

THE INFLUENCE OF FISCAL INCENTIVES ON INTERREGIONAL MIGRATION: CANADA 1961-78*

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Introduction

A number of recent contributions to the literature on migration have attempted to augment the traditional specification of the human capital model by including variables to account for fiscal incentives for migration. The underlying assumption is that migrants seek to maximize their lifetime consumption streams derived from both private and public goods where the latter is broadly defined to include both true public goods and publicly produced private goods. The failure to account for the provision of broadly defined public goods and the price (tax rates) at which they are provided relative to other jurisdictions represents a serious omission in the analysis of migration, especially when significant differences in the fiscal capacity of regions exist.

Migration is viewed as one mechanism for achieving a better allocation of resources, since it is normally thought to lead to a decline in interregional income differences except for differentials related to real transfer costs. Fiscally induced migration, however, may lead to a misallocation of resources, as it may widen market income differentials. From a policy perspective, knowledge of the existence and level of fiscally induced migration is fundamental in evaluating the efficiency consequences of migration. In this paper

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we extend the work of Cebula [6] and employ a comprehensive specification of the human capital model of migration to analyze interprovincial migration in Canada between 1961 and 1978. The emphasis of the analysis is on ensuring that both market and fiscal incentives for interprovincial migration are fully taken into account.

The justification for including fiscal variables in migration studies, particularly for the United States, is usually made in the context of the Tiebout model [28]. Tiebout hypothesized that voters would migrate between communities in order to obtain the optimal mix of public services and taxation. This "shopping around" by voters among competing municipalities is seen as having the potential of generating a more optimal provision of local public goods. The obvious implication of this model is that migration must be responsive to fiscal differences across possible residential locations.

In Canada there is a more important justification for an interest in the extent to which fiscal variables determine migration. This stems from the importance of federal transfers in the revenues of the "have-not" provinces. Traditionally the argument for transferring funds from the federal to provincial governments has been based on equity—it has been seen as desirable for residents of all provinces to be able to support a normal level of public services at average tax rates. These payments, however, lead to the possibility that labour will be inefficiently allocated across regions. Neo-classical theory suggests that migration is efficient because workers respond to wages and thus move to where their marginal product is greatest. Anything which causes a deviation in this pattern might be seen as reducing efficiency. Thus if one region has a large fiscal residual, workers may move there even though their marginal product, and thus their wage, will be lower because their real income inclusive of fiscal residual will be higher. If this is the case, a transfer of some of the fiscal residual from the destination to the origin region will result in a Pareto improvement.

Courchene [9;10] has argued on this basis that the various federal schemes transferring funds either to governments of have-not provinces or to individuals in those regions has slowed the efficient process of adjustment. There have been two main sets of responses to Courchene's view. One, largely attributable to Graham [15] but more generally based on the work of Myrdal [23], is that migration from low to high income regions does not narrow the income gap but rather widens it. It is argued that migrants are usually drawn from the most productive or innovative members of society, the young or those with higher levels of skill or

training, for example, and that their departure lowers rather than raises average income. This is, first, because these people are the highest paid and, second, because their residence in a region creates "externalities" which raise the incomes of everyone else. If this view is correct, migration from low to high income regions could well lower aggregate income, and thus a system of transfer payments to deter migration would be beneficial.

More recently a different response to Courchene's view has evolved. This is developed in the work of Boadway and Flatters [2] and Wilson, Percy and Norrie [30] and is well surveyed in Winer and Gauthier [31] and in the Economic Council's *Financing Confederation* [12]. In this work it is recognized that there will be a number of sources of fiscal residual other than those resulting from federal transfers. Given that this is the case, federal transfers can be seen as compensating for these other residuals. If, for example, large fiscal residuals from resource revenues lead to excessive, for efficiency, migration to Alberta, then transferring federal funds to other provinces might counteract this. As the Economic Council demonstrates, the system of equalization payments in effect in Canada can to a large extent be seen as compensating for the existence of other fiscal residuals.

Even if this is so, there are still acute differences in fiscal residuals between provinces in Canada because of other forms of transfers from the central government and because equalization payments only partially compensate for the differences in fiscal residual arising from other sources. The differences in surplus per capita between regions and provinces of Canada are large, as Table 1 indicates. The fiscal surplus variable is defined as the per capita difference between provincial government expenditures, net of interest payments on outstanding debt, and those provincial government revenues obtained through the direct and indirect taxation of individuals. Corporate taxes, intergovernmental transfer payments, and resource rents are therefore excluded from the estimates of provincial government revenues but are captured on the expenditure side. This fiscal surplus variable attempts to measure the burden of direct and indirect taxes borne by individuals relative to the value of government goods and services provided in the region. This fiscal surplus, however, can only be appropriated by residence in the region. Hence, if migration does lead to real incomes per capita being equalized across regions, this could only be achieved if the difference in fiscal surplus between regions was offset by an equivalent disparity in market or wage incomes. If one merely focused on market incomes, as much of the migration literature does, it might appear that migration from high to low wage regions was occurring or

that people in low wage areas were not moving in sufficient numbers to high wage areas. Yet from the perspective of the migrant seeking to maximize his expected consumption through time of *both* private and broadly defined public (government) goods, the decision to accept a lower market income in return for a higher fiscal surplus (i.e., more public goods relative to the price [taxes] he paid elsewhere) is quite rational.

Data such as those of Table 1 which include these large resource rental amounts and intergovernmental transfer payments present a particularly important advantage for testing the responsiveness of migration to fiscal variables. The attempts to test the Tiebout hypothesis by testing interjurisdictional migration generally use data from jurisdictions where budgets are close to balanced; i.e., where expenditures must be financed by taxation. This suggests that the incentive to move largely depends not on an imbalance between taxes and public services but rather on a mix of public services and taxes which is attractive to the individual. Because of the nature of our data and the nature of the jurisdictions involved, our study avoids this problem. Resource rents and federal government transfers are sufficiently large and variable so that some provinces have large fiscal surpluses, expenditures which exceed revenues by large amounts.

Table 1
PROVINCIAL FISCAL SURPLUS LEVELS 1961-1978
(Ontario = 100 in each year)

| Year | Atl | Que | Ont | Man | Sask | Alta | BC |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1961 | 109.8 | 89.8 | 100.0 | 122.3 | 112.5 | 205.3 | 131.9 |
| 1962 | 108.0 | 92.2 | 100.0 | 108.1 | 117.3 | 209.4 | 128.1 |
| 1963 | 149.7 | 126.6 | 100.0 | 130.2 | 133.2 | 246.3 | 144.1 |
| 1964 | 154.3 | 138.5 | 100.0 | 138.2 | 152.7 | 225.9 | 146.6 |
| 1965 | 159.6 | 160.2 | 100.0 | 144.8 | 161.6 | 242.8 | 120.8 |
| 1966 | 171.0 | 195.2 | 100.0 | 158.4 | 180.2 | 292.5 | 170.2 |
| 1967 | 229.8 | 153.5 | 100.0 | 165.7 | 158.7 | 311.8 | 144.4 |
| 1968 | 206.6 | 128.8 | 100.0 | 119.2 | 126.4 | 249.2 | 118.9 |
| 1969 | 177.8 | 99.5 | 100.0 | 105.1 | 110.3 | 203.4 | 109.3 |
| 1970 | 169.2 | 113.1 | 100.0 | 112.8 | 130.9 | 213.6 | 131.0 |
| 1971 | 171.1 | 95.2 | 100.0 | 118.6 | 133.7 | 197.6 | 105.2 |
| 1972 | 153.2 | 95.8 | 100.0 | 110.1 | 120.0 | 173.9 | 87.9 |
| 1973 | 150.5 | 92.4 | 100.0 | 115.9 | 133.4 | 168.0 | 101.8 |
| 1974 | 174.7 | 97.8 | 100.0 | 145.1 | 147.6 | 195.3 | 117.3 |
| 1975 | 160.0 | 93.4 | 100.0 | 129.5 | 152.1 | 201.7 | 132.7 |
| 1976 | 142.0 | 93.0 | 100.0 | 115.2 | 131.3 | 189.6 | 132.8 |
| 1977 | 154.1 | 103.9 | 100.0 | 129.2 | 150.0 | 233.2 | 112.7 |
| 1978 | 162.7 | 118.5 | 100.0 | 137.5 | 158.6 | 263.3 | 115.2 |

Sources and Notes: See Data Appendix.

The large-scale nature of the jurisdictions we deal with has the potential to alter the importance of the capitalization of tax-expenditure differences into land rental as a determinant of migration. In small local jurisdictions residential land may be in inelastic supply; thus in a desirable area in-migrants may bid up land until migration into the area is no longer attractive. In larger jurisdictions this is more likely to only hold true in the short run. In the longer run the supply of residential land will be more elastic and thus land rents should not increase by as much. This suggests that a partial adjustment model is appropriate, as a fiscal change could continue to have implications for several periods as the housing market adjusts.

Most work on migration has excluded fiscal variables as arguments. This includes the most well known of the Canadian studies, those by Grant and Vanderkamp [16;17] and by Wraque [32]. Exceptions are the works of Courchene [9] and Winer and Gauthier [31] for Canada, and Bradford and Kelejian [4], Cebula [6] and the attendant comment by Renas [25] for the U.S. These papers, despite certain problems, indicate that fiscal variables are significant determinants of migration. In none of these cases, however, do the fiscal variables represent very well the full fiscal residual; thus the magnitude of the fiscal effect is not well determined. Courchene uses as measures of fiscal transfer payments intergovernmental transfers per labour force member in the sending region, total federal transfers to the sending region as a proportion of that region's total income, and unemployment insurance benefits as a proportion of the origin region's income. Cebula and Renas use welfare and education expenditures as their measure of total expenditure. Both these treatments are based on rather *ad hoc* specifications of the estimating equations. Courchene's estimating equations, for example, contain only information about the fiscal residual in the origin region. Courchene's estimates contain no information about prices at all. Cebula's model places considerable emphasis on price variables, and in particular on house price variables, because of his interest in the extent to which fiscal variables are capitalized into house prices. Renas has suggested, however, that Cebula is adjusting twice for differences by deflating for prices and including housing as an explanatory variable. This problem will be particularly acute if the prices of most traded goods are equalized by market forces, leaving only non-traded goods such as housing to contribute to differences in price levels across jurisdictions.

One of the most comprehensive attempts to include fiscal variables is the recent study done by Winer and Gauthier [31] for the Economic Council of Canada. This study uses a micro data base which, while it presents many advantages, does not allow for cer-

tain things. It restricts their ability to test for partial adjustment and stock flow models of migration. It also forces them to use disaggregated measures of fiscal benefits which, while more comprehensive than Courchene's, may still not represent the full fiscal residual.

We have seen, then, that the papers which have so far incorporated fiscal variables into migration studies have been quite *ad hoc* in their specification of the estimating equation, with the exception of Winer and Gauthier [31]. This has perhaps been necessitated by the unavailability of complete government expenditure data.

The Model

The human capital theory of migration dates from the work of Sjaastad [27] and Schultz [26] and underlies many recent studies of labour migration. Excellent surveys of the literature are provided by Cebula [8] and Greenwood [18]. The human capital approach views migration as an investment decision where rational individuals seek to maximize their lifetime earnings. The prospective migrant will compare the present value of future income earned in his present location to that to be gained from living elsewhere. If he believes that he can increase the present value of his earnings by an amount greater than the cost of moving, he will migrate to the region yielding the highest net present value.

Underlying the human capital model is the implicit assumption that each individual migrant possesses a utility function relating the attributes of alternative locations. Before-tax labour income is seen as the only common characteristic of interest to all migrants, who then rank regions in terms of the wage rates they could earn in each. It is a simple extension of human capital theory to include the possibility that public expenditure variables also enter the migrants' utility functions and determine to some extent migration destination. It is reasonable to expect that in addition to income earned through labour market activity the prospective migrant would consider unearned benefits provided by public authorities in alternate locations.

For each individual, the present value of the monetary gain from migration from region *i* to region *j* is:

$$PVY_{ij_k} = \sum_{t=1}^n \frac{Y_{jt_k} - Y_{it_k}}{(1+r)^t} \quad (1)$$

where PVY_{ij_k} = the present value of future income differences between region *j* and region *i* for individual *k*

Y_{jt_k} = the income that would be earned by individual *k* in region *j* in current year *t*

Y_{it_k} = income earned by individual *k* in region *i* in current year *t*

n = total number of years remaining in individual *k*'s working life

r = appropriate discount rate

Certain forms of income (interest and dividends, for example) will be earned independent of location and thus will play no role in the individual's migration decision. These amounts will be netted out in equation (1).

Migration is hypothesized to be inversely related to the costs of moving between two regions. Hence, the individual will base his migration decision on the following net present value expression:

$$NPV_{ij_k} = \sum_{t=1}^n \frac{(Y_{jt_k} - Y_{it_k})}{(1+r)^t} - C_{ij} \quad (2)$$

where NPV_{ij_k} = the net present value of migrating from region *i* to region *j* for individual *k*

C_{ij} = the costs of moving between region *i* and region *j*

The costs involved in migration from one region to another are very difficult to quantify since they are both monetary and non-monetary in nature. The use of geographic distance as a proxy for the costs associated with migration has its origin in gravity models and is common to most migration studies. Many of the costs incurred by the migrant—money costs for travelling; the opportunity costs of wages lost; the costs of obtaining information about the destination as well as the costs of having obtained inadequate or imprecise information; the costs of job search; and the psychic costs of being removed from familiar surroundings—are thought to be related to the distance between the origin and the destination. In short, the relationship is hypothesized to be the following:

$$C_{ij} = f(\text{DIST}_{ij}) \quad (3)$$

where DIST_{ij} = the geographic distance from region *i* to region *j*.

The net present value expression above can be reformulated to take into account the fact that a migrant also considers the levels and costs of public goods provided in the two regions.

The net benefit accruing to the individual from regional governments in each jurisdiction is defined as the excess of public expenditures received by that individual over direct and indirect taxes paid by the individual. According to human capital theory, individuals discount the income gains to migration over their lifetime. It follows that any benefits obtained from public good provision should be similarly discounted. The migration decision of the individual will therefore depend on three factors:

$$P(m)_{ijk} = f \left(\sum_{t=1}^n \frac{(Y_{jt_k} - Y_{it_k})}{(1+r)^t} \right), \left(\sum_{t=1}^n \frac{(\text{exp-tax})_j - (\text{exp-tax})_i}{(1+r)^t} \right), C_{ij} \quad (4)$$

where $P(m)_{ijk}$ = the probability that individual k will migrate from region i to region j

$(\text{exp-tax})_{i,j}$ = public expenditures on individual k less taxes paid by individual k in region i (region j)

The human capital theory of migration is formulated in terms of the individual's decision-making process. Since data are rarely available at a disaggregated level, however, it is necessary to convert the basic relationship expressed in (4) to a model which can be estimated with aggregate data.

The above discussion examined the determinants of the migration decision at the level of the individual and with the assumption that income streams were certain. Unfortunately the available data are aggregated over individuals and the market incomes are not certain. Thus the above specification must be formulated to be compatible with the available published data and to allow for the probability of obtaining the income stream.

For aggregate migration flows the expected market earnings variable is specified as:

$$\text{WDIF}_{ij} = (\text{EW}_j - \text{EW}_i) \quad (5)$$

where EW = the expected wage in region j and region i

WDIF_{ij} = the difference in expected average wages between region i and region j

Both Courchene [9] and Grant and Vanderkamp [16] have argued that incomes in the sending and receiving regions should be included separately. Including these variables in this fashion, however, would be rather *ad hoc* in the context of the human

capital model. It may also be that the incentive to migrate provided by a given wage differential may vary across income classes although, again, this would not be consistent with the human capital specifications. Our data require that we assume all employed migrants receive the average wage in both their originating and receiving regions; thus we are in general not able to capture this effect. We might, however, expect the coefficient of the WDIF_{ij} variable (as well as the variables representing fiscal and house price differentials) to be smaller for migration from higher average income provinces. The expected wage is calculated as the average wage in the region weighted by the probability of employment as shown in expression (5a):

$$\text{EW}_i = [(100 - U_i)W_i]/100 \quad (5a)$$

where U_i = the unemployment rate in region i

W_i = the average wage in region i

EW_i = the expected wage rate

This formulation assumes that the discount rate and time horizon of all migrants are identical across regions and through time. Expression (5) will therefore be proportional to expression (1).

The differential in fiscal surplus variable specified in expression (4) must also be reformulated to take into account the level of aggregation of the available data. Accordingly per capita government expenditure and revenue levels of the jurisdictions must be used, but this specification abstracts from the fact that individuals who qualify for certain expenditures in one region might not in others or that the incidence of certain taxes differs across individuals in different locations. The probability of obtaining this fiscal surplus is taken to be 1.0. If we maintain the assumption of a constant discount rate and time horizon for all migrants, a proxy for the differential fiscal surplus variable which is proportional to that specified in (4) is:

$$\text{FISDIF}_{ij} = \left(\frac{\text{exp-rev}}{\text{pop}} \right)_j - \left(\frac{\text{exp-rev}}{\text{pop}} \right)_i$$

where FISDIF_{ij} = the fiscal gap between region j and region i

$\left(\frac{\text{exp-rev}}{\text{pop}} \right)$ = government expenditures minus revenues from indirect and direct taxes on individuals in region i (region j)

In summary, the basic human capital model incorporating only the effect of differential levels of fiscal surplus and market (wage) incomes takes the following form:

$$M_{ij} = a_0 + a_1 (WDIF_{ij}) + a_2 (FISDIF_{ij}) + a_3 (DIST_{ij}) \quad (6)$$

The specification of (6), however, neglects the issues of potential capitalization of fiscal surplus in housing prices and the influence of interregional differences in price levels. Cebula [6] addressed the issue of differences in interregional price levels by using regional price indexes to deflate nominal value variables. In addition, he included housing prices as a variable to capture the potential capitalization of fiscal surplus. Renas [25] has argued, however, that both including housing prices and deflating nominal values by an index inclusive of housing prices led Cebula to attribute incorrectly support for the Tiebout hypothesis to these deflated variables, whereas it is the housing price variable which contributes significantly to the explanatory power of the model.

Renas' criticisms are correct if interregional trade is effective in equalizing the prices of traded goods between regions. Housing prices which represent prices in the non-traded sector (i.e., goods produced and consumed within the same region) will reflect the main component of cost of living differences between regions. Cebula is in effect double-counting the influence of price level differences on migration flows by including housing prices as a separate variable while adjusting the other economic variables by a cost of living index inclusive of housing prices. As a result of this it is difficult to interpret the results obtained by Cebula, since part of the fiscal capitalization effect is captured in the real (deflated) economic variables. Renas' procedure of including only a housing price variable is more satisfactory, since this separate cost of living variable captures the effect of fiscal capitalization. We allow for the possible influence of interregional differences in living costs with the variable:

$$HSPDIF_{ij} - HSP_j - HSP_i \quad (7)$$

where $HSPDIF_{ij}$ = the difference in housing price levels between regions i and j

$HSP_{i,j}$ = the average housing price in region i (region j)

We noted earlier that in large-scale jurisdictions such as provinces the supply of housing might be inelastic in the short run but be very elastic in the long run as a result of the stock of housing responding to movements in housing prices. Consequently, the capitalization of fiscal surplus would be more of a phenomenon in the short run than in the long run. In fact, if the long run supply curve of housing were perfectly elastic there would be *no capitalization effect* in the long run. This factor plus the existence of lags in information and liquidity constraints suggest that the migration model should be specified in terms of a partial rather than a full adjustment mechanism.

We define the optimal or desired rate of migration M_t^* as a function of the economic variables previously defined:

$$M_t^* = a_1 + a_1(WDIF_{ij}) + a_2(FISDIF_{ij}) + a_4(HSPDIF_{ij}) + a_3(DIST_{ij}) \quad (8)$$

The adjustment between migration in the current period and the preceding period is assumed to be a linear function, b , of the difference between the desired migration in period t and that of the preceding period:

$$(M_t - M_{t-1}) = b(M_t^* - M_{t-1}) \quad (9)$$

where $0 < b < 1$

The parameter b above represents the fraction of the desired adjustment that is accomplished during time period t . For a given value of b we can calculate the number of time periods it would take for full adjustment to occur or for actual migration to equal optimal migration. Allen [1] refers to $(1/b)$ as the time constant of the lag. It is important to note, however, that complete adjustment is only realized if M_t^* is constant over time. If M_t^* changes, which is to be expected since the economic factors determining it are unlikely to stay constant, the interval $(1/b)$ will change as well. The length of the adjustment period is in this sense a rather ambiguous concept, since actual migration rates are unlikely to ever "catch up" to their optimal levels. The parameter b does, however, indicate the fraction of the gap between actual and optimal migration accounted for in a given time interval. If $b = 1$, the adjustment of migration is complete in the sense that current period migration is equal to its optimal level.

Substitution of expression (8) into (9) yields:

$$(M_t - M_{t-1}) = b(a_0 + a_1 WDIF_{ij} + a_2 FISDIF_{ij} + a_3 DIST_{ij} + a_4 HSPDIF_{ij} - M_{t-1}) \quad (10)$$

This expression can be rearranged to yield:

$$M_t = ba_0 + ba_1 WDIF_{ij} + ba_2 FISDIF_{ij} + ba_3 DIST_{ij} + ba_4 HSPDIF_{ij} + (1-b) M_{t-1} \quad (11)$$

The parameters estimated in expression (11) are short run coefficients which are easily converted into short run elasticities through multiplication by \bar{X}_i/\bar{M} . Long run elasticities are obtained by dividing the short run elasticities by b . Since b is constrained to fall between 0 and 1, the short run elasticities will be smaller (or equal to) the long run elasticities.

The theory developed earlier leads us to predict the signs of the variables as follows:

$$\begin{aligned}\partial M/\partial W D I F &= a_1 > 0 \\ \partial M/\partial F I S D I F &= a_2 > 0 \\ \partial M/\partial D I S T &= a_3 < 0 \\ \partial M/\partial H S P D I F &= a_4 < 0\end{aligned}$$

The partial adjustment model specified above has one obvious drawback. It seems to suggest that a given differential in market or fiscal incentives between sending and receiving regions would be consistent with some *continuous flow* of migrants. Accordingly, we label this model as the "perpetual flow" specification. For purposes of comparison we have estimated two functional forms in addition to the above perpetual flow partial adjustment case. The first of these is a full adjustment model similar to that used by Laber and Chase [20] but with the addition of variables for fiscal differences and house price differences. This formulation is derived by assuming that migration fully adjusts to incentives in the first period and therefore that in equation (10) the adjustment coefficient, b , is equal to 1. The full adjustment model estimating equation is thus:

$$M_t = a_0 + a_1 W D I F_{ij} + a_2 F I S D I F_{ij} + a_3 D I S T_{ij} + a_4 H S P D I F_{ij} \quad (12)$$

and we would have the same expectations with respect to the coefficients as we had for the partial equilibrium model.

We have also estimated a somewhat more sophisticated stock-flow model developed by Lianos [21]. In this model changes in the incentive to migrate are seen as changing the stock of migrants. Then, of that potential stock some fixed proportion will migrate in any particular period. The initial stock in response to the incentives to migrate can be given as:

$$S^1 = \alpha + \beta X_1$$

where X_t can be thought of as a representative incentive to migrate which will vary from period to period. Further changes in the incentives to migrate can add to that stock; i.e., in period 2 we might have addition to the stock:

$$S^2 = \alpha + \beta(X_2 - X_1).$$

At the same time some fixed proportion of the total stock of migrants will be leaving each period such that:

$$M_t = k S_{M_t} \quad (13)$$

$$\text{where } S_{M_t} = \sum_{i=1}^t S^i - \sum_{i=1}^{t-1} M_i .$$

The stock of potential migrants at time period one will thus be:

$$S_{M_1} = S^1 = \alpha + \beta X_1$$

at time period two will be:

$$\begin{aligned}S_{M_2} &= S^1 + S^2 - M_1 \\ &= \alpha + \beta X_1 + \alpha + \beta(X_2 - X_1) - k(\alpha + \beta X_1) \\ &= \alpha + (1 - k)\alpha + \beta(X_2 - X_1) + (1 - k)\beta X_1\end{aligned}$$

at time period three will be:

$$\begin{aligned}S_{M_3} &= S^1 + S^2 + S^3 - M_1 - M_2 \\ &= \alpha + \beta X_1 + \alpha + \beta(X_2 - X_1) + \alpha + \beta(X_3 - X_2) \\ &\quad - k(\alpha + \beta X_1) - k[\alpha + (1 - k)\alpha + \beta(X_2 - X_1) + (1 - k)\beta X_1] \\ &= \alpha + (1 - k)\alpha + (1 - k)^2\alpha + \beta(X_3 - X_2) \\ &\quad + (1 - k)\beta(X_2 - X_1) + (1 - k)^2\beta X_1\end{aligned}$$

and in general at time period t will be:

$$S_{M_t} = \alpha + (1 - k)\alpha + (1 - k)^2\alpha + \dots + (1 - k)^{t-1}\alpha + \beta(X_t - X_{t-1}) + (1 - k)\beta(X_{t-1} - X_{t-2}) + \dots + (1 - k)^{t-1}\beta X_1 \quad (14)$$

Migration in period t is given by equation (13). Lagging this equation one period gives us:

$$M_{t-1} = k S_{M_{t-1}} \quad (15)$$

the migration in period $t-1$. Multiplying equation (15) by $(1 - k)$ and subtracting the result from equation (13) gives:

$$M_t = k[S_{M_t} - (1 - k)S_{M_{t-1}}] + (1 - k)M_{t-1}$$

Finally, using equation (14) to derive S_{M_t} and $S_{M_{t-1}}$ and substituting we arrive at equation:

$$M_t = k\alpha + k\beta(X_t - X_{t-1}) + (1 - k)M_{t-1}$$

As the X_t term is a representative incentive to migrate, our full estimating equation for the stock-flow model is:

$$M_t = k\alpha + k\beta_1(MWD) + k\beta_2(DFIS) + k\beta_3(DIST)_{ij} + k\beta_4(DSHP) + (1 - k)M_{t-1}$$

$$\text{where } MWD = W D I F_{ij,t} - W D I F_{ij,t-1}$$

$$DFIS = F I S D I F_{ij,t} - F I S D I F_{ij,t-1}$$

$$DHSP = H S P D I F_{ij,t} - H S P D I F_{ij,t-1}$$

In the next section we discuss the data used for our estimates and then cite results for the three estimating equations: equation (11) and the perpetual flow (pf) model; equation (12) representing the full adjustment case (fa); and equation (16) the reduced form of the stock flow model (sf).

The Data

The migration data are based on family allowance records of applications for account transfers between provinces made by individual recipients. The data set is comprised only of those receiving family allowance benefits and is not representative of the mobility patterns of the total population. In particular, young unmarried individuals, married without children, and families with grown children are excluded from the estimates.

The dependent variable used in the estimation, the rate of outmigration from region i to region j , is calculated as the gross migration flow from i to j divided by the population of region of origin, i .

$$M_{ij} = \frac{GM_{ij}}{POP_i} \quad i, j = 1 \dots 7$$

where M_{ij} = the rate of outmigration from region i to j

GM_{ij} = the gross flow of migrants from region i to j

POP_i = the population of region i

The earnings variable employed in the estimation is an estimate of average weekly wages and salaries (industrial composite) in each of the provinces and the Atlantic region. The average wage in each region was weighted by the probability of obtaining employment in the region. Both the earnings and unemployment rate data for these calculations were obtained from the Conference Board publication, *The Provincial Economies: 1961-1978* (1979). It was assumed that the average number of weeks of full-time employment was 50. This assumption converts the estimate of expected market income to an annual base compatible with the fiscal gap variable.

The distance variable is the distance in miles separating the major urban centres of each province. Alternative specifications to the linear form results were tried. The use of the other specifications, i.e., $1/DIST$, $DIST^{1/2}$, did not prove to be statistically superior to the linear specifications.

The fiscal gap variable was calculated from provincial government revenue and expenditure data obtained from various Statistics Canada sources. Only revenues obtained through the direct

or indirect taxation of individuals were considered relevant for a migration model. Corporation taxes, intergovernmental transfers and resource rents were therefore excluded from the estimates for the revenue category. All provincial government expenditures with the exception of interest paid on outstanding debt were used in the calculation of the fiscal variable. Provincial revenues obtained from such sources as natural resource rents and federal transfer payments are therefore implicitly captured in the expenditure side of our estimates.

The estimate of housing prices is the average transactions price of property processed by the Multiple Listing Service of the Canadian Real Estate Association. There are two problems with these data. First, they contain a small proportion of commercial transactions in each region. Ideally we would want an estimate of residential housing prices alone. Second, it is not possible to adjust the data for shifts in the mix of housing (i.e., condominiums, single family homes, etc.); thus our estimates of housing prices may vary because of shifts in the mix as well as because of price changes across the mix. These estimates of regional housing price levels are the only ones available.

The provinces of Prince Edward Island, New Brunswick, Nova Scotia, and Newfoundland were combined into one unit, the Atlantic region. This aggregation was made necessary because the housing price variable, HSP, was only available at this level.

The data appendix provides a complete listing of all data sources and definitions.

Estimation Results

The basic equations estimated were set out above: equation (12), full adjustment; equation (11), perpetual flow; and equation (16), stock flow. Each specification was estimated for each of seven regions for the period from 1961 to 1978 inclusive. This pooling of time series (18 years) and cross sections (i to j where $j = 1 \dots 6$) yields 108 observations for each region. The model in linear form was estimated using OLS. A dummy variable, D_{Que} , with a value of 1.0 for outmigration from other provinces to Quebec and 0.0 otherwise, was included in the estimating equations. The view was that cultural and linguistic factors would make an anglophone treat migration to Quebec as involving higher transfer costs than to other provinces, *ceteris paribus*. In no instance, however, was the variable significant, and the results containing it are not reported.

Table 2
REGRESSION RESULTS FOR MODELS OF OUTMIGRATION
(rate per 1000 - T statistics in parentheses)

| Variable / Model | Intercept | DIST | MWDIF | MWD | FISDIF | DFIS | HSGPDIF | DHSP | M _{t-1} | R ₂ | SEE |
|-------------------------|-------------|-----------|----------|----------|---------|----------|------------|------------|------------------|----------------|------|
| ATLANTIC | | | | | | | | | | | |
| Full Adjustment | (1) 7.84* | -.0038* | .0052* | - | .0048 | - | -.00023** | - | - | .37 | 3.78 |
| | (6.88) | (-5.80) | (3.11) | | (1.39) | | (-1.67) | | | | |
| Perpetual Flow | (2) .37 | -.00044** | .0012* | - | .0027* | - | -.000095* | - | .96* | .96 | 1.00 |
| | (1.00) | (-2.30) | (2.55) | | (3.04) | | (-2.60) | | (36.08) | | |
| Stock Flow | (3) .06 | -.000012 | - | .0016* | - | .0047* | - | -.000078 | .98* | .96 | 1.00 |
| | (.18) | (-.11) | | (2.02) | | (2.23) | | (-1.31) | (38.92) | | |
| QUEBEC | | | | | | | | | | | |
| Full Adjustment | (1) 5.94* | -.0027* | .0028* | - | -.0013 | - | -.000034 | - | - | .82 | .92 |
| | (25.76) | (-16.10) | (9.80) | | (-1.55) | | (-1.57) | | | | |
| Perpetual Flow | (2) .75* | -.00037* | .00044** | - | -.00012 | - | -.000012 | - | .87* | .96 | .45 |
| | (2.37) | (-2.39) | (2.34) | | (.28) | | (-1.10) | | (17.64) | | |
| Stock Flow | (6) .28 | -.00011 | - | .0011* | - | -.00033 | - | -.0000099 | .95* | .96 | .45 |
| | (1.65) | (-1.50) | | (2.45) | | (-3.33) | | (-.39) | (33.17) | | |
| ONTARIO | | | | | | | | | | | |
| Full Adjustment | (7) 2.33* | -.000043 | -.00070* | - | .00047 | - | .00010* | - | - | .27 | .93 |
| | (6.89) | (-.23) | (-3.32) | | (.08) | | (5.90) | | | | |
| Perpetual Flow | (8) -.07 | .00012* | -.000084 | - | .00014 | - | .0000094** | - | .95* | .96 | .22 |
| | (-.67) | (2.60) | (-1.61) | | (.99) | | (2.01) | | (40.24) | | |
| Stock Flow | (9) -.09 | .00010* | - | .00036** | - | .00055 | - | -.000023* | .97* | .96 | .21 |
| | (-1.10) | (2.50) | | (1.92) | | (1.27) | | (-2.48) | (47.94) | | |
| MANITOBA | | | | | | | | | | | |
| Full Adjustment | (10) 7.05* | -.0017* | .0026* | - | .0011 | - | -.000036 | - | - | .49 | 2.42 |
| | (9.79) | (-3.61) | (4.34) | | (.63) | | (-.63) | | | | |
| Perpetual Flow | (11) .32 | .000015 | .0042** | - | .0013** | - | -.000038** | - | .95* | .94 | .84 |
| | (.88) | (.08) | (1.92) | | (2.07) | | (-1.93) | | (40.23) | | |
| Stock Flow | (12) .53 | -.00016 | - | .0012** | - | -.0034** | - | .000052 | .94* | .94 | .84 |
| | (1.51) | (-.96) | | (1.74) | | (-2.01) | | (1.06) | (28.73) | | |
| SASKATCHEWAN | | | | | | | | | | | |
| Full Adjustment | (13) 10.93* | -.0027* | .0038* | - | .015* | - | -.00031* | - | - | .79 | 2.29 |
| | (20.64) | (-7.64) | (6.38) | | (8.99) | | (-5.16) | | | | |
| Perpetual Flow | (14) 1.75* | -.00026 | .00094* | - | .0035* | - | -.00010* | - | .84* | .95 | 1.15 |
| | (2.92) | (-1.14) | (2.71) | | (3.19) | | (-3.23) | | (17.04) | | |
| Stock Flow | (15) .68 | -.00023 | - | .0034* | - | -.00049 | - | -.000080 | .93* | .95 | 1.16 |
| | (1.13) | (-1.02) | | (3.32) | | (-2.21) | | (-1.13) | (23.32) | | |
| ALBERTA | | | | | | | | | | | |
| Full Adjustment | (16) 7.83* | .00067 | .0094* | - | .0065* | - | -.00054* | - | - | .65 | 2.99 |
| | (11.63) | (1.38) | (9.25) | | (2.86) | | (-5.99) | | | | |
| Perpetual Flow | (17) .64** | .00033** | .00142* | - | .0024* | - | -.00012* | - | .92* | .96 | 1.05 |
| | (1.78) | (1.92) | (3.06) | | (2.92) | | (-3.32) | | (26.22) | | |
| Stock Flow | (18) .27 | -.000047 | - | .0018** | - | .0020 | - | -.000097** | .98* | .96 | 1.07 |
| | (.82) | (-.37) | | (1.82) | | (1.21) | | (-2.27) | (36.49) | | |
| BRITISH COLUMBIA | | | | | | | | | | | |
| Full Adjustment | (19) 6.80* | -.00036 | .003* | - | .0093* | - | -.000084 | - | - | .52 | 2.19 |
| | (13.11) | (-1.08) | (3.53) | | (5.02) | | (-1.21) | | | | |
| Perpetual Flow | (20) .16 | -.0000023 | .00013 | - | .00016 | - | .0000062 | - | .98* | .96 | .58 |
| | (.67) | (-.03) | (.52) | | (-.28) | | (-.33) | | (35.39) | | |
| Stock Flow | (21) .06 | -.000033 | - | -.000066 | - | -.0023* | - | -.000013 | .94* | .97 | .57 |
| | (.32) | (-.57) | | (-1.6) | | (-2.89) | | (-.47) | (44.74) | | |

* 99% level of significance one-tail t; ** 95% level of significance one-tail t.

The estimation results for a linear specification of (12), (11) and (16) are reported in Table 2.¹ Some general patterns are evident. First, the partial adjustment models [(11) and (16)] always have higher R^2 and lower standard errors of estimate than the full adjustment specification (12). This result, however, is to be expected, as the partial adjustment models include a lagged dependent variable. Secondly, if one specification performs well for a region in terms of significance levels of variables this result generally holds for the other specifications. In the case of the full adjustment and perpetual flow models this generally holds true for significance level and sign of the coefficient. Unfortunately there is sometimes a reversal of sign of statistically significant variables between the stock flow model and the other two. This is particularly evident in the case of Ontario.

The measure of differential market incentive for migration, MWDIF or MWD, is statistically significant and of predicted sign for the Atlantic region, the provinces of Quebec, Manitoba, Saskatchewan, Alberta and British Columbia (fa only). In the case of Ontario the coefficient is significant and of incorrect sign for the fa model and significant and of predicted sign for the sf model.

The measure of the differential fiscal incentive (FISDIF) for migration is statistically significant and of predicted sign for at least one model for the Atlantic region (pf, sf), the provinces of Manitoba (pf), Saskatchewan (fa, pf), Alberta (fa, pf) and British Columbia (fa).

The interregional price level variable, which also serves as a proxy for capitalization of fiscal surplus, HSGPDIF or DHSP, is statistically significant and of predicted sign for the Atlantic region (fa, pf), Ontario (sf), Manitoba (pf), Saskatchewan (fa, pf), and Alberta (fa, pf, sf). In the case of Ontario this variable is significant but opposite in sign to the predictions of theory in the case of the full adjustment and perpetual flow specification.

The results for the distance variable, DIST, are quite anomalous. The variable is significant and of predicted sign for the Atlantic region (fa, pf), the provinces of Quebec (fa, pf), Manitoba (fa), and Saskatchewan (fa), but it is significant and of perverse sign for the provinces of Ontario (pf, sf), and Alberta (pf). Since our dependent variable is gross outmigration from i to j , we cannot make the usual appeal to the influence of return migration.

¹Elasticity figures might seem attractive but are difficult to interpret. These would normally be calculated at the mean values of the variables concerned. These means can be positive, negative or zero. In particular for those provinces where the net migration average approaches zero the elasticity of migration response approaches infinity. The estimated coefficients themselves were thus seen as having more intuitive value.

There certainly appears to be wide differences between regions of Canada in terms of the adjustment of migration to the incentives for migration. In the case of the perpetual flow model the time constant of the lag ($1/b$) ranges from 20 years in the case of British Columbia to 6.25 for Saskatchewan. For the stock flow model the lag in adjustment $[(1 - k)/k]$ ranges from 49 years for the Atlantic region and Alberta to 13.9 years for Saskatchewan.

The most interesting result of this paper relates to the relative responsiveness of migrants to market (MWDIF) and fiscal (FISDIF) incentives for migration. When those regions, where both MWDIF and FISDIF are significant in the same model are examined, we obtain the results shown in Table 3. It is clear from Table 3 that, with the exception of the anomalous cases of Manitoba and Alberta, migrants are much more responsive to a dollar's worth of fiscal surplus than to a dollar's worth of market income. This result has the strong implication that migration may not lead to a more efficient allocation of resources. From Table 1, we see that both the Atlantic provinces, because of large equalization and transfer payments, and Alberta and Saskatchewan, because of large resource revenues which are not fully compensated for by the equalization scheme, have large fiscal surpluses. The analysis by Courchene [10] concerning the adverse impact of equalization and transfer payments on the adjustment of the Atlantic region to changed market circumstances certainly is supported by these results. Similarly the concern expressed by some observers [11;14;22] regarding the adverse consequences for the

Table 3
RELATIVE PROPENSITIES TO RESPOND TO MARKET AND
NON-MARKET INCOME INCENTIVES FOR MIGRATION

| | | (1) | (2) | (2) ÷ (1) |
|------------------|----|-------------|---------------|-----------|
| | | MWDIF (MWD) | FISDIF (DFIS) | |
| Atlantic | Pf | .0012 | .0027 | 2.25 |
| | Sf | (.0016) | (.0047) | (2.93) |
| Manitoba | Pf | .0042 | .0013 | .31 |
| | Sf | (.0012) | (-.0034) | (-2.83) |
| Saskatchewan | Fa | .0038 | .015 | 3.94 |
| | Pf | .00094 | .0035 | 3.68 |
| Alberta | Fa | .0094 | .0065 | .69 |
| | Pf | .0014 | .0024 | 1.71 |
| British Columbia | Fa | .0030 | .0093 | 3.1 |

Source: Calculated from Table 2.

efficient allocation of resources, especially for labour, because of the amount of economic rent collected by the Alberta government appears to have a basis in fact.

Conclusion

Our results here confirm the work of others with respect to the traditional determinants of migration such as wage rates, distance and cost of living differentials. They provide evidence of a much broader nature than that previously available on the effect of differential fiscal surpluses on migration. The results suggest that migration is responsive to fiscal surplus differences across regions and thus that the possibility of a misallocation of labour could exist. The large fiscal surpluses which exist in the Atlantic provinces as a result of federal transfers and in Alberta as a result of the provincial government capturing more economic rent because of higher energy prices, appear, for example, to be reducing the rate of outmigration.

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DATA APPENDIX

| Data | Description | Source | Units of Measurement |
|-------------------------|---|--|----------------------|
| Migration | Gross migration flows from region i to region j, 1961-1978 | Statistics Canada, <i>International and Inter-provincial Migration in Canada</i> , Cat. No. 91-208 | persons |
| Population | Provincial population, 1961-1978 | Statistics Canada, <i>Estimates for Canada and the Provinces</i> , Cat. No. 81-201 | persons |
| Distance | Highway miles separating major urban centres | Statistics Canada, <i>Canada Year Book, 1976-77</i> , Cat. No. 11-202E, p. 738 | miles |
| Wages | Average weekly wages and salaries of an industrial composite for provinces and the Atlantic region, 1961-1978 | The Conference Board in Canada, <i>The Provincial Economies: 1961-1978</i> | current dollars |
| Unemployment Rates | Provincial (regional) unemployment rates 1961-1978 | The Conference Board in Canada, <i>The Provincial Economies: 1961-1978</i> | percentage |
| Government Expenditures | Provincial government expenditures net of interest paid on outstanding debt, 1961-1978 | Statistics Canada, <i>Provincial Finances</i> , Cat. No. 68-207 | current dollars |
| Government Revenues | Provincial government revenues net of inter-governmental transfers and corporation tax revenues, 1961-1978 | Statistics Canada, <i>Provincial Finances</i> , Cat. No. 68-207 | current dollars |
| Housing Prices | Average transactions price of property processed by the Canadian Real Estate Association, Multiple Listing Service, 1961-1978 | Obtained from the Canadian Real Estate Association | current dollars |