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FISCALLY-INDUCED INTERPROVINCIAL MIGRATION IN CANADA

by

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ABSTRACT

It has been suggested that equalization grants both promote efficiency in the labour market and are a cause of inefficiency in the labour market. The validity of either proposal depends on migrants' responses to provincial fiscal benefits, or what has been termed fiscally-induced migration. The present study attempts to empirically verify whether this phenomenon has been relevant for interprovincial migration in Canada.

The theoretical reasoning behind the proposals with respect to the efficiency aspects of equalization grants is reviewed, as are past attempts to empirically test for fiscally-induced migration in Canada. For the present study a strict utility choice model of interprovincial migration has been employed, using cross-sectional data for both 1965 and 1977. Ordinary least squares and weighted least squares estimations were carried out. The fiscal variables employed were expected or potential net fiscal benefits in both the origin and destination regions. Other variables included were origin and destination region expected wage rates, destination region labour force size, distance, and the number of past migrants.

The results indicate that expected fiscal benefits in the origin region did not hinder out-migration in either

year tested, and so it can be concluded that equalization grants do not promote inefficiency in the labour market. Expected fiscal benefits in the destination region were found to have influenced destination choice in 1977, but not in 1965. This was expected, as since the 1973 increase in energy prices, the fiscal capacity of the energy producing provinces have greatly increased relative to the non-producing provinces. Thus, equalization grants are required to remove the fiscal incentive to migrate and promote efficiency in the labour market.

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CHAPTER I

INTRODUCTION

The usual justification given for unconditional grants from the federal to regional governments to equalize regional government fiscal capacities is for the attainment of fiscal or horizontal equity. Such transfers have efficiency aspects associated with them as well. It has been argued that if fiscally-induced migration exists, equalization of regional government fiscal capacities is required in order to achieve maximum national output. To obtain maximum national output, labour must allocate itself according to wage rates, with migration flowing from low to high wage regions. If wages do not reflect the marginal contribution to output, or if migrants are influenced by factors other than wages, the labour market adjustment will not be efficient and national output will be lower than otherwise. Equalization of fiscal capacities should, other things being equal, remove the fiscal incentives to migration.

It has also been argued that equalization of fiscal capacities promotes inefficient interregional labour flows by slowing down out-migration from economically depressed areas. Unconditional grants allow the recipient governments to provide public goods and services which decrease, for any given interregional wage rate differential, the incentive

to migrate out. Maximum national output is not obtained and the economic adjustment of the depressed region is slowed down.

In order to determine if either or both of these efficiency arguments apply, it is necessary to determine if fiscally-induced migration exists, and if the provision of equalization grants hinder out-migration. The present study attempts to determine if these phenomena are relevant for interprovincial migration in Canada.

A review of the literature, an expanded version of the above arguments, is given in Chapter II. There has been very little empirical research in this area for Canada. The few studies which have been done are also reviewed in Chapter II.

A cross-sectional study for both 1965 and 1977 was done. These two years were chosen so that it could be determined if the energy price increase of 1973, and subsequent increase in the resource revenues of the producing provinces, resulted in a greater effect of fiscal variables on migration. A strict utility choice model was employed. This model is theoretically consistent with the destination choice decision and overcomes some of the problems associated with other migration models. In particular, with the strict utility choice model, it is assumed that the probability of choosing any particular location to migrate to is dependent on the attributes of all alternatives, rather than just the alternatives of the chosen region as is assumed in

the human capital model of migration. The description of the model and the included variables are given in Chapter III. Also included in Chapter III is an explanation of the data and estimating procedure used.

The fiscal variable employed was a measure of potential or expected fiscal benefits--those revenues not directly collected from labour which, therefore, allow the subsidization of public benefits to labour. These revenues were defined to include corporate income taxes, equalization payments, and natural resource revenues. In previous studies in which actual benefits were used as the fiscal variable, it was found in some cases that such benefits were not relevant determinants of migration. This can partially be explained by the use of actual benefits which do not show the substantial divergence across regions that potential benefits do. Since the 1973 increase in energy prices, there have arisen large disparities in provincial government fiscal capacities and these differentials are expected to increase in the future. Thus it is imperative to know if migrants respond to these revenues, on the assumption that they will be transferred into benefits at some time, so that the equalization program can be adjusted accordingly.

Both the origin and destination region benefits were included, and each was included as a separate variable. By including both, it can be determined if fiscal benefits are a pulling factor for migrants and thus if equalization payments are required for efficiency in the labour market,

and also if equalization grants promote inefficiency by hindering out-migration from depressed regions. Further, by including both variables rather than the absolute difference or relative difference, symmetry of response to changes in either is not assumed.

The estimation results are given in Chapter IV. Both ordinary least squares and weighted least squares estimation techniques were used. The results indicate that fiscal benefits were a significant influence on location choice in 1977 but not 1965, and that higher origin region fiscal benefits promoted rather than hindered out-migration in both years.

The conclusions of the study as well as the implications for the equalization program and suggestions for further study are given in Chapter V.

CHAPTER II

LITERATURE REVIEW

The primary justification for the provision of public goods is the failure of the market mechanism to efficiently provide them, due to their properties of non-rivalry in consumption and non-excludability. Some public goods also have the property that the benefits accrue to the residents of a particular area, and are commonly called local public goods. Central provision of all public goods would likely result in uniform provision for all areas, and to the extent that tastes and preferences differ between regions, these goods can be most efficiently provided by the government representing only those affected (i.e. local governments are better able to determine the marginal costs and benefits that accrue to individuals in their regions).

Given that some decentralization of public good provision is more efficient than purely central provision (the fact that this is the case in most countries gives support to this notion) raises the questions of equity of provision across regions and efficiency of provision within regions. In particular, the issues of interjurisdictional spillovers, fiscal gaps, fiscal equity, and the inefficiency of resource mobility become apparent. These four issues form the basis

for intergovernmental transfers or what has been termed "fiscal federalism." In Canada, these transfers take the following forms:

1. Tax collection agreements between the federal and provincial governments to close the provincial fiscal gaps;
2. Conditional grants or tax concessions to correct for interjurisdictional spillovers of benefits, coordinate or standardize activities among provinces, or act as incentives for provincial governments to provide goods and services deemed desirable by the federal government; and
3. Equalization payments or unconditional grants from the federal government to the provincial governments for the attainment of fiscal equity.

The original justification for equalization payments or grants to compensate for the disparities in regional government revenues, and the stated objective of these payments in Canada, is to attain or move towards fiscal equity. But such payments have been hypothesized to be required for efficient interregional labour flows, and also hypothesized to be a cause of inefficiency with respect to such flows. The phenomena of fiscally-induced migration is at the heart of this seemingly conflicting view with respect to the efficiency of equalization payments. This will be elaborated below, as will the concept of fiscally-induced migration.

As already stated, subordinate levels of government provide "local" public goods which they finance through their own collection of revenues (the taxing and expenditure

responsibilities of the provincial governments are laid out in the B.N.A. Act in Canada). The notion of the ability of a government to raise revenues to finance its expenditures is referred to as its "fiscal capacity." In a purely neo-classical world there would be no such things as regional economies, but when the unrealistic assumptions (in terms of real world phenomena) of no space, constant returns to scale, and homogeneous ubiquitous factors of production are dropped, "clusters" of economic activity that look different can be generated (i.e. different economic structures occupying different regions of a national economy). Different regional economic structures imply different regional growth rates as economic circumstances change, and thus different per capita or average income levels. Even with perfect factor mobility and/or commodity trade between regions such that the marginal rates of return to factors are equalized, with different economic structures (due, say, to different natural resource endowments) regions will have different occupational structures and thus different per capita income levels. Pure public goods are such that the benefits accrue to all individuals equally (i.e. the benefits are not divisible). Given this and the progressitivity of the income tax system, the higher the per capita income level of an area, the greater will be its fiscal capacity. Higher tax burdens must be imposed on residents in regions of lower fiscal capacities than those of higher fiscal capacities in order to finance any given level of public expenditures or,

alternatively, higher levels of public goods and services could be provided in regions with greater fiscal capacities if the same tax structure was used in all regions. Fiscal capacity differences would occur, as argued above, even with perfect commodity or factor mobility.

Federal transfers to regions with lower fiscal capacities are justified on the basis of the principle of "fiscal equity." As developed by Buchanan (1950, pp. 538-600), fiscal equity (also known as horizontal equity) is the notion that individuals who are "equal in those objective circumstances traditionally employed in the calculation of national tax burdens" (p. 587) but reside in different geographic areas should have access to public goods and services at equal prices or tax rates. The aim of these transfers is not to equalize fiscal capacities such that equal levels of public goods and services are provided in each region at equal rates of taxation, because due to differing preferences regions may provide varying levels and combinations of public services at various tax rates. Rather, the notion of fiscal equity requires only that equal individuals are subject to the same fiscal treatment. Buchanan argued that in assessing the fiscal treatment of an individual it is the difference between the value of the public services received and the taxes contributed, the so-called "fiscal residuum," that should be equalized.

The provision of unconditional grants to governments of different regions to attain fiscal equity is not accepted

by all as the most appropriate form of redistribution of government revenues. Moore (1980), for example, feels that equalization payments which equalize the fiscal capacities of provincial governments cannot be justified by appeal to rules of distributive justice (which relate to equity among individuals, not governments or groups of differently situated individuals) unless the receipts are used to finance identifiable income-redistributive services. He recommends instead that fiscal equalization become part of a comprehensive national program of interpersonal income distribution.

Federal government personal income tax rates could be made to vary from province to province so as to offset the differences in fiscal capacity, and would probably come closer to achieving the goal of fiscal equity than do equalization payments. A further advantage of fiscal redistribution on an individual basis is that it would allow the necessary inter-area transfer of funds to take place without an increase in the flow of revenues through the federal government (Buchanan, 1950). However, geographically discriminating personal income taxation by the federal government would probably be considered unconstitutional, and also politically disastrous for any government attempting such a program even though the same purpose would be accomplished as is with equalization payments. As stated by Scott (1980, p. 16):

> Today, equalization is taken for granted, an embodiment of national equity, uniquely Canadian.

And:

> . . . the equalization system is the strongest modern tangible evidence of national solidarity.

A case for equalizing fiscal capacities has also been made by reference to efficiency considerations. Individuals are assumed to value private goods as well as public goods. In deciding where to live they consider both market-determined rewards (income or wage attainable) and the fiscal rewards (publicly provided benefits and tax rates) in alternative locations. Since regions with low fiscal capacities either provide a lower level of public services or an equal level but at higher tax rates than high fiscal capacity regions, there will be an incentive for people to move to the high capacity areas for any given wage rate. Thus, if interregional wage rates are equal but the net publicly-provided benefits (value of public goods and services minus taxes) are greater in one region there will be an incentive for people to move to this region. Or, if one particular region offers higher wage rates as well as public benefits there will be a greater incentive to move to this area than there would be if the public benefits were equal in all areas. And, even if the wage rate is lower in a particular region than in another, a greater level of public benefits may induce in-migration even though a lower wage would be obtained. This movement of people towards

regions offering higher levels of net public benefits is what is referred to as fiscally-induced migration.

Assuming labour is paid the value of its marginal product, fiscally-induced migration is inefficient in that it distorts labour allocation across regions. The highest possible output of a country is obtained when labour (and capital) allocates itself according to the value of its marginal product or the wage rate, the maximum being attained at the equilibrium when the marginal return to factors is equalized across regions. Fiscally-induced migration will result in a greater allocation of labour in high fiscal capacity regions than is called for on the basis of wage rates, and will thus result in lower total national output. This of course assumes that the response of labour to market-determined wages is complete, which of course it is not.[1] If less migration than is called for on the basis of interregional wage rates takes place, then fiscally-induced migration may actually increase the efficiency of the labour market in the short run. In the longer run, when labour response to wage rates is optimal in terms of private return differentials, the presence of fiscally-induced migration will represent a decrease in the efficiency of

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[1] For example, in one study of Canadian interprovincial migration it was found that only 1/50th of the difference between optimal (in terms of wage rate differentials) and actual migration is eliminated in each year. See Mills, K., "Fiscally-induced Migration in Canada," M.A. Non-thesis paper, University of Alberta, Dept. of Economics, 1980.

allocation. In the short run at least, equalization of fiscal capacity via unconditional grants can be justified as increasing the efficiency of interregional labour allocation by eliminating or at least reducing the incentive to migrate for fiscal reasons.

The value of net public good provision to labour can be greater in one region than another due to sources of provincial government revenue that is not directly collected from labour. The main examples are corporate income taxes and natural resource revenues. The case of the inefficiency of fiscally-induced migration due to natural resource revenues has been made explicit in a study by Wilson et al. (1980). In this model there are two regions, one which receives natural resource rents which are used by the regional government to subsidize the provision of public goods and services to labour. This provides a fiscal-inducement to labour to this region such that a greater number of people than is optimal will be located in this area. Also, the resource-rich region (West) was assumed to have a comparative advantage in producing resource products, and the other region (East) a comparative advantage in producing manufactured goods, so that the loss of output in eastern manufacturing due to the fiscally-induced out-migrants is greater than the increase in western manufacturing due to these migrants. This 'dissipation' of the resource rents or, equivalently, decrease in aggregate real income, will occur if the rents are used to decrease personal income taxes,

increase public good expenditure, or saved in the equivalent of the Alberta Heritage Savings and Trust Fund, so long as there is a requirement that an individual must reside in the region in order to participate in the benefits. Total output could be increased and both regions would benefit if equalization of the resource revenues was carried out.

Equalization of fiscal capacities has also been hypothesized, as already mentioned, to decrease the efficiency of interregional labour allocation. This argument, as originally stated by Scott (1950), is somewhat similar to the above argument in that it assumes that individuals value publicly provided benefits and take them into account when deciding upon the area to locate in. This argument states that individuals in low-income, low-wage regions are induced not to migrate to higher wage regions because of the fiscal benefits which equalization payments allow the governments of low-income regions to provide. By counteracting the incentive labour has to migrate out of depressed regions in response to market-determined rewards, the maximization of national production is prevented.

Courchene (1978) has also argued that the level of governmental transfers has impeded the required adjustment of the so-called have-not provinces in Canada. Using a gold-standard model of adjustment, he shows that the necessary long-run adjustment of regions incurring a balance of payments deficit is slowed down due to sterilization of the deficit through transfer payments (i.e. the decrease in

wealth needed for adjustment is replaced by government wealth so that present consumption, including import consumption, is maintained). Thus the adjustment process is prolonged and made more serious by incurring an even larger deficit. Further, to the extent that wages and prices are inflexible downwards so that prices and costs do not decrease with a fall in demand (which would allow the increased production of exports to help finance the deficit), an even larger decrease in wealth is required to finance the deficit. Thus demand will fall even more and unemployment will result. Since wages are rigid downwards, only out-migration can decrease unemployment in these regions. And since equalization payments retard out-migration, adjustment through this avenue is also hindered by the transfers.

This aspect of Courchene's theory, which is similar to Scott's, depends on two propositions. The first is that out-migration from have-not provinces is impeded by these transfers, and the second that out-migration is necessary for the economic adjustment of such regions. Whether or not out-migration from depressed areas is hindered by the provision of equalization payments is an empirical issue. The only evidence for Canada indicates that the rate of outflow of labour from any province is negatively related to the level of intergovernmental transfers it receives (Courchene, 1970).[2] It is possible, however, to examine a priori the

[2]This study will be elaborated on in the second section of the literature review.

effects that unconditional equalizing grants have on the movement of labour out of a region by considering the use such grants are put to (Buchanan, 1952). Upon receipt of an unconditional grant or equalization payment the recipient government can maintain the existing level of public service expenditure and decrease provincial taxes by the amount of the grant, expand the provision of public service benefits by the amount of the grant leaving provincial taxes unchanged, or, as is most likely, use the grant to provide some combination of tax reductions and expenditure expansions. If the grant is used solely to allow provincial taxes to be reduced, the degree of resource distortion that results depends on which segment of the labour force is affected. Professional people, highly skilled technicians, and potential enterpreneurs are usually more 'tax conscious' than unskilled and semi-skilled people. And since in depressed regions it is the latter group which is in abundance and the former which is scarce, it may be that the resource distorting effects of equalizing grants (inducement of unskilled and semi-skilled to remain in area) may be outweighed by the resource-correcting effects (inducement of skilled group to remain). The net effect cannot be presented with certainty. Also, the type of taxes reduced will affect the outcome. Indirect taxes are hidden in nature and may not be known or considered to a great extent by individuals, but to the extent that they are, their effect is subject to the analysis above. The effect of property taxes on

out-migration, which in the long run should decrease rents, should be similar to that of indirect taxes, although unskilled workers usually own less taxable property than skilled workers so that the former group may be less affected in this case. Property taxes, however, affect the movement of capital resources so that a reduction of such taxes in a depressed area may induce in-migration of needed capital. This assumes that there is no corresponding increase in other taxes or decrease in public expenditures.

If the equalizing grant is used to increase the provision of provincially-provided services, the extent of hinderance to out-migration is dependent on the type of service that is increased. Increased expenditure on transportation and communication may actually be inducive to out-migration; similarly with increased expenditure on education, since more highly educated individuals are usually more mobile. If social service expenditures such as public health, public housing, assistance to the handicapped, and so on are increased the effect is likely to be resource distorting since the unskilled and unemployed are more responsive to such expenditures. A more educated and healthy work force may also tend to be resource correcting though in that it may induce a capital inflow.

Whether taxes or expenditures or a combination of the two is changed with the receipt of an equalization payment, the effect will depend on ". . . the relative importance of the offsetting effects on different resource

categories" (Buchanan, 1952, p. 214).

Empirical evidence on the effect of unconditional grants on the spending and taxing decisions of the provincial governments in Canada is scanty, but those studies available reached similar conclusions. With respect to expenditures, it was found that "conditional grants stimulate spending on individual programs to a greater degree than do unconditional grants, and their effects vary, depending on the program and the province being considered" (Boadway, 1980, p. 57). For example, unconditional grants were found to significantly affect total provincial welfare expenditures in one study in which all ten provinces were tested. In another study which used Ontario as a high income province and New Brunswick as a low income province, unconditional grants were found only to affect education expenditure in Ontario.

There is no empirical evidence to suggest what effect unconditional grants have on the taxing decisions of the Canadian provincial governments. It has been suggested, however, that a province may try to maximize its equalization entitlement by decreasing the tax rate on a revenue source for which it is a 'have' province (share of tax base for that revenue source is greater than its share of the population). This disincentive is of course greatest for the have-not provinces, or those which receive equalization payments. It has been suggested that this influence of equalization payments on the taxing decisions of the

provincial governments is insignificant in size relative to the total equalization payments (Boadway, 1980).

To recapitulate, in order for equalization grants from the federal to the provincial governments to hinder the required adjustment of economically depressed regions the normal process of out-migration in response to private returns must be lessened, and secondly, the out-migration of labour from such regions must be the required adjustment. It has been seen that only particular tax and expenditure usages of equalizing grants will hinder out-migration; these grants are not all used to provide 'good' things, which is what is implied by both Scott and Courchene's arguments with respect to the inefficiency of equalizing grants.

There is also disagreement as to whether out-migration is required for the economic adjustment of poor regions. If labour were homogeneous, then interference with the natural adjustment process of the mobility of factors would be inefficient. Labour is not homogeneous, however. It is usually the highly skilled, young, and educated individuals in the labour force that are the most mobile, and the loss to poorer regions of such individuals, in Myrdal's view may actually slow down the adjustment and growth of such regions. It is the unskilled and semi-skilled that are usually in excess supply in poor regions. Equalizing grants to poorer regions may, if the more productive members are the most responsive to public benefits, actually increase the viability of such regions, depending of course on the

relative response of the unskilled.

As can be seen, the efficiency or inefficiency of equalization payments is not an agreed-upon issue. As stated by Boadway (1980):

> Of all areas of fiscal federalism, the interrelationships among transfers, migration and development is one of the most ripe for economic research. Much of the case for or against equalization payments rests upon these yet-to-be established empirical relationships. (p. 49)

Besides the two efficiency arguments given above, one for and one against equalization payments, there has been put forth another efficiency argument for making unconditional grants. The discussion in this area was originated in response to Tiebout's (1956) model of local expenditure. In this model it is assumed that there are an infinite number of communities offering a variety of tax and public expenditure combinations which consumers have full knowledge of and migrate freely to in accordance with their preferences. It is also assumed that there are no spillover effects of public good provision between regions, and that there is an optimal community size, defined in terms of the economies of scale in the provision of these goods, which all communities seek to obtain. Thus communities will offer the mix of taxes and public goods which is most preferred by their residents and consumers will migrate to the region which matches most closely their preferences (note: a very important assumption is that employment restrictions do not apply or, equivalently, all income is dividend income).

Like persons will congregate together and there will be a Pareto optimum provision of public goods within each region and an efficient allocation of consumers over regions (every region will be of optimum size).

As initially argued by Buchanan and Wagner (1970) and later by Buchanan and Goetz (1972), the efficiency results of the Tiebout model depend on the assumptions that all public goods are 'pure' and that all income is dividend income. To the extent that some of the public goods offered are 'impure' (i.e. have congestion costs associated with them), an efficient provision of such goods in every region will not result. More importantly, if space, and thus locational fixity of resources is added to the Tiebout model, an optimum allocation of labour across regions will not result.

Buchanan and Goetz utilize a Ricardian model (thus fixed factors of production are recognized) in which labour in-migration results in diminishing marginal productivity (which is similar to dropping the assumption that all income is dividend income in the Tiebout model). In this model, if all regions were equally endowed with the fixed factor and if only private goods were produced in the economy, then labour would migrate until its marginal productivity was equal in all regions or, equivalently, there would be an efficient allocation of labour over all regions. With locational public good provision, however, this is not the case. Addition of one more user or consumer of a (pure) public good results in no extra costs of provision because of the

property of non-rivalry in consumption, but decreases for all individuals the tax payment per person needed to finance the given amount of provision. Since workers do not take into account this benefit that their migration bestows upon the region they are migrating to, or the costs in terms of higher taxes per person in the region they leave, an optimum allocation of labour over regions will not result. In particular, as shown by Buchanan and Goetz (1972), a region with a greater amount of the fixed factor will have a larger population when returns to the fixed factor are equalized and thus a lower tax price per unit of public good provision which, if not internalized by central authorities, will result in an overpopulation of this region in terms of the Pareto allocation criteria.

Flatters et al. (1974), using a similar model to that of Buchanan and Goetz, derive, using the constraint of equal per-worker utility levels between regions at the optimum, the market equilibrium allocation of labour between two regions that would result and the socially optimum allocation condition. The socially optimum condition takes into account the externality generated by the migration of labour such that at the optimum the net value of the marginal product of labour is equalized. It is shown that since workers consider only the average levels of taxation in their decisions to migrate and not the externality associated with their migration, that a Pareto optimum distribution of labour between the two regions or a Tiebout type equilibrium

will result only if the total tax bill per person were equalized between the two regions. This was shown to be the case only if the compensated price elasticity of demand for public goods is equal to unity for all individuals. If this is not the case, then the region with the larger taxes paid per person will be underpopulated while the other region will be overpopulated. Flatters et al. (1974) recommend that in order to achieve an efficient allocation of labour the central government should tax workers in the overpopulated regions and subsidize workers in the underpopulated region, with the optimal tax/subsidy rate determined so that when per-worker utility levels are equalized between regions, so are net per-worker tax payments. It is not obvious how the central government would carry this out, or in what direction the grants would go. Further, the strength of this argument depends on labour being perfectly mobile, which it is not, and on all provincially-provided public goods being 'pure' (price elasticity equal to negative one), which is even farther from reality.

In summary of this review, it has been seen that equalization payments, which are justified on the basis of fiscal equity, have associated with them at least two efficiency considerations. The first consideration argues that grants to equalize regional government fiscal capacities are required in order to prevent an over-allocation of labour in high fiscal capacity regions. The second argues that equalizing grants hinder the out-migration that is needed from

economically depressed regions. The less mobile is labour, the stronger is the case for making equalization payments on an equity basis and the weaker is the justification on an efficiency basis. Likewise, the more mobile is labour, the stronger is the case for equalization with respect to the efficiency aspects, and the less the need for such payments to attain fiscal equity. Whether or not the efficiency aspects of equalization payments are relevant at all depends on the existence of fiscally-induced migration. The present study will attempt to determine if these phenomena are in fact present in Canada. The response of labour to fiscal incentives in both its present region and in the other regions of the country will be determined so that both efficiency aspects of equalization payments may be tested.

The empirical evidence of fiscally-induced migration in Canada to date will be briefly reviewed in the next section. Before that, though, it is necessary to mention another aspect of this whole issue--that of the capitalization of fiscal benefits.

It has been argued that if the quality and quantity of local public goods and the level of property taxes are determinants of the residential choice for migrants, then local property values and therefore housing rents should be affected by them (Oates, 1969). In-migration to the high net public benefit regions increases the demand for housing in these regions which, if the supply is inelastic, will cause the price to rise. Part or all of the value of local

public benefits will be capitalized into the value of housing therefore, with the amount dependent on the elasticity of supply. This capitalization should negate to some extent the higher public benefits and thus attract less migrants than otherwise.

There is some disagreement though as to whether the increase in housing prices actually represents capitalization of fiscal advantages.[3] If the Tiebout mechanism is working perfectly there would be no capitalization. Any increase in the price of housing therefore would represent a short-run disequilibrium situation in which the Tiebout model has not fully adjusted. In the long run, however, the capitalization should decrease as, at least theoretically, the supply of housing is perfectly elastic. If, other things being equal, the price of housing does not decrease then the increased prices due to fiscally-induced migration would be due to the capitalization of the fiscal benefits.

There is scanty empirical evidence relating to the capitalization of fiscal benefits. Oates (1969) found that housing prices are positively affected by tax decreases and educational expenditure increases, indicating capitalization. Meadows (1976), however, using the same data but a much more

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[3] See, for example: Matthew Edel and Elliot Sclar, Taxes, spending and property values: supply adjustment in the Tiebout-Oates model, Journal of Political Economy, Sept. - Oct./1974, 82: 941-54; and Mark V. Pauly, A model of local government expenditure and tax capitalization, Journal of Public Economics, Oct./1976, 6: 231-42.

sophisticated model, found the overall impact of tax and expenditure changes on housing prices to be a lot less than was found by Oates. Much more research is needed in this area.

Empirical Studies

There are available three empirical studies of interprovincial migration in Canada in which fiscal variables were included. These were done by Courchene (1970), Mills (1980), and Mansell (1980) and will be reviewed below. A review of some of the studies analyzing the affect of fiscal variables on interregional migration in the United States will also be given.

Courchene did both a cross-section study, using the census years 1956 and 1961, and a time-series study for the time period 1952-1967. The census data used were disaggregated by age and education. Family allowance migration data were used for the time-series study and they were not disaggregated. The out-migration rate[4] was used as the dependent variable in both cases. The independent or explanatory variables employed were all or a combination of earned income per employed person in both the sending and receiving

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[4]Gross labour migration from province i to province j divided by the labour in i was the dependent variable for the cross-section study; gross family allowance recipient migration from province i to province j divided by the family allowance recipient population in province i was the dependent variable for the time-series study.

regions, the unemployment rate in both regions, the overall Canadian unemployment rate (time-series only), the percentage of the labour force employed in agriculture in the sending region, the level of education in the sending region, the distance between the two regions, and shift dummy variables representing out-migration from Quebec to all other provinces, from the Atlantic provinces to Ontario, and from Saskatchewan to Alberta. The fiscal variable employed in the cross-section study was the total of location-orientated subsidies or intergovernmental transfers only and were defined as the sum of statutory subsidies, equalization payments, stabilization payments, and the Atlantic Provinces Adjustment Grant, in the sending region only. This sum was divided by the labour force to obtain what Courchene termed the "unearned income per member of the labour force."

For the time-series study, total federal transfers to province i or the sending region (which included transfers to persons) divided by earned income was used as the fiscal variable. Unemployment insurance benefits divided by earned income was also included since it was hypothesized that these benefits decrease the costs of being unemployed and thus inhibit unemployed persons from migrating to a region where they may be employed. It is not obvious why the fiscal variables used in the cross-section study were defined differently than those of the time-series study, nor why in one case the transfers used were scaled by the labour force and in the other by income.

The model used in both cases was a single equation relating the migration rate to the independent variables. In the cross-section study a linear functional form was used since in some cases for the data disaggregated by age the dependent variable took a value of zero. The log-linear functional form was found to give better results than the linear form in the time series analysis.

This very simple model succeeded in explaining four-fifths of the variation in out-migration flows. Most of the coefficients were significant and of the expected sign. Both the intergovernmental transfer variable and the total transfer variable were found to be significant and negatively related to the outflow of migrants. Courchene interpreted this finding to be a verification of Scott's proposition, namely that the transfer of government income serves to inhibit labour mobility. Unemployment insurance benefits were also found to inhibit out-migration. The coefficient of this variable was larger than that of the total transfer variable even though the latter included the former. This was interpreted to mean that unemployment insurance benefits are more effective in inhibiting migration than are total transfers generally. By including both of these variables, the effect of unemployment insurance benefits is essentially double-counted.

Courchene was interested only in determining if transfers inhibited out-migration. Whether or not a higher level of fiscal benefits in alternative regions attract

in-migration was not determined. In defining the private variables, however, the benefits and costs of migrating were identified and those variables relevant in both the sending and receiving regions were included. In this light, to the extent that they differ regionally, intergovernmental transfers in the receiving region should also have been included as part of the benefits. If, in fact, these variables do affect out-migration, the model is mis-specified. Further, multicollinearity of the variables is undoubtedly a problem in this model.

The results do imply, however, that federal transfers to provincial governments are inefficient in that they inhibit out-migration. Younger and more highly educated individuals were found to be the most mobile (response to stimuli the strongest) though, so that if Myrdal's view of regional growth and disparities is correct, then the conclusion that transfers promote inefficiency is not a definite one.

The study done by Mansell and Kwaczek (1980), which was done for the Alberta government, looked at the determinants of net in-migration to Alberta.[5] Both disaggregative and aggregative models were tested. In the disaggregative models the flows between Alberta and each major Canadian

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[5] As well, the determinants of international migration to Alberta were studied. Since in the present study we are mainly interested in interprovincial migration, only that portion of Mansell's paper will be reviewed here. The results of the immigration portion of the study can be found in the original report.

region were examined on an individual basis. Three different forms of aggregative models, in which total net inmigration to Alberta was studied, were used. The first was a model in which the Alberta benefit variables were compared with the average of such variables for all regions. Thus it was assumed that the response of migrants is in no way influenced by the particular region in which they reside in. Further, it was assumed that the costs of reallocating are constant across all regions so that they do not affect the regional response. The second aggregative model allowed for the population of the sending region and distance to influence regional migration by utilizing variables weighted by the average of these two variables. The third aggregative model allowed for divergence in the regional response to the net benefit associated with moving by including the net benefit variable for each region in the equation.

The independent variable for all models was net inmigration to Alberta--gross inflows less gross outflows from each region for the disaggregative models, and total gross inflows less outflows for the aggregative models. Annual family allowance interprovincial migration data were used. The explanatory variables used were all or a combination of expected income, unemployment rates, opportunity, money and psychic costs of moving, government transfers, growth rate of employment, growth rate of national income, and lagged migration. Both the expected income variable and the government transfer variable were entered in relative form. The

government transfer variable was defined as per capita government expenditures minus per capita taxes in Alberta divided by the same in the sending region. The expenditure data included outlays on non-market goods and services as well as hospital expenditures. Both the psychic and money cost variables were entered as a function of the distance between regions. The opportunity cost of moving was entered as a function of transfer payments (unemployment insurance benefits and occupational training allowances) and of expected income in the sending region.

For both the aggregative and the disaggregative models, time-series analysis was done for the years 1962 to 1978. All models were single equation with a logarithmic functional form. The model was estimated by ordinary least squares. The regions of Canada were broken down into the Maritime region, and the remaining six provinces.

The results for the disaggregative model indicated that relative expected income was the only consistently significant variable affecting in-migration. It was hypothesized a priori that migrants would view the government transfer variable as part of the benefits of moving to Alberta and therefore a positive coefficient was expected. For the regional regressions the estimated coefficient was significant only for the Maritimes and Ontario, and in both cases the sign of the coefficient was negative. The fact that there was little variation in the transfer measure over the estimation period was thought to be a possible

explanation for its lack of significance in explaining net in-migration from the other regions. The negative coefficient was explained by hypothesizing that the causality was more from migration to government expenditure than vice versa. In this view, large influxes of migrants to Alberta puts downward pressure on the per capita government provision of goods and services which increase to the constant or to an increased level with a lag (after migration occurs). This hypothesis would appear to apply more to public goods and services for which congestion applies (so-called "impure" public goods) than to pure public goods (an example of which is hard to find, especially at the provincial level). Unless there is excess capacity already, an increase in in-migration would require increased provincial expenditures on such public goods as education, health, and social services. For other goods, such as transportation and communication, it is possible that, at least initially, an influx of migrants would not require increased provision.

This finding of the Mansell study would appear to contradict Courchene's finding that migrants do consider government provision of goods and services as part of the benefits of a region. However, Courchene used only the origin region fiscal benefits, while Mansell used the relative difference between regions so that essentially they were not testing the same thing. By using a relative form, the response to origin and destination region fiscal benefits were forced to be symmetrical in the Mansell model. Also, it is

possible that had expected fiscal benefits rather than actual benefits been used, Mansell would have found fiscally-induced migration to be significant. This would seem to apply especially to Alberta with its well-publicized natural resource revenues.

The opportunity cost measure was in all cases for both the aggregative and disaggregative models highly correlated with the government transfer variable and in most instances when the opportunity cost was dropped from the model, the transfer variable became significant but remained negative. Increasing opportunity cost was found to positively affect migration (i.e. greater unemployment insurance benefits in the sending region had the effect of increasing annual net in-migration to Alberta). The positive relationship was explained as follows. As the unemployment rate in a region increases the probability of receiving transfer payments increases. If migrants view the increase in unemployment as an indication of a long-term deterioration of the economic situation in the region and do not consider unemployment insurance benefits as a substitute for earned income, then as the opportunity cost increases, out-migration from the region increases. This seems a very plausible explanation. Courchene, however, found that migrants do consider unemployment insurance benefits as a substitute for earned income.

Of the three aggregative models used, the model utilizing the averages of all variables for the rest of Canada gave the best results in terms of explanatory power and

significant coefficients. It is likely though that the estimated effect of some of the independent variables which vary widely from province to province is lost when averages are used. Also, the costs of migrating, which are usually proxied by distance, cannot be considered to be irrelevant. The disaggregative results obtained by Mansell did prove, as concluded by him, that there is considerable variation in the regional responses to income and employment differentials. Autocorrelation in the model using weighted averages and multicollinearity in the model using regional net benefit variables were present to such an extent that the results from both these models were unreliable.

The coefficient of the government transfer variable was found to be significant in the aggregative model utilizing average variables, but as with the disaggregative regressions, the sign was negative. The opportunity cost was again found to have a positive influence on migration.

From this study it can be concluded that fiscally-induced migration to Alberta, in the manner tested, is not significant. It might be expected that if fiscally-induced migration was present at all in Canadian interprovincial migration that it would be most significant for in-migration to Alberta. This hypothesis is based, however, on the fact that the expected fiscal benefits would be higher in Alberta given its superior position with respect to government revenues, particularly natural resource revenues. The actual net fiscal benefits as defined in Mansell's models do not

show the divergence across regions that expected fiscal benefits do.

The third available Canadian migration study in which fiscal benefits were included as a determinant of location is that of Mills (1980). This study utilized an extension of the Laber and Chase (1971) application of the human capital model to Canadian migration. In this model, it is assumed that perspective migrants seek to maximize their lifetime earnings by migrating to the region in which the net present value of earnings are the greatest. Laber and Chase utilized the present value of expected income as a proxy for the benefits of migrating, and geographic distance as the proxy for the costs associated with migrating. In this approach it is the absolute difference of benefits between regions which is used in order to calculate the net benefit of relocating. Mills (1980) also used the net present value of the absolute difference in expected wages and distance as explanatory variables. As well, she included a public expenditure variable as part of the benefit associated with moving, which, in keeping with the human capital approach, was defined as the net present value of the absolute difference in regional public expenditure benefits. For each region, public benefits were defined as expenditures minus revenues per capita. Expenditures included all provincial government expenditures except for interest paid on outstanding debt. Revenues included only those revenues collected through direct or indirect taxation of individuals

(i.e. corporate income taxes, natural resource revenues and intergovernmental transfers were not included in the revenue). Besides the net present value of expected wages and fiscal benefits, and distance, a housing price index, a lagged dependent variable and two dummy variables were included in the explanatory variables. The first dummy variable was used for out-migration from Quebec, and the second for all out-migration for the years 1974-1978 to see if there was an increase in migration flows due to the energy price increases in 1973 and subsequent increase in economic activity in producing provinces. The housing price index was used as an indicator of non-traded goods sector prices and was included to take account of regional cost of living differences.

Combined cross-sectional and time-series analysis was done for out-migration from the seven Canadian regions (Maritimes plus the remaining six provinces) to the other six regions for the time period 1961 to 1978. The dependent variable employed was the gross out-migration rate (gross migration from region i to region j divided by region i's population). A linear functional form was used implying an increasing marginal utility of income for migrants, which is a questionable assumption. The model was estimated using ordinary least squares.

As a comparison, a model similar to Laber and Chase's in which fiscal benefits were not included was also tested. For most provinces the explanatory power of the model

increased with the inclusion of the fiscal variable. The coefficient of this variable was positive and significant for the Maritime region, Ontario, Saskatchewan, Alberta and British Columbia, indicating that migrants from these regions prefer high public benefit locations. For Quebec and Manitoba this coefficient was also significant, but the sign was negative. Part of this result was said to be due to the fiscal variable employed. For some regions (Quebec, Manitoba and the Maritimes) a relatively small portion of their government expenditures are financed by their own tax collection. Federal transfers make up most of the difference. Therefore, as defined in this study, these regions show up as high surplus areas with respect to public benefits. Mill's calculations indicate that the Maritime provinces were second only to Alberta in net per capita public benefits. This is the same problem as the Mansell study had in using actual rather than expected fiscal benefits. Courchene, to some extent, avoided this problem by utilizing federal transfers. He, however, did not include corporate income taxes or natural resource revenues which, as explained earlier, at least potentially could be expected to be used to either increase the per capita provision of public benefits or decrease their cost.

There were statistical problems associated with using combined cross-sectional time-series data in Mill's model as well as multi-collinearity between the lagged dependent variable and the other explanatory variables. This

study also suffered, as will be seen the present one does, from the lack of disaggregated migration data. To properly test the human capital model of migration, data disaggregated by age at least are essential. Given these limitations, it was concluded that ". . . migrants respond in a positive fashion to differences in wages and fiscal surplus levels between regions and high provincial housing prices were found to act as a deterrent to in-migration" (Mills, 1980, p. 52).

The results of the Canadian studies of fiscally-induced interprovincial migration are not strictly comparable because of the different models, variable definitions and time periods used. In one case the absolute difference in regional fiscal benefits was found to be positively related to out-migration. In-migrants to Alberta, however, were not significantly affected by the relative public benefit differential. Both of these studies utilized actual provincial government expenditures, and in both cases it was assumed that the response to an increase in destination region benefits elicites the same response as an identical decrease in origin region benefits. The third study, which utilized intergovernmental transfers in the origin region only, found that such transfers inhibit out-migration. The results with respect to the effect of transfers to persons on migration are also not conclusive. In one case these transfers were found to decrease out-migration and in another to increase it.

In no case were the public benefits of both the origin and destination regions entered separately as they need to be in order to determine if fiscally-induced migration to high surplus regions exists, and if intergovernmental transfers inhibit out-migration. Also, the response to public benefits in the sending and receiving regions is unlikely to be symmetrical. Further, expected fiscal benefits were not used, and it is hypothesized that it is this measure rather than actual benefits which migrants respond to. The present study will attempt to overcome these difficulties.

Before turning to the description of the empirical portion of this paper, a review of the relationship between fiscal variables and human migration patterns in the United States will be given. This information was found in a review article by Cebula (1979).

Most of the studies in the United States that attempted to determine the impact of state and local government actions on internal migration flows have focused on the influence of welfare benefits. There is an enormous differential in geographical welfare benefits which is widely recognized. In order to properly assess the impact of these differentials, the migration data need to be disaggregated by income levels since receipt of such payments depends upon income. What was done in most cases was to separate the data into 'black' and 'white' groups since a larger proportion of black people than white people is elligible for

welfare payments. The more recent studies utilized a 'white' and 'non-white' classification. Since what essentially was being studied was the differential impact welfare benefits have on low-income and high-income persons' migration, the racial classification undoubtedly gives some degree of unreliability to the results obtained. In this manner of thinking, a disaggregation by sex would have been just as good, or possibly better than by race, since a larger proportion of women are elligible for welfare benfits than men. Further, as has been found in international migration studies, a large proportion of the residential choice of racial groups is determined by the location of other people who have migrated from the same place. In one of the American studies in which the proportion of black people residing in an area was used as a determinant of in-migration of black people to the area, drastically different results were obtained than those in which the variable was not included. Indeed, as will be seen in the present study, the location of previous migrants from a region is one of the largest determinants of residential choice of interregional migrants. Disaggregation by socio-economic groups would have given more revealing results than the racial classification.

What was found in most studies was that low-income people (proxied by non-whites) are strongly attracted to high welfare benefit regions because, it is said, such individuals regard these benefits as a form of income and/or long-term unemployment compensation. High welfare benefit

regions, however, act as a disincentive to in-migration of high-income migrants (proxied by whites). These payments act as an economic disincentive to higher income people because they see them as a redistribution of taxes, of which they contribute the most. Local property taxes were included in some of the studies as a determinant of migration and it was found in most cases that the "economically advantaged" prefer low property tax areas and the "economically disadvantaged" are insensitive to property tax levels, which makes sense since they own little property. Usually regions with high welfare levels are also those with high property taxes, so that besides attracting low-income people, high-income people are inclined to leave such regions. Eventually the state governments of these regions have to rely on federal transfers and borrowing to finance their expenditures.

In the studies utilizing simultaneous models in which welfare benefit levels are determinants of migration and vice versa, the same results were found with respect to high and low income people's migratory response to welfare benefit levels and local property taxes. This was the case for both in-migration and out-migration studies. In one case, the data were disaggregated by age and race and the government variable employed was the total per capita level of state and local government expenditures. All groups were found to show a strong preference for high expenditure regions.

The effect of state and local government expenditures on migration other than welfare have not been determined. For example, it was pointed out by Cebula (1979) that the effect of educational expenditures, the largest most important public benefit to the average migrant, is not known. Also, the explicit costs to the migrant of the provision of whatever public services they receive needs to be taken into account. The available evidence indicates that the quantity as well as the mix and cost of public services all are determinants of location choice. As pointed out, though, the propensities of various population groups to migrate differs as does their response to various stimuli, so that in order to properly assess the effect of public variables, data disaggregated by age, sex, income class, race, and so on, are essential.

CHAPTER III

MODEL, DATA AND ESTIMATION TECHNIQUE

Model

Modelling the Migration Decision

Basically, three different models of interregional migration have been empirically tested and reported in the literature. The first is a single equation relating the decision to migrate to a number of private and public variables in both the origin and destination regions and, in some cases, to the personal characteristics of the migrants (however, if such data as age, education, income or sex of all migrants are known, separate regressions are usually tested for the different subgroupings). This model is used to test either the 'push-pull' or the 'selectivity of migrants' theories of migration. The second, the human capital formulation, relates the decision to migrate to the costs and returns that would accrue to an individual if he/she moved. Both these models can be simply represented as follows:

$$\frac{Mij}{Pi} = f(Xi,Xj),$$

where Mij represents the number of people moving from i to j, Pi the population of the origin region, and Xi and Xj the

attributes of the origin and destination regions which affect migration. Note that Mij/Pi can be interpreted as the probability of a move from i to j.[6]

This formulation has been criticized by Vanderkamp (1976) in that it assumes that the probability an individual will move from region i to region j is independent of the conditions in the other regions so that as a consequence, an increase in the number of migrants to j is entirely at the expense of the number of stayers in i. A more reasonable assumption is that when conditions in j change such that a

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[6] Rather than using straight observations on the number of migrants between areas, the dependent variable is usually 'normalized' in some way to allow for the fact that, other things being equal, one expects to find larger flows of migrants between more populous regions. If normalization of the dependent variable does not take place and population is not included as an explanatory variable, then, because population size is usually correlated with the economic explanatory variables used in migration equations, the estimated coefficients of these variables will be biased by picking up part of the effect actually due to population size. It has been suggested by Young (1975) that raw migration flows be normalized by the product of the sending and receiving region's population as this embodies the assumption of unitary elasticity of migration flows with respect to both sending and receiving region population, a gravity model normalization, and is thus uncorrelated with the explanatory variables in either the sending or receiving region. Vanderkamp (1976), however, feels that the physical science analogy defense of the gravity model is useless. The receiving region's population he views as an indicator of the number of job vacancies arising in region j in a particular period, and normalizes the migration flows by the receiving region's population to obtain Mij/Pi or the probability that someone in i will move to j. This same procedure was used in the model for this study with the exception that the size of the labour force in the receiving region rather than the population was used as a proxy for the number of job vacancies which would arise. See later.

greater number of individuals migrate from i to j, a proportion of this increased migration from i is at the expense of migration to regions k or l, whose relative attractiveness had decreased.

The third model that has been empirically tested is a strict utility choice model of the migration decision, which was developed by Vanderkamp and Grant (1976) to overcome the problems of the traditional human capital formulation.

Vanderkamp and Grant apply the strict utility or multinomial logit model as developed by Domenich and McFadden (1975) for application to urban travel demand, in which the individual makes a choice among discrete alternative modes of transportation. In the migration context, the individual also makes a choice among discrete alternatives in that when locational characteristics change she/he either stays in her/his present location or moves; the choice is not divisible.

The theory of rational consumer behavior states that all possible alternatives can be ranked in order of preference by the decision maker, who subsequently chooses the option he/she finds most desirable given his/her tastes and budget constraints. In the multinomial logit specification of the migration decision it is also assumed that the individuals are utility maximizers, with the utility of any alternative dependent only on the attributes of that alternative and on the socio-economic characteristics affecting

tastes. At any point in time, the potential migrant would evaluate the utility of each alternative location (including the present location), and choose that one which maximizes utility.[7]

Essentially what one is trying to obtain is a demand function for any location. If the individual choices from a particular origin region to a particular destination region are aggregated and the total divided by the population, this frequency can be interpreted as the probability that an individual drawn at random from the origin region population will choose this particular destination, and is referred to by Domenich and McFadden (1975) as the "choice probability." The theory of utility maximization provides a framework of individual choice but does not consider the unobserved characteristics such as tastes and unmeasured attributes of alternatives, both of which result in variations in the observed choices of two or more individuals facing the same measured alternatives. Variations in the aggregate demand for a 'lumpy' commodity, of which the discrete choice of

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[7] In this, and the other models of migration mentioned, the choice of destination depends on a comparison of the costs and benefits (attributes) of the different locations, while the evaluation of the given benefits or costs are independent of when the move is made. Ideally, one would like to model both the decision of when to move and the choice of destination once the decision to move has been made. Since, however, the timing of the decision to move is likely to depend on socio-economic chracteristics such as income, family size, occupation, age, education, etc., data of which were not available, only the choice of destination was modelled and estimated. As will be seen later, though, the present model does allow for the staying choice to be differently affected by its attributes.

location can be thought of, are due to shifts at the extensive margin when individuals are switching from one alternative to another, rather than the intensive margin as in the usual divisible commodity, identical individual case. As such, rather than assuming that tastes and unobservable attributes are uniform, as is usually done in aggregate demand studies on the assumption that the effects of the unobservable factors cancel out, what is needed is a specification of the distribution of these factors so that the distribution of choices in the population can be generated.

Following the notation of Domenich and McFadden, the utility function of the individual migrant for any given alternative can be written as:

$$u = U(X,s,\xi), \tag{1}$$

where X is a vector of locational attributes, s is a vector of summarized socio-economic characteristics, and ξ is a vector of unobservable socio-economic characteristics determining tastes, and also represents the unobservable attributes of each alternative location. The desirability of any location with given attributes can thus be represented as in (1). If a random sample is drawn from a population with common socio-economic characteristics and facing the same alternatives, ξ will be random and the utility function stochastic. Suppressing the unobservable term, (1) can be written as:

$$u = U(X,s) \tag{2}$$

and thought of as a random function whose value is a random variable dependent on which individual is drawn from the

socio-economic group.

The utility maximization condition can be stated as follows:

$$U(X^j,S) > U(X^i,S) \qquad \text{for } j \neq i,\ j = 1, \ldots, J \qquad (3)$$

with i representing the origin region and j the destination region. Since the utility values are stochastic, (3) will occur with some probability:

$$Pij = \text{Prob}\left|u(X^j,S) > u(X^i,S)\right|, \qquad (4)$$

$$\text{for } j \neq i,\ j = 1, \ldots, J$$

where Pij denotes the choice probability of migrating from i to j. Assuming that the utility function in (1) can be written as:

$$U(X,S,\xi) = V(X,S) + \eta(X,S),$$

where V is non-stochastic and reflects the representative tastes of the population, and η is stochastic reflecting the individual differences in tastes and unobservable attributes, the utility maximizing condition in (4) becomes:

$$Pij = \text{Prob}\left|\eta(X^j,S) - \eta(X^i,S) < V(X^i,S) - V(X^j,S)\right| \qquad (5)$$

$$\text{for } j \neq i,\ j = 1, \ldots, J.$$

In order to solve equation (5), an explicit functional form and a probability distribution of the stochastic utility function need to be specified. Domenich and McFadden assumed the cumulative distribution of the random components of the utility function to be independently and identically distributed with a Weibull distribution in order to obtain a computationally tractable model. They also assumed the non-stochastic portion of the utility function to be

linear-in-parameters. With these two assumptions, (5) can be written as the multinomial logistic model.

$$Pij = \frac{e^{V(X^j,S)}}{\sum_{i=1}^{j} e^{V(X^i,S)}} . \qquad (6)$$

From (6) it can be seen that the probability for all choices sum to unity and that the probability of any choice is dependent on the attributes of all alternatives, thus satisfying the criticism raised against the human capital model.

As can be seen from equations (7) and (8) below, the 'odds' of choosing location j are independent of the presence or absence of a non-chosen third alternative.

$$\frac{Pij}{Pii} = \frac{e^{V(X^j,S)}}{e^{V(X^i,S)}} . \qquad (7)$$

$$\ln\left(\frac{Pij}{Pii}\right) = e^{V(X^j,S)} - e^{V(X^i,S)} . \qquad (8)$$

This 'independence of irrelevant alternatives' property requires that the alternatives be perceived as completely distinct and independent, which is not an unreasonable assumption for a model of interprovincial migration. The function $e^{V(X,S)}$ is known as a 'strict utility function.' From equation (6) it can be seen that the probability of alternative j being chosen is proportioned to its strict utility, with the proportion determined by the condition that exactly one alternative must be chosen since the probabilities over all alternatives must sum to unity. The individual probabilities in this strict utility model are thus dependent on

all attributes of all locations, with the odds of moving to j rather than i only related to the attributes of the two choices.

Following Vanderkamp and Grant (1976)[8], $V(X^j)$ will be specified as:

$$V(X^j) = A \log X_j \qquad (9)$$

in order to incorporate the diminishing marginal utility of income assumption into the utility function. Substituting (9) into (8) gives the estimating equation

$$\log\left(\frac{Pij}{Pii}\right) = A_1 \log Xj - A_2 \log Xi \qquad (10)$$

In specifying this estimating equation from (8), Vanderkamp and Grant assumed that for all moving choices the attributes of each destination region play the same role in the utility function, while the staying choice is differently affected by its attributes. This is an especially plausible argument in that there is a reluctance to change locations by most individuals, so that the same income, for example, in both

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[8]Writing $V(X^j)$ rather than $V(X^j,S)$ assumes that the migration equation will be estimated separately for each socio-economic group. Unfortunately, the migration data available were not broken down by any socio-economic characteristics such as income, age, education, or sex. The data used in the present study are family allowance data, so that single people, the most mobile section of the population, are not included. It is quite plausible that families with children and those without (including single individuals) do respond differently to the same attributes, so that in a sense the migrants used in this study could be considered as a somewhat homogeneous group. Income class may be a better indication of socio-economic characteristics but alone, it too assumes a great deal of similarity with respect to other characteristics.

the origin and destination regions is surely valued higher in the home region. In fact, it is reasonable that a smaller income in the origin region could provide an equivalent state of utility as a larger one in the destination region. Distance is almost always included as an argument in migration equations and presumably picks up the effect of psychic and monetary costs of moving. This, however, implies that these psychic costs are an increasing function of distance, which may or may not be the case for all individuals. The usual justification given for the differential treatment of the origin region attributes is to allow for the effect that origin region income has on the ability to finance a move. This differential treatment assumption can be written as:

$$Pij = \frac{\ell^{A \log Xj}}{\sum_{\substack{j=1 \\ j \neq i}}^{J} \ell^{A \log Xj} + \ell^{B \log Xi}} \qquad (11a)$$

and

$$Pii = \frac{\ell^{B \log Xi}}{\sum_{\substack{i=1 \\ j \neq i}}^{J} \ell^{A \log Xj} + \ell^{B \log Xi}} \; . \qquad (11b)$$

The log of the ratio of probabilities is:

$$\log\left(\frac{Pij}{Pii}\right) = (a_0 - b_0) + A \log Xj - B \log Xi, \qquad (12)$$

where a_0 and b_0 denote the constant terms of equations (11). Equation (12) is the estimating equation that will be used, with $\left(\frac{Pij}{Pii}\right)$ replaced by $\left(\frac{Mij}{Pii}\right)$. Note that Pii in (11) denotes the probability of remaining in region i, whereas Pii in the

term ($\frac{Mij}{Pii}$) denotes the population of region i (see footnote #6).

Definition of Variables

As mentioned above, gross migration flows between any two regions[9] divided by the origin region's population, the 'odds' of making a move from i to j, was used as the dependent variable.

The independent or explanatory variables were chosen with reference to the different theories of migration. There are three main theories--the human capital approach, the selectivity of people approach, and the push-pull approach. The human capital approach, as outlined by Sjaastad (1962), puts internal migration in a framework of the costs and returns of investment in human capital. The expected returns are in the form of differential income streams accruing to the migrant from better opportunities in the destination region. The costs are composed of out-of-pocket money costs of moving, the non-money or opportunity costs of foregone income during the time spent travelling, searching for and leaving a new job, and the psychic costs of moving away from one's family and friends and familiar surroundings. If the discounted present value of expected benefits is greater than the discounted present value of the costs the individual

[9]The four Maritime provinces were combined to constitute one region because the number of out-migrants from or to each of these provinces individually were in most cases very small. The remaining provinces each were considered as an individual region.

would make the relocation. The costs of migration should be relatively constant over all age groups, but may be higher for older persons due, for example, to the higher moving expense of families. A case probably could be made for greater psychic costs of older people moving for the first time, also. The expected benefits are greater for younger people, however, since they have a longer life expectancy and thus a longer pay-off period. One would expect therefore, and as has been found to be the case, that younger people are the most mobile. More highly educated individuals have also been found to be more mobile and in terms of the human capital hypothesis, this would be explained by the lower non-monetary (and possibly psychic) costs and the greater expected returns of such individuals.

With respect to the human capital theory, then, one would consider some form of income or wage variable in both the sending and receiving region, or the income differential, as the variable representing the expected benefits. The probability of obtaining a job in the receiving region also needs to be taken into account (although, if the world worked according to neo-classical theory, higher wage regions would imply low regional unemployment rates and vice versa). Some indicator of the costs of migration is also implied as a variable to explain migration. All forms of costs are usually assumed to increase with distance and thus the distance between two regions is used as the cost variable. A breakdown of migrants by age and/or education (or

occupation as an indicator of education), with separate testing for each sub-group or, alternately, the inclusion of both these characteristics as independent variables, is also implied, but these data, as in the present study, are not always available.

The selectivity of people theory[10] delineates the relationship between internal migration and economic development by hypothesizing that migrants are dynamic risk-taking individuals for whom the psychic costs of relocation are small. The movement of such individuals to areas of better economic opportunities promotes subsequent growth for such regions and therefore induces more in-migrants of the same type. As in the human capital approach, this theory implies that age and education as well as the economic opportunities of the destination region are the more important variables in explaining migration. It is possible, however, that the risk-taking individuals who migrate may move to a region with a lower average wage rate than in their present region if the local dispersion of wages about these means are different so that there is some possibility of obtaining a substantially higher wage in the new region. In this case, the destination region's average wage level would not have as important an influence on migration as, say, the distribution of income.

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[10]The major contributor to this theory is Simon Kuznets. The description was taken from Sahota (1968).

The push-and-pull thesis of migration[11] states that people are pushed from rural areas by such factors as outmoded land tenure systems, unfavorable terms of trade, wide dispersion of income and rural poverty. They are pulled to areas of better employment and educational opportunities, and by the 'bright lights' of cities. Again, the economic opportunities of the destination region, such as the income level and employment opportunities, are implied as variables needed to explain out-migration, as are the push factors of the unemployment rate and the distribution of income in the origin region. Some indicator of the amenities of a region is also implied.

People do not migrate for economic reasons alone, though, nor can it be assumed that they always act as rational economic beings. As indicated by Richardson (1969) the migration hypothesis must take account of attachments to regions, inertia, and the exercise of free choice by individuals. The psychic costs of moving and the amenities of urban areas have already been mentioned as non-economic factors affecting migration. Richardson also points out that, since the channels through which wages and job availability information are passed are at best imperfect, the past movements by out-migrants from an area tend to affect the destination of later out-migrants because of the availability of job information and contacts. Further, this so-called 'friends

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[11]The major contributors to this theory are Ravenstein and Redford. The description was taken from Sahota (1968).

and neighbours' or 'stem-family' process is reinforced by the advantages to the new migrant of the temporary lodging and spiritual support that can be offered by previous known migrants. This process may induce more migrants to an area than would be justified on the basis of initial wage or unemployment differences. In empirical studies of migration between regions, then, some measure of previous migration should be included.

And finally, as stated in the literature review, there is thought to be migration in response to fiscal factors. If migrants consider fiscal factors as part of the benefits of a region, one would expect migration from regions of low to regions of high net fiscal incidence and/or less out-migration than would be predicted by consideration of income and employment differences from depressed areas.

In view of all of the above, the following were included as explanatory variables in the present study of migration: regional wage rates, net fiscal incidence, unemployment rates, labour force size and employment growth rates, as well as distance and the number of previous migrants from one region to another for a specified period of time. Data on regional income distributions as well as the socio-economic characteristics of the migrants were not available, although presumably some indicator of the income distribution could have been found. Also, no attempt was made to measure the amenities offered by regions, although such indicators as the degree of urbanization or the average

yearly temperature could have been used.

The specific definitions of the variables used are given below.

Private Variables

Wage Rate, Job Opportunities. The economic attributes of the receiving region which influence migration are the wage rate and the job opportunities. Job opportunities may be represented by at least three indicators: the regional unemployment rates to represent the excess supply or demand for labour, the growth rate of employment per labour force member as an indicator of the number of new jobs being created, and the labour force size itself as an indicator of the size of the regional labour market and therefore the number of job openings that arise through the normal process of retirements, death, and labour force withdrawals. The latter two indicators essentially measure the same thing--the difference between the two is subtle--so that only one need be included.

An "expected" wage rate was constructed as follows:

$$EW = |(100 - U)W + U(UIB)| /100, \qquad (13)$$

where EW represents the expected wage rate, U the regional umemployment rate, W the regional average weekly wage rate, and UIB the regional average weekly unemployment insurance benefits. Both the growth rate of employment per labour force member and the labour force size itself were used as indication of job openings. The latter was represented by

the total number of persons in the labour force, and the former as follows:

$$\frac{\Delta E}{L},$$

where ΔE stands for the increase in the total number of persons employed and L, the total labour force. A cross-sectional study was done for two different years--1965 and 1977. ΔE was therefore calculated by subtracting the total number of persons employed in 1964 and 1976 from that of 1965 and 1977, respectively.

The expected average weekly wage rate for the origin region was calculated as for the destination region. The origin wage rate was included separately from the destination region wage rate, rather than using the difference between the two as is done in the human capital formulation, to allow for the different valuations of origin region attributes, and the possible effect of origin region income on the ability to finance a move.

Since aggregated migration rates were used as the dependent variable, the average wage rate of both regions was used. As such, it is assumed that the occupational structure and the income distribution is similar in all regions, or do not matter.

A priori, or positive relationship is expected between the out-migration rate and the expected wage rate, the employment growth rate, and the labour force size in the destination region. A negative relationship is expected

between the out-migration rate and the expected wage rate of the origin region if this wage rate acts as a push factor. This relationship will be lessened, however, by the extent of the effect of origin region wage rate on the ability to finance a move.

Initially, the expected wage rate and the employment growth per labour force member were used as indicators of economic opportunities. The actual wage rates were also tried with the regional unemployment rates entered as separate variables, as was the labour force size rather than the employment growth rate as an indicator of job openings. As will be seen in the next section, the expected wage rates and the labour force size appear to be the most relevant indicators of the private economic influences on destination choice.

If the regional cost of living differentials are such that real wages are the same in all regions, there would be no advantage in terms of higher wages to changing locations. If interregional commodity trade is successful in equilibrating the prices of traded goods, the only regional cost of living differences would be in the non-traded goods sector of which housing is the main component (in the short run at least, housing supply can be considered inelastic). But by reference to regional price indices it can be seen that in Canada traded goods prices are not completely equalized across regions. As such, the wage rate data were converted to real terms using a regional price index for all

items. The index used was the implicit price deflator for gross domestic provincial product, which was constructed as a measure of provincial inflation (see Appendix).

Migration Stock Variable. Initially, the model was used without inclusion of any variable indicating the number of past migrants from the same origin region, and the explanatory power of the model was relatively low. However, when the migration stock variable was included the explanatory power of the model (measured by the adjusted R^2 coeffient) greatly increased. This variable, which takes account of the information flow between friends and the social transition process, was constructed by adding together the yearly number of migrants from any one destination region to a specific origin region for the five years previous to the year under study (i.e. 1960 - 1964 and 1972 - 1976).[12]

Since the distribution of past migrants is a function of past migration, it is a function of all the variables which influenced past migration. The estimated coefficients of the variables in the model not including the migration stock variable would tend to overstate the direct relationship between the variables and migration because these variables also influence migration indirectly through their past effect on the distribution of migrants. As will be seen, addition of the migration stock variable did affect,

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[12]This variable was constructed following Greenwood (1969).

considerably in some cases, the magnitude of the parameter estimates of the other variables.

A priori, a positive relationship between this variable and the out-migration rate is expected.

Distance. The distance between regions was used as the indicator of the money, non-money or opportunity, and psychic costs of migration. As these costs are assumed to increase with distance, a negative relationship between it and the migration rate is expected. Inclusion of the migration stock variable would be expected to greatly decrease the negative effect of distance on migration, since both the psychic costs of distance and the information effect are somewhat lessened by the presence of family and acquaintances.

Public Variables

As explained in the literature review, fiscally-induced migration refers to the movement of people from one region to another because of better public benefits.[13] As also pointed out, both the benefits provided and the cost to the migrant of these public services are important. The mix of public goods and/or tax rates is also thought to influence location choice. Fiscally-induced migration therefore

[13]Fiscally-induced migration can also take place within a region or a province. Some municipalities may offer more favourable property taxes, school systems, recreational facilities, etc. The present study considers only the interregional movement of people; intraregional migration is not analyzed.

involves the movement of people to that locality, other things being equal, which offers the most desirable mix and quantity of public goods at the least cost, or similarly, the most desired tax rates given their demand for public goods. This seems to imply that indicators of both the type and quantity of public goods provided and the cost of provision or tax rates should be used as fiscal variables in a migration model. To determine which specific tax rates or expenditure to use, however, it is necessary to have some information about the migrants. For example, it has been shown that poor people respond more to welfare type benefits than to tax rates, while wealthier folks are more concerned with tax rates and educational expenditures (Cebula, 1979). Since aggregate migration data were used in the present study, no attempt to test for migration in response to the mix of public goods and services provided or the tax structure was made. The data used were family allowance migration data so presumably education expenditure per capita would constitute part of the fiscal incentive to move. This was not tested.

What is needed in order to test the response of migrants to the quantity of regional public benefits is a measure of the fiscal residuum--the value of public services received minus the taxes contributed. A surrogate way to measure this is to use regional government revenue sources other than that collected directly from labour, as they provide the only means of providing a fiscal advantage to

labour. There are three such sources of provincial revenue that are not collected directly from its residents--taxes on capital or corporate income taxes, taxes on crown lands or natural resource revenues, and transfer from the federal government.[14] If there are locational advantages to situating industries in certain areas, the governments of such regions will be able to tax these industries above the level required to provide services to capital and use these taxes to subsidize the provision of public benefits to labour (Wilson, 1980).

With respect to federal transfers, only those that differ regionally should be included in the transfer revenue measure. Federal transfers to persons vary according to income in the same way across the country (except for unemployment insurance benefits which have been taken account of in

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[14]Note that resource revenues (or equalization payments) could also be used by the provincial governments to subsidize capital (Wilson, 1980). Capital would be attracted to such a region and the return to labour would increase. Since factors are free to migrate between regions, in the long run the capital to labour ratio and thus the wage to rental ratio will be equal across regions. The increased wage rate will induce the migration of labour until these ratios are restored to the level existing before the subsidization of capital took place. This represents a dissipation of resource rents in the same way as labour in-migration in response to public subsidization via resource rents does in that the marginal contribution of the induced labour due to the subsidization of capital will be less than their marginal contribution in the region they migrated from.

The response of capital to public subsidization was not considered in this study. As labour induced by this subsidization is responding to wage rate differentials, the magnitude of inducement due to capital subsidization is not known since its effect shows up in the response to the wage rate, and we do not know what proportion of the wage rate is due to capital subsidization (or what stage in the adjustment process the region is in).

the expected wage variable) and thus should not be included. Only unconditional grants from the federal to the provincial governments allow the latter to provide lower taxes and/or a higher provision of public goods to its residents, which in the Canadian case take the form of equalization payments. The sum of corporate income taxes, natural resource revenues, and equalization payments divided by the region's population was thus used as the fiscal variable. The origin and distribution region's benefits were entered separately rather than using the difference between the two. As with income or wages, it is likely true that marginal utility of net public benefits in the destination region is different from that of the origin region (higher presumably because of the migrant's preferences for his/her home region). Also, by entering this variable separately, some ideas as to whether or not equalization payments hinder out-migration can be obtained.

Using this surrogate measure of the fiscal residuum has an advantage over using the actual residuum in that it represents potential or expected net expenditures. As mentioned in the literature review, because of equalization payments the Maritime provinces and Quebec are able to maintain per capita net fiscal benefits at about par with the rest of the provinces. Thus, the differences between regions of the actual fiscal residuum are not that substantial. Using the surrogate measure, however, highlights better the difference in revenues that would allow public subsidization of labour. Also, the magnitude of resource revenues in Alberta are

expected to increase drastically over the next decade relative to other regions.

With respect to potential public benefits, it may be argued that migration may be postponed until such time as these revenues are in some manner distributed to labour. However, there may be a residency term requirement for qualification of such benefits which would induce migration before the distribution. Also, there are gains to be made in the short term in the real estate market which would induce migration now.

Besides the hypothetical distribution of revenues saved in the equivalent of the Alberta Heritage Savings and Trust Fund (AHSTF), large increases in resource revenues may be expected to be used to subsidize industrial development, for example, such that the future economic prospects of such a region look bright. When the public sector experiences sharp and drastic increases in its revenue it takes time for the government and its bureaucrats to formulate development plans and plans pertaining to social service spending using its new revenues, as is evidenced by the management of the AHSTF at present. For whichever of these reasons, or others, it is believed that potential fiscal benefits as measured in this study are more of an inducement to migration than actual benefits, with the former measure of course including the latter.

Migrants may perceive the three revenue sources--corporate income taxes, natural resource revenues and

equalization payments--differently. For example, large equalization payments may be seen as an indication of economic decline of a region. Resource revenues may be seen as an indication of prosperity and opportunity in the future (if they are managed properly) or they could be viewed as a short-term phenomenon, especially non-renewable resource revenues, and thus not induce migration. To obtain some idea of how migrants view these funds, per capita corporate income taxes, equalization payments and natural resource revenues were included as separate independent variables in the model. The results, however, were poor. Besides the statistical problem of multi collinearity, it is probably true that most people have little information on the relative magnitudes of each of these individual revenue resources in all regions. It is also unlikely that they have very much information concerning the size of the three sources together, although presumably most would have an ordering in their minds of the relative wealthiness of the provincial governments, and some idea of the weighting of the individual sources for each province.

A positive relationship is expected between the destination region fiscal benefits and the out-migration rate. A negative relationship between origin region fiscal benefits and the out-migration rate is expected since higher public benefits reduce the need to migrate away from declining regions. Both origin and destination fiscal benefits were defined as the per capita sum of the three revenue sources.

The fiscal benefits were deflated by regional price indices since cost of living differences may reduce the inducement to move. Thus it is implicitly assumed that the increase in housing values in the expanding regions experiencing in-migration is a disequilibrium phenomenon that will in the long run, in which the supply of housing is more elastic, reverse itself. To test if the increase in housing values does represent a capitalization of fiscal benefits, the wage rates and fiscal variables were deflated by regional price indices excluding housing and the housing price index was entered as a separate explanatory variable in one of the regressions. A positive relationship between this variable and out-migration would indicate that at least part of the fiscal advantage is capitalized into the value of housing.

Dummy Variable

A dummy variable for out-migration from Quebec was included in the model to take account of the language and cultural factors that inhibit out-migration of French Quebeckers.

The model with the included variables can be written as follows:

$$\ln\left(\frac{Mij}{Pii}\right) = a_0 + a_1 \ln Wj + a_2 \ln Wi + a_3 \ln Fj + a_4 \ln Fi + a_5 \ln LFj + a_6 \ln Dij + a_7 \ln MS + a_8 D + \xi \quad (14)$$

The symbols are defined as follows:

Mij = number of migrants from i to j;

Pii = origin region population;

Wj = destination region expected wage rate (as defined in equation (13));

Wi = origin region expected wage rate (as defined in equation (13));

Fj = destination region fiscal benefits;

Fi = origin region fiscal benefits;

LFj = destination region labour force;

MS = migration stock;

Dij = distance;

D = dummy; and

ξ = error term.

The different indicators used for certain variables, that were noted earlier, are the following:

EGj = destination region employment growth;

Uj = destination region unemployment rate;

Ui = origin region unemployment rate; and

HPj = destination region housing price index.

Data

The data used are given in the appendix along with the sources. The formulas for constructing the variables from this data were given in the previous section.

With respect to the migration data, a note needs to be made. These data do not indicate whether it is the first move or a multiple move, or whether or not it is return migration. Data disaggregated on this basis would be better since return migrants, and to some extent multiple migrants, respond to different incentives and differently to the same incentives or variables as do first-time migrants (Vanderkamp, 1971).*

As indicated previously, a cross-sectional analysis was done for two different years. Since 1973, the resource revenues, particularly energy, of the resource-rich provinces have dramatically increased. It was hypothesized that fiscally-induced migration may be of greater importance since the increase of energy prices because of the wide divergence in provincial revenues between the energy-rich and energy-poor provinces that has resulted, and the large amount of publicity it has received (and similarly, public controversy it has caused). To test this, the model was tested using data from one pre Opec-year, 1965, and one post Opec-year, 1977. The general economic conditions prevailing during these two years are quite dissimilar, and to the extent that they influence migration, the results from the two years are

*As noted previously, family allowance migration data were used. I would like to thank S. Wilner and G. Gauthier of the Economic Council of Canada for making available these data.

not comparable. The national economic indicators are more likely to affect the total amount of interregional migration than residential choice. During a downturn of the economy less first-time migration takes place and more return migration takes place. During an upsurge, the reverse takes place (Vanderkamp, 1971). Since in 1965 the Canadian economy was operating at or near full employment while during 1977 it was in a recovery period with higher natural unemployment and higher inflation than 1965, the present model might be expected to work better in 1965 than in 1977 since it is one of residential choice for first-time migrants. Stronger relationships between migration and its determinants would be expected, but this difference may be neutralized to some extent by the greater, presumably, interregional flow of information in 1977. The same structural model was assumed for both years, and this too may not be the case. A priori, then, the difference between the parameter estimates of the two years cannot be predicted.

There are 42 observations for each of the two years, corresponding to gross migration from each of the seven regions to each of the remaining six regions. Originally a pooled time-series, cross-sectional study for out-migration from each region was planned. However, there are a number of statistical problems associated with such an analysis (Kmenta, 1971, pp. 508-517). The strict utility model employed in this study is derived for use with data

disaggregated by socio-economic characteristics. As noted, it was necessary to assume that families with children represent a common socio-economic group, which undoubtedly is an overstatement. Combining the statistical problems associated with this assumption with those of pooled time-series cross-sectional estimation would not seem to make much sense. Thus the study was limited to cross-section analysis.

Estimation Technique

The model was initially estimated using ordinary least squares. However, as would be expected, some heteroskedasticity of the residuals was indicated. Goldfeld-Quant tests were performed to try to determine which variable, assuming it to be a single variable, was causing the heteroskedasticity. The results of the tests (see Table 5) were not conclusive, and a priori it is not known which variable is likely to cause the heteroskedasticity. Thus, weighted least squares estimation using the following two assumptions was applied:

(i) $\sigma i^2 = \sigma^2 Xi^2$; and

(ii) $\sigma i^2 = \sigma^2 Xi$.

For each of the origin region wage rate, destination region wage rate, distance, and migration stock, weighted least squares or, similarly, ordinary least squares using data as transformed according to each of the above two assumptions separately, was carried out. For each year, then, eight

regressions were run using the transformed data. That one which gave the best results in terms of the size of the standard errors was chosen as the final result.

CHAPTER IV

RESULTS AND ANALYSIS RESULTS

Ordinary Least Squares Results

In Table 1 are given the ordinary least squares (OLS) results in which either the size of the labour force or the growth rate of employment per labour force member was used as the indicator of job openings. The migration stock variable was not included in this model.

With respect to the alternative indicators of job openings, the size of the labour force appears to have a more significant impact on migration than does employment growth for 1977, whereas for 1965 the opposite is true. In both years, both indicators have a positive influence on migration as expected. In 1977, neither the coefficient of the labour force variable nor that of the employment growth variable is significant. In 1965, the employment growth variable is significant while that of the labour force is not. To be able to compare the results of the two years, the same indicator must be used and although the employment growth variable is significant for 1965 while the labour force variable is not for either year, the latter was chosen to use in the weighted least squares (WLS) regressions. This was done for two reasons. Firstly, it is more likely

Table 1

Ordinary Least Squares Using Alternative Indicators of Job Openings and Excluding Migration Stock Variable

1977			Dependent Variable: Migration Rate						
Wj	Wi	Fj	Fi	LFj	EGj	Dij	D	C	R^2
9.12670 (3.38727)*	3.67913 (1.52129)	0.668923 (2.30692)*	0.574887 (2.10193)*		0.0346902 (0.146772)	-0.786236 (-4.50980)	-1.21486 (-3.58560)*	-63.9400 (-3.05739)*	.5915
8.01737 (3.06462)*	3.67770 (1.54867)**	0.707748 (2.63208)*	0.575968 (2.14448)*	0.218875 (1.13078)		-0.800555 (-4.70692)	-1.18265 (-3.54141)	-60.3089 (-3.06949)*	.6060
1965									
5.50606 (5.505081)*	-0.384778 (-0.355034)	-0.370320 (-0.63250)	0.360145 (1.50870)*		0.790217 (4.18425)*	-1.00724 (-6.70447)	-1.10363 (-3.70468)*	-14.7277 (-1.88487)*	.7460
5.02049 (3.51093)	-0.158117 (-0.118745)	-0.13178 (0.38722)	0.360175 (1.24386)	0.213126 (1.03634)		-0.896688 (-4.99856)	-1.07782 (-2.93711)*	-19.5890 (-2.08092)*	.6278

* Significant at 5% level.
** Significant at 10% level.

Total No. of observations = 42.
Values in parentheses are t-statistics.

that information about the size of the regional labour force (or at least the size of the regional population which is a good indicator of the size of the labour force) is more available and well known than information concerning the growth rate of employment. And secondly, since regional unemployment rates were incorporated into the expected wage rate and the number of new jobs is likely to be reflected in the unemployment rate, inclusion of both in the model may be double counting. As such, it was decided to use the labour force variable as the indicator of the number of jobs arising through the normal process of additions and withdrawals from the labour force, and the unemployment variable (incorporated into the expected wage rate) as the indicator of the regional excess supply or demand situation, which should include the employment growth effect.[15]

Next, consider the results of the model excluding the migration stock variable. For 1977 these can be seen in the upper half of Table 1. The parameter estimates of all the variables display the expected sign except those of the variables representing the origin region fiscal benefits and the origin region wage rate. The sign of the coefficient of the origin regional fiscal benefits was hypothesized to be negative indicating the individual's presumably high

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[15]Note that inclusion of the unemployment rate assumes that regional labour markets are not perfectly adjusted. If they were, there would be no need to include the unemployment rates or the employment growth variable, since these would be reflected in the wage rate.

valuation of the benefits received in the home region. A negative relationship was also expected between migration and the origin region wage rate, whereas a positive coefficient for this variable was obtained. The higher the origin region wage rate the more likely is the individual to choose her present region to live in, or similarly, the less attractive will other regions be. This relationship will be lessened, however, if wages have an effect on the ability to finance a move (Vanderkamp, 1976). A positive coefficient indicates that the financing effect of the wage rate on migration outweighs the effect it has on the choice of location. As will be seen later though, this relationship changes when the migration stock variable is included.

By far the largest influence on location choice or the probability of migration from region i to region j in this model excluding the migration stock variable is the destination region expected wage rate. This elasticity was estimated to be about 8.0. Since this variable as defined takes account of the combined probability of the income if a job is found and the income, in terms of unemployment insurance benefits, if a job is not found, the effect of this variable on location choice might be expected to be large.

All variable coefficients are significant for this model with the noted exception of the labour force size. Its coefficient is positive as expected though, indicating that the probability of migrating into a region is increased the greater the size of its labour force, which reflects

both the number of job turnovers and the diversity of occupations available in the region.

Considering now the estimated results for the model including the migration stock variable, upper half of Table 2 for 1977, it can be seen that the results, particularly the magnitudes of the coefficients of the other explanatory variables, change considerably. Firstly, the explanatory power of the model increases from 0.53 to 0.79, as measured by the R^2 statistic adjusted for degrees of freedom. And secondly, the parameter estimates of all other variables decrease in absolute magnitude. Biased coefficients would be expected in a model in which a relevant explanatory variable which was correlated with the other independent variables was omitted, with the bias equal to the true coefficient of the omitted variable times the regression coefficient of the excluded variables on the included variables. Assuming that previous migrants considered the same variables in the same way in making a location choice, the coefficients of the model excluding the migration stock variable should be upward biased--i.e. the positive coefficients will be too large and the negative coefficients too small, or similarly, the absolute value of all coefficients will be too large. This was found to be the case. The coefficient of the destination region expected wage rate decreased dramatically from 8.0 to 1.9. The coefficient of the origin region wage rate also decreased, and became negative--3.7 to -1.7--indicating that the lower (higher) is the expected wage rate in the

Table 2

Ordinary Least Squares Including Migration Stock Variable

Dependent Variable: Migration Rate

Wj	Wi	Pj	Pi	LFj	Dij	MS	D	C	R^2
1977									
1.91078 (0.977256)	-1.69541 (-0.961578)	0.352971 (1.90296)*	0.401033 (2.23468)*	0.157482 (1.22762)	-0.211022 (-1.47753)**	0.711509 (6.69365)*	-0.76130 (-3.31639)*	-11.42840 (-7.66985)*	.8329
1965									
2.84865 (2.38729)*	-2.456881 (-2.17596)*	-0.941704 (-0.357298)	0.637573 (2.75697)*	-0.019477 (0.118705)	-0.256677 (-1.34289)**	0.687660 (4.87274)*	-0.74739 (02.55922)*	-8.98238 (-1.18112)*	.7381

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in Parentheses are t-statistics.

sending region, the greater (less) is the probability that people will migrate out. This coefficient also became insignificant. The elasticity of migration with respect to the destination region wage rate is slightly greater than that of the origin region wage rate indicating that the "pull" factor of higher wages in the destination region is stronger than the "push" factor of low wages in the origin region. The coefficient of both wage rates are not significant, even at the 10 percent level. This result is surprising; the wage rate of the destination region was expected to be the major determinant of location choice.

The coefficients of both variables decreased and remained significant, so previous migrants must have perceived these benefits in the same way as those who migrated in 1977. The labour force variable coefficient also decreased in value, and remained insignificant. The magnitude of the distance coefficient also decreased. This could be due not only to the fact that previous migrants were hindered by distance, but also because the psychic costs of migration and some of the money costs, which increase with distance, are decreased by the presence of previous, known migrants. Further, distance to some extent also represents uncertainty in that the larger the distance from the home region is the destination region, the less would be the available information on the attributes of the destination region. Family and friends already located in the destination region act as a medium of information flow and thus decrease the

uncertainty associated with moving far away. The coefficient of the migration stock variable itself is positive, reflecting the migrant's preference to locate in regions where she knows some people.

The OLS results for the year 1965 can be seen in the lower half of Table 1 for the model excluding the migration stock variable, and the lower half of Table 2 for the model including this variable. Consider first the model in which the migration stock variable was excluded. The coefficients of the destination region expected wage rate, distance, and the dummy variable are of the expected size and are significant. The labour force variable coefficient is positive but not significant, as is the origin region fiscal benefits coefficient. The estimated coefficient of the destination region fiscal benefits, however, is negative whereas a positive relationship between it and out-migration was expected. It is also not significant.

When the migration stock variable was added to this model the explanatory power greatly increased, as it did for the 1977 data set. The adjusted R^2 statistic is 0.55 for the model excluding this variable and 0.68 for the model including this variable. Both the destination region wage rate and distance retain their signs and significance in this model, but decrease in absolute magnitude as would be expected if previous location decisions were affected in the same manner by these variables. The labour force coefficient also decreases in magnitude, to a negative number, but it is

very small and also insignificant. The absolute value of the coefficient of the destination region fiscal benefits decreases (becomes less negative) and is also very small and insignificant. The coefficient of the origin region fiscal benefits increases in size when the migration stock variable is included. This may indicate that previous migrants viewed these factors as benefits and that the relationship between them and migration was negative. This would result in a downward bias of the estimate of the coefficient of this variable in the model excluding the migration stock variable.

For both the 1965 and 1977 results multicollinearity could be a problem as is indicated by the large size of the standard errors (bracketed numbers below). The presence of multicollinearity decreases the precision of the estimates and makes it difficult to disentangle the separate effects of each independent variable on the dependent variable. The actual estimated equations are:

1977

$$\ln\left(\frac{Mij}{Pii}\right) = \underset{(14.9004)}{-11.4284} + \underset{(1.95526)}{1.91076}\ \ln Wj - \underset{(1.76316)}{1.69540}\ \ln Wi$$

$$+ \underset{(0.185485)}{0.352970}\ \ln Fj - \underset{(0.179459)}{0.401306}\ \ln Fi$$

$$+ \underset{(0.128282)}{0.157483}\ \ln LFj - \underset{(0.14281)}{0.211020}\ \ln Dij$$

$$+ \underset{(0.106296)}{0.711513}\ \ln MS - \underset{(0.229557)}{0.761299}\ D \quad ; \text{ and}$$

1965

$$\ln\left(\frac{Mij}{Pii}\right) = \underset{(7.60496)}{-8.98283} + \underset{(1,19326)}{2.84865}\ \ln Wj - \underset{(1.13458)}{2.46881}\ \ln Wi$$

$$- \underset{(0.263563)}{0.0941704}\ \ln Fj + \underset{(0.231259)}{0.637573}\ \ln Fi$$

$$- \underset{(0.164075)}{0.0194770}\ \ln LFj - \underset{(0.191138)}{0.256677}\ \ln Dij$$

$$+ \underset{(0.141124)}{0.687660}\ \ln MS - \underset{(0.292038)}{0.747391}\ D$$

Before turning to the weighted least squares regressions results, note first Tables 3, 4, 5 and 6. In Table 3 are the results of the model (excluding the migration stock variable) using nominal rather than real fiscal benefits and expected wage rates. If people are better able to perceive changes in wages than changes in prices or, similarly, there is money illusion, nominal rather than real wages are the relevant variables to include. Compared to the equivalent equations in Table 1, the results using nominal data are not much different. The coefficient of the destination region fiscal benefits for 1977 is not significant and has the wrong sign. The same is true for the employment growth rate for both years. For 1965, the signs of both fiscal variables are wrong but significant. The explanatory power of the model for this year is greater using real data than that of the model using nominal data which may indicate that, for 1965 at least, real values are what were of importance to consumers.

Table 4 contains the results of the model in which actual wages and unemployment rates were entered a separate

Table 3

Ordinary Least Squares Using Nominal Data

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	EGj	Dij	D	C	R^2
1977								
7.29256 (3.47271)*	1.58890 (1.09713)	-0.033766 (-0.0204702)	0.270210 (1.63536)**	-0.361681 (-1.17349)	-0.765106 (-4.41241)*	-1.16552 (0.339168)	-46.6424 (-3.01840)*	.5921
1965								
4.90864 (4.08522)*	0.191392 (0.160971)	-0.336742 (-1.36396)**	0.345421 (1.36341)**	0.675272 (3.25181)*	-0.978194 (-5.97819)*	-1.05774) (-3.28093)*	-14.1160 (-1.69251)*	.6997

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in parentheses are t-statistics.

Table 4

Ordinary Least Squares Using Actual Wages With Unemployment Variables Entered Separately

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	Uj	Ui	LFj	Dij	MS	C	D	R^2
1977											
1.07631 (0.793718)	-1.76873 (-1.52944)**	0.191415 (1.50089)**	0.476553 (4.01757)*	-0.408216 (-1.69836)*	-0.363038 (-1.46989)**	0.221170 (1.67963)*	-0.104975 (-0.682041)	0.727972 (7.15852)*	-6.35280 (-2.61419)*	-0.363038 (-1.46989)**	.8628
1965											
4.01363 (2.86560)*	-3.01769 (-2.45482)*	-0.16182 (-0.657996)	0.600368 (2.83652)*	0.188329 (0.801223)	-0.191551 (-0.717407)	-0.122527 (-0.758166)	-0.251476 (-1.11906)	0.683774 (4.31658)*	-10.4785 (-1.25052)	-0.601540 (-1.88633)*	.8341

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in parentheses are t-statistics.

explanatory variables. For 1977, the labour force variable and both unemployment rates have the right sign and are significant. For 1965, however, both unemployment rates have the wrong sign. As with expected wages, the coefficients of both actual wage in each year have the right sign, and all except the destination region actual wage rate in 1977 are significant.

The results of the model in which the wage rates and the fiscal variables were deflated by a price index excluding housing and with the housing price index entered as a separate explanatory variable can be seen in Table 5.[16] For both years the housing price index was significant and positive, indicating that as housing prices increase in the destination region the probability of migrating to that region increases. Theoretically, one would expect the coefficient of this variable to be negative indicating migrants' preferences for low cost regions. The positive coefficient could indicate some degree of capitalization of fiscal benefits, especially in the short run in which the price elasticity for housing is quite inelastic. This of course is a very crude manner in which to test for capitalization. Migration is a function of housing prices, but at the same time housing prices are a function of migration, so that in the manner tested a simultaneity bias is probably present.

[16] Recall that the data were deflated by a price index for all items including housing for the other regressions except those in Table 3, in which nominal data were used.

Table 5

Ordinary Least Squares With Housing Price Index Entered Separately

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	MS	Dij	LFj	HPj	D	C	R^2
1977										
0.814567 (0.655173)	-0.346666 (-0.376161)	0.125687 (1.11463)	0.444979 (4.50265)*	0.547151 (5.75754)*	-0.386559 (-2.72168)*	0.540130 (2.98724)*	7.67660 (2.33590)*	-0.920808 (-4.58874)*	-51.1129 (-3.31234)*	.8777
1965										
2.19009 (1.84961)*	-1.71606 (-1.50901)*	0.501123 (1.48233)**	0.565328 (2.56790)*	0.525390 (3.68526)*	-0.455612 (-2.41035)*	-0.265920 (-1.37670)*	16.7136 (2.88537)*	-0.861122 (-3.12028)*	-88.1026 (-3.20022)*	.8181

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in Parentheses are t-statistics.

A more accurate model would be one in which the simultaneity was taken account of. The coefficients of the other explanatory variables for this model are of the expected sign except for origin region fiscal benefits, and are significant with the exception of both wage rates in 1977. For 1965, the origin region fiscal benefits enter with the correct sign and are significant, whereas for the equivalent model in which the housing price index was included in the overall deflator, Table 2, this variable was insignificant and entered with the wrong sign.

In comparing the success of the model between 1965 and 1977 (Table 2), it is hard to say in which year it performed better. The overall explanatory power of the model is greater in 1977 which could mean, other things being equal, that the proportion of total interprovincial migration comprised of return migrants was not greater in 1977 than in 1965 as hypothesized a priori, based on the overall national economic conditions prevailing in the two years. It might also imply that this model fits better the locational characteristics considered by return migrants than first-time migrants. The elasticities are generally higher and more significant in 1965 though. As was expected, the fiscal benefits of the destination region presented a bigger drawing card for migrants in 1977 than in 1965. The response to origin region fiscal benefits is similar in both years. The effect of distance and migration stock is also similar, indicating that Canada manpower did not increase

its involvement or effectiveness in interregional information transfer during the period 1965 to 1977.

To see if there was a statistically significant change in all the regression parameters for the two years, OLS estimation method was applied to the two sets of data combined (results in Table 6) and an F-test was performed using the sum of the squared residuals from this regression and from the corresponding individual year regressions (see Table 2). The result of the test indicates that we cannot reject the hypothesis that the relationship between the migration rate and its determinants was the same in 1965 as it was in 1977. Note that this is a test to determine if all of the parameter estimates were not statistically different, not a test for individual parameter estimates.

The results in which the data for the two years were combined are similar to the individual year results for the labour force size variable, as well as for the distance and migration stock variables (see Tables 2 and 6). The destination region wage rate coefficient is positive but not significant in the combined results whereas for 1965 this coefficient was found to be significant. For the origin region wage rate the sign of the coefficient is negative for the combined year results and the individual year results, and significant for the combined years and 1965, but not 1977. The origin region fiscal benefits were found to positively and significantly affect migration in 1977 whereas for 1965 this coefficient was negative and insignificant.

Table 6

Ordinary Least Squares Using
Combined Data for Both Years, 1977 and 1965

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	LFj	MS	Dij	D	C	R^2
0.689130	-3.16968	0.120936	0.341836	0.109845	0.745654	-0.185854	-0.785434	3.14811	.7773
(1.10164)	(-5.34713)*	(1.07592)	(3.20757)*	(1.08851)	(9.44151)*	(-1.66329)*	(-4.33486)*	(1.07239)	

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 84.
Values in Parentheses are t-statistics.

For the combined years the coefficient is positive but not significant. In all three cases, the origin region fiscal benefits positively and significantly influences migration, although the magnitude of the coefficient is smaller for the combined years.

Weighted Least Squares Results

In most cross-sectional studies, heteroskedasticity of the residuals is a problem. If the assumption of constant variance of the disturbance term does not hold, but the other assumptions of the classical linear model hold, the OLS estimators are unbiased, but do not have the minimum variance of the class of linear unbiased estimators and therefore are not efficient. As well, the least squares estimator of $\hat{\sigma}^2 = S^2$, the variance, is biased.[17]

There are three related problems associated with heteroskedasticity. The first concerns testing to see whether it is present. The second concerns determining the nature of the heteroskedasticity, and the third the procedure to follow to obtain best linear unbiased estimates. In this study, Goldfeld - Quant tests were performed to see if heteroskedasticity was present. But, this test requires some <u>a priori</u> knowledge or assumption concerning which of the independent variables is causing the problem. If it is

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[17] For a proof of these propositions, see Madalla (1977, pp. 259-260) or Johnstone (1972, pp. 214-216).

known which variable is the cause and the precise manner in which it is related to the residual variances, a best linear unbiased estimator can be derived.

In this study, the variances of the residuals around their mean value could be caused by a number of variables. For example, the residual variance about the migration regression function could increase with the migration stock variable because migrants who know people living in other regions might have to worry less about the costs of migration and the probability of getting a job within a short time period. The variance of the stochastic disturbances might also increase with the income of the migrant as is usually the case in consumer budget studies. The heteroskedasticity in this model may also be caused by a combination if the explanatory variables. The variance could be proportional to the mean value of the whole regression function too. And finally, the heteroskedasticity could arise from the fact that the location choice involves choosing one of J discrete alternatives, so that the variance would be dependent on which destination region is being considered.

It was assumed that the variance of the residuals increases with a single explanatory variable. Goldfeld-Quant tests were performed using each of the wage rates, the migration stock variable, and distance to order the observations. It was also assumed that the variance of the residuals increases with the square of each variable. The results of these tests can be seen in Table 7. For 1965, no

Table 7

Goldfeld-Quant Test Results

$\sigma i^2 = \sigma^2 Xji^2$ Goldfeld-Quant Test statistic =

$$R = \frac{SSE_2}{SSE_1}$$

	1965	1977
$\sigma i^2 = \sigma^2 (MS)^2$	R = 0.7327412	8.482894*
$\sigma i^2 = \sigma^2 (Wj)^2$	R = 1.563192	1.490886
$\sigma i^2 = \sigma^2 (Wi)^2$	R = 0.165814	4.178073*
$\sigma i^2 = \sigma^2 (Dij)^2$	R = 1.639803	0.290441

SSE_1 = Sum of squared residuals from 1st regression using first 15 observations.

SSE_2 = Sum of squared residuals from 1st regression using last 15 observations.

Note: Data was ordered according to increasing size of the variable thought to be causing the heteroskedasticity.

* Denotes rejection of the null hypothesis of homoskedasticity of the residuals.

heteroskedasticity using the above assumptions was indicated. For 1977, it appears as though the variance could increase with either the square of the migration stock variable or the square of the origin region wage rate variable.

Weighted least squares, or equivalently, ordinary least squares with the data transformed by dividing each variable by the square of the variable thought to be causing the heteroskedasticity, should give best linear unbiased results. This was done for all four of the variables for which the Gold-feld Quant tests were performed. WLS regressions were also run with the data transformed as though the variance of the residuals increased directly with the variable in question. Thus, for each year eight WLS regressions were run (see discussion under Estimation Technique).[18]

The results can be seen in Table 8 for 1965 and in Table 9 for 1977. The signs and significance of the estimated parameters in the weighted least squares regressions for 1965 are the same as the ordinary least squares regression for this year (see Table 2). The standard errors of the parameter estimates are generally smaller for most variables for any particular WLS regression however (see p. 55, 78 & 79). Also, the explanatory power of the model is greater for the WLS regressions than for the OLS regression.

As compared to the 1977 OLS results, the WLS results

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[18] Probably a less ad hoc method of dealing with the heteroskedasticity would be to assume the variances to be proportional to the mean value or the square value of the entire regression function and transform the data accordingly.

Table 8

Weighted Least Squares Results, 1965

Dependent Variable: Migration Rate

Wj	Wi	Pj	Pi	LFj	Dij	MS	C	D		R^2
2.5698 (1.23600)*	-2.39364 (1.17523)*	-0.105642 (0.277851)	0.633264 (0.243969)*	0.0444457 (0.167848)	-0.250162 (0.201023)	0.720085 (0.141477)*	-8.43293 (7.89942)	-0.265409 (.107673)*	$\sigma i^2 = \sigma^2 MS$	.7972
2.21130 (1.28114)*	-2.31423 (1.21843)*	-0.113253 (0.393602)	0.628532 (0.257819)*	0.0716723 (0.171483)	-0.237716 (0.211719)	0.755070 (0.141771)*	-7.62474 (8.21303)	-.0941665 (.0399527)*	$\sigma i^2 = \sigma^2 (MS)^2$	.8121
2.85377 (1.19713)*	-2.44533 (1.13552)*	-0.0950575 (0.264536)	0.630852 (0.232755)*	0.0205387 (0.164506)	-0.259881 (0.191832)**	0.687303 (0.141608)*	-9.06232 (7.62642)	-0.346877 (0.135394)*	$\sigma i^2 = \sigma^2 Wi$	.7828
2.85877 (1.20894)*	-2.42070 (1.13668)*	-0.095877 (0.26583)	0.624828 (0.234278)*	0.0216664 (0.164921)	-0.263138 (0.192512)**	0.686939 (0.142085)*	-9.14689 (7.64858)	-0.160996 (.0627775)*	$\sigma i^2 = \sigma^2 (Wi)^2$	.7826
2.81189 (0.140324)*	-2.47178 (0.190402)*	-0.0915998 (0.163406)	0.639426 (0.230433)*	0.0206345 (0.262990)	-0.256445 (1.13313)**	0.[illegible]045 (1.[illegible]67)*	-8.82046 (7.57132)	-0.347034 (0.134546)*	$\sigma i^2 = \sigma^2 Wj$	.7848
2.77567 (1.18239)*	-2.47434 (1.13172)*	0.0888884 (0.262464)	0.641216 (0.229599)*	0.0218[illegible]2 (0.1627760)	-0.256329 (0.189678)**	0.686277 (0.139534)*	-8.66160 (7.53870)	-0.161154 (.0619969)*	$\sigma i^2 = \sigma^2 (Wj)^2$	.7865
2.97987 (1.19447)*	-2.58249 (1.13076)*	-0.0648509 (0.257688)	0.640116 (0.225864)*	-0.000062 (0.161427)	-0.246276 (0.186094)	0.682105 (0.141038)*	-8.63761 (7.57084)	-0.290080 (0.107288)*	$\sigma i^2 = \sigma^2 Dij$	.7791
2.89996 (0.140907)*	-2.70956 (0.181168)*	-0.0358037 (0.158710)	0.640716 (0.220305)*	-0.0220815 (0.251531)	-0.234864 (0.12492)**	0.676259 (1.19450)*	-8.15544 (7.53364)	-0.112463 (.0394870)*	$\sigma i^2 = \sigma^2 (Dij)^2$	.7748

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in parentheses are standard errors.

Table 9

Weighted Least Squares Results, 1977

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	LFj	Dij	MS	C	D		R^2
1.42[illegible] (1.94837)	-2.14213 (1.71276)**	0.325300 (0.185421)*	0.351946 (0.177968)*	0.164666 (0.125081)**	-0.205183 (0.139561)**	0.746571 (0.0994239)*	-6.86513 (14.6600)	-0.[illegible]9636 (.0794319)*	$\sigma i^2 = \sigma^2 MS$	.8664
0.810444 (1.94507)	-2.64802 (1.67568)**	0.295390 (1.86462)**	0.297057 (0.177054)**	0.182799 (0.122354)**	-0.186092 (0.138093)**	0.787811 (0.0931219)*	-1.57054) (14.4924)	0.0945486 (-3.41230)*	$\sigma i^2 = \sigma^2 (MS)^2$	.8949
1.94029 (1.94302)	-1.75446 (1.73781)	0.351234 (0.184190)*	0.392317 (0.177729)*	0.153078 (0.127227)*	-0.221625 (0.140254)**	0.707817 (0.105287)*	-11.0981 (14.7374)	-0.346388 (0.103508)*	$\sigma i^2 = \sigma^2 Wi$	.8348
1.92334 (1.93983)	-1.79818 (1.73359)	0.348488 (0.183961)*	0.385077 (0.176997)*	0.152225 (0.126818)	-0.222563 (0.139899)**	0.708920 (0.105018)*	-10.7783 (14.7128)	-0.156526 (.048234)*	$\sigma i^2 = \sigma^2 (Wi)^2$	.8351
1.98281 (1.94574)**	-1.69268 (1.74198)	0.358145 (0.183950)*	0.401490 (0.178521)*	0.153533 (0.127896)	-0.221835 (0.140505)**	0.705513 (0.105488)*	-11.6633 (14.7580)	-0.348362 (0.103707)*	$\sigma i^2 = \sigma^2 Wj$	.8351
2.00802 (1.94536)	-1.67579 (1.74193).	0.362349 (0.183506)*	0.403294 (0.178573)*	0.153163 (0.128252)	-0.223037 (0.140414)**	0.704262 (0.105426)*	-11.8778 (14.7446)	-0.158326 (.0470047)*	$\sigma i^2 = \sigma^2 (Wj)^2$	.8360
2.33202 (2.00024)	-1.73980 (1.79260)	0.377135 (0.187123)*	0.408812 (1.181684)*	0.120974 (0.129916)	-0.219006 (0.141423)**	0.697376 (0.108986)*	-12.9968 (15.1045)	-0.287728 (0.0869904)*	$\sigma i^2 = \sigma^2 Dij$	.8203
2.68439 (2.05743)**	-1.82238 (1.84429)	0.398111 (0.189740)*	0.414486 (0.185016)	0.085702 (0.132417)	-0.216496 (0.142541)**	0.688805 (0.112688)*	-0.107603 (15.4693)	-0.107603 (.0331845)*	$\sigma i^2 = \sigma^2 (Dij)^2$	.8051

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 42.
Values in Parentheses are standard errors.

in which the variance of the residuals was assumed to increase with the square of the migration stock variable performs better. The standard errors of all variables are smaller than the OLS standard errors, the R^2 statistic is higher, and the labour force size and origin region wage rates are both significant in the weighted least squares regression, but not in the ordinary least squares regression. The WLS results in which the variance was assumed to increase directly with the migration stock variables also performed better than the OLS regression for 1977. Again, the explanatory power of the model is greater, the standard errors smaller, and the origin region wage rate and destination region labour force size significant. These results are not too surprising since the Gold-feld Quant tests indicated the strongest relationship between the residuals and the migration stock variable.

The relationship between migration and expected wages indicates that the probability of migrating from i to j increases the lower the expected wages in i are and the higher the expected wages in j are. The labour market appears to be adjusting in the required direction to eliminate geographical wage rate and unemployment rate differentials and thus increase national income above the level it would be in the absence of migration. The expected wage rate of the destination region, for 1977, did not appear to have significantly affected the location choice of migrants. This result is hard to explain heuristically, especially

since the wage rate, unemployment rate and unemployment benefits were all included in the definition. Statistically the lack of significance could be due to multicollinearity as the standard error of this variable is about as large as the coefficient itself.

In other empirical studies of migration, the origin region wage rate has been found not to significantly affect location. This is usually explained by hypothesizing that the attributes of the destination region are the relevant factors in making a location choice, while the origin region wage rate exerts its influence through the ability to finance a move. In the present study the results indicate the opposite. The influence of wage rates on the ability to finance an interregional relocation do not outweigh the "pushing" effect low wages have on people.

The negative parameter estimate of the distance variable indicates that the farther apart two regions are the less probable is there to be migration between them. The money costs of moving increase with distance, as presumably do the psychic costs. The opportunity costs of working time lost while travelling also increases with distance, whereas the opportunity cost of time lost while searching for and leaving a new job are more dependent on the employment conditions in the new region and the personal characteristics of the migrant.

The variable was entered in logarithmic form so that the negative coefficient indicates that costs increase with

distance at a declining rate. This is true of transport changes and makes sense for psychic costs as well. Psychic costs appear to constitute a large portion of the costs of distance since the effect of distance decreased more than 50 percent when the migration stock variable was added to the model and, as explained earlier, psychic costs are less if the migration stock is higher.

The migration stock variable itself significantly and positively affected migration. Past interprovincial migration patterns therefore could be used as rough indicators of future patterns. The inclusion of this variable has great intuitive appeal; human beings do not always act rationally as defined in economics.

The coefficient of the dummy variable (see Table 2) indicates that there are barriers to out-migration from Quebec to the other Canadian regions not accounted for by the other variables in the model. These are usually thought to be the cultural and language differences of French Quebeckers. If this is true, then out-migration from this province should increase once the constitution is patriated since the language barrier, in education at least, should be lessened.

The size of the labour force in the receiving region appears to positively affect location choice. This variable had a significant effect in 1977, but not in 1965.

For both years, the origin region fiscal benefits positively and significantly affect the out-migration rate.

Thus, the higher such benefits per capita in a region are, the greater the probability of people moving out. The sign of the coefficient of this variable was expected to be negative since it is thought that for any given private benefit differential between regions, the need to migrate out is lessened by the provision of public goods. This proposition requires public goods to be perceived as at least partial substitutes for private goods. Whether or not this is the case probably depends on the program being considered. Personal transfer type benefits may be considered as partial substitutes for private benefits, especially for low income people. Mansell (1980) found, however, that higher unemployment benefits promote out-migration. Higher income people may perceive increased or a high degree of provincial social service spending as an indicator of the economic decline of the region, especially if they are financed by federal government transfers. This segment of the population is also less likely to view publicly provided benefits as alternatives to private sector benefits. Since we do not have any information about the migrants except that they are those people possessing the characteristics of migrants, which, according to the selectivity of people hypothesis are the young and educated, we cannot know in which manner the origin region fiscal benefits are perceived. But if migrants do possess the characteristics usually attributed to them, they are less likely to stay in a region which is declining relatively to other regions in the same country. The fact

that Quebec and the Maritimes are high per capita fiscal benefit regions and also that a high proportion of their provincial government revenues derive from equalization payments lends support to the notion that, for these regions at least, high origin region fiscal benefits are perceived as an indication of a longer-run decline of the provincial economy.

In order to properly test how the public provision of goods and services (and tax rates) are viewed, it is necessary to have migration data disaggregated by social and income class. The results of the present study indicate that those who perceive higher public benefits as an indication of the economic decline of the region outweight the effect on migration of those who see these benefits as an alternative to private sector benefits. This is probably not the only explanation possible for the positive coefficient of the origin region fiscal variable, but it is the only plausible explanation given the limitations of the data.

The destination region fiscal benefits in 1965 were not a significant influence on location choice. The sign of the coefficient was negative, and very small.

For 1977, the fiscal benefits of the receiving region were found to be one of the attributes that the migrant considers when making a location choice (i.e. coefficient was significant). Further, the parameter estimate of this variable is positive indicating that the probability of migrating to a particular region is increased, the higher

are the fiscal benefits available in that region. Thus, what is usually referred to as fiscally-induced inter-regional migration did exist in 1977. This would imply that Alberta, Quebec and the Maritime provinces should have attracted the most migrants in 1977 based on fiscal factors. Fiscally-induced migration to Alberta makes sense since its government's capacity to subsidize labour is well above that of the other provinces and is projected to increase its relatively favourable position in this respect. In-migration to the Atlantic provinces could be made up of a large proportion of return migrants who, because they are returning to a low private benefit region, consider public benefits as a substitute for private benefits. What this implies is that the model should be tested separately for each province in a time-series study to determine the impact of fiscal factors in different regions. But in order to utilize the strict utility model with combined cross-section time-series data, disaggregated migration data is required in order to obtain statistically reliable results. And, as with origin region fiscal factors, knowing only the direction in which destination region fiscal factors affect migration, although adequate to make conclusions with respect to the efficiency of equalization payments, is not of much help for the provincial governments in determining who is attracted by different public programs. Migration data needs to be classified by socio-economic characteristics in order to determine this.

Further empirical research in this area would best be carried out in a manner similar to the following. The decision to move or not should be regressed on the socio-economic characteristics of the migrants such as age, sex, education, occupation, marital status and income class, and also on the "pushing" factors such as wage and unemployment rates. The fiscal variable employed could be the percentage of government expenditures financed through federal transfers, as the results of the present study imply that this may increase out-migration. From these results it could be determined which characteristics of people most influence whether or not they are migrants and the migration flows between regions could be disaggregated accordingly (assuming of course the data are available). A model of location choice similar to the present one could then be used to study the time pattern of migration using the attributes of the destination region that are relevant to the sub-group being considered as the explanatory variables. With respect to fiscal factors, it has already been mentioned that, for example, different income groups may be interested in different public expenditure and tax programs. The wage rate could also be made more specific to the group being studied. And, disaggregation by province of origin would also be useful, especially with respect to fiscal factors.

The present study indicates that in the aggregate sense migrants are attracted to regions in which the potential public benefits are large. That this phenomenon was

significant in 1977 but not in 1965 may be because the inter-provincial diversity in provincial revenues has become more skewed in the 1970s, and that this diversity, especially as related to resource revenues, has been much more publicized and thus well known during this time.

As with the OLS estimations, the data for the two years were combined and estimated together by weighted least squares to see if there was a statistically significant change in all the regression parameters for the two years. The estimation results are contained in Table 10. F-tests were performed using the sum of the squared residuals from these regressions and from the corresponding individual year WLS regressions (Tables 8 & 9). In all cases, the tests indicated that the hypothesis that each and every estimated parameter for the two years are equal cannot be rejected. This of course is a very restrictive test, so that statistically different estimates for individual parameters between the two years are possible. The major differences in the WLS results are for the destination region fiscal benefits and wage rate. The parameter estimate of the wage rate is positive for all the individual year WLS regressions, but significant in only two cases for 1977 and in all cases for 1965. For the combined WLS results the destination region wage rate was not found to significantly affect migration. A positive and significant relationship between destination region fiscal benefits and migration was found for 1977, whereas for 1965 the relationship was negative and not statistically significant. In the

Table 10

Weighted Least Squares Results Using
Combined Data for Both Years, 1965 and 1977

Dependent Variable: Migration Rate

Wj	Wi	Fj	Fi	LFj	Dij	MS	C	D		R^2
0.449215 (0.682321)	-3.04865 (0.596669)*	0.114997 (0.115206)	0.339345 (0.108543)*	0.137014 (0.100593)*	-0.186418 (0.113876)*	0.774340 (.075758)*	3.33974 (2.98643)	-0.277715 (0.644718)*	$\sigma i^2 = \sigma^2 MS$	0.8080
0.169689 (0.683084)	-2.91949 (0.601254)*	0.112381 (0.118520)	0.338704 (0.110841)*	0.168597 (0.100180)*	-0.184077 (0.116371)**	0.802635 (.0726455)*	3.61193 (3.04237)	-0.0930520 (0.0231290)*	$\sigma i^2 = \sigma^2 (MS)^2$	0.8364
0.707103 (0.68277)	-3.15067 (0.591422)*	0.117698 (0.113156)	0.339849 (0.107082)*	0.108681 (0.101218)	-0.188997 (0.112202)*	0.745188 (.079257)*	3.03171 (2.94559)	-0.359845 (0.083172)*	$\sigma i^2 = \sigma^2 Wi$	0.7768
0.725026 (0.683832)	-3.13095 (0.590350)*	0.114440 (0.113933)	0.337817 (0.107640)*	0.107572 (0.101530)	-0.192117 (0.112677)*	0.744750 (0.0795509)*	2.91177 (2.95687)	-0.164897 (0.0381950)*	$\sigma i^2 = \sigma^2 (Wi)^2$	0.7763
0.688080 (0.679351)	-3.15394 (0.592041)*	0.120564 (0.112550)	0.346049 (0.106848)	0.110779 (0.101071)	-0.187820 (0.111883)*	0.743589 (.0790431)*	3.08434 (2.93766)	-0.360941 (.082932)*	$\sigma i^2 = \sigma^2 Wj$	0.7781
0.686809 (0.676991)	-3.13805 (0.591387)*	0.120185 (0.112725)	0.350333 (0.107127)*	0.111792 (0.101227)	-0.189857 (0.112021)*	0.741399 (0.0791050)*	3.012166 (2.94048)	-0.165902 (0.0379676)*	$\sigma i^2 = \sigma^2 (Wj)^2$	0.7791
0.816027 (0.693402)	-3.28020 (0.598889)*	0.132279 (0.112445)	0.349217 (0.106588)*	.076291 (.100477)	-0.175560 (0.109931)**	0.740749 (.0798562)*	3.17516 (2.95497)	-0.300971 (.067561)*	$\sigma i^2 = \sigma^2 Dij$	0.7670
0.945167 (0.704049)**	-3.39847 (0.603841)*	0.144597 (0.112287)**	0.355967 (0.106440)*	0.0414541 (0.100062)	-0.165146 (0.108203)*	0.734242 (0.087079)*	3.24006 (2.97188)	-0.115137 (.0252577)*	$\sigma i^2 = \sigma^2 (Dij)^2$	0.7560

*Significant at 5% level.
**Significant at 10% level.

Total No. of observations = 84.
Values in Parentheses are standard errors.

combined year results the relationship was positive but not significant. As explained earlier, there is reason to believe that the relationship between this variable and migration is different for the two years. As also noted, destination region wage rates have been found in other studies to be the most influential factor affecting migration, and were expected to be in this study also. Since the test for structural change which was performed does not rule out differences in individual parameter estimates for the two years, it is possible that the effect of destination region wage rates and fiscal benefits is different. Also, the source of the heteroskedasticity may not be the same for both years, so that estimating the two years together after transforming them with the same variable may not give reliable results. As compared to the magnitude of the estimates, especially for the destination region wage rates and fiscal benefits, the standard errors are much larger for the combined year WLS results than the individual year WLS results.

Before closing this section it should be noted that capitalization of part of the fiscal benefits of the destination region was indicated by the positive coefficient of the housing price index. A much better manner to test for capitalization would be to follow a procedure similar to that used by Oates (1969) and Meadows (1976) in which the value of housing is regressed against its determinants, which include fiscal factors. Which fiscal factors to include could be determined from the interregional migration

studies proposed above, in which specific expenditures and tax programs would be tested for their effect on migration. As noted earlier, another way in which to proceed would be to recognize the simultaneity between housing prices and migration.

CHAPTER V

CONCLUSIONS

The purpose of this study was to test the proposals put forth with respect to the efficiency of equalization payments. A sound theoretical argument can be made for both the efficiency-promoting and inefficiency-promoting aspects of these grants, but in both cases migrants are assumed to respond in a particular manner to fiscal factors.

Previous studies of interprovincial migration in Canada found different results with respect to migrants' response to fiscal factors. For all cases the actual net public benefits were included, which, in part due to the existence of equalization payments in Canada, do not show the large differentials that exist between the fiscal capacities of the provincial government that has largely resulted from the increase in energy prices in 1973. Larger fiscal capacities, at least potentially, allow provincial governments to increase the provision of net public benefits to labour. All that is required for fiscally-induced migration to take place is the migrants' perception that increased provincial government revenues will in some way be transformed into public benefits. It is migration in response to these potential public benefits which was tested for in this study.

The strict utility choice model employed performed

quite successfully, both in terms of the significance of the coefficients and the explanatory power (approximately four-fifths of the variation in interprovincial migration rates was accounted for in the model). Although the standard errors of the regression coefficients decreased when the model was re-estimated by weighted least squares, they were still relatively large indicating that the heteroskedasticity was not completely eliminated. Multicollinearity of the independent variables is also likely to be present in this model. The strict utility choice model was developed to be used on data which is disaggregated by socio-economic characteristics, whereas only aggregate migration data were available for use. This too may have decreased the efficiency of the estimates.

The results indicate that migrants are attracted to regions offering high expected wages, high potential fiscal benefits and a larger labour force, which represents occupational diversity and job openings, although in most regressions this latter variable did not exert a significant influence on destination choice. The greater the number of people from a particular region that have relocated in another region, the greater is the probability that other migrants from the same region will locate there. Besides these attributes of the destination region, distance influences location choice, with shorter distant moves being preferred. The attributes of the origin region that encourage out-migration are low wages, and high fiscal benefits.

Except for the origin region fiscal benefits, all variables affected the destination choice of migrants as expected. Higher public benefits were expected to discourage out-migration. This requires migrants to perceive public goods as substitutes for private goods which, as indicated, does not appear to be the case. A possible explanation for this is that migrants perceive these benefits, especially in depressed regions in which the major source of funds to subsidize public benefits to labour are equalization payments, as an indication of continuing decline in the regional economy. This would support Mansell's (1980) finding that increased unemployment insurance benefits promoted out-migration.

The results of the study indicate that the labour market is adjusting in an efficient manner; labour moves from low to high wage regions with the real economic costs of migrating (proxied by distance) are taken into account. This efficiency is decreased, however, by the positive fiscal influence of fiscal benefits on destination choice, and the preference of migrants to move into areas in which previous known migrants have located. Relocation subsidies and greater provision of more accurate information concerning regional wage and unemployment rates could partially decrease the costs of migration and the uncertainty associated with it. The psychological aspects of the migration process are more difficult to deal with. The fiscal incentive to migrate could be eliminated by equalization payments such

that the fiscal capacities of regional governments are equalized.

The results indicated above hold for both 1965 and 1977 with two exceptions. The receiving region fiscal benefits did not affect the destination choice of migrants in 1965, whereas they exerted a positive and significant influence in 1977. It is possible that this result is due to the greater diversity in magnitude of such benefits in 1977. The efficiency of the estimate for this variable in 1965 is very low. The second difference between the estimated results of the two years is for the destination region wage rate. This variable has been found to be one of the most significant factors affecting destination choice in other interregional migration studies, and was expected to be significant in this study. For 1977, the destination region wage rate did not significantly affect destination choice. Except for statistical problems, no explanation for this result can be thought of, especially since, as defined, this variable takes into consideration the probability of being unemployed as well as the income available if unemployed. As with the destination region fiscal benefits in 1965, the efficiency of the estimate for destination region wage rate in 1977 is very low.

The results of the test for structural change between the migration factors of the two years indicated that all of the influences of all variables have not changed. It is possible though that the individual coefficients did

change. This could be the case for the destination region wage rate and fiscal benefits; the efficiency of the estimates of these two variables in the combined year results are low relative to the estimates of the other variables.

Real rather than nominal wage rates and fiscal benefits were found to be, as theoretically one would expect, the relevant variables considered by migrants. The positive influence on migration indicated for the index of housing prices in the destination region may loosely be interpreted to indicate capitalization of fiscal benefits, in the short run, in which the supply of housing is inelastic. The simultaneity between in-migration and housing prices is not accounted for in this model, and undoubtedly should be for a definite conclusion with respect to capitalization of fiscal benefits to be made.

Further research in the area of interprovincial migration, which as indicated by this and previous studies should incorporate fiscal factors, could further illuminate the migration process through the use of migration data disaggregated by socio-economic characteristics. The data should be disaggregated by more than one characteristic if the reliability of the statistical estimates are to be increased, because a single classification assumes a lot of similarities with respect to other characteristics. Disaggregated migration data will allow separate testing of the decision to migrate or not, which is mainly dependent on the socio-economic characteristics of the person, from the

destination choice, which is dependent mainly on the attributes of the destination region. Also, if the destination choice is estimated for disaggregated groups, more relevant indicators of the influences can be used as the independent variables. For example, knowing the affect of net potential fiscal benefits on migrants is sufficient to answer the questions with respect to the efficiency aspects of equalization payments, but does not impart too much information concerning which programs are attracting people or, similarly, what groups are attracted by specific public good expenditres and tax regimes. The reliability of the statistical estimates of the influence on interprovincial labour flows, and thus use-value for policy makers, is dependent on the availability of disaggregated data. Such data could be used to determine which attributes affect the destination choice for each socio-economic group. Which characteristics to divide migrants by could be determined by modelling the decision to migrate on the characteristics of the migrants. Probably the relevant information to collect on migrants is their age, occupation, education and income, as these have been found in studies in which disaggregated data were used to be the factors most significantly affecting a person's propensity to migrate, and relative response to migration variables. For fiscal factors, an income disaggregation and division of those with and without children would probably be most useful, as these two factors are thought to be the factors most influencial in determining preferences for the

mix of public service provision and tax programs.

Another interesting task for future interprovincial migration studies would be to test the destination choice for other years than the two used in the present study, and/or in a time-series context for each province. If a time-series analysis is done for each province, however, statistical problems resulting from analyzing time-series cross-section data will be present, so that disaggregated data are essential for the estimates to be reliable at all.

An finally, the results of the present study indicate that equalization payments do not promote inefficiency in the labour market by hindering out-migration. Origin region potential fiscal benefits were found to actually promote out-migration. As such, the argument that equalization payments slow down the needed adjustment of economically declining regions (to the extent that out-migration is required for adjustment of such regions) appears to be invalid. The other efficiency aspect of equalization payments, namely their requirement to reduce the fiscal incentive to migrate associated with differing provincial fiscal capacities, is validated by this study, for 1977 at least. This implies, since potential benefits were used, that fiscal capacities rather than expenditures should be used in the equalization formula, as is done presently. It also implies that to be most effective in reducing the fiscal incentive, full equalization of fiscal capacities should be undertaken through equalization payments. Presently those provinces whose fiscal capacity is

below the national average for all provinces are brought up to this level through equalization payments. Also, there is no redistribution from those provinces above the national average; the payments are made out of federal government general revenues, so there remain great discrepancies in fiscal capacities, especially between the energy producing and non-energy producing provinces. If the equalization program is deemed not appropriate for resource revenue sharing, then an alternative program to accomplish the same result, many of which have been formulated, is called for on the basis of this study. Not only would it benefit the national economy of all provinces in terms of higher national output, but it would prevent problems in the energy producing provinces that will result from large in-migrations of people not warranted by labour market conditions.

The existing equalization program, in fact the complete federal-provincial fiscal arrangements net, is presently under revision. A new program, or changes to the present program are supposed to come into effect on April 1, 1982. However, the provinces do not support most of the federal government's proposal for reformation of the act, so the time of implementation is uncertain. Of importance to this study is the federal proposal to change the standard of equalization from the present national average standard to the standard of Ontario. Since Ontario's base for oil and gas is almost non-existent, equalization of these revenues will not take place. As such, discrepancies in fiscal

capacities, other things being equal, should increase between the energy producing and non-energy producing provinces, even with no further increases in the price of energy. And, based on the findings of this study, so will the incidence of fiscally-induced migration.

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APPENDIX A

DATA

Wage Rate: Average weekly wages and salaries of an industrial composite for the provinces and the Atlantic region. Current dollars.

Source: The Conference Board in Canda, The provincial Economies, 1961-1979.

	1965	1977
B.C.	101	283
Alta.	90	262
Sask.	85	236
Man.	82	226
Ont.	94	249
Que..	89	245
Atlantic*	75	222

*Calculated as follows: $\frac{Pi}{\sum_{i=1}^{4} Pi} Wi$ Pi = population Wi = wage rate

Unemployment Rates: Provincial (regional) unemployment rates

Source: The Conference Board in Canada, The Provincial Economies, 1961-1979.

	1965	1977
B.C.	4.2	8.5
Alta.	2.6	4.4
Sask.	2.5	4.5
Man.	2.5	5.9
Ont.	2.5	7.0
Que.	5.4	10.3
Atlantic*	7.4	12.8

*Calculated as follows: $\frac{Pi}{\sum_{i=1}^{4} Pi} Ui$ Pi = population Ui = unemployment rate

Umemployment Insurance Benefits: 12-month average weekly benefits.

Source: Statistics Canada, Statistical Report on the operation of the Unemployment Insurance Act, Catalogue No. 73-001.

	1965	1977
B.C.	25.65	107.84
Alta.	24.98	111.80
Sask.	24.66	104.56
Man.	24.95	102.53
Ont.	24.28	101.00
Que.	24.98	100.65
Atlantic*	23.26	95.40

*Calculated as follows: $\frac{Pi}{\sum_{i=1}^{4} Pi} UIBi$

Pi = population
UIBi = unemployment insurance benefits

Labor Force: That portion of the civilian non-institutional population 14 years of age and over who were employed or unemployed.

Source: The Conference Board in Canada, The Provincial Economies, 1961-1979.

	1965	1977
B.C.	666	1163
Alta.	541	892
Sask.	332	421
Man.	355	460
Ont.	2614	4044
Que.	2021	2792
Atlantic*	610	830

*Calculated as follows: $\sum_{i=1}^{4} LFi$

LFi = labour source

Change in Employment: $E_{it} - E_{it-1}$: Employment for each year: all persons who did any work at all, had a job but did not work due to illness or disability, personal or family responsibility, bad weather, labor disputes, vacation, other reasons.

Source: Statistics Canada, The Labour Force, Annual Review, Catalogue No. 71-001.

	1965	1977
B.C.	34	27
Alta.	22	32
Sask.	3	14
Man.	9	4
Ont.	75	105
Que.	84	67
Atlantic*	26	7

*Calculated as follows: $\sum_{i=1}^{4} \Delta Ei$ ΔEi = change in employment

Population: 000's of persons

Source: 1977: Statistics Canada, Estimates of Population by Sex and Age for Canada and the Provinces, Catalogue No. 91-203.

1965: Statistics Canada, Population Estimates by Marital Status, Age and Sex for Canada and the Provinces, Catalogue No. 91-203.

	1965	1977
B.C.	1797	2530.1
Alta.	1450	1952.1
Sask.	950	947.5
Man.	965	1032.8
Ont.	6789	8445.0
Que.	5685	6283.0
Atlantic*	1968	2226.9

*Calculated as follows: $\sum_{i=1}^{4} Pi$ Pi = population

Distance: Highway miles separating major urban centres: B.C.-Vancouver, Alta.-Edmonton, Sask.-Regina, Man.-Winnipeg, Ont.-Toronto, Que.-Montreal, Atlantic-Charlottetown.

Source: Statistics Canada, Canada Yearbook, 1976-77, Catalogue No. 11-202E.

B.C.	- Alta.	773
	Sask.	1132
	Man.	1387
	Ont.	2791
	Que.	2983
	Atlantic	3719
Alta.	- Sask.	488
	Man.	843
	Ont.	2147
	Que.	2329
	Atlantic	3075
Sask.	- Man.	355
	Ont.	1659
	Que.	1851
	Atlantic	2587
Man.	- Ont.	1304
	Que.	1496
	Atlantic	2232
Ont.	- Que.	335
	Atlantic	1071
Que.	- Atlantic	736

Migration

Source: Economic Council of Canada.

		1965	1977
B.C. -	Alta.	2129	4120
	Sask.	626	777
	Man.	502	609
	Ont.	1400	2071
	Que.	329	350
	Atlantic	355	537
Alta. -	B.C.	4272	4017
	Sask.	1447	1731
	Man.	721	868
	Ont.	1005	2216
	Que.	301	284
	Atlantic	329	631
Sask. -	B.C.	1322	772
	Alta.	1676	1747
	Man.	802	640
	Ont.	672	503
	Que.	107	58
	Atlantic	115	133
Man. -	B.C.	1340	907
	Alta.	964	1356
	Sask.	976	857
	Ont.	1876	1271
	Que.	356	140
	Atlantic	260	308
Ont. -	B.C.	2216	3011
	Alta.	1298	3831
	Sask.	588	724
	Man.	1437	1340
	Que.	4254	2675
	Atlantic	3023	3705
Que. -	B.C.	513	813
	Alta.	262	1168
	Sask.	114	122
	Man.	270	255
	Ont.	4774	6829
	Atlantic	1262	1217
Atlantic -	B.C.	653	712
	Alta.	330	1098
	Sask.	95	185
	Man.	331	370
	Ont.	5185	3643
	Que.	1431	793

Provincial Price Indices: Implicit Price Deflation for Gross Domestic Provincial Product, 1971 = 100.

Source: The Conference Board in Canada, The Provincial Economies, 1961-1979.

	1965	1977
B.C.	78.71	182.86
Alta.	79.78	205.93
Sask.	83.38	188.75
Man.	82.46	171.86
Ont.	77.78	166.35
Que.	80.79	172.7[illegible]
Atlantic*	76.98	174.81

*Calculated as follows: $\frac{Pi}{\sum_{i=1}^{4} Pi}$ Ii Pi = population, Ii = price index

Fiscal Benefits: Σ(equalization payments, corporate income taxes, natural resource revenues) per capita. Millions of current dollars.

Source: Statistics Canada, Provincial Government Finance Revenue and Expenditure, Catalogue No. 62-007.

	1965	1977
B.C.	156.8	500.5
Alta.	291.0	2598.3
Sask.	90.9	339.5
Man.	56.0	353.9
Ont.	298.1	896.1
Que.	345.9	1806.1
Atlantic	132.7	1102.1

Migration Stocks: sum of migrants for previous 5 years.

		1965	1977
B.C. -	Alta.	10856	9810
	Sask.	3015	4642
	Man.	2457	4063
	Ont.	6130	10922
	Que.	1615	2129
	Atlantic	4091	2657
Alta. -	B.C.	13242	20171
	Sask.	6070	7042
	Man.	3169	3963
	Ont.	6455	8103
	Que.	1316	1298
	Atlantic	1091	2236
Sask. -	B.C.	4519	5683
	Alta.	9432	9810
	Man.	4478	3747
	Ont.	3091	2536
	Que.	465	317
	Atlantic	358	572
Man. -	B.C.	3646	5709
	Alta.	3821	6319
	Sask.	4047	4302
	Ont.	7400	7019
	Que.	1328	1023
	Atlantic	1209	1633
Ont. -	B.C.	7202	15673
	Alta.	6014	12735
	Sask.	2293	2864
	Man.	7262	7728
	Que.	20985	18939
	Atlantic	13579	22858
Que. -	B.C.	1706	3478
	Alta.	1262	2526
	Sask.	469	340
	Man.	1085	1131
	Ont.	20178	23434
	Atlantic	5922	6013
Atlantic -	B.C.	2575	3278
	Alta.	1438	3077
	Sask.	483	602
	Man.	1272	1740
	Ont.	19799	17869
	Que.	6718	4686