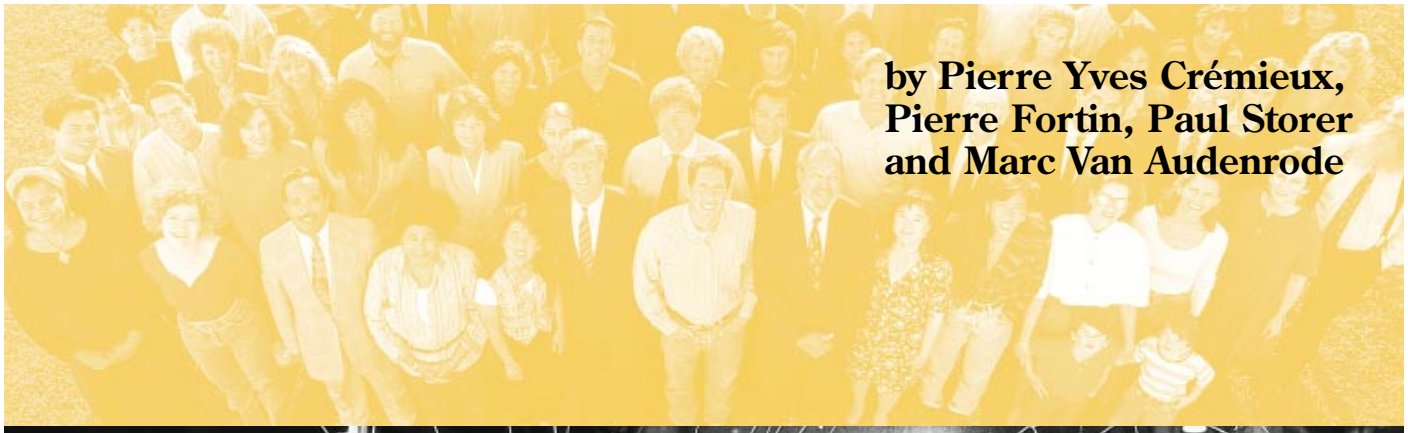
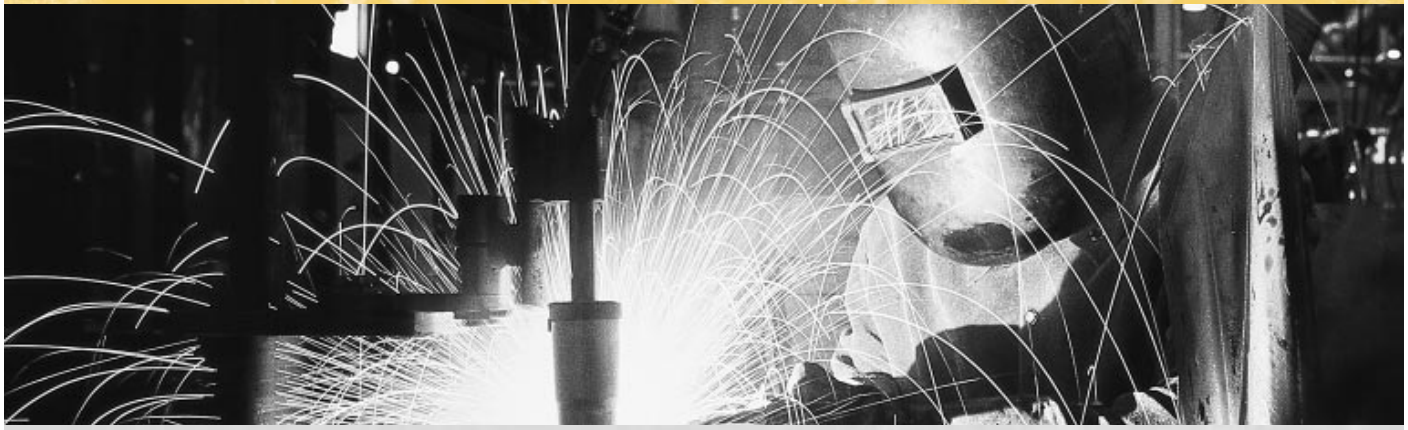
UI

Unemployment Insurance
and Job Search
Productivity



by Pierre Yves Crémieux, Pierre Fortin, Paul Storer and Marc Van Audenrode



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UI and the Labour Market

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Unemployment Insurance and Job-Search Productivity

by Pierre-Yves Crémieux, Pierre Fortin, Paul Storer and Marc Van Audenrode
Université du Québec à Montréal

UI and the Labour Market

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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
Director General
Evaluation Branch

Ging Wong
Director
Insurance Programs

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Abstract

This paper analyzes the effectiveness of the Unemployment Insurance regular benefits (UI) program in enhancing the productivity of job search. We focus on the linkages between several UI parameters and the behavioural responses of the unemployed, and assess the impact of these responses on job search outcomes. The intensity of the job search is the particular behavioural response that is emphasized, while the duration of unemployment spells and the wage obtained upon re-employment are the two job-search outcomes that are examined. We also assess the impact of UI parameters on these outcomes. The policy implications of the results are discussed in the conclusion.

Three potential effects of Unemployment Insurance (UI) are analyzed. First, there is the possibility that job-search subsidies may raise "reservation wages" — that is, the lowest wages that unemployed workers are prepared to accept upon being offered a job — and lower search intensity, thus acting as a disincentive. Set against this, the presence of Unemployment Insurance and UI-funded projects (such as training assistance) may increase the likelihood that a given level of search effort will produce a job. Finally, subsidized search, by making it possible for job seekers to look for employment over a longer period of time, may offer positive rewards in the form of more stable and better paid jobs resulting from better employer/ employee matches.

We attempt to quantify these disincentive effects of UI programs and to set them against their potential benefits — that is, lower wage losses for the unemployed. We also provide a detailed accounting of the costs and benefits of any change in UI policy with respect to these two possible outcomes. This accounting is derived from a statistical analysis of individual behaviour and captures the behavioural responses of economic agents. We then draw some implications for the aggregate unemployment rate.

The overall structure of the paper is based on a distinction between the *input* to the search process (search intensity) and two *outputs* (re-employment probabilities and re-employment wages). Section 1 briefly discusses the economic theory linking these quantities to UI policy, while Section 2 describes and summarizes the variables available in the Canada Employment Centre data base that we have used. The results pertaining to the search intensity input are presented in Section 3, following a discussion of the methodology and the data subset used in this analysis. A similar procedure is followed in Section 4 regarding the effect of UI on re-employment wages and in Section 5 for the impact of search intensity and expected re-employment wages on the duration of unemployment. In Section 6, we consider the implications of our findings and indicate in what way the results pertaining to re-employment probability are related to those pertaining to search intensity and re-employment wages. The paper concludes with an overall summary of the study as well as some conclusions. A series of technical appendices concludes the paper.

Introduction

This paper focuses on the linkages between the Canadian Unemployment Insurance (UI) system and the productivity of job search by the unemployed. That is, it examines the ability of unemployed individuals to find high-quality jobs quickly.

It is widely believed that the availability of UI benefits has a negative effect on job search intensity.

It is widely believed that the availability of UI benefits has a negative effect on job search intensity. There is even an extreme view that UI recipients postpone all serious efforts to find a new job until shortly before their benefits are exhausted. In this view, UI benefits are said to have a negative impact on job search productivity.

This paper is based on three separate, but related, studies aimed at clarifying these relationships. The studies deal with:

1) The effect of UI benefits on job search;

2) The effect of UI benefits on re-employment wages; and,

3) The determinants of unemployment duration.

Search Effort

In the first study, the goal is to examine the effect of UI benefits on search strategies and outcomes for a group of Canada Employment Centre (CEC) clients, based on data from a survey conducted by Employment and Immigration Canada (EIC) between 1986 and 1988. (The employment element of that department is now part of Human Resources Development Canada.) Information on the number of visits to employers and CECs, telephone calls made, and so on, is combined into a single measure of the level of search effort. This is then related to a set of over 40 characteristics, including location, age, sex, marital status, eligibility to UI benefits, and the duration of unemployment.

The results suggest that while the receipt of UI benefits reduces the need to search for a new job, it also lowers the cost of searching and, as a result, has only a small net negative effect on search intensity. One interesting find was that job search effort remained at a fairly high level for the first nine months of unemployment but declined steadily thereafter, stabilizing at a much lower level after 18 months. It was also noted that men searched harder than women, that people aged 25 to 44 searched most intensively, as did workers with higher educational levels, and that former union members searched less intensively.

New Wages

The paper also examines, again using CEC data, the relationship between UI benefit levels and re-employment wages. The method used in these calculations makes it possible to attribute any differences in new wages to corresponding differences in UI benefits. The availability of UI may prolong periods of unemployment, but if higher wages result this may well be socially (and privately) desirable.

This study suggests that the new wages of people with 50 or more weeks of UI benefits tend to be 7 to 9 percent higher than those of comparable people who are ineligible for benefits. In other words, if a person with 50 weeks of benefits receives

The intensity levels and expected new wages can be used, along with other relevant variables, to determine the likelihood that an unemployed person will find a new job after a given number of weeks of unemployment.

an hourly wage of $8 in a new job, an otherwise identical person with no benefits would be expected to receive a wage of roughly $7.32. At the same time, the new wages of 50-week recipients are only about 3 percent higher than those of people with 30 to 40 weeks of benefits.

Other factors also have an effect on re-employment wages: men tend to have wages 12 percent higher than those of women, while persons finding new jobs that are unionized have wages 29 percent higher than those of people who do not find unionized jobs. Marital status and the status as head of a family also have positive effects, in the order of 4 to 5 percent. The results also suggest that women lose more of their former wages than do men and that UI benefits have far fewer positive effects on women's new wages than on those of men.

Because seasonal unemployment is relatively important in the Atlantic provinces, results for that region were examined separately. It is reasonable to assume that the positive effect of UI on new wages will be weaker for persons who are simply collecting benefits during an inactive period before returning to basically the same job (and wage) some time later. As a consequence, the effect of UI on new wages should be weaker in the Atlantic provinces than in Canada as a whole. In fact, however, while a somewhat weaker effect is found for these provinces, there is no evidence of a great difference with the rest of the country. Thus the presence of seasonally unemployed persons in the study does not bias the results for the country as a whole.

Unemployment Duration

To complete the analysis of the outcomes of periods of unemployment, the study looks at the effect of UI benefits on average unemployment duration, identifying several potential determinants of the length of an unemployment spell. The duration of the search period depends, among other things, on the effort expended by the unemployed worker to locate job offers and on his or her wage demands with regard to any offers that are received. The intensity levels and expected new wages can be used, along with other relevant variables, to determine the likelihood that an unemployed person will find a new job after a given number of weeks of unemployment.

These variables are indeed associated with the probability of finding a new job and thus with unemployment duration. Searching more intensively increases that probability to a certain extent, but the incremental impact of successive increases in intensity falls with intensity levels. The results also suggest that the unemployed, to some extent, attempt to "hold out" for the wages earned in their previous jobs. Wage expectations point to the possible existence of two groups of workers — one of "low" quality, typified by long spells of unemployment and low wages, and another with both short periods of unemployment and high new wages. An interesting result is that UI benefits have an impact on job finding rates other than that coming from search effort or wages expectations. The source of this effect remains unclear.

The average duration of unemployment spells has a direct impact on the unemployment rate: if, on average, people take longer to find a new job, the unem-

ployment rate will be higher. Thus the study of the relationship between search intensity and UI addresses one of the most common criticisms levelled at the latter — namely, that the availability of UI benefits lowers the intensity of job search on the part of the unemployed and thereby raises the unemployment rate. According to this view, UI benefits are part of the problem rather than the solution.

The study of the relationship between search intensity and UI addresses one of the most common criticisms levelled at the latter — namely, that the availability of UI benefits lowers the intensity of job search on the part of the unemployed and thereby raises the unemployment rate.

In fact, longer spells need not be a cause for alarm if they are simply an indication that the unemployed are being more patient and rejecting job offers that do not represent a good match with their skills. For example, if an unemployed engineer turns down a job as a waitress, but later finds an engineering position, she will have been unemployed for a longer period than was absolutely necessary, but the longer duration will actually be desirable because it enables a better "fit" of human resources and job opportunities.

The study found a relatively minor effect of UI benefits on job search intensity. More specifically, the extreme view that search activity is low until benefits are exhausted is not supported by the data. Thus UI policy aimed at mitigating the harmful effects of unemployment does not seem to contribute to a worsening of the problem by removing the incentive to search. However, it appears that those who have been unemployed more than nine months become discouraged and reduce their search effort. This suggests that a program specifically aimed at helping the long term unemployed in their search would be highly desirable.

While there is some information on what happens to those unemployed more than nine months (representing approximately 16 percent of the sample), it seems likely that many of them leave the labour force and become Social Assistance recipients. Typically, they will tend to stay on public assistance longer and have more difficulty returning to the labour force. By reducing their search effort, UI may thus be worsening that problem for the long term unemployed. This would be an added incentive for establishing a program geared exclusively at people in this category.

The study of new wages is also of interest because it challenges the view that UI benefits simply cause search activity to be postponed and do not result in better wages. Our results suggest, in fact, that lengthy benefit periods do seem to have a positive effect on re-employment wages.

The study provides a cost/benefit analysis pointing to the policy implications of this finding. In particular, the results suggest that much of the wage improvement obtained after 50 weeks of benefits could be obtained with 40 or fewer benefit weeks. The length of the payback period can be crucial. If the wage increase from UI is only temporary or if individuals tend to stay in jobs for fewer than 10 years, the cost of the UI subsidy may be too high.

The evidence also suggests that a person with no benefits has a re-employment probability 21 percent higher than one with 50 weeks of benefits. Using known relationships between re-employment probabilities, unemployment durations, and unemployment rates, this gives unemployment rates of 11.7 percent and 14 percent, respectively. These measured effects do not take into account regionally extended benefits or the intensity effect and the re-employment wage effect.

The bottom-line result of the study is that UI benefits have a negative effect on unemployment durations that translates into a marked positive effect on the unemployment rate. In exchange for this duration effect, there is evidence of a positive effect on wages when UI benefits subsidize a longer job search. Whether the size of this effect warrants the cost of the UI program is left open. Further cost/benefit analysis based on the results of this paper might shed more light on this question.

The study also shows that in assessing the role of the UI system, the possible positive value of job search needs to be set against the costs of UI benefits and higher unemployment rates. Simply treating the longer unemployment spells associated with UI benefits as a total loss is no longer adequate. The study shows that these longer spells do not seem to be the result of the effect of UI on search intensity. Both of these findings may modify to some extent the conventional wisdom regarding Unemployment Insurance and the productivity of job search.

1. A Theoretical Framework

... job search models assume that the unemployed are engaged in a productive activity rather than passively awaiting the arrival of a job.

For a variety of reasons, job search theory is the ideal framework for this study. First, job search models assume that the unemployed are engaged in a productive activity rather than passively awaiting the arrival of a job. Were they not based on this notion of unemployment, programs which target the unemployed would play no role in facilitating labour market transitions. Secondly, job search models are explicitly random (or "stochastic") in that they assume that there is a distribution of potential wage offers for each worker. In the absence of this assumption, wage changes would not respond to labour market programs. Finally, job search models are based on an established methodology for the analysis of unemployment duration, which provides a starting point for the present study.

The model proposed by Devine and Kiefer (1991) provides an excellent introduction to this subject. The essential elements of the economic environment on which it is based (see Appendix A) can be roughly summarized as follows:

- The probability that an unemployed person will receive a job offer is a function of that person's search effort, of the efficiency of the job/skills matching process, and of the incentive for employers to hire workers. That probability may also depend on such factors as the reluctance of employers to hire the long-term unemployed or variations in the intensity of the job search.
- The wage offers received by job seekers may vary with the length of the search and, in the case of long spells, with the depreciation of human capital or the stigmatization attached to unemployment.
- Once a job offer is made, it may be rejected if the wage offered is less than the job seeker's reservation wage (which is a function of the perceived wage distribution and of the value of remaining unemployed).
- Unemployment insurance compensation is set at a fixed proportion of the pre-unemployment wage and is of limited duration. Job seekers may also have other income that can be used to finance a period of job search. This non-work income could vary over time as benefits expire or savings are exhausted.

In this environment, it is clear that wage changes, search intensity, and unemployment durations are closely interrelated. The reservation wage and, consequently, the new wage received by the unemployed person upon finding a new job, and search intensity can vary with unemployment duration. Other things being equal, a higher reservation wage will lead to a higher expected new wage. As a result, the expected duration of unemployment also increases because the probability of leaving unemployment declines in each period. A similar effect appears, obviously, when search intensity diminishes.

These relationships hinder the analysis of the impact of UI benefits on unemployment duration. A quantitative measurement of this effect is needed because by subsidizing job search, benefits raise the job seeker's total income and, at the same time, the reservation wage, both of which have an impact on the effort decision.

The effect of the search subsidy may be to encourage the unemployed to await the arrival of the best job offer and to turn down job offers that are deemed unsuitable. These subsidies may also lead to a reduction in the search effort. To correctly quantify these effects, one must isolate the true relationship between UI benefits and reservation wages, on the one hand, and between UI benefits and search intensity, on the other. Then, using the appropriate statistical techniques, the true relationship between UI benefits, re-employment wages, search effort, and unemployment duration can be estimated.

2. Overview of the Data

Data from the "Employment Services Evaluation" survey conducted by Employment and Immigration Canada (EIC) between 1986 and 1988 were used in our study. The survey examined two cohorts of Canada Employment Centre (CEC) clients, each over a 24-month period. Each cohort was interviewed at the time of initial contact and at 2-, 6-, 12-, and 24-month intervals after the initial interview. This provides a sufficiently long history to study the job-market experiences of participants.

The two time periods selected, from September 1986 to August 1988, and from January 1987 to December 1988, overlap in part, as we hoped that this would enable us to identify seasonal effects. Both of these periods were marked by a generally positive aggregate economic environment, a fact that should minimize any aggregate effect on the behaviour of the persons sampled.

In this section, we review the types of information that are available from the CEC data and describe the characteristics of the sample. The usefulness of these data for the study is assessed within the theoretical framework discussed above. The potential strengths and weaknesses of the data in terms of measuring job search productivity are also considered.

Broadly speaking, five types of information are available in the CEC data:

1) Personal characteristics of the persons surveyed (including age, sex, education and wages);

2) Non-policy characteristics of the labour market (including region, industry and union status);

3) Policy-related features of the job search environment (mainly, the level and duration of the UI benefits available);

4) Post-separation search strategies (reservation wages and search intensities); and,

5) Search outcomes (including new wages, unemployment durations and union status on the new job). In varying degrees, these variables measure the quantities identified in the theoretical model.

Personal Characteristics of Individuals

Information is provided in the survey regarding the personal characteristics of the participants, such as their age, sex, marital status, and educational level. As the tables in Appendix B show, age and educational levels are measured by categorical variables for age groups and educational levels. Compared with the general labour force, survey participants were relatively young, with almost 90 percent being less than 45 years old. Participants had reasonably high levels of education, with only 4.2 percent having no more than elementary schooling. This characteristic is probably linked to the young age of the participants, since education levels are generally higher for the young. Overall, wages in jobs lost were low, again because of the age, low education, and low job tenure (on average, 1.4 years) of the sample.

Labour Market Conditions

At the time of the survey, the Canadian economy was in a period of general growth, particularly in Ontario. The geographic distribution of the sample participants seems to match broadly that of the general population. Detailed information on the area of residence is available from the CEC codes in the data set. From these codes, CEC regions were identified and unemployment rates for each CEC region were obtained in order to provide a cross-reference between individuals, CEC region, and regional unemployment rates. Industry variables were also used to control for variations in wage-offer distributions and base-offer arrival rates between regions.

Policy-Related Characteristics of the Search Environment

The survey does not directly provide much information on the impact of economic policy on the search environment of the sampled individuals. Some information regarding the primary source of income is provided, but questions regarding UI benefits received and UI status in general were not asked. This problem was solved in part by merging the CEC files and benefit information from the "Benefit and Overpayment" (BNOP) file maintained by EIC.

Unfortunately, only 50 percent of the periods of unemployment in the CEC data could be matched with the BNOP information. This discrepancy was caused by at least three factors:

1) Some unemployed persons were not eligible for benefits;

2) Some eligible persons had unemployment spells shorter than the two-week waiting period; and,

3) Some eligible persons opted to delay the beginning of their benefits for more than one month. In the latter case, a one-month lag prevented definite matching of spells.

In those cases for which a match could not be made, UI benefit data were reconstructed by using regional unemployment rates and benefit determination algorithms. Here, two key factors needed to be determined. First, the eligibility of a respondent had to be established. At the time of the survey, the post-1978 UI system was in effect. Under this system, unemployed persons needed to have worked between 10 and 14 insurable weeks during the previous 52 weeks in order to become eligible for benefits.[1] The unemployment rate in a claimant's region determined this eligibility criterion.

For all eligible persons, benefits were equivalent to a constant 60 percent of previous earnings, subject to an upper limit set at 60 percent of maximum insurable earnings. Secondly, the duration of benefits had to be determined by three factors:

1) The "initial benefit phase" provided one week of benefits for each insurable week, up to a maximum of 25 weeks;

1 An insurable week is a week in which either 20 percent of the maximum insurable earnings was earned or at least 1 hour was worked. Self-employment did not count in establishing the number of insurable weeks.

2) The “labour force extended phase” provided one week of benefits for every two insurable weeks in excess of 25, up to a maximum of 13 additional weeks of benefits; and,

3) A “regional extended benefits phase” provided up to 32 weeks of benefits, depending on the regional unemployment rate. The actual benefit entitlement was the lesser of the sum of the number of weeks for each of these three phases or 50 weeks.[2]

To apply these criteria to the data in our sample, data on tenure prior to job loss and the region of the claimant were needed. Tenure data were available from information on the dates of job starts and separations. This information, however, is only available in months and thus cannot be measured with the same degree of precision found in benefit eligibility requirements. Nevertheless, a fairly precise determination of eligibility could be achieved in most cases, with the possible exception of persons who were unemployed at the time of the initial survey, who held more than one job in the 52-week qualifying period, or who had fewer than the required number of weeks in the job held immediately prior to responding to the questionnaire. Such persons could well be eligible if the total number of insurable weeks from all jobs was such as to enable them to qualify. For later questionnaires, this is less of a problem because more complete monthly work histories are available.

The regional criteria for eligibility and benefit duration were determined on the basis of the location of the Canada Employment Centres. A match between CEC numbers and Unemployment Insurance regions was established in order to place each person in a region. Next, for each region covered in the survey, monthly data were obtained for UI benefit entrance requirements and the regional-extended-benefit component, thus enabling us to determine eligibility and duration of benefits.

Two types of Unemployment Insurance variables were constructed from these data. The first measures the duration of benefits in weeks. This variable is expected to have a negative effect on the probability that a person will find a job in any given period and a positive effect on the post-separation wage. It is also possible to construct a wage replacement variable for those who actually do receive benefits. While weekly benefits were set at 60 percent of weekly insurable earnings for eligible persons, the existence of a ceiling on the amount of weekly insurable earnings meant that some persons could actually receive less than 60 percent of their pre-displacement salary in benefits. Given that non-discretionary expenses are generally geared to disposable income, persons with wage replacement rates lower than 60 percent might suffer more serious constraints while unemployed. It is thus reasonable to think that this element of the Unemployment Insurance system might have an effect on search strategies and outcomes.

Job Search Strategies

The two relevant variables in job search strategies are the reservation wage and

2 Actually, persons undergoing certain training programs could extend their benefit period. While complete BNOP information should identify such persons, this information was not available.

An index of search intensity was constructed on the basis of information about contacts resulting from the use of each method and the number of times each method was used.

search intensity. While the initial survey did ask participants a reservation wage type question, this was not included in subsequent interviews. Moreover, many participants did not respond to the question in the original survey. Consequently, reservation wage data have not been included in this study.

A great deal of information is available on the search behaviour of the unemployed. In each of the first four interviews (that is, the initial interview and the 2-, 6-, and 12-month follow-up interviews), unemployed clients were asked what search methods they had used since the last interview; how many times each method was used; how many contacts with employers had resulted by phone or by mail, or in person; and how many job offers had resulted from the use of each method. Methods of search were classified into eight different categories: talk to friends and relatives; go directly to an employer; answer ads about jobs; use the CEC; go to a union hiring hall; go to a private agency; place an advertisement for jobs; and "other method of search."

An index of search intensity was constructed on the basis of information about contacts resulting from the use of each method and the number of times each method was used. Each method was weighted, based on its effectiveness as measured by the number of employer contacts. The effectiveness of the method was then used as a proxy for the intensity of job search. The information on job offers was not used to construct the index, since job offers result both from the searcher's effort *and* from the employer's preferences, and since the latter are, at least in part, independent of the former. Unfortunately, the format was altered slightly for the last interview (24-month follow-up). Job seekers were asked how many times each of the eight methods was used and how many job offers had resulted, but not how many employer contacts had resulted from the use of each search method. Despite the absence of information on employer contacts in the last interview, the index of intensity was applied to all five interviews. The method used in constructing the index is described in Appendix C.

Outcomes of the Job-Search Process

To measure the effect of UI parameters on the productivity of job search, information on search durations and outcomes was required. Two main types of outcomes are measured in the CEC data base. Wages following a period of unemployment are available and can be compared with wages before displacement. The duration of unemployment can also be measured from the data. In both cases, the raw CEC data require a certain amount of conversion before they can be used for empirical analysis. Fortunately, the EIC survey includes information about salaries for current and previous jobs.

To measure the productivity of job search, the post-unemployment hourly wage was used as a measure of the quality of the worker's new job and of how well his or her human capital was preserved between jobs. Even though changes in hours worked also measure the success of job search, such changes were treated separately from those directly related to remuneration per unit of time. Consequently, data regarding hours per week, type of salary, and salary reported were combined to provide a measure of hourly salary.

To calculate unemployment durations, the EIC evaluation survey provides the employment status of respondents at five separate dates corresponding to the inter-

views. Responses to these questions make it possible to establish the first date at which a respondent classifies him or herself as being unemployed. Working from the survey in which unemployment is first reported, the time spent in unemployment is calculated by using the specified last date worked. From this date, it is possible to determine whether the respondent succeeds in finding a job. Once a respondent finds a job, the start date is used in combination with the date of job loss calculated earlier to derive a duration of unemployment. Persons who do not find a job before the end of the survey or who drop out are recorded as undergoing a "truncated" spell. The only information they contribute to the analysis is that they were unemployed for at least a certain number of months.

This method for measuring unemployment spells, by construction, can identify only persons who report themselves as unemployed when responding to one of the five questionnaires. However, the exclusion of those who are employed at each of these five dates but experience unemployment spells between them results in an undercounting of short spells of unemployment. It is possible to identify most of these between-questionnaire spells since respondents provided retrospective classifications of their labour market experience in each of the 24 months covered by the survey. All unemployment spells that lasted at least one calendar month can thus be determined, even if they occurred entirely between two survey dates.

The problem that remains is that wage data are available for both old and new jobs only when there was a single intervening unemployment spell. Thus even if two unemployment spells between the 12- and 24-month surveys were identified, wage data would not be available to permit an analysis of the effectiveness of the respondent's job-search efforts. Consequently, it is only possible to use information about single spells of unemployment occurring between questionnaire dates. Wages both before and after separation can be obtained in those cases. Unemployment duration information is also available because in each questionnaire following the initial interview, information was solicited regarding changes in employers for individuals employed for two consecutive surveys. For those not working for the same employer, a duration of unemployment can be calculated from information about the start date of the new job and the month-by-month history of the person. Hence, the bias against short spells of unemployment is reduced to a minimum, subject to monthly reporting frequencies and to possible multiple short spells without pre- and post-spell wage data.

The two principal strengths of these data sets are the richness of the information available and the sequential, or follow-up, method for sampling the cohorts. Information is available regarding participation in a large variety of CEC employment programs, such as job listings, counselling and training programs. There is also information regarding job search methods and perceptions of job market conditions. As the theoretical discussion illustrates, these factors are important in the job search model. Since the EIC data permit identification of these factors, it is possible to determine the relationship between UI benefits and job search productivity. Repeated follow-up sampling of the cohorts is important because it minimizes the impact of recall error. While some surveys require that respondents recall their activities over a one-year period (the Labour Market Activity Survey) or a five-year period (the Displaced Workers Survey), the recall periods in the EIC data are 2 months, 4 months, 6 months, and 12 months. The data should therefore be highly reliable.

... the sample is non-random. ... participants had all visited a Canada Employment Centre — indeed, that is how they came to be included in the survey.

A key feature of the survey is that month-by-month labour force histories are available. Each of the 24 months and each cohort surveyed provides information on whether the respondent was working, working for the whole month, changing employers, laid off, or looking for a job. This makes it possible, in principle, to assess the likelihood that respondents will stop looking for a job, depending on the type of regular benefits they received. In addition, each survey asks questions about search intensity and methods, as well as features of the job sought. This allows for the specification of a model of the probability of re-employment (see Appendix D).

One possibly limiting factor in this approach is that questions regarding the number of visits to a CEC or other indicators of search activity are available only once per survey and thus are constant for several months,[3] even though transitions potentially occur in every month. Nevertheless, desired wages and/or sources and amounts of search-period income vary over time. Even if this is not accounted for properly, it is possible to attribute re-employment wage outcomes to variables that act as proxies for changes in these variables.

Despite the many advantages of these data, there are some drawbacks. First, the information provided about UI benefits received is incomplete at best. Only respondents of the second cohort were asked whether they had applied for benefits. For both cohorts, information is provided regarding the principal source of income after job loss, with one possible choice being UI benefits. However, this is still an imperfect measure of a variable that could have been measured more precisely. Perhaps more importantly, there is no information on the eligibility of survey participants for benefits or on the exhaustion of benefits.

To deal with this issue, eligibility and potential benefit measures can be constructed with a fair degree of accuracy, based on information in the survey. As explained in the discussion on data construction, tenure and region were the principal determinants of benefit eligibility, and information on these factors is available from the survey questionnaires. Such constructed measures cannot be perfect, however, and it is therefore desirable to exploit additional sources of information. When available, "Status Vector header" file data, available for unemployment spells beginning in 1986, were used. For persons who filed claims for Unemployment Insurance, these provide exact information regarding eligibility, amounts of benefits received, and potential duration of benefits.

A more fundamental problem with the data is that the sample is non-random. Ideally, this study should be based on a randomly chosen representative sample of the unemployed, so that differences in search performance could be attributed entirely to differences in potential UI benefits. In the EIC sample, however, participants had all visited a Canada Employment Centre — indeed, that is how they came to be included in the survey. CEC clients had already selected themselves into a group that could be far from random.

Such endogenous sample-selection bias could be expected to skew the results. One could plausibly argue that individuals who visit Canada Employment Centres

3 For the 2-month follow-up survey, only two months are constant; for the 24-month follow-up survey, these variables have the same values as for the 12 months.

are highly motivated job seekers and/or people who are more likely to benefit from employment programs and from the subsidization of search by UI regular benefits. In this case, the methodology used in this study would likely overestimate the effectiveness of UI search subsidies. But one could also hypothesize that persons visiting Canada Employment Centres may seek to maximize the duration of their UI benefits and may visit the CECs to create the appearance of being active or to enquire into Unemployment Insurance questions. Data from the surveys indicate that 53 percent of individuals in the sample visited a CEC to search for jobs, while 26 percent did so for UI-related reasons.

To address the bias potentially induced by the particular profile of the CEC population, one must model the probability that members of the general population will come into contact with a Canada Employment Centre. Unfortunately, the data needed to conduct such an analysis were not available. Given this, the best solution was to use the results from a study by Osberg (1988), in which the probability of CEC use for the general Labour Force Survey population is modelled as a function of a variety of observable characteristics. The results can help to interpret the findings of the current project, based on EIC survey data.[4]

Finally, an individual's willingness to participate through all the stages of the survey could be linked to the survey itself (that is, it could produce a problem of "endogenous sample selection") and thus also have a skewing effect. Those interested in subsidizing their leisure, for example, might be less likely to take part in the survey for fear that refusal could lead to suspension of UI benefits.[5] This could lead them to underestimate the value of employment service programs.

There is some reason to be concerned about this problem. Cohort 1 had 5,500 CEC clients initially, but only 1,231 remained at the end of the survey. Likewise, Cohort 2 showed significant attrition, with the initial sample of 5,765 respondents decreasing to 1,472 by the end of the survey. More specifically, 4,989 members of the second cohort remained after the 2-month survey, 3,104 after the 6-month survey, 2,375 after the 12-month survey, and 1,472 completed the entire 24-month cycle. The continuation rates after the successive follow-up questionnaires were 86.5 percent, 62.2 percent, 76.5 percent, and 62.0 percent. This suggests that continuation patterns are not random.

The problem of endogenous sample selection can only be resolved correctly through the specification of a theoretical model describing the likelihood that a person will visit a CEC, become a survey participant, and continue to participate throughout the two-year survey period. However, an undertaking of this scope would require more resources than were available for this project. Nevertheless, it is possible to address this issue to some extent since observations are available for those in Cohort 2 who did not complete the 24-month cycle and since some

4 See Table 1.6.5 in Osberg's study. Note, however, that Osberg considers only workers who use CECs as a search method, while our data covers all CEC visitors. Of the latter, 40 percent say they visited the CEC for reasons not related to job search. A simple application of Osberg's results would therefore be inappropriate.

5 It was explained to survey participants that this could not happen, but some people have a strong distrust of bureaucracy and are thus likely to believe that non-participation could lead to some type of retribution. Hence, those with the most to fear are the least likely to drop out.

respondents may have experienced periods of unemployment that ended before they left the survey. Spells that are interrupted because of a withdrawal from the sample are simply recorded as truncated at the time of the last interview. Spells that started after the withdrawal date are obviously not recorded. This partial use of the missing observations increases the size of the sample and changes the sample-selection problem into a less serious problem of non-random truncation in some, but not all cases.[6] Unfortunately, partial observations are not available for the first cohort. As a consequence, only the second cohort is used in this study.

Three remaining data issues must be pointed out. First, because the creation of the sample gave rise to specification discrepancies between the two first-stage studies (wage changes and search intensity)[7] and because of the numerous missing values, the studies presented in Sections 3 and 4 are not based on identical sub-samples. Thus merging the two estimations to study unemployment duration results in a drop of the total number of observations.

Secondly, information on search intensity is not provided for workers who suffered a spell of unemployment between two interviews. As a consequence, these spells are not included in the study of search intensity nor in the final study of unemployment duration.

Thirdly, the absence of any variation in wage replacement rates other than that caused by pre-displacement wages renders the interpretation of the effects on wages, duration, or search intensity particularly hazardous. To avoid any misinterpretation of what could be just a spurious correlation, we dropped this variable from our analysis. Econometrics can provide answers only to the extent that there is some variation in the variables used.

6 The implications of non-random truncation do remain a problem, however, especially for the estimation of the new wage, using regressions of the sort estimated by Addison and Portugal (1989). Truncation is identical to sample selection in this case since, by construction, only completed spells can be analyzed in the new job regressions. Equations fitted in the first stage of the estimation are not applicable to all survey participants because those who are not truncated are not representative of the population as a whole. In other words, rather than being an unconditional expected fitted wage, the fitted wage may be conditional on a certain set of characteristics that determine truncation. In this case, it is necessary to employ a truncation/selection adjustment of the type employed by Addison and Portugal. Essentially, a probit model is used to estimate the probability that a spell will be truncated, given observable characteristics. This regression can then be used to generate a Mill's ratio based on the probability of truncation for each person analyzed in the wage change regression. Inclusion of this variable ensures that coefficients on included variables are not biased due to the selection rule for the observations.

For hazard rate or search intensity regressions, there is no selectivity bias because observations are included even if truncated. In the case of search intensity, the recording of a person as truncated — as having disappeared from the sample — is not random. However, this type of non-randomness is only likely to generate second-order effects. The set of observations used therefore pertains to the groups of spells of unemployment for which none of the variables to be used in the regressions are missing. Individuals experiencing multiple periods of unemployment can accordingly appear more than once in the data set.

7 The search intensity study uses the survey as a unit of observation, based on one observation per survey. The study of wages can only use one observation per spell of unemployment, as a new wage is only observed once, at the end of the spell.

3. Unemployment Insurance and Job Search

In an unemployed person's search for a job, two decisions are made about the search: the amount of effort that should go into the search, and the level at which the reservation wage should be set.

In an unemployed person's search for a job, two decisions are made about the search: the amount of effort that should go into the search, and the level at which the reservation wage should be set. These decisions are revised over time (say, each week) as long as the search fails to produce a new job. Thus the search effort and the reservation wage are key determinants of the probability of leaving unemployment (the "re-employment hazard rate"), along with the distribution of wage opportunities and the search behaviour of potential employers.

As mentioned in Section 2, the sample of CEC clients investigated here does not contain the information required to track and analyze directly the evolution of reservation wages within unemployment spells. However, the wages obtained in newly found jobs allow for indirect measurement of end-of-spell reservation wages. This question is investigated in Section 4.

Here, we provide a detailed examination of the search effort (or search intensity), which, contrary to reservation wages, is carefully measured in each of the interviews of the sample. There are two main objectives.

First, the phenomenon of search behaviour is interesting in itself. Specifically, the evolution of search intensity over time within unemployment spells and across interviews is carefully tracked. Issues of particular interest are the impact of UI eligibility on the search effort and the point at which unsuccessful job seekers stop searching. The importance of those two questions for UI policy and for the optimal timing of remedial intervention is obvious.

Secondly, a predicted measure of search intensity must be developed for the analysis of unemployment duration in Section 5 because search effort and the probability of re-employment are jointly endogenous to the job search process: not only does searching harder raises the probability of re-employment, but a greater re-employment probability (both desired and actual) also leads to greater search intensity. The analyses of job-search intensity in this section and of re-employment wages in Section 4 will provide two of the inputs necessary to identify the determinants of unemployment duration in Section 5. The variables used in the estimation model are described in Appendix D.

In interpreting the results of the model, one must keep in mind that the sample is most probably not entirely representative of the Canadian population. Moreover, the estimated coefficients could carry biases consistent with a sample that is younger and poorer than the general population, and in which males are over-represented. Several results stand out:

- The 25–44 age group searches significantly harder than any other age groups.
- Men search significantly harder than women.
- High school graduates search significantly harder, and university graduates even more so, than respondents who have not completed high school.
- Visible minorities search significantly harder than any other group.

- Search is substantially less intensive in Atlantic Canada (except Nova Scotia), Quebec, and Manitoba, and somewhat less intensive in western Canada, than in Ontario.
- Within provinces and relative to small cities, search is less intensive in rural areas, more intensive in Montreal, Winnipeg, Edmonton, and Calgary, and less intensive in Ottawa.
- Individuals who were union members in their last job search somewhat less hard than others. This is true even though the sample excluded those expecting a recall.
- The duration of the last job does not have a significant impact on search intensity.
- Previous earnings are not an important factor in the search effort.
- Those who rely mainly on family income tend to search less hard than others.
- Search intensity does not depend significantly on whether the respondents are eligible to Unemployment Insurance benefits or not. The only noticeable effect of UI is that claimants who are entitled to between 40 and 49 weeks of benefits seem to search harder than those who are entitled to 50 weeks, but this effect is small.

The relatively weak impact of UI eligibility and potential benefit duration on search effort is not inconsistent with economic theory, which predicts that greater search subsidization acts as a disincentive to job search but also makes it less costly, and therefore more effective and worthwhile. The verdict of the CEC clients sampled in our study is that the two effects simply cancel each other in most cases. This is consistent with the findings of a recent study on the search behaviour of a group of unemployed workers in the southeastern sector of Montreal (Fortin and Prévost [1993]).

The results also show that the search effort is quickly established after job separation and is sustained at a quasi-constant level for the next nine months. Thereafter, search intensity declines steadily, finally stabilizing at a much lower level after 18 months. For all practical purposes, the job seeker then quits searching. This estimated time pattern of search intensity differs from that identified by Fortin and Prévost (1993) with the Montreal sample of long-term unemployed in that in the CEC sample the job seeker seems to drop out sooner after the beginning of the search.

Two substantive results, therefore, emerge from our job-search analysis. First, eligibility to UI benefits and the potential duration of benefits do not influence search effort very significantly. There is a "value added" here because the net effect of UI eligibility on search behaviour is theoretically uncertain and can only be estimated empirically. Secondly, job seekers tend to quit searching after about 18 months of unsuccessful attempts at finding a new job.[8]

8 A third result is methodological: the estimated coefficients of the reduced-form equation reported in Table D.1 (column 1) make it possible to calculate the values of the search-intensity index. These coefficients will be used in the analysis of unemployment duration in Section 5.

4. Unemployment Insurance and Re-employment Wages

The success of a period of job search is closely related to the wage obtained in the new job since it measures how well the unemployed worker managed to preserve his or her human capital.

What is the effect of UI benefits on the productivity of job search, as measured by the wage obtained after a period of unemployment? Our findings are based on a statistical analysis of the new wage as a function of various individual-specific characteristics as well as UI eligibility criteria. The success of a period of job search is closely related to the wage obtained in the new job since it measures how well the unemployed worker managed to preserve his or her human capital. One aim of an Unemployment Insurance program is to subsidize the unemployed during the search period in order to enable them to select the most appropriate new job available, even if this implies a longer spell of unemployment. This has positive value not only for the unemployed workers who will preserve their income, but also for society, since the successful search results in higher value-added and higher productivity.

The unit of observation in this analysis is the unemployment spell, and the variables include the individual characteristics of the worker, pre- and post-separation wages, and the duration of the spell.

There is evidence of a positive effect of UI benefits on the new wage, but the size of this effect is small. Its magnitude was measured by using categorical variables for the number of weeks during which UI benefits were available, as follows:

1) Not eligible for benefits;

2) Eligible for fewer than 30 weeks of benefits;

3) Eligible for between 30 and 39 weeks of benefits;

4) Eligible for between 40 and 49 weeks of benefits; and,

5) Eligible for 50 weeks of benefits.

The use of categorical variables is preferable to the use of the actual number of weeks of benefits because it does not impose a constant increasing relationship between benefit weeks and new wages, nor is such a relationship borne out by the data. Rather, new wages seem to be a "step" function of the number of weeks of benefits. See Appendix E for a discussion of the econometric methodology used in estimating the impact of UI benefits on wages.

Results

A major policy concern in designing a UI program would be that because of scarring, stigma or skills depreciation, UI benefits could do more harm than good. By helping the unemployed to be patient and selective in their search process, UI benefits could at the same time foster any of these negative effects and result in lower wages for the unemployed. However, we find no support for the hypothesis that longer unemployment spells lead to lower wages upon re-employment. This could be because there are no scarring, stigma or skill-depreciation effects for this sample, or, alternatively, because this negative effect is offset by a positive effect of productive search, whereby longer spells of unemployment are the result of a highly patient seeker's waiting until a good offer arrives.

The results, presented in Table E.1, suggest that re-employment wages for ineligible workers are roughly 7 to 9 percent lower than those of individuals with 50 weeks of benefits. Eligible persons with fewer than 30 weeks of benefits have new wages generally 5 percent lower, and the same is true for those with 30 to 40 weeks of benefits. The new wages of persons with 40 to 50 weeks of benefits are virtually the same as those with 50 weeks.

Some other interesting findings arose from our calculations. For example, married, high-tenured, and younger workers were found to be more likely to be re-employed. Paradoxically, their education level did not appear to play a significant role in increasing or decreasing their chances of finding a job. Finally, the wage equation also displayed some of the traditional results observed in studies of displaced workers: women and high-tenured or unionized workers lose more from switching jobs, even when the reason motivating that move is taken into account. The only noticeable difference in our estimate, with respect to traditional results on displaced workers, is the fact that younger workers were found to lose more from switching jobs. This result may be attributable to the particular composition of our sample.

In order to better understand the results of this section, it may be useful to analyze the sensitivity of the results to changes in the sample and the determinants of wages in the jobs that were lost.

Women

The fact that men have higher re-employment wages than women, other things being equal, points to the need to analyze the determinants of new job wages for women separately. The re-employment-wage results for women (see Table E.4) show that women tend to retain less of their old salary on the new job. In addition, women seem to lose their salaries more quickly during a period of unemployment. On the other hand, the effects of some variables — marital status and union status in the new job — are almost identical for men and women. For women, there is little evidence of favourable UI effects on new wages. If anything, shorter benefit periods would seem to be beneficial. Together, these results suggest that the search environment might be quite different for women, or at least for the women in this sample.

The Atlantic Provinces

It is generally acknowledged that the current UI system actually serves two roles: it subsidizes job search and provides income maintenance. It is thus quite reasonable to assume that the system will have less of an impact on new wages for individuals who are primarily in seasonal jobs, and who simply use UI benefits to supplement their incomes during “off” periods. This could bias downward the true value of benefits for those who do exploit the insurance aspect of the program. This effect is analyzed by a regression for the Atlantic provinces since it is often in this region that seasonal employment is most concentrated. The results are presented in Table E.5.

Perhaps the most interesting feature of these results is that only old wages seem to have a great deal of influence on new wages. This may partly reflect the fact that the sample is rather small (140 observations). Interestingly, the coefficient for the lost wage is almost identical to that for the general population. The effect of the length of unemployment spells is much stronger, however, although this effect has not been estimated precisely. The effect of UI benefits does not seem radically different in the Atlantic provinces. While the 0-to-30-weeks group was dropped because of a lack of observations, it is not the case that the ineligible do much worse than those receiving 50 weeks of benefits.

Determinants of Wages in Lost Jobs

A final analysis is conducted for the determinants of wages in the jobs that are lost. This is interesting because it provides some insight into the characteristics of the sample. If the old wage is determined in much the same manner as is generally found for the population at large, it is possible to have a greater degree of confidence regarding the applicability of the new wage results for the general population. The results, presented in Table E.6, show evidence of rising age/earnings and age/tenure profiles that are consistent with standard human capital theory. Education effects are weak, however. Perhaps the most surprising result is that the regional variables are lowest in Ontario and highest in the Prairies, since the Ontario economy was relatively strong during this time, while that of the Prairies was relatively weak. This may be a hint of a problem of sample-selection bias, in that people who visit CECs are often likely to be those experiencing some difficulty in finding a new job. In Ontario, this may have included only fairly marginal workers, while in the Prairies the people encountering problems in their job search may have been so-called high quality workers. Such a phenomenon could explain the results obtained here. Other than this result, there is little else to suggest that the sample is unrepresentative.

5. Determinants of Job-Search Duration

Unemployed workers — especially those who had a wage above average for workers with their characteristics — try to "hold out" for their old wages and, as a result, will have longer spells of unemployment.

In conducting a statistical analysis of the probability of finding a job, various individual characteristics were related to unemployment durations along with the intensity measure from Section 3 and the expected new wage from Section 4. The method adopted for this analysis (see Appendix F) facilitates the study of the relationship between UI policy and unemployment durations and of the impact of reservation wage and search intensity effects.

The results show that a high regional unemployment rate sharply decreases the probability of escaping unemployment. They also show that unemployed workers — especially those who, by luck, because they were in a particularly good match, or for some other reason, had a wage above average for workers with their characteristics — try to "hold out" for their old wages and, as a result, will have longer spells of unemployment. This can only be explained by the fact that these workers try to obtain the same large, above-average wages in their new jobs.

The results also reveal that, over the period considered, there were unemployed workers who suffered only limited wage losses and short unemployment spells, while others suffered large wage losses and long unemployment durations. The latter finding could be explained by the fact that changes in the type of qualifications needed on the labour market outweighed the effects of productive search.

The analysis leads to the quantification of the effect of the number of UI benefit weeks on re-employment probabilities. This is then converted into an effect on unemployment duration and on the unemployment rate (see Section 6). The fact that search intensity and wages do not fully account for the re-employment probability effect means that the unemployment rate effects of UI benefits are not related one-for-one to re-employment wage and search intensity effects. Put another way, something else related to UI benefits has a depressing effect on job finding rates.

The robustness tests performed in the previous section are repeated here by separating the sample into men and women and by running separate calculations for the Atlantic provinces. In addition, separate estimates for persons eligible and not eligible for UI benefits are calculated.

The results of the first two tests (see Tables F.3 and F.4) suggest that there is relatively little difference between men and women and between the Atlantic provinces and the rest of Canada with respect to the effect of UI benefit duration on re-employment possibilities. As for the eligible/ineligible effect, the results (see Table F.5) suggest that the degree of heterogeneity among the ineligible is higher than among the eligible. In other words, individuals who are ineligible for UI benefits in Canada are part of a rather particular group, a group that is likely to comprise an assortment of atypical cases.

Overall, the results of these stability tests imply that there are differences between certain subgroups of the population that seem to be related to differing levels of diversity among these groups. The impact of these effects on the fitted wage and wage lost variables is greater than that on the search intensity variable.

6. Implications for Unemployment Insurance Policy

This study found a relatively minor effect of UI benefits on job search intensity.

The results of this study are of interest to policymakers for a variety of reasons. First, the study of the relationship between search intensity and UI benefits addresses one of the most common criticisms levelled at systems of Unemployment Insurance: that the availability of UI benefits will lower the intensity of job search on the part of unemployed workers and thereby raise the unemployment rate. According to this view, UI benefits are part of the problem rather than the solution. An extreme version of this point of view is that persons receiving UI benefits do not look for a job at all until shortly before the date of expiration of their benefits. Some support for this view is found in Unemployment Insurance experiments in the United States[9] which suggest that unemployed persons can shorten their spells of unemployment without incurring the corresponding cost of a wage decrease.

This study found a relatively minor effect of UI benefits on job search intensity. The study clearly had the potential to show that search duration varies with search intensity since respondents provided detailed information about search strategies on several occasions. Nevertheless, the extreme pattern of search intensity mentioned above — weak search activity until benefit exhaustion, followed by a feverish rash of search activity — was not reflected in the data. This means that UI policy aimed at mitigating the harmful effects of unemployment does not seem to contribute to a worsening of the problem by removing the incentive to search among the unemployed. However, it appears that those who have been unemployed for more than 12 months become discouraged and reduce their search effort. This suggests that a program specifically aimed at helping the long-term unemployed in their search would be highly desirable.

While there is limited information on what happens to those unemployed for more than 12 months (representing approximately 1 percent of the sample), it is likely that many of these individuals end up dropping out of the labour force and becoming Social Assistance recipients. Typically, they tend to stay on public assistance longer and to experience greater difficulty in returning to the labour force. By reducing their search effort, UI benefits may worsen that problem for those long-term unemployed. This is an additional incentive to establish a program geared exclusively towards the long-term unemployed in order to prevent them from sliding from Unemployment Insurance to Social Assistance.

The study of re-employment wages is also of interest, given the widespread view that UI benefits simply induce recipients to postpone search activity. This would imply that persons receiving such benefits for lengthy periods would fare no better in terms of re-employment wages than persons receiving benefits for a short period only. That does not seem to be the case here, however. Lengthy benefit periods do seem to have an effect on new wages. This effect is not necessarily constant for all levels of benefits, and there is evidence that almost all of the beneficial effects of UI on new wages are obtained with fewer than 50 weeks of benefits.

9 See Davidson and Woodbury (1993), for example.

Our results suggest that many of these positive outcomes would be obtained with fewer weeks of benefits.

Furthermore, at least half of the favourable effects of UI benefits seem to come with 30 to 40 weeks of benefits. The cost of having no benefits versus a full 50 weeks of benefits is, other things being equal, in the order of 7 to 9 percent of the new salary. In other words, if a person with 50 weeks of benefits received a new hourly salary of $8.00, an otherwise identical person with no benefits would be expected to receive a salary of roughly $7.32.

The direct policy implications of this result require some analysis of costs versus benefits. If 50 additional weeks of benefits raised a person's hourly salary by $0.68, this works out to $27.20 per week for a 40-hour week and $1,360 per year for 50 paid weeks per year. This premium could be received for several years, and so its present value would have to be calculated. Against this could be set the cost of 50 weeks of benefits at a rate of $176 per week ($8 x 40 x 0.55) or $8,800. This figure is an upper limit because most unemployed persons do not exhaust their benefits. Indeed, many never even entered the third phase of benefits in the 1986–1988 period. A payback period of 10 years might be enough to make this investment worthwhile from an individual perspective and perhaps also from a social point of view.

On the other hand, our results suggest that many of these positive outcomes would be obtained with fewer weeks of benefits. In particular, 40 or fewer weeks of maximum benefits could give the same wage boost but with a lower lump sum cost and hence also a shorter payback period. The length of the pay-back period can be quite crucial. If the premium from UI is only temporary, or if individuals tend to stay in jobs for fewer than 10 years, the cost of the UI subsidy may be too high.

The study of the effect of UI benefits on search intensity shows little direct impact of UI eligibility on search behaviour. Yet it also shows strong effects of unemployment duration on search. To the extent that UI benefits tend to generate longer durations, they may also indirectly reduce search intensity. We shall return to that aspect later on.

The implications of the study of job finding probabilities, in some ways, are contingent upon those of the first two studies. While the length of UI benefits had a depressing effect on the probability of finding a job, this could simply be because of the effect on search intensity or the increase in reservation wages, which produces the higher re-employment wages found in the first section of this study.

In fact, however, the analysis does not support this interpretation. When variables controlling for search intensity and the expected new wage are added to an equation for the re-employment probability, they do indeed have a significant effect. However, variables measuring the length of benefits entered separately also have an effect.

In estimating re-employment probability, the evidence suggests that it is 33 percent higher for a person with no benefits than for an otherwise equivalent person with 50 weeks of benefits, when taking only the direct effects into account. Applying

this figure to the average re-employment probability reported for Canada over the period 1976–1991[10] would produce an expected duration of unemployment of 3.76 months (zero weeks of benefits) rather than 4.55 months (50 weeks of benefits). Using the approximation:

unemployment rate = incidence of unemployment x average duration (in months),

and an average weekly incidence (per month) of roughly 3.1 percent[11], this gives an unemployment rate of 14 percent with the longer duration and 11.7 percent with the shorter duration. These figures clearly are approximate and serve only to quantify roughly the impact of having everyone with 50 weeks of benefits versus everyone with no benefits. This measured effect does not take into account regional extended benefits nor search intensity or re-employment wage effects. In addition, this calculation assumes that the behavioural responses obtained here can be extrapolated to the general population, a proposition that is far from being self evident.

A qualification to this result is that the re-employment probability of people with fewer than 30 weeks of benefits — but with some benefits — is as large as that for the ineligible. The hazard for this group is 31 percent higher than for those with 50 weeks. On the other hand, the fewer than 30 weeks group accounts for only 2 percent of the sample, and so this figure may not be reliable. Those in the 30 to 40 weeks and 40 to 50 weeks groups do have lower re-employment probabilities than the ineligible. There is thus some evidence that the magnitude of the effect of UI benefits on unemployment durations is significant from the point of view of their effect on the unemployment rate.

10 See Gunderson and Riddell (1993), which reported an the average re-employment hazard of 0.22 over the period 1976–1991; this would rise to 0.29 if benefits went from 50 to zero weeks.

11 As reported by Gunderson and Riddell (1993); see Table 24.3.

7. Conclusion

UI benefits do not appear to have a significant negative effect on job search productivity as measured by the input of the unemployed, that is, by search effort.

There are several interesting conclusions to be drawn from this study. First, UI benefits do not appear to have a significant negative effect on job search productivity as measured by the *input* of the unemployed, that is, by search effort. This result may be surprising, given the results of UI experiments in the United States. At present, these results are based on methodologies too dissimilar to permit any direct reconciliation. It would seem, however, that future work entail a UI experiment in which search intensity is measured as it was in the CEC data set.

Job search productivity was also measured by the *outputs* of the search process — that is, re-employment wages and probabilities of leaving unemployment. With regard to these, the study finds evidence that the existence of UI benefits can raise wages after a period of unemployment. The size of this effect is perhaps not so large as to imply that it warrants the cost, however. Some further cost/benefit analysis based on the results of the study could clarify this question.

Finally, the non-constancy of the relationship between the length of UI benefits and the new wage suggests that a maximum duration of benefits shorter than 50 weeks might be optimal from a cost/benefit viewpoint.

The effect of UI benefits on re-employment probability suggests that they also have a significant impact on the aggregate unemployment rate, but these effects do not seem to be working through search intensity or new wage effects. This is somewhat puzzling since the model of job search used here seemed to be quite complete. It is possible that no negative effects of benefits on search intensity were found because survey participants did not wish to admit to persons associated with EIC that they were not seeking work. Certainly, some such unmeasured effect related to benefit duration affects unemployment durations. One possibility could be the presence of regionally extended benefits, which act as a proxy for local demand-side conditions. This possibility was eliminated by adding regionally extended benefits separately. The direct effect of eligibility length did not disappear, however, with this addition.

The bottom line result of this study is that UI benefits have a negative effect on re-employment probabilities, which translates into a positive effect on the unemployment rate. In exchange for this duration effect, there is evidence of a positive effect on wages when UI benefits finance a longer job search. This positive effect is not large, and may be available with shorter maximum benefit periods. In assessing the role of UI benefits, this possible positive value of search needs to be set against the costs of UI in terms of benefit payments and higher unemployment rates.

Appendix A: Job-Search Theory

An excellent introduction to job search theory is provided in Devine and Kiefer (1991). The first chapter of this paper outlines the essential elements of the economic environment, which are as follows:

1. The model takes place in discrete time. After τ periods of searching, there is a probability $\delta_{i,\tau} = d(e_{i,\tau}, a_{i,\tau})$ that a job offer will be received by person i. This probability will be a function of the search effort of an individual $e_{i,\tau}$ and of a combination of the efficiency of the matching process and the incentive for employers to search, which are captured by a base arrival rate, $a_{i,\tau}$. This probability could be time-varying if employers are reluctant to hire the long-term unemployed or if search intensities vary with the duration of the job search period, for example. The cost of searching for an unemployed person is represented by a function, $c(e_{i,\tau})$.

2. The wage-offer distribution is captured by a probability density function, $f_{i,\tau}(w)$, specific to each individual. This wage offer function may itself vary with the length of the search spell, perhaps as a result of the depreciation of human capital or the stigmatization attached to unemployment.

3. Once a job offer is received, it may be rejected. This will happen if the wage offer is less than the reservation wage $w^r_{i,\tau}$ of the job seeker. The reservation wage decision is a function of the perceived wage distribution and the value of staying unemployed.

4. Unemployment insurance compensation is of a limited duration and is a non-decreasing function of the pre-unemployment wage. Job seekers may also have other income that can be used to finance a period of job search. It is assumed that an individual i receives a total period income of $b_{i,\tau}$ after searching for τ periods.

5. Persons are assumed to maximize the discounted expected value of their life-time income stream and to use the interest rate r when discounting future income streams.

6. The personal characteristics $e_{i,\tau}$, $a_{i,\tau}$, $f_{i,\tau}(w)$, $w^r_{i,\tau}$, and $b_{i,\tau}$ may or may not be entirely explained by a vector of observable characteristics, X_i.

Given this model, unemployed agents choose a search intensity and reservation wages that vary with $f_{i,\tau}(w)$, $b_{i,\tau}$, and the base-offer arrival rate, $a_{i,\tau}$. As Devine and Kiefer show, in the stationary case where $a_{i,\tau}$, $f_{i,\tau}(w)$, $b_{i,\tau}$, and search intensity are constant over time, the reservation wage is implicitly given by the equation:

$$w^r_i = b_i - c(e_i) + \frac{\delta_i}{r} \int_{w^r_i}^{\infty} (w - w^r_i)\, f_i(w)\, dw$$

Search intensity will be determined by a simple first-order condition that equates the marginal benefit of searching to its marginal cost:

$$c'(e_i) = \frac{\delta'_i(e_i,a_i)}{r} \int_{w^r_i}^{\infty} (w\text{-}w^r_i)\, f_i\,(w)\, dw$$

In the general case, however, the reservation wage may vary over time as a result of changes in $a_{i,\tau}$, $f_{i,\tau}(w)$, or $b_{i,\tau}$. Non-work income could vary over time as benefits expire or as savings are exhausted. Job offer probabilities might fall with τ if employers interpret longer spells of joblessness as a bad signal. Wage-offer distributions could drift to the left over time if workers' skills depreciated during joblessness or if employers inferred that the longer-term unemployed were of lower quality and thus merited lower wages. In this general case, the solution for the reservation wage and search effort becomes much more complicated because it is based on an expected-value calculation, with the values of the sum changing in each period.

In any case, for completed unemployment spells, the distribution of the post-unemployment wage is described by the conditional probability density function:

$$f_{i,\tau}\,(w \mid w \geq w^r_{i,\tau})$$

The distribution of waiting times until a job is found and accepted is obtained by noting that in each period the probability of leaving unemployment is:

$$\delta_{i,\tau}\,(e_i,\, a_i) \int_{w^r_{i,\tau}}^{\infty} f_{i,\tau}\,(w)\, dw$$

Appendix B: Characteristics of the Sample Used for the Hazard-Rate Estimation

Table B.1
Values of Selected Variables

Variable	Percent
Male	63
Rural	15
Minority	3
Married	44
Head of household	30
Succeeded in finding a new job	48
Deemed eligible for benefits	—

Table B.2
Maximum, Minimum, and Mean Values of Selected Variables

Variable	Minimum	Maximum	Mean
Weekly hours			
old job	1	90	35.4
new job	0	85	37.1
Hourly wage			
old job	$0.62	$62.50	$8.28
new job	$1.25	$70.00	$8.57
Change in hourly wage	-$2.59	$03.27	$0.05
Duration of unemployment	1 month	118 months	13.23 months
Potential UI benefits	0 weeks	52 weeks	33 weeks
Effective benefit rate	17%	60%	58%
Potential regional extended benefits	0 weeks	32 weeks	23.3 weeks

Note: The measure of Potential UI benefits includes the first two weeks for which benefits are not paid.

Table B.3A
Categorical Variables: Age, Education, Reason for Leaving Old Job

Variable	Percent
Age group	
15–19	6.3
20–24	28.2
25–44	53.7
45–64	11.7
65 and over	0.0
Highest educational level	
Elementary school	5.1
High school	60.9
College or university	32.0
Other	2.0
Reason for leaving old job	
Lost job/laid off	57.1
Moved, illness/disability, personal reasons, school/training, dissatisfied, quit, or retired	25.8
Other	17.2

Table B.3B
Categorical Variables: Region

Region	Region of Old Job (Percent)	Region of New Job (Percent)
Atlantic Provinces	9.0	10.2
Quebec	29.5	31.3
Ontario	41.0	42.6
Prairie Provinces	11.7	7.5
British Columbia and Yukon	8.8	8.4

Table B.3C
Categorical Variables: Industry

One-Digit SIC Code: New-Job Industry	Industry of Old Job (Percent)	Industry of New Job (Percent)
Agriculture	6.1	4.5
Non-agricultural — primary	4.7	6.7
Manufacturing	9.0	8.0
Construction	21.4	18.3
Transportation, communications, and utilities	4.9	6.6
Trade	16.2	16.5
Finance, insurance and real estate	7.4	8.8
Services	13.8	15.5
Public administration	16.7	15.0

Table B.4
Descriptive Statistics for Variables Used in the Intensity Estimation and Not in the Hazard-Rate Estimation

Variable	Mean	Minimum	Maximum
Tenure at old job (weeks)	73.94	0	1728
Intensity of search	10.62	0	40.14
		Percentage of Total Sample	
Interview			
Initial		50.0	
2 months		32.7	
6 months		7.6	
12 months		7.5	
24 months		2.1	
Main source of revenues			
Social Assistance		6.3	
Unemployment Insurance		59.3	
Family		19.4	
Other		15.0	
Province of residence			
Newfoundland		1.8	
Nova Scotia		3.6	
New Brunswick		4.2	
Prince Edward Island		1.0	
Quebec		32.1	
Ontario		38.3	
Manitoba		2.1	
Saskatchewan		0.3	
Alberta		7.4	
British Columbia and Yukon		9.2	
City of residence			
Montreal		14.1	
Winnipeg		1.3	
Calgary		1.0	
Edmonton		4.3	
Vancouver		4.1	
Ottawa		0.5	
Toronto		3.0	
UI eligibility at the beginning of spell (weeks)			
None		25.0	
Between 0 and 30		2.0	
Between 30 and 40		8.8	
Between 40 and 50		24.0	
50 and over		40.0	
Duration of unemployment spell (months)			
0		6.1	
Between 0 and 1		15.7	
Between 1 and 2		13.3	
Between 2 and 3		13.2	
Between 3 and 4		11.3	
Between 4 and 6		14.0	
Between 6 and 9		12.4	
Between 9 and 12		6.0	
Between 12 and 15		3.3	
Between 15 and 18		1.6	
Between 18 and 24		0.9	
Over 24		2.3	

Note: See also Figure 1.

Appendix C: Construction of the Search-Intensity Index

The index of search intensity is based on the responses of job seekers to questions about the intensity and methods of their search. In the first four interviews, each respondent was asked what search methods were used, how many times each method was used, and how many contacts resulted from the use of each method by phone, by mail, and in person. Finally, job seekers were asked how many job offers resulted in each case. Because the number of job offers depends, to a large extent, on the needs of employers, the number of employer contacts was preferred as an exogenous measure of method effectiveness. Because the eight methods of search reported in the surveys are quite different with respect to their cost and effectiveness, each method had to be weighted. The weights assigned to each method were based on the number of employer contacts. The weights could only be calculated on the basis of the first four interviews only, since no question was asked about employer contacts in the 24-month follow-up interview.

Based on the entire population of unemployed for the first four of the five interviews, the average number of times that method i is used (M_i) and the average number of contacts (C_i) by phone/mail or in person that resulted from the use of that method are calculated. The effectiveness of each method (weight) is then calculated as:

$$eff_i = C_i / M_i.$$

The more effective the method is, the greater eff_i is, since C_i will be greater for a given number of uses of method i. Hence each method was assigned a different index of average effectiveness (weight), varying from 0.58 for the category "talk to friends and relatives" to 1.18 for "go to a private agency for jobs."

Based on the weights calculated, each method was normalized for each individual and each interview. Let T_{ijk} equal the number of times that search method i is used by individual j in interview k; then:

$$inten_{ijk} = T_{ijk} * eff_i.$$

is the weighted intensity of use of method i by individual j in interview k. The final index of search intensity can then be calculated as the sum of the weighted intensities over all methods of search:

$$inten_{jk} = \sum_{I=1}^{8} inten_{ijk.}$$

Appendix D: Econometric Model Used in Estimating Search Intensity

The analyses of job search intensity in Section 3 and re-employment wages in Section 4 provide two of the necessary inputs to identify the determinants of unemployment duration in Section 5. Given this objective, two econometric equations are estimated for search intensity. The first is the reduced-form equation relating search intensity to the largest possible set of exogenous regressors available from the sample. There are 49 such regressors. Among other things, the results will serve to evaluate the final impact of UI eligibility on search intensity and will provide the predicted values of the intensity index to be inserted into the hazard-rate equation in Appendix F.

The second equation is structural. It relates search intensity to a restricted subset of the exogenous variables and to the endogenous variable "unemployment duration" so as to capture the pure duration dependence effect, if any. In that equation, unemployment duration is instrumented with the same large set of 49 exogenous regressors.

Exogenous Variables

The theoretical model of job search intensity is based on the Devine-Kiefer framework discussed in Appendix A. In this model, the exogenous variables affecting the job search process are:

1) The perceived market conditions (determinants of *a*);

2) The perceived distribution of wage opportunities (determinants of the density function *f*);

3) Unemployment Insurance compensation and other incomes (determinants of *b*); and,

4) The personal discount rate (*r*).

As explained in Section 2, job search intensity is measured as the weighted number of contacts by phone/mail or in person made with employers through one of the eight search methods identified in the survey questionnaire: talk with friends, contact employers directly, answer ads, use CEC services, use union halls, use private agencies, place ads, or use any other method. Our index of search effort weighs each method by its overall sample efficiency in leading to interviews with employers (see Appendix C).

Global market conditions, individual opportunities, income levels, and the personal discount rate are captured by a wide array of 49 exogenous variables describing the macroeconomic environment and personal characteristics. These variables, defined below, form the list of regressors to be employed in the reduced-form equation for search intensity. *For each category of attributes, the omitted reference variable is italicized (where applicable) and the number of explicit regressors is reported.*

1. **Age:** dummy variables for the age category (15–19, 20–24, 25–44, or *45–64*); three regressors (45–64 omitted).

2. **Sex:** dummy variables for the sex (man or *woman*); one regressor (male = 1).

3. **Education:** dummy variables for the level of schooling *(less than a high school degree*, high school degree but no university degree, or university degree); two regressors (less than high school omitted).

4. **Family status:** dummy variables for the marital status (married = 1), the position in the household (head = 1), and the presence of children (yes = 1); three regressors.

5. **Minority status:** dummy variables for native status (yes or *no*), disabled status (yes or *no*), and visible minority status (yes or *no*); three regressors (non-minority omitted).

6. **Place of residence:** dummy variables for the province of residence (*Ontario* omitted) and the rural/urban status (rural, *small town*, Montreal, Toronto, Vancouver, Ottawa, Winnipeg, Edmonton, or Calgary); 17 regressors.

7. **Union status:** dummy variable for union membership in the last job (yes = 1); one regressor.

8. **Tenure:** number of weeks in last job (quadratic polynomial); two regressors.

9. **Date:** dummy variables for the date of the interview (first, second ... fifth); four regressors (24-month follow-up omitted).[12]

10. **Earnings:** dummy variables for the income (INC) category in 1986 for the first four interviews, and in 1988 for the fifth interview ($INC = 0$; $0 < INC <$ \$10,000; \$10,000 $\leq INC <$ \$15,000; \$15,000 $\leq INC <$ \$20,000; \$20,000 $\leq INC <$ \$30,000; \$30,000 $\leq INC <$ \$40,000; $INC \geq$ \$40,000); six regressors (INC = 0 omitted).

11. **Main source of income:** dummy variables for the main source of income since the job was lost (Unemployment Insurance benefits, Social Assistance benefits, family income, or *other income*); three regressors.

12. **Unemployment Insurance eligibility:** dummy variables for the number of weeks (WUI) of Unemployment Insurance eligibility at the beginning of the unemployment spell ($WUI = 0$; $0 < WUI < 30$; $30 \leq WUI < 40$; $40 \leq WUI <$ 50; or $WUI \geq 50$); four regressors (over 50 weeks omitted).

The reduced-form equation for job search intensity is estimated by an ordinary-least-squares regression of the intensity index on a constant and the 49 right-hand variables out of the 12 categories just defined. These 49 regressors exclude the italicized reference variables. There are 3,648 valid observations, each corresponding to an interview with a respondent. Of the 3,648 respondents, 46.9 percent had only one interview, 40.9 percent had two interviews, 9.9 percent had three interviews, 0.5 percent had four interviews, and 0.2 percent had five interviews.

Since the percentage of respondents interviewed only once is very high, a fixed-effect model would be inadequate. In such a model, the individual-specific dummies would in fact completely "explain" the search behaviour of the one-interview respondents and would therefore preclude proper instrumentation of their search intensity. Such observations would then be lost for the analysis of the probability of leaving unemployment that is presented in Section 5. It is partly to avoid

12 It is important to note that, together, the variables identifying the place of residence and the date of the interview capture most of the relevant market variations across local markets and over time.

this undesirable situation that the intensity variable is regressed explicitly on the 49 right-hand variables without fixed effects.

Figure D.1 indicates that the values of the intensity variable are widely spread between 0 and 40 (but mostly between 0 and 20) with a sample mean of 10.6. The intensity index is equal to 0 for only 5 percent of the sample observations; thus there is no bunching of observations at 0. This lends support to the view that the ordinary-least-squares approach is a reasonably appropriate estimation method.

Figure D.1
Distribution of Search Intensities

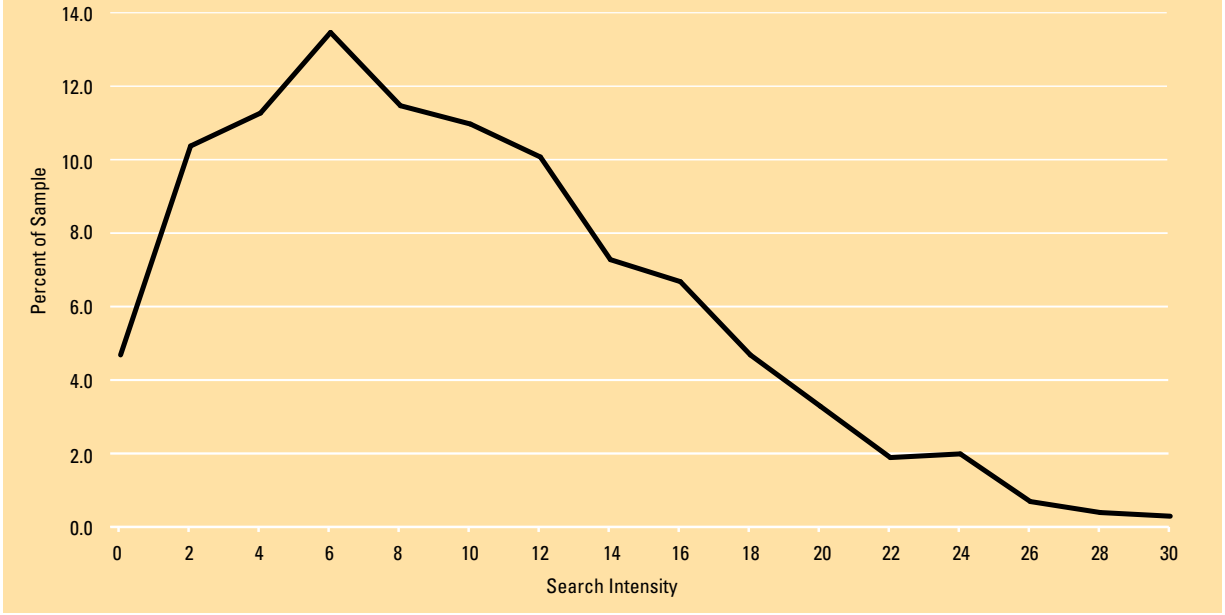


Table B.1 of Appendix B reports some of the usual descriptive statistics for the right-hand variables.[13] The following are noteworthy: 62 percent of the respondents are men, and 84 percent are aged 20 to 44; 53 percent do not have a high school degree, and only 4 percent hold a university degree. In terms of family, 48 percent are married, 31 percent are heads of households, and 92 percent have children. Around 10 percent have minority status: 3 percent are native, 2 percent are disabled, and 5 percent belong to visible minorities.

Regionally, 70 percent of the respondents live in central Canada, 11 percent in Atlantic Canada, and 19 percent in western Canada; 28 percent live in Canada's seven largest cities, and 18 percent come from rural areas. Only 9 percent held union jobs before their unemployment spells. The respondents spent an average

13 The statistics in Table B.1 count respondents as many times as they are interviewed.

of 17 months in their last jobs. Their median income was less than $10,000 in the year before the first interview; that year, only 11 percent earned more than $20,000. The main source of income since the loss of their job was Unemployment Insurance benefits had been for 59 percent of the sample, family income for 19 percent, and Social Assistance benefits for 6 percent. Finally, 25 percent of respondents were ineligible for Unemployment Insurance benefits at the beginning of their unemployment spells, 11 percent were eligible for periods of up to 40 weeks, 24 percent for periods of between 40 and 50 weeks, and 40 percent for 50 weeks or more.[14]

The structural equation for job search intensity is estimated by regressing the intensity index on a restricted subset of the exogenous variables and 11 additional categorical variables defined from the instrumented unemployment duration variable. The identifying restrictions impose nullity on the coefficients of the 22 exogenous variables for place of residence, date of interview, and union status. The dummy variables for unemployment duration are defined as follows:

13. **Duration of unemployment:** dummy variables for the number of months (DUR) elapsed from the beginning of the unemployment spell until the date of the interview; ($DUR = 0$; $0 < DUR \leq 1$; $1 < DUR \leq 2$; $2 < DUR \leq 3$; $3 < DUR \leq 4$; $4 < DUR \leq 6$; $6 < DUR \leq 9$; $9 < DUR \leq 12$; $12 < DUR \leq 15$; $15 < DUR \leq 18$; $18 < DUR \leq 24$; and $DUR > 24$); 11 regressors (duration = 0 omitted).

Estimation Results and Tests

The estimated reduced-form equation just described for the job-search-intensity index is reported in the first column of Table D.1. The coefficient of multiple determination (the R^2 statistic) is 11 percent. This low value reflects the large amount of heterogeneity that is usual in microdata sets.

The results of the model are summarized in Section 3. The most important finding is that search intensity does not depend significantly on whether the respondents are eligible for Unemployment Insurance benefits or not.[15] In interpreting these results, three remarks are in order. First, one must keep in mind, as was pointed out in Section 3, that the sample is most probably not entirely representative of the Canadian population. Moreover, the estimated coefficients could carry biases consistent with a sample that is younger and poorer than the general population, and in which males are over-represented. Second, the estimated impacts of the variables on job search intensity must be interpreted as deviations relative to the impacts of the omitted reference variables (where relevant). Third, the estimated importance of those impacts must be measured by comparing them to the standard error of the intensity index, which is 6.3. Although this remains a subjective appreciation, it could be said that a one-point change in the search intensity index is

14 The definition of eligibility here includes the first two weeks, during which no benefits are actually received. Hence the maximum duration is 52 rather than 50 weeks.

15 That result is particularly critical for this study. The non-significance of eligibility is formally tested by comparing the coefficient of the variable "0 weeks of eligibility" to zero (the coefficient of the omitted reference variable) and to the coefficients of each of the three other eligibility variables. The relevant *t*-statistics are all far below 2.0. The statement concerning UI claimants entitled to between 40 and 49 weeks of benefits compared with those entitled to 50 weeks (the omitted variable) reflects the rejection of the hypothesis that the regression coefficient is zero with a 4 percent level of confidence

"notable", a two- to three-point change "large", and a five-point change "very large".

Table D.1
Regression on Intensity of Job Search With and Without Unemployment Duration

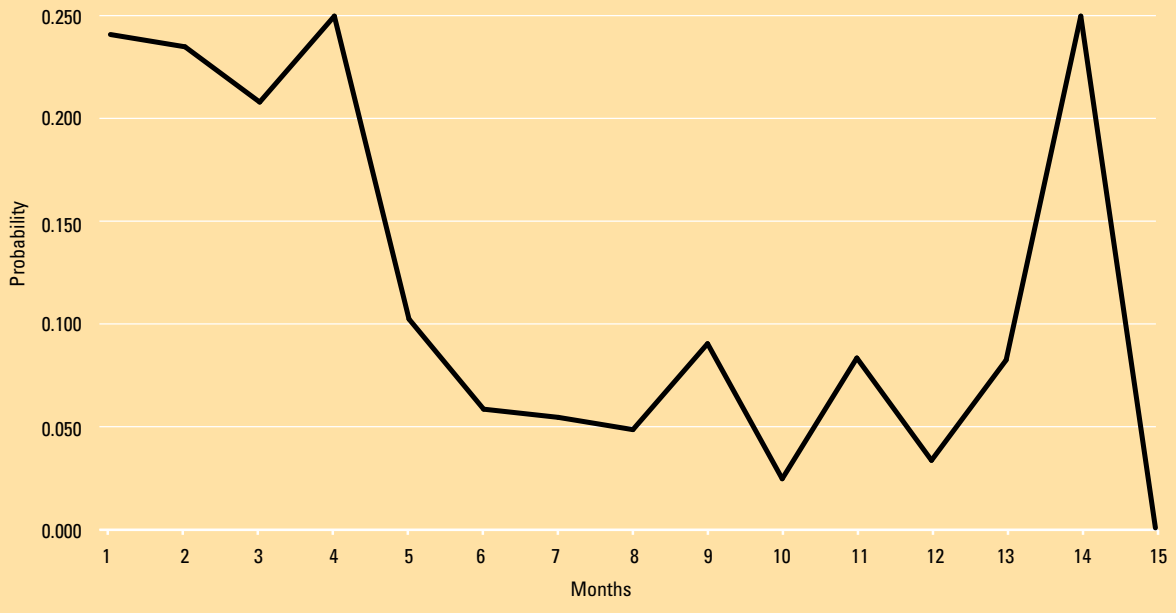
Specification	With Duration	Without Duration
Number of observations	3,648	3,648
R^2	0.0302	0.11
Intercept	14.88 (2.26)	8.46 (1.05)
Age (ref.: over 44)		
15 to 19	-0.04 (0.63)	0.53 (0.58)
20 to 24	0.12 (0.43)	0.24 (0.40)
25 to 44	0.72 (0.36)	0.71 (0.34)
Sex (male=1)	1.26 (0.23)	1.32 (0.23)
Education (ref.: elementary school)		
high school	0.53 (0.22)	1.05 (0.22)
university	1.94 (0.54)	2.24 (0.53)
Head of household (yes=1)	0.22 (0.26)	-0.07 (0.24)
Marital status (married=1)	-0.09 (0.26)	0.07 (0.25)
Children (yes=1)	-1.07 (0.43)	-0.41 (0.41)
Native (ref.: non-minority)	-0.72 (0.64)	-0.90 (0.62)
Disabled	1.48 (0.86)	0.70 (0.83)
Visible	3.02 (0.52)	1.82 (0.48)
Newfoundland (ref.: Ontario)		-3.86 (0.78)
Nova Scotia		0.04 (0.56)
New Brunswick		-2.57 (0.53)
Prince Edward Island		-4.92 (1.05)
Quebec		-3.48 (0.31)
Manitoba		-6.39 (1.20)
Saskatchewan		-2.27 (1.85)
Alberta		-1.32 (0.71)
British Columbia and Yukon		-0.78 (0.48)
Montreal (ref.: small town)		1.58 (0.36)
Winnipeg		4.82 (1.47)
Calgary		2.34 (1.23)
Edmonton		1.53 (0.84)
Vancouver		0.82 (0.67)
Ottawa		-3.37 (1.47)
Toronto		-0.64 (0.61)
Rural		-0.90 (0.62)
Job lost		
Unionized (yes=1)		-0.86 (0.36)
Tenure (weeks)	$6.3*10^{-3}$ ($1.9*10^{-3}$)	$7.0*10^{-4}$ ($1.3*10^{-3}$)
Tenure (squared)	$-7.4*10^{-5}$ ($2.9*10^{-5}$)	$5.3*10^{-6}$ ($2.4*10^{-5}$)
Interviews (ref.: 24-month follow-up interview)		
Baseline		2.09 (0.71)
2 months		2.70 (0.72)
6 months		1.16 (0.78)
12 months		-0.24 (0.78)
Earnings (ref.: earnings=0)		
Less than $10,000	-4.68 (1.61)	-0.23 (0.52)
$10,000 to $14,999	-4.67 (1.72)	0.11 (0.55)
$15,000 to $19,999	-5.25 (1.75)	-0.23 (0.59)
$20,000 to $29,999	-5.50 (1.89)	-0.27 (0.62)
$30,000 to $39,999	-4.93 (1.99)	0.14 (0.85)
$40,000 and over	-3.73 (2.35)	1.33 (1.43)
Main source of income (ref.: other)		
Social Assistance	1.91 (0.77)	0.59 (0.49)

UI benefits	-0.38 (0.31)	0.02 (0.30)
Family	-0.47 (0.40)	-0.77 (0.36)

Table D.1 *(continued)*
Regression on Intensity of Job Search With and Without Unemployment Duration

Specification	With Duration	Without Duration
Eligibility (ref.: over 50 weeks of eligibility)*		
0	-0.27 (0.35)	0.37 (0.29)
Between 0 and 30	1.41 (0.80)	0.94 (0.76)
Between 30 and 40	0.58 (0.41)	0.57 (0.40)
Between 40 and 50	0.31 (0.29)	0.60 (0.27)
Duration of unemployment spells (in months; ref.: duration of spell=0)		
Less than 1	-0.70 (1.14)	
Between 1 and 2	0.07 (1.04)	
Between 2 and 3	0.24 (1.02)	
Between 3 and 4	0.30 (1.04)	
Between 4 and 6	-0.17 (1.07)	
Between 6 and 9	-0.60 (1.16)	
Between 9 and 12	-2.78 (1.36)	
Between 12 and 15	-3.83 (1.75)	
Between 15 and 18	-4.17 (2.14)	
Between 18 and 24	-6.19 (2.45)	
More than 24	-6.47 (3.27)	

Figure D.2
Kaplan-Meier Hazard for Unemployment Duration



Note: This measure includes the first two weeks during which the individual is eligible but does not actually receive benefits.

M

Appendix E: Econometric Model Used in Estimating the Effect of UI Benefits on Wages

Murphy and Welch (1990) have shown that the interpretation of the coefficients of a high-power polynomial approximation is difficult, particularly when observations are not evenly spread over the independent variable's possible range of values. This is exactly the situation here. A highly non-linear relationship is likely to exist between the dependent variable and the duration of eligibility to UI benefits, and very few observations exists at various levels of eligibility.

Despite the simultaneity of unemployment durations and re-employment wages, authors have tried to use an ordinary-least-squares estimation of linear models to examine the effect of unemployment duration on re-employment wages. In particular, Classen (1977) and Kahn (1978) applied this approach to look at the relationship between Unemployment Insurance and job search outcomes in the United States. Recently, Addison and Portugal (1989) used the ordinary-least-squares analysis to conclude that longer spells of unemployment lowered post-displacement wages. Addison and Portugal considered the wages earned by worker *i* in jobs *j* and *j-1*:

$$1nW_{i,j-1} = \alpha_0 + \alpha_1 X^I_i + \alpha_2 X^{IE}_{i,j-1} + u_{i,j-1}$$

$$1nW_{i,j} = \beta_0 + \beta_1 X^I_i + \beta_2 X^{IE}_{i,j} + \beta_3 1n\,(dur_{i,j}) + u_{i,j}$$

Here, the vector of observable characteristics for individual *i*, X_i, is partitioned into X^I_i, which is a vector of characteristics specific to individual *i*, and $X^{IE}_{i,j}$, which is a vector of characteristics specific to individual *i* and job *j*. Also, $1n(dur_{i,j})$ is the duration of the unemployment spell for individual *i* between jobs *j-1* and *j*. Standard human-capital theory predicts that variables such as age, education, tenure, and industry should enter these equations.

The presence of the duration of unemployment could be explained by various theories. Hysteresis theories of unemployment, such as that proposed by Blanchard and Summers (1986), often hinge upon an alleged negative relationship between the probability of receiving a job offer and the length of an unemployment spell. Empirical support for this proposition is found in the work of Jackman and Layard (1991), using British data. In this framework, scarring or stigma effects may reduce the offer-arrival probability for the long-term unemployed. Persons thus stigmatized would face lower arrival probabilities and revise their reservation wages downward. Consequently, they would be more likely to accept a lower new wage. Similarly, a period of unemployment may have more tangible effects on re- employment prospects if job skills depreciate during a period of idleness, as in the model developed by Pissarides (1992). In this case, the distribution of wage offers may shift over time, lowering the reservation wage and thus the conditional and unconditional expected re-employment wages.

The result obtained by Addison and Portugal (1989) is that β_3 is negative. At the

same time, their two-stage least squares and instrumental variable results suggest that this derives from a relation between the unemployment-duration variable and other variables that have a joint impact on the wage change and unemployment duration. Hence one cannot conclude to a pure effect of duration on wages as a result of human-capital depreciation, insider/outsider effects, "scarring," or other such factors that may translate the wage offer distribution to the left over time. This suggests that some sort of two-stage correction is needed to correctly measure the relationship between unemployment duration and wage changes.

Finally, truncated jobless spells cannot be used since, by definition, new wage data are not available. As a consequence, the rejection rule for truncated observations is non-random since long-duration individuals are more likely to disappear from the sample. A correction for this type of truncation in the spirit of Heckman's "lambda" approach is implemented.

The results of our estimation are presented in Table E.1. The impact of two sources of potential bias must be considered. First, the non-random selection of the unemployed who remain in the sample may mean that the exclusion of unfinished or truncated spells biases the estimates. Second, the simultaneity between the re-employment wage and the duration of unemployment may also cause problems. To deal with these problems and to provide some analysis of the sensitivity of our results to issues of simultaneity and selectivity bias, we performed a sample-selection-bias-corrected, two-stage estimation of the equation.

Table E.2 presents the results of a probit analysis of the probability that an unemployment spell is completed. This equation is used to generate the inverse Mill's ratio or "lambda" term that is added to an instrumental-variable equation of the new-wage equation in Table E.3. Unemployment duration, in this case, is made into an instrumental variable, using the province where the job was lost, marital status, and the status of head of household as identifiers for wages. The table provides heteroskedasticity-robust, standard error estimates of the coefficients in parentheses. This equation provides roughly the same coefficient estimates as are derived with ordinary-least-squares estimates, suggesting that the quantitative results for new wages are quite robust to the estimation method used.

Table E.1
Equations for the Log New Wage

Variable	Without UI Variables	With UI Variables
Number of observations	1,441	1,441
Adjusted R^2	0.426	0.429
Constant	1.459 (0.1000)	1.5000 (0.1020)
Sex	0.121 (0.0200)	0.1260 (0.0200)
Rural	0.011 (0.0260)	0.0120 (0.0260)
Log (wage lost)	0.284 (0.0230)	0.2800 (0.0230)
Log (duration)	-0.014 (0.0180)	-0.0150 (0.0180)
Married	0.052 (0.0210)	0.0530 (0.0210)
Head of household	0.041 (0.0220)	0.0400 (0.0220)
Tenure	0.012 (0.0080)	0.0050 (0.0090)
Tenure (squared)	-0.001 (0.0005)	-0.0004 (0.0005)
Old job unionized	-0.060 (0.0270)	-0.0590 (0.0270)
New job unionized	0.292 (0.0250)	0.2870 (0.0250)
Age		
15 to 19	-0.197 (0.0480)	-0.1890 (0.0480)
20 to 24	-0.080 (0.0360)	-0.0830 (0.0360)
25 to 44	-0.025 (0.0310)	-0.0270 (0.0310)
New-job industry		
Non-agricultural primary	0.032 (0.0480)	0.0310 (0.0480)
Manufacturing	0.062 (0.0420)	0.0610 (0.0420)
Construction	0.224 (0.0380)	0.2280 (0.0380)
Transportation, communications and utilities	0.211 (0.0320)	0.2090 (0.0320)
Trade	0.128 (0.0400)	0.1260 (0.0400)
Finance, insurance and real estate	-0.036 (0.0320)	-0.0340 (0.0310)
Services	0.084 (0.0370)	0.0870 (0.0370)
Public administration	0.235 (0.0320)	-0.0270 (0.0310)
Eligibility for UI benefits (weeks)		
Not eligible	—	-0.0720 (0.0260)
Between 0 and 30	—	-0.0120 (0.0550)
Between 30 and 40	—	-0.0300 (0.0320)
Between 40 and 50	—	-0.0020 (0.0240)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table E.2
Probit Model Estimation (Standard Errors in Parentheses)

Variable	Coefficient
Number of observations	1,441
R^2	0.0725
Constant	1.248 (0.372)
Sex	0.027 (0.059)
Rural	0.099 (0.076)
Log (wage on job lost)	0.019 (0.070)
Head of household	0.002 (0.064)
Married	0.170 (0.061)
Tenure	0.038 (0.021)
Tenure (squared)	-0.003 (0.001)
Union job lost	-0.052 (0.079)
Eligibility for UI benefits (weeks)	
Ineligible	0.102 (0.080)
Between 0 and 30	0.183 (0.183)
Between 30 and 40	0.035 (0.094)
Between 40 and 50	0.015 (0.070)
Age	
15 to 19	0.162 (0.146)
20 to 24	0.086 (0.106)
25 to 44	0.040 (0.093)
Education	
1	-0.076 (0.231)
2	0.144 (0.197)
3	0.300 (0.200)
Year job was lost	
1	-1.845 (0.326)
2	-1.848 (0.307)
3	-1.568 (0.276)
4	-0.964 (0.280)

Table E.3
Instrumental-Variable Equations for the Log New Wage

Variable	Without UI Variables	With UI Variables
Number of observations	1,441	1,441
Adjusted R^2	0.257	0.354
Constant	1.6200 (0.1840)	1.4980 (0.1600)
Sex	0.0630 (0.0460)	0.1080 (0.0440)
Rural	0.0360 (0.0430)	0.0240 (0.0330)
Log (wage lost)	0.1890 (0.0600)	0.2480 (0.0540)
Log (duration)	0.0300 (0.0400)	0.0300 (0.0290)
Tenure	0.0130 (0.0130)	-0.0020 (0.0110)
Tenure (squared)	-0.0004 (0.0007)	0.0001 (0.0006)
Old job unionized	-0.2400 (0.1090)	-0.0610 (0.1090)
New job unionized	1.0120 (0.3560)	0.3920 (0.3670)
Lambda	-0.2510 (0.1320)	-0.2890 (0.0970)
Age		
15 to 19	-0.2190 (0.0680)	-0.2230 (0.0520)
20 to 24	-0.1020 (0.0490)	-0.1130 (0.0400)
25 to 44	-0.0750 (0.0470)	-0.0620 (0.0370)
New-job industry		
Non-agricultural primary	-0.4340 (0.3460)	-0.1660 (0.2830)
Manufacturing	0.3110 (0.3230)	0.0270 (0.2570)
Construction	0.4650 (0.2940)	0.4890 (0.2310)
Transportation, communications and utilities	0.2090 (0.1880)	0.2880 (0.1530)
Trade	0.4160 (0.3790)	0.2490 (0.3560)
Finance, insurance and real estate	-0.2690 (0.2300)	-0.0730 (0.1850)
Services	0.3590 (0.2080)	0.3910 (0.1610)
Public administration	0.0380 (0.1840)	0.1510 (0.1530)
Eligibility for UI benefits (weeks)		
Ineligible	—	-0.0920 (0.0360)
Between 0 and 30	—	-0.0520 (0.0650)
Between 30 and 40	—	-0.0480 (0.0390)
Between 40 and 50	—	-0.0080 (0.0270)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table E.4
Equations for the Log New Wage for Women Only

Variable	Without UI Variables	With UI Variables
Number of observations	548	548
Adjusted R^2	0.431	0.428
Constant	1.5650 (0.1540)	1.5610 (0.1560)
Rural	-0.0140 (0.0390)	-0.0140 (0.0390)
Log (wage lost)	0.2230 (0.0350)	0.2230 (0.0360)
Log (duration)	-0.0390 (0.0280)	-0.0400 (0.0280)
Married	0.0530 (0.0300)	0.0530 (0.0300)
Head of household	-0.0200 (0.0350)	-0.0210 (0.0350)
Tenure	-0.0007 (0.0110)	0.0005 (0.0120)
Tenure (squared)	0.0002 (0.0007)	0.0001 (0.0007)
Old job unionized	-0.0430 (0.0440)	-0.0450 (0.0450)
New job unionized	0.2850 (0.0420)	0.2840 (0.0410)
Age		
15 to 19	-0.1520 (0.0730)	-0.1520 (0.0730)
20 to 24	-0.0530 (0.0570)	-0.0550 (0.0580)
25 to 44	0.0390 (0.0510)	0.0370 (0.0510)
New-job industry		
Non-agricultural primary	0.0280 (0.0860)	0.0290 (0.0870)
Manufacturing	-0.0550 (0.0590)	-0.0550 (0.0590)
Construction	0.2420 (0.0660)	0.2480 (0.0670)
Transportation, communications and utilities	0.1460 (0.0600)	0.1440 (0.0600)
Trade	0.2740 (0.0710)	0.2730 (0.0710)
Finance, insurance and real estate	-0.0390 (0.0420)	-0.0370 (0.0420)
Services	0.0146 (0.0460)	0.1470 (0.0460)
Public administration	0.2950 (0.0410)	0.2970 (0.0410)
Eligibility for UI benefits (weeks)		
Ineligible	—	-0.0020 (0.0400)
Between 0 and 30	—	0.0120 (0.0820)
Between 30 and 40	—	0.0020 (0.0450)
Between 40 and 50	—	0.0220 (0.0360)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table E.5
Equations for the Log New Wage for the Atlantic Provinces

Variable	Without UI Variables	With UI Variables
Number of observations	140	548
Adjusted R^2	0.297	0.271
Constant	0.614 (0.741)	0.711 (0.790)
Sex	0.089 (0.084)	0.094 (0.086)
Rural	-0.005 (0.076)	-0.011 (0.080)
Log (wage lost)	0.290 (0.100)	0.283 (0.105)
Log (duration)	-0.087 (0.083)	-0.100 (0.087)
Married	0.101 (0.097)	0.083 (0.104)
Head of household	-0.002 (0.097)	0.003 (0.100)
Tenure	0.006 (0.046)	-0.003 (0.052)
Tenure (squared)	-0.002 (0.003)	-0.001 (0.004)
Old job unionized	0.107 (0.170)	0.103 (0.174)
New job unionized	0.503 (0.162)	0.500 (0.168)
Age		
15 to 19	-0.360 (0.297)	-0.366 (0.304)
20 to 24	-0.161 (0.255)	-0.192 (0.264)
25 to 44	-0.074 (0.234)	-0.087 (0.240)
New-job industry		
Non-agricultural primary	0.227 (0.202)	0.240 (0.208)
Manufacturing	0.491 (0.245)	0.491 (0.251)
Construction	0.394 (0.198)	0.397 (0.203)
Transportation, communications and utilities	0.232 (0.147)	0.231 (0.151)
Trade	0.479 (0.175)	0.499 (0.186)
Finance, insurance and real estate	0.118 (0.138)	0.126 (0.143)
Services	0.282 (0.174)	0.322 (0.188)
Public administration	0.327 (0.140)	0.335 (0.147)
Eligibility for UI benefits (weeks)		
Ineligible	—	-0.035 (0.107)
Between 0 and 30	—	—
Between 30 and 40	—	-0.171 (0.251)
Between 40 and 50	—	-0.021 (0.114)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table E.6
Equations for the Log Old Wage

Variable	Coefficient
Number of observations	2,383
Adjusted R^2	0.297
Constant	1.6480 (0.0860)
Sex	0.1470 (0.0170)
Rural	0.0190 (0.0220)
Married	0.0560 (0.0170)
Head of household	0.0850 (0.0180)
Tenure	0.0280 (0.0050)
Tenure (squared)	-0.0003 (0.0002)
Old job unionized	0.3250 (0.0220)
Age	
15 to 19	-0.2460 (0.0410)
20 to 24	-0.1050 (0.0300)
25 to 44	0.0180 (0.0270)
Education	
Primary	-0.0490 (0.0650)
High school	-0.0290 (0.0560)
Post-secondary	0.0780 (0.0570)
New-job industry	
Non-agricultural primary	0.0770 (0.0460)
Manufacturing	0.1540 (0.0400)
Construction	0.2420 (0.0360)
Transportation, communications, and utilities	0.0880 (0.0460)
Trade	-0.0760 (0.0370)
Finance, insurance, and real estate	0.1160 (0.0420)
Services	0.1940 (0.0380)
Public administration	-0.0930 (0.0370)
Province	
Quebec	0.0840 (0.0300)
Ontario	0.0580 (0.0290)
Prairies	0.1790 (0.0350)
British Columbia	0.1430 (0.0370)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Appendix F: Econometric Model Used in Estimating Unemployment Duration

The least-squares methods used until now cannot be applied to the question of unemployment duration. Even after correcting for selection bias and simultaneity issues, least-squares methods cannot properly handle the issue of truncation in the measure of duration.

An alternative method, which circumvents this truncation problem and at the same time addresses the simultaneity issue and the sample-selection-bias problem, has been explored by Van Audenrode and Storer (1993). This approach examines the duration/wage change relationship by looking at the hazard rate for re-employment, given the wage change. A first-stage regression estimates the wage change as a function of exogenous pre-search variables, just as in a two-stage least-squares equation. This regression also corrects for the presence of sample-selection bias. In a second stage, a fitted wage variable is obtained for all observations, including the truncated ones. This solves two problems at once: simultaneity is controlled for, and non-random selection is eliminated.

To implement the Van Audenrode and Storer methodology, the following two-step method was used:

1. A probit estimation of the probability of finding a job is performed, and the inverse of the Mill's ratio is computed.

2. The vector of observable characteristics, $\boldsymbol{X}_i$, is partitioned into two sub-vectors, $\boldsymbol{X}_{1,i}$ and $\boldsymbol{X}_{2,i}$. The first sub-vector, $\boldsymbol{X}_{1,i}$, contains fixed-effect variables that are not affected by post-employment events. The observed new wages are regressed on those $\boldsymbol{X}_{1,i}$ characteristics which are in no way related to search outcomes. In other words, industry, age, tenure, education, past wage and the "lambda" correction for selection bias, and so on, are used to explain the new wage, while variables such as search intensity are not. This regression may be written as:

   $$w_{n,i} = \alpha X_{1,i} + ßw_{0,i} + \gamma\hat{\lambda} + u_i$$

   Here, $w_{o,i}$ and $w_{n,i}$ are the wages of individual *i* before and after a period of joblessness. This regression may be viewed as similar to the first stage of a two-stage, least-squares equation that corrects coefficient estimates for simultaneity of wage changes and unemployment durations.

3. In the third stage, fitted new wages are calculated from the definition:

   $$\overline{w}_{n,i} = \alpha X_{1,i} + \hat{ß}w_{0,i} + \hat{\gamma}\hat{\lambda}$$

   These fitted new wages can be calculated for all individuals, including those who do not complete their joblessness spell. These predicted new wages then are interpreted as "normal" or "average" new wages for a person with a given

16 The regressors are usually defined as deviations from sample means, so that the baseline hazard is the hazard for the "average" individual in the sample.

set of pre-separation characteristics contained in sub-vector $\boldsymbol{X}_{1,i}$.

4. Next, a hazard-rate model is estimated which includes the fitted new wage from step 3 above as well as other relevant variables in $\boldsymbol{X}_i$. Among these variables is the job search intensity variable from Appendix D, although a fitted value is used to control for possible simultaneity between duration and intensity. Also, in this stage the fitted new wage variable is entered along with various measures of participation in UIRB programs to determine how program participants differ from a basic relationship between unemployment duration and the new wage.

In this last step, the approach consists in estimating the relationship between the duration of joblessness and the wage change by examining the conditional probabilities of moving to and from unemployment and employment at any given moment. When examining the influence of variables on the duration of unemployment, it is frequently assumed that these instantaneous probabilities of leaving unemployment after searching for τ periods — the so-called re-employment hazard rates $\lambda(\tau,\boldsymbol{Z}_{i,\tau})$ — are determined by an equation such as:

$$\lambda(\tau,\boldsymbol{Z}_{i,\tau}) = \lambda_0(\tau)\exp(\boldsymbol{Z}_{i,\tau}ß).$$

Here, $\boldsymbol{Z}_{i,\tau}$ is a vector of possibly time-varying covariates, and $\lambda_0(\tau)$ is the baseline hazard. The $\boldsymbol{Z}_{i,\tau}$ vector includes all of vector $\boldsymbol{X}_i$, as well as the fitted-wage, fitted-search-intensity, and program-participation variables. The baseline hazard is obtained when all of the $\boldsymbol{Z}_{i,\tau}$ variables are 0.[16] The baseline hazard can be viewed as a scaling factor that increases or decreases the probability of leaving unemployment for a given value of the covariates. This baseline hazard may vary with the time spent searching if there is a pattern of temporal dependence of hazard rates that is common to all individuals.

The advantage of this proportional hazard model of unemployment duration, relative to alternate models such as the "accelerated failure" model, is that it is possible to obtain non-parametric estimates of the baseline hazard. This is done through the use of the Cox partial-likelihood method, in which a likelihood function independent of the baseline hazard can be obtained. This permits an estimation of the ß parameters, which can then be used to estimate the baseline hazard itself.

The unit of observation is once again the unemployment spell. However, as intensity is measured at each of the surveys, more detailed information on search behaviour during the spell is available. A fitted value for search intensity is computed for each survey crossed by the spell. This fitted value is treated as a time-varying covariate in the Cox regression.

To estimate this model, the econometric software package STATA is ideal. The package has a routine COX, which applies the Cox partial-likelihood method to estimate the proportional-hazards model. This routine allows for time-varying regressors of the type that is used in the study of search intensity.

Tables F.1 and F.2 present the results of the application of this method. As expected, a positive effect of job search intensity is found over the range of values in this sample, although a negative coefficient on intensity entered with a squared term suggests that this effect is decreasing.

The results also show that the regional unemployment rate sharply decreases the probability of escaping unemployment. The negative sign of the lost wage coeffi-

cient indicates that unemployed workers try to "hold out" for their old wages. As most of the variables explaining this old wage are also included in the estimation, either directly or through the fitted new wage, the random component of the old wage is the element driving this result. The sign of the coefficient indicates that unemployed workers who, by luck, because they were in a particularly good match, or because of unobserved heterogeneity, had a wage above that of the average worker presenting the same characteristics, will have longer spells of unemployment. This can only be explained by the fact that these workers try to obtain the same large, above-average wages in their new jobs.

The positive sign of the coefficient of the fitted new wage is particularly interesting. To interpret it, it is important to remember that the fitted new wage has been "purged" of any luck, unobserved heterogeneity, and simultaneity component. Consequently, the interpretation that must be given to the positive coefficient is that, over the period considered, there were unemployed workers who suffered only limited wage losses and short unemployment spells, while others suffered large wage losses and long unemployment durations. Such a pattern could be explained by the fact that, over that period, the changes in the type of qualifications needed in the labour market outweighed the effects of productive search.

The categorical maximum-benefit-weeks variables also have a residual effect on re-employment probability, even after controlling for search intensity, in the estimation using time-varying covariates, the expected re-employment wage, and the old wage. One might think that these regressors would have captured entirely the search intensity and reservation wage effects of UI on job search outcomes, but this is apparently not the case.

Our estimation method nevertheless allows for a quantification of the effect of UI benefit weeks on re-employment probabilities. The fact that search intensity and wages do not completely account for the re-employment probability effect means that the unemployment rate effect of UI benefits is not related one-for-one to re-employment wage and search intensity effects. Put another way, something else related to UI benefits has a depressing effect on job finding rates.

Table F.1
First-Stage Fitted-Wage Regressions

Variable	Log (New Wage)
Number of observations	1,441
Adjusted R^2	0.307
Constant	1.3810 (0.2690)
Sex	0.1560 (0.0230)
Rural	0.0200 (0.0450)
Log (old wage)	0.3290 (0.0410)
Married	0.0880 (0.0680)
Head of household	0.0330 (0.0230)
Tenure	0.0080 (0.0170)
Tenure (squared)	-0.0008 (0.0013)
Old job unionized	0.0450 (0.0390)
Lambda	0.3270 (0.7010)
Eligibility for UI benefits (weeks)	
Ineligible	-0.0750 (0.0470)
Between 0 and 30	-0.0040 (0.0910)
Between 30 and 40	-0.0340 (0.0350)
Between 40 and 50	0.0120 (0.0270)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table F.2
Hazard-Rate Equation

Variable	Effect on Hazard
Number of observations	4,188
P value of chi^2	< 0.0001
Sex	-0.281 (0.132)
Rural	0.070 (0.116)
Log (wage lost)	-0.722 (0.256)
Fitted-wage change	2.184 (0.653)
Married	0.052 (0.094)
Head of household	-0.071 (0.094)
Regional extended benefit	
Weeks	-0.016 (0.006)
Ineligible	0.333 (0.126)
Between 0 and 30 weeks	0.308 (0.278)
Between 30 and 40 weeks	0.121 (0.144)
Between 40 and 50 weeks	-0.049 (0.105)
Fitted search intensity	0.752 (0.216)
(Fitted search intensity, squared)	-0.030 (0.010)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table F.3
Hazard-Rate Equation by Sex

Variable	Women	Men
P value of chi^2	< 0.0001	< 0.0001
Rural	0.136 (0.195)	0.043 (0.146)
Log (wage lost)	-0.223 (0.423)	-1.276 (0.339)
Fitted new wage	0.980 (1.070)	3.492 (0.871)
Married	-0.160 (0.152)	0.126 (0.246)
Head of household	-0.472 (0.184)	0.031 (0.131)
Regional extended benefit		
Weeks	-0.023 (0.011)	-0.016 (0.007)
Ineligible for UI benefits	0.346 (0.233)	0.393 (0.153)
Between 0 and 30 weeks	-0.046 (0.455)	0.579 (0.358)
Between 30 and 40 weeks	0.327 (0.217)	-0.141 (0.197)
Between 40 and 50 weeks	0.010 (0.177)	-0.124 (0.131)
Fitted search intensity	0.862 (0.358)	0.676 (0.275)
(Fitted search intensity, squared)	-0.036 (0.017)	-0.026 (0.013)

Note: Age, education, province of job lost, and job loss reason dummies are also included.

Table F.4
Hazard-Rate Equation for the Atlantic Region

Variable	Not Atlantic	Atlantic
P value of chi^2	< 0.0001	0.775
Rural	0.043 (0.129)	0.190 (0.310)
Log (wage lost)	-0.740 (0.263)	-0.970 (1.264)
Fitted new wage	2.192 (0.671)	3.874 (3.435)
Married	0.064 (0.097)	-0.016 (0.447)
Head of household	-0.082 (0.099)	-0.095 (0.352)
Regional extended benefit weeks	-0.017 (0.006)	0.016 (0.041)
ineligible for UI benefits	0.349 (0.132)	0.466 (0.499)
between 0 and 30 weeks	0.285 (0.279)	
between 30 and 40 weeks	0.091 (0.148)	1.137 (0.756)
between 40 and 50 weeks	-0.080 (0.111)	0.158 (0.347)
Fitted search intensity	0.781 (0.229)	1.024 (1.040)
(Fitted search intensity, squared)	-0.031 (0.010)	-0.044 (0.052)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Table F.5
Hazard-Rate Equation by UI Eligibility

Variable	Eligible	Ineligible
P value of chi^2	< 0.0001	< 0.0001
Sex	-0.256 (0.144)	-0.680 (0.358)
Rural	0.108 (0.129)	-0.126 (0.301)
Log (wage lost)	-0.599 (0.279)	-1.553 (0.704)
Fitted new wage	1.957 (0.711)	4.161 (1.806)
Married	0.006 (0.104)	0.126 (0.246)
Head of household	-0.120 (0.105)	0.004 (0.229)
Regional extended benefit weeks	-0.010 (0.007)	-0.033 (0.012)
between 0 and 30 weeks	0.447 (0.285)	
between 30 and 40 weeks	0.187 (0.149)	
between 40 and 50 weeks	-0.009 (0.107)	
Fitted search intensity	0.551 (0.225)	2.335 (0.749)
(Fitted search intensity, squared)	-0.021 (0.010)	-0.103 (0.035)

Note: Dummy variables for education, province of new job, job loss reason and year are also included.

Bibliography

ADDISON, J.T., and P. Portugal (1989). "Job Displacement, Relative Wage Changes, and Duration of Unemployment." In *Journal of Labour Economics*, 7:281–302.

BLANCHARD, O.J., and L.H. Summers (1986). "Hysteresis and the European Unemployment Problem." In *NBER Macroeconomics Annual*, 1:15–78.

CLASSEN, K.P., (1977). "The Effect of Unemployment Insurance on the Duration of Unemployment and Subsequent Earnings." In *Industrial and Labour Relations Review*, 30(4):438–44.

DAVIDSON, Carl, and Stephen Woodbury (1993). "The Displacement Effect of Re-employment Bonus Programs." In *Journal of Labour Economics*, 11:575–605.

DEVINE, T.J., and N.M. Kiefer (1991). *Empirical Labour Economics: The Search Approach* (New York: Oxford University Press).

FORTIN, Pierre, and Simon Prévost (1993). "Search Intensity of the Long-Term Unemployed: Evidence from a Panel of Southeast Montréal Workers." In *Cahier de Recherche du CERPE*, no. 22.

GUNDERSON, M., and W.C. Riddell (1993). *Labour Market Economics* (Toronto: McGraw-Hill).

HAM, J.C., and S. Rea (1987). "Unemployment Insurance and Male Unemployment Duration in Canada." In *Journal of Labour Economics*, 5:325–53.

JACKMAN, R., and R. Layard (1991). "Does Long-term Unemployment Reduce a Person's Chance of a Job? A Time-series Test." In *Economica*, 58:93–106.

KAHN, L.M. (1978). "The Returns to Job Search: A Test of Two Models." In *The Review of Economics and Statistics*, 60:496–503.

MURPHY, Kevin M., and Finis Welch (1990). "Empirical Age-Earnings Profile." In *Journal of Labor Economics*, 8:202–29.

OSBERG, Lars (1988). "An Evaluation of the Efficiency and Equity Implications of CEC Use in Job Search Activity." In *Program Evaluation Report, National Employment Services Evaluation: Labour Force Survey-Based Analysis of CEC Use*, Ottawa, Employment and Immigration Canada.

PISSARIDES, C. (1992). "Loss of Skills During Unemployment and the Persistence of Employment Shocks." In *Quarterly Journal of Economics*, 108:1371–92.

List of UI Evaluation Technical Reports

Unemployment Insurance Evaluation

In the spring of 1993, a major evaluation of UI Regular Benefits was initiated. This evaluation consists of a number of separate studies, conducted by academics, departmental evaluators, and outside agencies such as Statistics Canada. Many of these studies are now completed and the department is in the process of preparing a comprehensive evaluation report.

Listed below are the full technical reports. Briefs of the full reports are also available separately. Copies can be obtained from:

Human Resources Development Canada
Enquiries Centre
140 Promenade du Portage
Phase IV, Level 0
Hull, Quebec K1A 0J9 Fax: (819) 953-7260

UI Impacts on Employer Behaviour

- **Unemployment Insurance, Temporary Layoffs and Recall Expectations**
  M. Corak, Business and Labour Market Analysis Division, Statistics Canada, 1995. *(Evaluation Brief #8)*
- **Firms, Industries, and Cross-Subsidies: Patterns in the Distribution of UI Benefits and Taxes**
  M. Corak and W. Pyper, Business and Labour Market Analysis Division, Statistics Canada, 1995. *(Evaluation Brief #16)*
- **Employer Responses to UI Experience Rating: Evidence from Canadian and American Establishments**
  G. Betcherman and N. Leckie, Ekos Research Associates, 1995. *(Evaluation Brief #21)*

UI Impacts on Worker Behaviour

- **Qualifying for Unemployment Insurance: An Empirical Analysis of Canada**
  D. Green and C. Riddell, Economics Department, University of British Columbia, 1995. *(Evaluation Brief #1)*
- **Unemployment Insurance and Employment Durations: Seasonal and Non-Seasonal Jobs**
  D. Green and T. Sargent, Economics Department, University of British Columbia, 1995. *(Evaluation Brief #19)*
- **Employment Patterns and Unemployment Insurance**
  L. Christofides and C. McKenna, Economics Department, University of Guelph, 1995. *(Evaluation Brief #7)*