployment earnings and the benefit level; the expectation is that pre-unemployment earnings should increase the hazard while more generous benefits should reduce it.

Meyer summarizes his finding with respect to the impact of duration as follows: “The point estimates imply that moving from 54 to 41 weeks until exhaustion raises the hazard by 46 percent. The hazard is essentially flat between 41 and 6 weeks, but the point estimates imply a small decrease in the hazard. Between 6 and 2 weeks before benefit

\( ^8 \)The unobserved heterogeneity \( \theta_i \) is assumed to come from a particular distribution (the Gamma distribution) and the parameters of the distribution are also estimated.
exhaustion the hazard rises 109 percent. One week away the hazard rises an additional 95 percent. Cumulatively, the hazard more than quadruples as one moves from 6 weeks to 1 week until exhaustion.” (Meyer, 1990, p 780).

Nevertheless, while the result that worker’s who are close to benefit exhaustion increase their job finding rates is interesting Meyer also points out that the majority of unemployed workers find jobs well before the last six weeks of benefits. Hence, the most feature of UI that is most important for its overall impact on spell lengths is the benefit level – not the potential benefit duration. Meyer estimates a significant negative effect of the benefit level on the job finding hazard: a 10 percent increase in benefits is associated with an 8.8 percent decrease in the hazard. Overall, this implies that the effect of a ten percentage point increase in the replacement ratio would be to increase mean duration by one and a half week; this translates into an elasticity of spell duration with respect to the benefit level of around 0.8. The corresponding elasticity of spell duration with respect to benefit duration is around 0.5.9

The estimate of the impact of benefit duration obtained by Meyer (1990) on the other hand appears to be on the high side relative to the other findings in the literature. Smaller (but still positive) estimates are found by e.g. Moffitt (1985) and Card and Levine (2000).

**Layoffs and Unemployment: Some Conclusions**

Unemployment insurance can increase the unemployment rate in primarily two ways. It may increase the probability of workers becoming unemployed and it can increase the average time that unemployed workers remain unemployed.10 To see how the two channels interact, think about weeks of unemployment as the product of its “incidence” $I$ (number of times becoming unemployed) and the average duration of a spell $d$,

$$w = I \cdot d$$  \hspace{1cm} (9)

The impact of benefits $b$ will then be

$$\frac{\partial w}{\partial b} = \frac{\partial I}{\partial b} d + I \frac{\partial d}{\partial b}$$  \hspace{1cm} (10)

9 See also Katz and Meyer (1990).

10 UI can also affect the decision to be in the labour force.
whereby, after extending and simplifying, we have that

$$
\varepsilon_{I,b} \equiv \frac{\partial w}{\partial b} \frac{b}{w} = \left( \frac{\partial I}{\partial b} + I \frac{\partial \partial}{\partial b} \right) \frac{b}{w} = \frac{\partial I}{\partial b} \frac{b}{I} + \frac{\partial d}{\partial b} \frac{d}{d} = \varepsilon_{I,b} + \varepsilon_{d,b}
$$

(11)

In other words, the elasticity of weeks of unemployment with respect to the benefit is the sum of the elasticity of the incidence of unemployment and the elasticity of the duration of unemployment.

As noted above, the literature suggests a significant impact of benefits on duration with estimates of $\varepsilon_{d,b}$ in the range of 0.5 - 1. There is also some evidence on the impact of UI generosity on the incidence of unemployment; this literature however suggests much smaller effects.\(^{11}\) Hence Krueger and Meyer in their survey of the impact of social insurance programs on labour supply conclude that the overall combined effect of benefits generosity on unemployment through incidence and duration is suggested to be near one (Krueger and Meyer, 2002, p 26). They also note that this evidence from the US is well in line with the results obtained by Nickell (1998) who finds an elasticity of unemployment with respect to the replacement rate of close to one when performing an aggregate analysis of twenty OECD countries. Also as noted above, the evidence suggests that, while benefit duration matters, unemployment durations generally appear to be more responsive to the benefit level.

The US Cash Bonus and Job Search Experiments - to write

- Student presentation...
  

Structural Estimation of Job Search Models - to write

- Future extension of these notes. Survey by Eckstein.

Some Alternative Approaches - to write

- Swiss guy on regression discontinuity

\(^{11}\)Most of the literature comes from the US and tends to be particularly concerned with the impact of incomplete experience rating on the incidence of temporary layoffs.
5.2 Other Methods for Consumption Smoothing

Early in the lecture we discussed how, even in the absence of formal insurance (public or private) individuals may be able to achieve some degree of consumption smoothing. Three potential channels were listed: (i) savings/borrow, (ii) compensating labour supply by other family members, and (iii) income transfers from other individuals/organizations.

In general we would like to know not only if these alternative channels are empirically relevant, we would also like to know whether the extent of their use depends on the generosity of UI. If more generous UI reduces the use of these alternative sources of consumption smoothing then we might be concerned that UI is less beneficial than it might first seem – part of its effect would be to “crowd out” alternative consumption smoothing mechanisms. The impact of UI on at least two of the above mentioned channels have been considered in the literature.

Precautionary Savings and UI

It is widely recognized that a large share of individuals’s asset holdings can be considered as “precautionary savings”, savings undertaken as a precaution for a random drops in income, e.g. due to unemployment, illness etc. One question is then whether more generous UI reduces individuals’ precautionary savings, i.e. does public provision of insurance reduce this alternative mechanism for consumption smoothing. While this is theoretically plausible, there are also reasons why it might be quantitatively not so important. First, the risk of unemployment is, for many individuals, quite low. Second, benefits have limited duration and hence may not be a good substitute for own savings. Hence, it is a question that needs to be addressed empirically.

Engen and Gruber (2001) explore whether the provision of UI has an impact on asset accumulation in the US. The authors use a stochastic life-cycle simulation model in order to first verify that, in a realistic numerical model, the existing UI system can be expected to have any sizeable impact on asset accumulation and, if so, which types of individuals should be expected to exhibit the largest responses. In their model individuals save both pre

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12 See Deaton (1992) and Browning and Lusardi (1996) for surveys.
for retirement and for precautionary purposes and maximize expected lifetime utility,

\[ ELU_t = E_t \sum_{j=t}^{D} \beta^j \frac{c_j^{1-\gamma}}{1 - \gamma} \]  

(12)

where \( D \) is the age at “death”, \( \beta \) is the discount factor, and \( \gamma \) is the inverse of the intertemporal elasticity of substitution. The model starts at the age of 21 and finishes at the time of death \( D \) (age 75 in the model) and the length of a time period in the model is a quarter (i.e. an individual “lives” for 216 periods. In the model the individual’s earnings evolve stochastically when she is in work, and the individual is affected by randomly occurring exogenous unemployment spells; earnings and unemployment shocks are modelled as an AR(1) process and a two-state Markov process respectively with empirically plausible parameters. Unemployment benefits are included in the model as realistically as possible: the benefit obtained by a worker who is unemployed at time \( t \) is

\[ b = \max \{b_{\text{min}}, \min (b_{\text{max}}, \rho y)\} \]  

(13)

where \( y \) is the individual’s pre-unemployment earnings; the UI parameters are set equal to “typical” US values. The individual’s wealth evolves according to a standard wealth transition equation,

\[ w_t = (w_{t-1} - c_{t-1}) (1 + r_t) + (1 - R_t) \left[ L_t y_t + (1 - L_t) b_t \right] + R_t p_t \]  

(14)

where \( r_t \) is the interest rate, \( R_t \) is a dummy indicating whether the individual is retired (aged 66 and above), \( L_t \) is a dummy that indicates whether the individual is currently in work (or unemployed) and \( p_t \) is the pension entitlement of the individual (where for notational simplicity we ignored taxes).

The first question is whether, in a quantitative theoretical model, the provision of UI can be expected to have any noticeable impact on individuals’ wealth accumulation. In order to explore this, the authors compute the model with and without UI. Figure 11 shows the impact of UI on an (median) individual’s asset-to-income ratio that age age 25 to 64. This shows that, despite the fact that UI only provides partial insurance against earnings loss, it still has a sizeable predicted impact on asset holdings, at many ages, a drop in asset holding by over 25 percent. What is also noticeable from the figure is how the relative impact on savings is smaller for older workers. This is natural since older
workers (i) hold a larger amount of wealth for retirement purposes, and (ii) have less future uncertainty due to having fewer years left in the labour market.

FIG 11

This is pattern of is also highlighted in Fig 12 which shows the percentage reduction in asset holding as a function of age. The figure also highlights a second feature of the model – the dependence of the impact of UI on the underlying risk of unemployment. As can be expected, if the risk of unemployment is low, then the impact of UI on assets will be low and vice versa.

FIG 12

Hence the simulations presented by Engen and Gruber suggest the following testable predictions: the effect UI on savings in percentage terms (i.e. relative to the level of asset holdings) can be expected to be (i) decrease with age and (ii) increase with the underlying unemployment risk.

After establishing these hypothesis, they then turn to an empirical analysis. Using data from the Survey of Income and Program Participation (SIPP), they relate a household’s gross financial assets relative to its income (average over periods in order to approximate “permanent income”) and run reduced form equations of the form

\[ Wealth_i = \alpha + \beta_0 x_i + \beta_1 UI_i + \beta_2 \delta_j + \beta_3 \tau_t + \varepsilon_i, \]

(15)

\( x \) is a vector of demographic and economic characteristics of the household (or household head/spouse), e.g. age, age squared, gender, marital status, race, education, the number of children etc. Variation in UI generosity obtains due to variation across states and across time: \( UI_i \) is the replacement rate for this individual under his or her state/year UI system. \( \delta_j \) and \( \tau_t \) are state and year fixed-effects. Hence the model estimated is effectively an extended difference-in-difference model. The basic results from their empirical analysis are presented in Fig ??

FIG 13 (EngenGruberTab2.jpg)
The estimates imply a significant negative effect of the UI replacement ratio on the assets. In interpreting the results it must be kept in mind that the dependent variable here is the *wealth-to-income* ratio. The perhaps more interesting outcome is how UI affects on the *level of wealth holdings*. Using the estimated coefficient on UI, the level of UI and the (distribution of) assets holdings in the population, Engen and Gruber conclude that a 10 percent rise in replacement rate would lower savings by 2.8 percent, which is clearly a quantitively significant effect.

In order to test the theoretical predictions (ii) outlined above, Engen and Gruber present extension of the basic regression where they include measures of individual unemployment risk (constructed as a function of industry, region and year); they find that the “crowding out” effect of UI on savings is strongly related to underlying individual unemployment risk. In order to test the first prediction, Engen and Gruber then also allow the impact of UI to vary by age; again they find that the estimated effect conforms with the theory – the proportional effect of UI on savings is falling very sharply as individuals age.

**Family Responses**

- **CHECK FOR UK EVIDENCE ON THE ADDED WORKER EFFECT AND ALSO THE STIGLITZ THEORY PAPER**

While the empirical literature on the labour supply effects of UI has focused on the labour supply of the actual UI recipient, the benefit can have additional labour supply effect. In particular, in the face of an unemployment shock, other family members can increase their labour supply in order to compensate for the earnings loss (Heckman and MaCurdy, 1980, Lundberg, 1985) This response can be expected to be reduced by the provision of UI since the benefit mitigates the underlying earnings loss. In other words, the provision of UI may “crowd out” this response and hence have an additional adverse effect on the total labour supply by the affected families.

Berry-Cullen and Gruber (2000) examine how the provision of UI affects the labour supply of the wives of unemployed men. The authors use data from the Survey of Income and Program Participation (SIPP) and consider married couples (where both partners
are aged 25-54) and focus on unemployment spells where the husband is eligible for some UI. They relate the labour supply of the wives to the UI available to the unemployed husband; treating unemployment spells as their unit of observation they run regressions of the form

$$h_i = \alpha + \beta UI_i + \mathbf{X}_i'\mathbf{\Omega} + \varepsilon_i \quad (16)$$

where $h_i$ is labour supply of the wife in household $i$, $UI_i$ is the UI benefit to which the husband is eligible, and $\mathbf{X}_i$ is a vector of demographic characteristics (including age, education, race, number of children, state unemployment rate, husband’s industry, occupation and wage). The authors also include state- and year effects. If UI provided to the husband reduces the wife’s labour supply then $\beta < 0$.13

The key regressor is $UI_i$ – the UI benefits for which the husband is potentially eligible – which is calculated for each observed spell using information about the parameters of the UI system that was in place in the relevant state at the time of the specific unemployment spell.

The findings indicate substantial crowding out of the potential labour supply response of the wives. See Fig 14. According to the first estimate wives work 22.7 hours less for every $100/week UI benefit. (The average weekly UI benefit in the sample was $138.) The estimate is slightly higher in the Tobit specification. The third column shows that there is also a significant response on the extensive margin: $100/week UI benefit reduces the wife’s employment probability by 12.6 percentage points.

FIG 14 (BCGrubTab2.jpg)

The authors then consider the following hypothetical question: suppose there were no UI system at all (thus maximising the spousal response). How much of the husbands’ lost earnings would be compensated for by the increased earnings of the wives? Using their estimates Berry-Cullen and Gruber reach the conclusion that only about 13 percent of the husbands’ lost earnings would be replaced by increased earnings by the wives. Thus the

13Since the authors include husband’s earnings along with year- and state dummies the source of identification of the UI effect $\beta$ is not obvious. The parameter is effectively identified through the non-linearity of the UI system.
overall conclusion is that, while there is evidence that UI significantly crowd out spousal labour supply responses in terms of participation and hours, eliminating UI would not lead to a situation where increased spousal earning would significantly make up for the lost earnings of the husbands. Stated differently, spousal labour supply provides at best a partial insurance against the income risk from unemployment.

5.3 The Consumption Smoothing Effect on Unemployment Insurance

One rationale for providing UI is that it may help household maintain smooth consumption paths. In this context it is useful to make the distinction between the consumption smoothing benefit of UI and the insurance benefit of UI.

Consider an individual who is facing a stochastic income stream. Such a worker would like to buy insurance in order to reduce the volatility of disposable income. If private insurance markets are not available, then publicly provided insurance can reduce the volatility of the path of disposable income. This is the insurance effect which thus relates to private insurance market imperfections.

However, there can be a consumption smoothing effect even if incomes are fully predictable; if incomes fluctuate then maintaining a smooth consumption path will require borrowing and lending. However, if the individual is e.g. constrained from borrowing, then she will not be able to smooth her consumption perfectly over time.\(^{14}\) Hence the consumption smoothing effect relates more directly to credit market imperfections.

The two effects are clearly related. Nevertheless, the distinction is useful. We would generally not expect individuals to have perfectly insured income streams. Hence precautionary savings will in general have a role to play for smoothing consumption. But this implies that households that are likely to face credit market constraints (e.g. due to having low levels of assets) are also the one that can be expected to be in the worst

\(^{14}\)Consider e.g. a worker who lives for three periods, with a known income stream of £1 in period 1 and period 3 and zero in period 2. Assuming zero interest rate, smooth consumption would require consumption \(c_t = 2/3\) in each period; but in order to achieve this, the individual would need to be in debt at the end of period 2. If she is constrained from borrowing, she cannot maintain smooth consumption.
position for achieving smooth consumption. Hence, if UI helps anyone smooth consumption we should expect this to be the household most likely to be affected by borrowing restrictions.

**Some Empirical Evidence**

There are only a limited number of studies that look at how UI benefits help household maintain smooth consumption. A seminal paper is Gruber (1997) who uses data on consumption from PSID 1968-1987. This data allows Gruber to identify a set of job-losses (for heads of households). For each job-loss, he computes the UI benefit entitlement (in term of replacement ratio) of the individual $UI_i$ by applying the UI benefit formula for that state at the specific time. The dependent variable in the analysis is the change in (log) consumption when the individual becomes unemployed, $\Delta C_i$. Only food consumption (at home and away from home) is recorded in PSID so this is the variable that is used.

The basic specification is

$$\Delta C_i = \alpha + \beta_1 X_i + \beta_2 UI_i + \varepsilon_i$$

where $X_i$ contains a set of demographic variables (age, sex, marital status, race, education, etc.). Note that identification of the effect of UI comes from the fact that UI policy varies across states and over time.

It should be noted that take-up of UI benefits is well below 100 percent; indeed, the take-up rate of UI in the US is closer to around 70 percent. Hence, actual UI benefits are generally lower than the eligible UI. However, Gruber argues that using the UI benefits for which an individual is eligible is useful since it is more directly a policy parameter.

The average drop in consumption observed in the data upon entry into unemployment was 6.8 percent. The estimated parameter on the replacement ratio was around 0.26. This implies that a 10 percentage point increase in the replacement ratio would reduce the consumption drop by about 2.6 percentage. Thus, UI benefits plays a significant role in smoothing consumption. To emphasize this, Gruber notes that in the absence of UI, the drop in consumption would be 22.2 percent. Hence the existing UI system reduces the consumption drop to less than one third.

31
The findings of Browning and Crossley (2001) on Canadian data suggests a considerably smaller consumption smoothing role of UI. They find that, on average, a ten percentage point increase in the replacement ratio would only lead to an extra 0.8 percent consumption drop. However, Browning and Crossley also explore how the effect of UI depends on family characteristics; they find evidence that suggests that the consumption smoothing effect of UI is significantly larger for families that are more likely to be credit constrained.\textsuperscript{15}

A recent study by Ichino and Bentolila (2004) compare the effect of entering unemployment on consumption across four countries: the UK, the US, Spain and Italy. While the study is not directly concerned with UI, it is nevertheless illuminating. The authors argue that the UK and the US can, if anything, be expected to have more developed credit and insurance markets and welfare states. Given that, we should expect that the consumption drop upon entry into unemployment should be larger in Spain and Italy. However, the authors find the opposite. Hence, people in the two mediterranean countries must have access to other channels for consumption smoothing, e.g. family networks.

References


\textsuperscript{15} Indicators of possible liquidity constraints include having no assets, renting accommodation, being single etc.


