UI

# *State Dependence and Unemployment Insurance*

**by Thomas Lemieux
and W. Bentley MacLeod**

Human Resources Development Canada
Développement des ressources humaines Canada

UI Impacts
on Worker
Behaviour

Canada

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****This version has been reformatted for electronic presentation. For the purpose of reference, the page numbers have been maintained identical to the published report.**

## Unemployment Insurance Evaluation Series

Human Resources Development Canada (HRDC), in its policies and programs, is committed to assisting all Canadians in their efforts to live contributing and rewarding lives and to promote a fair and safe workplace, a competitive labour market with equitable access to work, and a strong learning culture.

To ensure that public money is well spent in pursuit of this mission, HRDC rigorously evaluates the extent to which its programs are achieving their objectives. To do this, the Department systematically collects information to evaluate the continuing rationale, net impacts and effects, and alternatives for publicly-funded activities. Such knowledge provides a basis for measuring performance and the retrospective lessons learned for strategic policy and planning purposes.

As part of this program of evaluative research, the Department has developed a major series of studies contributing to an overall evaluation of UI Regular Benefits. These studies involved the best available subject-matter experts from seven Canadian universities, the private sector and Departmental evaluation staff. Although each study represented a stand alone analysis examining specific UI topics, they are all rooted in a common analytical framework. The collective wisdom provides the single most important source of evaluation research on unemployment insurance ever undertaken in Canada and constitutes a major reference.

The Unemployment Insurance Evaluation Series makes the findings of these studies available to inform public discussion on an important part of Canada's social security system.

I.H. Midgley
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*Evaluation Branch*

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*Director*
*Insurance Programs*

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# *Abstract*

This paper analyses the evolution of the propensity of Canadian men to collect unemployment insurance (UI) benefits from 1972 to 1992. Using data from Human Resources Development Canada (HRDC), we find that high-frequency users of UI have been accounting for a growing proportion of UI spells over the last two decades. One possible explanation for this trend is that the first spell permanently increases the probability of collecting UI benefits in the future. Statistical estimates of the propensity to collect UI benefits yield some support for this hypothesis. The results suggest that learning about the functioning of the UI system may explain some of the dynamics of UI recipiency.

# *Introduction*

When the first unemployment insurance scheme was devised in Britain in the early 1900s, the economics of employment was viewed from the perspective of the supply and demand for a homogeneous labour commodity. At that time, there existed many jobs that could be described as “manual labour.” In such a world, labour (like wheat or iron) is considered a commodity characterized by a downward-sloping demand curve and an upward-sloping supply curve. Therefore, unemployment, like an excess supply of wheat, is caused by high wages. Despite its obvious oversimplification, this model underlies decades of government policy in labour markets. For example, expansionary monetary policy creates inflation and thus reduces real wages, thereby creating more employment; greater government spending increases demand and thus employment; and so on.

Current economic thinking recognizes that modern labour markets are characterized by an employment relation that is not a simple exchange of labour hours for a wage. Initiating an employment relationship requires matching the right worker to the right job. Even though unemployment is very high at present, many industries face shortages of skilled labour that cannot be satisfied from the current pool of applicants.

*Current economic thinking recognizes that modern labour markets are characterized by an employment relation that is not a simple exchange of labour hours for a wage.*

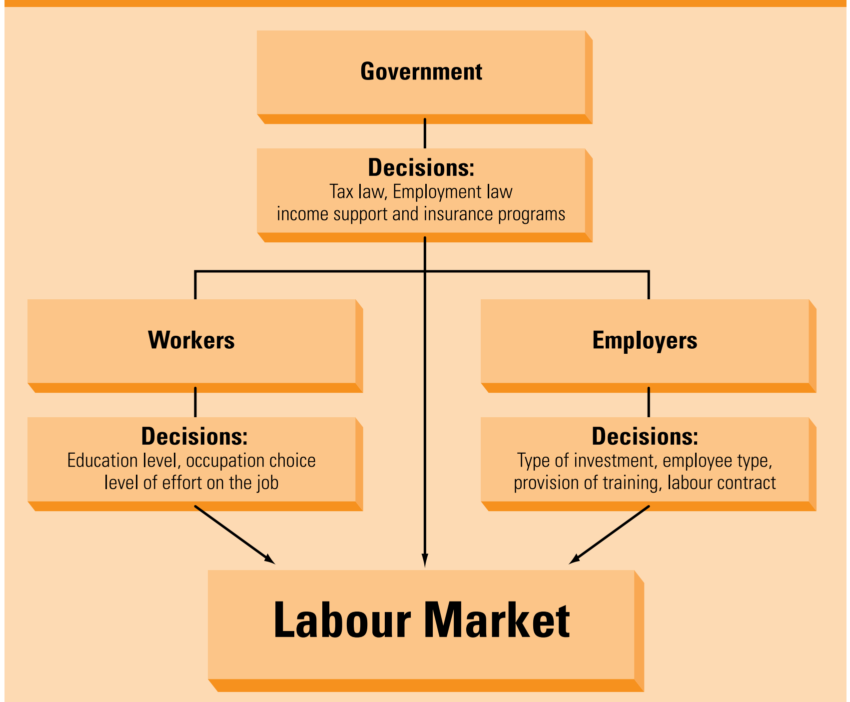
Once a match is formed, the employment relationship itself is best viewed as a contract between the worker and the firm.[1] Even when the worker is paid on an hourly basis, there are many rules governing that relationship, including a commitment by the employer to pay benefits, (such as unemployment insurance). This is further complicated by the fact that the tasks required of workers are more and more complex and difficult to assess. In a modern flexible manufacturing plant, for example, workers are often responsible for the maintenance of machines: when problems occur on the assembly line, they are expected to respond quickly and find solutions. To encourage workers to provide high-quality labour, employers need to create an environment conducive to good work. An important ingredient to such an environment is the expectation of a long-term relationship between the worker and the firm.

Thus the employment relationship operates within the context of the laws and institutions created by government. Many of the laws introduced by government, especially tax laws targeting particular industries, are designed to influence the decisions of employers and employees. These linkages are illustrated in Figure 1. Workers and firms make their decisions on the basis of the set of constraints imposed by government. In particular, the impact of any government program, such as unemployment insurance (UI), will evolve over time as people in the economy learn about the program and adjust their choices in reaction to the options and constraints created by the program. Given the complexity of the interrelationships between individuals in the economy, it is generally very difficult to predict with great accuracy the full impact of any new program.

1 For a review of the contract approach to employment and its implication for wages and employment, see MacLeod and Malcomson (1994).

*Most individuals in Canada do not receive UI benefits; and among those who do, only a small fraction can be classified as repeat users of the system.*

**Figure 1**
**Link between Government Decision and Effect on the Labour Market**




A growing number of studies based on cross-sectional data (or very short panel data) have investigated the impact of the Canadian UI program on the employment and unemployment behaviour of workers.[2] Although most of these studies suggest that many workers tend to "adjust" their labour market behaviour to the parameters of the UI system, they do not provide direct evidence on the dynamics of this adjustment[3] or on how the propensity of an individual to start a UI spell evolves in a dynamic setting.

The objective of the present study is to add to this body of knowledge in two ways. First, we explicitly incorporate the fact that individuals vary in their propensity to use the UI system. There has been a great deal of discussion about how the system acts as a disincentive to work. In our study, we are careful to model how the disincentive effect applies to only a small fraction of UI recipients. Most individuals in Canada do not receive UI benefits; and among those who do, only a small fraction can be classified as repeat users of the system. Both the theoretical model and the empirical estimates incorporate variables that reflect diversity among users of the UI program. This diversity (or heterogeneity) is important because any policy changes will have different consequences for different categories of users.

2 See, for example, Beach and Kaliski (1983), Ham and Rea (1987), Baber and Lea (1993), and Green and Riddell (1883).

3 One exception is Corak (1992), which finds evidence of "occurrence dependence" in the duration of UI spells—in other words, evidence that successive periods of UI tend to be longer and longer.

Second, an individual's employment choice is a complex dynamic function of his or her employment history. In our work, we incorporate two dynamic effects into an individual's choice to collect unemployment insurance. The first is that the fact that a worker received UI benefits in previous years was likely to affect the probability that he or she would receive unemployment insurance in the current year—a phenomenon called "state dependence." The second effect is that the first-time usage of the UI system is likely to affect *permanently* the probability of receiving benefits in the future.

In Section 1, the economics of these two effects are discussed in some detail. There, we present a framework that can help us to understand and interpret our empirical results. Section 2 focuses on the data used in the study. We examine how the UI system affected individual behaviour, based on the fact that government instituted a major reform of the UI program in 1971. The scope of the reform was such that people seeking UI benefits that year faced a new, untried system. Using administrative data that begin in 1971, we study the evolution of the annual propensity to receive unemployment insurance. The chronological (or longitudinal) aspect of the data enabled us to verify that individuals vary systematically in their propensity to receive unemployment insurance.

Our findings are presented in Section 3. (Appendix C describes the econometric method we used.) We found that first-time use significantly increased the probability of receiving unemployment insurance in all future years; and that the probability of receiving unemployment insurance in any one year increased significantly if UI was received in any of the four previous years. Finally, in Section 4 we interpret our results and discuss the policy implications. We outline how different policy choices are likely to affect different classes of UI recipients.

# 1. The Employment Decision

*In a rich country such as ours, there are always many jobs available, though they are often low-paying service jobs.*

Consider a simple model of employment choice. During each period, workers compare the return from employment with that from remaining outside the labour force. On the surface, this may seem to presume that involuntary unemployment is impossible. It is fruitless, however, to talk about the distinction between voluntary and involuntary unemployment. In a rich country such as ours, there are always many jobs available, though they are often low-paying service jobs.[4] Our social safety net also ensures that persons for whom only employment at deprivation wages is possible can choose the alternative of social assistance. In other cases, workers who lose their jobs may leave the labour market permanently. For example, they may decide to stay at home to carry on child-care activities. Alternatively, they may leave the labour force for several years in order to engage in retraining activities. We shall denote the set of activities carried out by individuals who have left the labour market, whether for retraining or child care, as "home production." Thus, for each period a certain number of persons decide either to stay in the labour market (and find a new job if they have just lost one) or to carry out some form of home production.

When workers first lose their job, they usually look for a new one that pays a similar wage. The Unemployment Insurance Act (section 14) explicitly recognizes the right of workers to search for a similar job for a reasonable period of time. In this regard, unemployment insurance benefits ease the cost of the search and help individuals to find better jobs than they might otherwise be able to do if forced by financial circumstances to accept the first job offer they receive. However, in a fast-changing economy such as ours, characterized by high levels of technological change, some job loss may involve a significant drop in workers' standard of living through no fault of their own.

For example, modern computers have all but eliminated the job of typesetting. Thus when a newspaper modernizes its plant and equipment, the people who had been very good typesetters all their lives may find themselves unemployed. In this case, it is very unlikely that these workers will be able to find new employment at a similar wage. Such workers face a permanent capital loss of their human capital as a result of technological change. For skilled workers, long-term unemployment and finally an exit from the labour force may be a preferable

4 See Layard, Nickell and Jackman (1991). This is not to deny that under certain conditions no work of any kind exists. An example of this would be the depression of the 1930s, when merely finding work that paid enough to feed oneself was impossible for many people. In such situations, workers who found employment were in fact paid above the market-clearing wage to ensure that they are sufficiently well-fed to carry out the required tasks. This phenomenon is at the origin of the efficiency wage model, as discussed in Leibenstein (1957). One important role of the social safety net in countries such as Canada is to ensure that people are never forced to reach such a low state of deprivation.

alternative to employment at a low-paying service job that does not recognize the high level of skill they have developed over a lifetime.[5]

*When first instituted, unemployment insurance was meant to provide temporary income support to individuals facing job loss, for example, during a recession.*

Government policy affects the size of the population that chooses to stay out of the labour force. In particular, the level of social security, along with tax and employment policies, affect family income and may enable a spouse to leave the labour force. The recent rise in female participation in the labour force is partly a result of the fact that female wages have risen relative to male wages over the past 20 years. The recognition that policy can affect the number of individuals out of the labour force does not imply, however, that in order to increase labour force participation, government should cut back social assistance. Indeed, to do so may force people to accept low-paying jobs, and it may even push some people towards criminal activity.

The case of the typesetter discussed above is illustrated in Figure 2 as the transition involving the loss of human capital. The realization that technical change can increase unemployment is reflected in recent work at Employment and Immigration Canada (now Human Resources Development Canada). In *A Labour Force Development Strategy for Canada*, worker retraining is seen as an important ingredient in trying to ensure that job loss and the associated loss of human capital does not translate into long-term unemployment.

When first instituted, unemployment insurance was meant to provide temporary income support to individuals facing job loss, for example, during a recession. This is illustrated in Figure 3, where $h' < h$ represents a recession. What must be noted here is that for a large segment of the labour force, unemployment is never viewed as an option, and that job losses take place among workers who are marginally attached to the labour force, that is, those who are close to the decision line between working and not working. This distinction is important because it explains the motivation for socially provided unemployment insurance.

Given that the employment relationship is a voluntary contract between two parties, the employer is always free to provide severance payments as part of the package. The level of insurance provided by the firm is determined by both

5 For purposes of exposition, it is useful to present a simple formal model that captures many of these incentive effects of UI. Suppose that at time $t$ all workers are completely characterized by their base productivity, $\theta$, and the value of home production, $u$. The base productivity of a worker is a composite variable representing the market value of education, occupation choice, and innate skills. Since this variable represents a market value, it will vary over time as a result of on-the-job training, technical change, and so on. Let *ft* $f_t(\theta,u)$ denote the distribution of these two characteristics in the economy in period $t$.

In addition to being linked to the worker's base productivity, wages are also affected by business-cycle shocks, including seasonal shocks. Letting $\eta_t$ denote the size of such a shock in period $t$, suppose that the wage of a worker is given by:

$$w_t = \theta + \eta_t .$$

Abstracting away for the time required for search, individuals choose employment if, and only if, the wage is greater than the value of home production or $w_t \geq u_t$. (As a matter of convention, we normalize the value of providing effort on the job to zero, so that the wage provides a sufficient statistic for the utility from employment.) This choice is illustrated in Figure 2, where the size of each area is related to the number of individuals in each state. The level of employment is found by counting the number of individuals whose market wage is greater than the value of home production. The employment rate is given by:

$$\textit{employment rate} \ = \int_{(\theta,u)\varepsilon E} f_t(\theta ,u)\, d\theta\, du,$$

where $E$ is the set of characteristics for workers choosing employment.

**Figure 2**
**Employment in the Absence of UI**

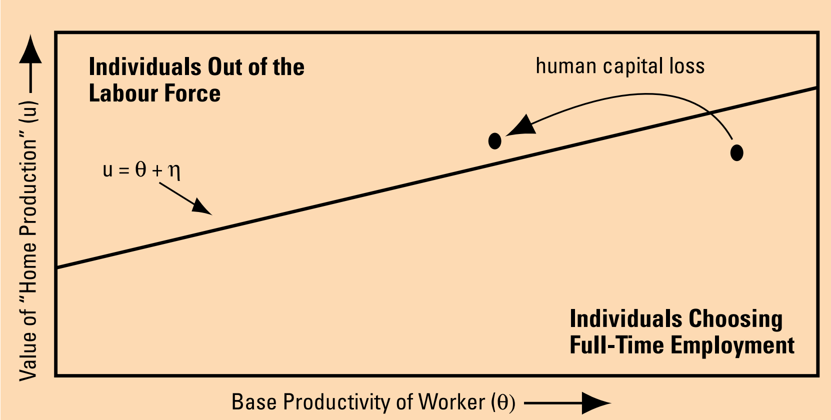
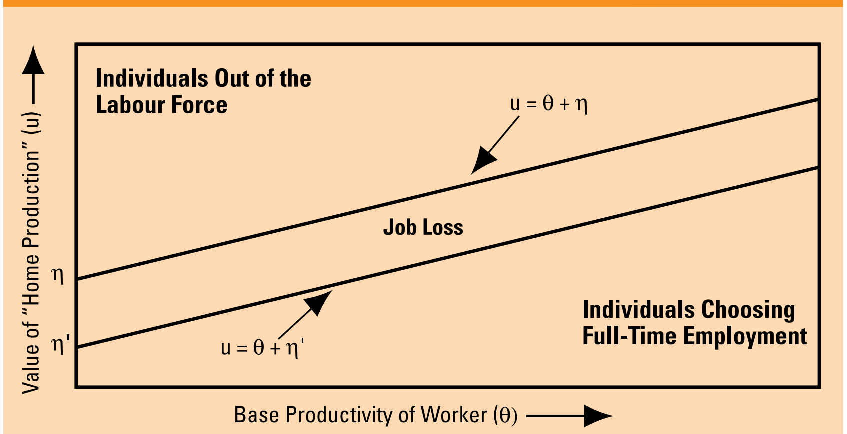



**Figure 3**
**Effect of an Economic Downturn**




market conditions and employment law. In some cases, if workers place a high value on such insurance, firms will offer severance packages as part of the employment contract to attract high-quality workers. The size of such benefits is likely to be a function of the workers' worth to the firm. Hence, workers in lower skill categories are not only more likely to be the ones facing the higher probability of unemployment, but they are also more likely to have the least generous severance package.

In this sense, UI compensation is not only an insurance program but also a redistributive program for people with higher probabilities of unemployment. Government could adopt a labour law that would require employers to provide a minimum level of layoff insurance.[6] However, that would put many small, mar-

6 See Bentolila and Bertola (1990) and Bertola (1990) for a discussion of the effect of employment security legislation on labour demand.

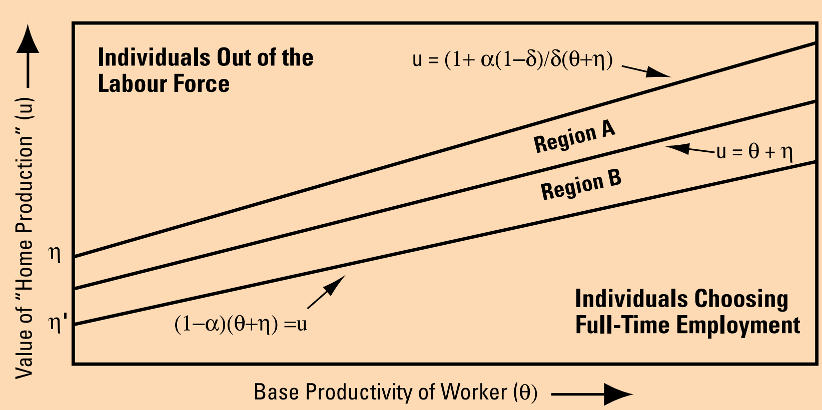
ginal firms that are more sensitive to business-cycle fluctuations at a disadvantage. More importantly, much of the motivation for UI came from the experience of the depression of the 1930s, a period during which many firms went out of business and thousands of people were forced into unemployment. These were individuals with families to feed and children to educate. Given that job loss is most severe among individuals who have the greatest difficulty in finding new work, unemployment insurance provides temporary support during a recession for the most disadvantaged workers. These are workers for whom their previous employer was unwilling or unable to provide the necessary level of insurance during a downturn in the economy.

*It is well known that increasing the level of insurance creates incentives for individuals to decrease their labour supply.*

## The Effect of Unemployment Insurance on Unemployment

It is well known that increasing the level of insurance creates incentives for individuals to decrease their labour supply. At the same time, as shown in a simple model developed in Appendix A, there are some people, who in the absence of unemployment insurance, might choose to be out of the labour force but, because UI benefits are available, decide to work for part of the year. The set of characteristics of these workers is found in region A of Figure 4. This illustrates how UI can actually increase labour force participation.[7] A common example would be employment in the arts. A theatre company may survive because its members have insured earnings while performing or touring, but collect UI benefits between shows. During this period, they may still be rehearsing and preparing for future employment. In the absence of UI, many of the performers might not be able to continue their profession.

**Figure 4**
**Unemployment Induced by Unemployment Insurance Compensation**




7 This is consistent with the finding of Card and Riddell (1993) that though unemployment grew in Canada during the 1980s, so did labour force participation, particularly among women.

*Learning effects may be one reason why first-time use of UI may lead to a permanent increase in future use.*

## "Occurrence Dependence"

Despite the simplicity and intuitive appeal of the model developed in Appendix A, a direct test is not possible, because the opportunities available to the individual are not directly observed. What we can observe is the person's equilibrium choice and how this choice varies as a function of observable shocks. Thus our goal is to find evidence that some individuals adjust their labour supply in response to the UI program, and in some cases work only the number of periods required to qualify for benefits.[8]

What is less well understood is the pattern of use of the UI system from year to year. If the system is mainly an insurance program against business-cycle fluctuations or structural change in the economy, then use by any given individual should be an infrequent event that is correlated with the business cycle or regional shocks. On the other hand, if the UI system is being used as a subsidy for leisure, as Figure 4 illustrates, then one would expect individuals to have a consistent and regular pattern of use. We have attempted to find such a pattern by testing for "occurrence dependence" in the data.

Here, we estimate two kinds of occurrence dependence. The first we call a "treatment" or "learning" effect. We suppose that the first time a person receives unemployment insurance affects the future probability of use in the same way during each subsequent period.

The second effect is a "lagged" effect, in which the probability that a person will use the system in any given year depends on whether he or she used it the preceding year. Suppose, for example, that a worker received UI benefits in 1973, 1974, 1982, 1983 and 1984. The "treatment" or "learning" effect is one in which receiving UI benefits in 1973 affects the probability of receiving them in subsequent years. A one-period lagged effect means that receiving benefits in 1973 affects the probability of receiving them in 1974, but not in any subsequent years. Similarly, a two-period lagged effect implies that receiving UI benefits in 1973 affects the probability of receiving them in 1975, but not in any other year. We now consider some of the economic reasons for the existence of treatment effects and lagged dependency.

## "Learning" the UI System

Learning effects may be one reason why first-time use of UI may lead to a permanent increase in future use. It takes time for people to learn about, and adjust to, the incentives provided by the unemployment insurance system. Most individuals who work full-time probably never consider the option of leaving employment to collect UI. However, when workers experience an unexpected layoff and a spell of unemployment, they then will become aware of the system's incentives. They may learn that they are better off working for only part of the year and collecting UI benefits for the remainder. In such cases, the first spell of unemployment will permanently increase the probability of future use.

8 There is already a great deal of evidence supporting the hypothesis that workers adjust their labour supply to the parameters of the UI system. Ham and Rea (1987) and Meyer (1990) conclude that the probability of finding a job increases as the expiry date of benefits approaches. Topel (1983) and Card and Levine (1993) present evidence showing that layoff probabilities depend on system parameters, including the existence of experience rating.

Such a learning effect also varies by region. In high-unemployment regions, more people are aware of the parameters of the UI system, and one would expect the effect of first-time use to be smaller. At the same time, variations in the generosity of the system will affect the usage rate of persons who are well informed about the system, but not necessarily that of people who have had little experience with UI. We found some evidence for both of these effects.

*Plant shutdowns and structural changes in the economy are important causes of job loss.*

The effect of learning is graphically illustrated in Figures 2 and 4. Figure 2 describes the behaviour of individuals as a function of their characteristics when they do not consider using the UI system to subsidize part-year work. A spell of UI was found to change the picture dramatically. Individuals were now aware of the level of subsidy available through the UI system and faced the set of decisions illustrated in Figure 4. Individuals in regions A and B are better off working for only part of the year and collecting UI for the rest of the year. Individuals in region A are those who would not work in the absence of UI. Learning may still play a role for these people. For example, they may be the spouse of a worker who has lost his or her job. In such a situation, the spouse is also in a position to learn about the parameters of the system.

While learning may lead to a permanent increase in the probability of receiving UI, this effect may also have a "lagged" component. For example, a young person who was unemployed in 1971 may choose to cycle in and out of the UI system for a couple of years before finding a permanent job. If that same person did not receive UI benefits from, for example, 1975 to 1985, then his or her knowledge of the UI system may be outdated, and consequently that worker may be less likely to consider UI as an alternative. Being laid off in 1986 may "remind" the individual of the high level of UI benefits and lead to an increase in UI recipiency from 1987 to 1991. In this case, therefore, the effect would express itself as a lagged dependency rather than as a permanent increase in the probability of using UI based on the experience of the system in 1971.

## Human-Capital Loss

Plant shutdowns and structural changes in the economy are important causes of job loss. Workers affected by such changes tend to face a permanent income loss as a result of either the loss of human capital or firm-specific events.[9] An example of this is the recent decline in the Atlantic coast fishery. In this case, people who have made significant investments in fishing vessels and gear are finding themselves with skills that have little market value. In the context of our model described above, they face a drop in their base productivity that may cause their characteristics to move into region A or B of Figure 4, and hence these people may become repeat users of the unemployment insurance system.

It should be recognized that, following a transition period, it is not the loss of human capital that generates the unemployment, but the incentives provided by the UI system. In the absence of UI or any social security, unemployed individuals would be forced to find some sort of work to support themselves and their families. The loss of human capital implies that there is a significant drop in

9 See Jacobson, Lalonde and Sullivan (1993).

*… job loss creates a stigma that lowers the value of the unemployed worker in the market. This may lead to a higher probability that the worker will make repeated use of the unemployment insurance system.*

income, though not necessarily an increase in unemployment. The UI system provides a subsidy for part-year work that may enable the unemployed person to have an income that is greater than it might be in the absence of UI, and this results in high measured unemployment.

After an initial drop, income rises quickly for displaced workers, though it does not return to its previous level.[10] This rise in potential income can occur as a result of retraining in a new job, and this may lead to a decline in the probability of using UI over time. This suggests that use of the system would generate a lagged dependency in which recourse to UI benefits in the previous year or years increases the probability of receiving benefits in the current year. The fact that job loss leads to a permanent income loss would imply that the probability of receiving UI benefits increases in all future periods. Thus job loss caused by job displacement implies both a positive lagged dependency and a positive treatment effect.

## Stigma Effects

Another reason for a dynamic effect is the negative signal that unemployment provides to the labour market. Given two workers who are identical in every respect except that one has lost his or her job, the individual who still has a job is likely to be the more highly regarded. Hence, job loss creates a stigma that lowers the value of the unemployed worker in the market. This may lead to a higher probability that the worker will make repeated use of the unemployment insurance system. The extent to which stigma affects a person's income depends on the extent to which job history is used in the employment decision. In occupations that use only information from the past few years, the stigma effect is likely to be short-term and to show up as a positive lagged effect rather than as a treatment effect.

## Mechanical Effects

Eligibility for UI benefits is based on the number of weeks a person must work in order to have access to benefits over a period of up to one year, with 10 to 14 weeks being the usual minimum qualification period. In most areas of the country, it is impossible for individuals to qualify for unemployment and receive the full benefits within the same calendar year. This makes it difficult to start a new benefit period every year. Thus the existence of a qualification period implies that the probability that a person will begin a benefit period in the current year should decrease if benefits were received in the previous year.

10 See Jacobson, LaLonde and Sullivan (1993).

# 2. Data and Descriptive Statistics

We analyzed the dynamics of UI recipiency in Canada using a large longitudinal data set for the years 1972 to 1992. To create this data set, we combined the Status Vector File of Human Resources Development Canada (HRDC) from 1971 to 1993 with HRDC's T4 Supplementary File for the period 1972–1991.

These two data sets are complementary. The Status Vector File contains data pertaining to all unemployment insurance claims established by claimants whose social insurance number (SIN) ends with the digit '5'. It also contains some demographic information, such as the age and sex of the claimant as well as the UI region in which the claim was filed. The drawback of this file is that it has very little information on what happens to claimants before and after their UI claims.

By contrast, the T4 Supplementary File provides no demographic information on workers, but contains records of all sources of T4 income for workers whose SIN ends with the digit'5'. It also provides information on the location and industry of the employer that issued the T4 form. This file can be used to establish whether a UI claimant received some labour income before and after each UI spell. By combining the two files, it is possible to reconstruct a detailed history of UI and labour-income recipiency from 1972 to 1991 for a large sample of workers.

More precisely, we extracted from the Status Vector File all claims that eventually led to the payment of regular UI benefits in the first week of payment. We thus excluded from the analysis workers initially filing claims for special benefits (seasonal, sickness, maternity, and so on.) We used the benefit-period commencement of each claim to identify the year in which the UI spell started. We identified all the years from 1972 to 1992 in which at least one spell started. We then took this information and merged it with data contained in the T4 Supplementary File on the dates when tax filers first received T4 income. This enabled us to identify a "year of entry" in the sampling universe for each UI claimant.

For almost half of the UI claimants, the year of entry was simply the year in which the T4 file started, that is, 1972 (see Table B.1, Appendix B). For most of these workers, the year of entry was also actually the year of entry into the sample rather than into the work force. For the other half of the sample, the year of entry was either the true year of first entry into the work force or the year of re-entry for people who earned some T4 income before 1972 but none in 1972. Since the age at entry of half of the claimants (that is, the age at which T4 income was first recorded) is 20 or less, this suggests that most of the 50.7 per cent of workers whose year of entry is 1973 or later were not re-entrants into the work force.

This brings us to the question of why it is important to know when a claimant first "entered the work force". The answer is that in order to find out how long it will take for someone who has previously used the UI system to make use of it again, we must know how long it took before the person used the system for the first time. Our measure of entry is imperfect in that students, in the summer jobs, are included among those who earn T4 income, and they have not yet made a "permanent" transition to the work force. Nevertheless, this is the best we can do with the available data. We will discuss these issues again in Section 3.

*… in order to find out how long it will take for someone who has previously used the UI system to make use of it again, we must know how long it took before the person used the system for the first time.*

We also used information from the T4 Supplementary File to compute a coarse measure of eligibility to UI. An individual who has not worked at any time during either the current year *t* or year *t*-1 cannot qualify for a new UI benefit period beginning in the current year. This UI eligibility variable can thus be used to correct for potential estimation biases which are likely to arise when people leave the work force temporarily or permanently because of early retirement, illness or some other related factor.

Note that the results reported here pertain to men only. This is partly because these problems are more severe for women as a result of maternity leave and so on. More generally, it would be more difficult to distinguish between secular trends in labour market participation from trends induced by the UI program for women than it is for men because of the large and positive trend in women's labour market participation. Thus we follow the tradition in labour-supply studies of treating men and women differently; it must be pointed out, however, that the arguments above have little force for the youngest cohorts of men and women.

Once the year of entry has been identified from the T4 file, this information is merged to the information about demographic characteristics and UI spells from the Status Vector File. The two files are combined into a yearly "panel data file" providing one observation per person for each year, from the year of entry to 1992. For each observation, we know whether the worker received some T4 income and whether he initiated a UI spell during the year. Observations pertaining to persons under 15 or over 65 were removed from the sample. Also excluded are people born before 1912 or after 1972. The resulting sample contains 10,253,535 observations for 618,911 men who started a UI spell at least once in the years 1972 to 1992.

A few statistics on the composition of the sample are reported in Table B.2 (Appendix B). The average age of men in the sample is just under 35. The regional composition of the sample more or less reflects the relative weight of each province in the national population. Note, however, that Quebec and especially the Atlantic provinces are over-represented. This simply reflects the fact that compared to provinces west of Quebec, a larger proportion of the work force in these provinces has received UI at least once.

Table B.2 (Appendix B) also shows that men in the sample received at least some T4 income in four years out of five and started a UI spell in one year out of five. The proportion of people starting a UI claim is disaggregated by province and by year in the second column of Table B.2 (Appendix B). Once again, there are important east/west differences as men in Quebec and the Atlantic provinces were more likely to start a UI spell than men in other provinces. Interestingly, the proportion of people starting a UI spell follows the business cycle but shows no obvious upward or downward trend.

## Longitudinal Analysis

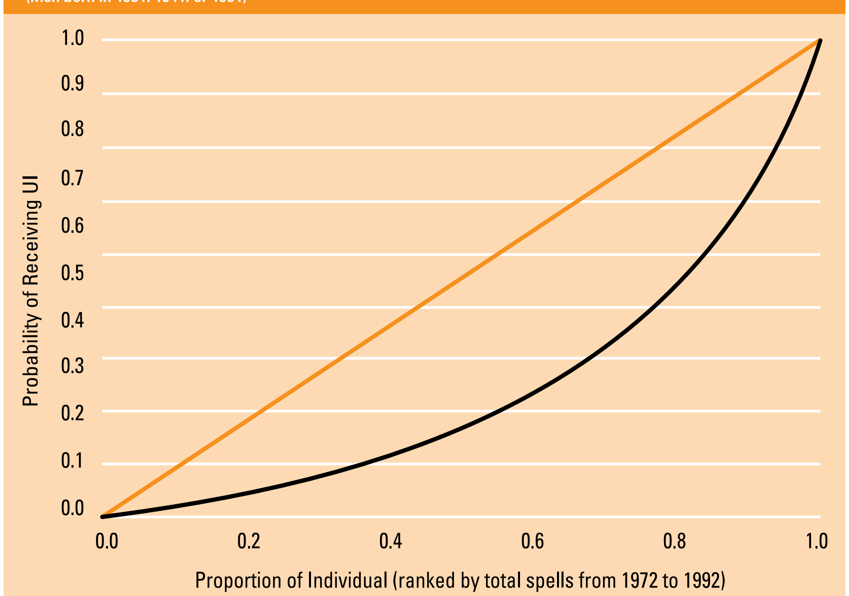
The descriptive statistics reported in Table B.2 (Appendix B) do not exploit the longitudinal aspect of the data, nor do they give any indication as to, for example, how the past history of UI recipiency is related to the current probability that a person will start a UI spell. Following are some descriptive statistics highlighting the dynamic aspects of UI recipiency.

One of the advantages of working with a large data set such as ours is that it is easy to control for observed characteristics by dividing the sample into homogeneous groups of people and analyzing each group separately. Here we select three cohorts of workers to present some descriptive evidence focusing on the longitudinal aspect of the data. The three cohorts consist of: men born in 1931, men born in 1941, and men born in 1951. These three years are selected so that all men are old enough to have been in the work force in 1972 and young enough to still be in it in 1992.

Our results (see Table B.3, Appendix B) suggest that, of the people sampled, there is a significant degree of persistence in the propensity to start a UI spell that cannot be explained by business-cycle factors or temporary disturbances in the labour market situation. One possible explanation is that the use of the system is concentrated among a small group of "repeaters," while most other people only occasionally apply for benefits. One simple way in which we measured the concentration in the use of UI was by sorting people into 21 groups, based on the number of times they started a UI spell over the 21 years of the sample. We then looked at the proportion of total spells attributable to each group. One convenient graphical way of representing the concentration in UI spells is to plot the proportion of UI spells accounted for by people with S spells or fewer (S = 1, ..., 21) as a function of the proportion of people with S and fewer spells. Figure 5 shows the resulting curve (which we call a Lorentz curve, by analogy with the well-known statistical device used in the income-distribution literature). It indicates a great deal of concentration in UI spells: while 31 per cent of claimants who had only one spell of UI over the 21-year period accounted for only 8 per cent of total spells, 7 per cent of claimants with 11 spells or more accounted for 22 per cent of total spells.

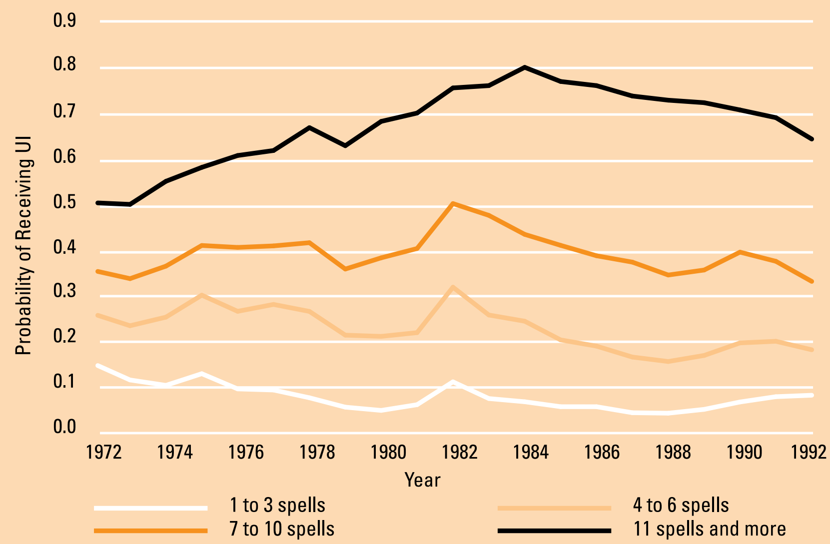
*… of the people sampled, there is a significant degree of persistence in the propensity to start a UI spell that cannot be explained by business-cycle factors or temporary disturbances in the labour market situation.*

**Figure 5**
**Lorentz Curve of UI Spells, 1972 to 1992**
**(Men born in 1931. 1941. or 1951)**



*For low-frequency users, the probability of receiving UI essentially follows the business cycle.*

**Figure 6**
**Probability of Receiving UI, 1972 to 1992**
(Men born in 1931, 1941, or 1951)




For reasons mentioned in Section 1 of this paper, the fact that UI spells tend to be concentrated among few "repeaters" may be attributable to a large variety of factors, some of which are related to the effect of the parameters of the UI system on people's behaviour. To investigate this issue in greater detail, we plot in Figure 6 the probability of starting a UI spell from 1972 to 1992 for four different groups of workers, including: a group of low-frequency users ("stayers") who had fewer than four UI spells over the sample period; a group of high-frequency users ("movers") who have at least 11 spells; and two intermediate groups with four to six spells and seven to 10 spells, respectively. Note that each group accounted for roughly 25 per cent of total spells, though the proportion of workers in each groups is very different. Sixty-two per cent of workers were in the group with one to three spells; 20 per cent were in the group with four to six spells; 11 per cent were in the group with seven to 10 spells; and 7 per cent were in the group with 11 spells or more.

The data used to calculate the probabilities reported in Figure 6 come from the pooled sample of the three cohorts of men born in 1931, 1941 and 1951, respectively. Separate figures by cohort and by region are reported in Figure 7. Interestingly, the patterns of use are similar across the five regions (Atlantic region, Quebec, Ontario, Prairie region, and British Columbia). In all five regions, high-frequency users increasingly relied on UI while the opposite is true for low-frequency users. The cyclical patterns are also similar across regions, suggesting that the patterns highlighted in Figure 6 are not caused by spurious changes in the regional composition of the sample.

The patterns of the probability of using UI reported in Figure 6 are quite informative. For low-frequency users, the probability of receiving UI essentially follows the business cycle. That is, it increases during recessions (1975, 1982, 1990–1992) and decreases during expansions. This probability also seems to follow a downward trend during the 1970s. By contrast, the same probability for high-frequency

**Figure 7a**
**Probability of Receiving UI, 1972 to 1992**
(Men in the Maritimes only)

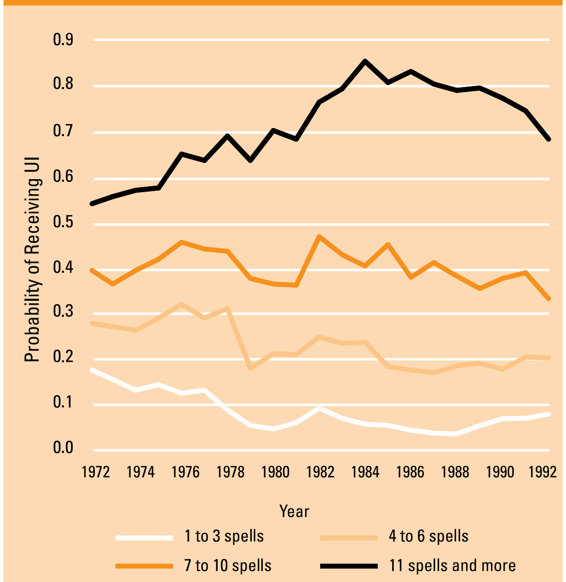



**Figure 7b**
**Probability of Receiving UI, 1972 to 1992**
(Men in Quebec only)

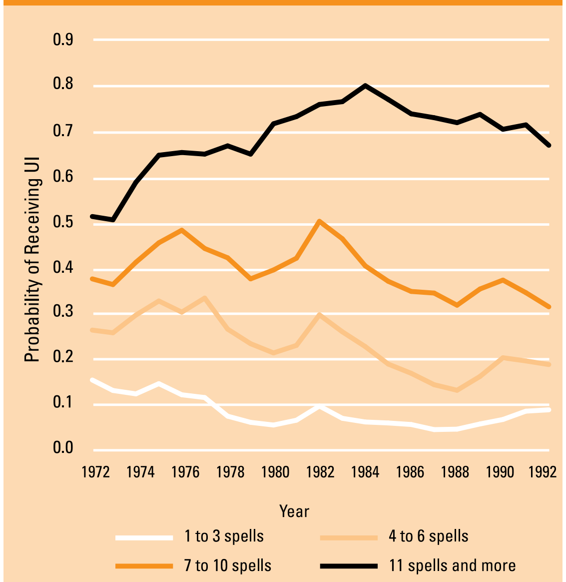



**Figure 7c**
**Probability of Receiving UI, 1972 to 1992**
(Men in Ontario only)

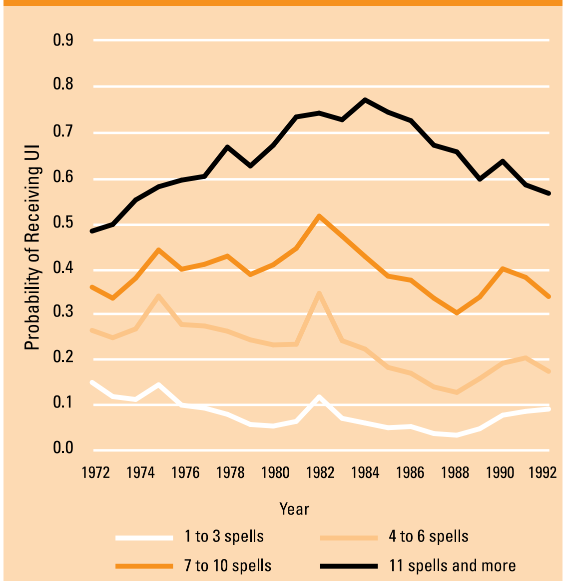



**Figure 7d**
**Probability of Receiving UI, 1972 to 1992**
(Men in the Prairies only)

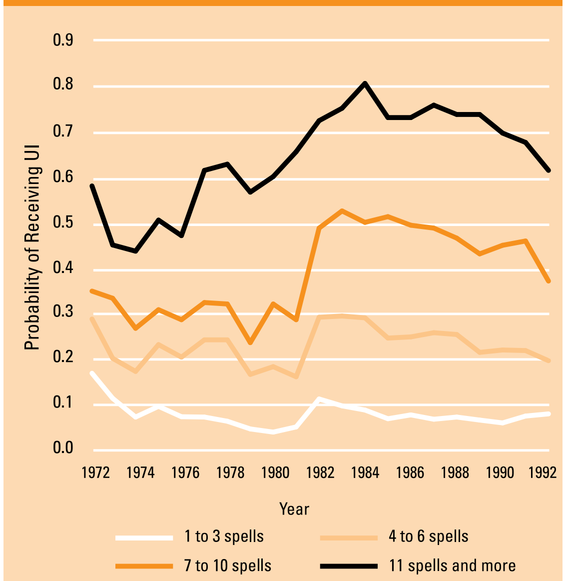


**Figure 7e**
**Probability of Receiving UI, 1972 to 1992**
(Men in British Columbia only)

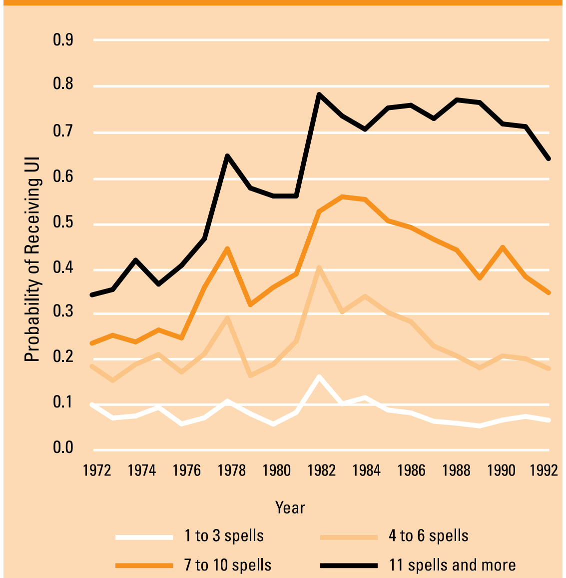



**Figure 7f**
**Probability of Receiving UI, 1972 to 1992**
(Men born in 1931 only)

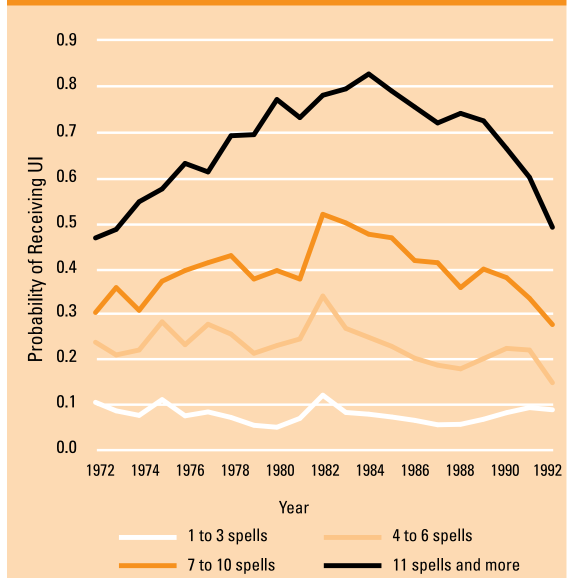



**Figure 7g**
**Probability of Receiving UI, 1972 to 1992**
(Men born in 1941 only)

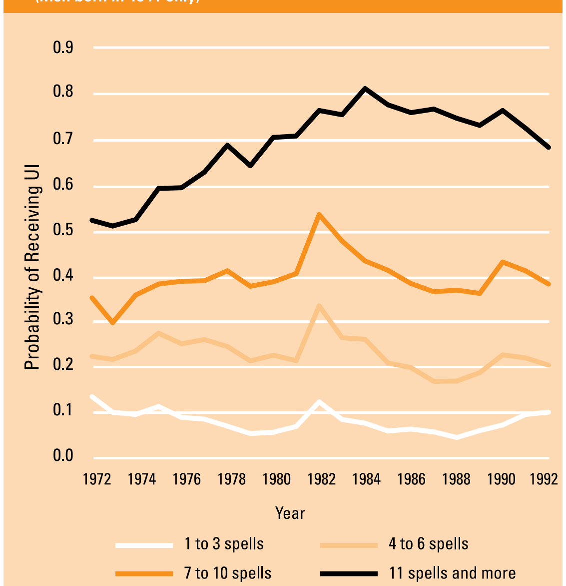



**Figure 7h**
**Probability of Receiving UI, 1972 to 1992**
(Men born in 1951 only)

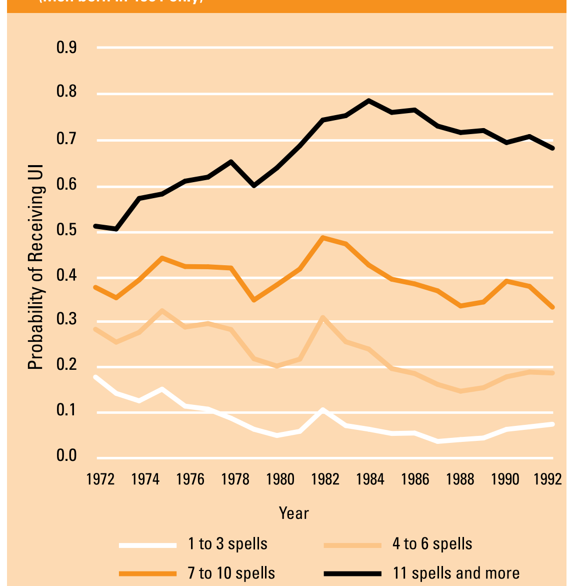
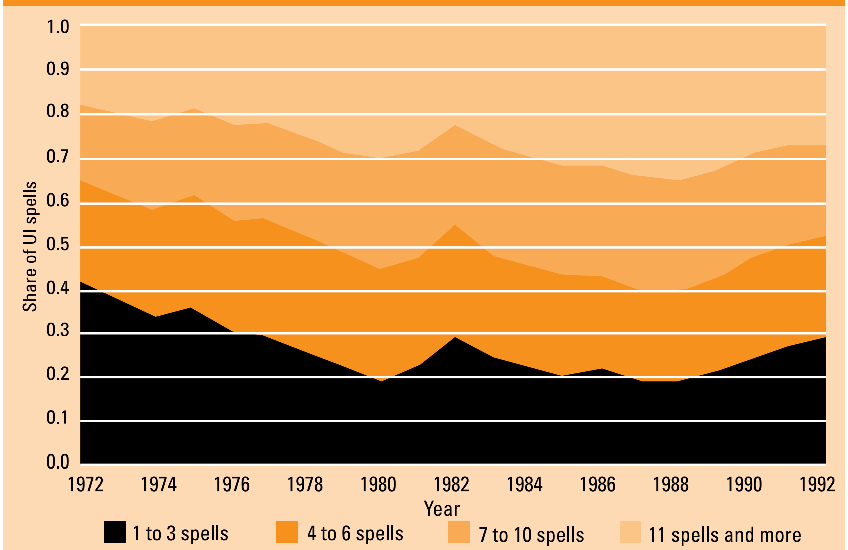


**Figure 8**
**Share of Yearly Spells by Groups of Workers**




users (11 spells or more) follows a steep upward trend between 1972 and 1984 and does not seem to follow the business cycle. If anything, the proportion of high-frequency users receiving UI declined during the 1990–1992 recession. The probabilities for the disaggregated groups reported in Figure 7 show a similar pattern.

Another way of looking at the evolution of the propensity of each of the four groups to use UI is to examine the share of UI spells accounted for by each group (see Figure 8). The results show that once business-cycle effects are controlled for, high-frequency users account for an increasing share of UI spells, while low-frequency users account for a decreasing share. In addition, the share of low-frequency users clearly rises during recessions while the share of high-frequency users declines. A similar conclusion is achieved by more formally fitting "probit" regressions for each group of workers. Such regressions indicate that the probability that high-frequency users will receive UI benefits is in fact pro-cyclical, and therefore decreases during recessions. They also indicate that the trend in the probability is positive and statistically significant.

This body of evidence suggests that UI plays a different role for different groups of workers. For low-frequency users, UI is more or less a pure insurance system that protects workers against labour market risks such as recessions. For high-frequency users, UI increasingly resembles a permanent income-support program that has little to do with labour market risks.

Several factors could explain this latter tendency. The first is learning. As shown in Figure 4, as knowledge about the UI system spreads, an increasingly large proportion of people end up in regions *A* and *B*. Others may also end up in either region because they have lost their job and have failed to re-invest in new skills that would enable them to move out of these two regions. A third and purely mechanical explanation is that, for some unknown reason, the relative labour market conditions for low-skilled workers was deteriorating over the sample period.

*These results suggest that part of the upward trend in the use of UI by high-frequency users is caused by the fact that exposure to the system permanently increases the probability of future use.*

If learning effects are important, previous experience with the UI system should have an important effect on the future probability of receiving benefits. In the remainder of the paper, we try to provide some evidence that this is indeed the case. We focus on the significance of learning effects rather than trying to account fully for the patterns of UI use shown in Figure 6.

## Grouped-Data Evidence on Learning Effects

If learning effects are important, a given experience with the UI system should have a greater impact on the future probability of receiving UI among people who had no previous experience with the UI system than among people who have had some previous experience. One simple measure of the magnitude of learning effects is thus obtained by comparing the evolution in the probability of UI recipiency of two such groups.

Consider a fixed cohort of workers at the beginning of the 1981–1983 recession, some of whom have received UI in the past. Focusing on the 1981–1983 period is an interesting "natural" experiment because many workers were exposed to unemployment and UI recipiency for the first time in their careers during that period. If learning is important, the post-recession probability of these workers' receiving UI benefits (in 1984–1986, for example) would be expected to be higher than the probability that would have prevailed if they had never been exposed to UI. Although this hypothetical probability cannot be directly observed, a control group of workers who were exposed to UI before the recession can be used to calculate the change in the probability of receiving UI between the recession (1981–1983) and the post-recession period (1984–1986) that would prevail in the absence of learning effects. The point is that since these workers have already been exposed to the system, a new exposure during the recession should not have any additional effect on the future probability of receiving UI. The change in probability for workers who have previously been exposed is thus net of learning effects.

We calculated separate estimates of the effect of learning for the cohorts of men born in 1931, 1941, and 1951 (see Table B.4, Appendix B). The estimated effect is positive for all three cohorts, suggesting that a first exposure to UI permanently increases the probability of receiving UI again in the future. The estimated effects range from 4.2 per cent (for men born in 1941) to 12.3 per cent (for men born in 1931). This means, for example, that for men born in 1931 who had never been exposed to the system, learning about the UI system as a result of the recession of the early 1980's permanently increased the probability that they would claim benefits by 12.3 per cent.

These results suggest that part of the upward trend in the use of UI by high-frequency users is caused by the fact that exposure to the system permanently increases the probability of future use. Learning may also explain why this upward trend levelled off during the 1980's. Since we define high-frequency users as people who received UI benefits in at least 11 years from 1972 to 1992, their first experience with the system cannot be after 1982.

The idea that a person's first exposure to UI increases the future probability of their using it can thus account for many of the empirical facts reported in this section. This hypothesis is formally tested in Appendix C by estimating a probit model with random effects.

# 3. Estimation Results

Because of methodological difficulties, the estimation is performed over a randomly selected subset of the main sample. In order to obtain estimates precise enough for several demographic groups in each province, we randomly selected one-in-five samples for Newfoundland, Nova Scotia, New Brunswick, and Saskatchewan; a one-in-six sample for Manitoba; a one-in-eight sample for Alberta; a one-in-20 sample for British Columbia; and one-in-50 samples for Quebec and Ontario. We selected a full sample for Prince Edward Island.

For each province, we further divide the sample into three subsets based on year of birth. The first demographic subsample includes men born before 1946, who are all old enough to have been in the labour force in 1972. The second subsample comprises "baby boomers" born between 1946 and 1955, while the third subset consists of men born after 1955 who were unlikely to have entered the work force by 1972. We have also limited our analysis to observations that satisfy the "eligibility" rule, that is, to those who received some T4 income during the current or previous year. By using this selection rule, we minimized potential biases caused by people who, for various reasons, leave the labour force permanently. We have also estimated our models without this selection rule and found very similar results.

First, we estimated separate models for each of the three demographic groups in each province. The estimates of the learning parameter are reported in Table B.5 (Appendix B). While the estimated effect is positive on average, some interesting patterns emerge from the table. First, learning effects tend to be large and positive for men born prior to 1946, but much smaller and often negative for younger workers. In addition, learning effects are more evident in Ontario, Alberta, and British Columbia, the three provinces in which the use of UI is also less widespread than in the rest of the country.

These two patterns are consistent with the role of social versus individual learning mentioned earlier. The more widespread the use of UI is in a region at any given time, the less previous experience with the system will affect the propensity to use it. Simply put, in regions where "everybody else" uses the UI system, a first experience with the system will not teach a person anything he or she did not already learn through family members or friends. The results reported in Table B.5 (Appendix B) thus support the view that the younger generations and people living in areas where the use of UI is more widespread already knew how the system worked before receiving UI for the first time. It is hard to see how other theories of occurrence dependence (such as models of "addiction" or other sources of "vicious circles") could explain the pattern of results reported in the table. For example, if people could become addicted to UI benefits in the same way people can become addicted to cigarette smoking, there would be no reason for the effect of first-time use of UI to vary across cohorts and regions. By contrast, the substitutability between individual and social learning provides a simple rationalization for the patterns observed in the data.

It is important to point out, however, that there is a great deal of persistence in the propensity to use UI that has little to do with learning. Our estimates

*… in regions where "everybody else" uses the UI system, a first experience with the system will not teach a person anything he or she did not already learn through family members or friends.*

(reported in Table B.6, Appendix B) suggest that labour market shocks can have relatively large effects on the propensity to use UI that will persist over several years.

For example, suppose that a recession were to result in a high level of layoffs and low alternative wages. This would lead to an increase in the number of individuals applying for UI benefits, which implies that the number of persons seeking UI benefits in the next period would also be greater. We found that, after controlling for business-cycle effects, the presence of an unemployment insurance system would result in a decreased labour supply in the years following a recession and thus increase the length and depth of the recession.

One advantage of working with a pooled sample is that one can exploit the variations in the parameters of the UI system over regions and over time in order to estimate the effect of these parameters on the propensity to use UI. The UI parameters are combined into a single UI "subsidy rate," defined as the replacement rate, multiplied by the ratio of the maximum number of weeks of eligibility of someone who has worked only the minimum number of weeks required to qualify, over the minimum number of weeks to qualify. An increase in the subsidy rate tends to cause an increase in the size of regions *A* and *B* in Figure 4. It should thus have a positive effect on the probability of receiving UI.

One interesting hypothesis that can also be tested in this setting is whether the subsidy rate has a larger effect on people who have previous experience with the UI system than it does on people who have had no previous experience.

The estimates of these pooled models are reported in Table B.7 (Appendix B), where the results for men born before 1946 appear in columns (1a) and (1b). The estimated learning effect in Newfoundland in 1973 (the reference province and period) is positive and statistically significant. The estimates for Nova Scotia, New Brunswick, Quebec, Ontario, and Manitoba are not statistically different from Newfoundland's; while those for Prince Edward Island and especially Saskatchewan, Alberta, and British Columbia are significantly larger. Thus the learning effect tends to be larger in provinces where the use of UI is less widespread. Note also that the size of the learning effect tends to decline over time. For example, the effect in 1992 is smaller than in 1973. This is also consistent with the idea that social learning can be a substitute for learning based on previous experience. Our estimated learning effect, which is only based on previous experience with the system, should thus become smaller as the characteristics of the program become better known.

The results reported in Table B.7 (Appendix B) also indicate that the subsidy rate has a positive effect on the propensity to use UI. That effect is larger for people who have "learned" than for people who have not, but the difference is not statistically significant.

Finally, because of the caveats mentioned above, we only briefly discuss the results for men born in 1946–1955 and after 1955. The learning effects for these two groups of men tended to be larger than the estimates reported in Tables B.5 and B.6 (Appendix B). In addition, the effect of the subsidy rate is positive and significant, as expected. Contrary to our expectations, the effect tends to be smaller for people who had some previous experience with the system.

# 4. Interpretation and Policy Implications

The purpose of the unemployment insurance system is not to "benefit people who choose to be unemployed or who lose employment by reasons of their own actions"[11], but rather "to compensate persons whose employment has terminated involuntarily."[12] The relevant policy question is: How can this objective be met at the lowest possible cost?

*The purpose of the unemployment insurance system is not to "benefit people who choose to be unemployed or who lose employment by reasons of their own actions", but rather "to compensate persons whose employment has terminated involuntarily."*

As noted in our theoretical section, it is difficult to say what constitutes involuntary unemployment. A highly skilled professional may always be able to find a job driving a taxi. However, if such a person were to be laid off, it would be considered very unreasonable and socially undesirable to insist that the person cut short their job-search process and accept this or any other job for which he or she is clearly overqualified. Conversely, if an individual has very poor job prospects in an area for which he or she has specialized skills, then it is considered reasonable to expect that the worker will adjust his or her expectations and accept possibly lower-paid employment. In the latter case, the Unemployment Insurance Act already recognizes that one of the roles of the UI system is to help in the transition to a new occupation when the demand for a worker's original occupation is in permanent decline.

It will never be possible to make a clear-cut distinction between extreme cases. Rather, policy must be based on pragmatic choices that try to weigh fairly the costs and benefits for various groups of users, recognizing that the UI system itself affects individuals' choices. Secondly, policy needs to take into account the differential impact that changes will have on different groups. As Mancur Olson (1971) emphasized, a change that adversely affects a small, well-defined group is likely to give rise to political action against that change, even though it may have significant benefits for society as a whole. The challenge, then, is to suggest policy changes that will improve the operation of the system and will not be derailed by special-interest groups. In our analysis, we are able to distinguish between the behaviour of different groups of users and, as a consequence, to assess the impact of changes on these groups.

We begin by summarizing the results of the study and outlining the effect of UI on work incentives. We then discuss the implications of our work for policy changes.

## Increase in the Proportion of UI Spells Accounted for by Repeaters

One main finding is that the proportion of people who cycle in and out of the system has increased steadily since 1971. This finding is based on our analysis of the evolution of the propensity to receive UI benefits for the set of individuals who received such benefits at least 11 times over the 21-year period from 1971 to 1992. This group accounts for a growing share of recipients over time. The perception of these individuals as "repeaters" is further supported by the fact that during a recession, the proportion of UI spells accounted for by this group actually

11 See McFarlane, Pun and Loparco (1993), p. 2.
12 Ibid., p.3.

decreases. This suggests that these workers have a more marginal labour-force attachment. In a recession, they simply leave the labour force rather than find employment permitting another work/UI cycle.

It should be noted that to be eligible for UI, workers must qualify by obtaining a sufficient number of weeks of employment. As shown in Figure 4, the presence of UI encourages individuals to enter the labour force so that they may qualify for benefits. It is thus important to point out that an increasing trend in the use of UI is not associated with a decreasing trend in labour force participation and, in fact, may well be associated with a rising trend. In this case, UI would be providing positive work incentives.[13]

The UI system acts as a disincentive to work for individuals who would work full-time in its absence. For people with lower incomes, UI provides an inducement to reduce their labour supply and to work on a part-year basis. As they do not leave the labour force, the UI system does not decrease labour force attachment for those people, only the number of hours of work that they supply in the year. In the case of seasonal industries, UI effectively reduces the cost of labour by subsidizing a firm's workers during the off-season. In so doing, the UI system provides a positive incentive for the growth of cyclical industries.

In this study, we do not distinguish between people who decrease their labour supply in order to use the UI system and those who increase their labour supply in order to begin participation in the UI system. If the former group is sufficiently large, the UI system may have a positive effect on growth and aggregate income. Of course, if this is a small group and the majority of repeaters are people who have decreased their labour supply, then the UI system decreases aggregate output. We know of no study that addresses this issue.

## Permanent Effect of the First-Time Use of UI on the Future Probability of Using UI

Our second main finding comes from our microeconomic study of individual choice and from our estimates of the effect of having been exposed to UI for the first time during the 1981–1983 recession. We found that first-time use of the system increased the probability of future use. This effect is a potential explanation for the increasing share of UI spells accounted for by repeat users. As workers became exposed to UI for the first time for a variety of reasons, they learned about the functioning of the system and adjusted their behaviour accordingly. For highly skilled workers, this first exposure to the system does not significantly affect their behaviour, since it is not profitable for them to work on a part-year basis, except perhaps during a short adjustment period. By contrast, for lower-skilled workers, being employed on a part-year basis may be an attractive long-run option. For these workers, a first experience may have a significant effect, therefore, on the future probability of receiving UI benefits.

We found some support for the view that the effect of first-time use is a learning effect, since the estimated effect tends to be lower for people who are more likely to know how the UI system operates—including young workers and people liv-

13 Some of the results reported by Card and Riddell (1993) are consistent with this view.

ing in high-unemployment regions, for example. We also found that adjustment lags over several periods account for an important part of the dynamics of UI recipiency.

*When a program is made more generous, more people are expected to use it.*

## Consequences of Learning Effects and Adjustment Lags for Policy

The learning effect and adjustment lags that we have found in this study have important implications for policy. The first of these is a "hysteresis" effect: the reality that reversing a previous policy will not return the economy to its previous state. When a new government program is introduced, individuals adjust their behaviour and make investments in new patterns of behaviour. Obvious examples include the way in which government policy affects people's occupational choices. More individuals might invest in a career as fishermen if they knew that they would qualify for UI benefits during the off-season. Once this choice has been made and family location has been chosen as a result, reversing those decisions in the future may be very costly.

Secondly, the speed of behavioural response to policy changes is likely to be very asymmetric, depending on whether a program is increasing or decreasing in size. When a program is made more generous, more people are expected to use it. As with any other "profit" opportunity, it takes time for people to learn about a new policy and adjust to its parameters. In keeping with our finding that first-time use tends to increase future use, these people were unaware of the benefits of the system prior to their using it and used it less than they might have had they been better informed. It should be emphasized that the effects we have found tend to understate the full learning effect because only a fraction of those persons on UI actually benefit from choosing to cycle in and out of the system. As we have shown, the proportion of people who use the UI system as an income-support system has increased over time. This highlights the important fact that it may be several years before the full financial ramifications of a more generous program are realized.

However, if one tries to reverse the process, the learning effect is immediate. That is, individuals using the program immediately become aware of any cutbacks in benefits. This also creates a well-defined interest group who are prepared to fight the cutbacks. This negative response is likely to be amplified by the investment decisions individuals made in response to the program before benefit reductions were implemented. In particular, if workers did not anticipate future cutbacks, the result would be over-investment in occupations that make use of the benefits arising from the UI system.

Given these two behavioural implications of our work, we now consider their implications for the available policy options.

## Policy Options

As outlined in *A Labour Force Development Strategy for Canada*, the UI system contains a number of different programs to target specific objectives such as retraining and maternity leave. Our study is more relevant to the three most important parameters of the UI system: the qualifying period; the number of weeks of insurance; and the replacement rate. Given the current emphasis on cost reduction, we consider in turn three cost-reducing policies and their impact on the target groups that we have identified. The policy options are as follows:

1. Increase the number of weeks of insured earnings needed to qualify for UI benefits;
2. Decrease the number of weeks of benefits once qualification has occurred; and,
3. Lower the replacement rate (that is, the proportion of a worker's previous income that is replaced by UI benefits).

To examine these policy options, it is necessary to bring together three kinds of information. From our study, we use evidence on lagged effects to understand the dynamics of policy change over time. Our tabulations on recipiency provide information on how any given policy may affect different classes of users. Finally, we draw on the incentive literature to make statements on the qualitative impact of policy. However, we cannot stress too strongly that any quantitative estimates must be viewed with great scepticism. We have very strong evidence of dynamic linkages between periods. In particular, this implies that estimates derived from cross-sectional supply-and-demand analyses are biased, though without further work we cannot estimate the magnitude of this bias.

## Impact of Changes to the UI System on Infrequent Users

Of those people who used the UI system during the sample period, the majority received benefits no more that two or three times. These are workers who are more likely to need UI compensation during recessions and for whom the UI system was originally designed, that is, infrequent users receiving income support during a temporary job loss. In the context of Figure 4, these are users who choose to work full-time. We would therefore expect that, while on UI, these people would engage in active and vigorous search for employment. The effects of each policy change on this group are summarized below.

### Lengthening the Qualification Period

Given that this group has used the system no more than two or three times over 20 years, increasing the qualification period from the current range of 12 to 20 weeks back to, for example, 1970 levels would have little effect on either their access to UI or their labour-supply behaviour, because uses among this group are generally separated by periods of several years. Given that this rule change is unlikely to have much effect on access to the system for these individuals, it should not affect the insurance properties of the system. Since most individuals in this group are currently working, such a rule change would not have a direct impact on their lives, and therefore they would not be motivated to respond against such changes. If the rule change were to result in lower UI payments, it may even generate mild support among this group of individuals.

### Decreasing the Number of Weeks of Benefits

The probability of finding employment tends to increase as one nears the end of the benefit period.[14] Consequently, shortening the benefit period will likely speed up the job-search process for those who behave in this manner. While this change

14 See Meyer (1990).

would have the immediate mechanical effect of decreasing expenditures on UI, there is no research at the moment that addresses the question of the efficiency of such a change over the longer term. Shortening the benefit period must be traded off against the cost of a search and the decrease in the quality of match. One way to address this issue would be to look at the income process of individuals and to see how the benefit period affects the income in the new job.

Again, given that most individuals in this group are not currently using the system, the level of political opposition to such a change in policy is likely to be small. Depending on the level of savings in term of UI premiums, this group may even express some support for such a change.

*A reduction in replacement rates, like the previous option, would lower system costs and increase the cost of unemployment for the individual.*

#### Lowering the Replacement Rate

A reduction in replacement rates, like the previous option, would lower system costs and increase the cost of unemployment for the individual. In terms of the impact on behaviour, the previous policy would affect exit from unemployment near the end of the benefit period, while changes in the replacement rate would affect exit throughout the whole period. This increased movement out of unemployment during the benefit period is likely to be largest for this group of occasional users.

Again, as in the previous case there is no research on this matter, so that it is impossible to say what the optimal replacement rate should be. Any increase in exit from unemployment is likely to decrease the quality of the match. We do not know what is the optimal trade-off between this lower match quality and the cost-savings in terms of lower UI disbursements. As well, given that this group is most likely to receive UI benefits during a recession, lowering the replacement rate would decrease the amount of redistribution from workers who keep their jobs to those less fortunate who face job loss during an economic decline.

Given that one of the objectives of the UI system is to protect this latter group of workers, one might argue that this policy would increase the hardship caused by a recession for the least able individuals and families in the economy. In this regard, the government might consider setting the replacement rate so as to reflect the social needs of the temporarily unemployed, while using the qualification and benefit periods to control overall system costs. However, this certainly does not imply that the replacement rate should be set at 100 per cent. During a recession, real wages fall, which implies that all individuals in the economy need to share in the loss of income. A very high replacement rate would encourage too many layoffs in a recession. This would result in even lower output, which would further aggravate the recession.

### Impact of Changes to the UI System on Frequent Users

The group of high-use people (the individuals covered by our study who used the UI system more than 11 times in the 21-year period) constitutes a relatively small proportion of those who use the system at all but a disproportionately large proportion of the number of recipients in any given period. Relative use by these people tends to decrease in a recession but has displayed a rising trend over the past 20 years. Moreover, there is evidence of a positive treatment effect, in that first-time use leads to an increase in future use; and of adjustment lags, in that use of UI in the four previous periods increased the probability that the individual

*… this evidence suggests that these are people who use the UI system to subsidize part-year work …*

would use the system in the current period. Together, this evidence suggests that these are people who use the UI system to subsidize part-year work (regions *A* and *B* in Figure 4). Thus, in this case the UI system is a transfer program from full-time workers to people who choose to work on a part-year basis.

Standard models of unemployment consider people with many spells of joblessness as having a weak labour force attachment, but this assumption can be misleading. To qualify for UI, workers must find jobs; thus high-use individuals are those who alternate periods of work with periods of UI recipiency. These workers are also able to find work regularly—the type of work that enables them to alternate working periods with UI benefit periods. The implications of each policy are described below.

## Lengthening the Qualification Period

This is the one policy variable that has substantially different effects on high- and low-use groups. It should be recognized, however, that lengthening the qualification period is not a simple reversal of the previous decision to shorten it. When the qualification period was first reduced in 1971, it was several years before the impact of that decision worked itself through the system. Not all workers were aware of the benefits available to them but, as shown above, first-time and subsequent use of the system increased future use. As individuals learned and adjusted their behaviour, therefore, we found that an increasing fraction of recipients fell into the repeat-use category.

Once repeat use has started, individuals invest in a way of life and a set of job contacts that make continued repeat use easier and more automatic. In addition, as the benefit system in high-unemployment regions permits a yearly cycle of alternating between work and UI, the UI system provides a direct subsidy to seasonal industries by lowering their labour costs. Because seasonal industries (especially fishing and forestry) typically face a great deal of foreign competition, subsidizing people through the UI system cannot increase their long-term welfare, because lower labour costs encourage greater entry and because the labour market eventually returns to an equilibrium in which workers have no preferences regarding the choice between having seasonal jobs and having full-year jobs.

If the alternative to working in a seasonal industry is to leave the region, then the UI system effectively reduces out-migration from areas with a high incidence of seasonal work. However, this does not make people better off in the long run. Because they face the decision in every period of whether to move, their welfare always hinges on the welfare of individuals in other parts of the country. In the end, the UI subsidy to seasonal industries will increase the size of these industries to a level where workers are indifferent between remaining in such an industry or leaving.

Such a policy, however, does shift the industry mix in regions with high employment in seasonal industries away from industries needing workers for the full year. The consequence is that there is a high level of *fixed* investment in seasonal industries. This implies that lengthening the qualification period will increase the cost of labour in these industries, resulting in a capital loss to both workers and owners.

In addition, increases in the qualification period target a well-defined group of individuals and industries. In terms of the learning model, these people are using the system regularly and therefore respond immediately to any policy variation. Thus the set of high-use recipients is a well-defined interest group that is likely to engage in a high level of political activity against any such changes. As Olson (1971) has emphasized, the level of political activity does not usually reflect the social costs and benefits, but rather the cohesion of the interest groups involved. In the case of the UI system, the negative political response to lengthening the qualification period is likely to be much larger than the positive response to the overall cost-savings resulting such a policy change. In particular, Olson would argue that the differential response is likely to be out of all proportion to the potential social gains.

It is worth emphasizing that lengthening the qualification period results in a capital loss to frequent users that will never be regained during their lifetime. In particular, given the forces that move the labour market into equilibrium, these people may be worse off in fact than they would have been if government had maintained the qualification period at the 1971 level. Although it is not possible to reverse history, one must realize that government changes to such a large and important program as the UI system have an irreversible impact on the lives of people.

### Shortening the Benefit Period

The effect of a decrease in the number of weeks of benefits has an ambiguous effect on the decisions of the high-use group. In particular, some individuals who cycle in and out of the industry may not use the full benefit period available to them.[15] In seasonal industries, the optimal use of the UI system depends on the fraction of the year with employment in the seasonal industry. If benefits are used to fill the gap until the beginning of the next work cycle, then shortening the benefit period will have no effect on behaviour. In fact, our estimated response to the benefit rate for people who have used the system is very small. This suggests that, for the current range of UI parameters at least, changes in the number of weeks of benefits are unlikely to have a large effect on those individuals, especially since the number of weeks needed to qualify plus the number of weeks of benefits usually adds up to at least one year. Changes in the number of weeks of benefits will have the largest impact on those who cycle in and out of employment over a period exceeding one year. In this case, our comments concerning political action in the previous section would apply.

### Lowering the Replacement Rate

A decrease in the replacement rate would have an immediate negative effect on high-use individuals. It would lower their yearly income and cause some of them to exit the employment/unemployment cycle. However, given that the current program has been in place for over 20 years, these are people who have made significant investments in a particular way of life. Thus a permanent decrease in the replacement rate will lead to a permanent capital loss. Again, as Olson (1971) has emphasized, when a well-defined interest group faces a capital loss, it has an incentive to lobby against such a loss. Unlike the decrease in the number of weeks of benefits, a reduction in the replacement rate uniformly affects all workers currently using the UI system on a regular basis. Such a policy would therefore unambiguously reduce the welfare of all members of the high-use group.

15 See Green and Sargent (1994).

# 5. Conclusion

The majority of individuals who used the UI system between 1972 and 1992 received benefits no more than one to three times. If the objective of the system is to target a group that needs occasional support while discouraging cycling by a minority of individuals, then the best policy would be to lengthen the qualification period. Since lowering the replacement rate uniformly affects both high and low users, significant changes in this area would likely result in high levels of opposition. Given that the benefit period is more important to the occasional user than to the frequent user, decreasing this level of benefits would have a disproportionate impact on the low-use group. We conclude, therefore, that the qualification period is the instrument of choice if one wishes to target users who need UI during occasional periods of job loss.

*… the qualification period is the instrument of choice if one wishes to target users who need UI during occasional periods of job loss.*

# *Appendix A: The Effect of Unemployment Insurance on Unemployment*

To understand how the UI system itself can generate unemployment, let us suppose that search costs are negligible so that individuals can find work immediately at some wage. To keep things as simple as possible, we suppose that once a worker has $x$ weeks of insured earnings, she or he will be eligible for $y$ weeks of benefits equal to a fraction $a$ of the previous wage. An individual with characteristics $(\theta, u)$ thus considers one of the following three options:

1. Work full-time at a wage of $w = \theta + \eta$;

2. Exit the labour force to receive benefit $u$;

3. Work the number of weeks required to apply for UI compensation and then collect the benefits until they are exhausted before beginning to work again.[16] Letting $\delta = x/(x + y)$ be the fraction of time the worker must be employed to earn $y$ weeks of benefits, the return to $i$ is given by $ui = \delta \cdot w + (1-\delta)(u + \alpha \cdot w) = (\delta + (1-\delta)\alpha)w + (1-\delta)u$. Let us call the person who follows this strategy a part-year worker.

There are four distinct sets of characteristics to consider, illustrated in Figure 4. First, there are those workers who prefer full-time work to either taking part-year work or being outside the labour force. They are in the bottom region of Figure 4. Workers who are indifferent between full-time and part-year employment have characteristics satisfying $w = u$, which implies:

$$(1 - \alpha)(\theta + \eta) = u.$$

This group is below the line that divides the space of characteristics between the set of workers who in the absence of UI would choose work and those who would choose to stay out of the labour force. Thus region *B* consists of those workers who would be employed full-time in the absence of unemployment insurance, but now find it in their interest to work only part of the year and to collect UI benefits for the rest of the year.

The line dividing those choosing to be out of the labour force from those who work part-year satisfies $u = ui$, yielding the equation:

$$u = (1 + \alpha (1 - \delta)/\delta)(\theta + \eta).$$

16 Given the linearity of the system, it is not difficult to show that if agents choose to cycle in and out of UI, then they will work only the minimum number of periods needed to qualify. Exactly the same form of behaviour is optimal with the more complex system one observes in practice, though with fluctuating labour demand individuals may work for more periods to qualify for a greater number of periods of benefits.

# Appendix B: Tables

**Table B.1**
**Distribution of Age and Year of Entry in the Sample**

| | Age of Entry | | | Year of Entry | |
|---|---|---|---|---|---|
| Age | Frequency | Cumulative Frequency | Year | Frequency | Cumulative Frequency |
| 15 | 0.105 | 0.105 | 1972 | 0.493 | 0.493 |
| 16 | 0.124 | 0.229 | 1973 | 0.061 | 0.553 |
| 17 | 0.110 | 0.339 | 1974 | 0.049 | 0.602 |
| 18 | 0.079 | 0.418 | 1975 | 0.038 | 0.640 |
| 19 | 0.049 | 0.466 | 1976 | 0.035 | 0.675 |
| 20 | 0.035 | 0.501 | 1977 | 0.034 | 0.709 |
| 21 | 0.029 | 0.531 | 1978 | 0.033 | 0.742 |
| 22 | 0.026 | 0.557 | 1979 | 0.034 | 0.776 |
| 23 | 0.025 | 0.582 | 1980 | 0.031 | 0.807 |
| 24 | 0.024 | 0.606 | 1981 | 0.030 | 0.837 |
| 25 | 0.023 | 0.629 | 1982 | 0.020 | 0.857 |
| 26 | 0.020 | 0.649 | 1983 | 0.022 | 0.879 |
| 27 | 0.019 | 0.668 | 1984 | 0.023 | 0.902 |
| 28 | 0.018 | 0.685 | 1985 | 0.023 | 0.925 |
| 29 | 0.017 | 0.702 | 1986 | 0.021 | 0.946 |
| 30-34 | 0.069 | 0.771 | 1987 | 0.021 | 0.967 |
| 35-39 | 0.057 | 0.828 | 1988 | 0.013 | 0.981 |
| 40-44 | 0.055 | 0.883 | 1989 | 0.010 | 0.991 |
| 45-49 | 0.049 | 0.932 | 1990 | 0.006 | 0.996 |
| 50-54 | 0.038 | 0.970 | 1991 | 0.004 | 1.000 |
| 55-59 | 0.025 | 0.995 | | | |
| 60-64 | 0.005 | 1.000 | | | |

*Note: Based on a sample of 618,911 men aged 15 to 65. A person "entered" the sample the first time he received T4 income between 1972 and 1991.*

**Table B.2**
**Summary Statistics of the Sample**

| | Mean | Proportion Starting a UI Claim |
|---|---|---|
| **Age:** | 34.759 | — |
| Employed during the year: | 0.796 | — |
| UI claim: | 0.210 | — |
| **Province:** | | |
| Newfoundland | 0.025 | 0.375 |
| Prince Edward Island | 0.005 | 0.349 |
| Nova Scotia | 0.036 | 0.259 |
| New Brunswick | 0.031 | 0.321 |
| Quebec | 0.286 | 0.234 |
| Ontario | 0.350 | 0.179 |
| Manitoba | 0.037 | 0.185 |
| Saskatchewan | 0.029 | 0.196 |
| Alberta | 0.087 | 0.176 |
| British Columbia | 0.115 | 0.194 |
| **Year:** | | |
| 1972 | 0.030 | 0.234 |
| 1973 | 0.033 | 0.205 |
| 1974 | 0.036 | 0.204 |
| 1975 | 0.038 | 0.238 |
| 1976 | 0.041 | 0.216 |
| 1977 | 0.043 | 0.221 |
| 1978 | 0.044 | 0.215 |
| 1979 | 0.046 | 0.180 |
| 1980 | 0.048 | 0.183 |
| 1981 | 0.049 | 0.198 |
| 1982 | 0.050 | 0.267 |
| 1983 | 0.051 | 0.230 |
| 1984 | 0.052 | 0.225 |
| 1985 | 0.053 | 0.204 |
| 1986 | 0.054 | 0.199 |
| 1987 | 0.055 | 0.183 |
| 1988 | 0.055 | 0.182 |
| 1989 | 0.055 | 0.190 |
| 1990 | 0.055 | 0.215 |
| 1991 | 0.055 | 0.222 |
| 1992 | 0.054 | 0.214 |

*Note: Based on a sample of 10,253,535 observations of men aged 15 to 65 from the years 1972 to 1992 who have earned some T4 income at least once since 1972.*

**Table B.3**
**Autocorrelation in the Use of Unemployment Insurance Over Time**

| Time Interval: | Correlation: | Time Interval: | Correlation: |
|---|---|---|---|
| Same year | 1.000 | | |
| 1 year | 0.291 | 11 year | 0.108 |
| 2 years | 0.280 | 12 years | 0.100 |
| 3 years | 0.243 | 13 years | 0.090 |
| 4 years | 0.215 | 14 years | 0.082 |
| 5 years | 0.190 | 15 years | 0.070 |
| 6 years | 0.175 | 16 years | 0.063 |
| 7 years | 0.158 | 17 years | 0.051 |
| 8 years | 0.142 | 18 years | 0.044 |
| 9 years | 0.127 | 19 years | 0.032 |
| 10 years | 0.116 | 20 years | 0.026 |

*Note: These correlations are calculated from a sample of 604,185 observations on men born in the years 1931, 1941, and 1951.*

**Table B.4**
**Grouped Data Estimates of the Effect of Learning on the Future Probability of Receiving Unemployment Insurance**

| | Probability of Receiving UI in: | | | Difference between | Difference-in- |
|---|---|---|---|---|---|
| | 1981-83 (1) | 1984-86 (2) | 1987-89 (3) | (1) and (2) (4) | Differences (5) |
| 1. *Men born in 1931* | | | | | |
| 1.a. Had no previous UI experience | 0.355 | 0.373 | 0.345 | 0.019 | 0.123 |
| 1.b. Had some previous UI experience | 0.432 | 0.328 | 0.260 | -0.104 | |
| 2. *Men born in 1941* | | | | | |
| 2.a. Had no previous UI experience | 0.406 | 0.365 | 0.330 | -0.041 | 0.042 |
| 2.b. Had some previous UI experience | 0.436 | 0.353 | 0.295 | -0.083 | |
| 3. *Men born in 1951* | | | | | |
| 3.a. Had no previous UI experience | 0.421 | 0.395 | 0.325 | -0.026 | 0.056 |
| 3.b. Had some previous UI experience | 0.412 | 0.330 | 0.269 | -0.082 | |
| ***Adjusted for selection*** | | | | | |
| 1. *Men born in 1931* | | | | | |
| 1.a. Had no previous UI experience | 0.211951 | 0.256769 | 0.310924 | 0.045 | 0.083 |
| 1.b. Had some previous UI experience | 0.680655 | 0.642784 | 0.648925 | -0.038 | |
| 2. *Men born in 1941* | | | | | |
| 2.a. Had no previous UI experience | 0.250655 | 0.270742 | 0.337991 | 0.020 | 0.064 |
| 2.b. Had some previous UI experience | 0.675676 | 0.631397 | 0.635423 | -0.044 | |
| 3. *Men born in 1951* | | | | | |
| 3.a. Had no previous UI experience | 0.275236 | 0.296097 | 0.330417 | 0.021 | 0.071 |
| 3.b. Had some previous UI experience | 0.651059 | 0.600613 | 0.604236 | -0.050 | |

**Table B.5**
**Random Effect Probit Estimates of the Learning Effect by Demographic Group and by Province, 1972-1992.**

| Province | Men born before 1946 (1) | Men born from 1946 to 1955 (2) | Men born after 1955 (3) | Average (4) |
|---|---|---|---|---|
| Newfoundland | 0.407 | -0.093 | -0.280 | 0.011 |
| | (0.068) | (0.069) | (0.055) | |
| Prince Edward Island | 0.460 | -0.323 | 0.312 | 0.150 |
| | (0.079) | (0.065) | (0.066) | |
| Nova Scotia | 0.276 | -0.196 | -0.080 | 0.000 |
| | (0.071) | (0.059) | (0.054) | |
| New Brunswick | 0.440 | -0.314 | 0.435 | 0.187 |
| | (0.072) | (0.065) | (0.080) | |
| Quebec | 0.389 | -0.024 | -0.190 | 0.058 |
| | (0.084) | (0.077) | (0.061) | |
| Ontario | 0.741 | 0.329 | 0.180 | 0.417 |
| | (0.074) | (0.089) | (0.077) | |
| Manitoba | 0.153 | -0.060 | -0.181 | -0.029 |
| | (0.079) | (0.067) | (0.057) | |
| Saskatchewan | 0.443 | -0.065 | -0.125 | 0.084 |
| | (0.088) | (0.080) | (0.058) | |
| Alberta | 0.605 | 0.184 | -0.136 | 0.218 |
| | (0.078) | (0.086) | (0.054) | |
| British Columbia | 0.899 | 0.003 | -0.221 | 0.227 |
| | (0.085) | (0.083) | (0.061) | |
| Average | 0.481 | -0.055 | -0.029 | 0.132 |

*Note: Standard errors are in parentheses. All models also include a full set of year effects, four lagged values of the dependent variable, age and its squared. Unobserved heterogeneity is accounted for by estimating a seven types discrete distribution.*

*The number of observations used in the estimation varies from 12, 817 (men born between 1946 and 55 in Prince Edward Island) to 26, 940 (men born after 1955 in Nova Scotia). The average number of observations is 18,697.*

**Table B.6**
**Sum of the Estimated Coefficients on the Four Lags of the Dependent Variable by Demographic Group and by Province**

| Province | Men born before 1946 (1) | Men born from 1946 to 1955 (2) | Men born after 1955 (3) | Average (4) |
|---|---|---|---|---|
| Newfoundland | 1.195 | 1.448 | 1.391 | 1.345 |
| Prince Edward Island | 1.286 | 1.318 | 1.055 | 1.220 |
| Nova Scotia | 1.084 | 1.192 | 1.305 | 1.194 |
| New Brunswick | 1.323 | 1.496 | 1.033 | 1.284 |
| Quebec | 1.024 | 1.245 | 1.229 | 1.166 |
| Ontario | 0.716 | 0.864 | 0.944 | 0.841 |
| Manitoba | 1.105 | 1.285 | 1.254 | 1.215 |
| Saskatchewan | 1.064 | 1.415 | 1.289 | 1.256 |
| Alberta | 1.109 | 1.010 | 1.273 | 1.131 |
| British Columbia | 1.000 | 1.493 | 1.133 | 1.209 |
| Average | 1.091 | 1.277 | 1.191 | 1.186 |

**Table B.7**
**Number of Observations Used in the Estimation**

| Province | Men born before 1946 (1) | Men born from 1946 to 1955 (2) | Men born after 1955 (3) |
|---|---|---|---|
| Newfoundland | 16,260 | 15,064 | 20,308 |
| | (956) | (702) | (1,695) |
| Prince Edward Island | 13,265 | 12,817 | 22,984 |
| | (1,382) | (1,074) | (2,115) |
| Nova Scotia | 20,268 | 19,944 | 26,940 |
| | (1,382) | (1,074) | (2,115) |
| New Brunswick | 16,823 | 17,909 | 22,642 |
| | (1,167) | (957) | (1,798) |
| Quebec | 17,930 | 16,116 | 19,210 |
| | (1,211) | (901) | (1,493) |
| Ontario | 22,406 | 20,016 | 23,097 |
| | (1,446) | (1,124) | (1,787) |
| Manitoba | 18,898 | 19,482 | 23,751 |
| | (1,294) | (1,093) | (1,830) |
| Saskatchewan | 14,634 | 14,089 | 24,853 |
| | (1,101) | (804) | (1,954) |
| Alberta | 15,405 | 15,180 | 23,426 |
| | (1,019) | (865) | (1,850) |
| British Columbia | 17,266 | 14,877 | 18,032 |
| | (1,133) | (857) | (1,470) |

*Note: The number of individuals in each subsample is in parentheses.*

**Table B.8**
**Random Effect Probit Estimates for Each of the Three Demographic Groups for all Provinces, 1972-1992**

| | Men born before 1946 | | Men born in 1946-55 | | Men born after 1955 | |
|---|---|---|---|---|---|---|
| | Main Effect | Interaction with Learning | Main Effect | Interaction with Learning | Main Effect | Interaction with Learning |
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| Intercept | -2.437 | 0.610 | -2.290 | 0.328 | 0.701 | 0.701 |
| | | -0.116 | | -0.086 | | -0.183 |
| First Lag | 0.408 | — | 0.431 | — | 0.451 | — |
| | -0.011 | | -0.009 | | -0.007 | |
| Second Lag | 0.399 | — | 0.420 | — | 0.417 | — |
| | -0.011 | | -0.010 | | -0.007 | |
| Third Lag | 0.218 | — | 0.251 | — | 0.232 | — |
| | -0.011 | | -0.010 | | -0.008 | |
| Fourth Lag | 0.127 | — | 0.153 | — | 0.135 | — |
| | -0.012 | | -0.010 | | -0.008 | |
| Age | -0.154 | — | -0.123 | — | -0.317 | — |
| | -0.020 | | -0.030 | | -0.015 | |
| Age Squared | 0.010 | — | 0.079 | — | -0.305 | — |
| | -0.004 | | -0.009 | | -0.008 | |
| Subsidy Rate | 0.040 | 0.008 | 0.138 | -0.063 | 0.106 | -0.053 |
| | -0.021 | -0.030 | -0.014 | -0.026 | -0.009 | -0.024 |
| **Province Dummies:** | | | | | | |
| Prince Edward Island | -0.195 | 0.145 | 0.120 | -0.124 | -0.226 | 0.188 |
| | -0.095 | -0.058 | -0.073 | -0.051 | -0.094 | -0.053 |
| Nova Scotia | -0.364 | -0.069 | -0.010 | -0.246 | -0.655 | 0.181 |
| | -0.093 | -0.060 | -0.063 | -0.046 | -0.093 | -0.059 |
| New Brunswick | -0.131 | -0.016 | 0.125 | -0.143 | 0.114 | -0.065 |
| | -0.092 | -0.056 | -0.065 | -0.046 | -0.084 | -0.051 |
| Quebec | -0.547 | -0.016 | -0.102 | -0.252 | -0.275 | -0.117 |
| | -0.102 | -0.066 | -0.073 | -0.052 | -0.104 | -0.063 |
| Ontario | -0.679 | -0.098 | -0.311 | -0.263 | -7.008 | 5.452 |
| | -0.109 | -0.075 | -0.071 | -0.055 | -0.054 | -0.051 |
| Manitoba | -0.908 | 0.091 | -0.607 | -0.018 | -6.510 | 5.054 |
| | -0.118 | -0.082 | -0.085 | -0.063 | -0.055 | -0.056 |
| Saskatchewan | -1.257 | 0.346 | -5.084 | 3.661 | -6.710 | 5.268 |
| | -0.141 | -0.103 | -0.085 | -0.080 | -0.056 | -0.053 |
| Alberta | -1.437 | 0.365 | -3.833 | 2.570 | -7.049 | 5.538 |
| | -0.149 | -0.113 | -0.014 | -0.130 | -0.062 | -0.059 |
| British | -1.248 | 0.375 | -2.563 | 1.550 | -7.080 | 5.568 |
| Columbia | -0.144 | -0.099 | -0.221 | -0.192 | -0.057 | -0.049 |

**Table B.8**
**(continued)**

| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
|---|---|---|---|---|---|---|
| **Year Dummies** | | | | | | |
| 1973 | -0.280 | — | -0.141 | — | -0.007 | — |
| | -0.018 | | -0.015 | | -0.033 | |
| 1974 | -0.485 | 0.043 | -0.208 | -0.054 | 0.024 | -0.088 |
| | -0.021 | -0.041 | -0.018 | -0.041 | -0.030 | -0.179 |
| 1975 | -0.388 | -0.138 | -0.162 | -0.037 | 0.022 | -0.115 |
| | -0.021 | -0.040 | -0.020 | -0.041 | -0.029 | -0.169 |
| 1976 | -0.466 | -0.062 | -0.250 | 0.018 | -0.013 | -0.074 |
| | -0.022 | -0.042 | -0.024 | -0.042 | -0.029 | -0.170 |
| 1977 | -0.426 | -0.151 | -0.240 | -0.020 | 0.006 | -0.149 |
| | -0.023 | -0.041 | -0.026 | -0.042 | -0.029 | -0.168 |
| 1978 | -0.389 | -0.222 | -0.216 | -0.053 | -0.050 | -0.228 |
| | -0.024 | -0.042 | -0.029 | -0.043 | -0.029 | -0.167 |
| 1979 | -0.479 | -0.175 | -0.268 | -0.043 | -0.057 | -0.320 |
| | -0.030 | -0.049 | -0.032 | -0.049 | -0.029 | -0.167 |
| 1980 | -0.515 | -0.056 | -0.257 | 0.012 | -0.086 | -0.315 |
| | -0.032 | -0.050 | -0.034 | -0.050 | -0.030 | -0.168 |
| 1981 | -0.408 | -0.160 | -0.187 | 0.007 | -0.097 | -0.187 |
| | -0.033 | -0.051 | -0.036 | -0.050 | -0.030 | -0.168 |
| 1982 | 0.075 | -0.218 | -0.062 | 0.182 | -0.095 | -0.042 |
| | -0.029 | -0.045 | -0.036 | -0.044 | -0.030 | -0.167 |
| 1983 | -0.170 | -0.230 | -0.263 | 0.231 | -0.235 | 0.018 |
| | -0.030 | -0.044 | -0.042 | -0.044 | -0.031 | -0.166 |
| 1984 | -0.149 | -0.239 | -0.319 | 0.269 | -0.274 | 0.006 |
| | -0.032 | -0.045 | -0.046 | -0.046 | -0.032 | -0.167 |
| 1985 | -0.304 | -0.113 | -0.415 | 0.279 | -0.317 | -0.064 |
| | -0.036 | -0.048 | -0.050 | -0.049 | -0.033 | -0.167 |
| 1986 | -0.336 | -0.153 | -0.285 | 0.184 | -0.316 | -0.031 |
| | -0.039 | -0.051 | -0.049 | -0.047 | -0.033 | -0.167 |
| 1987 | -0.381 | -0.133 | -0.466 | 0.259 | -0.369 | -0.058 |
| | -0.042 | -0.052 | -0.056 | -0.051 | -0.034 | -0.167 |
| 1988 | -0.350 | -0.188 | -0.479 | 0.251 | -0.376 | -0.069 |
| | -0.044 | -0.055 | -0.058 | -0.054 | -0.035 | -0.167 |
| 1989 | -0.305 | -0.114 | -0.461 | 0.307 | -0.424 | 0.034 |
| | -0.046 | -0.055 | -0.059 | -0.052 | -0.036 | -0.167 |
| 1990 | -0.227 | -0.124 | -0.382 | 0.262 | -0.410 | 0.050 |
| | -0.048 | -0.057 | -0.061 | -0.054 | -0.037 | -0.167 |
| 1991 | -0.159 | -0.134 | -0.405 | 0.357 | -0.420 | 0.112 |
| | -0.049 | -0.057 | -0.063 | -0.054 | -0.038 | -0.167 |
| 1992 | -0.136 | -0.202 | -0.441 | 0.306 | -0.483 | 0.157 |
| | -0.052 | -0.059 | -0.067 | -0.055 | -0.039 | -0.167 |

*Note: The models for men born from 1946 to 1955 and after 1955 did not fully converge. Results should thus be interpreted with caution. The subsidy rate is the UI replacement rate, multiplied by the maximum number of weeks of eligibility and divided by the minimum number of weeks to qualify. Unobserved heterogeneity is modelled as a 13 types discrete distribution.*

# *Appendix C: Estimation by Random-Effect Probit*

In order to look at the dynamics of UI recipiency, consider the following model for the probability that individual $i$ will start a spell of UI in period $t$:

$$\mathbf{Pr}\ (U_{it} = 1 | U_{it\text{-}1}, x_{it}, L_{it}) = F(\alpha_i + \delta_t + \gamma U_{it\text{-}1} + x'_{it}\beta + \theta_0 L_{it} + (x'_{it}\ \theta_1)L_{it}), \qquad (1)$$

where $i$ = 1, .., $N$, $t$ = 1, ..., $T$, and $F$(.) is a cumulative distribution function. In this paper, we simply assume that $F$(.) is a unit normal. The cumulative distribution function $F$(.) is increasing in its arguments. An increase in arguments such as $\alpha_i$ or $x'_{it}$ ß will thus increase the probability that individual $i$ will begin a UI spell in period $t$. The arguments in the function $F$(.) are listed below:

$U_{it}$ dummy variable equal to 1 if individual $i$ starts a UI spell during year $t$;

$\alpha_i$ time-invariant random effect;

$\delta_t$ aggregate time effect;

$x_{it}$ vector of covariates including the age of individual $i$ and the parameters of the UI system in individual $i$'s region at time $t$;

$L_{it}$ a variable indicating whether or not individual $i$ has "learned" how to use the UI system at time $t$. In the simplest version of the learning model, this variable has a value of 1 if $i$ has received unemployment insurance in the past, and 0 otherwise.

In what follows, we refer to $L_{it}$ as a learning variable although, more generally, it can simply be viewed as a variable indicating whether the person has ever collected UI in the past. The parameter $\theta_0$ relates the learning variable to the probability of receiving UI, while the vector of parameters $\theta_1$ indicates whether variables in the vector $x_{it}$ (such as the replacement rate of UI) have a different impact on the probability of using the UI system for people who know about the system than for people who are unfamiliar with it. In other words, $\theta_1$ captures possible interactions between learning effects and variables such as the parameters of the UI system.

To understand why learning effects can be interpreted as hysteresis effects in the use of UI, consider the simple case in which $\theta_1 = 0$. From the definition of the learning variable $L_{it}$, it is clear that receiving UI for the first time switches the value of $L_{it}$ from 0 to 1 and thus permanently increases the probability of receiving UI, provided that $\theta_0$ is positive. This basic property of learning effects remains when $\theta_1$ is different from 0 except that the size of the hysteresis effect then depends on the value of variables such as the replacement and subsidy rates of the UI system.

One difficulty in isolating the importance of learning effects is that many other factors may explain why the history of UI recipiency of a given person $i$, ($U_{i1}$, ..., $U_{it\text{-}1}$) may help predict whether $i$ will receive UI in period $t$. To see this, note that except for the learning term $\theta_0 L_{it} + (x'_{it}\ \theta_1)L_{it}$, equation (1) is a standard statistical model for a binary variable with panel data (see Chamberlain (1980) and Heckman (1978, 1981)). In such models, there are two reasons why the history of UI recipiency of $i$ may help predict whether $i$ will receive UI in period $t$. First, certain individuals may be more likely to be unemployed and to receive UI because they have low skills and/or have a high marginal valuation of leisure.

These factors are summarized by the random effect $\alpha_i$. Since this random effect is, by definition, fixed for a given individual *i* over time, it increases the probability that *i* will receive UI in any time period. As a result, previous use of UI will be strongly correlated with present use since some people are always likely to receiving UI (high $\alpha_i$), while others are not (low $\alpha_i$). This could give the misleading impression that previous use of UI is a cause of the present use of UI. This is called the problem of "unobserved heterogeneity" in the econometrics literature.

A second reason why the history of UI recipiency of *i* may help predict whether *i* will receive UI in period *t* is due to the presence of the lagged dependent variable $U_{it\text{-}1}$ in equation (1). Note that in the estimation we consider models that include further lags of $U_{it\text{-}1}$. We call this particular form of state dependence an adjustment lag. It is natural to expect an adjustment lag in the data for a variety of reasons. For instance, the rate of job separation is higher in the first year on the job than in subsequent years. Workers who have received some UI in year *t-1* cannot have been working for very long in year *t*. A job separation and a UI spell are thus more likely to be observed in year *t* if $U_{it\text{-}1} = 1$ than if $U_{it\text{-}1} = 0$. Alternatively, workers who have lost some specific human capital because of permanent job displacement may be more likely to be unemployed than if they still had that specific skill. A UI spell caused by permanent job displacement may thus increase the future probability of receiving UI. They key difference between an adjustment lag and learning is that the adjustment lag only temporarily affects the probability of receiving UI, while learning affects it permanently.

It should thus be clear that the mere fact that the history of UI recipiency ($U_{i1}, ..., U_{it\text{-}1}$) may help to predict whether *i* will receive UI benefits in period *t* does not prove the presence of learning effects. Rather, the econometric challenge consists in isolating learning effects from the effects of unobserved heterogeneity and adjustment lags. We discuss the econometric strategy in detail below.

One final remark is that the variable $L_{it}$ is only a crude measure of learning. People may also learn how to use the system through friends and family. This yields the interesting prediction that the relative role of past UI experience in learning how to use the system should be less important in regions and/or industries in which the use of UI is widespread. As a consequence, one testable implication of this learning model is that the coefficient should be lower in high UI regions such as the Atlantic provinces than in low UI regions such as Ontario or Alberta.

## Estimation Methods

Under the assumption that F(.) is a unit normal, the probability that individual *i* will start a spell of UI in period *t* can be rewritten as:

$$Prob(U_{it} = 1 \mid U_{it\text{-}1}, L_{it}, x_{it}, \alpha_i) = \Phi(\alpha_i + \delta_t + z'_{it}\,\omega), \tag{2}$$

where:

$$z_{it} = \gamma U_{it\text{-}1} + x'_{it}\,\beta + \theta_0 L_{it} + (x'_{it}\,\theta_1) L_{it}. \tag{3}$$

The probability of observing a sequence $(U_{i1},...,U_{iT})$ of UI spells is thus equal to:

$$\Pi_{t=1}^{T}\Phi(\alpha_i + \delta_t + z'_{it}\omega)^{(1\text{-}U_{it})}\,(1\text{-}\Phi(\alpha_i + \delta_t + z'_{it}\omega)^{U_{it}} \tag{4}$$

This probability is the essential building block of the likelihood function that we will later maximize. There are two important issues, however, that need to be addressed before the model can be estimated. First, the probability in equation (4) is conditional on a particular value of the random effect. Since the random effect $\alpha_i$ is not observed, we need to integrate over the distribution of $\alpha_i$ to obtain an unconditional probability of observing the sequence ($U_{i1}$, ..., $U_{iT}$):

$$\int \Pi_{t=1}^{T} \Phi(\alpha_i + \delta_t + z'_{it}\omega)^{(1-U_{it})} \; (1-\Phi(\alpha_i + \delta_t + z'_{it}\omega))^{U_{it}} \, dG(\alpha_i) \qquad (5)$$

where *G(.)* is the cumulative distribution function of the random effect $\alpha_i$. Following authors like Card and Sullivan (1988) and Heckman and Singer (1984), we assume that *G(.)* is a discrete distribution with K points of support $\alpha^1,..., \alpha^K$. The probability of each point of support is given by $P^k$, *for k = 1 to K.* Under this assumption, equation (5) can be rewritten as:

$$\Sigma_{k=1}^{K} P^k \, \Pi_{t=1}^{T} \, \Phi\,(\alpha^k + \delta_t + z'_{it}\omega)^{(1-U_{it})} \; (1-\Phi(\alpha^k + \delta_t + z'_{it}\omega)^{U_{it}}] \qquad (6)$$

In the few existing applications of this random-effect model, the value of *K* chosen is relatively small (3 or 4) and both the *K* location parameters $\alpha^k$ and the *K-1* probability parameters $P^k$ are estimated as parameters of the model. Note that only *K-1* probability parameters need to be estimated since the *K* parameters must always sum up to 1. For computational reasons, we take the slightly different approach of fixing a grid of larger number of values for the $\alpha^k$ parameters and estimating the *K-1* probability parameters.

The second important estimation issue arise because of the nature of the structure of the administrative files that we used to construct the data set used for the estimation. Since the Status Vector File only contains information on workers who filed a UI claim at least once, we have no demographic information on workers who never filed a claim. Because these workers are thus not included in the final sample, the potential sample-selection biases that could result from the way the final sample is constructed must therefore be corrected for. In other words, we must take into account the fact that everybody in our sample experienced at least one spell of UI during the period 1972–1992. The probability that a person experienced at least one spell of UI is given by:

$$1- \Sigma_{k=1}^{K} P^k \, \Pi_{t=1}^{T} \Phi(\alpha^k + \delta_t + z'_{it}\omega) \qquad (7)$$

The probability of observing a sequence ($U_{i1}$, ..., $U_{iT}$) of UI spells conditional on experiencing at least one spell of UI is thus equal to:

$$\frac{\Sigma_{k=1}^{K} P^k \Pi_{t=1}^{T} [\Phi(\alpha^k + \delta_t + z'_{it}\omega)^{(1-U_{it})} \; (1-\Phi(\alpha^k + \delta_t + z'_{it}\omega)^{U_{it}}]}{1- \Sigma_{k=1}^{K} P^k \, \Pi_{t=1}^{T} \Phi(\alpha^k + \delta_t + z'_{it}\omega)} \qquad (8)$$

Equation (8) is the contribution of person *i* to the likelihood function of the model. The log-likelihood function of the model is obtained by taking the log of the product of the contribution of each person. It can be written as:

$$\sum_{i=1}^{N} \log \left[ \frac{\Sigma_{k=1}^{K} P^k \Pi_{t=1}^{T} \Phi(\alpha^k + \delta_t + z'_{it}\omega)^{(1-U_{it})} \; (1-\Phi(\alpha^k + \delta_t + z'_{it}\omega)^{U_{it}}]}{1- \Sigma_{k=1}^{K} P^k \, \Pi_{t=1}^{T} \Phi(\alpha^k + \delta_t + z'_{it}\omega)} \right] \qquad (9)$$

This log-likelihood function is then numerically maximized over the values of the vector of parameters $\omega$ and of $P^1$ to $P^K$ using a modified version of the Gauss-Newton algorithm. The estimated value of the parameter vector $\omega$ is consistent and asymptotically normal under the assumption that the discrete distribution postulated for the random effect $\alpha_i$ is the true distribution function *G(.)* of $\alpha_i$. We have also found in several Monte-Carlo experiments that the estimated values of $\omega$ obtained using our random-effect probit with a discrete distribution for $\alpha_i$ were on average very close to the true value $\omega$ even when the true distribution of $\alpha_i$ was continuous (a unit normal). This suggests that a discrete distribution function for $\alpha_i$ approximates the true distribution well enough to guarantee that our estimator is "approximately" consistent.

## Results

Given the numerical burden associated with maximizing the log-likelihood function (9), we perform the estimation only over a randomly selected subset of the main sample. To obtain estimates precise enough for several demographic groups in each province, we randomly selected one-in-five samples for Newfoundland, Nova Scotia, New Brunswick, and Saskatchewan; a one-in-six sample for Manitoba; a one-in-eight sample for Alberta; a one-in-20 sample for British Columbia; and one-in-50 samples for Quebec and Ontario. We selected a full sample for Prince Edward Island.

For each province, we further divide the sample into three subsets based on the year of birth. The first demographic subsample includes men born before 1946 who were all old enough to have been in the labour force in 1972. The second subsample is composed of "baby-boomers" born between 1946 and 1955, while the third is made up of men born after 1955 who were unlikely to have entered the work force by 1972. We also limit our analysis to the observations that satisfy the "eligibility" rule, that is, that the individuals sampled must have received some T4 income during the current or the previous year. By using this selection rule, we have limited potential biases caused by people who permanently exit the labour force for various reasons. We have also estimated our models without this selection rule and found very similar results.

We first estimate separate models for each of the three demographic groups in each province. In each of the 30 random-effect probit models, we include the learning variable, the first four lags of the dependent variable ($U_{it-1}$ to $U_{it-4}$), a full set of year dummies, as well as age and age squared. We decided to include four lags of the dependent variable after observing that the estimated effect of further lags was rarely statistically different from 0. Unobserved heterogeneity is accounted for by estimating a seven-point discrete distribution for $a_i$. In other words, we assume there are seven types of workers with a, taking on the values $\alpha^1 = -5, \alpha^2 = -4, \alpha^3 = -3, \alpha^4 = -2, \alpha^5 = -1, \alpha^6 = 0,$ *and* $\alpha^7 = 1$ in equation (9). We thus estimate the parameters $P^1$ to $P^7$ along with the other parameters of the model. We do not include any interactions between the learning variable and other variables in these simple models. The parameter $q_1$ is thus implicitly set at 0.

The estimates of the learning parameter $\theta_0$ are reported in Table B.5 (Appendix B). While the estimated effect is positive, on average, some interesting patterns seem to emerge from the table. The first is that learning effects tend to be large and positive for men born before 1946 but much smaller and often negative for younger workers. In addition, learning effects are largest in Ontario, Alberta, and British Columbia, three provinces in which the use of UI is less widespread than in the rest of the country.

*It is important to point out, however, that there is a great deal of persistence in the propensity to use UI that has little to do with learning.*

These two patterns of results are consistent with the role of social versus individual learning mentioned earlier. The more widespread the use of UI is in a region at any given time, the less previous experience with UI will affect the propensity to use UI. The point is simply that when "everybody else" uses the system, a first experience with the system does not teach a person anything he or she has not already learned through family or friends. The results reported in Table B.5 (Appendix B), therefore, support the view that in areas where the use of UI is more widespread the younger generations and other people living there already knew how the system worked before they received UI for the first time. It is hard to see how other theories of occurrence dependence (such as models of "addiction" or other sources of "vicious circles") could explain the pattern of results reported in the table. For example, if people become "addicted" to UI in the way others are addicted to cigarette smoking, there is no reason to think that the effect of first-time use of UI should vary across cohorts and across regions. By contrast, the substitutability between individual and social learning provides a simple rationalization for the patterns observed in the data.

It is important to point out, however, that there is a great deal of persistence in the propensity to use UI that has little to do with learning. The four lagged values of the dependent variable are positive and statistically significant for all demographic groups in all provinces. To give an idea of the magnitude of the effects, we report the sum of the estimated coefficients for each of the four lags in Table B.6 (Appendix B). On average, the sum of these four coefficients is much larger than the size of the estimated learning effects. This suggests that labour market shocks can have relatively large effects on the propensity to use UI that will persist over several years.

For example, suppose that a recession gives rise to a high level of layoffs and low alternative wages. The number of individuals on UI will increase and, given the large positive lagged effect, this implies that more people will choose to receive UI benefits in the next period. Since we have controlled for business-cycle effects by including year dummies, these results indicate that the unemployment insurance system decreases labour supply in the years following a recession and thus increases the length and depth of the recession.

The sum of the four coefficients associated with the lags of the dependent variable also tend to be negatively correlated with the estimated learning effects reported in Table B.6 (Appendix B). For example, this sum is smaller for men born before 1946. It is also smaller than average for British Columbia and especially Ontario. This suggests that it may be difficult to distinguish learning effects from the structure of adjustment lags in the most unrestricted specifications reported in Tables B.5 and B.6 (Appendix B).

We have thus re-estimated a more constrained version of the model in which adjustment lags, as well as the effect of age and year dummies, are constrained to be the same in the ten provinces. For each of the three demographic groups of men, this constrained model is estimated on a pooled sample of the 10 provincial samples used in Table B.7 (Appendix B). We also include a set of province dummies to allow for differences in the intercept in each province.

One further advantage of working with a pooled sample is that one can exploit the variation of the parameters of the UI system over regions and over time in order to estimate the effect of these parameters on the propensity to use UI. We combine the UI parameters into a single “subsidy rate” of UI, defined as the replacement rate, multiplied by the ratio of the maximum number of weeks of eligibility of someone who has worked only the minimum number of weeks required to qualify, over the minimum number of weeks to qualify. An increase in the subsidy rate tends to increase the size of the regions *A* and *B* in Figure 4. It should thus have a positive effect on the probability of receiving UI.

One interesting hypothesis that can also be tested in this setting is whether the subsidy rate has a larger effect on people who had some previous experience with the UI system than on people who never had such experience. In terms of equation (1), this means that the component of the vector of parameters $\theta_1$ corresponding to the subsidy rate (one of the element of $x_{it}$) should be positive. To ensure that the estimated value of this parameter does not simply reflect omitted trends or regional differences in the size of the learning effect, we also interact the learning variable with the full set of year and province dummies.

The random-effect probit estimates of these pooled models are reported in Table B.7 (Appendix B). At the outset, it is important to point out that only the model for men born before 1946 fully converged, that is, satisfied our pre-defined convergence criteria. The parameter estimates for some of the province dummies (Ontario and the West) were still moving in the last iterations and should be interpreted with caution. The other estimated parameters were no longer moving and are more likely to be accurate.

The results for men born before 1946 are reported in column (1a) and (1b) of Table B.7 (Appendix B). The estimated learning effects are reported in column (1b). The estimated effect in the base province (Newfoundland) and the base period (1973) is positive (0.610) and statistically significant; while in five other provinces (Nova Scotia, New Brunswick, Quebec, Ontario, and Manitoba) it is not statistically different than the base learning effect. On the other hand, the estimated learning effect in Prince Edward Island and especially in Saskatchewan, Alberta, and British Columbia is significantly larger than the base effect (Newfoundland). Nevertheless, the learning effect tends to be larger in provinces where the use of UI is less widespread. This pattern is not as striking, however, as seen in Tables B.5, B.6 and B.7 (Appendix B). Note also that the size of the learning effect tends to decline over time. For example, the effect in 1992 is smaller by 0.202 than in 1973. This is also consistent with the idea that social learning can be a substitute for learning based on previous experience. Our estimated learning effect, which is based solely on previous experience with the system, should thus become smaller as the characteristics of the program become better known in the public.

The results reported in Table B.7 (Appendix B) also indicate that the subsidy rate has a positive effect (0.04) on the propensity to use UI. The effect is larger by 0.008 for people who have learned how to use it than for people who have not, but this difference is not statistically significant.

Finally, we only briefly discuss the results for men born in 1946–1955 and after 1955 because of the caveats mentioned above. The learning effects for these two groups tend to be larger than the estimates reported in Tables B.5 to B.7 (Appendix B). In addition, the effect of the subsidy rate is positive and significant, as expected. Contrary to our expectations, the effect tends to be smaller for people who had some previous experience with the system.

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