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# Policy-induced Migration in Canada: An Empirical Study

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**by**
**Kathleen M. Day and Stanley L. Winer**

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# Abstract

We investigate the influence of public policy on interregional migration in Canada using new interprovincial migration data constructed from personal income tax files for the years 1974 to 1996. We consider the consequences for gross and net migration flows of regional variation in employment insurance, provincial social assistance, personal income taxes and public spending of different types, and we compare the effects of these policies to the impacts on migration of wages, employment prospects and moving costs. We also conduct a preliminary investigation of the migration consequences of certain extraordinary political events in Quebec and of the closing of the cod fishery in Newfoundland.

Unemployment insurance is an especially important and well documented source of income for many people, and regional variation in the generosity of the insurance system over the last three decades has been substantial. The results suggest that while increasing the generosity of the system in high unemployment regions may have induced more migration to the Atlantic region than would otherwise have occurred, the resulting changes in gross flows are probably not large and have had, at most, small effects on average provincial unemployment rates. A variety of other interesting results is also provided.

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# 1. Introduction

A leading, and still controversial, explanation for the persistence of regional disparity in Canada – the transfer dependency thesis – points to the adverse effects of unduly subsidizing people to remain in relatively disadvantaged provinces. In this view, public policies which favour people in some regions over those in others lead to domestic migration decisions that are unrelated to the real productivity of labour in alternative destinations. To the extent that labour services are not located where they are most productive, average earned income in the country as a whole declines, and the regional disparity in earned incomes increases (Graham 1964; Courchene 1970, 1978; Boadway and Flatters 1982 a,b).

An important example of a public program that may attenuate the link between internal migration and labour productivity is the unemployment insurance system. At least since 1971, this 'insurance' program has been more generous to people who live in regions with above average unemployment rates. The program thus creates differences across regions in the portion of an individual's total or comprehensive income that originates in the public sector. Since people base their location decisions on a comparison of comprehensive incomes, and not just on a comparison of their earned or pre-transfer labour incomes, regional differences in the public component of comprehensive incomes created by the unemployment insurance system may lead to a misallocation of labour across the country.[1]

The fact that regional differences in public policies exist in Canada is indisputable. Figures 1 and 2 present coefficients of variation across provinces of several federal and provincial policy variables – real per capita federal current and net capital spending, minimum weeks required to qualify for unemployment insurance (UI) benefits, maximum weeks of UI benefits to which a person with minimum qualifying weeks is entitled, real per capita provincial spending on health, real per capita provincial spending on education, real per capita provincial spending on other functions (excluding social assistance and debt service), the real personal income tax burden, and real social assistance payments for a single mother with two children. For comparison purposes, Figure 3 presents the unweighted coefficients of variation of real average weekly earnings and provincial unemployment rates. These figures show that public policies exhibit levels of relative

[1] See also Winer and Gauthier (1982, 3), Watson (1986) and Usher (1995, 142), for examples of how intergovernmental grants that are too generous relative to what is required for national economic efficiency may similarly lead to a national misallocation of labour services.

regional dispersion that are comparable to those of wages and unemployment rates, two labour market variables commonly believed to influence migration decisions.

**Figure 1. Regional Variation in Federal Government Policies**

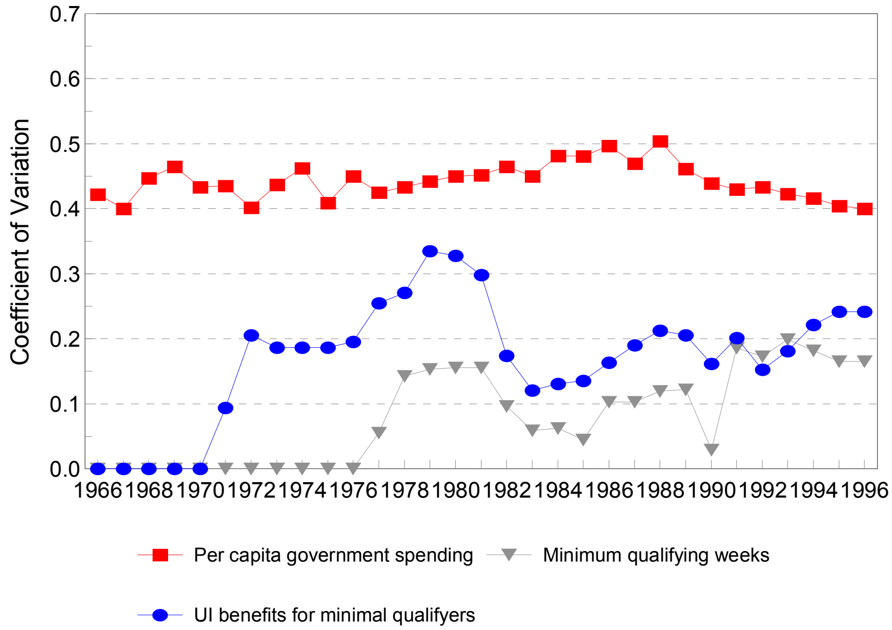



**Figure 2. Regional Variation in Provincial/Local Government Policies**

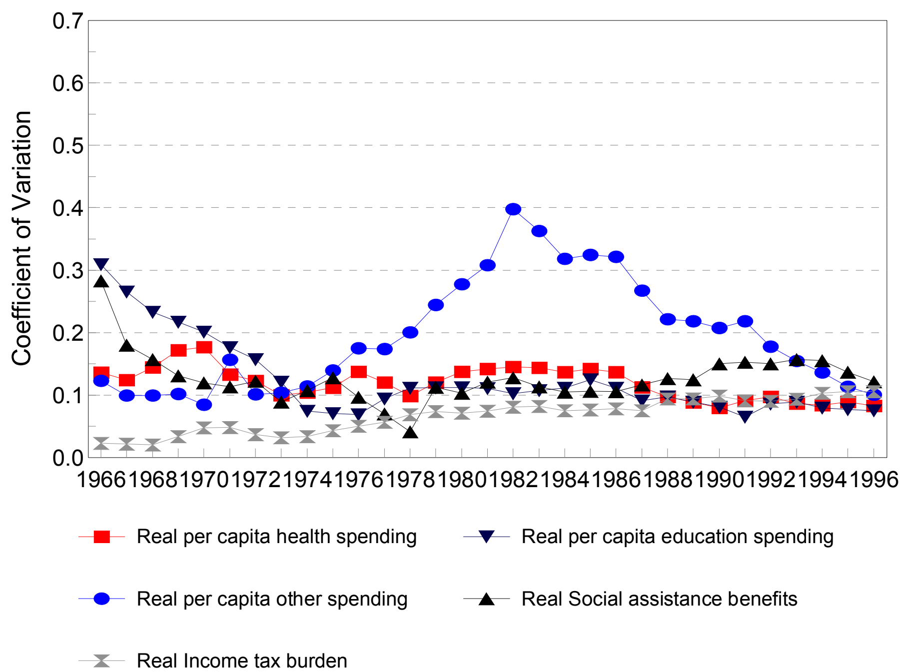
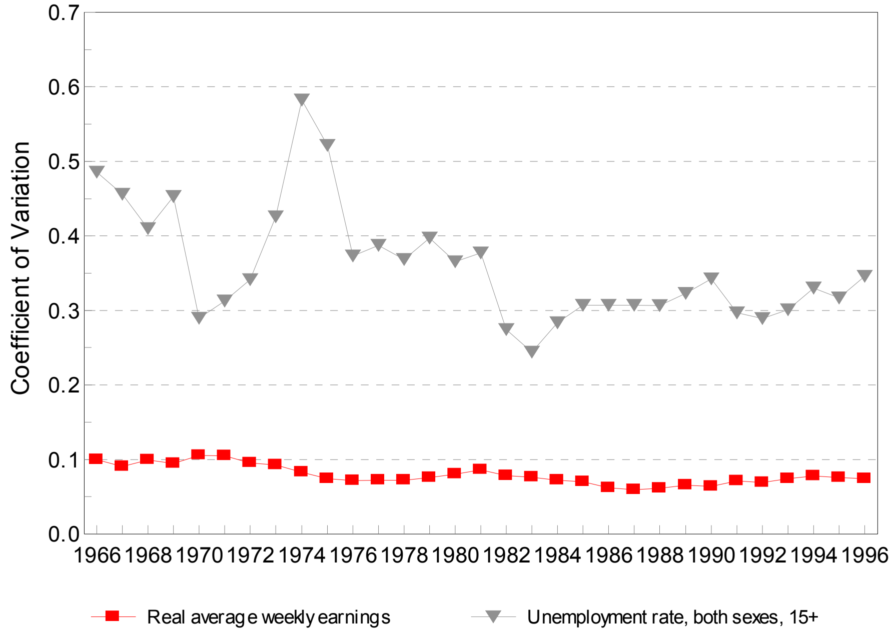


**Figure 3. Regional Variation in Labour Market Variables**




However, the extent to which the regional differences in public policies illustrated in Figures 1 and 2 actually alter migration patterns is another matter. Since migration usually involves a substantial fixed cost, personal migration decisions may not be greatly affected by existing regional differentials in the public component of comprehensive incomes if those differentials are not 'large.' It is possible that even the effect of UI on comprehensive incomes is not big enough to alter individual migration decisions substantially in comparison to the effects of changing market conditions.

Although there is empirical evidence that public policy has affected migration patterns to some extent, notably in the work of Courchene (1970), Winer and Gauthier (1982), Shaw (1986) and Day (1992), in the pre-1995 literature as a whole (reviewed in Day and Winer 1994) there is no consensus concerning the empirical significance and quantitative importance of the relationship. More recently, Lin (1995), using the Labour Market Activity Survey longitudinal data set for the 1988-90 period, found that interprovincial migration behaviour does not depend on whether a person has received unemployment insurance or social assistance benefits. On the other hand, using the Longitudinal Administrative Data set based on personal tax files for 1982-95, Finnie (2000) found that the receipt of unemployment insurance is associated with a statistically significant increase in out-migration of prime-aged men and women (the quantitative importance of the effect is not computed). However, neither of these interesting contributions take the generosity of the unemployment insurance system into account, and thus there remains the possibility that the receipt of unemployment insurance (dummy) variable used is acting as a proxy for employment opportunities, rather than reflecting the operation of the insurance system itself. Thus, considering the literature in Canada as a whole, it is reasonable to conclude that the premise of the transfer dependency thesis – that policy-induced migration is an important phenomenon in Canada – and, therefore, the thesis itself, remain to be confirmed.

In this paper we investigate once again the strength and nature of policy-induced migration in Canada, using gross flow data on the interprovincial migration of personal income tax filers grouped by income class for the period from 1974 to 1996. The model we construct for this purpose differs from those used previously to study internal migration in Canada, especially with respect to the way in which unemployment insurance is treated. We also include in the model as many policy parameters that vary across regions as is reasonably possible given data availability. Since the public sector differentiates between taxpayers to a considerable extent on the basis of income, disaggregation by income class is useful in constructing a representation of the role of the public sector.[2] The long time period covered by the data allows us to include periods in the 1970's when, as shown in Figures 1 and 2, there were important changes in policy parameters.

The paper is organized as follows. In section two we present an econometric model of individual migration decisions. The data are discussed in section three, and estimation results are presented in section four. In section five, we discuss a number of policy simulations based on the estimation that explore the effects of regional variation in selected public policies. Conclusions, limitations of the analysis and suggestions for future research complete the paper.

[2] The larger version of the study on which this paper is based, Day and Winer (2001), utilizes data for 1968 to 1996: the 68 - 73 data are from a 10% sample, while the 74 - 96 data are based on the complete tax tapes. Migration flows are also disaggregated by age and sex as well as by income. Conclusions reached are essentially the same as those reported in this paper.

# 2. A Model of Interprovincial Migration Flows

It is straightforward to conceive of the decision by an individual to move from province *i* to province *j* as the outcome of utility maximization: each individual is assumed to choose province *j* over all other provinces if his or her utility is higher in *j*. Policy variables such as income tax rates and levels of public services may be introduced into the standard utility maximization problem of a prospective migrant relatively easily: income tax rates enter the individual's budget constraint, while public goods can be incorporated as arguments of the utility function. However, introducing policies such as unemployment insurance (UI) and social assistance (SA) benefits, receipt of which is contingent upon the individual being unemployed, is more difficult. The existence of these types of transfer payments is contingent on an individual's employment status, and may alter the individual's work/leisure decision.

In this study, we focus on how uncertainty about employment prospects in different regions interacts with the UI system to affect the migration decision. We assume that for each individual, the number of weeks of work in each possible destination is a discrete random variable that takes on only four possible values. In state 1, individuals work a total of 50 weeks, leaving them two weeks of leisure time.[3] In state 2, individuals work a total of *MXYR* weeks, where *MXYR* is the number of weeks of work such that the individual would be able to spend the remainder of the year collecting UI benefits.

In state 3, individuals work only *MIN* weeks, the minimum number of weeks required to qualify for UI benefits, and they spend the remainder of the year collecting a combination of UI and SA benefits. The insurance system and the social assistance systems of the provinces thus jointly determine income in state 3. Finally, in state 4, it is assumed that individuals spend the entire year on social assistance and do not work. These four states correspond, in a stylized manner, to important kinks in an individual's annual budget constraint induced by the UI and SA systems in existence in Canada during our sample period.[4]

3 The log-linear functional form (described in section 2.1) that we choose for the direct utility function would be undefined in state 1 if this state did not include any leisure time.

4 See Phipps (1990) for an illustration of this budget constraint. For an overview of the evolution of the Canadian unemployment insurance system, now called Employment Insurance, see Lin (1998) or Dingledine et al. (1995).

Since labour supply is a discrete random variable, as described above, the utility-maximizing migration decision can be formalized in the following manner. Let $\pi_{js}$ be the ex ante probability, as seen by the individual, that state *s* will occur in province or region *j*. Assume further that these province-specific aggregate probabilities are independent of individual migration decisions, and independent of the region of origin. Then, from the perspective of a person currently resident in province *i*, expected utility in *j* is

$$EU_{ij} = \sum_{s=1}^{4} \pi_{is} U_{ijs}, \qquad \textbf{(1)}$$

where $U_{ijs}$ is the maximum utility that an individual originating in *i* would enjoy in province *j* in state *s*.

The individual chooses to reside in the province or region that yields the highest expected utility. In other words, an individual in *i* will move to *j* if

$$EU_{ij} > EU_{ik}, \ \forall \ k \neq j, \quad k = 1,..., J, \qquad \textbf{(2)}$$

where $EU_{ij}$ is the *maximum* expected utility that an individual from province of origin *i* would enjoy in province of destination *j*, and *J* is the total number of provinces. If *j* happens to be the individual's province of origin (i.e., if $j = i$), the individual will not move.

The above model emphasizes the role of migration in utility optimization. Indeed, because labour supply is assumed to be fixed in each state of the world, location is the *only* margin on which individuals are assumed to adjust. It is also worth noting that (2) implies that migration decisions depend on differences in *total* expected utility across alternative destinations. Thus, for example, while some aspects of the UI system may affect the relative price of leisure, as interesting studies of this effect (such as Sargent 1995) have shown, what matters in the present context is how the insurance system alters total expected utility in different locations. For this reason, the representation of the UI system in this paper is different than in studies designed to measure the effects of this system on the relative price of leisure.

In the following three sections of the paper, we deal with the specification of the expected utility function, some extensions of the basic model, and the derivation of a likelihood function.

## 2.1 Detailed specification of the expected utility function

In order to provide more structure for the expected utility function, we need an assumption about the utility function, and a detailed specification of the constraints facing any individual in each location. We assume that in each province and state of the world individuals maximize the following Cobb-Douglas utility function:

$$U_{ijs} = \alpha_1 \ln X_{ijs} + \alpha_2 \ln(T - L_{js}) + \alpha_3^{\prime} \ln(F_j) + \alpha_4^{\prime} \ln(A_j) \ , \quad \textbf{(3)}$$

where $\alpha_1$ and $\alpha_2$ are individual coefficients, and $\alpha_3'$ and $\alpha_4'$ are vectors of coefficients. As before, the subscript *i* indicates the province of origin, *j* the province of destination, and *s* the state of the world. *X* is real consumption; *T* is the total time (in weeks) available for work or leisure; *L* is weeks of work; *F* is a vector of real fiscal benefits, such as those associated with the provision of education and health care; and *A* is a vector of locational amenities, including cultural and linguistic factors, that may affect the individual's utility.

In each province and each state of the world, the individual is assumed to maximize the utility function (3) subject to a budget constraint and a constraint that defines the number of weeks of work available to the individual in the particular province and state of the world:

$$q_j X_{ijs} + w_j (T - L_{js}) = w_j T + UI_{js} + SA_{js} + B_{is} + TR_i - C_{ij} - TAX_{ijs} \ , \quad \textbf{(4)}$$

where

$$L_{js} = \begin{cases} 50 & if \ s = 1 \\ MXYR_j & if \ s = 2 \\ MIN_j & if \ s = 3 \\ 0 & if \ s = 4 . \end{cases} \quad \textbf{(5)}$$

In the budget constraint, *q* is the price of consumption goods; *w* is the individual's wage, which is assumed to be identical in all states of the world; *UI* is income from unemployment insurance benefits; *SA* is social assistance income; *B* is interest and investment income; *TR* is personal transfers from the public sector other than *UI* and *SA*; *C* is the sum of the before-tax direct and indirect (foregone wage) monetary costs of moving; and *TAX* is total federal and provincial income tax.[5] In the labour supply constraint, *MXYR* is the number of weeks of work required to ensure that the individual will receive UI benefits for the remainder of the year, while *MIN* is the minimum number of weeks of work required to qualify for regular UI benefits. Note that some components in (4) depend on *i* and *j*, while others are assumed to depend on either *i* or *j* but not both.

The three components of income that depend on the state of the world are defined as follows:

$$UI_{js} = \begin{cases} 0 & if \quad s = 1 \quad or \quad s = 4 \\ \rho w_j^R (T - MXYR_j - 2) & if \quad s = 2 \\ \rho w_j^R MINWKS_j & if \quad s = 3 \end{cases} \quad \textbf{(6)}$$

$$SA_{js} = \begin{cases} 0 & if \quad s = 1,2 \\ \frac{\overline{SA}_j}{52}(T - MIN_j - MINWKS_j - 2) & if \quad s = 3 \\ \overline{SA}_j & if \quad s = 4 \end{cases} \quad \textbf{(7)}$$

and

$$B_{is} = \begin{cases} 0 & if \quad s = 4 \\ B_i & otherwise \end{cases}, \quad \textbf{(8)}$$

where $\rho$ is the benefit-replacement rate ($0 \leq \rho \leq 1$); $w^R$ is the before-tax replaceable wage; *MINWKS* is the maximum number of weeks of UI benefits that a person with *MIN* weeks of work can receive, and $\overline{SA}$ represents annual social assistance benefits.

As equations (6) to (8) indicate, there are two states of the world in which individuals receive some income from unemployment insurance, and two states of the world in which they receive some income from social assistance. The two-week waiting period for UI benefits is taken into account in the calculation of incomes in states 2 and 3. In state 4, social assistance and transfers from the federal government (*TR*) are the only sources of income.

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5 It is possible to rewrite the budget constraint in terms of the marginal tax rate. While its form has no bearing on estimation, it is convenient to reformulate the budget constraint as a function of the marginal tax rate in order to derive the derivatives of the migration rates $P_{ij}$ with respect to the various components of income. We present one such derivative below. See Day and Winer (2001), Appendix E, for the reformulated versions of after-tax income net of moving costs.

Once the $U_{ijs}$ have been obtained by solving the utility maximization problem for each state of the world in each province, they are substituted into equation (1) to obtain the following expression for the expected utility in province *j* of an individual originating in province *i*:

$$EU_{ij} = \alpha_1[\pi_{j1}\ln INC_{ij1} + \pi_{j2}\ln INC_{ij2} + \pi_{j3}\ln INC_{ij3} + \pi_{j4}\ln INC_{ij4} - \ln q_j] \quad \textbf{(9)}$$
$$+ \alpha_2[\pi_{j1}\ln(T-50) + \pi_{j2}\ln(T-MXYR_j) + \pi_{j3}\ln(T-MIN_j) + \pi_{j4}\ln T]$$
$$+ \alpha_3'\ln(F_j) + \alpha_4'\ln(A_j)\ .$$

In equation (9), after-tax incomes net of moving costs in the four states of the world are denoted $INC_{ijs}$ and, using the fact that $T = 52$, may be written as:

$$INC_{ij1} = 50w_j + B_i + TR_i - C_{ij} - TAX_{ij1}\ , \quad \textbf{(10)}$$
$$INC_{ij2} = w_j MXYR_j + \rho w_j^R(50 - MXYR_j) + B_i + TR_i - C_{ij} - TAX_{ij2}\ ,$$
$$INC_{ij3} = w_j MIN_j + \rho w_j^R MINWKS_j + \frac{\overline{SA}_j}{52}(50 - MIN_j - MINWKS_j) + TR_i - C_{ij} - TAX_{ij3}\ ,$$
$$INC_{ij4} = \overline{SA}_j + TR_i - C_{ij}\ .$$

It should be noted that since equation (9) is derived from the direct utility function given in equation (3), a simple utility-related interpretation of the signs of the coefficients is available. In the direct utility function, a ‘good’ (that is, a commodity that provides positive utility) will have a positive sign, and a ‘bad’ will have a negative sign. Thus, because in the direct utility function they are the coefficients of consumption and leisure time, both of which are generally considered to be ‘goods,’ estimates of both $\alpha_1$ and $\alpha_2$ in equation (9) are expected to be positive. Similarly, any fiscal variable F or locational amenity A whose estimated coefficient is positive (negative) can be interpreted as providing positive (negative) utility to individuals.[6]

It is also important to note that equations (9) and (10) indicate why the incentive to move embedded in the UI system (or other aspects of public policy) cannot be captured by a single index variable. Rather, differences in the probability weighted log-incomes and probability weighted log-leisure times, not in individual UI (or other) policy parameters, are what matter.

6 Note that the consumption good’s price, $q_j$, appears separately from the income terms in (9) because it is assumed to be the same in all states of the world.

We examine the nature of these broader measures later, after dealing with some essential issues of data construction.

## 2.2 Extensions of the basic model

The basic model of expected utility defined by equations (9) and (10) may be usefully extended in several ways. First, to allow for more risk aversion than the Cobb-Douglas functional form implies, we add to (9) the probabilities associated with less than full employment states. This modification also allows for the possibility that individuals value employment in and of itself.

Second, we add two variables to reflect non-monetary moving costs that are not incorporated in the variable $C_{ij}$. The distance between the province of origin and the province of destination is added to capture the non-monetary costs of moving that increase with distance, while a dummy variable equal to one if the choice involves a move and zero otherwise is included to account for fixed costs of moving, such as the psychic cost of leaving family and friends behind and re-establishing one's home in a new location, the costs of selling a home, and the costs of finding a new place to live. The inclusion of this dummy variable in the model ensures that the utility associated with staying, $EU_{ii}$, will differ from the expected utility associated with all moves ($EU_{ij}, j \neq i$) even if the attributes of all regions are identical.[7]

Third, we added dummy variables to allow consideration of two extraordinary events related to the public sector, the effects of which are probably not adequately captured by the other private and public sector variables of the model – the election of a separatist government in Quebec in 1976 and the subsequent introduction of language legislation in 1977, and the closing of the cod fishery on the east coast in 1992. Since a decision to move often carries with it substantial fixed costs – for example, the cost of moving away from 'home' – regional differences in the private and public sectors in more ordinary times may not generate incentives that are sufficient to overcome such costs. However, extraordinary events, such as those in Quebec and on the east coast fishery, may still create migration incentives that are substantial enough to overcome the fixed costs of moving. We use dummy variables to allow for the possibility that these two events

[7] It should be noted that this dummy variable does **not** serve to identify stayers. Rather, it adds an extra term to the utility associated with the staying option for all individuals, whether movers or stayers. Each potential migrant will compare utilities across all options in making his or her migration decision.

had an important impact on inflows to and outflows from Quebec during the 1977-1980 period, and on inflows to and outflows from Newfoundland from 1993 to the end of our sample period.

Finally, we include dummy variables to control for the effects of language and province-specific amenities. The possibility that the predominance of French in Quebec might deter in-migration to Quebec from other provinces is accounted for by including a dummy variable that is equal to one if the alternative under consideration is a move to Quebec and the province of origin is not Quebec, and zero otherwise.[8] Amenities such as climate, which do not change much over time, are dealt with by including alternative-specific (i.e., province-specific) dummy variables for all alternatives except British Columbia.[9]

## 2.3 The likelihood function

To derive a likelihood function for the model, we adopt the conditional multinomial logit model first proposed by McFadden (1974). This model assumes that the expected utility of an individual chosen at random from the population is given by

$$V_{ij} = EU_{ij} + \varepsilon_{ij} , \qquad \textbf{(11)}$$

where $EU_{ij}$ is defined by equation (1), and $\varepsilon_{ij}$ is a random error representing attributes of alternative $j$ that are pertinent to the individual but which the researcher cannot systematically observe or model.[10]

As McFadden (1974) has shown, if the $\varepsilon_{ij}$, $j = 1, ..., J$, where $J$ is the number of alternatives, are assumed to be independently and identically distributed across individuals with an extreme value distribution, then the probability that any individual in region i will choose alternative $j$ is given by

$$P_{ij} = \frac{e^{EU_{ij}}}{\sum_{k=1}^{J} e^{EU_{ik}}} \qquad \textbf{(12)}$$

---

8 This is a standard practice in modelling interregional migration in Canada.

9 One alternative must be excluded to avoid the equivalent of a dummy variable trap.

10 Pudney (1989, 112) notes that it is implausible to assume that the form of the function $EU_{ij}$ is the same for all alternatives. One way of dealing with this problem is to include an additive alternative-specific constant to the function, as we do in this study.

The probability of staying in $i$ rather than moving is $P_{ii}$ .

In the case of aggregate or grouped data, such as we use in this study, a likelihood function can be constructed using (12) by assuming that all individuals in a particular group are identical. If we define $h$ to be an index of the specific group to which an individual belongs, where $n_{ijh}$ (possibly equal to zero) is the number of individuals from region i in group $h$, then the log-likelihood function for a sample of $H$ groups in each of J regions is

$$\ln \mathcal{L} = \sum_{h=1}^{H} \sum_{i=1}^{J} \sum_{j=1}^{J} n_{ijh} \ln P_{ijh} , \qquad \textbf{(13)}$$

where $P_{ijh}$ is given by equation (12). In this study, groups are defined by income class.[11] The estimates of $P_{ijh}$ resulting from the maximum likelihood estimation procedure are estimates of the migration rate for the corresponding group.[12] Note that the fact that the expected utility function (9) is linear in parameters guarantees that the log-likelihood function has a global optimum.

11 In Day and Winer (2001), groups are also defined by age and sex in addition to income.

12 It may be noted that since all of the explanatory variables used are averages over the population of a province as a whole rather than over the members of the group, the issue of selectivity bias does not arise.

# 3. Data

In this section we provide a brief description of the migration data and the data used to represent the explanatory variables of the model. Further details regarding the construction of the data are provided in an extensive appendix in Day and Winer (2001).

## 3.1 The migration data

The migration data for the 1974-1996 period are constructed from personal income tax records for the tax years 1973-1996.[13] For any tax filer, interprovincial migration is assumed to have occurred sometime during the second of two adjacent tax years if the individual reports a different province of residence on December 31st of the second year. All tax filers are included in our migration counts, with the exception of: (i) those younger than 20 or older than 64; (ii) immigrants, emigrants, and persons migrating to or from the northern territories; (iii) persons who died during the tax year; (iv) those with no income from wages and salaries, self-employment, UI, or social assistance; and (v) full-time students.[14] These exclusions were designed to restrict the data set to individuals who are attached to the labour market. For each individual remaining in the data set, both the province of origin and the province of destination were recorded for each year from 1974 to 1996. The tax filers were then grouped into three income classes, based on their total income as defined by Revenue Canada ($TI^{RC}$): [15]

$$\begin{array}{ll} \textit{Low income}: & 0 < TI^{RC} \leq 0.5\, median\,(TI^{RC}) \\ \textit{Middle income}: & 0.5\, median\,(TI^{RC}) < TI^{RC} \leq 1.25\, median\,(TI^{RC}) \\ \textit{High income}: & TI^{RC} > 1.25\, median\,(TI^{RC}) \quad . \end{array} \tag{14}$$

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13 Construction of the data used in this study was a substantial project in its own right. The data were also extended backward to 1968 with the help of tapes containing the partial tax records of a 10% sample of Canadians for the period 1967-1973, but estimation results based on the extended data set are not presented here. For further details, see Day and Winer (2001). Results of estimation over the longer period are consistent with the conclusions reached below.

14 All tax filers under the age of thirty who claimed a tuition deduction of at least about three-quarters of the average university tuition payed in Canada each year in each province were assumed to be students. This rule will not eliminate all students, however, since many transfer the deduction to a parent.

15 In 1995, for example, median total income for all tax filers in our data set is about $24,142, or about 62.5% of the median income for families and unattached individuals reported in Statistics Canada catalogue 13-207. The lower median income in the tax data in part reflects the fact that since families do not file joint tax returns in Canada, the income of each spouse is recorded separately. Median total income in the tax files is consistently lower than median family income, although the ratio of the two varies from year to year.

Finally, the number of individuals in each cell of the data set was recorded, with cells being defined by year, province of origin, province of destination, and income class.[16] These numbers constitute the gross flow data used for estimation.

Since these migration data are derived from individual tax records, strict confidentiality conditions apply to their use. Despite the fact that we began with the complete set of tax returns filed in each year, many of the migration cells with an origin and a destination in one of the smaller provinces contain very few individuals, and do not meet Statistics Canada's conditions for their publication. Rather than work with a publishable data set that contains many censored cells, we employ the uncensored migration data. Statistics Canada has, however, agreed to retain this data for a period of ten years, and to make them available without cost to other researchers interested in confirming the results reported here.[17]

## 3.2 The explanatory variables

A list of the explanatory variables included in the empirical model, together with their definitions and the expected signs of their coefficients, is provided in Table 1. Note that the first two variables, INCOME and LEISURE, are composite variables that are defined as follows:

$$INCOME_{ij} = \pi_{j1} \ln INC_{ij1} + \pi_{j2} \ln INC_{ij2} + \pi_{j3} \ln INC_{ij3} + \pi_{j4} \ln INC_{ij4} + \ln q_j \ , \quad \textbf{(15)}$$

$$LEISURE_{ij} = \pi_{j1} \ln(2) + \pi_{j2} \ln(T - MXYR_j) + \pi_{j3} \ln(T - MIN_j) + \pi_{j4} \ln(T) \ , \quad \textbf{(16)}$$

where $INC_{ijs}$ is defined in equation (10).

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16 As noted earlier, the data were also classified by age and sex as well as by income class. For additional results using the age/sex/income class data, see Day and Winer (2001).

17 Researchers interested in using these data should contact the Business and Labour Market Analysis Division of Statistics Canada. The conditions for using the data include being sworn in under the Statistics Act, and working with the data on Statistics Canada premises. We are grateful to Garnett Picot and Statistics Canada for making this arrangement.

Table 1: **List of Explanatory Variables**

| **Variable name** | **Definition** | **Expected sign** |
|---|---|---|
| INCOME | expected value of log of after-tax income | + |
| LEISURE | expected value of log of leisure time | + |
| **Public Expenditure:** | | |
| HEALTH | log of real per capita provincial and local govt spending on health | + |
| EDUCATION | log of real per cap provincial and local govt spending on education | + |
| OTHER SPENDING | log of real per cap provincial and local govt spending on other functions, excluding social services and debt service | ? |
| FEDERAL SPENDING | log of real per capita current and capital spending by the federal govt | + |
| **Moving Costs:** | | |
| DSTAY | dummy variable equal to 1 if origin = destination, zero otherwise | + |
| DISTANCE | log of distance between origin and destination | - |
| **Additional Risk Aversion:** | | |
| Model 1: P2 | probability of state 2 | - |
| P3 | probability of state 3 | - |
| P4 | probability of state 4 | - |
| Model 2: LP234 | log (P2 + P3 + P4) | - |
| **Extraordinary Events:** | | |
| PQ | dummy variable equal to 1 if outflow from Quebec, 1977-80; 0 otherwise | + |
| PQ2 | dummy variable equal to 1 if inflow to Quebec, 1977-80; 0 otherwise | - |
| FISH | dummy variable equal to 1 if outflow from Newfoundland, 1993-96; 0 otherwise | + |
| FISH2 | dummy variable equal to 1 if inflow to Newfoundland, 1993-96; 0 otherwise | - |
| **Locational Attributes:** | | |
| QUEBEC | dummy variable equal to 1 if province of origin is not Quebec and province of destination is Quebec, 0 otherwise | - ? |
| NFLD | dummy variable equal to 1 if choice is Newfoundland, 0 otherwise | ? |
| PEI | dummy variable equal to 1 if choice is PEI, 0 otherwise | ? |
| NS | dummy variable equal to 1 if choice is Nova Scotia, 0 otherwise | ? |
| NB | dummy variable equal to 1 if choice is New Brunswick, 0 otherwise | ? |
| QUE | dummy variable equal to 1 if choice is Quebec, 0 otherwise | ? |
| ONT | dummy variable equal to 1 if choice is Ontario, 0 otherwise | ? |
| MAN | dummy variable equal to 1 if choice is Manitoba, 0 otherwise | ? |
| SASK | dummy variable equal to 1 if choice is Saskatchewan, 0 otherwise | ? |
| ALTA | dummy variable equal to 1 if choice is Alberta, 0 otherwise | ? |

One advantage of working with grouped data, as we do here, rather than microdata, is that we are able to avoid the problem of estimating incomes for individuals in alternative destinations by using averages over the population in each province.[18] Thus $INC_{ijs}$ is constructed using data on average weekly earnings and average nonwage income, among other variables. The UI variables $MIN_j$, $MINWKS_j$, and $MAXYR_j$ are constructed using provincial unemployment rates and the provisions of the UI Act, under the assumption that each province constitutes a single UI region.[19] Similarly, the replaceable wage $w_j^R$ is computed using average weekly earnings in each province. $TAX_{ijs}$ is estimated using the actual federal tax schedule and provincial income tax rates, under the assumption that the migrant is single and claims only the personal exemption/tax credit.[20] The last component of income, annual SA income in province *j,* is approximated by the annual SA income for a single mother with two children, the only measure which is available on a consistent basis for all provinces throughout the time period studied.[21] Unfortunately, it is impossible to obtain data on any of these income components that varies with income class.

Regional city consumer price indices for the major city in each of the ten provinces are used to represent $q_j$. The regional city CPIs adjust for inflation but do not reflect differences in price levels across provinces. (A consistent index that measures differences in the cost of living across provinces does not exist for our entire sample period.)[22]

In representing real fiscal benefits, it is preferable to include in the empirical model variables that reflect as closely as possible the benefits received by individuals. This approach also motivates our modelling of the role of unemployment insurance and social assistance. However, measures of the benefits of public services actually received by individuals are not available on a time series basis. As in Day (1992) and MacNevin (1984), we must use (as elements of the vector F) real per capita consolidated provincial and local government spending on health, education, and other functions, excluding spending on social services and debt service, from

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[18] There are disadvantages of using grouped data, including the possibility of aggregation bias. Resource constraints prevented us from constructing longitudinal data for each individual taxpayer from 1974. Such microdata do exist from 1982 (the LAD data set), but this data set obviously does not include evidence from the 1970s when the unemployment insurance system was substantially altered. We regard the present project as a useful complement to one based on longitudinal microdata data such as the LAD. The latter project is a challenging and expensive one that remains for future research.

[19] In fact, the number of UI regions has increased over the years.

[20] For all provinces except Quebec, provincial income taxes are computed as a percentage of federal income tax owing. In the case of Quebec, provincial income taxes were computed separately using the Quebec income tax schedule.

[21] We are indebted to Pierre Lefevbre for providing us with these data.

[22] Létourneau (1992) attempts to measure regional differences in price levels in Canada for the 82-98 period.

Statistics Canada's Financial Management System (FMS). These data include both current and capital spending by provincial governments. Social services are excluded from F because they are already accounted for in the model by the inclusion of social assistance in the definition of income in states three and four, as discussed above. We do include in F per capita total federal current and capital spending in each province (data on federal spending by function are not available by province). All four fiscal variables are deflated using the regional city CPI.

It is appropriate at this point to note that federal transfers to the provinces are omitted from the model, in contrast to Courchene (1970) and Winer and Gauthier (1982). Intergovernmental transfers will influence people to the extent that they affect an individual's consumption of public services or tax burdens. Since we have already included in the model, in principle at least, both the tax and expenditure sides of provincial fiscal systems, adding intergovernmental grants would amount to double counting.[23]

Finally, we turn to the measurement of the probabilities of the states of the world. Because the unemployment rate series published by Statistics Canada do not correspond to the four states defined in the model, we estimate the probabilities of the four states using employment data from the Labour Force Survey ($n_{Ej}$), together with data on the number of individuals receiving UI benefits in each province ($n_{UIj}$), the number of social assistance cases in each province ($n_{SAj}$), the number of UI recipients with more than twenty qualifying weeks of employment, and the number of UI recipients with less than twenty qualifying weeks of employment.

Letting be $P^{j}_{20+}$ the proportion of UI recipients with more than twenty qualifying weeks and $P^{j}_{<20}$ the proportion of UI recipients with less than twenty qualifying weeks, the ex ante probabilities of the four states of the worlds are approximated as follows:

23 Winer and Gauthier (1982) point out and explicitly deal with the double counting problem by omitting some (arbitrarily chosen) elements of provincial government budget restraints. As indicated above, it is better to have in the empirical model policy variables that are as closely connected as possible to what people actually receive from or pay to the public sector. The role of intergovernmental grants may be studied by constructing a model of the effect of grants on provincial government spending and taxing decisions, and then combining the results of this study with estimates of the effects of provincial fiscal policies on migration behaviour.

$$\pi_{j1} = \frac{n_{Ej}}{n_{Ej} + n_{UIj} + n_{SAj}} \tag{17}$$

$$\pi_{j2} = \frac{p^{j}_{20+} \cdot n_{UIj}}{n_{Ej} + n_{UIj} + n_{SAj}}$$

$$\pi_{j3} = \frac{p^{j}_{<20} \cdot n_{UIj}}{n_{Ej} + n_{UIj} + n_{SAj}}$$

$$\pi_{j4} = \frac{n_{SAj}}{n_{Ej} + n_{UIj} + n_{SAj}} .$$

One problem with these estimates is that while the ex ante probabilities in the model are defined in terms of the distribution of weeks of work across the labour force, $n_{Ej}$, $n_{UIj}$, and $n_{SAj}$ are all measures of the stock of individuals in a particular state at a particular point in time. A better measure of the true $\pi_{j1}$, for example, might be the proportion of the labour force that enjoys at least 50 weeks of work each year. However, the Labour Force Survey measure of employment includes individuals who are in the middle of shorter spells of employment as well as those who are in the middle of long spells, and thus $\pi_{j1}$ may tend to overestimate the number of individuals in state 1. The choice of twenty weeks of work as the dividing line between states 2 and 3, rather than some value between $MIN_j$ and $MXYR_j$, is also an approximation that is likely to be more accurate for some provinces than for others. It does coincide, however, with the usual notion of the dividing line between workers who are "strongly attached" and "weakly attached" to the labour force. Unfortunately, data on the distribution of weeks of work by province is limited, necessitating the approximations in (17).

Before turning to the estimation results, it is interesting to look at regional variation in the INCOME and LEISURE variables defined in (15) and (16), and in selected components of them, especially the probability weighted logs of real incomes in states 2 and 3 which more directly reflect (than do INCOME and LEISURE) the migration incentives embedded in the unemployment insurance system. Figure 4 shows the coefficient of variation of these variables from 1966 to 1996. It can be seen that the coefficient of variation of the component of INCOME stemming from state 3 is larger and increasing relative to the state 2 component. This is largely the result of movements in $\pi_{j2}$, $j = 1,..., 10$, rather than in parameters of the insurance system itself. One may also note that regional variation in the LEISURE variable is greater than that for INCOME over the entire period from 1966, and that the substantial regional variation in the income components associated with states 2 and 3 *does not* carry over to the fuller measures of expected income and expected leisure.

**Figure 4: Regional Variation in Model Variables INCOME and LEISURE and Selected Income Components (coeffcients of variation)**

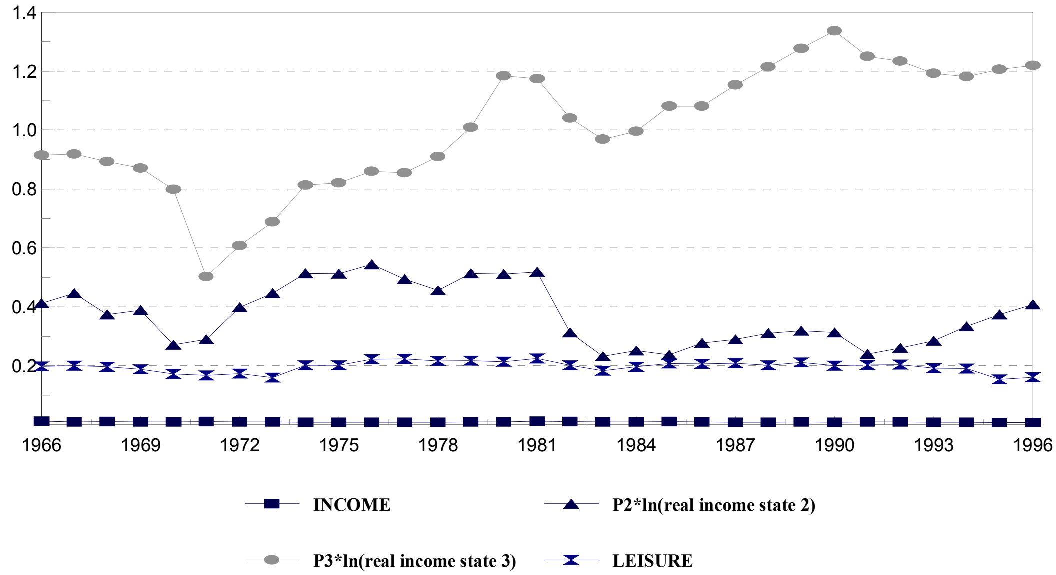


**Figure 5: Employment Insurance Incomes, Ontario-Newfoundland,Probability Weighted Logs of Real Incomes, Stayers, 1966-1996**

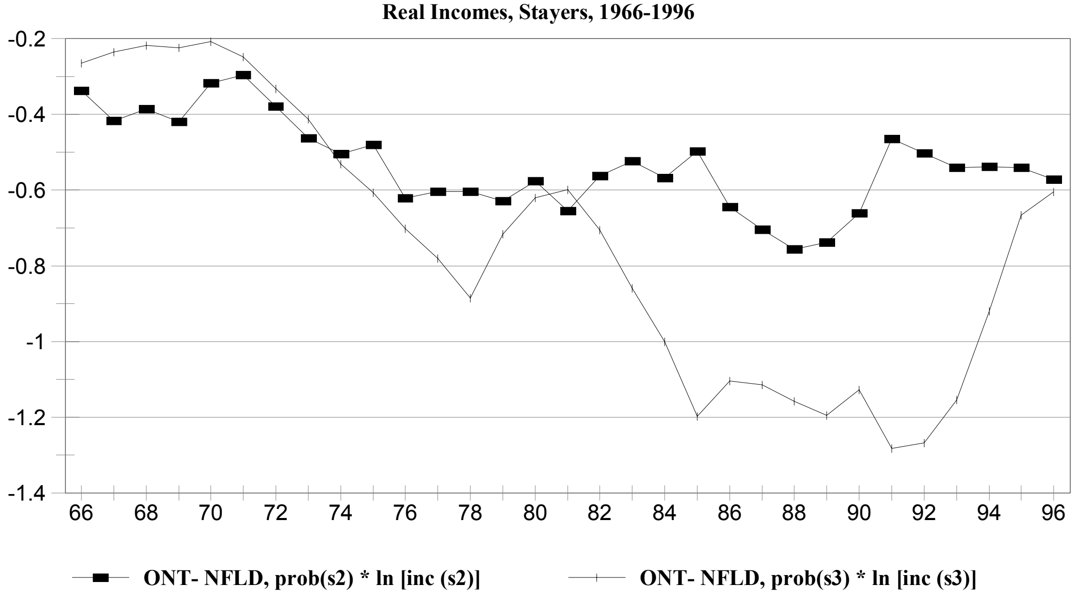


Figure 5 shows the consequences of the insurance system for the probability-weighted income differentials between Ontario and Newfoundland in states 2 and 3. This figure suggests that until reforms were introduced in the early 1990s, the insurance system was increasingly biased in favour of weakly attached labour market participants who registered for unemployment insurance in Newfoundland. Since the major changes in insurance policy parameters occurred in 1971, 1974, 1979 and 1994, it can also be inferred from Figure 5 that movements in the probabilities of employment as well as in incomes if unemployed are important in determining migration incentives. This is not surprising; incentives to move created by the insurance system depend on *both* the income received in any location as well as the probability that an individual will need to rely on UI there. In the end, what matters to individuals (in our model) is how the variables INCOME and LEISURE, which take both of these factors into account, are affected by changes in UI parameters.[24] Of course, indexes of incentives to move are one thing, and the effect of such incentives on observed migration patterns is another.

[24] Thus, indexes of unemployment insurance generosity, based on parameters of the unemployment insurance system, by themselves, may not be reliable as indicators of migration incentives.

# 4. Estimation Results

Maximum likelihood estimates of two versions of the model for each of three income classes for the period 1974-1996 are presented in Table 2.[25] As indicated in Table 1, the two versions of the model differ only in the variables included to account for additional risk aversion. Theory does not provide any guidance as to the form in which the additional risk aversion variables should be included; the two models presented represent two of the several alternatives we considered. In Model 1, the untransformed probabilities of all three unemployment states are allowed to enter the model separately. In Model 2, the natural log of the sum of the probabilities of the three unemployment states is included instead.

The overall fit of the model, as measured by McFadden's $R^2$, is quite good for all income classes and both models; all the $R^2$ values exceed 0.9. However, the correlations between the actual and fitted values of the 100 different origin-destination migration rates are often very low or even negative, ranging from -0.4372 to 0.9002 for Model 1 and -0.7749 to 0.9163 for Model 2.[26] Thus the model does not do a good job of explaining many of the individual origin-destination migration rates. Correlations between the actual and fitted values of aggregate in-, out-, and net in-migration flows for each province, presented in Table 3, tend to be considerably higher. For this reason, in reporting the results of simulations below, we restrict our attention to in-, out-, and net migration flows.

Turning now to the parameter estimates in Table 2, it can be seen that the values of the coefficients of INCOME, LEISURE and the public expenditure variables are sensitive to the manner in which the probabilities of unemployment are included in the model. The coefficients on INCOME and LEISURE for Model 1 tend to be larger, for each income class, than the corresponding estimates for Model 2. In one case, for the high income class in Model 2, the coefficient on the leisure term is negative and statistically insignificant.[27] The sensitivity of the estimates can be attributed to collinearity between the probabilities of the states of the world, the variable LEISURE, and to a lesser extent, the public expenditure variables and INCOME.

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[25] Estimation was carried out using LIMDEP 7.0.

[26] The full matrices are available in Day and Winer (2001).

[27] Negative coefficients also appear for Models 1 and 2 when the data are disaggregated by age and sex as well as by income class. In Model 1, the estimated coefficient of one or more of the additional risk aversion variables is positive in 19 of 54 cases, especially for female groups. (There are 18 income class-age-sex categories and 3 employment probabilities.) For Model 2, 4 of 18 coefficients on the single variable reflecting employment states are positive. We note that when the unemployment insurance simulations reported below are conducted using these disaggregated models, and the results are then aggregated up, conclusions remain essentially the same as reported in this paper.

Table 2: **Parameter estimates by income class, 1974-1996**

| | | | **Model 1** | | | **Model 2** |
|---|---|---|---|---|---|---|
| **Variable** | **Low Income** | **Middle Income** | **High Income** | **Low Income** | **Middle Income** | **High Income** |
| INCOME | 1.806 | 2.391 | 1.507 | 0.748 | 1.200 | 0.416 |
| | (41.79) | (63.93) | (35.07) | (18.35) | (34.23) | (10.29) |
| LEISURE | 2.832 | 7.105 | 4.887 | 0.571 | 0.904 | -0.010 |
| | (12.61) | (36.29) | (21.10) | (26.87) | (46.70) | (-0.44) |
| HEALTH | -0.471 | -0.414 | -0.300 | 0.169 | 0.149 | 0.192 |
| | (-28.24) | (-29.33) | (-18.57) | (11.19) | (11.57) | (12.93) |
| EDUCATION | 0.388 | -0.007 | -0.161 | 0.662 | 0.327 | 0.054 |
| | (26.35) | (-0.521) | (-10.93) | (45.04) | (25.22) | (3.62) |
| OTHER | -0.198 | -0.341 | -0.419 | -0.357 | -0.494 | -0.547 |
| SPENDING | (-22.91) | (-45.05) | (-48.78) | (-41.89) | (-66.51) | (-64.72) |
| FEDERAL | 0.229 | 0.493 | 0.514 | -0.429 | -0.214 | -0.137 |
| SPENDING | (22.95) | (59.61) | (52.36) | (-52.02) | (-31.05) | (-1.66) |
| DSTAY | 1.576 | 1.848 | 1.378 | 1.496 | 1.761 | 1.290 |
| | (155.60) | (207.18) | (133.47) | (149.42) | (199.67) | (126.24) |
| DISTANCE | -0.502 | -0.504 | -0.599 | -0.517 | -0.521 | -0.616 |
| | (-349.25) | (-398.90) | (-409.63) | (-365.71) | (-419.18) | (-427.42) |
| LOG | | | | -0.748 | -0.842 | -0.477 |
| (P2+P3+P4) | | | | (-127.85) | (-158.58) | (-79.98) |
| P2 | -28.979 | -42.977 | -30.780 | | | |
| | (-40.50) | (-69.11) | (-41.82) | | | |
| P3 | -13.396 | -26.861 | -21.103 | | | |
| | (-18.53) | (-42.61) | (-28.25) | | | |
| P4 | -9.890 | -23.780 | -17.150 | | | |
| | (-13.11) | (-36.09) | (-22.03) | | | |
| QUEBEC | -2.243 | -2.351 | -2.065 | -2.240 | -2.348 | -2.066 |
| | (-407.27) | (-487.53) | (-399.05) | (-406.51) | (-486.77) | (-399.20) |
| PQ | 0.232 | 0.405 | 0.486 | 0.294 | 0.460 | 0.545 |
| | (29.48) | (64.73) | (73.27) | (37.61) | (74.28) | (83.36) |
| PQ2 | 0.151 | 0.156 | 0.076 | 0.076 | 0.095 | 0.013 |
| | (15.87) | (19.12) | (8.39) | (8.08) | (11.69) | (1.50) |
| FISH | 0.105 | -0.142 | -0.267 | 0.003 | -0.291 | -0.361 |
| | (10.47) | (-13.08) | (-17.97) | (0.316) | (-26.83) | (-24.41) |
| FISH2 | -0.883 | -1.168 | -1.084 | -0.790 | -1.030 | -0.995 |
| | (-60.65) | (-83.23) | (-64.56) | (-54.54) | (-73.62) | (-59.48) |
| NFLD | 0.354 | 0.469 | 0.054 | -0.572 | -0.641 | -0.903 |
| | (27.45) | (41.11) | (-3.87) | (-56.85) | (-71.78) | (-86.85) |
| PEI | -0.883 | -0.835 | -1.521 | -0.992 | -1.049 | -1.738 |
| | (-66.57) | (-73.32) | (-110.37) | (-78.46) | (-97.81) | (-136.26) |
| NS | -0.491 | -0.041 | -1.069 | -0.211 | -0.378 | -0.890 |
| | (-40.99) | (-4.97) | (-90.12) | (-17.93) | (-39.23) | (-75.75) |
| NB | -0.052 | -0.041 | 0.539 | -0.335 | -0.428 | -0.842 |
| | (-5.41) | (-4.97) | (-54.72) | (-37.89) | (-56.57) | (-94.78) |
| QUE | 1.577 | 1.897 | 1.505 | 1.319 | 1.554 | 1.274 |
| | (204.72) | (285.40) | (198.91) | (180.53) | (248.98) | (178.52) |
| ONT | -0.252 | -0.342 | -0.263 | 0.120 | 0.050 | 0.039 |
| | (-41.76) | (-66.31) | (-44.42) | (24.06) | (11.57) | (7.78) |
| MAN | -1.046 | -1.177 | -1.377 | -0.721 | -0.839 | -1.138 |
| | (-156.59) | (-208.97) | (-212.09) | (-112.50) | (-153.21) | (-180.63) |
| SASK | -1.136 | -1.083 | -1.212 | -1.010 | -0.971 | -1.127 |
| | (-176.52) | (-194.70) | (-194.34) | (-159.85) | (-177.33) | (-183.35) |
| ALTA | -0.543 | -0.541 | 0.542 | -0.595 | -0.589 | -0.538 |
| | (-90.62) | (-103.05) | (-91.09) | (-99.59) | (-112.58) | (-91.72) |
| Log L | -7213435 | -9794318 | -8019435 | -7216434 | -9806258 | -8022762 |
| Log $L_0$ | -92028900 | -165821900 | -163142600 | -92028900 | -165821900 | -163142600 |
| McFadden's $R^2$ | 0.922 | 0.941 | 0.951 | 0.922 | 0.941 | 0.951 |
| No. of observations | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 |

Notes : t-statistics are in parentheses. Log L is the log of the likelihood function at the parameter estimates. Log $L_0$ is the maximum value of the log of the likelihood function when only destination-specific constants included. McFadden's $R^2$ is [1 - (log L / log $L_0$)]. Likelihood ratio tests for all equations indicate that the model with destination-specific constants only can be rejected in favour of the full model at 1%.

Table 3: **Correlations between Actual and Fitted Values of Migration Flows, Models 1 and 2, 1974-1996**

| Province | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| | Out-migration | In-migration | Net In-migration | Out-migration | In-migration | Net In-Migration |
| **Low Income** | | | | | | |
| NFLD | 0.7056 | 0.6714 | 0.6036 | 0.6532 | 0.7167 | 0.5091 |
| PEI | 0.7502 | 0.2045 | 0.5733 | 0.5497 | 0.3454 | 0.3309 |
| NS | 0.6840 | 0.7480 | 0.2486 | 0.7421 | 0.6861 | 0.3229 |
| NB | 0.7649 | 0.3106 | 0.3382 | 0.8438 | 0.2871 | 0.5312 |
| QUE | 0.6736 | 0.5995 | 0.693 | 0.5967 | 0.3994 | 0.348 |
| ONT | 0.5265 | 0.7879 | 0.7365 | 0.3549 | 0.8222 | 0.6954 |
| MAN | 0.4195 | 0.1050 | 0.3837 | 0.3141 | 0.1904 | 0.239 |
| SASK | 0.9149 | 0.6417 | 0.9251 | 0.7459 | 0.2377 | 0.4511 |
| ALTA | 0.7215 | 0.8640 | 0.9224 | 0.6774 | 0.8715 | 0.912 |
| BC | 0.6746 | 0.7744 | 0.7183 | 0.7166 | 0.7058 | 0.6563 |
| Min | 0.4195 | 0.105 | 0.2486 | 0.3141 | 0.1904 | 0.239 |
| Max | 0.9149 | 0.864 | 0.9251 | 0.8438 | 0.8715 | 0.912 |
| **Middle Income** | | | | | | |
| NFLD | 0.2356 | 0.5605 | 0.5172 | 0.3172 | 0.5461 | 0.6137 |
| PEI | 0.3663 | -0.3435 | 0.6796 | 0.1264 | -0.4364 | 0.592 |
| NS | 0.2530 | -0.3374 | 0.3818 | 0.4873 | -0.5146 | 0.4161 |
| NB | 0.2237 | -0.4951 | 0.3329 | 0.5579 | -0.5301 | 0.4997 |
| QUE | 0.6163 | -0.2996 | 0.8291 | 0.4902 | -0.3059 | 0.6249 |
| ONT | 0.3532 | 0.2037 | 0.5916 | 0.0886 | 0.3694 | 0.5168 |
| MAN | -0.0794 | -0.3160 | 0.3911 | -0.3990 | -0.1169 | 0.0384 |
| SASK | 0.6212 | 0.2966 | 0.9063 | 0.4983 | -0.6436 | 0.4091 |
| ALTA | 0.3013 | 0.6468 | 0.9081 | 0.2399 | 0.6939 | 0.8917 |
| BC | 0.2496 | 0.5823 | 0.7315 | 0.2931 | 0.4002 | 0.6684 |
| Min | -0.0794 | -0.4951 | 0.3329 | -0.399 | -0.6436 | 0.0384 |
| Max | 0.6212 | 0.6468 | 0.9081 | 0.5579 | 0.6939 | 0.8917 |
| **High Income** | | | | | | |
| NFLD | 0.3743 | 0.6574 | 0.5172 | 0.4324 | 0.6526 | 0.2887 |
| PEI | 0.2214 | -0.0985 | 0.6796 | 0.1965 | -0.1708 | 0.304 |
| NS | 0.6598 | 0.6096 | 0.3818 | 0.7070 | 0.5084 | 0.1657 |
| NB | 0.4530 | -0.2934 | 0.3329 | 0.5555 | -0.3366 | 0.0978 |
| QUE | 0.6253 | 0.3086 | 0.8291 | 0.5645 | 0.2288 | 0.7139 |
| ONT | 0.2221 | 0.6598 | 0.5916 | 0.1615 | 0.7378 | 0.6437 |
| MAN | -0.0017 | -0.1079 | 0.3911 | -0.1648 | -0.0663 | 0.0085 |
| SASK | 0.8495 | 0.1958 | 0.9063 | 0.7610 | -0.2086 | 0.1088 |
| ALTA | 0.7960 | 0.5533 | 0.9081 | 0.7684 | 0.5103 | 0.9423 |
| BC | 0.3954 | 0.6371 | 0.7315 | 0.4146 | 0.5284 | 0.6614 |
| Min | -0.0017 | -0.2934 | 0.3329 | -0.1648 | -0.3366 | 0.0085 |
| Max | 0.8495 | 0.6598 | 0.9081 | 0.7684 | 0.7378 | 0.9423 |

LEISURE is a function of the variables *MIN* and *MXYR*. Due to the structure of the Canadian UI system, both *MIN* and *MXYR* are lower in high unemployment provinces, resulting in a higher value for LEISURE in such provinces. Needless to say, the probabilities of the three unemployment states are highly correlated with the Labour Force Survey's provincial unemployment rates, resulting in a strong correlation between LEISURE and the probabilities of the three states. It should be noted, however, that experiments with alternative models indicate that it is important to have the probabilities in the model to allow for aversion to regions where employment prospects are relatively poor. Omission of these variables leads to coefficients on income that are often negative, likely because the INCOME variable then acts to some extent as a proxy for undesirable employment prospects as well as for wages.

The signs of the coefficients on HEALTH, EDUCATION, and FEDERAL SPENDING also differ across the two models, suggesting that the collinearity problem extends to these variables as well. We can think of no good reason why people might value additional amounts of publicly provided goods such as health care negatively. Perhaps the fiscal aggregates that we have to use in lieu of better measures of public services received are more highly correlated with the other explanatory variables than the actual benefits received would be. It is also possible that these fiscal aggregates are picking up the influence of other factors not accounted for elsewhere in the model.

Despite the collinearity problem, the coefficient of INCOME is generally positive, suggesting that individuals do prefer regions with higher expected incomes. This result is consistent with other studies of interprovincial migration in Canada. The negative coefficient of DISTANCE is also consistent with our expectations and other studies, and implies that the costs of migration increase with distance from the point of origin. The positive coefficient of DSTAY, which takes on the value 1 for choices that do not involve a move, implies that there are indeed substantial fixed costs associated with migration away from one's home. The coefficient of QUEBEC always has a negative sign, suggesting that language does form a barrier to in-migration to that province. (The coefficients of DISTANCE, DSTAY, QUEBEC, and the variables related to extraordinary events are all stable across different specifications of the model.)

The positive coefficient of PQ for all models and all income classes suggests that the election of a separatist government and subsequent events in the mid to late 1970s led to an increase in out-migration from the province; although this accords with much anecdotal evidence, estimating this effect in the present context is another matter. Unexpectedly, the coefficient of PQ2 is also positive, indicating that inflows to Quebec also increased (though not nearly by as much, as the simulation reported immediately below shows). It is possible that this increased inflow consists of former Quebecers returning to their home province.

The signs of the coefficients of PQ and PQ2 may not tell the whole story of the extraordinary events in Quebec, though. If other explanatory variables such as average weekly earnings or the probabilities of the unemployment states also changed, then the effect of the dummy variables on migration flows is likely to represent a lower bound on the total effect. Nonetheless, it is still of interest to examine the magnitude of the effect on migration to and from Quebec by comparing the predicted migration flows when PQ and PQ2 are equal to 1, to the predicted flow when PQ and PQ2 are equal to 0. Both the individual effects of these two variables and their net effect on in-migration to Quebec are presented in Table 4. The impact on inflows to Quebec was greatest for the middle and low income groups, while the impact on outflows was greatest for the middle and higher income groups. Over the 1977-1980 period as a whole, the cumulative effect of the political events captured by the Quebec dummy variables is estimated to be an increase in net out-migration of between 26,000 (Model 1) and 33,000 (Model 2) people. By way of comparison, the actual net outflow from Quebec (in our migration data) during the 4 years after the election of the Parti Quebécois was 50,600 people.

Table 4: **Effect of Extraordinary Events on Migration To and From Quebec and Newfoundland.**

| | Estimated change in inflows and outflows as a result of the event | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Model 1** | | | | **Model 2** | | | |
| | Low income | Middle income | High income | Total | Low income | Middle income | High income | Total |
| **Election of Parti Quebécois: 1977-1980** | | | | | | | | |
| In-migration to Quebec | 2,049 | 2,858 | 1,152 | 6,059 | 1,074 | 1,788 | 210 | 3,072 |
| Out-migration from Quebec | 4,754 | 13,340 | 14,314 | 32,408 | 5,844 | 14,775 | 15,625 | 36,244 |
| Net In-migration to Quebec | -2,705 | -10,482 | -13,162 | -26,349 | -4,770 | -12,987 | -15,415 | -33,172 |
| **Closing of Cod Fishery: 1993-1996** | | | | | | | | |
| In-migration to Newfoundland | -7,553 | -12,457 | -7,727 | -27,737 | -6,411 | -10,128 | -6,738 | -23,277 |
| Out-migration from Newfoundland | 1,314 | -1,536 | -1,580 | -1,802 | 41 | -3,376 | -2,245 | -5,580 |
| Net In-migration to Newfoundland | -8,867 | -10,922 | -6,147 | -25,936 | -6,452 | -6,752 | -4,493 | -17,697 |

Table 4 also presents estimates of the additional effect of the closing of the cod fishery in 1992 on migration to and from Newfoundland, over and above any effect due to related changes in incomes and unemployment rates. Interestingly, inflows to rather than outflows from Newfoundland seem to be the most affected, registering large decreases for all three income classes. It is possible that this pattern reflects the effect of the TAGS income subsidy program for fishers, as in-migrants were not eligible for benefits under TAGS, but this remains a conjecture.[28]

The total effect of the closing is substantial, although considerably smaller for Model 2 than for Model 1. The Model 1 estimates imply a net loss of about 26,000 people, while the Model 2 estimates imply a net loss of less than 18,000 people. These estimated increases in net outflows of tax filers are greater than the actual net outflow (in our data set) of 14,500. The discrepancy between the actual and predicted outflows may be a prediction error, or it may be that other variables included in the model change in an offsetting manner.

Finally, the pattern of signs on the alternative-specific dummy variables indicates that people are generally moving to the west coast (B.C. is the omitted province). Perhaps the most interesting finding here is that the coefficient of QUE is positive, while those for all other provinces are generally negative. In other words, after allowing for a general tendency for migration to Quebec to be different from that to other provinces (using the QUEBEC dummy discussed earlier), this positive coefficient suggest that some migrants view Quebec as having some amenities that are more desirable than those of the other provinces.

[28] We are grateful to Michael Hatfield of HRDC for this suggestion.

# 5. The Effect of Eliminating Regional Variation in the Determinants of Migration

Although the coefficient estimates tell us something about the direction of the effects on migration rates of changes in the explanatory variables, they cannot alone tell us anything about the magnitude of those effects. In this paper, simulation is the primary method we use to explore the quantitative importance of the estimation results. The simulations are designed to uncover the consequences for migration of the elimination of all regional variation in some key policy variables: *MIN*, the minimum weeks of work required to qualify for UI benefits; regionally extended UI benefits; per capita federal spending; per capita spending on education; provincial income tax rates; and social assistance benefits.[29] To our knowledge, such simulations have not been conducted before, even though regional variation in public policy is at the heart of concern over the economic consequences of fiscally-induced migration.

In order to put the policy simulations into better perspective, we also simulate the effects of eliminating regional dispersion in average weekly earnings and the probabilities of the four states of the world, and of eliminating monetary and nonmonetary moving costs. All simulations are carried out for both models, in view of the collinearity issue pointed to earlier, in order to investigate the robustness of the results. Table 5 contains a summary of the assumptions underlying the simulations; further details are found in Day and Winer (2001).

All the simulation results are reported as changes from a base case defined by the fitted values of the model being simulated. Because changes in populations flows are easier to comprehend than changes in migration rates, we translate the changes in predicted migration rates into changes in migration flows by multiplying each origin-destination specific migration flow by the

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29 See Day and Winer (2001) for discussion of marginal effects. Among other things, the marginal effect calculations reveal that interaction of the UI and provincial SA systems matters for the effect of changes in the insurance system, especially when *MINWKS* is considered. Increases in *MINWKS* lead to increases in net in-migration only in Newfoundland, Quebec, and Manitoba, because it is only in these provinces that after-tax weekly unemployment insurance benefits, as constructed for this project, are larger than weekly SA benefits. In the other provinces, increases in *MINWKS* lead to decreases in net in-migration, regardless of the model used. Another interesting finding is that the change in the Quebec income tax rate that is required to produce the same effect on net in-migration as a one-dollar change in average weekly earnings (in the same province) is much larger than that for the other provinces. This result indicates that net out-migration from Quebec is less responsive to personal tax changes than that from the other provinces. Since Quebec has the highest income tax rate of all the provinces, this result suggests that Quebec has taken advantage of a relatively sluggish response of migration to tax increases.

appropriate provincial population. Then the origin-destination specific flows are summed across provinces to obtain the change in net in-migration for each province and income class.[30] Finally, we report only the average change over the 1978-1996 period. This time period was chosen because prior to 1978, there was no regional variation in *MIN*, a key UI policy variable.

Table 5: **Simulation Assumptions**

| Simulation No. | Variable(s) affected | Assumptions |
|---|---|---|
| (1) | *MIN* (minimum qualifying weeks) | *MIN* = 13 weeks in all provinces in all years |
| (2) | Regional extended benefits | 2 weeks of benefits for each qualifying week of work in all provinces in all years |
| (3) | *MIN* and regional extended benefits | Combination of (1) and (2) |
| (4) | Per capita federal spending | Real per capita federal spending identical in all provinces (model structure makes level of real per capita spending chosen irrelevant) |
| (5) | Per capita education spending | Real per capita education spending identical in all provinces (model structure makes level of real per capita spending chosen irrelevant) |
| (6) | Provincial income tax rates | Provincial piggyback rate set equal to the nine-province average in all provinces for each year. Quebec treated like provinces that are signatories to the tax collection agreement with the federal government. |
| (7) | Social assistance benefits | Annual social assistance benefits set equal to the ten-province average in all provinces for each year |
| (8) | All policy variables | Combination of (3), (4), (5), (6), and (7) |
| (9) | Average weekly earnings | Average weekly earnings set equal to Canadian Industrial Composite value in all provinces for each year. Foregone wage costs of moving adjusted accordingly. |
| (10) | Probabilities of states of the world | For each province, probabilities computed for the aggregate of the ten provinces for each year were used. UI benefits in each state of the world re-computed, using actual guidelines, under assumption that unemployment rate equal to Canadian average value in all ten provinces for each year. |
| (11) | Moving costs | All moving costs set equal to zero: *C* = *DIST* = *DSTAY* for all *i* and *j* and all years |

It should be noted that although the simulations cover a 19-year period, they are not dynamic. Rather, in each year the same policy change is treated as if it were being introduced that year for the very first time. The average changes reported can thus be viewed as the average impact effect of introducing the policy change. We chose to focus on average impact effects for two reasons: first, the inability of all versions of the model estimated to do a good job of explaining year-to-year fluctuations in migration flows; and second, the fact that our model does not allow us to predict the effects of migration flows on such determinants of migration such as average weekly earnings or the probabilities of the states of the world.

[30] See Day and Winer (2001) for more detailed simulation results, including the impact on total inflows and total outflows for each province.

## 5.1 Effects on the volume of migration

First we consider the effect of eliminating regional differences in the explanatory variables on the volume of interprovincial migration. Table 6 presents the change in the total number of migrants relative to the base case (the status quo), in both absolute and percentage terms, for the eleven different simulations that were carried out using Models 1 and 2. The change in the volume of migration is computed by summing gross outflows across provinces for each income class.

A comparison across simulations of the percentage change in the total number of migrants, shown in the lower panels of the tables, indicates that moving costs are by far the single most important determinant of the volume of migration in Canada, easily dominating the role of the employment probabilities by two or three orders of magnitude. In turn, the role of the probabilities of the states of the world dominates the role of average weekly earnings, by up to an order of magnitude (depending on the model used). All the policy variables considered together play a role that is somewhat larger than that of wages for Model 1 (4.82% vs. 3.33%), and about 1/3 as much as wages for Model 2. The difference in results between models for this simulation likely stems from the role of federal spending, which has a bigger percentage impact on mobility for Model 1 (2.36%) than for Model 2 (0.32%).

Individually, the remaining policy variables, including the UI variables, play a much less important role (except for federal spending in Model 1). Provincial tax rates have an effect that, for each income class, is more or less the same for the two models. It is interesting to note that in the case of tax rates, the overall change in the number of migrants is smallest for the high income group.

The effect of eliminating regional differences in qualifying weeks for UI (*MIN* ) has a uniformly small effect compared to, say, the effect of eliminating regional variation in wages in both models. The volume of migration is still relatively unchanged even when **all** regional variation is eliminated from the UI system, a policy change that likely is at the extreme end of feasible reforms. While there are some differences across income classes, in all cases the gross change in the number of migrants is quite small when compared to that for average weekly earnings or for the probabilities of the various employment states.

Table 6: **Effect on Volume of Migration of Elimination of Regional Variation**

| | Model 1 | | | | Model 2 | | | |
|---|---|---|---|---|---|---|---|---|
| **Variable** | Low Income | Middle Income | High Income | Total | Low Income | Middle Income | High Income | Total |
| Change in number of interprovincial migrants [a] | | | | | | | | |
| MIN | 59 | 63 | -2 | 120 | 8 | 4 | 2 | 14 |
| Regional extended benefits | 143 | 248 | 46 | 437 | 19 | 10 | 1 | 30 |
| MIN and regional extended benefits | 176 | 328 | 649 | 1,153 | 22 | 13 | 1 | 37 |
| Per capita federal spending | 727 | 2,040 | 1,175 | 3,941 | 302 | 217 | 9 | 528 |
| Per capita education spending | 61 | -5 | -164 | -108 | 218 | 323 | 62 | 603 |
| Provincial income tax rates | -307 | -176 | -43 | -527 | -153 | -148 | -29 | -331 |
| Social assistance benefits | -142 | -227 | -127 | -496 | -59 | -115 | -35 | -209 |
| All policy variables | 1,455 | 4,159 | 2,428 | 8,042 | 368 | 197 | 27 | 592 |
| Average weekly earnings | 1,087 | 2,888 | 1,588 | 5,563 | 369 | 1,262 | 386 | 2,016 |
| Probabilities of states of the world | 14,102 | 26,779 | 15,104 | 55,984 | 812 | 2,828 | 2,816 | 6,455 |
| Moving costs | 1,773,054 | 3,120,010 | 3,378,924 | 8,271,988 | 1,774,272 | 3,155,662 | 3,382,173 | 8,312,106 |
| Change in number of interprovincial migrants as percentage of base case [b] | | | | | | | | |
| MIN | 0.12 | 0.10 | -0.00 | 0.07 | 0.02 | 0.01 | 0.00 | 0.01 |
| Regional extended benefits | 0.28 | 0.39 | 0.09 | 0.26 | 0.04 | 0.02 | 0.00 | 0.02 |
| MIN and regional extended benefits | 0.34 | 0.52 | 1.24 | 0.69 | 0.04 | 0.02 | 0.00 | 0.02 |
| Per capita federal spending | 1.41 | 3.22 | 2.25 | 2.36 | 0.59 | 0.34 | 0.02 | 0.32 |
| Per capita education spending | 0.12 | -0.01 | -0.31 | -0.06 | 0.42 | 0.51 | 0.12 | 0.36 |
| Provincial income tax rates | -0.60 | -0.28 | -0.08 | -0.32 | -0.30 | -0.23 | -0.06 | -0.20 |
| Social assistance benefits | -0.28 | -0.36 | -0.24 | -0.30 | -0.12 | -0.18 | -0.07 | -0.13 |
| All policy variables | 2.83 | 6.57 | 4.65 | 4.82 | 0.72 | 0.31 | 0.05 | 0.35 |
| Average weekly earnings | 2.12 | 4.56 | 3.04 | 3.33 | 0.72 | 1.99 | 0.74 | 1.21 |
| Probabilities of states of the world | 27.44 | 42.33 | 28.89 | 33.54 | 1.58 | 4.46 | 5.38 | 3.86 |
| Moving costs | 3,449.48 | 4,931.71 | 6,463.77 | 4,955.07 | 3,447.68 | 4,977.51 | 6,462.08 | 4,971.36 |

Notes:
[a] Number of migrants = sum across provinces of gross out-migration flows.
[b] Base case is sum of predicted out-migration flows from Model 1 or Model 2 respectively.

## 5.2 Effects on the pattern of migration

Even if regional dispersion in policy variables has little effect on the volume of migration, it may still affect the pattern of migration, or the distribution of the population across regions. Table 7 summarizes the effect of the simulations on the pattern of interprovincial migration, for all income classes taken together. In most cases, the signs of the coefficient estimates tell us something about the effect of regional variation on the pattern of migration flows. For example, as long as the coefficient of INCOME is positive, the elimination of regional variation in provincial income tax rates will tend to increase net in-migration to provinces where tax rates are relatively high, and reduce net in-migration to provinces where tax rates are relatively low. Indeed, this is exactly what happens for both Model 1 and Model 2: net in-migration rises for the high-tax provinces of Quebec, Newfoundland, New Brunswick, and Nova Scotia, while net in-migration to all other provinces decreases. Similarly, the elimination of regional variation in average weekly earnings (column (9) of Table 7) reduces net in-migration to the relatively high-wage provinces of Ontario, Alberta, British Columbia, and Quebec, and raises net in-migration to all other provinces.

In other cases, the signs of the coefficient estimates alone are not sufficient to tell us what the outcome of the simulations will be. The two simulations involving the UI parameter *MIN* are a case in point. The sign of the derivative of the migration rate with respect to $MIN_j$, given in equations (18) and (19) below, is in fact ambiguous:

$$\frac{\partial P_{ij}}{\partial MIN_k} = -P_{ij}P_{ik}\left\{\frac{\alpha_1\pi_{k_3}}{INC_{ik3}}\left[w_k(1-\tau_{ik3}) - \frac{\overline{SA}_k}{52}\right] - \frac{\alpha_2\pi_{k3}}{(T-MIN_k)}\right\}, \qquad k \neq j \qquad \textbf{(18)}$$

$$\frac{\partial P_{ij}}{\partial MIN_j} = P_{ij}(1-P_{ij})\left\{\frac{\alpha_1\pi_{j_3}}{INC_{ij3}}\left[w_j(1-\tau_{ij3}) - \frac{\overline{SA}_j}{52}\right] - \frac{\alpha_2\pi_{j3}}{(T-MIN_j)}\right\} \qquad \textbf{(19)}$$

Table 7: **Effect on the Pattern of Migration of Elimination of Regional Variation: Percentage Change in Net In-Migration**

| | Simulation | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Province** | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| **Model 1** | | | | | | | | | | | |
| NFLD | -35.4 | -50.9 | -69.2 | 26.5 | -2.8 | 22.6 | -0.3 | -80.9 | 9.4 | 1,690.7 | 12,433.9 |
| PEI | -254.7 | -318.0 | -458.1 | -1710.4 | 21.4 | -26.9 | -17.6 | -2,896.4 | 2,295.4 | 9,267.5 | 172,443.3 |
| NS | -17.0 | -138.1 | -128.1 | -2548.7 | 37.5 | 27.8 | -17.0 | -3,115.7 | 872.9 | 2,560.1 | 96,255.5 |
| NB | -184.8 | -394.6 | -414.8 | -676.1 | 90.9 | 136.1 | 57.1 | -1,681.2 | 1,003.8 | 11,489.1 | 142,936.9 |
| QUE | -1.2 | -14.0 | -13.5 | 90.3 | -3.6 | 70.3 | 1.7 | 160.5 | -10.1 | 238.8 | -22,249.9 |
| ONT | 106.9 | 251.0 | 258.1 | -139.4 | -28.0 | -279.1 | -12.5 | -612.6 | -880.5 | -6,586.7 | -169,860.5 |
| MAN | 7.0 | 14.8 | 18.2 | -78.9 | 4.5 | -0.1 | -1.2 | -84.4 | 84.3 | -277.8 | 8825.4 |
| SASK | 9.6 | 30.3 | 36.9 | 121.1 | 3.3 | -8.2 | 1.1 | 172.5 | 137.6 | -498.6 | 13,426.2 |
| ALTA | 13.7 | 27.3 | 36.2 | 297.9 | -19.0 | -99.1 | 3.5 | 761.0 | -174.2 | -1,153.4 | 18,972.8 |
| BC | -0.6 | -2.4 | -2.2 | 32.4 | 1.7 | -3.8 | -0.7 | 28.3 | -32.0 | 34.7 | 5,468.7 |
| **Model 2** | | | | | | | | | | | |
| NFLD | -2.0 | -4.1 | -4.7 | -18.5 | -9.5 | 9.9 | -0.2 | -19.5 | 4.2 | 337.9 | 12,832.1 |
| PEI | -24.4 | 11.6 | -27.2 | 987.6 | 93.0 | -11.4 | -7.6 | 1,612.7 | 964.8 | 2,701.9 | 163,885.7 |
| NS | -0.8 | -7.7 | -9.7 | 1391.4 | 193.0 | 12.6 | -7.5 | 1,034.0 | 363.2 | 964.1 | 91,438.7 |
| NB | -10.9 | -47.3 | -41.0 | 350.0 | 423.5 | 58.2 | 25.2 | 467.5 | 416.2 | 3,662.1 | 136,651.2 |
| QUE | -0.1 | -0.8 | -0.7 | -46.3 | -20.7 | 29.4 | 0.8 | 3.2 | -4.3 | 171.2 | -23,064.5 |
| ONT | 16.8 | 48.2 | 52.4 | 39.4 | -146.1 | -115.8 | -5.4 | -1,077.2 | -363.5 | -1,829.2 | -170,350.1 |
| MAN | 0.3 | 0.9 | 1.0 | 37.7 | 24.1 | -0.1 | -0.5 | 11.5 | 34.6 | -38.4 | 9,176.3 |
| SASK | 0.6 | 2.4 | 2.7 | -65.6 | 19.5 | -3.5 | 0.4 | 49.4 | 56.9 | -211.7 | 14,011.6 |
| ALTA | 0.6 | 1.7 | 1.8 | -151.9 | -116.5 | -42.2 | 1.5 | 232.4 | -72.6 | -889.0 | 22,943.1 |
| BC | 0.0 | -0.1 | -0.1 | -15.9 | 12.2 | -1.6 | -0.3 | -24.4 | -13.4 | 48.3 | 5,409.8 |

Simulations:

(1) *MIN*
(2) Regional extended benefits
(3) *MIN* and regional extended benefits
(4) Per capita federal spending
(5) Per capita education spending
(6) Provincial income tax rates
(7) Social assistance benefits
(8) All policy variables
(9) Average weekly earnings
(10) Probabilities of states of the world
(11) Moving costs

As shown by (19) – a similar argument applies to (18) – an increase in $MIN_j$ will have two effects on migration from *i* to *j*: first, since individuals must work longer to qualify for unemployment insurance benefits in state 3, their wage income will rise and their social assistance income will fall. As long as the after-tax wage exceeds average weekly SA benefits (recall that individuals in state 3 are assumed to go on social assistance when insurance benefits end),[31] and the coefficient $\alpha_1$ is positive, this effect will tend to increase inflows to region or province *j*. Second, the individual's leisure time will fall. If $\alpha_2$ is also positive, this effect will tend to reduce inflows to province *j*. The larger is $\alpha_2$ relative to $\alpha_1$, or in other words, the stronger is the individual's preference for leisure relative to consumption, the more likely it is that the net effect will be negative so that on balance, people leave the region where the insurance system becomes less generous.

When regional variation in *MIN* is eliminated over the 1978-1996 period, *MIN* rises in the Atlantic provinces, Quebec, and British Columbia, where it previously was lowest. The results in Table 7 show that in these provinces, net in-migration falls as a result of this hypothetical policy change. Net in-migration rises in the remaining provinces, which experience a decrease in *MIN*. Similar results are obtained when regional extended benefits are eliminated, both alone and in conjunction with the elimination of variation in *MIN*.[32]

The elimination of all policy variation – an unlikely policy scenario in a federal country like Canada – has more substantial consequences for the regional distribution of population than the individual policy simulations. In both models, Ontario is a net loser of population in this simulation, while the pattern across the other provinces varies with the model employed. The implication is that regional variation in public policy in the country as a whole over the last two decades has not been accomplished at Ontario's expense.

Finally, to complete the discussion of the effects of policy on the pattern of migration, it is interesting to examine the effect of the elimination of moving costs. As column (11) indicates, the result is to redistribute people away from the two central provinces, Ontario and Quebec, to

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31 No waiting period for the receipt of social assistance is allowed for in this calculation.

32 It should be noted that for the high income group using Model 2, the coefficient of LEISURE is negative, which has the effect of reversing the direction of the effects of eliminating regional variation in *MIN* and regional extended benefits. But the direction of the aggregate effects for all income classes together, while an order of magnitude larger in Model 1 than in Model 2, is still the same.

the periphery of the country. This result does not imply that in the absence of moving costs, Ontario and Quebec are less attractive overall than the other provinces; rather it is simply a consequence of the fact that Ontario and Quebec have the largest populations. Consequently, a small increase in the rate of out-migration from either of these provinces can lead to a bigger outflow of people than a large change in the rate of out-migration from one of the smaller provinces.

## 5.3 An assessment of the consequences of regional variation in policy variables

A number of authors, in particular Courchene (1970, 1978), have suggested that the phenomenon of policy-induced migration may exacerbate regional disparities in unemployment rates in Canada by making high- unemployment regions more attractive than they otherwise would be. However, to our knowledge, no empirical study has directly examined this issue.

Because we model only migration behaviour, we cannot say anything conclusive about the impact of migration on labour market behaviour. But we can estimate the change in provincial unemployment rates resulting from the simulations reported above if we make some assumptions about the impact of migration on unemployment. Accordingly, we assume that all out-migrants from a province were previously unemployed, while all in-migrants to the province will end up employed. Then the change in in-migration will always equal the change in employment, while the change in out-migration will equal the change in unemployment.

This pair of assumptions represents the most favourable outcome possible in terms of the impact effect of migration on unemployment rates. In fact, some interprovincial migrants will likely be moving from one job to another, while others will be unemployed in both province of origin and province of destination. Thus calculations based on these assumptions are likely to over-estimate any reduction in unemployment rates that might result from the elimination of regional variation in policy and other variables.

Table 8: **Hypothetical Unemployment Rates Resulting from Elimination of Regional Dispersion (average 1978-1996)**[a]

| Simulation | NFLD | PEI | NS | NB | QUE | ONT | MAN | SASK | ALTA | BC |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | | | | | | | | | | |
| MIN | 16.7 | 13.7 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.4 | 7.4 | 9.6 |
| Regional extended benefits | 16.6 | 13.6 | 11.2 | 11.9 | 10.8 | 7.4 | 7.2 | 6.4 | 7.4 | 9.6 |
| MIN and regional extended benefits | 16.5 | 13.4 | 11.2 | 11.9 | 10.8 | 7.4 | 7.2 | 6.4 | 7.4 | 9.6 |
| Per capita federal spending | 16.8 | 12.1 | 9.9 | 11.7 | 10.9 | 7.4 | 6.8 | 6.6 | 7.5 | 9.6 |
| Per capita education spending | 16.8 | 13.9 | 11.3 | 12.1 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| Provincial income tax rates | 16.9 | 13.9 | 11.3 | 12.1 | 10.9 | 7.4 | 7.2 | 6.3 | 7.3 | 9.6 |
| Social assistance benefits | 16.8 | 13.9 | 11.3 | 12.1 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| All policy variables | 16.4 | 10.6 | 9.5 | 11.3 | 10.9 | 7.3 | 6.8 | 6.7 | 7.7 | 9.6 |
| Average weekly earnings | 16.7 | 15.0 | 11.5 | 12.2 | 10.8 | 7.3 | 7.3 | 6.6 | 7.2 | 9.5 |
| Probabilities of states of the world | 17.1 | 15.4 | 11.3 | 13.1 | 10.9 | 6.5 | 5.6 | 4.2 | 6.3 | 9.5 |
| Moving costs | -37.9 | -8.1 | -56.3 | -47.2 | -82.9 | -87.6 | -46.3 | -40.9 | -52.4 | -39.0 |
| **Model 2** | | | | | | | | | | |
| MIN | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| Regional extended benefits | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| MIN and regional extended benefits | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| Per capita federal spending | 16.7 | 14.6 | 11.8 | 12.1 | 10.8 | 7.4 | 7.3 | 6.1 | 7.3 | 9.5 |
| Per capita education spending | 16.8 | 14.0 | 11.4 | 12.2 | 10.8 | 7.4 | 7.2 | 6.4 | 7.3 | 9.6 |
| Provincial income tax rates | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| Social assistance benefits | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |
| All policy variables | 16.7 | 15.0 | 11.7 | 12.2 | 10.8 | 7.3 | 7.2 | 6.5 | 7.6 | 9.5 |
| Average weekly earnings | 16.8 | 14.4 | 11.4 | 12.1 | 10.8 | 7.4 | 7.2 | 6.4 | 7.3 | 9.5 |
| Probabilities of states of the world | 17.6 | 15.3 | 11.6 | 12.9 | 10.9 | 7.2 | 7.0 | 5.6 | 6.8 | 9.7 |
| Moving costs | -37.4 | -7.9 | -55.6 | -46.5 | -87.5 | -87.8 | -45.5 | -40.1 | -49.7 | -39.3 |
| Actual average unemployment rate [b] | 16.8 | 13.9 | 11.3 | 12.0 | 10.8 | 7.4 | 7.2 | 6.3 | 7.4 | 9.6 |

**Notes:** [a] Hypothetical unemployment rates were computed under the assumptions that all out-migrants from a province were unemployed prior to moving, and that all in-migrants would be employed after moving. Total employment and unemployment for both sexes aged 20-64, obtained from CANSIM (see Appendix), were used as the basis for the calculations. For each simulation average employment over the 1978-1996 period was computed as actual average employment plus the change in in-migration, while average unemployment was computed as actual average unemployment less the change in out-migration. The average unemployment rate was then computed as the ratio of average unemployment to the sum of average employment and average unemployment. The calculations were done using the simulation results for Model 1, based on the parameter estimates for income classes for 1974-1996.

[b] The actual average unemployment rate was constructed using the average annual values of employment and unemployment over the 1978-1996 period. It is very similar in magnitude to the average of annual unemployment rates over this period.

The results of our calculations of the impact of eliminating regional variation in selected variables on provincial unemployment rates are presented in Table 8. As in the case of the simulations, only the average unemployment rate for the 1978-1996 period – computed using average employment and average unemployment data for the period for individuals of both sexes aged 20-64 – is presented. The calculations are carried out using the simulation results for Models 1 and 2, summed over all income classes, derived from the coefficient estimates in Table 2. The actual average unemployment rate for each province during the period is also presented.

Mirroring the results in Table 7, the hypothetical unemployment rate calculations for both models indicate that the elimination of moving costs has by far the largest impact on unemployment Indeed, the hypothetical unemployment rates for this simulation are actually negative, reflecting the fact that the simulated increase in the volume of out-migration exceeded the actual level of unemployment in all provinces. One interpretation of this result is that the elimination of moving costs would encourage many individuals not currently included in Statistics Canada's measure of the labour force to make interprovincial moves.

Turning to the other ten simulations, it can be seen that their effects on average unemployment rates are generally not big, even for Model 1 for which changes in migration flows tend to be largest. One simulation which seems to have a greater impact on average unemployment rates than most of the others is that in which regional variation in the probabilities of the states of the world is eliminated, but the effect is different for different provinces. Both Models 1 and 2 predict increases in average unemployment rates for all the Atlantic provinces except Nova Scotia under this scenario, with the largest increase being 1.5 percentage points for Prince Edward Island in the case of Model 1. Both models also predict that this scenario will lead to decreases in unemployment rates in Ontario, Manitoba, Saskatchewan, and Alberta, with the largest decrease being 2.1 percentage points for Saskatchewan under Model 2.

The only other simulations which result in changes of more than one percentage point in average unemployment rates are the elimination of regional variation in per capita federal spending and the elimination of regional variation in all policy variables. However, the relatively large negative effect of the latter simulation on unemployment rates in Nova Scotia and Prince Edward Island under Model 1 (decreases of 1.8 and 3.3 percentage points respectively) appears to be related to the positive coefficients on per capita federal spending for Model 1. For Model 2, where the coefficients on per capita federal spending are negative, the elimination of regional variation in all policy variables actually increases unemployment rates in these provinces, rather than reducing them.

Finally, it is important to note that even in the case of Model 1, which yields the largest changes in migration flows when regional variation in the unemployment insurance system is eliminated, the impact on average unemployment rates of the elimination of this variation is small. The Model 1 results lead to changes in unemployment rates only in the four Atlantic provinces, with the largest decrease in unemployment rates being half a percentage point in Prince Edward Island. Under Model 2, average unemployment rates in all ten provinces are completely unaffected by the elimination of regional variation in unemployment insurance. It should also be remembered that the policy change introduced – the complete elimination of regional policy variation – is very large, so that half a percentage point is likely to be an upper bound for the effects of marginal policy changes in the UI system that may occur in the future.

# 6. Conclusions and Suggestions for Further Research

Modelling gross interprovincial migration flows is a challenging task. In a study of policy-induced migration, the dependence of unemployment insurance benefits on provincial unemployment rates makes it hard to distinguish their separate influences on migration behaviour. To reach conclusions regarding the importance of unemployment insurance and other public polices on interprovincial migration flows, we estimate two variants of a basic migration model, and we rely upon simulations that explore the effects of eliminating regional dispersion in key determinants of migration behaviour. The results with respect to policy variables are placed into perspective by simulating the consequences of the elimination of regional variation in wages, employment prospects and moving costs. Previous studies of fiscally-induced migration have not placed much, if any, emphasis on carrying out such simulations.

As a whole, the results confirm that the major determinants of interprovincial migration are differentials in earnings, employment prospects and moving costs, with moving costs being the most important of the three. The average annual impact of the public policies considered here on the volume of migration – that is, on the total number of Canadians who make interprovincial moves – is small. The estimated models predict that the elimination of both regional extended benefits and regional differences in qualifying requirements for unemployment insurance would have increased the volume of migration by less than 1%. Even the simultaneous elimination of regional variation in all the policy variables included in the analysis (unemployment insurance, personal income taxes, social assistance and provincial and federal spending on goods and services) is predicted to raise the volume of migration by at most 5%, or by less than half a percentage point, depending on the specific model used. By way of contrast, the estimates indicate that the complete elimination of moving costs would raise the volume of migration by 5,000%.

To further explore the nature of the relationship between public policies, migration, and provincial unemployment rates, we calculated hypothetical average unemployment rates that might have been observed in the absence of any regional policy differences. These calculations suggest that regional differences in public policies have had very little impact on regional disparities in unemployment rates in Canada. One explanation for this result is that the sort of policy changes we have experienced over the last three decades have not been large enough to overcome the costs of moving away from 'home.'

Although regional differences in public policies may not have had a large impact on interprovincial migration, our results indicate that some extraordinary public policy events did. The events surrounding and following the election of the separatist Parti Québecois government in Québec in the second half of the 1970s, and the closing of the cod fishery in Atlantic Canada in 1992 appear to have had substantial consequences for interprovincial migration. These results suggest that one must be careful to distinguish between the effects of marginal changes in policy, and the effects of large, discrete changes which may swamp the retarding influence of even high fixed moving costs. While marginal changes in the unemployment insurance system between 1974 and 1996 may not have important consequences for interregional migration or regional unemployment rates, complete elimination of this system of income support, which is more important on average to people in poorer regions, is not a shock that is represented in the data, and the effects of such an extraordinary policy change cannot be inferred from our results.

If the transfer dependency thesis is to retain its currency, then, it appears necessary to interpret it in the light of our finding that marginal changes in policy variables of the sort experienced since 1974 are not associated with substantial changes in migration patterns. To do so, one might focus on the differential effects across regions that (may) result from the *existence* of income support programs, as distinct from the effects of marginal changes in these programs, even when they are uniformly supplied across the country. It also seems wise to consider alternative explanations for the persistence of regional disparities in which migration does not play its classical role of equalizing opportunity because of high fixed moving costs.[33]

Several avenues for further research are suggested by the paper, and we conclude by briefly noting some of them. It is clear that there is room for additional work on models of interprovincial migration that are better able to predict year-to-year changes in migration flows. This work should include more detailed treatment of the effects of important social and political

[33] On this point, see also Emery (1999). In such an alternative to the transfer dependency hypothesis, public policies of various kinds, even when uniformly applied across the country, may influence regional disparities by inducing shifts from work to leisure that are more pronounced in poorer parts of the country. But the consequences of public policy for interregional migration will not play a fundamental role in such an alternative view, perhaps because of the existence of large fixed migration costs.

events in Quebec and of the events surrounding the closing of the east coast cod fishery. It would also be desirable to find new ways of dealing with the collinearity of UI variables and employment prospects when modelling the effects of public polices.

A model of interregional migration in which migration and labour market behaviour and performance are all endogenously determined remains on the research agenda.[34] And the role of intergovernmental grants in determining migration patterns also remains to be uncovered, a task that will likely require that the measurement of the net benefits of public services be improved so that a model of the effects of grants on provincial fiscal decisions may be combined with a model of policy-induced migration. Finally, in view of the importance of moving costs revealed here, further attention to the measurement and role of such costs in migration will be worthwhile. We hope that the present work, and the associated working paper containing the full data appendixes, will be of help to those who wish to address any of these interesting projects in the future.

[34] The work of Rosenbluth (1996) will be helpful in this respect.

# Appendix

This Appendix provides further details regarding data sources for the explanatory variables. As in the text, the subscripts *i*, *j*, and *s* refer, respectively, to province of origin *i*, province of destination *j*, and state of the world *s ( =1,2,3,4)*. Time subscripts apply to all variables but have been omitted for convenience. A more extensive set of data appendixes is provided in Day and Winer (2001). The discussion below is based on Appendix A of the much longer working paper.

### *A.1 Variables related to unemployment insurance*

The variables $MIN_j$, $MINWKS_j$, and $MXYR_j$ all depend on the provisions of the Unemployment Insurance Act and were computed under the assumption that each province constituted a single UI region. Thus qualifying weeks and weeks of benefits were based on the provincial unemployment rates published by Statistics Canada. Legislative changes during the sample period were taken into account. Data on national and provincial unemployment rates were obtained from CANSIM (series D44950, D44971, D44992, D45013, D45034, D45055, D45076, D45097, D45118, D45139, and D45160). Information on $\rho$, the benefit replacement rate for unemployment insurance, was obtained from Statistics Canada catalogue 73-202S, *Unemployment Insurance Statistics 1995*, p. 50, for the period 1966-1994, and from Marcel Bédard of HRDC for 1995 and 1996. The values used for 1971 and 1996, years in which important legislative changes occurred, were computed as simple averages of the new and old values. Information on Maximum weekly Insurable Earnings (or MIE) was obtained from Lin (1998) for the period 1972-1996. Again, due to legislative changes, the value used for 1993 was computed as 0.25 times the new value plus 0.75 times the old value, while that for 1994 was computed as a simple average of the old and new values. This information was combined with data on average weekly earnings to construct UI benefits and $w_j^R$,the replaceable wage, which was defined as follows:

$$w_j^R = \begin{cases} w_j, & w_j < MIE \\ MIE, & w_j \geq MIE \end{cases}.$$

For further details on the construction of these variables, see Appendix D of Day and Winer (2001).

### *A.2 Probabilities of the states of the world*

The variables $p_{20+}^j$ and $p_{<20}^j$ were constructed from special tabulations of data on UI recipients by age, sex, and length of benefit period, provided by Marcel Bédard of HRDC. Data on employment and the number of recipients of regular UI benefits in each province were obtained from Statistics Canada. For the fiscal years 1981/82 to 1996/97, the number of recipients of social assistance benefits was assumed to equal the number of SA cases, provided to us by Anne Tweddle of HRDC. For earlier years, the number of SA recipients was computed as the number of SA beneficiaries multiplied by the province-specific average ratio of cases to beneficiaries for the fiscal years 1980/81 and 1981/82. The fiscal year data were converted to a calendar year basis by assuming a uniform distribution over the quarters. For further details regarding the exact data sources and calculations, see Appendix C of Day and Winer (2001).

### *A.3 Government expenditure variables*

$HEALTH_j$ is consolidated provincial and local government spending on health in province j divided by $POP_j * q_j$; $EDUCATION_j$ is consolidated provincial and local government spending on education in province j divided by $POP_j * q_j$; and OTHER $SPENDING_j$ is total consolidated provincial and local government spending less the sum of consolidated provincial and local government spending on health, education, social services, and debt charges in province j, all divided by $POP_j * q_j$. $POP_j$ and $q_j$ are defined in section A.4 below. Consolidated provincial and local government spending data, for the fiscal year ending March 31st, were obtained from CANSIM for the period 1966-1995. These data were converted to a calendar year basis by taking weighted averages of spending for each pair of years as follows:

$$EXP_t^{CY} = 0.25 EXP_t^{FY} + 0.75 EXP_{t+1}^{FY} ,$$

where $EXP_t$ is government expenditure in year *t*, *CY* indicates calendar year data, and *FY* stands for fiscal year data.

A change in the definition of the government sector introduced by Statistics Canada in 1997 resulted in a break in the fiscal year data in 1996. The 1996 data on the new basis were converted to the old basis by multiplying the 1996 value on the new basis by the ratio of the 1995 value on the old basis and the 1995 value on the new basis, for each series retrieved. The CANSIM matrix and series numbers for both the old and the new (post-revisions) series retrieved are given in the tables below.

**CANSIM matrix and series numbers for consolidated provincial/local government spending data, old basis**

| Province | Matrix | Health | Education | Social Services | Debt Charges | Total Spending |
|---|---|---|---|---|---|---|
| NFLD | 2808 | D465283 | D465285 | D465284 | D465294 | D465279 |
| PEI | 2809 | D465324 | D465326 | D465325 | D465335 | D465320 |
| NS | 2810 | D465365 | D465367 | D465366 | D465376 | D465361 |
| NB | 2811 | D465406 | D465408 | D465407 | D465417 | D465402 |
| QUE | 2812 | D465447 | D465449 | D465448 | D465458 | D465443 |
| ONT | 2813 | D465488 | D465490 | D465489 | D465499 | D465484 |
| MAN | 2814 | D465529 | D465531 | D465530 | D465540 | D465525 |
| SASK | 2815 | D465570 | D465572 | D465571 | D465581 | D465566 |
| ALTA | 2816 | D465611 | D465613 | D465612 | D465622 | D465607 |
| BC | 2817 | D465652 | D465654 | D465653 | D465663 | D465648 |

| CANSIM matrix and series numbers for consolidated provincial/local government spending data, new basis | | | | | | |
|---|---|---|---|---|---|---|
| **Province** | **Matrix** | **Health** | **Education** | **Social Services** | **Debt Charges** | **Total Spending** |
| NFLD | 8182 | D482602 | D482613 | D482607 | D482627 | D482598 |
| PEI | 8183 | D482667 | D482678 | D482672 | D482692 | D482663 |
| NS | 8184 | D482732 | D482743 | D482737 | D482757 | D482728 |
| NB | 8185 | D482797 | D482808 | D482802 | D482822 | D482793 |
| QUE | 8186 | D482862 | D482873 | D482867 | D482887 | D482858 |
| ONT | 8187 | D482927 | D482938 | D482932 | D482952 | D482923 |
| MAN | 8188 | D482992 | D483003 | D482997 | D483017 | D482988 |
| SASK | 8189 | D483057 | D483068 | D483062 | D483082 | D483053 |
| ALTA | 8190 | D483122 | D483133 | D483127 | D483147 | D483118 |
| BC | 8191 | D483187 | D483198 | D483192 | D483212 | D483183 |

Similarlily, *FEDERAL SPENDING*$_j$ is defined as federal government current expenditure on goods and services plus investment in fixed capital and inventories less capital consumption allowances, all divided by $POP_j * q_j$. For the period 1966-1995, these data were obtained from the Provincial Economic Accounts via CANSIM. A change in the definition of the government sector introduced by Statistics Canada in 1997 resulted in a break in the series in 1996. 1996 data on the old basis were provided by Dan Finnerty of the Income and Expenditure Accounts Division, Statistics Canada, for federal government current expenditure on goods and services. 1996 values for investment in fixed capital and inventories and capital consumption allowances were constructed by multiplying the 1996 value on the new basis by the ratio of the 1995 value on the old basis and the 1995 value on the new basis. The CANSIM matrix and series numbers for both the old and new series used are given in the tables below.

| CANSIM matrix and series numbers for federal government spending data, old basis | | | | |
|---|---|---|---|---|
| **Province** | **Matrix** | **Current Expenditure on Goods and Services** | **Investment in Fixed Capital and Inventories** | **Capital Consumption Allowances** |
| NFLD | 6757 | D13233 | D13243 | D13242 |
| PEI | 6758 | D13253 | D13263 | D13262 |
| NS | 6759 | D13273 | D13283 | D13282 |
| NB | 6760 | D13293 | D13303 | D13302 |
| QUE | 6761 | D13313 | D13323 | D13322 |
| ONT | 6762 | D13333 | D13343 | D13342 |
| MAN | 6763 | D13353 | D13363 | D13362 |
| SASK | 6764 | D13373 | D13383 | D13382 |
| ALTA | 6765 | D13393 | D13403 | D13402 |
| BC | 6766 | D13413 | D13423 | D13422 |

| CANSIM matrix and series numbers for federal government spending data, new basis | | | |
|---|---|---|---|
| **Province** | **Matrix** | **Investment in Fixed Capital and Inventories** | **Capital Consumption Allowances** |
| NFLD | 9071 | D25804 | D25801 |
| PEI | 9072 | D25827 | D25824 |
| NS | 9073 | D25850 | D25847 |
| NB | 9074 | D25873 | D25870 |
| QUE | 9075 | D25896 | D25893 |
| ONT | 9076 | D25919 | D25916 |
| MAN | 9077 | D25942 | D25939 |
| SASK | 9078 | D25965 | D25962 |
| ALTA | 9079 | D25988 | D25985 |
| BC | 9080 | D26011 | D26008 |

### *A.4 Other variables*

$INT_I$ interest, dividend, and miscellaneous investment income in province i Source: CANSIM series D43205 (NFLD), D43221 (PEI), D43237 (NS), D43252 (NB), D43269 (QUE), D43285 (ONT), D43301 (MAN), D43317 (SASK), D43333 (ALTA), D44454 (BC).

$B_{is}$ Per capita interest, dividend and miscellaneous investment income in states 1, 2, and 3. ($B_{i4}$ is zero in state 4), = $INT_i$ / $POP_{i.}$ .

$POP_I$ population of province i. Source: CANSIM series D2 (NFLD), D3 (PEI), D4 (NS), D5 (NB), D6 (QUE), D7 (ONT), D8 (MAN), D9 (SASK), D10 (ALTA), D11 (BC).

$q_j$ price of consumption goods in region j. All-items regional city consumer price index for one major city in each province, 1986=100. The cities chosen were St. John's, NFLD; Charlottetown, PEI; Halifax, NS; Saint John, NB; Montreal, QUE; Toronto, ONT; Winnipeg, MAN; Saskatoon, SASK; Edmonton, ALTA; and Vancouver, BC. Source for cities other than Charlottetown: 1966-1971, Winer (19??); 1972-1996, CANSIM series P816000 (St. John's), P816400 (Halifax), P816600 (Saint John), P817000 (Montreal), P817400 (Toronto), P817800 (Winnipeg), P818200 (Saskatoon), P818400 (Edmonton), P818800 (Vancouver). Source for Charlottetown: 1974-1996, CANSIM series P816200; for the years 1966-1973, the CPI for Charlottetown was assumed to be the same as that for Halifax.

$SA_{j4}$ standard social assistance (SA) benefits in region *j* in state 4, equal to the amount received by a single parent with two children. Source: Pierre Lefebvre. Two series, one for 1950 to 1992 and one for 1973 to 1994, were spliced together by regressing the log of the newer series on the log of the older one, and then predicting values for 1968-1972 comparable to the newer series. Figures for 1995 and 1996 were derived using the figure for 'couple with 2 children' from *Welfare Incomes* (National Council of Welfare, 1995, 1996). These figures for 1995 and 1996 were adjusted downwards by removing the premium payed when there is two spouses. Difference between payment with one as opposed to two spouses calculated using Lefebvre data for 1994.

$TR_j$ transfers from the federal government, excluding unemployment insurance = (Family and youth allowances + Adult occupational training payments + Miscellaneous and other payments) / $POP_i$ . Source: 1968-1995, CANSIM. The CANSIM series and matrix numbers are given in the table below. Data for 1996 on the same basis as the 1968-1995 data were supplied by Dan Finnerty, Income and Expenditure Accounts Division, Statistics Canada. CANSIM matrix and series numbers for these data appear in a table below.

$w_j$ average weekly earnings (including overtime), industrial composite/ aggregate, by province. Source: CANSIM. In 1983 the survey upon which these data are based was modified considerably, resulting in a break in the series. (For further details regarding this change, see "Note to Users" in Statistics Canada catalogue 72-002, *Employment,* *Earnings and Hours*, 1983.) To convert them to the same basis as the new data, the data for 1966-1982 were adjusted using a scale factor equal to the average over the first three months of 1983 of the ratio of the new series to the old series. The CANSIM numbers for both the old and new series are given in a table below.

$DIST_{ij}$ Distance in kilometres between major city in province *i* and major city in province *j*. The major cities selected were St. John's, Newfoundland; Charlottetown, Prince Edward Island; Halifax, Nova Scotia; Saint John, New Brunswick; Montreal, Quebec; Toronto, Ontario; Winnipeg, Manitoba; Regina, Saskatchewan; Calgary, Alberta; and Vancouver, British Columbia. Source: *AAA Road Atlas* (1992), p. 127. The distance between P.E.I. and BC was computed as the sum of the distances between P.E.I. and NB and NB and BC.

$C_{ij}$ $= C1_{ij} + C2_{ij}$

$C1_{ij}$ foregone wage cost of moving from *i* to *j*, defined as equal to 1, 1 and ½, or 2 weeks of foregone earnings, depending on distance travelled.

$$C1_{ij} = \begin{cases} w_i & DIST_{ij} < 1600\ km \\ 1.5w_i & 1600\ km \leq DIST_{ij} < 3200\ km \\ 2w_i & DIST_{ij} \geq 3200\ km \end{cases}$$

$C2_{ij}$ $= AC \cdot DIST_{ij} + RC \cdot DIST_{ij}$. Monetary cost of moving from *i* to *j*, defined as the air plane travel cost for one person for the distance moved plus the rail cost of moving one ton of freight for the same distance

$AC$ passenger revenue per passenger kilometre, air. Source: 1966-1977, unpublished data from Statistics Canada; 1978-1996, Statistics Canada catalogue 51-206.

$RC$ Railway operating revenue per revenue ton-kilometre = railway operating revenue freight/ revenue ton-miles, converted to kilometres. Source: Statistics Canada catalogue 52-216, *Rail in Canada*.

$TAX_{ijs}$ amount of federal-provincial income tax paid by a person moving from *i* into state *s* in *j*, including adjustments for the basic personal deduction/credit. As in the actual tax system, taxable income includes UI benefits but not SA benefits. Moving costs are also tax deductible. Information on tax schedules and provincial tax rates was obtained from various issues of *Taxation Statistics* (a Revenue Canada publication), *The National Finances*, and *The Finances of the Nation* (both of which are publications of the Canadian Tax Foundation). For further details regarding the calculations can be found in Appendix E of Day and Winer (2001).

| **CANSIM Matrix and series numbers for data on government transfer payments to persons, old basis** | | | | |
|---|---|---|---|---|
| **Province** | **Matrix** | **Family and youth allowances** | **Adult occupational training allowances** | **Miscellaneous and other transfers** |
| NFLD | 5068 | D42646 | D42654 | D42655 |
| PEI | 5069 | D42671 | D42679 | D42680 |
| NS | 5070 | D42696 | D42704 | D42705 |
| NB | 5071 | D42721 | D42729 | D42730 |
| QUE | 5072 | D42746 | D42754 | D42755 |
| ONT | 5073 | D42771 | D42779 | D42780 |
| MAN | 5074 | D42796 | D42804 | D42805 |
| SASK | 5075 | D42821 | D42829 | D42830 |
| ALTA | 5078 | D42846 | D42854 | D42855 |
| BC | 6961 | D44344 | D44352 | D44353 |

| **CANSIM numbers for average weekly earnings data** | | |
|---|---|---|
| **Province** | **Old Series (1966M01-1983M03)** | **New Series (1983M01-1996M12)** |
| NFLD | D703300 | L661222 |
| PEI | D703350 | L663101 |
| NS | D703360 | L664926 |
| NB | D703410 | L667585 |
| QUE | D703460 | L670290 |
| ONT | D703660 | L673960 |
| MAN | D704010 | L677569 |
| SASK | D704060 | L680500 |
| ALTA | D704160 | L683346 |
| BC | D704316 | L686578 |
| CANADA | D703000 | L657711 |

Note: Monthly data were converted to annual by taking annual averages.

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