The Sargent Index of EI/UI Behavioural Effects: The Impact of Uncertainty

by
Alex Grey and Francis L'Italien

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Abstract

Measures of behavioural effects of Employment Insurance (EI) and Unemployment Insurance (UI) are an important instrument used to assess the impact of this insurance on the labour market. Two measures used in Canada, the Fortin index and the Sargent index, are based on the labour-leisure model, which assumes perfect certainty.

This paper considers the impact that the introduction of uncertainty might have on values of the Sargent index. It develops a framework where individuals choose between strategies of maximising the use of EI/UI benefits or accepting the next available job offer, reflecting the risk of uncovered unemployment. While this modification can have a significant effect on the duration of unemployment spells, the impact on the pattern of the Sargent index is relatively small. Hence, the Sargent index as constructed is probably a good representation of the pattern of change in an index of EI/UI behavioural effects.

One additional result is that in labour markets where the arrival rate of job offers is low, individuals will tend to adopt a strategy of accepting the first available job offer because of the high risk of exhaustion of EI/UI benefits. This means that full use of benefits may reflect inability to find employment rather than a strategy to make full use of EI/UI benefits.

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Table of Contents

1. Introduction

Measures of the behavioural effects of Employment Insurance/Unemployment Insurance (EI/UI) are an important instrument used to assess the impact of EI/UI on the labour market. Measures of EI/UI behavioural effects have generally been developed around the concept of "a wage when not working" [Oswald (1986)]. This commonly takes the form of the replacement rate. However, as Atkinson (1995) points out, the replacement rate makes a series of assumptions about EI/UI programs that may not correspond to the actual conditions under which the unemployed are eligible for benefits. In Canada, two indexes have been developed that go further in incorporating features of the EI/UI program are measures developed by Fortin and Sargent [Fortin (1984); Sargent (1995)]. However, one criticism that has been raised of both the Fortin and Sargent measures is that because they are based on the neo-classical labour supply model, they assume that the unemployed face a situation of perfect certainty.

This paper proposes to consider the impact that uncertainty might have on an index of EI/UI behavioural effects. The paper begins with a simple theoretical model that combines elements of a job search model with the Sargent model. In this way, the paper attempts to introduce an element of uncertainty into the Sargent Index. It then goes on in section 3 to present an empirical simulation of the impact of uncertainty on the values of the Sargent Index over time. The subsequent section draws out some implications of the findings, which is followed by a brief conclusion.

2. Theory

The most prominent theoretical framework used to analyse the impact of the EI/UI program on the labour market is the job search model. As described in Atkinson and Micklewright (1991), in this model the distribution of offered wages is treated as exogenous and an unemployed worker decides whether to accept or reject a job offer based on the reservation wage. The availability of EI/UI benefits raises the wage at which unemployed individuals are willing to accept job offers. As a result it will lead to a lower acceptance rate of job offers and lengthening duration of unemployment. Individuals will weigh the expected incremental gains in wages from continued job search against acceptance of a current offer. Because EI/UI lowers the cost of continued job search it is likely to be associated with lengthening duration of unemployment. To the extent that the probability of receiving a job offer depends on the time allocated to job search, the standard result is that an increase in the EI/UI benefit rate leads to a decline in the amount of time per week spent searching [Atkinson and Micklewright (1991)].

One of the most commonly used measures of the incentives associated with EI/UI programs facing unemployed workers is the replacement rate (ρ), or the ratio of weekly benefits to average earnings. This is often adjusted to take account of differences in coverage of the labour force by EI/UI, which is measured as the percentage of the labour force that is insured. In Canada, of 25 studies of the impact of the EI/UI program on the labour market surveyed, 7 used the simple replacement rate, while 6 used a variable combining the replacement rate and the EI/UI coverage rate (Table 1). In addition, 2 studies made use of variables that measure the duration of EI/UI benefits while 3 studies made use of dummy variables to measure the impact of EI/UI.

However, there are several criticisms of the use of the replacement rate as a measure of the impact of EI/UI on reservation wages. Restrictions on eligibility for EI/UI, particularly entrance requirements limit the numbers of unemployed in receipt of UI. As well, program requirements may penalise failure to accept job offers. The result is that UI may play a less important role than commonly suggested in supporting reservation wages [Atkinson and Micklewright (1991); Atkinson (1995)]. Moreover, as EI/UI benefits are time-limited, the impact on the reservation wage declines as the benefit exhaustion point is approached [Mortensen (1977)]. In addition, there is an increasing incentive to return to work in order to be potentially eligible for benefits in future unemployment spells if unemployment is expected to recur [Mortensen (1977)].

Table 1 EI/UI Indexes used in studies of the impact of EI/UI on the aggregate unemployment rate

Author/date	Measure of EI/UI
Grubel, Maki and Sax (1975)	ρ (weekly UI benefits/average weekly industrial wages and salaries)
Maki (1975)	ρ (weekly UI benefits/average weekly industrial wages and salaries)
Denton, Feaver and Robb (1975)	Dummy variables Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration/minimum entrance requirement)) Individually Maximum UI benefits Minimum weeks for UI eligibility ρ % of LF insured
Grubel and Maki (1976)	ρ (weekly UI benefits/average weekly industrial wages and salaries)
Green and Cousineau (1976)	ρ/ UI disqualification rate (X/P, Disqualifications/ Covered population)
Lazar (1978)	Dummy variable
Riddell and Smith (1982)	(% of LF insured * ρ * factor adjusting for taxation of UI benefits >1971)
Miller (1987)	ρ (weekly UI benefits/ average weekly earnings (net of taxes))
Landon (1987)	% of LF insured * ρ (average weekly UI benefits/average weekly earnings (industrial composite))
Ford and Rose (1989)	Replacement rate * coverage rate
Fortin (1989)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio))
Burns (1990a)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio))
Burns (1990b)	Fortin measure (% of LF insured (national) * ρ (provincial) * D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio) (National)
Keil and Symons (1990)	(% of LF insured * ρ)
Coe (1990)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio) Index (ρ * % of LF insured)
Johnson and Kneebone (1991)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration to minimum entrance requirement ratio)) Dummy variables to account for provincial differences
Milbourne, Purvis and Scoones (1991)	Maximum UI benefit duration.
Setterfield, Gordon and Osberg (1992)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio) (both level of composite index and of level of each component entered separately and change in each component entered separately)
Myatt (1992)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified individual to minimum entrance requirement ratio)
Fortin, Keil and Symons (1993)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified individual to minimum entrance requirement ratio)
Van Rijckeghem (1993)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified individual to minimum entrance requirement ratio)
Fortin, Keil and Symons (1995)	Fortin measure (% of LF insured * ρ * D/M (Maximum benefit duration for a minimally qualified individual to minimum entrance requirement ratio)
Prasad and Thomas (1998)	Sargent measure (non-linear function of minimum entrance requirements, benefit duration and replacement rate)
Bougrine and Seccareceia (1999)	Fortin measure (% of LF insured * ρ *D/M (Maximum benefit duration for a minimally qualified worker to minimum entrance requirement ratio))
Horstein and Yuan (1999)	Replacement rate (% of LF insured, legislated replacement rate, average unemployment duration, maximum EI/UI benefit entitlement))

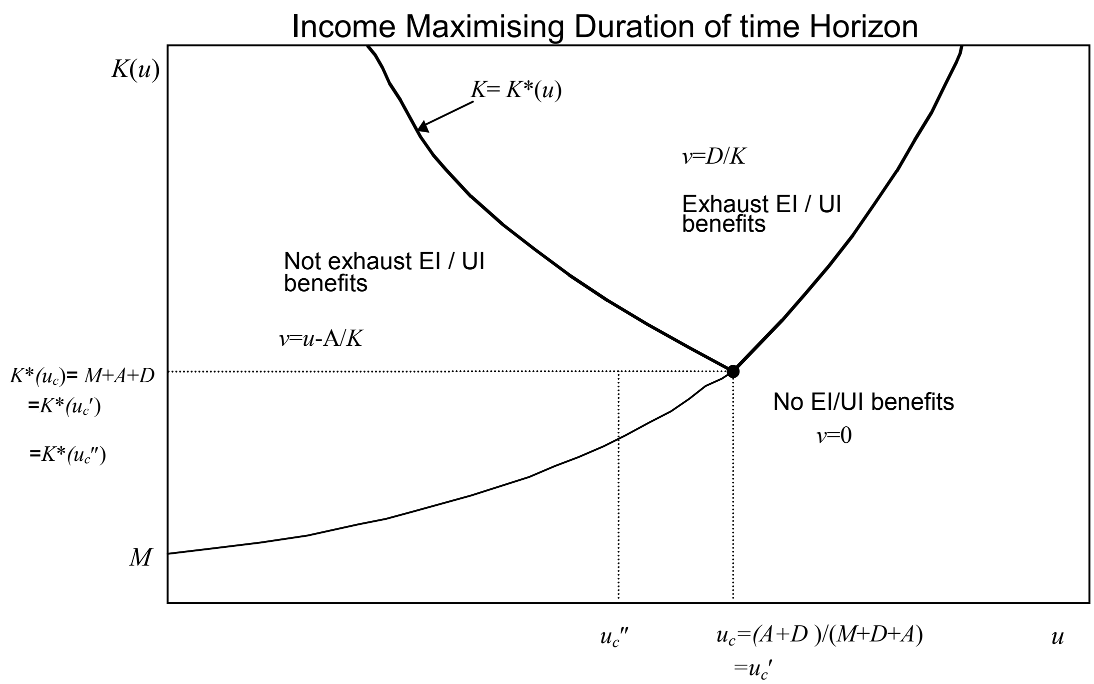
The Fortin measure has become a commonly used indicator of EI/UI behavioural effects. Of the 25 studies undertaken in Canada, this measure was used in the majority (13) (Table 1). It is constructed to reflect the incentives available facing workers with a marginal attachment to the labour force. It is a joint measure of the coverage rate of EI/UI, the replacement rate of EI/UI and the ratio of the maximum duration of benefits available for a minimally qualified worker to the minimum entrance requirement. It is therefore ostensibly a measure of the wage subsidy derived from eligibility for EI/UI [Fortin (1984)]. The Fortin measure responds to two of Atkinson's criticisms of indexes of EI/UI benefits, in that it incorporates a measure of entrance requirements and a measure of benefit duration. However, one criticism of the Fortin measure is that it measures the potential impact of EI/UI benefits for only one segment of the labour force [Sargent (1995)].

The index developed by Sargent (1995) is a more complex measure of EI/UI behavioural effects based on the assumption that individuals both choose the type of labour force participation they will have, and the length of an unemployment spell. The index incorporates preferences for non-participation, full-year employment or intermittent employment and unemployment that are dependent in part on EI/UI parameters. As described in Sargent (1995), individuals who choose intermittent employment and unemployment are assumed to optimise their choice of duration of employment and unemployment based on EI/UI parameters.

The index is calculated in a two-step process. Individuals first select the income maximising duration K^* as a function of the unemployment rate u. Chart 1a traces out the locus of combinations of the optimal value of $K^*(u)$ as presented in Sargent (1995). u-K space is divided into three regions depending on v, the rate of unemployment compensated by EI/UI. Given the optimal time horizon, $K^*(u)$, the critical level of unemployment u, where the individual works just long enough to qualify for EI/UI and at the same time receives the maximum level of benefits for the weeks worked, is u_c. At u_c, $K^*(u_c) = M+A+D$, where M is the minimum duration of employment needed to qualify for EI/UI benefits, A is the waiting period for EI/UI benefits and D is the maximum duration of benefits for a minimally qualified worker. Given the optimal time horizon, $K^*(u_c)$, Chart 1b shows income (y) – u space where point u_c translates into the kink point on the budget constraint. Income, y_c is comprised of employment income wM and EI/UI benefits paid ρwM. At point (u_c, y_c), $K^*(u_c)$ is taken up with employment and unemployment covered by EI/UI. It is assumed that individuals' preference functions are linear which leads to either a corner solution for utility maximisation, or to the kink point being the utility-maximising point for individuals who chose to both work and be unemployed during period $K^{*}(u_c)$ [Sargent (1995)].

The choice of a utility-maximising point in the Sargent model is consequently based on the EI/UI program parameters: the replacement rate, minimum EI/UI entrance requirements and maximum EI/UI benefit duration corresponding to entrance requirements. Based on these parameter values, index values can be calculated which reflect changes in the EI/UI program. In the Sargent index, the duration of unemployment spells is therefore purely a function of EI/UI program parameters. As the Sargent index is based on the labour-leisure model, it assumes perfect certainty.[1]

Chart 1a



Source: Sargent (1995)

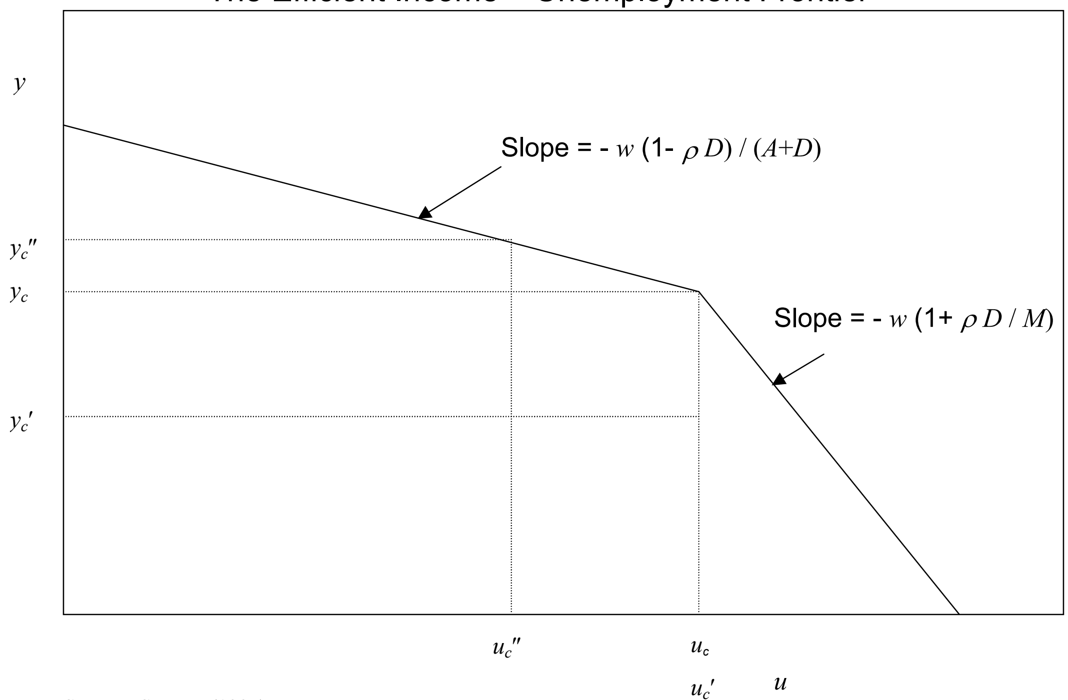
This paper proposes to consider a modification to this approach, based on incorporating elements of the job search model into the Sargent framework. This allows for uncertainty over the arrival of job offers and individuals' responses to this uncertainty in a framework designed to maximise expected utility. As such, the approach goes part way towards introducing an element of uncertainty into the Sargent framework, however, as this is based on the neo-classical labour supply model, unemployment is still essentially treated as voluntary. This is most evident in that the model applies only to individuals who adopt a strategy of intermittent employment. In sum,

1 The only constraint placed on workers is in the 52-week component of the Sargent index, where, due to the limited availability of seasonal jobs, individuals cannot adjust their time horizon K and must plan around a 52-week period.

this exercise involves constructing an optimising framework in an environment of uncertainty. If the arrival rate of job offers is not fully predictable by individuals, they need to incorporate this information into their decision-making process.

Chart 1b

The Efficient Income – Unemployment Frontier



Source: Sargent (1995)

Uncertainty over the arrival of job offers can be incorporated into the Sargent framework by treating the optimising behaviour of individuals as a planned allocation of time between employment and unemployment, which is subject to uncertainty and so provides an expected value. This should be weighed against the alternative of accepting a job offer prior to the exhaustion of EI/UI benefits. The framework developed below considers the case for individuals with a flexible time horizon and it assumes that individuals have already chosen the optimal time period $K^*(u_c)$ based on EI/UI parameters as in Sargent (1995). The utility function used is that defined in Milbourne, Purvis and Scoones (1991) where utility $V = \alpha y + h$, where α is the marginal utility of income, y is income and h is leisure (replaced by unemployment).

This example represents a rather basic version of the model. Ideally, the model should reflect a long-term time horizon, incorporating multiple periods. As a substitute, $K^*(u_c)$, the optimal time horizon as defined by Sargent (1995), is assumed to be a constant. This allows an expression for one period $K^*(u_c)$ to represent an entire series of periods.[2] For a representative period $K^*(u_c)$, V_a represents the utility of income and leisure that reflects the full utilisation of EI/UI benefits but with the risk of a spell of uncovered unemployment where the individual receives SA benefits. The period over which utility is evaluated is $K^*(u_c) = M + A + D$. V_a is defined as:

$$V_a = \lambda\left[\alpha w(M) + (1+\alpha\rho w)(K^*(u_c) - M - A) + A\right] + (1-\lambda)\left[\frac{(1+\alpha S)}{\lambda} + \alpha w(M) + (1+\alpha\rho w)\left(K^*(u_c) - 1/\lambda - M - A\right) + A\right] \tag{1}$$

where λ is the arrival rate of job offers, w is the wage rate, ρ is the replacement rate, M is the minimum work requirement under EI/UI legislation, D is the maximum duration of EI/UI benefits for a minimally qualified worker and S is the amount of Social Assistance benefits per week available for individuals who do not qualify for EI/UI benefits. If λ is measured over a short enough period, it becomes the probability of finding employment at a point in time: individuals on average face a probability λ of finding a job at the start of the period $K^*(u_c)$ and (1- λ) of being jobless and having to resort to SA benefits, given that they have just exhausted their EI/UI benefits.[3] The utility value of income is α, which is applied to both wage income and EI/UI benefits, which are a function ρ of wage income. Time unemployed enters directly into the utility function as leisure. Therefore, a period of unemployment covered by EI/UI benefits is converted into utility using $(1+\alpha\rho w)$, while the waiting period results in utility of just A as it is uncompensated. The wage rate is assumed to be constant at w so that this analysis deals with uncertainty over the arrival rate of job offers and not their wage rate.

Therefore for a representative period $K^*(u_c)$ equation (1) gives the expected value of the outcomes dependent on the probability of finding employment. If the person does find employment their utility is the sum of the utility of income from employment and the sum of the utility from unemployment which is entirely compensated by EI. The length of a spell of unemployment is exactly equal to D so that there is no uncovered unemployment. If a job is not

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2 Assuming a constant K*(*uc*) simplifies the analysis considerably as it is a precondition to defining a representative period.

3 In Pissarides (2000) uses λ to represent the probability of a job separation. $\lambda\delta t$ represents the probability that a worker will move from employment into unemployment during a short time interval δt, where λ represents job-specific shocks that arrive to occupied jobs. In this paper, the use of λ is reversed and measures the probability of a transition into employment.

found, utility is the sum of the utility derived from the expected duration of receipt of Social Assistance based on the arrival rate of job offers and the expected value of utility from employment income and unemployment covered by EI/UI benefits for the remainder of the period once a job is found. The expected duration of a SA claim is the simple inverse of the job-finding rate or $1/\lambda$.[4] It would not be difficult to modify equation (1) to consider the possibility of individuals ineligible for EI/UI not being able to qualify for SA.

V_b represents the alternative strategy where an individual minimises the risk of exhausting EI/UI benefits, and so falling onto SA, but does not make full use of EI/UI benefits. The individual accepts job offers before the maximum duration of EI/UI benefits is reached or before the end of $K^*(u_c)$ at $t_\phi K^*(u_c)$ (where $t_\phi K^*(u_c) > M$). For a representative period $K^*(u_c)$, this would give a value of V_b as follows:

$$V_b = \alpha w M + (1+\alpha\rho w)\left(t_\phi K^*(u_c) - M - A\right) + A + \alpha w(1-t_\phi)K^*(u_c) \qquad (2)$$

The individual takes a job part way through period $K^*(u_c)$ and does not maximise the use of EI/UI benefits because of the risks of uncovered unemployment. If the individual opts for strategy V_b, the expected utility from a representative period $K^*(u_c)$ is the value of employment income from the initial period M, the value of unemployment covered by EI/UI until $t_\phi K^*(u_c)$ and the value of employment income from $t_\phi K^*(u_c)$ until the end of period $K^*(u_c)$.

The individual will accept the job offer at $t_\phi K^*(u_c)$ if $V_b > V_a$. It is possible to solve for the point $t_\phi K^*(u_c)$ where $V_a = V_b$, which gives the following expression for t_ϕ:

$$t_\phi = \frac{\left[V_a - \alpha w\left(M + K^*(u_c)\right) + (1+\alpha\rho w)(M+A) - A\right]}{K^*(u_c)\left[(1+\alpha\rho w) - \alpha w\right]}$$

4 Equation (1) represents the utility for a representative period. However, the order, though not the total duration in each of the labour market states will vary across periods. In the case where the individuals does not find a job at the beginning of the period with a probability of (1-λ), the spell of employment *M* leading to EI/UI eligibility is delayed by a period of 1/ λ. The spell of unemployment compensated by EI/UI will therefore extend beyond the end of K*. However, each period K* (*uc*) where the individuals does not find a job will still be partitioned according to K* (*uc*)-M-A-1/λ=duration of EI/UI benefits. Each period where the individual does find employment will be partitioned K* (*uc*)=M +A+D. Therefore, equation (1) does reflect the distribution of K* across the various states, though not necessarily their order.

This can be simplified to:

$$t_\phi = 1 - \frac{[(1-\lambda)/\lambda(\alpha\rho w - \alpha S)]}{K^*(u_c)][(1+\alpha\rho w) - \alpha w]} \qquad (3)$$

For given values of the other parameters, t_ϕ is the earliest point in time at which the individual is indifferent between continuing under strategy V_a until EI/UI benefits are exhausted and accepting a job offer under strategy V_b. For higher values of t_ϕ he (she) will prefer V_b while for lower values, V_a is preferable. As is evident, the value of t_ϕ depends on λ and S and w. In a labour market with abundant job offers, where λ approaches 1, t_ϕ approaches 1 and the individual will follow the conventional strategy V_a, maximising the use of EI/UI benefits. The lower the value of λ, the larger the range over which V_b is preferable to V_a until λ is so low that V_b is always the preferred option. The value of t_ϕ also depends on S – the lower S the larger the range over which V_b is preferable to V_a.

The higher w the greater the cost of uncovered unemployment in this framework as unemployment covered by EI/UI is a linear function of w, given that there is no ceiling on EI/UI benefits in this model. Because of the substitution effect associated with increases in w, V_b becomes preferable to V_a over a growing share of $K^*(u_c)$ as the opportunity cost of not accepting a job offer rises. However, as w increases the income effect of work during period M and compensated unemployment comes to predominate. Consequently, as wages rise beyond a certain point, the potentially lost income due to uncovered unemployment comes to be a relatively small share of total utility. As a result, V_a comes to be preferable to V_b at higher wage levels.

In a world of perfect certainty, where $\lambda = 1$, individuals would find themselves at u_c and on the line $K^*(u)$ in Chart 1a. This is the optimal point in the Sargent model for individuals who have at least some unemployment. The income measured by the first two terms of equation (1) corresponds to that associated with u_c. However, were the individual to chose V_a in an environment of uncertainty where $\lambda < 1$, the expected unemployment rate u_c' would still equal u_c hence the individual would still be at $K^*(u_c)$ in Chart 1a, though not all unemployment would be covered by EI/UI benefits. As the expected value of income is less than where $\lambda = 1$ because not all unemployment is covered, it would place the individual within the budget constraint in Chart 1b. Hence, the individual would be at y_c' instead of y_c in Chart 1b. If $\lambda < 1$, individuals may choose the strategy represented by V_b. This also implies a sub-optimal choice in that unemployment u_c'' will be less than u_c. In fact the point associated with u_c'' will be below $K^*(u)$ in Chart 1a as $K^*(u)$ represents combinations of u and K at which the individual just exhausts EI/UI benefits. However, it will lie on the budget constraint in Chart1b to the left of u_c, as over the range $u < u_c$, the budget constraint represents combinations where the individual does not exhaust EI/UI benefits. Given the linear utility function, which guaranteed the kink point at u_c, as the optimal point on the budget constraint for individuals choosing intermittent employment, the utility gained from choosing either V_a or V_b in an environment of uncertainty will be less than choosing V_a in an environment of certainty.

This analysis should also consider uncertainty in the duration of jobs as well as in the arrival rate of job offers, which has been discussed in the foregoing analysis. The possibility of early termination of employment before M would move individuals into the region of ineligibility for EI/UI benefits in Chart 1a and inside the budget constraint $w(1+\rho D/M)$ in Chart1b so that they would have an incentive to search for a second job to make up the necessary minimum. This is a potential source of uncovered unemployment in addition to uncertainty over the arrival of job offers at the beginning of the subsequent period $K^*(u_c)$. However, as it is unpredictable, it is assumed not to enter the planning process involving the choice between V_a and V_b. Consequently, it does not enter the estimation of expected unemployment based on the optimising framework of Sargent.

Because of uncertainty over the arrival of job offers, individuals choose combinations of unemployment and income that are sub-optimal as compared to the model proposed by Sargent. However, these are optimal choices in an environment of uncertainty. If the uncertainty persists over time, then individuals will find themselves continually at an inferior point in terms of utility. This can be termed the cost of uncertainty that leads to a lower optimum points (u_c', y_c') or (u_c'', y_c''). For example, individuals reduce voluntary unemployment, which is covered by EI/UI in order to minimise the risk of involuntary unemployment, which in this framework would not be covered by EI/UI assuming uncertainty leads to the choice of strategy V_b. The result is that the unemployment rate will be lower than that predicted by Sargent.

The advantage of this approach is that it introduces a strategy based on the standard reservation wage framework into the Sargent model but hopefully keeps the model intact. One advantage of the Sargent model is that it incorporates the ρ (the replacement rate), M (minimum duration of employment necessary for eligibility) and D (maximum duration of EI/UI benefits). Most normal search models of unemployment only incorporate ρ and D and not M as the individual is assumed to be already unemployed.

The Sargent model also contains a component based on the employment patterns of seasonal workers whose time horizon $K^*(u)$ is assumed to be fixed at 52 weeks [Sargent (1995)]. He defines u_{mxyr}^{52} as the unemployment rate consistent with just exhausting one's EI/UI benefits under the constraint that $K^*(u)$ = 52 weeks. Seasonal workers will tend to cluster at two points. Individuals whose unemployment rate is higher than u_{mxyr}^{52} will tend to cluster at $u_{\min}^{52}$ which is the highest rate of unemployment consistent with still qualifying for EI/UI, where they will exhaust EI/UI benefits and have uncompensated unemployment. Individuals whose unemployment rate is lower than u_{mxyr}^{52} will tend to cluster at u_{mxyr}^{52}, where they will just exhaust EI/UI benefits before being re-employed.

Seasonal workers are unlikely to be able to adjust their behaviour to take account of uncertainty in the arrival of job offers. They are likely to face a sharp decline in the job offer rate in the off-season, so that strategy V_b is no longer viable. Consequently, they will be more constrained to follow strategy V_a. The only thing that might be possible would be for them to extend their period of seasonal employment in one year, however, this would not compensate for weeks of work less than M in the subsequent period which would lead to ineligibility for EI/UI benefits.

3. Empirical estimates

The preceding section introduced several modifications to the theory underlying the Sargent index of EI/UI behavioural effects, essentially to introduce an element of uncertainty into the framework. This section proposes to examine what might be the potential effect on values of the Sargent index were it modified to reflect these changes. The original Sargent index for workers with a flexible time horizon is an estimated unemployment rate u^* defined as:

$$u^* = \frac{D+A}{D+A+M}\left[1-\left(\frac{1-\rho D/(D+A)}{1+\rho D/M}\right)^{\theta}\right]$$

The first term of the index, u_c, is the unemployment rate as a function of EI/UI parameters for all individuals who have chosen to participate in the labour market with intermittent employment/unemployment. At u_c individuals work for the minimum amount required and just exhaust their EI/UI benefits over period $K^*(u_c)$.

The second term measures the proportion of the labour force that chooses a pattern of intermittent employment as opposed to full-year employment or non-participation. The derivation is complex and readers are referred to Sargent (1995) for a full explanation. The parameter θ is the scale parameter from a pareto distribution and it is estimated as the coefficient of the *ln* of the labour force participation rate on $ln(1+\rho D/M)$, which Sargent estimates as 0.199. The second component is not adjusted in the modified Sargent index and continues to be estimated the same way as it is in the original Sargent index. It is assumed that individuals will base their participation decisions only on the values of the EI/UI program parameters rather than taking uncertainty into account. However, it is possible to consider adjusting the expected duration of unemployment in the participation equation, which would imply that individuals anticipate that they cannot use all of their EI/UI benefits and so adjust their participation decision accordingly.

The numeric example that is presented in Tables 2a/b illustrates the impact of the proposed modifications to the Sargent index and compares the results of the modified Sargent index with those of the original Sargent index. In this example, Canada as a whole is treated as one EI/UI region, with parameter values of D, M, ρ and A that are based on a weighted average across

Table 2a **Parameter values for numerical example**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ρ	D	M	A	λ	α	W	S
				$\alpha = \alpha_2$				
1970	0.48	12.0	8.0	2	0.5	0.002960	574	175
1972	0.64	30.3	8.0	2	0.5	0.004360	574	175
1978	0.60	29.7	11.6	2	0.5	0.003979	574	175
1995	0.53	20.3	15.8	2	0.5	0.003367	574	175
				$\alpha = (\alpha_2 - 0.0001)$				
1970	0.48	12.0	8.0	2	0.5	0.002860	574	175
1972	0.64	30.3	8.0	2	0.5	0.004260	574	175
1978	0.60	29.7	11.6	2	0.5	0.003879	574	175
1995	0.53	20.3	15.8	2	0.5	0.003267	574	175
				$\alpha = (\alpha_2 - 0.0002)$				
1970	0.48	12.0	8.0	2	0.5	0.002760	574	175
1972	0.64	30.3	8.0	2	0.5	0.004160	574	175
1978	0.60	29.7	11.6	2	0.5	0.003779	574	175
1995	0.53	20.3	15.8	2	0.5	0.003167	574	175
				$\alpha = (\alpha_2 - 0.001)$				
1970	0.48	12.0	8.0	2	0.5	0.001960	574	175
1972	0.64	30.3	8.0	2	0.5	0.003360	574	175
1978	0.60	29.7	11.6	2	0.5	0.002979	574	175
1995	0.53	20.3	15.8	2	0.5	0.002367	574	175
				$\alpha = (\alpha_1 + 0.0015)$				
1970	0.48	12.0	8.0	2	0.5	0.002513	574	175
1972	0.64	30.3	8.0	2	0.5	0.002008	574	175
1978	0.60	29.7	11.6	2	0.5	0.002187	574	175
1995	0.53	20.3	15.8	2	0.5	0.002536	574	175
				$\alpha = (\alpha_1 + 0.0001)$				
1970	0.48	12.0	8.0	2	0.5	0.001113	574	175
1972	0.64	30.3	8.0	2	0.5	0.000608	574	175
1978	0.60	29.7	11.6	2	0.5	0.000787	574	175
1995	0.53	20.3	15.8	2	0.5	0.001136	574	175
				$\alpha = \alpha_1$				
1970	0.48	12.0	8.0	2	0.5	0.001013	574	175
1972	0.64	30.3	8.0	2	0.5	0.000508	574	175
1978	0.60	29.7	11.6	2	0.5	0.000687	574	175
1995	0.53	20.3	15.8	2	0.5	0.001036	574	175

Table 2b **Results for key variables from numerical example**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Year	u_c	V_a	V_b	V_a-V_b	$K^*(u_c)$	t_ϕ	$t_\phi K^*(u_c)$	$U_c'' = t_\phi K^*(u_c) - M$	$U_c''/(D+A)$	$U_c''/K^*(u_c)$	$U''_c/K^*(u_c)$ (1970=100)	Modified Sargent Index	Modified Sargent Index (1970=100)	Original Sargent Index (1970=100)
								$\alpha = \alpha_2$						
1970	0.64	37.1	37.1	0	22.0	0.884	19.4	11.4	0.82	0.52	*100*	0.1000	*100*	*100*
1972	0.80	100.1	100.1	0	40.3	0.790	31.9	23.9	0.74	0.59	*114*	0.2059	*206*	*228*
1978	0.73	98.3	98.3	0	43.3	0.820	35.5	23.9	0.75	0.55	*106*	0.1628	*163*	*177*
1995	0.59	73.3	73.3	0	38.2	0.876	19.4	17.6	0.79	0.46	*100*	0.0964	*96*	*100*
								$\alpha = (\alpha_2 - 0.0001)$						
1970	0.64	36.3	36.3	0	22.0	0.911	20.0	12.0	0.86	0.55	*100*	0.1051	*100*	*100*
1972	0.80	98.6	98.6	0	40.3	0.830	33.5	25.5	0.79	0.63	*116*	0.2199	*209*	*228*
1978	0.73	96.6	96.6	0	43.3	0.861	37.3	25.7	0.81	0.59	*108*	0.1750	*166*	*177*
1995	0.59	71.8	71.8	0	38.2	0.907	34.6	18.8	0.84	0.49	*100*	0.1029	*98*	*100*
								$\alpha = (\alpha_2 - 0.0002)$						
1970	0.64	35.5	35.5	0	22.0	0.928	20.4	12.4	0.89	0.56	*100*	0.1085	*100*	*100*
1972	0.80	97.0	97.0	0	40.3	0.859	34.6	26.6	0.82	0.66	*117*	0.2298	*212*	*228*
1978	0.73	95.0	95.0	0	43.3	0.888	38.5	26.9	0.85	0.62	*110*	0.1830	*169*	*177*
1995	0.59	70.3	70.3	0	38.2	0.926	20.4	19.5	0.87	0.51	*100*	0.1070	*99*	*100*
								$\alpha = (\alpha_2 - 0.001)$						
1970	0.64	29.3	29.3	0	22.0	0.978	21.5	13.5	0.97	0.61	*100*	0.1181	*100*	*100*
1972	0.80	84.6	84.6	0	40.3	0.948	38.2	30.2	0.93	0.75	*122*	0.2607	*221*	*228*
1978	0.73	81.6	81.6	0	43.3	0.963	41.7	30.1	0.95	0.70	*113*	0.2050	*174*	*177*
1995	0.59	58.2	58.2	0	38.2	0.978	37.3	21.5	0.96	0.56	*100*	0.1178	*100*	*100*
								$\alpha = (\alpha_1 + 0.0015)$						
1970	0.64	33.6	33.6	0	22.0	0.954	21.0	13.0	0.93	0.59	*100*	0.1135	*100*	*100*
1972	0.80	63.6	63.6	0	40.3	0.984	39.7	31.7	0.98	0.79	*133*	0.2733	*241*	*228*
1978	0.73	68.3	68.3	0	43.3	0.983	42.6	31.0	0.98	0.71	*121*	0.2108	*186*	*177*
1995	0.59	60.7	60.7	0	38.2	0.973	37.1	21.3	0.95	0.56	*100*	0.1167	*103*	*100*

Table 2b(continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Year	u_c	V_a	V_b	V_a-V_b	$K^*(u_c)$	t_ϕ	$t_\phi K^*(u_c)$	$U_c'' = t_\phi K^*(u_c) - M$	$U_c''/(D+A)$	$U_c''/K^*(u_c)$	$U''_c/K^*(u_c)$ (1970=100)	Modified Sargent index	Modified Sargent index (1970=100)	Original Sargent index (1970=100)
$\alpha = (\alpha_1 + 0.0001)$														
1970	0.64	22.7	22.7	0	22.0	0.992	21.8	13.8	0.99	0.63	*100*	0.1208	*100*	*100*
1972	0.80	41.8	41.8	0	40.3	0.997	40.2	32.2	1.00	0.80	*127*	0.2778	*230*	*228*
1978	0.73	44.9	44.9	0	43.3	0.996	43.2	31.6	0.99	0.73	*116*	0.2148	*178*	*177*
1995	0.59	39.5	39.5	0	38.2	0.994	38.0	22.1	0.99	0.58	*100*	0.1213	*100*	*100*
$\alpha = \alpha_1$														
1970	0.64	21.9	21.9	0	22.0	0.993	21.9	13.9	0.99	0.63	*100*	0.1210	*100*	*100*
1972	0.80	40.2	40.2	0	40.3	0.997	40.2	32.2	1.00	0.80	*127*	0.2780	*230*	*228*
1978	0.73	43.2	43.2	0	43.3	0.997	43.2	31.6	1.00	0.73	*116*	0.2149	*178*	*177*
1995	0.59	38.0	38.0	0	38.2	0.995	38.0	22.2	0.99	0.58	*100*	0.1210	*100*	*100*

EI/UI regions. Sargent (1995) calculated a value of the index for each region based on regional EI/UI parameters and then aggregated using a weighted average of regions. This was then indexed to 100 using the estimated unemployment rate for non-seasonal workers in 1970 as the base. The modification that is presented here therefore represents a fictitious case and is meant for illustrative purposes to indicate what the impact of uncertainty would be on the index in an average EI/UI region. The values of w and S chosen are also national averages. The value of w is average weekly earnings for all employees for 1995, while the value of S is an estimated weighted average weekly payment based on provincial statutory rates for 1995 (see Appendix A). By holding w and S constant in all years, the problem of the impact of changes in real wages and the real value SA benefits on the choices on individuals is avoided.

Table 2b presents the original and modified Sargent indexes for workers with a flexible time horizon [Table 2b columns (15) and (14) respectively]. The framework developed in this paper leads only to an adjustment in the length of an unemployment spell in the Sargent index. In the modified Sargent model, assuming individuals choose strategy V_b to avoid the risk of involuntary or uncovered unemployment, they will potentially accept jobs before they exhaust their EI/UI benefits and so end up moving to u_c'' from u_c. U_c'' therefore represents the minimum length of a covered unemployment spell where an individual is indifferent between strategies V_a and V_b. In the modified Sargent index, U_c'' replaces D+A in the original Sargent index, estimated as $U_c'' = t_\phi K^*(u_c)-M$ [Table 2b, column (9)]. The estimated value of $K^*(u_c) = M+D+A$ in each year [column (6)] is based on EI/UI program parameters and so varies as these change. t_ϕ, the proportion of $K^*(u_c)$ at which an individual first becomes indifferent between strategies V_a and V_b is estimated using equation (3) [Table 2b, Column (7)].

Different scenarios are presented that are based on differences in α, which is a key variable influencing the choice between V_a and V_b. The value of α can vary between the value where an individual is indifferent between participation and withdrawal from the labour force $\alpha_1 = \dfrac{1}{w\left(1+\rho\dfrac{D}{M}\right)}$ and $\alpha_2 = \dfrac{1}{w\left(1-\rho\dfrac{D}{D+A}\right)}$ where an individual is indifferent between full- and part-year employment. Tables 2a/b present a range of estimates based on different values of α starting from α_2 and declining and starting from α_1 and increasing. The results are sensitive to differing values of α. For an α close to α_2 the duration of an unemployment spell U_c'', where $V_a = V_b$, is significantly different from the full value of $D+A$ as estimated from EI/UI program parameters. Moreover, the size of U_c'' relative to $D+A$ varies significantly over time. As α approaches α_1, U_c'' approaches $D+A$. This is what would be expected to happen as, intuitively, individuals who have a stronger attachment to the labour market (close to α_2) will be more affected by uncertainty over uncovered unemployment, while individuals whose preferences are such that they are close to indifferent between labour force withdrawal and intermittent employment (close to α_1), will be relatively unaffected by uncertainty over uncovered unemployment. According to the specification used, the impact of uncertainty on the choice of V_b over V_a diminishes relatively rapidly by the middle panel of Table 2a/b [see Table 2b column (10), $U_c''/(D+A)$]. Individuals who have a stronger attachment to the labour force will be more likely to adjust their behaviour to reflect the risk of uncovered unemployment, while those with a weaker attachment will be more likely to exhaust EI/UI benefits, their behaviour not being affected by the risk of not finding a job at the end of $K^*(u_c)$.

The comparison between the original and the modified Sargent indexes uses 1970, 1972, 1977 and 1995. A comparison between the first two years shows the impact on the index of the UI reforms of 1971, which led to a substantial increase in the index, while further reforms in 1976, 1977 and 1978 led to a decline in the value of the index by 1978. Reforms in 1979, 1990, 1993 and 1994 led to a further decline in the value of the index by 1995. The value of the modified Sargent index in 1995 is slightly below that of 1970 regardless of the value of α used. These results are similar to those of the original Sargent index. However, the modified index shows less of an increase in the intervening years than the original index (Table 2b, columns (14) and (15) respectively). The duration of U_c'' changes substantially for individuals whose α is close to α_2 as individuals close to preferring full-year employment would be more likely to adjust their behaviour in response to changes in the labour market environment. Despite this, the impact of changes in measured EI/UI benefits on the modified Sargent index for individuals whose α is close to α_2 is much less marked. This is because the value of the index is affected in all years. There is little impact on the values of the Sargent index for individuals whose α is close to α_1.

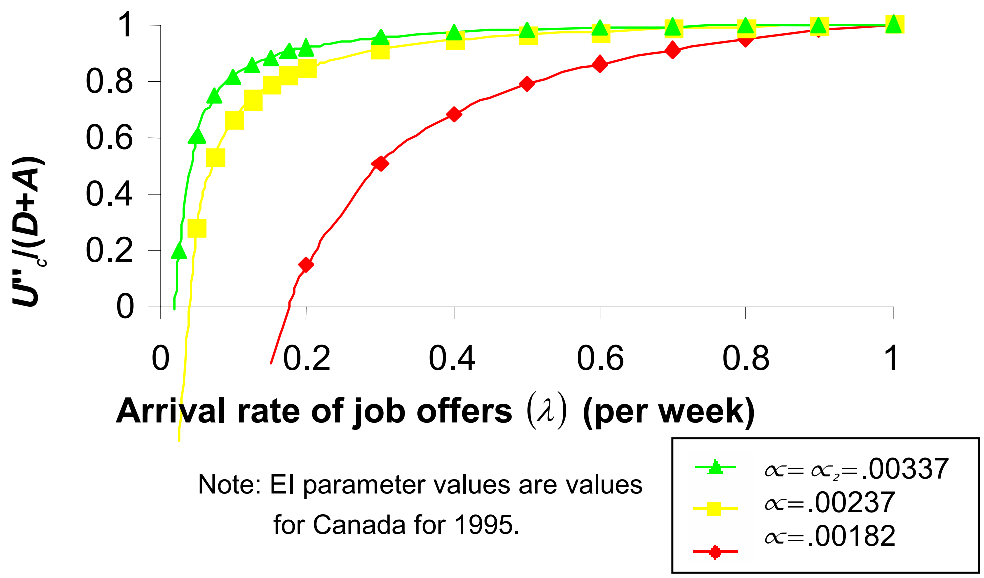
The results also depend on the state of the labour market, as reflected in λ, the arrival rate of job offers per week. The simulation here has used a value of 0.5, which is held constant in all years. Holding λ constant means that changes in the index are a result only of changes in measured EI/UI program parameters. In general the pattern of the index is not that sensitive to changes in λ

that are made in all years (results not shown). This is again a result of a change in the duration of unemployment spells in all periods.

Chart 2 shows the relation between the minimum length of an unemployment spell where an individual is indifferent between strategies V_a and V_b, and D+A or $U_c''/(D+A)$ under different labour market conditions as represented by varying λ. The EI/UI parameter values are those for 1995. As the results are sensitive to different values of α, the relation is shown for a range of different values of α. As would be expected, the relation between λ and $U_c''/(D+A)$ is a positive one: the more frequent the arrival rate of job offers, the longer a worker who has minimally qualified for EI/UI can delay accepting job offers and remain unemployed for a period closer to the maximum duration of EI/UI benefits to which he (she) is entitled. At a certain point, below the point at which the arrival rate of job offers is very low, V_b is always preferable to V_a. In other words, the expected value of the strategy of accepting the first job offer is always greater than remaining unemployed until EI/UI benefits are exhausted. This is because the risk of not finding a job when EI/UI benefits are exhausted and so having to turn to SA benefits, is too great in a labour market with a low λ. This point varies between a λ of 0.175 or 1 job offer every 5 weeks for an individual indifferent between working all year and working part year to a λ of 0.025 or 1 job offer every 40 weeks for an individual with a significantly lower attachment to the labour market. This suggests that some labour markets may be sufficiently weak that the risk of uncovered unemployment is enough to cause individuals, with a reasonable degree of attachment to the labour markets, to take the first available job.

Extending this finding to actual observed behaviour, some labour markets may be sufficiently weak that the risk of uncovered unemployment is large enough that individuals with a reasonable degree of attachment to the labour market will be willing to take the first available job. This would be true even if individuals are attempting to maximise their use of EI/UI benefits. Full use of EI/UI benefits may therefore reflect low values of λ, and consequently a failure to find employment before EI/UI benefits are exhausted, even when individuals are willing to take the first available job. One situation where a observed exhaustion of EI/UI benefits may not reflect the inability to find employment, is the case of workers who have a high probability of returning to a job at the same time the following year. Here, the original strategy of matching employment and unemployment spells could still apply, which might be the case for some seasonal workers. In this case the arrival of job offers is not random, which is one of the assumptions required for the estimation of a threshold level of λ below which the unemployed would adopt the strategy of accepting the next job offer.

Chart 2
Effect of labour market conditions on unemployment spell length
Ratio of unemployment spell where $V_a=V_b$
(U''_c) to ($D+A$)



By contrast, the Fortin index of EI/UI behavioural effects should be unaffected by changes in uncertainty. The Fortin measure is the implicit subsidy rate of EI/UI for individuals who have a weaker attachment to the labour market and therefore exhaust their EI/UI benefits. These individuals are to the right of u_c where the EI/UI subsidy rate is $w(1+\rho D/M)$, which is the slope of the budget constraint to the right of the kink point (Chart 1b). The Fortin index is the relative value of this subsidy rate, again indexed to 100 using the subsidy rate in 1970 as the base. The introduction of uncertainty and the consequent adjustment of unemployment spell length do not affect this subsidy rate. The effect of uncertainty is to shift the kink point down and/or to the left, while individuals to the right of the kink point are unaffected. Intuitively this can be seen in that as these individuals already exhaust their EI/UI benefits, an increased risk of benefit exhaustion associated with a decrease in λ does not affect them. The duration of covered unemployment spells, represented by D in this index, should therefore not be adjusted. It might be true in a labour market where λ is lower, that the actual duration of unemployment or jobless spells for these individuals increases, however, this would not enter into the calculation of the Fortin index, which incorporates only the duration of covered spells of unemployment. Consequently, the framework proposed in this paper should not be extended to the Fortin measure.

Another means of illustrating the impact of uncertainty on the pattern of the Sargent index is to adjust the duration on unemployment spells in the index using spell durations that have already been empirically estimated. It can be argued that the model presented in this paper, involving the choice between alternative strategies in the face of uncertainty over the arrival rate of job offers, represents one process that underlies empirically observed survival functions for unemployment spells. It therefore provides some justification for using empirically estimated survival functions for spells of unemployment to adjust the maximum duration of EI/UI spell length D for a minimally qualified worker in the Sargent Model. This exercise therefore involves applying information from estimated survival functions to the Sargent model, which assumes that EI parameters determine the length of a spell of unemployment. An estimate of U_c'' is obtained by adjusting D to the estimated length of an unemployment spell based on empirical survival functions for a spell of unemployment, in this case Jones (1995) and Corak (1996). The estimate of Jones may be preferable for purposes of this exercise as it is estimated from administrative data on the receipt of UI benefits.

Table 3 shows the original Sargent index for workers with a flexible time horizon in 1970, 1972, 1978 and 1995 [Sargent (1995)]. Values for the Sargent index are based on average national values for ρ, M and D as in Table 2.[5] The method of calculating the length of a spell of unemployment U_c'' using the two survival functions of Jones (1995) and Corak (1996) is based on that proposed by Sider (1985) for estimating expected unemployment duration using a hazard function. U_c'' is estimated by calculating the length of a spell of unemployment as estimated from the survival function that is closest to D but less than D. As the survival functions are estimated only for one period, the adjustment of spell duration in 1970, 1972, 1978 and 1995 is based on the same survival function. Consequently changes in the adjusted Sargent index value over time do not reflect changes in the survival function. One positive aspect of this is that the

[5] The values for the original Sargent index in Table 3 differ slightly from those provided by Sargent. The estimates in this paper are based on the same methodology used to calculate the modified index, that is national estimates of ρ, D and M based on weighted averages across EI/UI regions are used to calculate a national value of the index. Sargent (1995) calculated the value of the index in each region and then computed a weighted average of regions.

application of a fixed survival function to the calculation of an index over time parallels the application of a fixed unemployment rate in the calculation of the original Sargent index.

The second panel of Table 3 shows the profile of the index using the adjustment to D to obtain U_c'' based on the survival function of Corak (1996). The third and fourth panels consider a similar adjustment to D to obtain U_c'' using the survival function estimated in Jones (1995). The survival function estimated by Jones results in a shortening of unemployment in 1970 from D = 12 weeks on average to U_c'' = 10.4 weeks and in 1995 from 20.3 to 15.0 weeks respectively. The preferred option, the third panel, shows the adjustment only to the unemployment spell duration of those who choose to have some unemployment and without an adjustment to the share of the population that choose this pattern of intermittent employment and unemployment. The fourth panel shows the index value when both the duration of unemployment and labour force participation (the share of the labour force with intermittent employment which is dependent on α and therefore on D) are both adjusted to reflect a lower unemployment spell length using the survival function of Jones (1995).

In general shortening the duration of unemployment spells to U_c'' based on the survival functions of Jones (1995) and Corak (1996) does not have a great effect on the pattern of the Sargent index. This is because U_c'' is reduced below D in all years, including the base year 1970, by a somewhat similar proportion. Only adjustments that have a differential effect in the duration of unemployment spells in different years will affect the Sargent index. This is the case in 1972 and 1978, where the hazard function leads to a sharper truncation of unemployment spells relative to D. Consequently, the greatest effect is therefore a muting of the increase in the modified index in the 1970s. The modified index reaches a peak of 218 in 1972 versus 228 in the original index as individuals are less able on average to benefit from the extension of D in the 1970s. The modified index declines more rapidly by 1978 and the decline is greater by 1995 compared to the original Sargent index. The decline in the modified index by 1978 and further by 1995 is principally due to the increase in M which is the same as in the original Sargent index which is compounded by lower relative values of D compared to 1970 than in the original index.

Table 3 **Adjustment to the Sargent Index based on observed survival functions**

					Sargent Index* Flexible time horizon	
	r	**D**	**M**	**A**	**Actual value**	**1970=100**
(1) Standard Sargent Index						
1970	0.48	12.0	8.0	2	0.1223	*100*
1972	0.64	30.3	8.0	2	0.2790	*228*
1978	0.60	29.7	11.6	2	0.2159	*177*
1995	0.53	20.3	15.8	2	0.1224	*100*
	r	U''_c	M	A	Actual value	1970=100
(2) Adjusted value of unemployment spell based on survival function [Corak (1996)]						
1970	0.48	10.9	8.0	2	0.1187	*100*
1972	0.64	14.7	8.0	2	0.2351	*198*
1978	0.60	14.7	11.6	2	0.1738	*146*
1995	0.53	13.2	15.8	2	0.1023	*86*
(3) Adjusted value of unemployment spell based on survival function [Jones (1995)]						
1970	0.48	10.4	8.0	2	0.1167	*100*
1972	0.64	19.6	8.0	2	0.2540	*218*
1978	0.60	19.6	11.6	2	0.1919	*164*
1995	0.53	15.0	15.8	2	0.1082	*93*
(4) Adjusted value of unemployment spell based on survival function [Jones (1995)] (adjustment to participation component)						
1970	0.48	10.4	8.0	2	0.1094	*100*
1972	0.64	19.6	8.0	2	0.2211	*202*
1978	0.60	19.6	11.6	2	0.1666	*152*
1995	0.53	15.0	15.8	2	0.0965	*88*

* The formula for the Sargent Index is $[(D+A)/(D+A+M)]*[1-((1-r*D/(D+A))/(1+r*D/M))^{.199}]$.
The value 0.199 in each equation is Sargent's estimate of theta [Sargent (1995)].

4. Implications for an index of EI/UI behavioural effects

Is there a rationale that would explain why the pattern of the index does not change greatly when the underlying framework is modified as in this paper? First, how unemployment is modelled will primarily affect the duration of unemployment and employment spells. The replacement rate should figure similarly in different specifications. Second, the duration of employment spells *M* is treated similarly in this paper compared to the original Sargent index. Only the duration of unemployment spells are modelled differently, as compared to the original Sargent framework where they are assumed to be *D*. Using the framework proposed in this paper, they are significantly shorter than *D* in some of the simulations. However, changes in index values may not be that sensitive to changes in model specification because the index is based on relative values. Consequently, if durations of unemployment spells are more or less proportionately shorter than *D*, such as is the case in this model incorporating uncertainty, there would be relatively little impact on index values. The profile of the index will vary over time only to the extent that the way unemployment is modelled has a differing effect over time. One potential drawback of the approach presented in this paper is that the duration of unemployment, as modelled, is very sensitive to α, which can affect the profile of the index over time.

The general profile of the index apparently did not change significantly with the incorporation of some elements of the job search model into the Sargent index. However, it is more difficult to extrapolate to suggest that the index would have the same profile were it based on a model of involuntary unemployment. How unemployment is modelled will affect the impact of changes in *M* on the index values. In a model based on the labour – leisure model, changes in *M* are incorporated directly into the index, and are in fact a major component of its decline from 1977 through to 1995. It is assumed that individuals are able to choose employment spell lengths that correspond to EI/UI entrance requirements. In an index where unemployment is viewed as involuntary, not all individuals would be able to increase weeks/hours worked in response to an increase in EI/UI entrance requirements. Therefore, changes in *M* would tend also have an impact on the value of the index through a decline in the coverage rate of EI/UI.

Major modifications would potentially have to be made to the index developed in this paper, if it were to more fully reflect involuntary unemployment. As the Sargent index now stands, one has to depend on shifts in the balance between weeks worked and weeks of covered unemployment due to increases in *M*, in the index based on voluntary unemployment, to correspond to the decline in EI/UI coverage that would accompany an increase in *M* in an index based on a model of involuntary unemployment. Despite these differences, at least on a cross-section basis, as M is likely to be set by administrators of the EI/UI program to reflect the types of jobs that can be found, it will likely be correlated with the duration of actual jobs for individuals not in full-year employment. Consequently, on a cross-section basis, modelling unemployment as voluntary or involuntary may lead to similar results in the Sargent index, at least as far as *M* is concerned.

Whether the Sargent index is a good indicator of changes in EI/UI benefits, regardless of how unemployment is modelled, depends in part on the differing impact over time that the way unemployment is modelled has on unemployment spell length relative to *D*. One indication from this paper is that the impact of differences in the modelling of unemployment spells may not have a significant effect on the pattern of the index. The general applicability of the Sargent index also depends on the extent to which increases in *M*, as incorporated into the Sargent model, parallel decreases in EI/UI coverage that would occur if the index were based on a model of involuntary unemployment. Here there is no evidence available.

5. Conclusions

This brief paper has considered only one modification of the Sargent index of EI/UI behavioural effects, which attempts to take account of the impact of the risk of unemployment not covered by EI/UI, when individuals must depend on the arrival of new job offers. The results of the paper suggest that the introduction of elements of the job search model does not have a great impact on the general pattern of the index over time. However, it is more difficult to extrapolate further. Whether the profile of the Sargent index values would reflect the pattern that would exist were the index to be based on a model of involuntary unemployment depends primarily on whether one accepts that the way changes in M are incorporated into the index parallels changes in EI/UI coverage that would occur in a model based on involuntary unemployment.

It may not be feasible to go further in introducing elements of involuntary unemployment into an index of EI/UI. First, as involuntary unemployment reflects the demand side of the economy, the index would become increasingly linked to the actual state of the labour market. As such, it would be increasingly difficult to separate the impact of changes in program parameters from changes in demand-side conditions. Even with the more minor modifications introduced in this paper, one already has to make assumptions about λ. Second, a key component of such an index would be a relation between changes in M and the EI/UI coverage rate. At the present time, the authors know of no theory that could be the basis of such a relation, nor any empirical estimates that could be used. Such being the case, the Sargent model, potentially reflecting a degree of uncertainty, may be the best alternative as an index of EI/UI.

It should be recognised that both the Sargent framework, and the proposed modification in this paper are much less useful in predicting actual unemployment spell length than they are in providing index values based on relative unemployment incidence and spell duration. Predicted spell durations differ significantly from the actual observed duration of spells of EI/UI, most notably in the model presented in this paper. This underlines the fact that it would be difficult to extend the Sargent/Fortin framework beyond developing an index of EI/UI benefits.

One tangential finding of this exercise that is of interest is the implication it has for understanding the potential causes of EI/UI benefit exhaustion in weaker labour markets. In labour markets where the arrival rate of job offers λ is relatively low, even in cases where individuals are attempting to maximise their use of EI/UI benefits, the risk of uncovered unemployment is sufficient to cause individuals, with a reasonable degree of attachment to the labour markets, to adopt a strategy of accepting the first available job offer. Consequently, in regions with high unemployment rates, observed exhaustion of EI/UI benefits is more likely to reflect lack of employment opportunities rather than a desire to take full advantage of EI/UI benefit durations.

Appendix

Data

w: Average weekly earnings for all employees (including overtime) for 1995, from Statistics Canada (2000), *Annual estimates of employment, earnings and hours, 1987-1999*, Catalogue No. 72F0002XIB.

S: The estimate of the national composite SA benefit rate is based on a weighted average of provincial composite benefit rates. Each provincial composite benefit rate is based on statutory benefit rates for different classes of SA cases (single employable, disabled, single parent, couple with two children) weighted by the shares of these cases in the total provincial SA caseload for 1995 [See National Council of Welfare (1996) for statutory SA rates)]. A composite benefit rate for Canada is obtained from provincial estimates by weighting across provinces using the provincial share of unemployed. A national estimate was also obtained using only provincial data on SA caseloads as weights. This composite value is somewhat higher than the estimate using provincial shares of unemployment.

EI/UI Parameters: Estimates of ρ, M and D are obtained from Sargent (1995) and unpublished estimates provided by Tim Sargent. Values of the Sargent index are also obtained from unpublished estimates provided by Tim Sargent.

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