CHARACTERIZATION AND EXPLANATION OF PRIMARY, RETURN AND ONWARD INTERPROVINCIAL MIGRATION: CANADA, 1976-86

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ABSTRACT

Using data from the Public Use Sample files of the 1981 and 1986 Canadian censuses, this thesis sets out to characterize and explain primary (migration from the province of birth), return (migration back to the province of birth following an initial migration) and onward (migration to a province other than the province of birth following an initial migration) interprovincial migration within Canada for the 1976-81 and 1981-86 periods.

Three major themes are developed and expanded over the course of the thesis. The first theme is one of characterization. In order to study the propensities of in- and outmigration, appropriate in- and outmigration rates are computed (Long, 1988; Rogers and Belanger, 1990). The major finding is that the Canadian migration patterns are similar to those observed in the United States.

The second theme is the explanation of return and onward migration amongst non-natives (those whose province of residence was different from their province of birth) aged 20-44 within Canada by applying a three-level nested logit model to the 1976-81 micro data. Research has tended to take either a macro-adjustment or micro-behavioral stance in modelling migration flows, but the complementary frameworks suggest the need for an integrative approach

incorporating structural-institutional forces and personal factors. Important factors include mother tongue, level of education, age and family type. Influential provincial attributes include economic variables, distance and cultural similarity. The main finding is that return migrants also responded to interprovincial variations in economic opportunities in a rational way.

The final theme is the temporal analysis of primary, return and onward migration through the economic boom of 1976-81 and economic bust of 1981-86. Relative to return migration, primary and onward migration became less important during the period of economic bust, although migration selectivity with respect to personal factors remained basically the same. In making migration decisions, non-natives continued to respond to the spatial variation in economic opportunities so that the spatial patterns of migration changed in response to the changing spatial economy.

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CHAPTER 1

INTRODUCTION

1.0 CONTEXT

The evolution of the Canadian population has been a function of natural increase, foreign emigration and immigration and internal migration. With a decrease in the spatial variations in birth and death rates, internal migration has increased in importance as a major determinant of population distribution. An important catalyst of internal migration is national and regional economic opportunities. Alberta's prosperity of the late 1970s, for example, which was due largely to the oil boom and the corresponding expansion of employment, was accompanied by the rapid inflow of inmigrants and social and economic problems. In contrast, Saskatchewan is faced with population decline as a result of prolonged net outmigration, which forced its provincial population to drop below one million by the late 1980s (Statistics Canada 1991). Such net-outmigration leaves behind a declining tax base and declining property values.

Migration reflects and determines social change and therefore has wide-spread consequences, both for society as a whole and for the individual. Treating

migration as a dichotomous variable ('migrants' versus 'non-migrants') and relying on neo-classical migration theory, Courchene (1970) viewed migration as an economic event, whereby migrants would move from low to high wage regions. Yet migration is usually rather inefficient, in that large flows of migrants are usually accompanied by corresponding counterflows. The existence of these migration counterflows may be disturbing, since migration may fail to replace certain types of individuals in areas that attract comparatively few inmigrants, impact upon the allocation of factors of production (capital and labour), the distribution of human capital, regional disparities and the geographical polarization of ethnic groups. Because of these concerns, migration counterflows deserve closer attention.

A major advance in migration research, paralleling the greater availability of micro data (where the unit of observation is either a person or a household), has been the recognition that migration is more than a one-time event, allowing previous migration experience to be emphasized. Different kinds of people may have different propensities to migrate and different migrants may have different destination choice patterns, resulting from a unique set of forces played out at the time of migration. That is, changing life-cycle or personal attributes interact with a larger set of ecological variables (defining the social, economic and geographical variables of regions within the choice set available to the potential migrant).

Geographical relocation is typically classified into (i) change of residence

or 'residential mobility', which is generally a short distance move (Zelinsky 1971) and (ii) migration, with the relocation crossing at least a municipal boundary (Liaw 1988). The concept of migration is necessarily geographical, as a change in residence implies a change in location and interaction over space, which may occur over short distances (e.g. around the block or across town) or longer distances (e.g. between regions) and touches upon social, cultural, economic and population geography. To be sure, the spatial dimension or aspect of migration is important. Yet in order to gain insight into the question of where, why and who migrate requires insights from sociology and economics and is of interest to academics, policy makers and planners alike. In this respect, a geographical analysis allows us the opportunity to bring together different research traditions. The focus of this dissertation will be on long-distance 'interprovincial' migration.

Migration is a learning process, implying that it is not only a function of specific social, economic, cultural or political factors but that it is also partially dependent upon an individual's previous migration history. Nativity, which may be used as a surrogate for migration experience or for the region in which individuals spent their 'formative' years has been shown to be an important determinant of migration (Liaw and Ledent 1988; Liaw 1990) with *non-natives* (those whose region of residence at time *t* differs from their region of birth) being much more migratory than *natives* (those whose region of birth is the same as their region of residence at time *t*) (Long 1988; Liaw 1990).

Migrants may be further disaggregated into three mutually exclusive classes composed of (1) *primary migrants*, those who have moved out of their 'home' region, (2) *return migrants*, those who have migrated at least once with a subsequent migration returning them to their home region, and (3) *onward migrants*, those who have migrated at least once with a subsequent migration to a region other than their home region.

Support for the disaggregation of migration flows has been revealed by these contrasts between each of the three types of migrants. Much of the existing work has employed longitudinal data (for example, DaVanzo 1976, 1978; Morrison and DaVanzo 1986; Grant and Vanderkamp 1976, 1986). Such data are especially well-suited to the study of repeat migration, owing to their temporal depth, but generally lack spatial information, owing to small sample size. Consequently, the *spatial* patterns of return and onward migration comes mainly from census data.

1.1 OBJECTIVES AND METHODOLOGY

The effects of the explanatory variables on migration behaviour must be rather complex and cannot be effectively studied without the availability of high quality micro data and an appropriate migration model. The principle objective of this research is to characterize and explain primary, return and onward

Canadian interprovincial migration using disaggregate migration data and to evaluate the effects of various personal and ecological variables upon the migration process.

With the exception of Grant and Vanderkamp (1976, 1986), whose work relies upon the use of longitudinal data, primary, return and onward migration processes in Canada have not been thoroughly explored. The results to date indicate that nativity status is crucial in understanding migration. Further, nativity may help to explain apparent inconsistencies in the migration flows, such as the relatively large inflow of return migrants into economically disadvantaged regions. This research may therefore assist in the interpretation of regional disparities and in explaining why factor mobility does not appear to have reduced them. To this end, it is believed that the separation of the three types of migration is an important step in understanding migration in general and in reconciling reality and theory.

In order to achieve the objectives of this dissertation, three underlying themes are developed. The first theme focuses upon a descriptive analysis of primary, return and onward migration for the total population, by age group and selected personal characteristics. By taking into account information on (i) province of birth, (ii) province of residence in 1976 (1981) and (iii) province of residence in 1981 (1986), one can calculate primary, return and onward in- and outmigration rates by age (Long 1988). Because these measures are adapted

from Long (1988) and Rogers and Belanger (1990), the results are comparable with American ones. The results indicate:

a) the general properties of primary, return and onward migration in Canada for the population in total and by age group; and

b) whether the findings of Long (1988) are robust to the use of a different data set and, more importantly, to a different political and regional system;

The second theme involves a multivariate analysis of return and onward migration in which *non-native* migration patterns are analyzed and explained in terms of a three-level multivariate nested logit model (Kanaroglou *et al.* 1986a, 1986b) for the 20-44-year-old age group. Exploration of these relationships will enable us to consider, among other things:

a) the differences between return and onward migration streams;

b) the relative importance of personal attributes and/or ecological variables on the migration decision at each level; and

c) differences by age group.

The existence of broad social, political and economic forces operating over the study period most likely had significant effects on the directions and magnitudes of primary, return and onward migration streams, which should be seen at both the bi-regional and multi-regional levels of the analysis. Therefore, by considering both the 1976-81 and 1981-86 periods, the results will indicate

whether:

a) temporal variations in primary, return and onward migration exists; and

b) there were significant differences in the factors affecting the migration process at each level of the model.

Data for this study are drawn from the 1981 and 1986 Statistics Canada Public Use Sample (PUS) files of the 1981 and 1986 censuses, which are 2 percent cross-sectional samples of the Canadian population. The use of micro-data allows, among other things, to control for the effects of personal attributes upon the behaviour of migrants, improved focus on the decision making unit and better accounting of previous migration experience.

1.2 STUDY ORGANIZATION

The dissertation is loosely divided into bi-regional and multi-regional analyses of primary, return and onward migration. Chapter 2 reviews the migration literature, focusing upon the definition and measurement of migration as well as theories and determinants of migration. Although several extensive reviews of the migration literature exist (see for example Clark 1982; Cadwallader 1992), the purpose of this chapter is to provide an overview of the pertinent literature and empirical results to date. Within the chapter, a loose distinction is

made between macro and micro level approaches. Macro approaches, rooted in the neo-classical model, explain migration behaviour with reference to wage and income differentials between regions. The micro approach, on the other hand, deals with the decision making process and is interested in how individuals choose between alternatives.

Readers not interested in the literature review should focus upon chapters 3, 4, 6 and 7, which concentrate upon the analysis of interprovincial migration. Since these four chapters are meant for submission to a professional journal and are self-contained, the reader will notice some overlap between the chapters. Chapter 3 provides a characterization of primary, return and onward migration in terms of overall migration rates, age-specific migration rates and net migration volumes. Consequently, it is largely a hypothesis generating chapter, providing insight into primary, return and onward migration.

Chapter 4 continues the descriptive analysis by focusing on the temporal patterns of migration, with particular reference to age, level of completed education, gender and family type.

A review of the migration literature exposes a wide-ranging set of models. Chapter 5 presents the logit model, which is the multivariate model used in this analysis. Consideration is given to discrete choice models and random utility theory in general, before focusing upon the logit model.

Employing a synthesis of the macro and micro perspectives (Cadwallader

1989, 1992), chapters 6 and 7 present the results of the logit analysis of return and onward migration. This theoretical framework provides a useful frame of reference for asking a variety of questions relating to both the macro and micro perspectives of migration. Chapter 6 focuses upon the estimation results for the 1976-81 period.

Vanderkamp (1972) noted that the proportion selecting to make a return migration tended to increase during recessionary periods. During our study period, the presence of marked changes in the spatial pattern of economic opportunities through the late 1970s (a period of economic boom) and the early 1980s (a period of economic bust) corresponded to changes in interprovincial migration patterns. Chapter 7 studies how migration behaviours responded to the changing spatial economy. In doing so, it reveals certain persistent migration flows as well as changing properties.

Chapter 8 concludes by providing a summary of the major findings, their policy implications and avenues for future research.

CHAPTER 2

A REVIEW OF THE LITERATURE ON MIGRATION

2.0 INTRODUCTION

In the past, the mechanization of agriculture and increasing opportunities within the emerging cities meant that the dominant migration pattern was rural to urban. Intra-regional or inter-regional migration is now the major source of regional population growth or change within developed countries; it affects the quality of human capital, regional income disparities and the concentration of ethnic groups among other things, in both sending and receiving regions. Clearly, migration is a complex phenomenon and one that has not allowed easy reconciliation between theory and reality.

This chapter lays the groundwork for the current research by reviewing the salient migration literature and establishes the theoretical framework of this study. In any attempt to structure a literature review, there is a high likelihood that some points will fall into more than one category. Therefore, the present structure is meant only to facilitate discussion, rather than forming a strict nomenclature. Section 2.1 will discuss issues of definition and measurement. Sections 2.2 and 2.3 will explore the development of migration theory, with specific emphasis upon

the approaches, determinants and the consequences of migration. Temporal patterns will be discussed in section 2.4 and section 2.5 presents a brief overview of primary, return and onward migration. Since much of the literature concerning primary, return and onward migration is reviewed in subsequent chapters, this section will focus upon the shortfalls of the existing migration literature and avenues of further exploration. Section 2.6 concludes this chapter.

2.1 DEFINITION AND MEASUREMENT

Simply defined, migration involves a change of usual residence by a person, family or household. However, this definition does not account for spatial scale, i.e. the distance of the move. It is therefore useful to distinguish between *mobility* and *migration*. The notion of mobility refers to residential relocation, while migration generally involves a longer distance move (Zelinsky 1971). At the margins, it is difficult to distinguish between migration and residential mobility. For the purposes of the current study, migration is defined as the movement of individuals between provinces, which (in many cases) necessarily requires a shift from one labour market to another. It is also difficult to measure migration in certain situations such as the temporary movement of workers, students or seasonal workers (*circulation*). Therefore, a temporal dimension is also required in order to distinguish between permanent migration

and temporary migration.

The basic sources of migration information include the census, longitudinal data files such as the Panel Survey of Income Dynamics (PSID) in the United States or the Longitudinal Survey (LS) in the United Kingdom, and population registration systems. Census surveys typically employ questions about place of residence at specific points in time while registration systems and longitudinal surveys record all moves. Although complementary, these distinct data sources provide two alternative measures of migration (Ledent 1980). *Movements* measure migration from counts of moves recorded by a population registration system or longitudinal surveys. *Transitions*, on the other hand, are based on retrospective questions from the census. The difference between the two systems lies in the number of moves recorded, with registration systems and longitudinal surveys picking-up each individual move over a period of time while the census records only one move over a fixed period. The use of movement or transition data therefore implies that different methods of analysis must be used in modelling migration. The application of transition (census) data is relatively straightforward; rates are derived by dividing migrants by the population at the start of the interval (the 'at-risk' population). The use of movement data requires more complicated approaches (see Rees 1983, 1989, for a review of methods).

Another important issue in defining migration is the length of time over which migration is measured. Too long an interval is likely to introduce errors

since respondents will not be able to recall all their moves and some will be missed. Conversely, too short a migration interval may blur the distinction between temporary migration and permanent migration.

2.2 DEVELOPMENT OF MIGRATION THEORY

Much of migration theory stems from the original work of Ravenstein (1889), who provided the first insights into the determinants of migration. Premised on an individual's desire to better themselves, Ravenstein described the spatial, population and economic determinants of migration. Among the more important generalizations were the following: the majority of migrants move only a short distance; migration is stepwise; each migration stream tends to have a compensating counterstream; and the major cause of migration is economic. These often quoted generalizations have stood the test of time and formed the basis of scientific discussion over the years.

More recently, Lee (1966) advancing Ravenstein's ideas, created a framework for migration analysis that incorporates the 'pull' effects of the destination, the 'push' effects of the origin, intervening opportunities' and personal characteristics. For example, high unemployment rates at the origin would constitute a push factor and high wages in the destination would represent a pull factor. Between each potential origin and destination was a set of intervening

opportunities, the most important being distance. Finally, a set of personal factors is allowed to influence the origin and destination characteristics. Like Ravenstein's work, Lee's conceptualization of migration has generated much empirical work.

Much of the literature on migration may be differentiated based upon underlying theory, falling into the broad categorization of *macro* and *micro* approaches (Stillwell and Congdon 1991). The micro approach attempts to explain the processes underlying the migration decision and is concerned with how individuals choose between alternatives. Place utility and perception of potential destinations are thus subsumed within the more general framework of choice behaviour. The macro approach (commonly known as the *macro-adjustment model*), focuses upon the role of migration in the labour market and in particular on the impact of migration on sending and receiving regions in terms of demand and supply for labour. Macro approaches are therefore

> concerned with investigating the relationships between migration and objectively determined macro variables such as ... wage rates (Stillwell and Congdon 1992, p. 6).

In relation to the labour market, the question can be asked whether rates of outmigration are higher from areas with high unemployment and low wages and rates of inmigration are correspondingly lower. If this is the case, then migration would appear to act as an 'equilibrating mechanism', levelling out regional disparities in wages and employment levels. This perspective has its roots in

neo-classical economics (Hicks 1932; Borts and Stein 1965).

The macro-adjustment model suggests that labour migrates in response to inter-regional wage differentials, moving from low to high wage regions. Labour is treated as a factor of production as is capital; both seek opportunities where returns are the greatest. In particular, labour is expected to move from regions with low demand for labour (low wages) to regions with relatively high demand (high wages). Migration will continue to reduce demand and wage differentials between regions until an equilibrium is reached. By focusing on wage rates *per-se*, the model assumes that prices adjust freely upwards or downwards to meet conditions of excess demand or supply respectively.

The macro-adjustment model has been subject to a number of criticisms; market imperfections, incomplete information, heterogeneous labour pools and contracts between buyers and sellers create 'stickiness' in the labour market, complicating or impeding the free movement of individuals and capital (Shaw 1985). Typically, economic variables do not perform as expected in empirical studies. Variables representing origin 'push' effects should, in theory, be significant, yet Lowry (1966) found these variables to be insignificant and only the destination variables to be statistically significant. Likewise, measures of unemployment in origin and destination regions are often inconsistent in terms of the sign and level of significance, but give the overall impression that unemployment is important in the migration decision (Marr *et al.* 1978; Winer and

Gauthier, 1982). This lack of expected relationships may reflect, in part, the nature of aggregate data, simultaneity bias and its insensitivity to the subtleties of the labour market.[1]

Micro approaches, on the other hand, focus more closely on the decision making process of migration, considering how personal attributes, economic, social or cultural factors affect the migration decision. The roles of such factors will tend to vary with the distance of the migration. Residential mobility, for example, is influenced largely by the migrant's position in the life-cycle while destination choice is a function of specific location attributes and a rather limited search process (Rossi 1980). Migration, on the other hand, is typically a function of a broader set of factors.

The *human-capital* approach (Sjaastad 1962) emphasizes the role of income returns on the migration decision, whereby immediate costs are balanced against future expected returns (life-time earnings). If benefits outweigh costs, then the individual will migrate. While migration is viewed as an investment in human-capital, other non-monetary considerations and labour heterogeneity are allowed to enter into the decision process, meaning that migration is not exogenously determined. Since younger individuals have longer time periods within which to capture the benefits of migration than have their older counterparts, the human capital model provides an economic rationale for the higher propensity to migrate among younger age groups. The costs of migration,

which include financial costs, opportunity costs of foregone income and psychic costs of leaving familiar surroundings are directly associated with distance and the time horizon over which individuals evaluate the expected costs and benefits of migration, with the discount rate defining how willing people are to exchange expected future gains for current losses.

Despite its theoretical attractiveness and its wide application to migration research, the human capital model is not without its shortcomings. Although several studies claim support for the model, the empirical specification of the model is difficult. The main problem lies in the model's assumption of perfect information. To assume perfect knowledge of future earnings potential and changes in employment is not realistic. The difficulty associated with the construction of a measure of life-time earnings has often lead to its replacement by current income, decreasing the model's attractiveness and applicability.

Behaviourial models represent an alternative view of migration and the decision making process. Since sociologists do not believe in the existence of a perfectly rational economic person, individuals are thought of as being satisficing rather than maximizing, evaluating only a subset of the possible alternatives. The behaviourial approach assumes that individual behaviour is based on their perception of the environment. Such approaches have been widely used in residential mobility analyses (i.e. Moore 1972; Rossi 1980) which view mobility as an adjustment process allowing the needs of the person to be

better satisfied. Assuming that residential need was related to residential stress, Rossi (1980 p. 226) concluded that

> mobility is the mechanism by which a family's housing is brought into adjustment with its own needs.

'Residential stress' as defined by life-cycle status and measured by the desire for increased living space, changing social outlooks and/or environmental concerns, triggers the departure decision process, with families with children being the most mobile groups.[2] Similarly, Moore (1972) and Clark and Onaka (1985) concluded that housing adjustment was the single most important cause of residential mobility. While providing an intuitive understanding of migration, behaviourial models are difficult to quantify and have therefore received limited attention within the economic literature.

2.3 DETERMINANTS OF MIGRATION

Many variables are either directly or indirectly linked to migration. Differential characteristics of sending and receiving regions provide the impetus to migrate while personal characteristics condition the response to utility differentials across regions. The decision to migrate may be imposed (involuntary movement), or it may be motivated by situations which affect the household directly (i.e. marriage or employment) or the awareness of other opportunities (i.e.

economic) within the system. Other factors, including household tenure, duration of residence and social networks discourage migration. Therefore, models must attempt to capture these variables via appropriate functions and explanatory variables. The following sections discuss the *ecological* (i.e. the set of variables describing the environmental, geographic and economic circumstances of a province) and personal determinants of migration.

2.3.1 Ecological Determinants

Much of the early work in Canadian interprovincial migration was based upon the macro-adjustment model utilizing aggregate data derived from censuses, with contributions by Courchene (1970) and Vanderkamp (1970, 1971). Although inconclusive, their results did permit consensus on a variety of issues and laid the groundwork for future research.

The gravity model confirmed Ravenstein's generalization that migration was negatively affected by distance. Strictly speaking, distance is a proxy for less easily measured variables associated with the monetary costs of movement, psychic costs and information costs. Biases or lack of adequate information may limit an individual's search field, especially amongst such population sub-groups as the poorly educated. Conversely, the human-capital model suggests that the labour market for the highly educated should be larger in geographic scope and more accessible, meaning that information costs should also be lower for these individuals, with less error in judgement. Accordingly, the distance effect should

be less for the highly educated. Distance is therefore a proxy variable for many effects, including information diffusion, costs of migration and the choice of destination. Most studies have used road or airline distances between points. Alternative measures have been used in some cases, reflecting intervening opportunities between origin and destination (eg., Stouffer 1960).

Employment growth and unemployment levels have also been related to migration patterns (Shaw 1985; Anderson and Papageorgiou 1991; Liaw 1991). Theoretically, the greater the unemployment in a region, the greater the outmigration, while inmigration should be negatively related to unemployment levels. However, the presence of regional unemployment levels has mixed effects upon migration. In some instances, variables measuring unemployment perform as expected but perform poorly in other instances (Courchene 1970; Grant and Vanderkamp 1976; Wrage 1981; Winer and Gauthier 1982). One reason for this finding is the use of aggregate data, since the unemployed constitute a small proportion of the total population. The overall impression is that the effects of origin factors appear to be ambiguous, while destination effects tend to be clearer. Because of its temporal depth, longitudinal data has been helpful in studying the effects of unemployment on migration. Using micro-level data derived from the PSID, DaVanzo (1978) explored the role of unemployment upon the migration decision, finding that families whose heads were either looking for work or unemployed were more likely to migrate than those families whose heads

were not looking. Further, higher unemployment rates encouraged out-migration among the unemployed, but exerted little influence on those who had a job. Lansing and Mueller (1967) speculated that the low level of educational attainment amongst the unemployed meant that they were less aware of employment opportunities elsewhere.

The macro-adjustment model suggests that labour will migrate from low to high-wage regions allowing income levels to equalize throughout the system over time. This assumes, of course, that there are no barriers to mobility. While wages are undoubtedly important in motivating migration, the choice of the appropriate representation of the variable is also important. The relationship is partially a function of cost-of-living (Cadwallader 1992), and only wage earners will respond to income differentials. As such, wages will be less important in explaining migration behaviour of the over 65 year old age group. Grant and Vanderkamp (1976) explored whether migrants based their expected incomes on the differences in average income between regions *i* and *j*, or whether they were able to calculate more complicated income functions, implying access to accurate information and sufficient foresight to anticipate their own income streams. Grant and Vanderkamp's analysis (which was also supported by Shaw (1985)) demonstrated that migrants respond to average income differentials as opposed to transitory or random components. To assume that migrants perform complex wage calculations may be unrealistic.

More recent studies using a variety of data sources and estimation techniques (eg. Robinson and Tomes 1982; Winer and Gauthier 1982; Shaw 1985) have incorporated not only 'traditional' effects such as distance and income but also an awareness of other effects such as fiscal benefits. In the process of evaluating the effect of natural resource rents, Winer and Gauthier (1982) noted the re-direction of migration patterns in the post-OPEC (1973) era, at which point Western Canada, especially Alberta, became an important destination for migrants, while Ontario lost its predominance. They have argued that the failure to account for the effect of fiscal benefits and broadly defined public goods represents a serious omission in the analysis of migration, since fiscally induced migration may lead to inefficiencies via the misallocation of resources, altering the response of an individual.

The existence of different fiscal capacities across provinces, stemming from provincially controlled natural resource revenues, may result in the provision of public goods at lower tax rates. Such differences in the provincial fiscal capacity may, in the extreme, over-ride differences in provincial wage structure. The plausibility of this hypothesis was found to be significant by several authors who reported that the existence of differential natural resource rents (NRR) between regions represents a significant determinant of migration (Mills *et al.* 1983; Winer and Gauthier 1982). Since migration does not necessarily imply an increase in the marginal productivity of labour, migration into resource-rich

provinces such as Alberta may represent an attempt on the part of the migrant to capture the benefits of NRR without additions to their tax burden, resulting in market inefficiency. That is, individuals have partaken in inefficient 'rent-seeking' as opposed to efficient 'wage-seeking' migration behaviour. But, this could simply be a response by individuals concerned with employment prospects. That is, there may be some collinearity between NRR and employment. Indeed, both Grant and Vanderkamp (1986) and Shaw (1985) were unable to determine whether NRR exerted an *independent* effect on migration and concluded that NRR may not be a completely suitable explanatory variable since it is (i) most likely inter-correlated with employment and income and (ii) too abstract a concept to enter into individual calculations of the benefits of the potential destination. If NRR does affect the migration decision, it most likely operates indirectly through investment and expenditure effects and not as an independent variable.

The generosity of unemployment insurance benefits may have an effect upon migration similar to NRR. Following revisions to the Unemployment Insurance Act in 1971, regional differences in the generosity of unemployment insurance were created, coinciding with a re-orientation of migration flows away from Ontario (Winer and Gauthier 1982). Although the presence of transfer payments have an uncertain effect on migration, it may be affected in the following three ways (Winer and Gauthier 1982).

First, regional variations in the generosity of unemployment insurance

could induce migration of current unemployment insurance recipients to those areas with relatively more generous benefits. Second, since unemployment insurance benefits act as an income stream, they partially determine an individual's financial ability to afford migration. The unemployed person may not have the financial resources to move. Therefore, the presence of unemployment benefits tends to retard migration by allowing an individual to remain at their current location through an increase in the adjustment or job-search period. Migration may therefore be an option only of last resort given the costs associated with relocation (Courchene 1970). Finally, a cut in benefits may precipitate migration in search of additional income and employment.

Many migration studies have used climatic variables as proxies for quality of life or the 'attractiveness' of a potential destination in terms of the environment. Most studies have used a measure of temperature, and several (e.g. Liaw and Ledent 1987; Liaw 1991) have concluded that people prefer destinations with milder climates.

2.3.2 Personal Determinants

Migration propensity is clearly related to the characteristics of potential migrants. As Myrdal (1957) and Kuznets (1979) point out, migration is selective with respect to individual characteristics such as age, education and gender.

The inclusion of self-selection variables in macro studies was originally limited to representation by aggregate regional measures of, for example,

education or age. While much of this work was geared towards an explanation of residential mobility, many of the same conclusions can be extrapolated to migration in general and return migration in particular. The convergence of migration and mobility theories coincided with a recognition that changes in geographic scale do not necessarily imply a need for different explanatory mechanisms, blurring the distinction between mobility and migration (Golledge 1980).

Based upon the Annual Housing Survey, Long (1988) found that approximately 50 percent of the respondents made an inter-state migration because of changes in marital status, retirement or education level. Age is also significantly correlated with migration propensity and is consistent across time and space. Related to the mobility rates of their parents, the migration rates for young dependents are relatively high and those for teenagers somewhat lower. Young adults, who tend to be less tied to a specific area and are consequently more willing to migrate, represent the most mobile segment of society. Their rates peak in the early twenties and decline thereafter with age but with a slight upturn in migration rates at retirement. Undoubtedly, such incentives to migrate will change over time and with age. Sandefur (1985, p. 365) comments that

> at different stages of life people use a somewhat different "subjective cost-benefit calculus" in making migration decisions. The importance of certain migration determinants may vary significantly depending on whether an individual is married, whether he or she has children, and/or whether he or she is in the labour force or retired.

That is, family ties or job security are likely to decrease the propensity to migrate among older people. It is therefore reasonable to assume that among the reasons for moving is the age composition of the population. If young and old migrate for different reasons, then at a given point in time, the dominant reasons for migration depend partly on the relative size of these different groups.

Other factors such as gender or occupation have a lesser effect on migration. Although the shape of the migration schedule is relatively similar for males and females, some variations exist. For example, elderly females are slightly more migratory than elderly males (Cheung and Liaw 1987).

Education also plays an important role in the propensity to migrate and provides a guide to a region's loss or gain of human capital. Generally, the higher the level of education, the greater the probability of migration.[3] It seems reasonable to assume that such findings are largely related to employment opportunities available to the highly educated. Shaw (1985) asserted that the more highly educated migrants have greater accessibility to information and are therefore more likely to migrate. Amongst younger adults, provinces with greater post-secondary educational opportunities are more likely to attract migrants.

Ethnicity is another significant variable in the decision to migrate. The desire to reside in familiar cultural surroundings means that the set of potential destinations may be restricted. Rates of migration to and from Quebec to all other provinces is lower than amongst the predominately English-speaking

provinces and several studies of Canadian interprovincial migration have established that language commonality is positively correlated with migration. For example, regardless of age, individuals reporting English as their mother tongue were most likely to make an interprovincial migration while their French-speaking colleagues were least likely to. Furthermore, if the potential migrant is residing in Quebec and is English, the propensity to migrate is increased. Conversely, the propensity to migrate is reduced for the French speaking population residing in Quebec and increased amongst the French residing outside of Quebec (Robinson and Tomes 1982; Winer and Gauthier 1982; Shaw 1985; Liaw and Ledent 1987; Liaw 1991).

Marital status and family type have somewhat similar effects on the propensity to migrate and are related to life-cycle status. In many instances, people migrate as members of families or households. Such 'chain' migration is influenced by marital status, or more specifically by the presence (or absence) of dependents which may tie a family to a specific location during a child's education. Singles, being 'foot-loose and fancy free', are most likely to have a higher probability of migration and are more willing to take risks. Individuals who were recently married tend to have higher migration propensities and likely end up in a nearby province (acquaintance is subject to the distance decay effect) (Liaw 1988; Liaw 1990) and/or in the region of residence of the partner (Kawabe and Liaw 1991). With an increasing proportion of dual-income households, it is

reasonable to assume that migration is less dependent upon employment status. Migration may decrease income prospects by worsening the employment possibilities of one of the spouses, hence decreasing the propensity to migrate. Conversely, if one spouse is unemployed, a working partner helps to alleviate the risk of an unsuccessful relocation (Mincer 1978; Marr and Millerd 1988; Maxwell 1988).

2.3.3 The Equity:Efficiency Tradeoff

The sensitivity of migration to interprovincial differences in fiscal structure is a key component of on-going policy debates within Canada and is linked to the macro-adjustment model. On the equity side, the Rowell-Sirois Commission of 1940 called for the maintenance of 'horizontal fiscal balance' between provinces (Winer and Gauthier 1982) such that an individual in a 'wealthy' community would receive the same level of services as an individual with the same income but living in a 'poor' jurisdiction *while incurring the same tax burden*. The desire to achieve horizontal fiscal balance within the Canadian Federal system has led, over the years, to more generous transfer payments (i.e. increased unemployment insurance benefits in 1971) and the entrenchment of the principle of transfer payments within the Canadian Constitution.

The equity-efficiency debate stems from the belief that transfers decrease the efficiency of the economy. Courchene (1978, p. 26) argued that

> the presence of the large and growing network of income re-distribution

> programs lessens both the necessity for and the desire on the part of the "have-not" regions to make the adjustments required to remain economically viable.

Equalization payments may therefore actually create economic inefficiency via a decentralized population. By inducing people to remain or move to poorer provinces where their marginal product is lower, the presence of transfer payments has actually 'short-circuited' the adjustment process by retarding out-migration.[4] Therefore, the existence of transfer payments may be partially responsible for low returns to employment in the Atlantic provinces (Courchene 1970).

Favouring 'people prosperity' over 'place prosperity', Courchene emphasized the welfare of individuals over that of geographical areas. Consequently, as long as differences in net-fiscal benefits exist, market incomes will not equalize across regions and national per-capita income will fail to reach its potential. Courchene therefore argues that regional adjustment programs should be abandoned, allowing regions to 'run with their strengths' and the market to operate freely (Courchene 1970; Courchene and Melvin 1985).

It is, however, arguable as to whether transfer payments have actually reduced regional disparities.[5] Certainly, little evidence has been collected over the past thirty years suggesting that gaps between the 'have' and 'have-not' provinces have narrowed (Savoie 1986, 1992). The persistence of regional disparities appear to indicate that migration is neither the equilibrating mechanism

posited by Courchene, nor can this failure be attributed to the existence of transfer payments.

Several broad arguments against Courchene's view have been articulated. First, the assumptions of the macro-adjustment model are flawed. Distortions due to distance, slowness of labour to react to wage variations and the differential response of individuals to a variety of signals violates efficiency conditions. Non-competitive markets, externalities and government policies further distort the market. Finally, the macro-adjustment model upon which Courchene bases his argument assumes a homogenous labour force, yet labour is heterogenous. Accordingly, it is questionable whether individual behaviour conforms to aggregate migration behaviour in general (Robinson and Tomes 1982).

Second, Boadway and Flatters (1982) argue that greater inefficiencies would arise if the Federal Government did not pursue 'complete' fiscal equality. Using 'complete' in the sense that differences in fiscal capacity exist between the have and have-not provinces (i.e. through NRR or transfer payments), resulting in the provision of public services at differential tax rates. Therefore, unless such inequalities are balanced, unrestricted migration will respond to these differences, creating further inefficiencies. In light of this, Boadway and Flatters suggest that fiscal benefits increase the odds of migration but that equalization payments reduce these same odds by acting as a compensating mechanism. Therefore,

they suggest that the negative effects of equalization have been over-stated.

The third argument is loosely based upon Myrdal's (1957) work. Since migration is selective, it tends to increase regional differences rather than decrease them (cumulative causation).

Fourth, Matthews (1981) criticizes the macro-adjustment model for its lack of emphasis on social and cultural considerations. Instead, Matthews argues that underdevelopment is not a result of a *lack* of development, but is caused by the continued exploitation of the dependent area. Therefore, it is the draining of capital and resources from a region that is responsible for regional disparities. Matthews' dependency theory approach assumes that migrants are 'victims' of the economic system, being forced to migrate in search of better economic returns (a reserve army of labour). Such marxist perspectives relate migration to capitalist production and the spatial division of labour (e.g. Veltmeyer 1978). Pointing to the historical drain of capital from the Atlantic provinces in the earlier part of this century, dependency theory offers a convincing argument. However, it tends to be a-historical and lacks an ability to predict. More importantly, it removes self-determination from the potential migrant.

In the end, neither the macro-adjustment model, cumulative causation nor dependency theory adequately explains the nature and causes of regional disparities, nor do they offer a realistic interpretation of migration. There are too many other considerations that are overlooked.

2.3.4 Consequences of Migration

Since the movement of people affects both origin and destination regions, migration does not occur in a vacuum. Migration is both a reaction to the economic environment as well as a cause of change (Vanderkamp 1968). The perspective that migration is beneficial to the overall efficiency of the economy is rather simplified and dependent upon the context within which migration is evaluated. In developing countries, for example, the continuing inmigration of people to cities poses threats to health, safety and the ability of the government to deal with an increasingly concentrated population.

The economic impacts of migration are uncertain and reflect the theoretical viewpoint taken. Macro-adjustment models view migration as an adjustment mechanism, although the increase in the size of the labour force in the receiving region has only a small negative effect on the growth of wages in the destination region (Wrage 1981). While reducing total population, out-migration does not appear to have a significant downward effect on origin wage rates, and may even worsen the problem as it affects regional age-structures and the mobility levels of the remaining population (Wrage 1981).

Since migration is positively selective, it tends to remove the highly-educated and better skilled. The impact of inmigration on regional labour supply may be partially offset by the impact on the *derived* demand for labour (Muth 1971). Every new immigrant worker in Quebec, for instance, creates an additional

labour demand equivalent to 0.22 (multiplier = 1.22) due to consumer expenditures in the first year. When indirect effects are added, the multiplier increases to 1.45 (Polese 1981). Consequently, because of spin-off effects, it takes more migrants than originally posited to reach an equilibrium position. Migration's self-perpetuating characteristics on a growing locality has its counterpart in declining areas.

The principal effect of migration is related to its impact upon the age structure and hence the stock of human capital of the region. Since young adults and the highly educated are more mobile and sensitive to economic conditions, they are more likely to migrate from depressed areas in search of new opportunities, leaving behind an aging population. In considering the effects of elderly migration within Canada, Liaw and Kanaroglou (1986, p. 202) commented that

> the key to understanding the spatial distribution of the burden of the elderly lies mainly in the migration process.

This places significant pressure on the provision of social services as an older population is left behind. Conversely,

> if children or older people are heavily represented among new arrivals, the demand for specific services such as schooling or hospital facilities are affected (Shaw 1985, p. 7).

The bulk of empirical evidence suggests that migration does not encourage wage and income equalization. Migration is more than a transfer of

labour but also of private and public demand, savings and human capital. Hence, the relationship between capital and labour is complex. Other determinants of labour demand, such as economic structures, resource endowments or technology along with a heterogenous labour pool, non-price aspects of competition, unionism and incomplete information mean that the market cannot adjust instantaneously.

The outcome of migration upon personal satisfaction is more ambiguous. Migration is not advantageous for all people and its success is partially dependent upon the judgement criteria used. Recalling that the human-capital model claims that migration is a "means of promoting efficient resource allocation" (Sjaastad 1962, p. 80) at the individual level, it may increase the value of human-capital by allowing an individual the opportunity to work in a market where their skills are more highly valued, increasing their income. Even though most individuals report an increase in post-migration earnings, the fact that most moves are made by young adults who are typically facing increasing income schedules regardless of whether they moved or not (Morrison 1977) makes it difficult to determine if the increase in income resulted from the migration, or if it would have occurred on its own. Indeed, while mean income differentials between migrants and non-migrants exist, Lansing and Mueller (1967) could not find a consistent income advantage for migrants. Instead, such differences were attributable to occupational, education, racial and gender differences. Therefore,

the decision to migrate is more likely to be based upon perceived improvements in *individual welfare*, meaning that it is the individual who assumes any tangible costs or benefits derived from migration.

2.4 TEMPORAL EFFECTS

It is unrealistic to assume that locational preferences remain static over time. The 1970s phenomena of counterurbanization or migration down the urban hierarchy forced demographers to re-evaluate the determinants of migration (see Vining 1975; Berry 1988; Field 1988). Hailed as a 'clean-break' with the past, counterurbanization was attributed to a range of factors, including increasing importance of non-economic factors (amenity factors), conservative economic policies (Mera 1988), regional restructuring (Frey 1987; Champion 1988) and economic cycles (Berry 1988). Arguably, migration is a function of short-term (i.e. year to year) processes since it is probable that individuals are most sensitive to fluctuations in employment and wages.

Both Lee (1966) and Zelinsky (1971) hypothesized that migration displayed definite patterns over time. There are essentially two strands of discussion, one focusing upon the changing reasons for migration over time and the other examining the rates of migration. Lee hypothesized that over the short-run, migration would vary with fluctuations in the economy while over the long-

run, the volume and rates of migration would increase. Zelinsky (1971) placed migration in the context of modernization, arguing that

> there are definite, patterned regularities in the growth of personal mobility through space in time during recent history, and these comprise an essential component of the modernization process (Zelinsky 1971, p. 222)

Zelinsky hypothesized five stages of systematic mobility change and five concurrent stages of economic development comprising the mobility transition, of which the fifth stage was a deceleration of residential migration and circulation.

Of greater interest are the changing determinants of migration. From surveys asking respondents why they had migrated, there is no firm evidence to conclude that the reasons for migration have changed in favour of non-economic motives (Long 1988). Whilst high amenity areas have attracted increasing proportions of the migration flows, such growth may reflect either the changing age structure of the North American population or the increasing ability of employers to locate in such areas (Long 1988). That is, the changing migration patterns favouring high amenity locations do not necessarily mean that the underlying reasons for moving have changed.

Empirical work presents an alternative picture. In his analysis of Canadian inter-metropolitan migration patterns, Shaw (1985) concluded that the influence of 'traditional' market variables on the propensity to migrate had declined while non-monetary and fiscal variables were more relevant in explaining

flows. Improvements in the standard of living or productivity could increase the pursuit of leisure activities, such that differential wages across regions figure less in the migration decision. Further, unemployment insurance benefits and segmented labour markets may decrease the potential range of destination choices and reduce the pressure to migrate. This could, however, represent the 'chicken and egg' effect and simply reflect the greater ability of employers either (i) to locate in high amenity areas, or (ii) to locate in resource-rich areas, with employment growth deriving from the new location.

Using aggregate data to model interprovincial migration, Anderson and Papageorgiou (1992) found significant changes in the roles of explanatory variables. Over time, employment expectations at the destination became more important as compared to expected wages, suggesting that individuals are more concerned with whether or not employment would continue to be available at the destination, rather than how much it paid. Using aggregate data to model interprovincial migration over the 1961-1983 period, Liaw and Ledent (1987) noted that the impact of distance, ethnic dissimilarity, climate, wage rate and destination population share on the destination choice declined in importance, while unemployment benefits and employment growth rates increased in importance. While not all studies provide the same conclusions with respect to the changing impact of the explanatory variables over time, they do seem to agree that the role of distance is becoming less important. Decreases in the time and costs

associated with transportation and communications has most likely contributed to this result.

Lacking appropriate time series, much of the work to date has been cross-sectional only, preventing analysis of the representativeness or accuracy of cross-sectional studies. Since the determinants and consequences of migration may vary cyclically, the general problem with cross-sectional data lies in its inability to measure short-run effects (Molho 1984).

2.5 PRIMARY, RETURN AND ONWARD MIGRATION

One of the most important factors influencing the likelihood of migration is nativity status. Liaw (1991) found that *non-natives* (those whose province of residence differs from their province of birth) were much more prone to migrate than *natives* (those whose province of residence is the same as their province of birth). For some individuals, migration begets migration. For the purposes of this dissertation, non-native migrants may be further divided into two groups; *return migrants* (non-natives who make a subsequent migration back to their province of birth) and *onward migrants* (non-natives who make a subsequent migration to a province other than their province of birth). If migration is learning-by-doing, then the barriers to the first move may be the hardest to overcome. In this respect, while return migration may be a result of a chain of events put in motion

by the first move, onward migration may be more closely related to events after the first move.

An appropriate conceptual framework accounting for migration history is required for the successful evaluation of return and onward migration. Such a framework has been loosely articulated by DaVanzo and Morrison (1981) and Grant and Vanderkamp (1986) based upon the role of location specific capital, imperfect information and disappointment with the initial or primary migration. It may emerge that the initial migration was sub-optimal, prompting a further migration. Since the home region is familiar to the potential migrant and the relative costs of a return migration are less, migration back to the home region is more likely. In such instances, return migration is a 'corrective' move, guided by superior information about a familiar area.

While return and onward migration have received considerable attention, there is little direct evidence supporting the disappointment hypothesis. By constructing a measure of disappointment based on 'expected' income, Grant and Vanderkamp (1986) hypothesized that return migrants would be more strongly affected by disappointment than onward migrants. Their results indicated that a disappointing income experience during the initial migration was an important, *but not necessary*, determinant of return migration. Although the disappointment hypothesis provides a rational framework within which return migration can be modelled, the results to date are incomplete and tentative. It is

also likely that changes in the economic environment of the adopted province, unexpected changes in employment location or in the features of an individuals life-cycle (such as the death of a spouse) and/or changes in personal attributes (such as a change in education status) may prompt a repeat migration. Finally, it is unclear how return migrants respond to economic opportunities and the physical environment relative to onward migrants. For example, is the likelihood of return migration increased by high employment growth in the province of birth? Similarly, do return migrants exhibit a distance decay function similar to onward migrants? Questions such as these have not yet been fully answered.

2.6 CONCLUSIONS

Our interest in interprovincial migration cannot neglect existing theories and empirical findings. This chapter has therefore presented a review of the existing migration literature, focusing on theory and determinants of migration. Migration studies have evolved from the conceptualization of migration as defined by a gravity model towards the placement of migration within a larger social background which recognizes individual behaviour.

Returning to Courchene's statement that migration is an economic event, there is still no doubt of this. But, one must question to what extent this is true, and how the existence of personal attributes and other non-economic variables

moderate economic effects. Although the determinants, consequences and temporal patterns of migration have been the focus of previous research efforts, the evolution of migration research is on-going. The greater reliance upon micro-level models has opened new avenues of research and allowed greater attention to non-economic variables and personal attributes, broadening our understanding of the migration process.

The variety of theoretical frameworks available, the nature of the data set at hand and the range of questions to be addressed throughout this study implies that the setting of migration within a theoretical framework is unclear. At the aggregate level, it is likely that migrants will behave as posited by the macro-adjustment model. While the macro-adjustment model and economic rationality are powerful in the normative context, the behaviourial approach allows an understanding of individual decision making along with the identification of regularities in actual, not optimal, behaviour.

Yet, as has already been discussed, neither of these frameworks alone provide a completely suitable vehicle for the analysis of migration. Both have shortcomings which are not easily rectified. Since it is implicitly recognized that micro theories start with the individual but that they aggregate to the general (macro) level for homogenous populations, it is argued that the distinction between the micro and macro approaches has blurred, although the nomenclature provides a useful but somewhat broad classification framework.

The synthesis of macro and micro approaches therefore provides a potentially more flexible and unified conceptual framework for migration analysis while maintaining a positivistic framework. Such a structure allows interaction between large-scale socio-economic landscapes (i.e. provinces) and the individual. Cadwallader (1992), for instance, constructed a theoretical schema for linking the macro and micro approaches, whereby objective variables (macro-observable variables) which are linked to subjective variables (individual perceptions) inform the utility function which is translated into migration behaviour.

It is the belief that the separation of interprovincial migration into its three component flows is an important step in understanding migration. There is also a need to re-orient our attention towards a clearly focused concern over who return and onward migrants are and why they move, with careful control of the migrant's background. More specifically, there would appear to be a shortage of research within (i) the Canadian context, (ii) in terms of the spatial components of primary, return and onward migration and (iii) the temporal components of primary, return and onward migration.

The following study addresses these shortfalls and provides a link with previous work. While the initial work is comparable to American studies, the application of similar methods and techniques provides a bridge between Canadian and American migration systems. Moreover, the existing area of research is extended via the application of a suitable multivariate model in order

to provide a substantive explanation of return and onward migration. Chapter 3 provides a characterization and description of primary, return and onward migration rates over 1976-81 and chapter 4 considers the changing patterns between 1976-81 and 1981-86. Chapters 6 and 7 provide an explanation of return and onward migration using the three-level nested logit model.

ENDNOTES

1. At the macro level, models assuming a one-way relationship between the dependent and independent variables suffer from simultaneity bias, obscuring the true effects of the variables (Muth 1971; Vanderkamp 1971; Fields 1978). For example, if we are interested in assessing the impact of migration on regional labour markets, there is a need to understand the relationship between migration and employment growth. Suppose that there is a strong positive correlation between employment growth in region *j* at time *t* and migration to region *j* at time *t*. It may be assumed that high employment growth attracts migrants but it is impossible to determine whether inmigration generated employment growth (by additions to the labour force) or whether employment growth caused inmigration. Unless independence is assumed, both migration and employment growth will exert simultaneous effects on each other and it is difficult to determine which came first (the classic chicken and egg problem).

2. There is some disagreement over the definition of the actual stages of the life-cycle. As such, definitions must be considered in nominal terms only. Most researchers typically distinguish between married/non-married and the presence or absence of children.

3. Robinson and Tomes (1982) found schooling to be negatively related to outmigration from Quebec amongst the Francophone population.

4. That is, individuals may choose to migrate to regions where their marginal product is lower, yet they receive a greater income.

5. Regional Disparities: The sustained geographic differences in per-capita income, wage rates and/or unemployment (Polese 1981, p. 519).

CHAPTER 3

CHARACTERIZATION OF PRIMARY, RETURN AND ONWARD INTERPROVINCIAL MIGRATION IN CANADA: OVERALL AND AGE-SPECIFIC PATTERNS[1]

3.0 INTRODUCTION

The progress of empirical research depends crucially on the information content and the flexibility of the available real-world data. Unfortunately, most data for migration research are available only in tabulated forms that provide little information on the crucial personal factors and practically no flexibility for reorganizing the data to test specific behaviourial hypotheses. Consequently, rather unsatisfactory round-about methods have often been used for making inferences. For example, to substantiate the theoretically plausible hypothesis that unemployed persons are more migratory than employed individuals, a researcher with an aggregate migration table would usually use the unemployment rate of the origin region as an explanatory variable and expect the sign of the corresponding coefficient to be positive. The empirical research results of such an approach, at least since Lowry (1966), have been rather confusing: frequently the coefficient of the origin unemployment rate was shown to be either not significantly different from zero or significantly negative.

The increasing availability of micro data (those with the unit of observation being either a person or a household) in the last two decades is a promising development for obtaining better insight into the migration process. Such data typically contain information on many personal attributes and are relatively flexible for defining theoretically more meaningful migration variables. Two types of such data are now widely used: **longitudinal** (e.g. the well-known Income Dynamics Panel of the University of Michigan) and **cross-sectional** (e.g. a sample taken from a population census). The former is usually considered to be better than the latter because, with its temporal depth at the individual level, it is particularly helpful for studying the effects of previous migration and employment experiences on current migration propensity, as demonstrated by the research results in the United States since the early 1970s (e.g. Morrison 1971; DaVanzo 1976a, 1978; and Morrison and Davanzo, 1986) and in Canada since the mid-1970s (e.g. Grant and Vanderkamp 1976, 1984). However, the usefulness of longitudinal data files is usually limited by their relatively small sample sizes and sampling frames unrepresentative of the individuals of the whole system. A consequence of the small sample size is that the research results based on longitudinal data have so far revealed very little about the **spatial patterns** of the migration process.

Although lacking temporal depth, the **Public Use Sample (PUS)** of the 1981 Canadian population census is much larger than typical longitudinal data

files and is an unbiased representation of all segments of the Canadian population. It is one of the best cross-sectional micro data files to study how **personal factors** affect the spatial patterns of interprovincial migration. With more than 400,000 individuals in the sample, the PUS allows the evaluation of the effect of a given personal factor on the spatial patterns of migration in the context of other important personal factors and ecological variables (Liaw and Ledent 1988; Liaw 1990). However, the usefulness of the PUS is limited by the fact that the information on most (but fortunately not all) personal attributes is known only at the end of the 1976-81 migration interval.

Based on an application of the nested logit model to the 1981 PUS, Liaw and Ledent (1988) and Liaw (1990) have shown that in the context of the other important personal factors (education and mother tongue) and a set of ecological variables, **nativity** (a personal factor reflecting the previous migration experience since birth) has significant effects on the interprovincial migration patterns of both young adults and the elderly in Canada during the 1976-81 period. Specifically, the *non-natives* (those whose province of residence in 1976 was different from the province of birth) are much more migratory and more likely to migrate in the "wrong" directions than the *natives* and those foreign-born. Among young adults, non-native migrants are less sensitive to the attractions of destination income and employment opportunities than native and foreign-born migrants. Similarly, among the elderly, non-native migrants are less sensitive to the attractions of

housing opportunities at the potential destinations than the other two types of migrants.

It is highly likely, however, that a sharper contrast can be achieved by dividing the non-native migrants into two behaviourially distinct groups: the *return migrants* (those who migrated back to the province of birth) versus the *onward migrants* (those who migrated further to a province which is not the province of birth). The onward migrants would include a high proportion of those searching for "greener pastures over the hill" and would be quite similar to the *primary migrants* (i.e. the native migrants) with respect to their response to the attractions of potential destinations, whereas the return migrants would include a high proportion of those moving in the "wrong" directions. The plausibility of this speculation is strongly suggested by the sharp contrasts of these three types of migrants that are revealed from the data of several American censuses by Long and Hansen (1977), Long (1988 pp. 100-136), and Rogers and Belanger (1990).

The propensities of making these three types of migration may vary in a systematic way with other personal attributes, such as age and education. With respect to age, Long (1988) shows that young children (and by implication their middle aged parents) are more likely to make return interstate migrations and that, contrary to the conventional wisdom, the age-pattern of the propensity of making return interstate migration does not display a "retirement peak", whereas the propensities of making primary and onward migrations clearly do. With

respect to education, he further shows that the propensities of making primary and onward interstate migrations increase with education, whereas that of making return migration does not.

The purpose of this chapter is to use the PUS of the 1981 Canadian census to reveal some general properties of the primary, return and onward migration flows among the provinces in Canada -- not only for the total population but also for separate age groups. Since we adopt the same measures of migration as those used in Long (1988) and Rogers and Belanger (1989), our results are easily comparable with the American ones. Our main finding is that, as far as the major differences and similarities among the three types of migration are concerned, the interprovincial migration process in Canada shares the same set of properties as the interstate and interdivisional migration in the United States. Our work is motivated by the belief that the separation of the three types of migration is an important step toward reconciling theory and reality.

The organization of the chapter is as follows. The data and method of measuring the three types of migrations are described in section 3.1. The overall and age-specific patterns are characterized in sections 3.2 and 3.3, respectively. The differential effects of the three types of migration on population redistribution are studied in section 3.4. A brief concluding discussion is presented in section 3.5. Detailed information on the at-risk populations, group-specific migration rates with their standard errors, and the shares of migration flows by return migrants

are presented in the appendix to chapter 3 (Tables 3.A.1 through 3.A.7).

3.1 DATA AND METHOD

The distinction among the three types of migration from the PUS is based on information on the province of birth and the province of residence in 1976 and 1981. In order to avoid revealing confidential information, Statistics Canada in making available the PUS, retained the geographical coding only at the provincial level and merged Prince Edward Island (the smallest of the ten provinces) with the northern territories into one fictitious geographical unit for the 1976 place of residence. Since the fictitious unit does not make geographical sense, we delete all individuals whose places of birth or of residence are located in it. We also deleted all individuals (mostly immigrants) whose places of birth or residence in 1976 are located outside of Canada. The remaining number of individuals in the sample is 363,297 persons.

An individual is defined as an interprovincial migrant if the province of residence differs between 1976 and 1981. It is well-known that this definition results in the under-counting of both migrants and migrations. Since the propensity to migrate again declines with the duration of stay (Morrison 1971), the under-counting problem tends to be more serious among return and onward migrants.

To measure the propensities of leaving and entering a province, we define the out- and inmigration rates by dividing the province's numbers of out- and inmigrants by the corresponding **at-risk** populations, respectively (Long 1988, p. 116).[2] The at-risk population for computing each of the three types of outmigration rate from province X is as follows:

- for **primary** outmigration, it is the number of persons born in province X and residing in province X in 1976;
- for **return** and **onward** outmigrations, it is the number of persons residing in province X in 1976 and born in one of the remaining eight provinces in Canada.

The at-risk population for each of the corresponding types of inmigration rate is as follows:

- for **primary** inmigration, it includes all persons born in the remaining eight provinces and residing in their province of birth in 1976;
- for **return** inmigration, it is the number of persons born in province X and residing in the remaining eight provinces in 1976;
- for **onward** inmigration, it is the number of persons born in the remaining eight provinces and residing in neither province X nor their province of birth in 1976.

Note that the inmigration rates of province X are really the destination-specific outmigration rates of the rest of the system, with the destination being province

X.

Although the inmigration rates defined here do not easily lead to the computation of net migration rates for evaluating the net effects of migration on population redistribution, they are the proper measures of the **propensity** to inmigrate, whereas the conventional "inmigration rate" obtained by dividing the number of inmigrants by the destination population size is not. According to Davanzo (1976b), the latter should be more properly termed "the population growth rate due to inmigration". An important advantage of the former is that they allow the researcher to reveal whether a large return inmigration flow into an economically depressed region (e.g. West Virginia in the U. S.) is due to the inability of most of the previous outmigrants from the region to adjust to the new milieu of the destination or simply due to the large stock of them residing in the rest of the system (Long 1988, p. 121).

Finally, to assess the **effects** of the three types of migration on population redistribution, we also follow Long's approach by computing the net flows (i.e. the inflow minus the outflow) for each type of migration.

3.2 INTERPROVINCIAL PRIMARY, RETURN AND ONWARD MIGRATION RATES: OVERALL PATTERNS

With respect to the at-risk population in 1976, 85.5 percent were natives

and 14.5 percent were non-natives. Although the non-natives represented a small proportion of the at-risk population, they contributed 44 percent of the total number of migrants. For the whole system, the overall outmigration rate was 5.1 percent, which was a weighted average of: a low primary outmigration rate of only 3.4 percent, a high return outmigration rate of 8.3 percent and a high onward outmigration rate of 7.2 percent. Thus, with an outmigration rate of 15.5 percent (8.3+7.2), the non-natives were more than four times as migratory as the natives. For a non-native migrant, the probability of making a return migration was somewhat greater than that of making an onward one.

From the origin-specific outmigration rates in Table 3.1, we observe that the return and onward outmigration rates were substantially higher than the corresponding primary outmigration rates in every province. Thus, the mobility differential between the non-natives and natives is a very general phenomenon. However, the non-natives' stronger propensity to make return migration than their propensity to make onward migration is observed only in the four provinces with larger populations.

Both return/primary and onward/primary ratios in Table 3.1 were relatively large in the French-speaking province of Quebec and the economically depressed provinces of the Atlantic region (Newfoundland, Nova Scotia and New Brunswick). It seems that the dominance of the French language and the lack of economic opportunities had particularly strong push effects on the non-natives.

Table 3.1
Provincial Outmigration Rates Based on Nativity, 1976-1981 (%)

Province	Primary (1)	Return (2)	Return/ Primary (3)	Onward (4)	Onward/ Primary (5)
Nfld.	5.0	19.0	3.8	19.7	3.9
N.S.	5.0	11.6	2.3	13.3	2.6
N.B.	4.4	12.5	2.9	13.1	3.0
Quebec	2.0	13.0	6.4	8.3	4.1
Ontario	3.4	7.0	2.1	5.6	1.7
Manitoba	6.7	11.0	1.6	14.1	2.1
Sask.	6.1	10.5	1.7	10.9	1.8
Alberta	4.1	9.0	2.2	8.0	1.9
B.C.	3.3	5.4	1.7	4.2	1.3
Canada	3.4	8.3	2.4	7.2	2.1

Note: (3) = (2)/(1); (5) = (4)/(1).

Table 3.2
Provincial Inmigration Rates Based on Nativity, 1976-81 (%)

Province	Primary (1)	Return (2)	Return/ Primary (3)	Onward (4)	Onward/ Primary (5)
Nfld.	0.03	8.9	296.0	0.09	3.0
N.S.	0.11	8.1	73.8	0.45	4.1
N.B.	0.11	7.6	68.6	0.32	2.9
Quebec	0.20	7.2	36.1	0.30	1.5
Ontario	1.04	13.1	12.6	2.34	2.3
Manitoba	0.15	4.3	28.4	0.52	3.5
Sask.	0.18	4.4	24.5	0.50	2.8
Alberta	1.34	10.6	7.9	3.02	2.3
B.C.	0.80	16.6	20.7	2.86	3.6
Canada	0.42	8.5	20.2	1.00	2.4

Note: (3) = (2)/(1); (5) = (4)/(1)

We also see in Table 3.1 that British Columbia, where as high as 39 percent of the at-risk population was non-native, had the lowest onward/primary ratio (1.3). Thus, similar to California (Long 1988, p. 117-119) and the Pacific division (Rogers and Belanger 1990) in the United States, British Columbia showed that the Pacific coast could be called the "end of line" in the migration system.

To the extent that the primary and onward migrants are positively selective whereas the return migrants are negatively selective, we may suspect that in terms of the variation among the provinces, the primary outmigration rate is more highly correlated with the onward outmigration rate than with the return outmigration rate. This was indeed the case: the simple correlation coefficients were 0.61 and 0.23, respectively. For the outmigration rates of the states of the United States, the corresponding values were 0.28 and 0.06 (Long 1988, p. 120).

From the inmigration rates in Table 3.2, we see that the attractiveness of every province was (1) strongest for its native sons/daughters residing in the rest of Canada and (2) weakest for those people residing in their own province of birth. The return/primary ratio had particularly large values in the three Atlantic provinces where high unemployment has been a chronic problem. These high values resulted from the combination of the region's **very weak** ability to attract primary migrants from the rest of the country and a **moderately high** propensity of its native sons/daughters to return. Thus, for the economically backward

region, the shortage of inmigrants was almost totally due to its inability to appeal to the natives of other regions.

The inmigration rates in Table 3.2 also reveal that it is not true that a very high proportion of the Atlantic region's previous outmigrants had failed to adjust to the new life at the destination and then became return migrants, although its inmigration flow consisted of a high proportion of return migrants.[3] With respect to these aspects of return inmigration, the Atlantic region in Canada is similar to the economically backward state of West Virginia in the United States (Long 1988, p. 121).

In addition to being the "end of line" in the migration system, British Columbia, with the highest return inmigration rate among all provinces (16.6 percent), displayed the strongest ability to "recapture" its natives. This is another property similar to that of California in the United States (Long 1988, p. 121).

In terms of the variation among provinces, the primary inmigration rate was more strongly correlated with the onward inmigration rate ($r=0.96$) than with the return inmigration rate ($r=0.68$). However, for the interstate system in the United States, the opposite was observed: the corresponding simple correlations were 0.62 and 0.69, respectively (Long 1988, p. 120).

In general, our result confirms that "the three rates of inmigration tend to be more highly correlated than the three rates of outmigration" (Long 1988, p. 120). This difference suggests that "growing areas rather uniformly attract --

and declining areas repel -- migrants with a variety of migratory backgrounds, but areas seem less consistently to send their natives and previous inmigrants to other locations" (Long 1988, p. 121).

3.3 INTERPROVINCIAL PRIMARY, RETURN AND ONWARD MIGRATION RATES: AGE PATTERNS

The two main questions we wish to deal with in this section are the following. First, are the three types of out- and inmigration **schedules** (i.e. the age patterns of migration rates) similar to, or different systematically from, the typical migration schedules such as those shown in Liaw and Nagnur (1985)? The typical form consists of (1) a decline from a moderately high level in early childhood to a low level in the early teens, (2) a very sharp increase in the late teens to a very high maximum in the early 20s, (3) a persistent decline at a decreasing rate toward the long stretch of low levels between the late 40s and the late 50s, and finally (4) a minor "retirement" peak around age 60 (for females) or 65 (for males) if the migration is from expensive and congested metropolitan areas toward places with low living cost and high amenity. Beyond age 75, there may be another slight increase in migration levels associated with the increased need for assistance (Rogers 1988).

Second, do the **spatial patterns** of the three types of out- and

inmigration rates vary with age in some regular manner? An analysis of the age-specific annual migration matrices of an eight-region population system of Sweden revealed (1) that the spatial patterns of migration tend to be highly similar between successive age groups, (2) that a relatively large change in spatial patterns happens between the early and late teens, (3) that the spatial pattern of the late teens is different from most other age groups, and (4) that the spatial pattern of an elderly age group is most different from those of the late teens and early 20s (Liaw 1985).

In order to avoid irregularities due to small at-risk population and to capture the underlying major changes in age pattern, we use the following ten age groups: five-year age groups from 5-9 to 30-34, ten-year age groups from 35-44 to 55-64, and the 65+ age group. Although such age groups are not helpful for detecting the retirement peak and the rise of migration level associated with old dependency, they can help reveal the basic shape of a migration schedule quite well. Note that since age is defined here as of the end of the five-year migration period, the average age of migration of the 15-19 age group at the time of migration was only about 15 -- an age before the graduation from high school. Therefore, the sharp rise as well as the labour force peak may both be found in the 20-24 age group.

In studying the shapes of migration schedules, our attention is focused on the four most populous provinces, because their rates tend to be more

reliable. From the migration point of view, these four provinces are rather different. Quebec has been a chronic net loser, mainly because of its persistent inability to attract migrants of non-French speakers from the rest of the country. Ontario, the country's economic heartland, shifted from being a major net gainer for many decades to being a net loser in 1976-81, because its economic base was severely affected by the 1973 oil crisis and by the general decline of the North American automobile industry. Alberta, frequently a beneficiary in the general westward net drift of migrants in Canada, experienced substantial increase in its net gain in 1976-81 as the rapid expansion in the energy industry created many new jobs for young adults. British Columbia, with its rich natural resources, mild climate and scenic environment, has experienced substantial net migration for many decades.

We learn from the out- and inmigration schedules of the four most populous provinces in Figures 3.1 and 3.2 the following three main features. First, the **primary** migration schedules tended to be relatively similar to the typical schedule described above. Among the eight primary migration schedules, the outmigration schedule of British Columbia and the inmigration schedule of Alberta appeared to be most similar to the typical schedule.

Second, the **return** migration schedules tended to have a sharply uplifted migration level for young children (surpassing the labour force peak in most cases) and a shift of the labour force peak from the early 20s to the late 20s

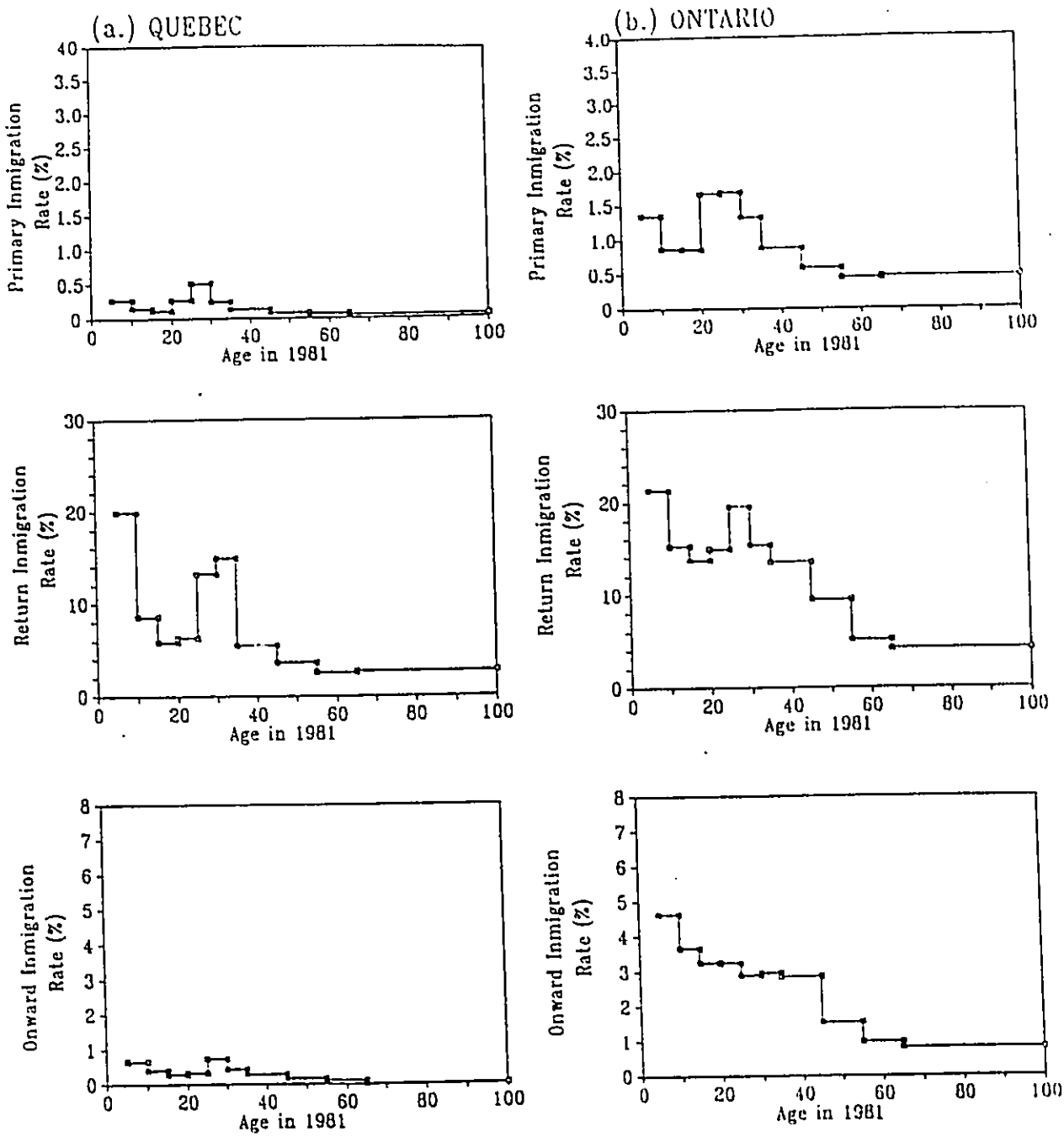


Figure 3.1 The Age Patterns of Primary, Return and Onward Outmigration Rates in the Four Most Populous Provinces in Canada: 1976-81

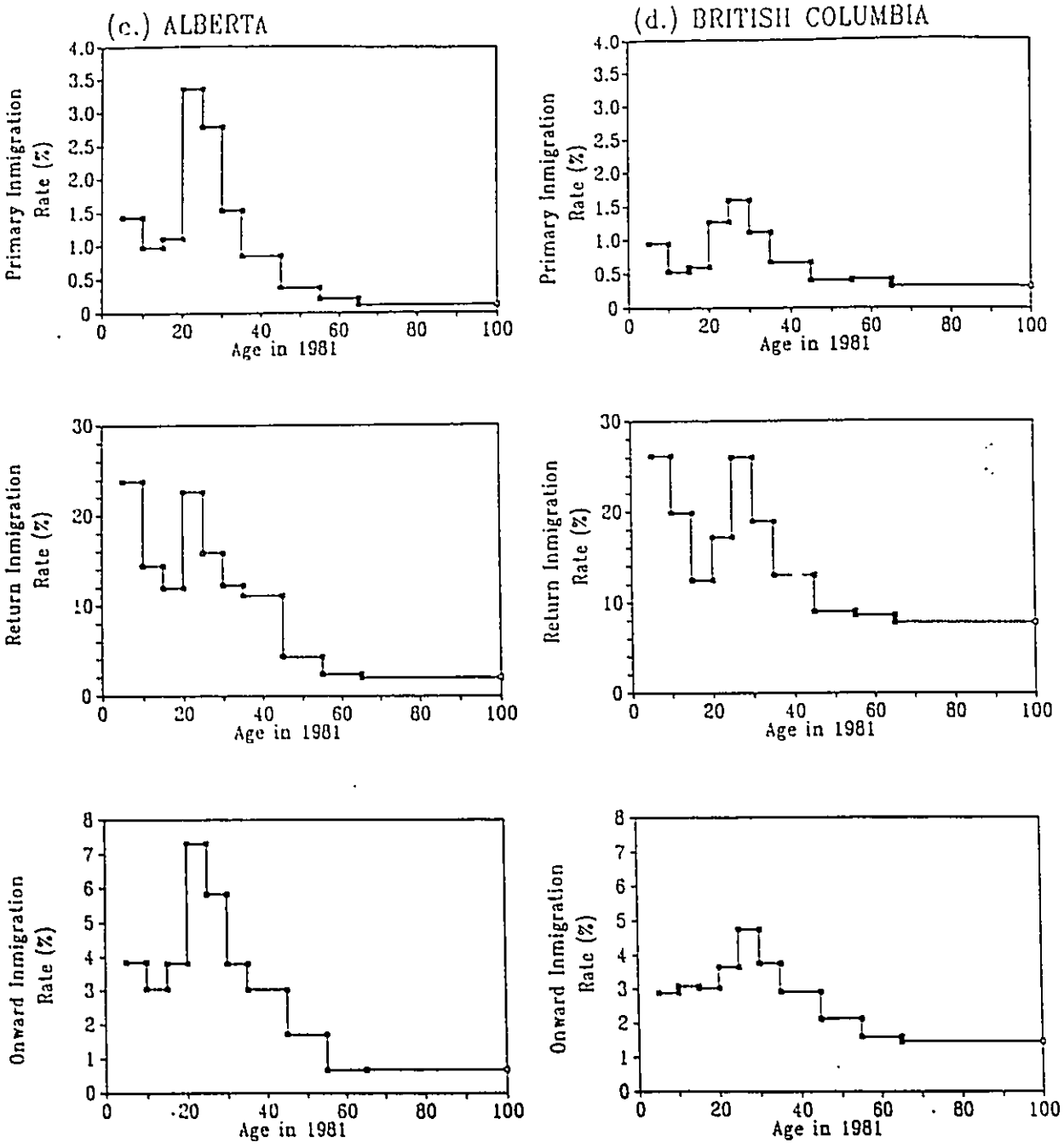


Figure 3.1 (Continued)

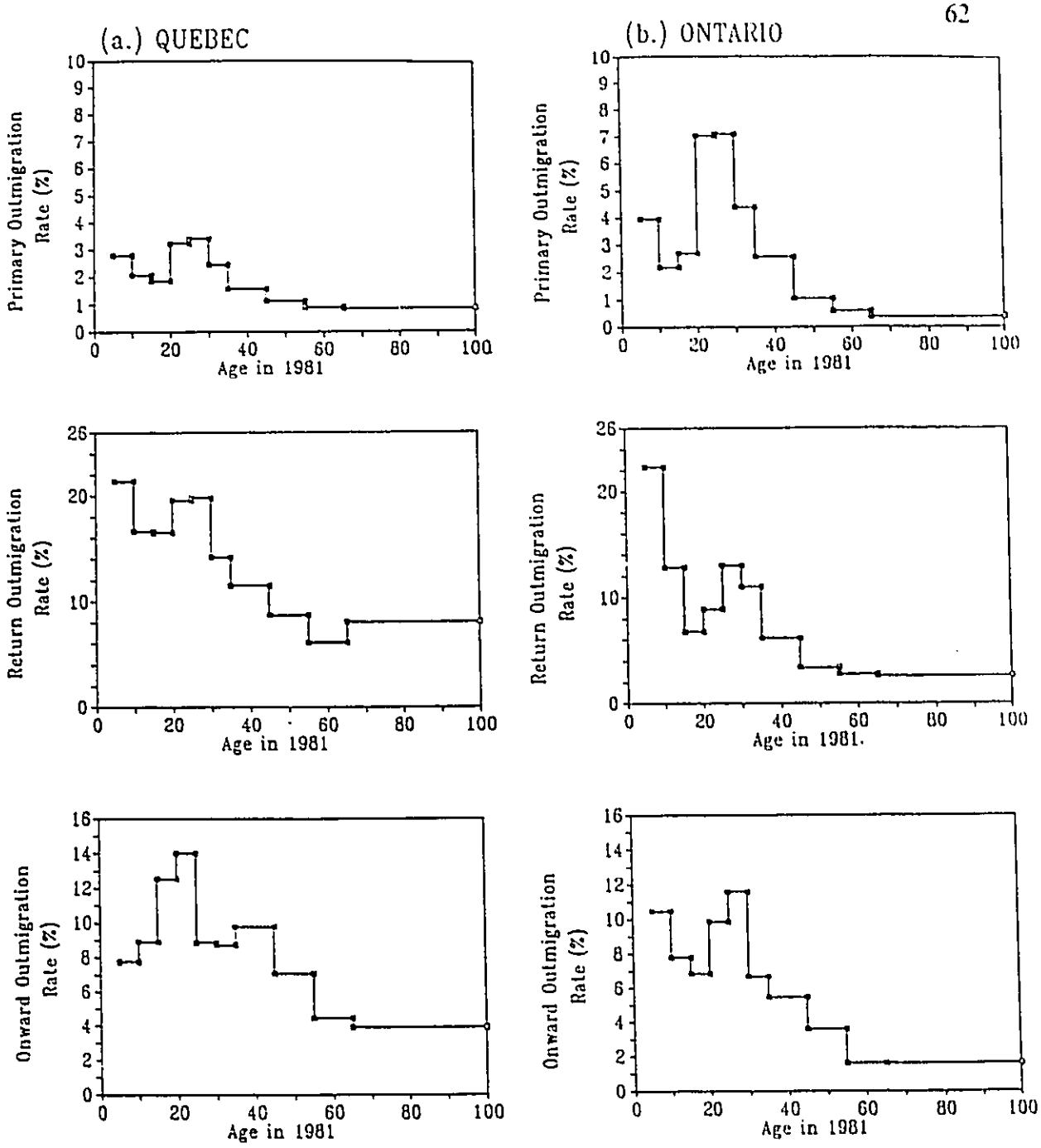


Figure 3.2 The Age Patterns of Primary, Return and Onward Inmigration Rates in the Four Most Populous Provinces in Canada: 1976-81

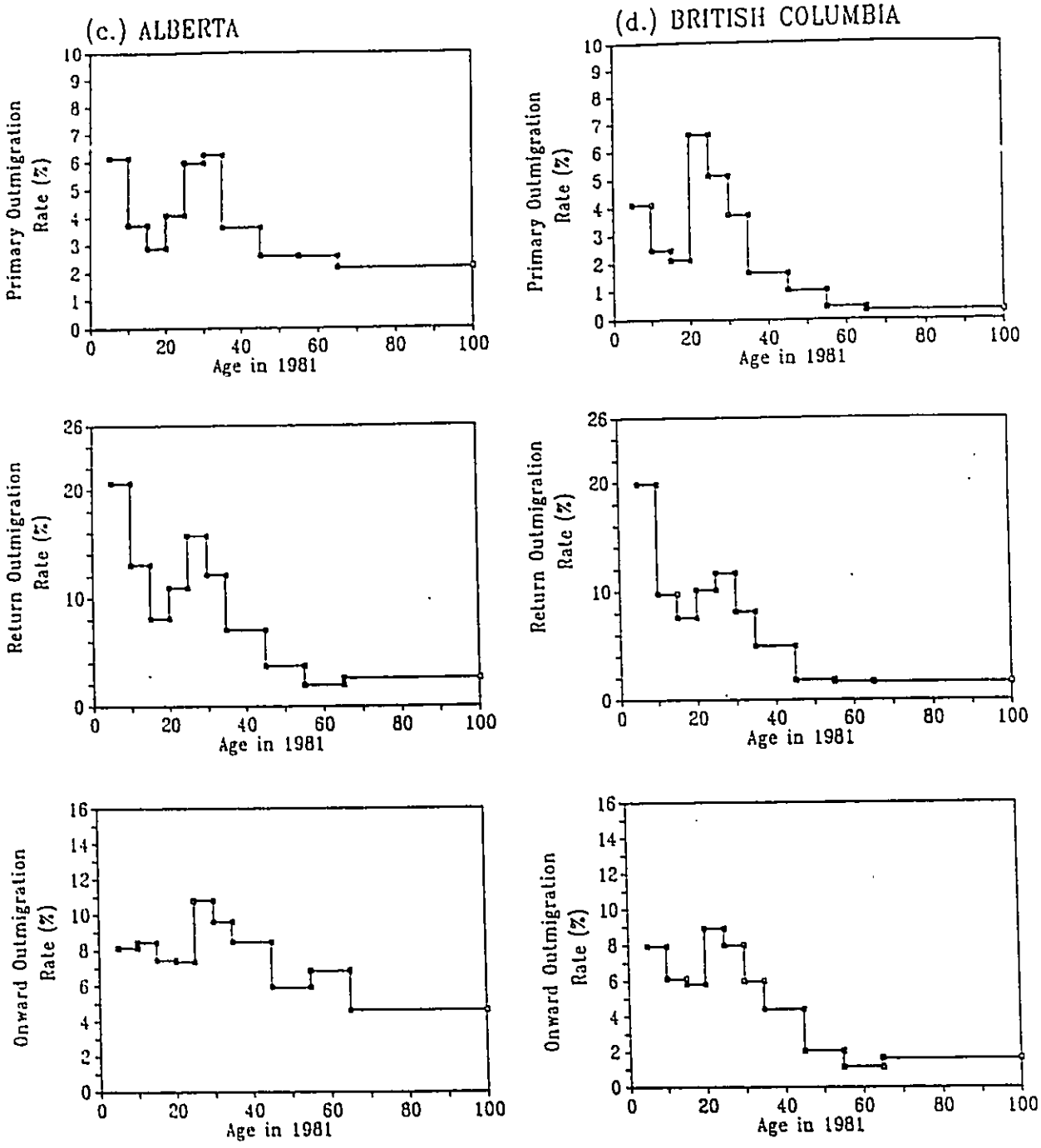


Figure 3.2 (Continued)

or even the early 30s (e.g. the inmigration schedule of Quebec). These properties were also clearly displayed by the interstate and interdivisional return migrations in the United States (Long 1988, p. 131; Rogers and Belanger 1990). They suggest that middle-aged individuals with dependent children have relatively strong propensities to make return migrations.

Third, the shapes of the **onward** migration schedules varied greatly among the provinces; the onward inmigration schedule of Ontario even lost the labour force peak completely! Since the at-risk populations for the onward rates were either identical to or much larger than those for the corresponding return rates, the large interprovincial variation in onward rates could not be easily dismissed as a fluke. At this stage, we do not have a plausible explanation.

To study the similarity between age groups of the spatial patterns of each type of out- and inmigration rates, we compute the weighted correlation coefficients for each pair of age groups, with the weights being the at-risk populations. The reason for using these weights is that some of the age-specific rates of the smaller provinces may have unreliably large values which, if unweighted, would yield a misleading index of similarity.

From the correlation coefficients in Tables 3.3 and 3.4, we can make the following general observations. First, the spatial variations in each type of migration rates tended to be similar between **successive** age groups. This tendency was particularly strong for primary and onward inmigration rates but

Table 3.3
Weighted Correlation Coefficients of Age-Specific Outmigration Rates: Canada, 1976-81

Given Age Group	Correlation of Given Age Group with: Next Younger Age Group	Next Older Age Group	Most Similar Age Group		Least Similar Age Group		All Ages Pooled
			Primary Outmigration				
05-09	---	0.94	0.97	(30-34)	0.54	(65+)	0.91
10-14	0.94	0.73	0.94	(05-09)	0.60	(20-24)	0.85
15-19	0.94	0.91	0.95	(25-29)	0.34	(65+)	0.93
20-24	0.73	0.92	0.92	(25-29)	0.15	(65+)	0.90
25-29	0.91	0.90	0.95	(15-19)	0.26	(65+)	0.95
30-34	0.92	0.98	0.98	(35-44)	0.51	(65+)	0.97
34-44	0.90	0.81	0.98	(30-34)	0.56	(65+)	0.95
45-54	0.98	0.90	0.90	(55-64)	0.36	(20-24)	0.70
55-64	0.81	0.94	0.94	(65+)	0.34	(20-24)	0.58
65+	0.90	---	0.94	(55-64)	0.15	(20-24)	0.43
			Return Outmigration				
05-09	---	0.46	0.46	(10-14)	-0.33	(25-29)	-0.10
10-14	0.46	0.63	0.76	(30-34)	0.46	(05-09)	0.82
15-19	0.46	0.88	0.90	(65+)	-0.09	(05-09)	0.78
20-24	0.63	0.76	0.88	(15-19)	-0.32	(05-09)	0.79
25-29	0.88	0.92	0.92	(30-34)	-0.33	(05-09)	0.93
30-34	0.76	0.88	0.92	(25-29)	-0.05	(05-09)	0.92
34-44	0.92	0.92	0.92	(45-54)	-0.17	(05-09)	0.94
45-54	0.88	0.84	0.92	(35-44)	-0.06	(05-09)	0.96
55-64	0.92	0.89	0.89	(65+)	0.13	(05-09)	0.73
65+	0.84	---	0.90	(15-19)	0.28	(05-09)	0.72
			Onward Outmigration				
05-09	---	0.72	0.92	(25-29)	-0.19	(55-64)	0.78
10-14	0.72	0.86	0.91	(35-44)	0.23	(65+)	0.84
15-19	0.72	0.78	0.95	(35-44)	0.29	(55-64)	0.89
20-24	0.86	0.84	0.85	(30-34)	-0.13	(55-64)	0.84
25-29	0.78	0.90	0.92	(05-09)	0.05	(55-64)	0.89
30-34	0.84	0.89	0.90	(25-29)	0.24	(55-64)	0.97
34-44	0.90	0.77	0.95	(15-19)	0.46	(55-64)	0.95
45-54	0.89	0.40	0.81	(30-34)	0.40	(55-64)	0.87
55-64	0.77	0.89	0.89	(65+)	-0.19	(05-09)	0.37
65+	0.40	---	0.89	(55-64)	-0.09	(05-09)	0.49

Table 3.4
Weighted Correlation Coefficients of Age-Specific Inmigration Rates: Canada, 1976-81

Given Age Group	Correlation of Given Age Group with: Next Younger Age Group	Next Older Age Group	Most Similar Age Group		Least Similar Age Group		All Ages Pooled
			Primary Outmigration				
05-09	---	0.99	0.99	(10-14)	0.75	(65+)	0.99
10-14	0.99	0.99	0.99	(15-19)	0.70	(65+)	0.99
15-19	0.99	0.97	0.99	(10-14)	0.67	(65+)	1.00
20-24	0.97	0.98	0.98	(25-29)	0.49	(65+)	0.97
25-29	0.98	0.98	0.99	(15-19)	0.61	(65+)	0.99
30-34	0.98	1.00	1.00	(35-44)	0.76	(65+)	0.99
34-44	1.00	0.97	1.00	(30-34)	0.82	(65+)	0.98
45-54	0.97	0.96	0.97	(35-44)	0.77	(20-24)	0.91
55-64	0.96	0.97	0.97	(65+)	0.62	(20-24)	0.79
65+	0.97	---	0.97	(55-64)	0.49	(20-24)	0.69
			Return Outmigration				
05-09	---	0.36	0.60	(25-29)	0.27	(30-34)	0.51
10-14	0.36	0.83	0.89	(25-29)	0.36	(05-09)	0.89
15-19	0.83	0.85	0.96	(35-44)	0.53	(05-09)	0.91
20-24	0.85	0.64	0.85	(15-19)	0.29	(65+)	0.74
25-29	0.64	0.78	0.93	(55-64)	0.60	(05-09)	0.95
30-34	0.78	0.77	0.82	(45-54)	0.27	(05-09)	0.86
34-44	0.77	0.93	0.96	(15-19)	0.43	(05-09)	0.96
45-54	0.93	0.86	0.93	(35-44)	0.32	(05-09)	0.94
55-64	0.86	0.91	0.93	(25-29)	0.43	(20-24)	0.88
65+	0.91	---	0.91	(55-64)	0.29	(20-24)	0.75
			Onward Outmigration				
05-09	---	0.97	0.97	(10-14)	0.78	(55-64)	0.93
10-14	0.97	0.97	0.98	(35-44)	0.85	(20-24)	0.96
15-19	0.97	0.94	0.99	(35-44)	0.84	(55-64)	0.99
20-24	0.94	0.96	0.96	(25-29)	0.67	(55-64)	0.93
25-29	0.96	0.98	0.98	(30-34)	0.82	(55-64)	0.98
30-34	0.98	0.99	0.99	(35-44)	0.90	(55-64)	1.00
34-44	0.99	0.98	0.99	(30-34)	0.89	(55-64)	0.99
45-54	0.98	0.95	0.99	(30-34)	0.86	(20-24)	0.99
55-64	0.95	0.99	0.99	(65+)	0.67	(20-24)	0.89
65+	0.99	---	0.99	(55-64)	0.70	(20-24)	0.91

relatively weak for the return and onward outmigration rates as well as the return inmigration rate.

Second, for both **primary** and **onward** migration rates, one of the elderly age groups (55-64 or 65+) tended to display the least similarity to most of the other age groups. This tendency was particularly strong for the onward outmigration rates.

Third, for **return** migration rates, the youngest dependent age group tended to display the least similarity to most of the other age groups. Paradoxically, this tendency held true even for the 30-34 and 35-44 age groups in which most of the parents were to be found. This result suggests that within the parental age groups, individuals without children tended to migrate rather differently from those with children.

Finally, from the column showing the correlation coefficient with the least similar age group, we see that, for each of the three types of migration rates, the spatial patterns of the age-specific outmigration rates tended to vary with age in a more drastic way than those of the age-specific inmigration rates. For return and onward outmigration rates, some coefficients even turned out to be negative.

3.4 DIFFERENTIAL EFFECTS OF PRIMARY, RETURN AND ONWARD MIGRATIONS

Now we shift our focus to the differential effects of the three types of migration on population redistribution. The effects are measured by the volumes of net migration shown in Table 3.5 for all ages pooled and for separate age groups. Since the PUS is a two-percent sample of the 1981 census, the values in the table should be magnified roughly by a factor of 50 to reflect actual magnitudes.

The first panel of Table 3.5 reveals the following properties. First, the interprovincial variation in **total** net migration was determined mainly by the variation in the **primary** net migration; Alberta and British Columbia were the clear gainers and all other provinces were clear losers. Second, the **return** net migration tended to have a sign opposite to that of the primary net migration and hence cancel out part of the primary effect; Alberta and British Columbia were clear losers in return migration. Third, the **onward** net migration tended to be similar to the primary net migration and hence to reenforce the primary effect; Alberta and British Columbia were again the clear gainers at the expense of all other provinces. These three properties are identical to those revealed from the interdivisional migration data of all American census since 1940 (see Rogers and Belanger, 1990, who expanded the earlier findings by Long and Hansen, 1977

Table 3.5
Net Primary (PR), Return (RE) and Onward (ON) Migration by Province and Age: Canada, 1976-81

	Total	PR	RE	ON	Total	PR	RE	ON	Total	PR	RE	ON
	All Ages				Ages 20-24				Ages 45-54			
Nfld.	-338	-399	107	-46	-124	-129	13	-8	-4	-9	7	-2
N.S.	-247	-304	114	-57	-110	-84	-8	-18	6	-6	14	-2
N.B.	-115	-127	72	-60	-106	-80	1	-27	11	0	10	1
Que.	-2144	-1714	-127	-303	-436	-325	-54	-57	-178	-115	-24	-39
Ont.	-1418	-1311	151	-258	-464	-469	55	-50	-1	24	6	-31
Man.	-656	-479	-25	-152	-112	-80	-6	-26	-48	-24	-4	-20
Sask.	-115	-304	216	-27	-111	-120	8	1	-4	-26	19	3
Alta.	3287	3033	-204	458	1246	1050	33	163	72	56	-11	27
B.C.	1746	1605	-304	445	217	237	-42	22	146	100	-17	63
	Ages 05-09				Ages 25-29				Ages 55-64			
Nfld.	-31	-25	6	-12	-59	-82	35	-12	-5	-10	5	0
N.S.	-37	-32	1	-6	-66	-80	15	-1	17	-1	13	5
N.B.	16	16	1	-1	-56	-52	14	-18	19	1	17	1
Que.	-200	-173	-15	-12	-249	-251	13	-11	-115	-71	-20	-24
Ont.	-141	-170	33	-4	-445	-381	28	-92	6	30	-23	-1
Man.	-64	-55	-3	-6	-141	-111	-8	-22	-19	-19	2	-2
Sask.	41	44	-3	0	9	-58	68	-1	-25	-43	21	-3
Alta.	251	250	-22	23	642	674	-109	77	-4	14	3	-21
B.C.	165	145	2	18	365	341	-56	80	126	99	-18	45
	Ages 10-14				Ages 30-34				Ages 65+			
Nfld.	-21	-19	-2	0	-25	-43	26	-8	-6	-4	-1	-1
N.S.	-9	-13	7	-3	-29	-32	23	-20	7	-12	19	0
N.B.	5	6	-9	8	-1	-4	10	-7	8	-2	11	-1
Que.	-192	-152	-19	-21	-148	-186	60	-22	-104	-65	-19	-20
Ont.	-30	-65	36	-1	-61	9	-36	-34	-757	-757	1	-1
Man.	-44	-32	-3	-9	-84	-58	-1	-25	-9	-18	6	3
Sask.	-7	-2	9	-14	15	-22	36	1	-7	-18	14	-3
Alta.	193	196	-16	13	262	275	-64	51	-2	5	-8	1
B.C.	105	81	-3	27	208	198	-54	64	70	71	-23	22
	Ages 15-19				Ages 35-44							
Nfld.	-57	-47	-7	-3	-6	-31	25	0				
N.S.	-15	-14	-1	0	-11	-30	31	-12				
N.B.	-14	-6	3	-11	3	-6	14	-5				
Que.	-245	-187	-22	-36	-277	-189	-27	-61				
Ont.	-95	-139	52	-8	-93	-56	-1	-36				
Man.	-41	-28	-3	-10	-94	-54	-5	-35				
Sask.	-28	-27	11	-12	2	-32	33	1				
Alta.	365	304	7	54	262	209	-17	70				
B.C.	130	144	-40	26	214	189	-53	78				

Note: Values should be multiplied by a factor of about 50 to reflect actual magnitudes.

and Long, 1988, pp. 127-129).

Two exceptions to the second property were Quebec and Manitoba, both of which experienced net losses from all three types of migration. Quebec's tendency to lose all three types of migrants is particularly worrisome, because its declining share of the Canadian population has been considered by its political leaders as a serious threat to the survival of its French culture.

The remaining panels of Table 3.5 show that the net migration of every age group also displayed the above three general properties. There are several interesting minor variations from the overall pattern. First, the return net migration for Alberta in the 20-24 age group assumed large positive values, which seemed to suggest that the new jobs created by the oil boom was particularly attractive to those in their early 20s. Second, the overall net losses in Nova Scotia and New Brunswick are limited to the age groups younger than 45. The shift to being net gainers for these two Atlantic provinces for the population 45 and over was due mainly to a decrease in the net loss through both primary and onward migrations. Finally, it is somewhat encouraging to see that for the 25-29 and 30-34 age groups Quebec actually experienced positive net return migration, although the losses through the other two types of migrations were too large to allow a balance in overall net migration.

3.5 CONCLUSIONS

By focusing on the Canadian born population, we have shown that although the non-natives represented only 14.5 percent of the at-risk population, they contributed 44 percent to the 1976-81 interprovincial migration, with about one-half being the return type and the other half being the onward type. The four-fold difference in the propensity to migrate between non-natives and natives and the large interprovincial variation in population composition by nativity imply that the place of birth information in the population census is crucial for understanding of the observed migration phenomena. For example, we can now understand why British Colombia could have a moderately high overall outmigration rate, despite the fact that its primary, return and onward outmigration rates were all very low.

Our analysis has revealed that several general properties of primary, return and onward migrations identified for the interstate and interdivisional systems in the United States also exist in the Canadian interprovincial migration system:

- the Pacific coast is the "end of line" in the sense that its previous inmigrants tend to have very low propensities to outmigrate;
- with respect to spatial variation, the primary outmigration rate is more similar to the onward outmigration rate than to the return outmigration

rate;

• previous outmigrants from economically depressed regions do not have very high propensities to make a return inmigration, although they tend to represent a large part of the inflow;

• the Pacific coast, in addition to being the "end of line", has the strongest ability to "recapture" its previous outmigrants;

• the three rates of inmigration tend to be more highly correlated than the three rates of outmigration, suggesting that regions tend to function more consistently as attractors than as senders of migrants;

• among the three types of out- and inmigration schedules, those of primary migration are most likely to have the "typical" shape, whereas those of return migration tend to have an elevated level in the young dependent age groups and a shift of the labour force peak toward the late 20s and the early 30s;

• with respect to the effects on population redistribution, **primary** net migration dominates the overall redistributional potential, whereas the **return** (**onward**) net migration **weakens** (**reenforces**) the effect of the primary net migration.

There are two additional findings we wish to highlight. First, the **onward** out- and inmigration schedules displayed rather different shapes in different regions. The differences can not be easily dismissed as due to random errors,

and at this stage we do not have a plausible explanation for them. Second, the spatial patterns of the age-specific outmigration rates varied with age in a more drastic way than those of the inmigration rates. In other words, with respect to migrants at different stages of life cycle, the provinces tended to function less consistently as senders than as attractors.

Finally, we note that the inmigration rate, though rather concise and illuminating, does not help describe how a migrant chooses one of several potential destinations and hence can not reveal the effects of some important factors like distance. Therefore, it will be replaced by a set of destination choice proportions in the next step of our research. We will also consider the **simultaneous** effects of such important personal factors as the level of education and mother tongue. Since the more comprehensive analysis can no longer be effectively carried out with simple tables and graphs, we will also switch to a multivariate approach using the nested logit model.

ENDNOTES

1. This chapter originally appeared in Canadian Journal of Regional Science. 13(1):17-34.

2. Since both the stayers and migrants in the data are survivors at the end of the migration period, the rates computed from the data are, strictly speaking, conditional on survival.

3. The percentage shares of return migrants in the inmigration flow of the three Atlantic provinces were 58, Newfoundland; 39, Nova Scotia; and 36, New Brunswick. The corresponding shares for Alberta and British Columbia were 10 and 12. (see Appendix A, Tables 3.A.6 and 3.A.7).

CHAPTER 3 APPENDIX

Table 3.A.1
At-Risk Populations Used to Determine Overall Primary, Return and Onward Migration Rates: 1976-81

A) Outmigration

Province	Primary	%	Return	%
Nfld.	9927	3.2	453	0.9
N.S.	12826	4.1	2020	3.8
N.B.	10609	3.4	1598	3.0
Quebec	104166	33.5	5071	9.6
Ontario	103164	33.2	15970	30.3
Manitoba	13747	4.4	2681	5.1
Sask.	13784	4.4	2125	4.0
Alberta	20718	6.7	8784	16.7
B.C.	21656	7.0	13998	26.6
Total	310597		52700	

Note: The at-risk population is identical for both return and onward outmigration

B) Inmigration

Province	Primary	%	Return	%	Onward	%
Nfld.	300670	12.1	2174	4.2	50073	13.5
N.S.	297771	12.0	4288	8.3	46932	12.7
N.B.	299988	12.1	3601	7.0	47501	12.8
Quebec	206431	8.3	7399	14.3	40230	10.9
Ontario	207433	8.3	9639	18.7	27091	7.3
Manitoba	296850	11.9	6341	12.3	43678	11.8
Sask.	296813	11.9	9939	19.2	40636	11.0
Alberta	289879	11.7	5510	10.7	38406	10.4
B.C.	288941	11.6	2751	5.3	35951	9.7
Total	2484776		51642		370498	

Table 3.A.2
At-Risk Populations Used to Determine Age-Specific Primary, Return and Onward Outmigration Rates: 1976-81

Province	Age in 1981									
	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65 +
					Primary Outmigration					
Nfld.	1081	1154	1194	1130	970	840	1146	843	767	802
N.S.	1212	1219	1433	1359	1134	1064	1544	1243	1205	1413
N.B.	1062	997	1207	1180	1047	902	1206	962	965	1081
Quebec	8431	9013	11595	12154	10497	9310	13867	11472	9252	8575
Ontario	11199	11200	12991	12551	10320	8315	10767	9230	8334	8257
Manitoba	1481	1383	1601	1553	1348	1097	1460	1239	1318	1267
Sask.	1257	1399	1653	1620	1323	1024	1494	1510	1432	1072
Alberta	2612	2480	2819	2712	2215	1599	2102	1817	1433	929
B.C.	3047	2902	3019	3008	2295	1931	2091	1350	1117	896
Total	4128	4056	4213	4138	3265	2771	3237	2193	1884	1698
					Return Outmigration					
Nfld.	62	72	66	38	61	53	45	25	16	15
N.S.	112	166	210	215	215	229	308	205	177	183
N.B.	103	154	187	175	184	152	215	141	150	137
Quebec	271	337	351	485	464	459	817	679	672	536
Ontario	420	694	1020	1218	1485	1736	2928	2530	2272	1667
Manitoba	123	188	213	261	284	294	398	362	303	255
Sask.	166	177	191	217	208	195	246	181	168	376
Alberta	344	567	644	841	1238	1038	1459	1147	818	688
B.C.	277	606	930	1019	1253	1358	2203	2148	2179	2025
Total	339	678	996	1057	1314	1411	2248	2173	2195	2040

Note: The at-risk population is identical for both return and onward outmigration.

Table 3.A.3
At-Risk Populations Used to Determine Age-Specific Primary, Return and Onward Inmigration Rates: 1976-81

Province	Age in 1981 5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
					Primary Inmigration					
Nfld.	30301	30593	17848	36137	30179	25242	34531	28823	25056	23490
N.S.	30170	30528	36079	35908	30015	25018	34133	28423	24618	22879
N.B.	30320	30750	36305	36087	30102	25160	34471	28704	24858	23211
Quebec	22951	22734	25917	25113	20652	16722	21810	18194	16571	15717
Ontario	20183	20547	24521	24716	20829	17767	24910	20436	17489	16035
Manitoba	29901	30364	35911	35714	29801	24985	34217	28427	24505	23025
Sask.	30125	30348	35859	35647	29826	25058	34183	28156	24391	23220
Alberta	28770	39267	34693	34555	28934	24483	33575	27849	24390	23363
B.C.	28335	28845	34493	34259	28854	24151	33586	28316	24706	23396
Total	58636	59438	52341	70396	59033	49393	68117	57139	49762	46886
					Return Inmigration					
Nfld.	80	85	67	190	286	311	408	274	227	200
N.S.	126	176	277	317	435	489	905	631	483	449
N.B.	82	128	214	215	347	475	748	559	462	371
Quebec	216	431	615	649	798	839	1214	957	808	872
Ontario	595	819	882	1093	113	1009	1322	971	776	1039
Manitoba	169	267	413	434	523	559	973	969	990	1044
Sask.	133	317	467	585	888	905	1678	1912	1892	1162
Alberta	206	402	493	552	542	505	772	740	799	499
B.C.	218	282	241	355	346	296	430	245	210	128
Total	298	367	308	545	632	607	838	519	437	328
					Onward Inmigration					
Nfld.	1736	2804	1834	4241	5063	5150	8166	7119	6512	5667
N.S.	1640	2619	3325	3937	4742	4796	7406	6582	6095	5250
N.B.	1693	2679	3411	4079	4861	4887	7656	6718	6143	5374
Quebec	1391	2193	2846	3335	4130	4216	6588	5782	5275	4474
Ontario	863	1448	1910	2158	2774	2769	4369	3917	3707	3176
Manitoba	1586	2506	3186	3774	4585	4661	7248	6087	5462	4583
Sask.	1579	2467	3154	3667	4296	4414	6695	5325	4695	4344
Alberta	1328	1992	2675	3076	3612	3971	6388	5531	5138	4695
B.C.	1383	2073	2641	3095	3793	3860	5986	5025	4366	3729
Total	3119	4877	4475	7336	8856	9010	14152	12144	10878	9396

Table 3.A.4
Provincial Outmigration Rates Based on Nativity by Age: Canada, 1976-81

A) Primary Outmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	4.90	2.60	4.69	12.57	10.41	5.83	3.32	---	---	---
	1.29	0.92	1.20	1.93	1.92	1.58	1.04			
N.S.	6.60	4.18	3.98	11.18	12.61	6.11	3.50	1.29	1.13	---
	1.40	1.12	1.01	1.68	1.93	1.44	0.92	0.63	0.55	
N.B.	3.86	2.61	4.47	10.93	10.12	4.55	3.48	1.04	---	---
	1.16	0.99	1.17	1.78	1.83	1.36	1.03	0.64		
Que.	2.80	2.06	1.86	3.23	3.40	2.44	1.56	1.13	0.90	0.85
	0.35	0.29	0.25	0.31	0.35	0.31	0.21	0.19	0.19	0.19
Ont.	3.96	2.18	2.70	7.03	7.10	4.38	2.56	1.04	0.59	0.39
	0.36	0.27	0.28	0.45	0.50	0.44	0.30	0.21	0.16	0.13
Mtb.	8.64	5.35	4.62	11.01	14.02	9.85	6.10	3.31	2.05	1.66
	1.43	1.19	1.03	1.56	1.85	1.76	1.23	1.00	0.77	0.70
Sask.	5.57	4.07	4.23	14.75	11.41	7.23	4.62	2.52	3.21	2.15
	1.27	1.04	0.97	1.73	1.71	1.59	1.06	0.79	0.91	0.87
Alta.	6.13	3.71	2.87	4.06	5.96	6.25	3.62	2.59	2.58	2.15
	0.92	0.74	0.62	0.74	0.99	1.19	0.80	0.73	0.82	0.93
B.C.	4.10	2.48	2.12	6.62	5.14	3.73	1.67	---	---	---
	0.70	0.57	0.51	0.89	0.90	0.85	0.55			

Table 3.A.4 (Continued)

B) Return Outmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	—	—	21.21	—	—	21.31	—	—	—	—
			9.86			10.28				
N.S.	16.07	11.45	9.52	14.42	24.19	17.03	10.06	8.29	—	—
	6.80	4.84	3.97	4.70	5.72	4.87	3.36	3.77		
N.B.	21.36	15.28	7.49	10.86	21.20	19.74	13.02	—	—	—
	9.72	5.68	3.77	4.61	5.91	6.33	4.50			
Que.	21.40	16.62	16.52	19.59	19.83	14.16	11.51	8.69	6.10	8.02
	4.88	3.97	3.89	3.53	3.63	3.19	2.19	2.12	1.81	2.30
Ont.	22.38	12.82	6.76	8.87	13.00	11.00	6.15	3.40	2.77	2.58
	3.99	2.49	1.54	1.60	1.71	1.47	0.87	0.71	0.67	0.76
Mtb.	21.95	15.43	9.39	13.03	19.37	14.97	10.80	7.46	—	—
	7.31	5.16	3.92	4.08	4.60	4.08	3.05	2.71		
Sask.	18.07	11.86	8.38	17.51	19.71	13.33	13.41	—	—	—
	5.85	4.76	3.93	5.06	5.41	4.77	4.26			
Alta.	20.64	13.05	8.07	10.94	15.75	12.14	7.06	3.75	1.96	2.62
	4.28	2.77	2.10	2.11	2.03	1.99	1.31	1.10	0.95	1.19
B.C.	19.86	9.74	7.53	10.11	11.65	8.10	4.95	1.82	1.65	1.63
	4.70	2.36	1.70	1.85	1.78	1.45	0.91	0.57	0.53	0.55

Table 3.A.4 (Continued)

C) Onward Outmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	20.97	—	—	39.45	27.87	26.42	—	—	—	—
	10.13			15.54	11.25	11.87				
N.S.	18.75	12.05	13.33	22.79	22.33	20.09	11.69	6.83	—	—
	7.23	4.95	4.60	5.61	5.57	5.19	3.59	3.45		
N.B.	14.56	9.74	14.97	22.86	22.83	14.47	14.42	—	—	—
	6.81	4.68	5.11	6.22	6.06	5.59	4.70			
Que.	7.75	8.90	12.54	14.02	8.84	8.71	9.79	7.07	4.46	3.92
	3.18	3.04	3.46	3.09	2.58	2.58	2.04	1.93	1.56	1.64
Ont.	10.48	7.78	6.86	9.85	11.58	6.68	5.46	3.60	1.63	1.62
	2.93	1.99	1.55	1.67	1.63	1.17	0.82	0.73	0.52	0.61
Mtb.	17.89	19.15	15.96	19.54	20.07	19.05	16.83	10.22	—	—
	6.77	5.62	4.92	4.81	4.66	4.49	3.68	3.12		
Sask.	10.84	16.38	15.18	13.82	18.27	13.85	14.23	—	—	—
	4.73	5.45	5.09	4.59	5.25	4.85	4.37			
Alta.	8.14	8.47	7.4_	7.37	10.82	9.63	8.50	5.93	6.85	4.65
	2.89	2.29	2.03	1.77	1.73	1.79	1.43	1.37	1.73	1.57
B.C.	7.94	6.11	5.81	8.93	7.98	5.96	4.40	2.05	1.15	1.63
	3.18	1.91	1.50	1.75	1.50	1.26	0.86	0.60	0.45	0.55

Note: Standard errors (%) appear below the rates. Values not significantly different from zero ($p < 0.05$) are suppressed.

Table 3.A.5
Provincial Inmigration Rates Based on Nativity by Age: Canada, 1976-81

A) Primary Inmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	0.09	0.04	—	0.04	0.06	—	0.02	—	—	—
	0.03	0.02		0.02	0.03		0.01			
N.S.	0.16	0.12	0.12	0.19	0.21	0.13	0.07	0.04	—	—
	0.05	0.04	0.04	0.05	0.05	0.04	0.03	0.02		
N.B.	0.19	0.10	0.13	0.14	0.18	0.15	0.10	—	0.04	—
	0.05	0.04	0.04	0.04	0.05	0.05	0.03		0.02	
Que.	0.27	0.15	0.11	0.27	0.51	0.24	0.13	0.08	0.07	—
	0.07	0.05	0.04	0.06	0.10	0.07	0.05	0.04	0.04	
Ont.	1.35	0.87	0.86	1.67	1.69	1.33	0.88	0.59	0.45	0.47
	0.16	0.13	0.12	0.16	0.18	0.17	0.12	0.11	0.10	0.11
Mtb.	0.24	0.14	0.13	0.25	0.26	0.20	0.10	0.06	—	—
	0.06	0.04	0.04	0.05	0.06	0.06	0.03	0.03		
Sask.	0.38	0.18	0.12	0.33	0.31	0.21	0.11	0.04	—	—
	0.07	0.05	0.04	0.06	0.06	0.06	0.04	0.02		
Alta.	1.43	0.98	1.11	3.36	2.79	1.53	0.85	0.37	0.21	0.11
	0.14	0.10	0.11	0.19	0.19	0.15	0.10	0.07	0.06	0.04
B.C.	0.95	0.53	0.60	1.27	1.59	1.12	0.67	0.40	0.42	0.32
	0.11	0.08	0.08	0.12	0.14	0.13	0.09	0.07	0.08	0.07

Table 3.A.5 (Continued)

B) Return Inmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	22.50	10.59	—	10.00	17.91	11.90	8.33	—	—	—
	9.15	6.54		4.27	4.44	3.60	2.68			
N.S.	15.08	14.77	6.86	7.26	15.40	12.68	6.85	4.91	3.73	4.68
	6.25	5.24	2.98	2.86	3.39	2.95	1.65	1.69	1.69	1.95
N.B.	28.05	11.72	7.94	9.30	15.27	8.42	5.61	4.11	4.98	4.31
	9.72	5.57	3.62	3.88	3.78	2.50	1.65	1.65	1.98	2.07
Que.	19.91	8.58	5.85	6.32	13.16	14.90	5.52	3.66	2.60	2.75
	5.33	2.64	1.85	1.87	2.35	2.41	1.28	1.19	1.10	1.09
Ont.	21.34	15.26	13.72	14.91	19.51	15.36	13.54	9.47	5.15	4.23
	3.29	2.46	2.27	2.11	7.31	2.22	1.84	1.84	1.56	1.22
Mtb.	14.20	9.74	4.12	6.45	8.99	7.69	3.91	2.37	—	—
	5.26	3.26	1.92	2.31	2.45	2.21	1.22	0.96		
Sask.	20.30	9.46	5.78	7.66	12.27	6.85	3.93	1.46	1.32	1.55
	6.84	3.22	2.12	2.18	2.16	1.65	0.93	0.54	0.51	0.71
Alta.	23.79	14.43	11.97	22.64	15.87	12.28	11.14	4.32	2.38	2.00
	5.81	3.44	2.87	3.49	3.08	2.86	2.22	1.46	1.06	1.23
B.C.	26.15	19.86	12.45	17.18	26.01	18.92	13.02	8.98	8.57	—
	5.83	4.66	4.17	3.92	4.62	4.46	3.18	3.58	3.79	

Table 3.A.5 (Continued)

C) Onward Inmigration

	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
Nfld.	—	—	—	—	—	—	—	—	—	—
N.S.	—	0.65	0.84	0.79	0.99	0.54	0.32	—	—	—
		0.31	0.31	0.28	0.28	0.21	0.13			
N.B.	—	0.86	0.50	—	—	—	0.34	—	—	—
		0.35	0.24				0.13			
Que.	—	—	—	—	0.73	0.43	0.29	—	—	—
					0.26	0.20	0.13			
Ont.	4.63	3.66	3.25	3.24	2.88	2.96	2.84	1.53	0.97	0.82
	1.40	0.97	0.80	0.75	0.62	0.63	0.49	0.38	0.32	0.31
Mtb.	1.01	1.08	0.75	0.66	0.76	0.67	0.44	0.28	—	—
	0.49	0.40	0.30	0.26	0.25	0.23	0.15	0.13		
Sask.	1.14	—	0.54	0.85	0.86	0.63	0.54	—	—	—
	0.52		0.26	0.30	0.28	0.23	0.18			
Alta.	3.84	3.06	3.81	7.31	5.84	3.80	3.04	1.72	0.68	0.70
	1.03	0.76	0.73	0.92	0.76	0.59	0.42	0.34	0.22	0.24
B.C.	2.89	3.09	3.03	3.65	4.75	3.76	2.92	2.13	1.60	1.47
	0.88	0.74	0.65	0.66	0.68	0.60	0.43	0.40	0.37	0.39

Note: Standard errors (%) appear below the rates. Values not significantly different from zero ($p < 0.05$) are suppressed.

Table 3.A.6
The Percentage Share of Flows by Return Migrants: 1976-81

A. Outmigrants

Province	5-9	10-14	15-19	20-24	35-39	30-34	35-44	45-54	55-64	65+	All Ages
Nfld.	15.4	22.0	17.9	3.7	9.9	14.9	17.0	22.7	23.1	28.6	12.9
N.S.	15.1	21.1	19.0	13.4	21.4	26.0	25.6	36.2	29.4	9.5	20.4
N.B.	28.2	36.9	14.6	10.1	20.9	32.3	27.7	41.9	31.6	27.8	22.8
Atlantic	18.9	26.3	17.2	9.6	18.5	25.2	24.7	35.0	28.6	19.6	19.3
Quebec	18.4	20.6	18.2	17.1	18.8	19.6	24.0	24.9	26.6	31.4	20.6
Ontario	16.2	23.0	14.1	9.7	17.6	35.8	29.2	31.5	42.3	4.8	20.4
Manitoba	15.3	20.9	15.6	13.3	18.3	21.2	21.6	25.7	19.6	20.0	18.5
Sask.	25.4	19.6	13.9	12.4	17.8	20.5	24.1	15.8	7.0	11.1	17.2
Alberta	27.4	34.6	28.7	34.8	42.3	38.7	34.0	27.2	14.7	25.7	33.7
B.C.	27.2	35.1	37.2	26.2	40.1	41.8	45.2	40.2	54.5	47.8	37.1

B. Inmigration

Province	5-9	10-14	15-19	20-24	35-39	30-34	35-44	45-54	55-64	65+	All Ages
Nfld.	38.3	31.0	33.3	48.7	66.7	75.5	72.3	66.7	100.0	100.0	58.3
N.S.	23.2	32.1	21.1	18.9	37.9	51.2	56.4	58.5	52.9	75.0	38.8
N.B.	24.5	21.4	20.7	24.4	40.5	43.5	40.4	54.8	60.5	61.5	35.7
Atlantic	26.9	27.8	22.3	25.5	44.2	53.1	52.9	58.4	61.3	69.1	40.9
Quebec	37.4	46.3	49.3	34.2	43.6	67.9	58.8	59.3	53.8	72.7	50.5
Ontario	28.9	35.0	30.6	25.2	33.8	32.8	34.2	33.8	25.8	30.3	31.2
Manitoba	21.2	27.4	19.5	19.4	29.4	34.7	36.2	40.4	40.7	50.0	28.8
Sask.	17.0	30.0	31.0	23.5	45.6	43.7	47.5	52.8	78.1	62.1	37.2
Alberta	9.6	14.3	10.8	8.3	7.8	10.5	15.2	13.9	18.1	14.7	10.4
B.C.	15.5	20.5	9.4	10.0	12.3	11.9	12.3	9.1	9.4	7.2	12.0

CHAPTER 4

CHANGING PATTERNS OF PRIMARY, RETURN AND ONWARD INTERPROVINCIAL MIGRATION IN CANADA, 1976 TO 1986

4.0 INTRODUCTION

It is generally agreed that broad processes incorporating social, economic, political and structural factors affect migration within both the short and long-run (Frey 1987; Berry 1988; Champion 1988; Mera 1988). Simmons (1982 p. 168) commented that "it is apparent that several different processes must be at work [influencing migration], with short-term perturbations imposed upon longer term fluctuations and trends". On the one hand, long-run factors which are slow to change include distance, physical barriers, environmental differences and population size. On the other hand, short-run changes (i.e. year to year) are related to economic fluctuations (cycles) and include such variables as wages, employment growth, unemployment and job transfers. Changes in migration are therefore likely to be a function of these short-run processes since it is probable that individuals are most sensitive to these factors.

Liaw and Ledent (1988) demonstrated that *non-natives* (those whose province of residence differs from their province of birth) are more likely than

natives (those whos province of residence is the same as their province of birth) to migrate in the 'wrong' direction and to be less sensitive to the attractions of destination income and employment growth. While native or primary migrants compose a large proportion of the total flows, closer examination of migration flows has revealed that *return* migrants (those migrating back to their region of birth) and *onward* migrants (those migrating onward to a region other than their region of birth), represent a rather high proportion of the total migration flows (Eldridge 1965; Long 1988). Onward migrants tend to resemble primary migrants in their response to the attractions of the potential destination. On the other hand, return migrants typically include a high proportion of those moving in the 'wrong' direction. Such moves may represent individual dissatisfaction with the current region of residence because of disappointing income or employment experience which become important factors in the return migration decision (DaVanzo 1976; Yezer and Thurston 1976; Herzog and Schlottman 1982; Grant and Vanderkamp 1986).

Following Simmon's line of argument and extending it to primary, return and onward migration, it is unlikely that the rates and patterns associated with these three types of migration are constant over time. Vanderkamp (1972), for example, noticed that return migration's share of total migrations increased during recessionary periods while overall migration rates decreased. It is therefore likely that national and regional growth cycles alter the composition and more

importantly, the direction of migrant flows as migrants respond to shifting economic opportunities. Although not rigorously tested in this chapter, it is undoubtedly the changing social, economic or political conditions within Canada that underlie the observed changes in primary, return and onward migration patterns.

The objective of this chapter is to study the temporal patterns in primary, return and onward migrations between two census periods (1976-81 and 1981-86). The approach is largely descriptive and discusses five propositions developed in the following section in order to reveal some of the general temporal properties. We believe that the separation of migrants based upon previous migration history is important in understanding migration response to general and temporal changes. Since the same measures of migration as used by Long (1988) and Rogers and Belanger (1990) are adopted, the results are easily comparable to the American ones. Changes in migration patterns over time may provide insights into the temporal stability of various migration processes as different relationships will tend to predominate in the different time periods providing a sense of the degree of stability or volatility of migration. More precisely, the differences between migrants who return to an area and those who depart from it may be important over time, especially in areas that attract relatively few primary or onward inmigrants as these separate migration streams may work to remove or concentrate certain types of individuals within a region.

The chapter is organized as follows. Section 4.1 presents the propositions used within this chapter and section 4.2 establishes the analytical method. Section 4.3 discusses the observed patterns of primary, return and onward migration for the two periods, using the propositions as a guideline for the discussion. Conclusions are presented in section 4.4.

4.1 PROPOSITIONS

Since migration is a highly selective process (Myrdal 1957), the effects of political, social and economic forces at work between 1976-81 and 1981-86 are likely to vary systematically with respect to certain personal factors such as age, ethnicity, education or nativity. The decade between 1976 and 1986 was one in which Canada experienced political unrest and fundamental economic change. Following the so-called oil-boom in the 1970's, the collapse of the oil-based economy in Alberta corresponded to the severe national recession of 1981-82 which underscored the adverse effects of growing international competition and de-industrialization. During this time, Alberta's employment growth rate fell from an average of 6.3 percent in 1976-81 to -0.2 percent in 1981-86. While not as dramatic, British Columbia's employment growth rate fell from 4.5 percent to 0.0 percent. Although still below the national average of 10.4 percent, Alberta's unemployment rate doubled over the two periods from 4.2 percent to 8.6 percent.

In the post-recession years, however, the emergence of Ontario's "bubble economy", which was propelled by an over-heated real-estate market focused on Toronto, provided the illusion of recovery and strong economic growth. Ontario's recovery in the second period is reflected in the above average employment growth rate (1.6 percent compared to the national average of 0.9 percent) and a below average unemployment rate (8.7 percent versus a national average of 10.4 percent). Since the data have been shaped by recent history, so has the analysis with the consequence being that the major events of the period should be reflected in the migration process.

The belief that migration levels are linked with the economic conditions of the period leads to the first proposition;

Proposition 1. *Overall migration levels would decline during 1981-86, but non-native migrants would be more likely to make a return migration than an onward migration.*

Given the reduced interprovincial variation in birth and death rates, migration is the most important component in the growth or decline of a province's population. Disaggregation of migration flows by nativity also provides clues pertaining to the composition of a province's population profile. Although natives are less mobile than non-natives, natives are usually much more numerous, such that primary net migration tends to dominate the population re-distribution potential of a system (Long 1988; Rogers and Belanger 1990).

However such dominance is expected to decrease substantially during a period of severe economic recession. This leads to the second proposition;

Proposition 2. *Primary net migration would be the major determinant of overall net migration in 1976-81, whereas return net migration would become more influential in 1981-86.*

The propensities for undertaking any of these three types of migration vary systematically with such personal attributes as age and education. With respect to education, Long (1988) observed that the propensities increase with level of education for primary and onward interstate migration, but not for return migration. With respect to age, young children (and therefore their middle aged parents) are more likely to make a return migration (Long 1988). Further, age patterns of return migration do not display a retirement peak, while primary and onward migration clearly do. Changes in life-cycle status (such as marriage, family creation or death of a spouse) or disappointment with the initial migration and current province of residence may lead to re-migration. Accordingly, the following two propositions reflect the effect of personal attributes on the propensity to make a primary, return or onward interprovincial migration;

Proposition 3. *Migration propensities with respect to age for the three types of migration would remain stable between periods.*

Proposition 4. *The propensities to make a primary, return or onward interprovincial migration would vary with personal factors such as gender, marital*

status, family type and level of education in both periods.

Politically, the decade under study was characterized by increasing tensions between the federal government and its provincial counterparts over the partitioning of powers. The 1976 election of the pro-separatist Parti-Quebecois further exacerbated this situation by casting doubt on the long-run viability of the Canadian Federation and increased the schism between English and French. Much of the debate prior to the defeat of the Meech Lake Accord in 1990 centered upon the political recognition of Quebec as a 'distinct society'. Quebec's nationalistic visions were embodied in the election of the Parti Quebecois in 1976 and the ensuing political agenda aimed to strengthen Quebecois culture. However, doing so served to increased the polarization between the Anglophone and Francophone communities, leading to an increase in outmigration of the English speaking population from the province. Liaw (1990), for example, noted that the departure rate of young French-speaking adults from Quebec was only 2 percent, while the departure rate of their English-speaking counterparts was as high as 27 percent during the 1976-81 period. Likewise, few non-French speaking migrants choose Quebec as a destination so that its inmigration rates tend to be extremely low (Ledent and Liaw 1985). Such processes could lead to increasing population homogeneity within Quebec, leading to the final proposition;

Proposition 5. *Quebec's distinct culture and language inhibits the inmigration of*

English speaking migrants while promoting the outmigration of English speaking non-natives through both periods.

4.2 DEFINITION OF MIGRATION MEASURES

In conjunction with the increased availability of micro data, considerable effort has been made to model and explain primary, return and onward migration. Much of this work has employed longitudinal data such as the Income Dynamics Panel of the University of Michigan and the Canadian Unemployment Insurance Commission (for example, DaVanzo 1976, 1978; Morrison and DaVanzo 1986; Grant and Vanderkamp 1985, 1986). Such data are especially well-suited to the study of repeat migration owing to its temporal depth but generally lacks spatial information owing to small sample size. Consequently, less is known about the spatial patterns of return and onward migration. Such spatial patterns can be revealed by cross-sectional data such as the census (see Long and Hansen 1977; Long 1988; Rogers and Belanger 1990; Rogers 1990). Furthermore, the 'flavour' of the temporal changes may be obtained by connecting or stringing together two or more census intervals.

This study is based on the 1981 and 1986 census Public Use Sample (PUS) files, which are 2 percent cross-sectional samples of the Canadian population. The North West Territories, the Yukon Territories and Prince Edward

Island were not included in the analysis owing to confidentiality reasons and their small contribution to overall migration flows. The institutional population, immigrants and those individuals whose places of residence in 1976 or 1981 were outside Canada were also deleted from the sample.[1]

Migrants are defined as those whose province of residence at the start of the census period differs from their province of residence at the end of the census period. However, this definition results in the undercounting of both migrants and migrations, especially amongst return and onward migrants since the propensity to migrate again declines with the duration of stay (Morrison 1971). Using information on (i) the province of birth, (ii) the 1976 (1981) province of residence and (iii) the 1981 (1986) province of residence, primary, return and onward in- and outmigration rates can be calculated according to Long (1988). To measure the propensities for leaving and entering a province, out- and inmigration rates are defined by dividing the number of out- and inmigrants by the corresponding at-risk population.[2] For example, to compute the primary inmigration rate for a province, the at-risk population is the population of the natives in the rest of the system. The reader is referred to chapter 3 for a more complete description of the methodology employed.

4.3 TEMPORAL PATTERNS OF PRIMARY, RETURN AND ONWARD MIGRATION

The propositions presented in section 4.1 are now evaluated, and suggestions are advanced in partial explanation of the observations.

4.3.1 Overall Patterns

Non-natives comprised less than 17 percent of the population in both time periods, yet they contributed 44 percent and 55 percent of the total number of migrants in 1976-81 and 1981-86 respectively. The overall outmigration rate decreased from 5.1 percent during 1976-81 to 4.7 percent in 1981-86. Although all three types of outmigration rates declined, the decline in the return outmigration rate was less than the declines in primary and onward outmigration rates (Table 4.1). Non-natives were therefore six times as migratory as natives in the later period, compared to only four times in the former period.[3] The proportion of non-native migrants selecting to make a return migration (as compared to an onward migration) increased in the later period from 54 percent to 57 percent.

British Columbia was observed to have the lowest rates of return (5.4 percent) and onward outmigration (4.2 percent) in 1976-81, leading it to be called "the end of the line" following Long's (1988) description of California. British Columbia also had the strongest ability to recapture its natives, similar to

Table 4.1
Provincial Outmigration Rates Based on Nativity, Canada: 1976-81 and 1981-86

	Primary		Return		Onward	
Province	1976-81	1981-86	1976-81	1981-86	1976-81	1981-86
Nfld.	5.0	4.7	19.0	17.3	19.7	15.0
N.S.	5.0	3.2	11.6	8.6	13.3	9.1
N.B.	4.4	3.1	12.5	9.9	13.1	8.1
Quebec	2.0	1.4	13.0	7.4	8.3	5.3
Ontario	3.4	1.5	7.0	4.7	5.6	3.6
Manitoba	6.7	3.6	11.0	8.3	14.1	9.4
Sask.	6.1	4.0	10.5	9.8	10.9	9.2
Alberta	4.1	4.0	9.0	12.9	8.0	7.4
B.C.	3.3	3.1	5.4	5.7	4.2	4.2
Canada	3.4	2.2	8.3	7.7	7.2	5.6
Correlation Coefficient			0.23	0.78	0.61	0.79

All rates are expressed as percentages.
Correlation coefficients referenced to primary migration.

Table 4.2
Provincial Inmigration Rates Based on Nativity, Canada: 1976-81 and 1981-86

	Primary		Return		Onward	
Province	1976-81	1981-86	1976-81	1981-86	1976-81	1981-86
Nfld.	0.03	0.02	8.9	5.4	0.09	0.06
N.S.	0.11	0.12	8.1	8.7	0.45	0.40
N.B.	0.11	0.07	7.6	6.9	0.32	0.27
Quebec	0.20	0.19	7.2	7.0	0.30	0.34
Ontario	1.04	0.98	13.1	14.9	2.34	2.76
Manitoba	0.15	0.12	4.3	6.0	0.52	0.47
Sask.	0.18	0.12	4.4	4.2	0.50	0.42
Alberta	1.34	0.60	10.6	8.2	3.02	1.76
B.C.	0.80	0 44	16.6	12.5	2.86	1.80
Canada	0.42	0.29	8.5	8.8	1.00	0.84
Correlation Coefficient			0.68	0.84	0.96	0.98

All rates are expressed as percentages.
Correlation coefficients referenced to primary migration.

California. Thus, British Columbia sends large numbers of return and onward migrants to other provinces only because it receives a large number of inmigrants. During 1981-86, British Columbia could still be called the "end of the line", although Ontario had the strongest ability to recapture its previous migrants.

Economically depressed regions such as Atlantic Canada typically have a high outmigration rate and a correspondingly low inmigration rate. Conventional theory suggests that a large proportion of the inmigration stream into such regions is composed of non-natives who had a disappointing experience in their adopted province and who subsequently made a return migration. Recessionary times would thus have an inflationary effect on return flows, perhaps as individuals access location specific capital or kinship ties. While non-natives represented a high proportion of inmigration into the Atlantic region (41 percent in 1976-81 and 43 percent in 1981-86), the return inmigration rates of the Atlantic provinces were not very high (Table 4.2). The very low primary and onward inmigration rates of the Atlantic provinces indicates that there were few others who had reason (specifically non-natives) to move to the region (Table 4.2). Consequently, these provinces are more reliant upon their former natives as a source of inmigrants and population change through both periods. Flows from provinces with high levels of net outmigration were composed largely of primary outmigrants: a relatively small proportion of non-natives residing within the Atlantic provinces meant that the proportion of the flows that were return

outmigrants had to be small. For example, less than 15 percent of the outmigrants from Newfoundland were return migrants while greater than 70 percent were primary outmigrants.

These patterns are well demonstrated by Table 4.3 which decomposes migration into its components by percentage shares. Comparable to the United States (Long 1988; Rogers and Belanger 1990), primary migrants usually account for the largest share of migrants to or from a province. Among provinces with net outmigration, return migrants are an important source of population growth because of the small proportion of natives from other areas who are attracted to those provinces. Conversely, provinces that have experienced rapid growth, such as Alberta in the late 1970's, derive most of their inmigrants from those leaving their province of birth and who were onward migrants.

We can, by association, determine the importance of economic variables in determining the direction of primary, return and onward migration flows as migrants respond to the changing economic potential of the provinces. For example, the sharp decline in Alberta's oil economy from 1976-81 to 1981-86 was accompanied by a sharp increase in the share of the province's outmigration flow of return migrants (from 34 to 47 percent). Conversely, Ontario witnessed an increase in the proportion of return inmigrants (31 percent to 37 percent) as it performed better than other provinces in climbing out of the 1982 recession.

Provincial in- and outmigration rates provide alternate measures of the

Table 4.3
The Percentage Share of In- and Outmigrants Who Were Primary, Return or Onward Migrants by Province: 1976-81 and 1981-86

	Inmigrants			Outmigrants		
	Primary	Return	Onward	Primary	Return	Onward
NFLD.:						
1976-81	28.7	58.3	13.0	73.8	12.9	13.3
1981-86	25.3	61.8	13.0	73.0	14.4	12.5
N.S.:						
1976-81	37.8	38.8	23.5	56.2	20.4	23.4
1981-86	37.4	38.9	23.7	49.4	24.7	25.9
N.B.:						
1976-81	44.5	35.7	19.7	53.2	22.8	24.0
1981-86	35.0	41.0	24.0	49.1	27.9	22.9
Quebec:						
1976-81	38.2	50.5	11.3	66.1	20.6	13.2
1981-86	34.6	51.3	14.1	66.7	19.3	14.0
Ontario:						
1976-81	53.2	31.2	15.6	63.4	20.4	16.3
1981-86	43.1	37.2	19.2	51.5	27.4	21.1
Manitoba:						
1976-81	47.2	28.8	24.0	57.8	18.5	23.7
1981-86	35.4	39.9	24.7	50.0	23.4	26.6
SASK.:						
1976-81	45.3	37.2	17.4	64.8	17.2	18.0
1981-86	37.9	40.8	21.4	54.2	23.7	22.1
Alberta:						
1976-81	69.0	10.4	20.6	36.5	33.7	29.9
1981-86	58.7	15.5	25.8	25.5	47.4	27.1
B.C.:						
1976-81	60.9	12.0	27.1	34.5	37.1	28.5
1981-86	52.7	15.3	32.0	31.8	39.5	28.7

effects of provincial economic conditions. For example, onward inmigration rates to Alberta dropped from 3.02 percent to 1.76 percent while return outmigration from Alberta rose from 9.0 percent to 12.9 percent in the second period. Onward inmigration rates to Ontario increased from 2.34 percent to 2.76 percent and return outmigration rates from Ontario decreased from 7.0 percent to 4.7 percent.

In terms of the variation of the three types of migration among provinces, the similarity between primary and onward migration is shown by the simple correlation coefficients and supports earlier findings that onward migrants are similar to primary migrants ($r = 0.61$ in 1976-81 and 0.79 in 1981-86). Return migration rates were, on the other hand, only loosely correlated with primary outmigration rates ($r = 0.23$), except for the 1981-86 period ($r = 0.78$). The largely results confirm Long's comment that "growing areas rather uniformly attract - and declining areas repel - migrants with a variety of backgrounds, but areas seem less consistently to send their natives and previous inmigrants to other locations" (Long 1988, p. 121).

In order to study the temporal stability in the spatial pattern of each of the three types of migration, a simple correlation coefficient was computed between the 1976-81 and 1981-86 periods by migration type. Onward outmigration was the most stable ($r = 0.95$) while primary outmigration was the least stable ($r = 0.72$). This suggests that, in general, the spatial pattern of onward migration is more resilient to changes in political and economic

conditions than return or primary outmigration. Since onward migrants tend to be highly educated (DaVanzo 1983), we may draw a link between onward migration and employment relocation such that while both primary and onward migrants are positively selected, onward migrants may be doubly selected and may therefore be the 'cream of the crop'. This explanation is similar to Long (1988) who concluded that onward migrants were most likely to be highly educated and have access to the best employment opportunities.

4.3.2 Net Migration Patterns

Table 4.4 shows three important shifts in net migration over the 1976-81 period. First, Alberta went from a net-gainer of migrants during the 1976-81 period to a net-loser of migrants, corresponding to the oil-boom and bust. Second, Ontario's net-loss of the migrants ceased during the 1981-86 period with its economic recovery. Third, Quebec experienced a positive return net migration in the later period, its only positive inflow in the two periods.

In general, provinces do not experience gains or losses in all three types of migrants. The prevalent pattern (which was stronger in the 1976-81 period) is one in which the interprovincial variation in total net migration is determined mainly by the variation in primary net migration. Return net migration tends to have a sign opposite to that of primary migration, off-setting the primary effect while onward net migration tends to be similar to primary net migration, reinforcing its effect. During 1981-86, primary net-migration continued to be

Table 4.4
Volumes of Net Primary, Return and Onward Migration by Province: Canada, 1976-81 and 1981-86

Province	Total	Primary	Return	Onward
		1976-81		
Nfld.	-338	-399	107	-46
N.S.	-247	-304	114	-57
N.B.	-115	-127	72	-60
Que.	-2144	-1714	-127	-303
Ont.	-1418	-1311	151	-258
Mtb.	-656	-479	-25	-152
Sask.	-115	-304	216	-27
Alta.	3287	3033	-204	458
B.C.	1746	1605	-304	445
		1981-86		
Nfld.	-353	-394	84	-43
N.S.	144	-45	173	16
N.B.	-31	-107	76	0
Que.	-971	-1031	194	-134
Ont.	1618	458	908	252
Mtb.	32	-135	178	-11
Sask.	-60	-197	158	-21
Alta.	-504	889	-1216	-177
B.C.	125	562	-555	118

Unit = person
The values should be mutliplied by a factor of approximately 50 to reflect actual magnitudes.

important in determining overall net migration, although return net migration increased in importance with the absolute volume of return migrants exceeding that of primary net migration in the provinces of Nova Scotia, Ontario, Manitoba and Alberta.[4] Therefore, in a period of severe economic recession, the redistributional effect of return migration could exceed that of primary migration.

Although only a few provinces had a net gain or loss from all three types of migration (Quebec and Manitoba in 1976-81 and Ontario in 1981-86), it is possible to suggest circumstances under which this occurred. Quebec, for example, entered a politically unstable period following 1976. The election of the Parti Quebecois on a separatist platform in 1976 and the polarization of nationalistic views within Quebec created an atmosphere conducive to the outmigration of business and a portion of the Anglophone population. However, we must also consider the declining economic fortunes of Quebec during this period, with a deterioration of its economic base and rising unemployment levels. Ontario, on the other hand, experienced an economic boom during 1983-86, reversing a decade of slow economic growth.

4.3.3 Patterns by Age

In order to determine whether the age-schedules of each of the three types of migration are similar to the 'typical' migration schedule, migration rates were calculated according to age. Ten age groups were used in order to carry out this analysis: five-year age groups from 5-9 to 30-34, ten-year age groups

from 35-44 to 55-64 and an open ended 65+ age group. All age groups are defined as of the end of the period.

The out- and inmigration schedules of Ontario and Alberta (see Figures 4.1 and 4.2) reveal three main features.[5] First, primary migration most closely resembles the 'typical' age-schedule, with a moderately high rate among young dependents, dropping off in the teens, rising to a peak in the early twenties, and then declining at a decreasing rate beyond the peak. Second, the age curve of the return migration schedule has up-lifted rates for the young-dependent group and a delayed labour force peak, suggesting that the presence of children increases the propensity to make a return migration. This child-dependent migration schedule could represent a form of 'risk aversion' on the part of the parents, whereby a return migration may be the more economically viable option. Third, the shapes of the onward migration schedules vary greatly among the provinces during both periods. Since the at-risk populations for the onward rates are either identical or larger than those for the corresponding return rates, the variations in the onward rates cannot be dismissed easily, although its explanation is unclear.

To study the similarities and differences between age groups and the spatial patterns of each type of in- and outmigration rates, weighted correlation coefficients for each age group were computed, with the weights being the at-risk population (see Chapter 4 Appendix, Tables 4.A.1, 4.A.2).[6] Most noticeable is the

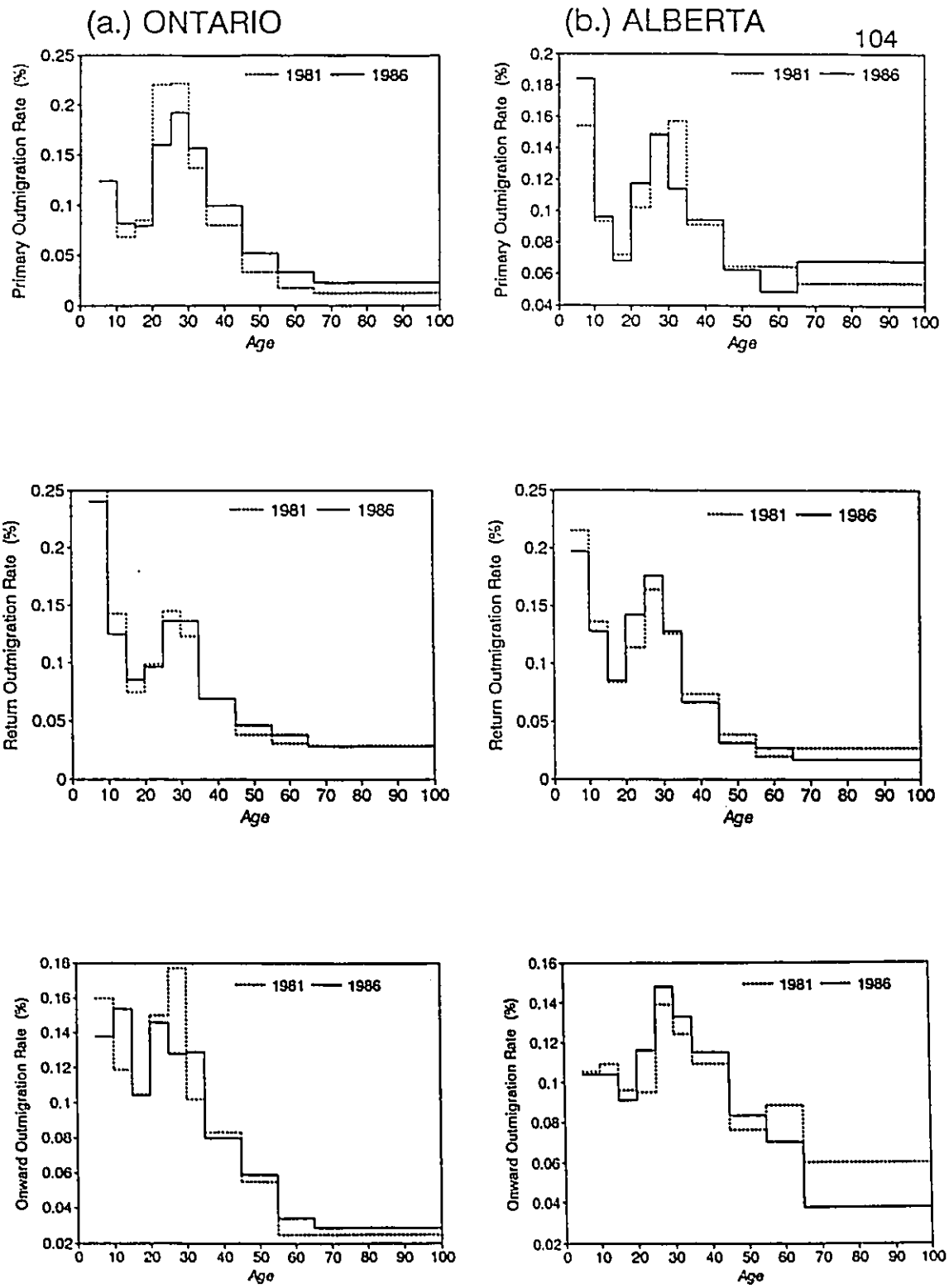


Figure 4.1 The Age Patterns of Primary, Return and Onward Outmigration Rates: 1976-81 and 1981-86

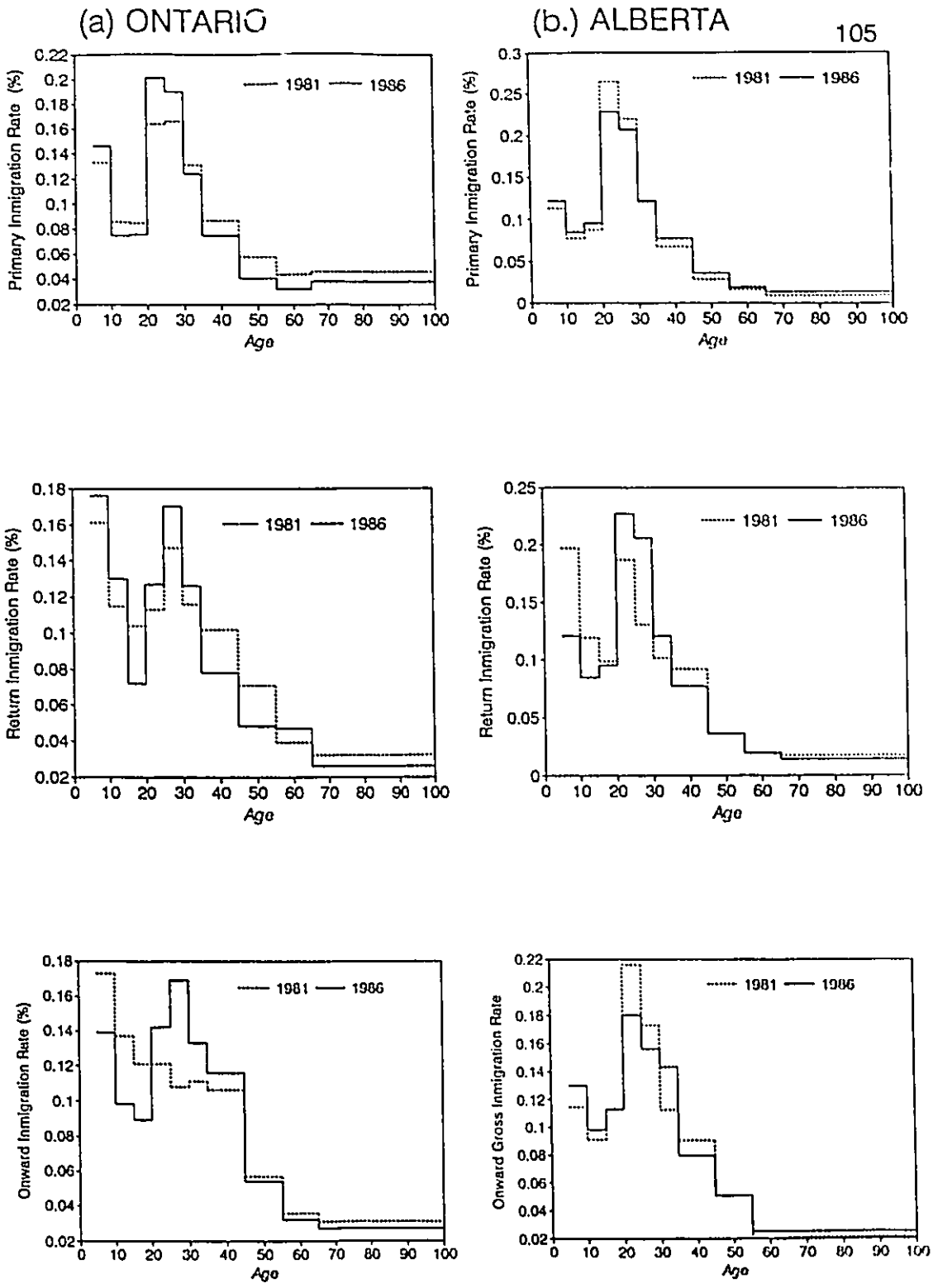


Figure 4.2 The Age Patterns of Primary, Return and Onward Inmigration Rates: 1976-81 and 1981-86

consistency of the trends originally observed in the 1976-81 period, and as a result, the general points that can be drawn are similar to those in chapter 3. First, the spatial variations in each type of migration tend to be similar for successive age groups. Second, one of the elderly age groups (either 55-64 or 65+) was least similar to most of the other age groups for both primary and onward migration. Third, for each of the three types of migration rates, the spatial patterns of the age-specific outmigration rates tended to vary with age more than those of the age-specific inmigration rates.

For return migration, the youngest dependent age group tended to display the least similarity with most other age groups, including those aged 30-34 and 35-44 in the 1976-81 period. In 1981-86, the younger age groups were observed to have the greatest similarity with the parental (i.e. 30-34 year olds) age group. This suggests that during recessionary periods, middle-age adults without young dependent children became more similar to those with young dependent children in having a relatively strong preference for making return migration.

In short, it was found that the salient features of the primary and return migration schedules persisted through both periods, whereas onward migration schedules continued to be highly irregular. An increase in the similarity of return migration rates between the young dependent age group and the 30-34 age group suggests that middle age adults, both with and without children, became similarly prone to make a return migration during recessionary periods.

4.3.4 Personal Attributes

In addition to age and mother tongue, four other personal factors were chosen which could affect migration selectivity. The categorization of the factors is as follows:

Gender: Female and male.

Education: Highly educated (with degree), middle educated (with certificate or diploma or still attending school) and low education (without degree, certificate or diploma).

Family Type: HWC family (family with husband, wife and at least one child), HW family (husband-wife family without children) and 'other households'.

Marital Status: Married, single or DSW (Divorced, Separated or Widowed).

Overall in- and outmigration rates were computed controlling for each of these factors (see Tables 4.5 and 4.6).[7] According to the outmigration rates by personal attributes in Table 4.5, the return and onward outmigration rates were substantially higher than the corresponding primary outmigration rates. Therefore, the observed mobility difference between natives and non-natives is a very general phenomenon: it is observed for every type of person through both periods. From the inmigration rates in Table 4.6, we note that the attractiveness of a region is (1) strongest for non-natives residing in the rest of Canada and (2) weakest for natives residing in their province of birth. Again, this contrast is

Table 4.5
Overall Outmigration Rates by Personal Attributes, Canada, 1976-81 and 1981-86

	1976-81			1981-86		
	Primary	Return	Onward	Primary	Return	Onward
			(%)			
GENDER:						
Male	3.5	8.4	7.5	2.1	8.9	6.1
Female	3.3	8.5	6.8	2.2	8.2	5.1
EDUCATION:						
High-ed	6.7	9.6	9.8	4.7	8.8	8.3
Mid-ed	3.7	10.1	8.3	2.4	8.7	5.9
Low-ed	2.4	6.1	5.0	1.8	8.3	4.7
MARITAL STATUS:						
Married	2.6	6.2	5.8	2.0	6.9	5.2
Single	4.1	12.3	9.9	2.5	12.6	7.1
DSW	2.5	7.3	4.9	1.6	7.3	4.1
FAMILY TYPE:						
HWC Family	2.6	9.1	7.4	1.7	8.8	5.7
HW Family	4.1	5.5	5.7	2.4	5.9	4.7
All Others	4.5	9.6	7.6	2.9	10.0	5.9

Table 4.6
Overall Inmigration Rates by Personal Attributes, Canada, 1976-81 and 1981-86

	1976-81			1981-86		
	Primary	Return	Onward	Primary	Return	Onward
			(%)			
GENDER:						
Male	0.44	8.4	1.06	0.27	8.9	0.86
Female	0.41	8.5	0.97	0.28	8.2	0.73
EDUCATION:						
High-ed	0.84	9.6	1.41	0.59	8.8	1.18
Mid-ed	0.46	10.1	1.18	0.30	8.7	0.85
Low-ed	0.30	6.1	0.72	0.22	8.3	0.67
MARITAL STATUS:						
Married	0.32	6.2	0.83	0.25	6.9	0.74
Single	0.51	12.3	1.41	0.31	12.6	1.02
DSW	0.31	7.3	0.70	0.20	7.3	0.58
FAMILY TYPE:						
HWC Family	0.33	9.1	1.05	0.22	8.8	0.82
HW Family	0.51	5.5	0.82	0.30	5.9	0.68
All Others	0.56	9.6	1.09	0.36	10.0	0.85

DSW = Divorced, Separated, Widowed
HWC = Husband, wife, child family
HW = Husband-wife family

observed for every type of person through both periods.

As expected, primary, return and onward migration rates by personal attribute generally declined between the two periods. With respect to personal attributes, the following points were observed.

Gender: In the whole system, primary, return and onward migration rates by gender were similar through both periods.

Education: Through both periods, the propensities to make primary and onward migrations displayed a very strong positive relation to the level of education. In contrast, the propensities to make return migrations were weakly and somewhat irregularly related to the level of education. In other words, we found very strong positive selectivity in primary and onward migrations and little selectivity in return migrations. This was true in both periods.

Family Type: Through both periods, the propensities to make primary migrations were the weakest for the HWC families and the strongest for 'other' households. With respect to the propensities to make return or onward migrations, the persistent contrast was between the low level of HW families and the high level of HWC families and other households. We also found that HW families became somewhat more similar to HWC families in having stronger preferences for making a return migration as compared to an onward migration in the second period.

Marital Status: Through both periods, single adults were more likely to

make any of the three types of migrations than those with married or DSW states.

4.3.5 English/French Contrasts

Overall, primary and onward in- and outmigration rates were much higher for English speaking non-natives, whilst the French were somewhat more likely to make a return migration. This basic contrast remained the same through both periods (Tables 4.7 and 4.8).

At the provincial level, the attractiveness of Quebec is greatest for the French-speaking non-natives returning home. The dominance of the French language in Quebec meant that both English speaking natives and non-natives had relatively high propensities to make a primary or repeat migration from Quebec, especially in the first period when language issues were the strongest. Similarly, linguistic barriers worked to keep French natives and non-natives alike at home, as shown by their low primary, return and onward outmigration rates from Quebec. Consequently, the high overall return outmigration rate from Quebec can be largely attributed to English-speaking non-native migrants, with a high return outmigration rate of 18.6 percent in 1976-81 and 14.6 percent in 1981-86. French-speaking natives residing in New Brunswick, where the French represent about one-third of the provincial population, also had a relatively low primary outmigration rate in both periods (2.8 percent and 2.4 percent).

Table 4.7
Provincial Outmigration Rates Based on Nativity and Mother Tongue, 1976-81 and 1981-86 (%)

A. 1976-81

	ENGLISH				FRENCH		
	Primary	Return	Onward		Primary	Return	Onward
Nfld.	4.9	18.1	18.9	Nfld.	---	---	---
NS	5.1	11.4	13.7	NS	3.2	26.9	13.9
NB	5.4	12.1	14.4	NB	2.8	17.5	5.5
Que	13.5	18.6	13.4	Que	0.8	7.1	2.3
Ont	3.4	6.3	6.1	Ont	4.1	12.0	3.8
Mtb.	7.8	12.0	15.1	Mtb.	4.3	8.5	12.7
Sask.	6.8	11.3	11.7	Sask.	5.2	8.1	11.5
Alta.	4.4	9.5	7.9	Alta.	3.4	9.5	11.2
BC	3.4	5.5	4.2	BC	---	7.7	5.5
Total	4.7	8.4	7.7	Total	1.1	10.3	4.5

B. 1981-86

	ENGLISH				FRENCH		
	Primary	Return	Onward		Primary	Return	Onward
Nfld.	4.7	19.6	13.8	Nfld.	---	---	---
NS	3.2	9.8	8.6	NS	---	13.1	17.2
NB	3.5	12.4	10.3	NB	2.4	9.4	3.7
Que	8.8	14.6	10.5	Que	0.7	4.8	1.7
Ont	1.5	4.4	4.1	Ont	3.0	10.9	2.3
Mtb.	4.2	9.6	9.6	Mtb.	3.0	---	---
Sask.	4.4	11.0	9.7	Sask.	5.1	18.2	11.4
Alta.	4.2	13.7	7.3	Alta.	4.7	23.9	11.3
BC	3.2	6.2	4.1	BC	---	11.3	6.7
Total	2.9	8.6	6.0	Total	0.9	9.7	3.8

Table 4.8
Provincial Inmigration Rates Based on Nativity and Mother Tongue, 1976-81 and 1981-86 (%)

A. 1976-81

	ENGLISH				FRENCH		
	Primary	Return	Onward		Primary	Return	Onward
Nfld.	0.05	9.2	0.10	Nfld.	0.01	0.0	0.05
NS	0.17	7.9	0.49	NS	0.03	11.2	0.28
NB	0.14	7.4	0.33	NB	0.08	7.9	0.34
Que	0.13	2.9	0.23	Que	1.32	14.1	2.86
Ont	1.69	14.1	2.41	Ont	0.44	8.3	2.49
Mtb.	0.22	4.3	0.56	Mtb.	0.02	---	---
Sask.	0.26	4.7	0.56	Sask.	0.03	---	---
Alta.	2.01	11.1	3.42	Alta.	0.27	---	1.32
BC	1.22	17.4	3.37	BC	0.12	---	0.87
Total	0.59	8.4	1.10	Total	0.14	10.3	0.65

B. 1981-86

	ENGLISH				FRENCH		
	Primary	Return	Onward		Primary	Return	Onward
Nfld.	0.04	6.3	0.06	Nfld.	---	---	---
NS	0.17	8.8	0.44	NS	0.04	7.0	0.29
NB	0.09	7.1	0.27	NB	0.06	6.5	0.28
Que	0.11	3.0	0.28	Que	1.58	14.3	2.20
Ont	1.46	16.2	2.88	Ont	0.49	8.3	2.92
Mtb.	0.17	6.0	0.54	Mtb.	---	10.6	0.31
Sask.	0.19	4.6	0.48	Sask.	---	3.3	---
Alta.	0.93	8.5	2.12	Alta.	0.07	5.7	0.66
BC	0.65	13.2	2.17	BC	0.10	0.0	0.62
Total	0.36	8.6	0.86	Total	0.12	9.7	0.54

4.4 CONCLUSIONS

We found that many characteristics of primary, return and onward migration are relatively constant over the two time periods. Given Long's (1988) and Rogers and Belanger's (1990) results which have tracked primary, return and onward migration over several decades, it is likely that the observed Canadian patterns are largely constant over time, with short-term perturbations in the provincial economies imposed upon them as suggested by Simmons (1982). The relatively constant characteristics include the following. First, the redistributional effect of primary migration tends to be (1) countered by return migration and (2) reenforced by onward migration. Second, people with young dependents are more prone to make a return migration. Third, both primary and onward migrants are very positively selective with respect to the level of education, whereas return migrations are not.

There were major changes in response to the changes in the economic system. First, the levels of all three types of migrations declined as a consequence of the economic downturn. Second, the declines were particularly strong for primary and onward inmigrations so that net return migration became much more important in determining interprovincial population redistribution. Third, the roles of Ontario and Alberta in the migration transaction were reversed.

From a practical standpoint, the effects of return and onward migration

on a local economy represents the sifting and sorting of people with specific characteristics and abilities. Whether the influx of specific types of migrants enhances or diminishes a province's fortunes is determined, in part, by the existing stocks of human capital. Although the resultant net migration may be numerically small, the separate streams may remove certain individuals from an area's population. The persistent selectivity with respect to education implies that primary and onward migrants are more helpful than return migrants in improving the human capital of destination provinces. Such selectivity is a major reason for the persistency of interprovincial income disparities.

So far in chapters 3 and 4, we have used well-specified migration measures to characterize the migration patterns and offered some interpretation and tentative explanations. To carry this study one step further, we will introduce in the next chapter a multivariate statistical model to be used in later chapters to study the joint effects of personal factors and ecological variables on migration behaviours.

ENDNOTES

1. In the discussion, the year enclosed in brackets represents information gathered from the 1981-86 Public Use Sample file.

2. The computed rates are conditional on survival since both stayers and migrants in the data are survivors at the end of the migration interval.

3. The overall outmigration rate represents the weighted average of the primary outmigration rate, return outmigration rate and onward outmigration rate, and is computed as

$$x_w = (x_p + x_r + x_o)/(w_p + w_r)$$

where x represents the number of primary (p), return (r) or onward (o) migrants and w represents the at-risk population. Note that the at-risk population for return and onward outmigrants is the same.

4. These same patterns also apply to each age group in general.

5. Ontario and Alberta were chosen so as to avoid unreliable rates.

6. Such weights are used since some of the age-specific rates of the smaller provinces may have unreliable values, which if unweighted, would lead to a misleading correlation.

7. In explaining why the return in- and outmigration rates were identical, the following relationships were discovered:

Primary Outmigration Rate = (No. of regions - 1) * Primary Inmigration Rate

Return outmigration Rate = Return Inmigration Rate

Onward Outmigration Rate = (No. of regions -2) * Onward Inmigration Rate

CHAPTER 4 APPENDIX

Table 4.A.1
Contrast of Outmigration Rates Between Age Groups in Terms of Weighted Correlation Coefficients: Canada, 1976-81 and 1981-86

	1976-81				1981-86			
Age Group	Least like age	R with least like age	Most like age	R with most like age	Least like age	R with least like age	Most like age	R with most like age
				Primary Outmigration				
05-09	65+	0.54	30-34	0.97	20-24	-0.61	10-14	0.98
10-14	20-24	0.60	05-09	0.94	20-24	0.59	05-09	0.98
15-19	65+	0.34	25-29	0.95	65+	0.46	25-29	0.87
20-24	65+	0.15	25-29	0.92	65+	0.21	25-29	0.93
25-29	65+	0.26	15-19	0.95	65+	0.42	20-24	0.93
30-34	65+	0.51	35-44	0.98	65+	0.63	35-44	0.90
35-44	65+	0.56	30-34	0.98	20-24	0.57	30-34	0.90
45-54	20-24	0.36	55-64	0.90	20-24	0.50	65+	0.88
55-64	20-24	0.34	65+	0.94	20-24	0.41	65+	0.91
65+	20-24	0.15	55-64	0.94	20-24	0.21	55-64	0.91
				Return Outmigration				
05-09	25-29	-0.33	10-14	0.46	15-19	-0.03	30-34	0.76
10-14	05-09	0.46	30-34	0.76	55-64	0.03	15-19	0.93
15-19	05-09	-0.09	65+	0.90	25-29	0.15	10-14	0.93
20-24	05-09	-0.32	15-19	0.88	15-19	0.43	25-29	0.96
25-29	05-09	-0.33	30-34	0.92	15-19	0.25	20-24	0.96
30-34	05-09	-0.05	25-29	0.92	15-19	0.46	25-29	0.87
35-44	05-09	-0.17	45-54	0.92	15-19	0.55	20-24	0.85
45-54	05-09	-0.06	35-44	0.92	15-19	0.31	55-64	0.84
55-64	05-09	0.13	65+	0.89	15-19	0.34	45-64	0.84
65+	05-09	0.28	15-19	0.90	20-24	-0.03	55-64	0.75
				Onward Outmigration				
05-09	55-64	-0.19	25-29	0.92	55-64	0.00	15-19	0.56
10-14	55-64	0.23	35-44	0.91	05-09	0.18	25-29	0.64
15-19	55-64	0.29	35-44	0.95	55-64	0.29	20-24	0.80
20-24	55-64	-0.13	30-34	0.85	55-64	0.23	15-19	0.80
25-29	55-64	0.05	05-09	0.92	15-19	0.51	35-44	0.86
30-34	55-64	0.24	25-29	0.90	05-09	0.44	65+	0.88
35-44	55-64	0.46	15-19	0.95	15-19	0.45	25-29	0.86
45-54	55-64	0.40	30-34	0.81	05-09	0.10	65+	0.88
55-64	05-09	-0.19	65+	0.89	05-09	0.00	65+	0.73
65+	05-09	-0.09	55-64	0.89	05-09	0.03	30-34	0.88

Table 4.A.2
Contrast of Inmigration Rates Between Age Groups in Terms of Weighted Correlation Coefficients: Canada, 1976-81 and 1981-86

	1976-81				1981-86			
Age Group	Least like age	R with least like age	Most like age	R with most like age	Least like age	R with least like age	Most like age	R with most like age
				Primary Inmigration				
05-09	65+	0.75	10-14	0.99	65+	0.79	25-29	0.98
10-14	65+	0.70	15-19	0.99	65+	0.81	15-19	0.99
15-19	65+	0.67	10-14	0.99	65+	0.76	10-14	0.99
20-24	65+	0.49	25-29	0.98	65+	0.72	25-29	1.00
25-29	65+	0.61	15-19	0.99	65+	0.78	20-24	1.00
30-34	65+	0.76	35-44	1.00	65+	0.86	35-44	0.99
35-44	65+	0.82	30-34	1.00	65+	0.89	30-34	0.99
45-54	20-24	0.77	35-44	0.97	20-24	0.88	35-44	0.99
55-64	20-24	0.62	65+	0.97	20-24	0.74	65+	0.99
65+	20-24	0.49	55-64	0.97	20-24	0.72	55-64	0.99
				Return Inmigration				
05-09	30-34	0.27	25-29	0.60	15-19	0.61	30-34	0.96
10-14	05-09	0.36	25-29	0.89	55-64	0.64	25-29	0.82
15-19	65+	0.53	35-44	0.96	25-29	0.36	10-14	0.75
20-24	05-09	0.29	15-19	0.85	15-19	0.45	35-44	0.85
25-29	05-09	0.60	55-64	0.93	15-19	0.36	30-34	0.87
30-34	05-09	0.27	45-54	0.82	15-19	0.61	05-09	0.96
35-44	05-09	0.43	15-19	0.96	15-19	0.51	05-09	0.94
45-54	05-09	0.32	35-44	0.93	15-19	0.60	05-09	0.93
55-64	20-24	0.43	25-29	0.93	15-19	0.39	35-44	0.94
65+	20-24	0.29	55-64	0.91	20-24	0.61	30-34	0.95
				Onward Inmigration				
05-09	55-64	0.78	10-14	0.97	55-64	0.59	10-14	0.96
10-14	20-24	0.85	35-44	0.98	55-64	0.71	05-09	0.96
15-19	55-64	0.84	35-44	0.99	55-64	0.76	20-24	0.99
20-24	55-64	0.67	25-29	0.96	55-64	0.70	15-19	0.99
25-29	55-64	0.82	30-34	0.98	55-64	0.77	30-34	0.99
30-34	55-64	0.90	35-44	0.99	55-64	0.83	25-29	0.99
35-44	55-64	0.89	30-34	0.99	55-64	0.82	25-29	0.98
45-54	20-24	0.86	30-34	0.99	05-09	0.80	65+	0.98
55-64	20-24	0.67	65+	0.99	05-09	0.59	65+	0.97
65+	20-24	0.70	55-64	0.99	05-09	0.72	45-54	0.98

CHAPTER 5

THE LOGIT MODEL

5.0 INTRODUCTION

Much of the early work in migration research was theoretical, aimed at finding migration regularities and how and why people migrate. However, it is insufficient to rely upon theoretical work (or for that matter empirical work) alone. Therefore, we require a methodically rigorous and theoretically sound model. The purpose of this chapter is to explain how the behaviour of a potential migrant (PM) can be represented by a statistical model based upon utility maximization. Individuals are assumed to migrate in order to improve their situation, or level of 'utility' based upon perceptions which are shaped by personal attributes and regional characteristics. Rothenberg (1977, quoted in Maier and Weiss 1991, p. 17) argues that

> each member of the population performs the following calculation: at each point of time he (she) perceives that a choice has to be made between remaining a resident of his (her) current region and moving to another region. Each region, including the current place of residence, is perceived as possessing a set of opportunities and constraints relevant to the calculation; in addition, if he (she) were to move, a set of costs would be incurred. By evaluating each of the regions as an alternative prospect in utility terms and subtracting the cost of moving to it in utility

> terms, the subject forms a utility level for each hypothetical course of action. If a move to any new region yields an expected utility level greater than that associated with remaining in the current region, the subject will become a migrant. He (she) will migrate to that region that promises the highest expected utility level.

This therefore requires a modelling strategy within which both regional and individual characteristics are considered. Originally developed for travel demand studies (see Ben-Akiva and Lerman 1985), the logit model allows both the conceptual and operational study of individual migration behaviour and has been successfully applied in numerous situations (see for example Liaw and Ledent 1987, 1988; Liaw 1990). Within this framework, migration is treated as a random phenomenon whereby probabilities are used to describe migration propensities.

The organization of the chapter is as follows. Section 5.1 presents a brief discussion of alternate migration models, including the gravity, entropy and net-migration models. The utility maximizing discrete choice model is presented in section 5.2. Section 5.3 presents the three-level nested logit model used in the analysis of return and onward migration. Section 5.4 discusses model estimation and section 5.5 provides a summary.

5.1 ALTERNATE MIGRATION MODELS

Any attempt to provide an in-depth coverage of alternate migration

models would be lengthy. For this reason, the following represents an abbreviated discussion of migration models, including the gravity model, entropy models and net migration models.

Building upon Ravenstein's work and borrowing from Newtonian physics, the *gravity model* represents one of the earliest analytical models describing the phenomena of spatial interaction. The substance of the gravity model rests on the premise that any two places (i,j) will have an interaction (M_{ij}) in proportion to their populations (P_i,P_j) and inversely proportional to the distance separating them D_{ij} (where α ($\alpha > 0$) represents a coefficient associated with distance and K a constant). Adapted from Zipf (1946), the general functional form is

$$M_{ij} = K \frac{P_i P_j}{(D_{ij})^{\alpha}} \qquad (5.1)$$

The inability of the Newtonian model to predict interaction consistent with observed flows was corrected by the introduction of balancing factors to ensure consistent estimates (constrained gravity models). Wilson (1970) demonstrated that the gravity model could be derived from entropy maximizing concepts[1] *without* relying upon physical analogies. Spatial interaction models identified the most likely spatial allocation pattern (for example housing or migration) subject to constraints based upon known information, but still relied

upon a single variable (or composite factor) to describe origin and destination attractiveness.

While both the gravity and entropy models are grounded in micro-economic theory, they could not explain the causes of migration or the decision making process. Their scope is limited by their ability to model only aggregate events within a homogenous population and their reliance upon a single explanatory variable. Lacking an ability to model the underlying micro-economic relationships (which may not aggregate linearly), the gravity model was little more than a descriptive tool. The natural extension was therefore the addition of other variables within an extended framework designed to improve the explanation.

With roots in the macro perspective, net-migration models treat migration as an adjustment process in order to identify the determinants of migration and to consider its consequences. Despite knowledge of the pitfalls associated with the use of net-migration models, studies have continued to use this approach (see for example Foot and Milne 1984; Greenwood 1985). Their major drawback is

> that 'net migrants' do not exist - they are a statistical creation. There are no "net migrants"; there are, rather, people who are arriving at places or leaving them. (Morrison 1971, p. 61)

Net changes in population stocks are typically dwarfed by gross-migration flows and therefore work to hide the spatial dynamics generated by them and

> why they are doing so is central to understanding the dynamics

of...growth and decline" (Morrison 1971, p. 61).

Further, in operationalizing the net-migration model, the independent variables are typically associated with the migration behaviour of individuals, but the dependent variable (net migrants) does not represent individual migration propensity. Rogers (1990, p. 299) argued

> Causal models of migration that seek to explain patterns of net migration are founded on inadequate perspectives. Net migration rates confound movement propensities with relative population stock levels. They hide well-established regularities in the age pattern of geographical mobility. They can lead to misspecified explanatory (causal) models.

Gross migration streams therefore provide a more accurate portrait of the processes at work and permit the use of personal attributes, such as mother tongue, education or place of birth.

5.2 DISCRETE CHOICE MODELS

We are interested in the behaviour of potential migrants, requiring a theoretical framework which describes both individual behaviour and results in an easily operationalized model. This therefore requires a discussion of how the potential migrant chooses between competing options. However, there is no universally accepted choice theory. Therefore, the first portion of this section will briefly establish a framework for choice theories, followed by a discussion of the random utility discrete choice model which is used in this dissertation, and of the

problems associated with it.

5.2.1 A Choice Framework

A choice can be viewed as the outcome of a sequential decision making process that includes the definition of the choice problem, generation of alternatives, evaluation of alternatives, choice and implementation. In the context of this dissertation, and realizing that migration is a highly selective process, different kinds of people will have different choice situations, reflected by different departure propensities or destination choices. Therefore, the decision maker is the potential migrant faced with a series of options, including whether to stay or to leave the current province of residence, to make a return or onward migration and the choice of the destination.

The choice set (i.e. a set of potential destinations) is made up of a set of alternatives that are both feasible and known during the decision making process, where feasibility is defined by constraints such as monetary considerations or information availability. When faced with a choice, the potential migrant is assumed to behave rationally, whereby rational behaviour describes a decision maker with consistent and transitive preferences[2] and decisions are part of a calculated decision process. This allows the transformation of individual desires into a function expressing the action of that individual under a given set of conditions.

A choice containing two or more alternatives requires a decision rule

which describes how a unique choice is arrived at. Such rules include *dominance*, *satisfaction*, *lexicographic rules* and *utility*. Of these four decision rules, utility is the most widely used in discrete choice modelling. Utility assumes commensurability of attributes, meaning that the attractiveness of an alternative expressed by a vector of attributes is reducible to a scalar (Ben-Akiva and Lerman 1985). This defines a single objective function expressing the attraction of an alternative in terms of its attributes. The assumption of a single index is based on the notion of tradeoffs that a decision maker uses in comparing attributes. Therefore, if the attributes of a potential destination include measures of coldness, employment growth and cultural similarity, the destination with the highest utility (which is the destination with the best combination of employment growth, coldness and cultural similarity) will be chosen.

5.2.2 The Utility Maximizing Discrete Choice Model

The basic mathematical approach to modelling individual preference and behaviour is micro-economic consumer theory. Economic consumer theory, however, assumes that the choice set is a non-negative continuous variable, meaning that the demand functions derived from consumer theory have limited empirical usefulness when modelling discrete choices (i.e. in this case individual provinces of destination), as it is not possible to use the maximization techniques of calculus to derive discrete demand functions (Ben-Akiva and Lerman 1985).

Fortunately, basic micro-consumer theory concepts can be applied to

discrete choice sets, allowing the assumptions of rational behaviour to be maintained. The only difference between discrete choice theory and consumer theory is that utility functions are worked with directly. The migration choice problem is therefore described as a selection of one option from a finite, discrete set of alternatives.

Assuming a utility function U, each individual is faced with a set of discrete alternatives such that region i is chosen if and only if

$$U_i > U_j, \quad \text{for all } j \neq i \tag{5.2}$$

That is, the utility of region i is greater than the utility of region j. The utility of region i, U_i, is defined by the utility function incorporating attributes of the alternatives and the potential migrant;

$$U_i = U[z_i, S]$$

where z_i is a vector of attributes defining region i (e.g. regional attributes) and S is a vector of personal attributes defining an individual.

Rarely does it appear that the PM is rational. In choice experiments, individuals do not always select the same alternative when faced with the same choice situations (inconsistent). Furthermore, by changing the choice sets, a violation of the transitivity assumption is also observed. Because behaviour is inherently probabilistic, a probabilistic mechanism is introduced to explain any behaviourial inconsistencies[3]. But what determines this probability? Two options

exist. The first assumes that it results from individual behaviour which is inherently probabilistic, and the second assumes that it is due to the analysts lack of information regarding individual behaviour. This second approach, which is called random utility theory (Manski 1977), treats utilities as random. The lack of information does not reflect a lack of rational behaviour on the part of the decision maker, but a lack of information regarding the characteristics of individuals on the part of the modeller. However, such distinctions are, in themselves, not important, as identical models can be derived from both interpretations (Ben-Akiva and Lerman 1985). The probabilistic choice mechanism therefore captures the effects of unobserved variations among the decision makers and the unobserved attributes of the alternatives.

In attempting to maximize utility, the choice probability of alternative i, $P(M_i)$ is equal to the probability that the utility of choice i, U_i, is equal to or greater than all other utilities within the choice set (C)

$$P(M_i) = \Pr[U_i > U_j;\ i,j \in C] \text{ and } 0 \le P(M_i) \le 1.0 \qquad (5.3)$$

assuming that a 'tie' ($U_i = U_j$) cannot occur.

In general, the random utility of an alternative is defined as the sum of all deterministic and random components of the total utility, such that

$$U_i = V(z_i, S) + E(z_i, S) = V_i + E_i \qquad (5.4)$$

where V_i represents the deterministic component and E_i the random component (disturbance). The deterministic component is in turn a function of the vector of known regional characteristics and personal attributes.

The derivation of a specific random utility model requires assumptions about the joint probability distribution of the full set of disturbances. For example, for a binary choice function where $E = E_j - E_i$ is assumed to be logistically distributed results in the binary logit model. Similarly, the assumption that all disturbances are independently and identically Gumbel distributed (IID) results in the multinomial logit model defined by[4]

$$P(M_i) = \frac{\exp(V_i)}{\exp(V_j) + \exp(V_i)} \qquad (5.5)$$

Both models ensure that $\Sigma P(M_i) = 1$ and $0 \leq P(M_i) \leq 1$.[5] Since utility is measured ordinally, choice probabilities are not affected by the addition or multiplication of a constant to the region-specific utilities (Maier 1986). Therefore, only the relative utilities of regions can be determined (Maier and Weiss 1991).

5.2.3 The IIA Property

The choice probability framework within the logit model is largely responsible for its wide popularity in applied work. Furthermore, it has several advantages over other migration models, including allowances for (i) individual choice behaviour and heterogeneity, (ii) the probability of migrating to be affected by all regions within the system and (iii) a richer mechanism for capturing the

attributes of the system through the inclusive variable in the nested logit.

The most critical drawback of the logit model is its inability to allow for correlation across choices in E_i. This is known as 'independence of irrelevant alternatives' (IIA) and may lead to erroneous predictions. Formally, the relative choice probabilities from a subset of alternatives is dependent only upon the alternatives included within the subset and are independent of any other alternatives that may exist, such that (Maier and Weiss 1991);

$$\frac{P(M_j)}{P(M_k)} = \frac{\exp(V_j)}{\exp(V_k)} = \exp(V_j - V_k) \qquad (5.6)$$

Potential destinations may be evaluated similarly which may lead to correlation in the random component of the utility function, contradicting the assumption that the error terms are mutually independent.

The classic illustration of this problem is the 'red bus - blue bus' example. Suppose that P(car) = 0.5 and P(bus) = 0.5. Now, suppose a new bus service is introduced, equal in all aspects to the existing bus except that they are painted different colours. Under the choice axiom, the ratios of choice probabilities are constant. That is, P(car) = 1/3, P(red bus) = 1/3 and P(blue bus) = 1/3. However, this is an unrealistic assumption, since it is more likely that the two buses will behave as a single alternative with the following choice probabilities; P(car) = 0.5, P(red bus) = 0.25 and P(blue bus) = 0.25. Consequently, the validity of the choice axiom is restricted to choice sets with

distinct alternatives (Ben-Akiva and Lerman 1985).

The assumption within the logit model that all disturbances are independent and identically distributed (IID) constrains all disturbances (E_i) to have the same scale parameter μ. However, this implies that the variance of the random component of the utilities are equal. In the red bus/blue bus example, this is impossible, since the buses were completely equivalent, except for colour. Therefore, the disturbances are more likely to be perfectly correlated (i.e. completely substitutable), leading to false inferences (Ben-Akiva and Lerman 1985).

The validity of a model is questionable whenever alternatives are perceived to be similar. IIA is generally not a severe problem when modelling choice behaviour for two reasons. First, models that account for population heterogeneities tend to provide more accurate results. Second, in a simplified representation of the migration decision, the choice must be made between staying in the current region or migrating to another region. In cases with non-identical but similar alternatives, a choice hierarchy may be assumed, with different choice mechanisms applying to different levels of the hierarchy (e.g. departure and destination choice) (Ben-Akiva and Lerman 1985). By grouping similar alternatives (e.g. potential destinations) into one subset, the problem of correlation is largely avoided. From the destination decision model, an *inclusive value* can be derived which represents an aggregate characteristic of the

respective subset.[6] Therefore, the nested logit model effectively allows for some correlation (McFadden 1978; Maier and Weiss 1991).

5.3 THE THREE-LEVEL NESTED LOGIT MODEL

Before moving into the discussion of the three-level nested logit model, we should briefly consider the choice between the multinomial logit (ML) model and the nested logit (NL) model. In the ML model, there is no distinction between the decision to stay and to migrate. In the latter case, this distinction is made by splitting the model into three levels, assuming that the potential migrant is faced with a three-level hierarchial choice set (see Figure 5.1). At the upper level, the PM chooses to depart or to stay in the current location. At the middle level, if the PM chooses to depart, the choice is between making a return or onward migration. At the bottom level, the choice (given an onward migration) is between a specific destination in the remaining set of provinces. The NL model is preferred over the ML model for conceptual and empirical reasons (Anderson and Papageorgiou 1993).

First, in the ML model, the relative advantage to the non-native migrant to staying in *i* or moving to *j* depends only on the characteristics of *i* and *j*. In the NL model, the relative advantage depends not only on a comparison of origin and destination characteristics, but also on regional variations in mobility which reflect

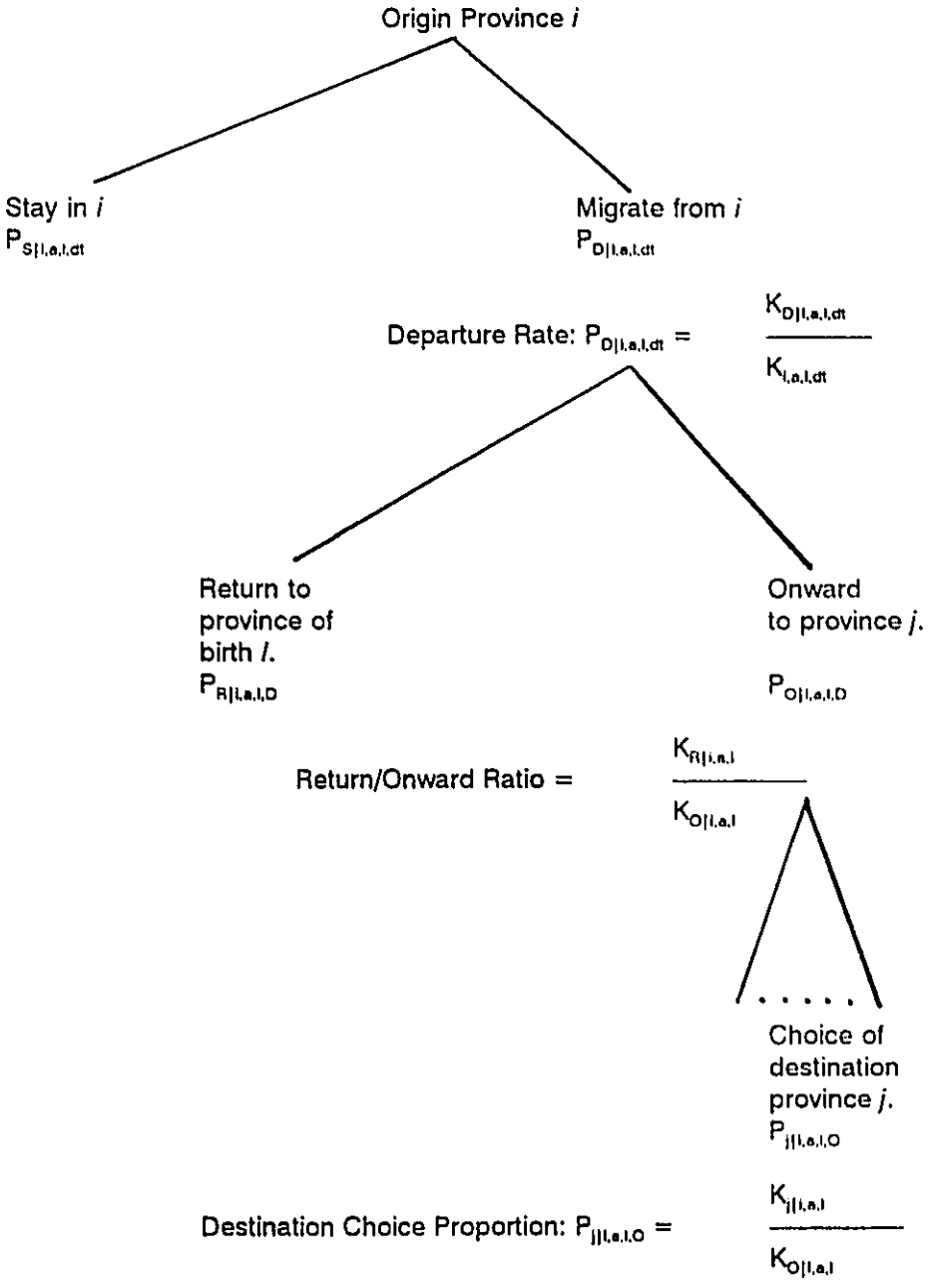


Figure 5.1 The Three-Level Choice Hierarchy

the characteristics of the origin province relative to all other provinces in the system. Therefore, the upper level of the NL model does not suffer from IIA, although it does at the lower level (Anderson and Papageorgiou 1993; McFadden 1978).

Second, it is impossible to determine *a priori* whether the decision to migrate should be represented by a one-stage model such as the ML model, or in two stages such as the NL model. Since the ML is a special case of the NL model, the latter is adopted and the issue is decided upon empirical grounds. In contrast, if the ML model is adopted and is wrong, a specification error results (Fotheringham 1986). Finally, since the NL model differentiates between decisions at each level of the hierarchy, especially with reference to the departure and destination choices, it can better account for differences between origin and destination characteristics (see Shaw 1985).

The propensities to make these choices are represented by a set of well-defined probabilities. For a non-native PM residing in province i during dt, born in province l and having personal attributes a, the propensity to make the choices at the three levels are represented by the departure probability ($P_{D|i,a,l,dt}$) and the stayer probability ($P_{S|i,a,l,dt}$) at the upper level; the return probability ($P_{R|i,a,l,D}$) and the onward probability ($P_{O|i,a,l,D}$) at the middle level; and the destination choice probability ($P_{j|i,a,l,O}$) (for j not equal to i and l) at the lowest level. All of these probabilities are conditional on the information given on the right side of the

vertical bar. Therefore, the probability of choosing to migrate to region j from region i is defined as

$$P_{i,j,a,I,dt} = [P_{D|I,a,I,dt}][P_{O|I,a,I,D}][P_{j|I,a,I,O}] \quad (5.7)$$

Since migration is assumed to be an outcome of a decision-making process which does not exist at all times, the departure probability is assumed to be a function of (i) the likelihood that the decision-making process emerges and is carried out and (ii) the probability that the perceived utility of the potential destination is higher than that of the province of current residence. The odds of departure are the product of (i) a monotonically increasing function of the migration interval and (ii) the odds that the maximum utility of the potential destinations is higher than the current province of residence;

$$P_{D|I,a,I,dt} / (1 - P_{D|I,a,I,dt}) = \exp[h(dt)]P_{D|I,a,I} \quad (5.8)$$

where $P_{D|I,a,I}$ is the probability that the maximum utility of all potential destinations is higher than the current province of residence and h(dt) is a function of the migration interval such that

$$\partial h[dt]/\partial dt > 0$$

That is, the longer the time interval, the more likely the decision process will occur and be carried out (Liaw 1991).

The choice probabilities are assumed to be functions of the perceived utility of the provinces in the choice set. The perceived utility of province j is defined as a random variable of the following form;

$$U_{j|l,a,t} = V_{j|l,a,t} + E_{\delta(i,j)|l,a,t} + E_{\gamma(l,j,l)|l,a,t} + E_{j|l,a,t} \qquad (5.9)$$

where $V_{j|i,a,t}$ is the deterministic component and the remaining terms are random such that

$\delta(i,j)$ = S (staying) if $j = i$,

= D (departing) if $j \neq i$,

$\gamma(i,j,l)$ = S (staying) if $j = i$,

= R (return) if $j \neq i$ and $j = l$

= O (onward) if $j \neq i$ and $j \neq l$

The random components are such that the following assumptions are met:

(1) All $E_{\delta(i,j)|i,a,t}$, $E_{\gamma(i,j,l)|i,a,t}$ and $E_{j|i,a,t}$ are independent random variables.

(2) $E_{j|i,a,t}$ is Gumbel-distributed with mode being zero and scale parameter being $1/\mu_3$.

(3) $E_{\gamma(i,j,l)|i,a,t}$ is such that $E_{\gamma(i,j,l)|i,a,t} + E_{j|i,a,t}$ is Gumbel-distributed with mode being 0 and scale parameter being $1/\mu_2$.

(4) $E_{\delta(i,j)|i,a,t}$ is such that $E_{\delta(i,j)|i,a,t} + E_{\gamma(i,j,l)|i,a,t} + E_{j|i,a,t}$ is Gumbel distributed with

mode being 0 and scale parameter being 1.

For example, the utility ($U_{j|i,a,l}$) for a particular destination j under the onward branch is defined as

$$U_{j|i,a,l} = V_{j|i,a,l} + E_{D|i,a,l} + E_{O|i,a,l} + E_{j|i,a,l}; \quad j \neq i, \; j \neq l \tag{5.10}$$

Based on the method in Kanaroglou, Liaw and Papageorgiou (1986a, 1986b), it can be shown that the choice probabilities are linked to $V_{j|i,a,l}$, $V_{D|i,a,l}$ and $V_{O|i,a,l,D}$ and μ in the following way.

For a non-native onward migrant, the probability of choosing a particular province j ($j \neq i$ and $j \neq l$) as a destination is:

$$P_{j|i,a,l,O} = \text{Prob}\{U_{j|i,a,l} > \max_{k \neq j}[U_{k|i,a,l}]; \; j,k \in C''\} \tag{5.11}$$

where C' refers to the choice set under the onward branch. It follows that

$$P_{j|i,a,l,O} = \text{Prob}\{[V_{j|i,a,l} + E_{D|i,a,l} + E_{O|i,a,l} + E_{j|i,a,l}] > \max_{k \neq j}[V_{k|i,a,l} + E_{D|i,a,l} + E_{O|i,a,l} + E_{k|i,a,l}]; \; j,k \in C''\} \tag{5.12}$$

$$P_{j|i,a,l,O} = \text{Prob}\{V_{j|i,a,l} + E_{j|i,a,l} > \max_{k \neq j}[V_{k|i,a,l} + E_{k|i,a,l}]; \; j,k \in C''\} \tag{5.13}$$

Based upon the above assumptions, the destination choice sub-model can be derived as

$$P_{j|i,a,l,O} = \frac{\exp(V_{j|i,a,l}/\mu_3)}{\sum_{k \neq l,l} \exp(V_{k|i,a,l}/\mu_3)} \tag{5.14}$$

For a non-native migrant, the probability of choosing the return branch is defined as:

$$P_{R|i,a,l,D} = \text{Prob}\{U_{l|i,a,l} > \max_{k \epsilon C''}[U_{k|i,a,l}]\} \tag{5.15}$$

which is equivalent to

$$P_{R|i,a,l,D} = \text{Prob}\{V_{l|i,a,l} + E_{D|i,a,l} + E_{R|i,a,l} + E_{l|i,a,l} > \max_{k \epsilon C''}[V_{k|i,a,l} + E_{D|i,a,l} + E_{O|i,a,l} + E_{k|i,a,l}]\} \tag{5.16}$$

and

$$P_{R|i,a,l,D} = \text{Prob}\{V_{l|i,a,l} + E_{R|i,a,l} + E_{l|i,a,l} > \max_{k \epsilon C}[V_{k|i,a,l} + E_{O|i,a,l} + E_{k|i,a,l}];\ j,k \epsilon C''\} \tag{5.17}$$

The return/onward choice sub-model at the middle of the choice framework is therefore written as

$$P_{R|i,a,l,D} = \frac{\exp(V_{l|i,a,l}/\mu_2 - \mu_3 I_{O|i,a,l}/\mu_2)}{1 + \exp(V_{l|i,a,l}/\mu_2 - \mu_3 I_{O|i,a,l}/\mu_2)} \tag{5.18}$$

where

$$I_{O|i,a,l} = \ln[\sum_{k \neq l, k \neq i} \exp(V_{k|i,a,l}/\mu_3)] \quad (5.19)$$

is the inclusive variable of the onward branch.

For a non-native potential migrant, the probability that the departure branch is more attractive is:

$$P_{D|i,a,l} = \text{Prob}\{U_{i|i,a,l} < \max_{k \neq i}[U_{k|i,a,l}]\} \quad (5.20)$$

$$P_{D|i,a,l} = \text{Prob}\{V_{i|i,a,l} + E_{S|i,a,l} + E_{S|i,a,l} + E_{I|i,a,l}] < \max_{k \neq i}[V_{k|i,a,l} + E_{D|i,a,l} + E_{O,R|i,a,l} + E_{k|i,a,l}]\} \quad (5.21)$$

$$P_{D|i,a,l} = \frac{\exp(\mu_2 I_{D|i,a,l} - V_{i|i,a,l})}{1 + \exp(\mu_2 I_{D|i,a,l} - V_{i|i,a,l})} \quad (5.22)$$

where

$$I_{D|i,a,l} = \ln[\exp(V_{i|i,a,l}/\mu_2) + \exp(\mu_3 I_{O|i,a,l}/\mu_2)] \quad (5.23)$$

is the inclusive value of the departure branch, which reflects the attractiveness of the rest of Canada, because the mode of the maximum utility of the alternatives under the departure branch is $\mu_2 I_{D|i,a,l}$.

Combining equations (5.8) and (5.22) yields the departure choice submodel:

$$P_{D|i,a,l,dt} = \frac{\exp(A_o + \mu_2 I_{D|i,a,l} - V_{i|i,a,l})}{1 + \exp(A_o + \mu_2 I_{D|i,a,l} - V_{i|i,a,l})} \quad (5.24)$$

where A_o is an unknown parameter used to capture the positive effect of the length of the time interval available for making the migration decision. Since the time interval is fixed at five years, A_o is simply a constant.

The utility function is typically assumed to be linear-in-parameters (additive). The models may be operationalized by defining $V_{i|i,a,l}$, $V_{j|i,a,l}$ and $V_{i|i,a,l}$ to be linear-in-parameters functions of vectors $Y_{i|i,a,l}$, $Z_{j|i,a,l}$ and $X_{i|i,a,l}$ such that

$$V_{j|i,a,l} = \gamma' Z_{j|i,a,l} \text{ for } k \neq i \quad (5.25)$$

$$V_{i|i,a,l} = \beta' Y_{i|i,a,l} + \beta_o \quad (5.26)$$

and

$$V_{i|i,a,l} = \alpha' X_{i|i,a,l} + \alpha_o \quad (5.27)$$

where Z, Y and X are vectors of observable personal factors and ecological variables; γ, α and β are vectors of the unknown coefficients; and β_o and α_o are used to maintain comparability after the observable variables are introduced. Although linear-in-parameters may sound restrictive, such a definition allows the transformation of the explanatory variables. That is, linearity in parameters is not the same as linearity in the attributes. Therefore, transformation of the variables is permitted without compromising the linear-in-parameters assumption. The

destination, return/onward and departure choice equations are therefore operationalized as

$$P_{j|l,a,l,O} = \frac{\exp(\gamma' Z_{j,l,a,l}/\mu_3)}{\sum_{k \neq l} \exp(\gamma' Z_{k,l,a,l}/\mu_3)} \tag{5.28}$$

$$P_{R|l,a,l,D} = \frac{\exp(\beta' Y_{l|l,a,l}/\mu_2 + \beta o - \mu_3 I_{O|l,a,l}/\mu_2)}{1 + \exp(\beta' Y_{l|l,a,l} + \beta_o - \mu_3 I_{O|l,a,l}/\mu_2)} \tag{5.29}$$

where

$$I_{O|l,a,l} = \ln \sum_{k \neq l} \exp(\gamma' Z_{k,l,a,l}/\mu_3) \tag{5.30}$$

and

$$P_{D|l,a,l} = \frac{\exp(A_o + \mu_2 I_{D|l,a,l} - \alpha' X_{i|l,a,l})}{1 + \exp(A_o + \mu_2 I_{D|l,a,l} - \alpha' X_{i|l,a,l})} \tag{5.31}$$

where

$$I_{D|l,a,l} = \ln[\exp((\beta' Y_{i|l,a,l} + \beta_o)/\mu_2) + \exp(\mu_3 I_{O|l,a,l}/\mu_2)] \tag{5.32}$$

Note that for notational simplicity we let α_o be absorbed into A_o.

Although the departure, mode and destination choice probabilities in the above equations are not directly observable, they may be estimated by the departure rate and the return/onward and destination choice proportions. For individuals with personal attribute a and born in province l, the departure rate

from province i during (t,t+5) is computed from

$$M_{D|i,a,l} = S_{D|i,a,l}/S_{i,a,l} \tag{5.33}$$

where $S_{i,a,l}$ is the number of non-natives in province i at time t who were born in province l and had personal attributes a and $S_{D|i,a,l}$ is the number of out-migrants in $S_{i,a,l}$.

The ratio of the return probability to the onward probability is estimated by

$$M(R/O) = S_{R|i,a,l}/S_{O|i,a,l} \tag{5.34}$$

where $S_{O|i,a,l}$ is the onward migration stream in $S_{D|i,a,l}$; and $S_{R|i,a,l}$ is the corresponding return migration stream.

The destination choice probability of the onward migrants is approximated by the destination choice proportion and is defined as

$$M_{j|i,a,l,o} = S_{j|i,a,l}/S_{O|i,a,l} \tag{5.35}$$

where $S_{j|i,a,l}$ is the number of onward migrants from i to j in $S_{O|i,a,l}$.

All of these variables can be considered as random variables, with expected values $E(M_{D|i,a,l}) = P_{D|i,a,l}$, $E(M(R/O)) = P_{R|i,a,l} / P_{O|i,a,l}$ and $E(M_{j|i,a,l,o}) = P_{j|i,a,l,o}$, respectively.

5.4 MODEL ESTIMATION

There are several general approaches to estimating discrete choice problems. The two methods most commonly used are least squares and maximum likelihood. These, along with the maximum-quasi likelihood method, will be discussed in this section.

Least-squares is most widely used in the case of linear regression and can be applied with appropriate modifications to a discrete choice model (both binomial and multinomial). The most commonly used approach is Berkson's procedure (Ben-Akiva and Lerman 1985) which transforms linear-in-parameters models into a standard regression format. If the model is written as

$$P_I = \frac{1}{1+\exp(-z_I)} \tag{5.36}$$

where $z_i = \beta X_i$, then the model may be transformed such that the dependent variable is simply the log-of-the-odds that a particular choice is made, such that

$$\log\left(\frac{P_I}{1 - P_I}\right) = \beta X_I \tag{5.37}$$

Berkson's procedure divides the sample into homogenous subgroups and uses the share of each group choosing each alternative as estimates of the choice probability, hence $P_i / (1 - P_i)$ may be estimated by the odds of the observed relative frequencies $(M_i / (1 - M_i)$. This method becomes problematic when M_i = 0 or 1.

Typically, the maximum likelihood (ML) method of estimation is used, whereby the "estimator is the value of the parameters for which the observed sample is most likely to have occurred" (Ben-Akiva and Lerman 1985, p. 20). Therefore, 'revealed preferences' allow the use of information about utilities which is inferred from observations of choice behaviour. As such, parameters are chosen which maximize the likelihood of the sample data. In general, ML estimators are consistent, asymptotically normal and asymptotically efficient.

Although similar to the maximum likelihood method, the maximum quasi-likelihood (MQL) method (Wederburn 1974; McCullagh 1983) does not assume that migration is an independent event (Liaw and Ledent 1987). MQL yields coefficients similar to ML, with t-ratios weighted by the weighted residual mean square (WRMS). In logit analysis involving the use of micro data, the WRMS approaches 1.0 such that the t-scores and adjusted t-scores resulting from the application of MQL are nearly identical (Liaw and Schuur 1988). Since the t-scores asymptotically approach the normal distribution, the computed coefficients are considered to be significant for a large sample if their t-scores exceed 2.0.[8]

We employ the MQL method in a sequential way, with the destination choice submodel estimated first and the departure choice submodel estimated last. Using the estimated parameters of the destination choice submodel, the values of $I_{O[i,a,]}$ are then computed. Using this as a separate independent variable, the parameters of the R/O submodel are estimated. The same procedure applies to the departure choice submodel. Of course, the estimation of the upper levels depends on the estimates obtained at the previous stage, introducing potential (and unknown) biases in the model.[9]

As a measure of the goodness-of-fit of the model, the rho-squared measure is defined as

$$\text{Rho-square} = 1 - L(\beta)/L(0) \qquad (5.38)$$

where $L(\beta)$ is the maximum-quasi-likelihood of the model with the given specification and $L(0)$ is the maximum-quasi-likelihood of the null model (constant only). McFadden (1974) suggested that a rho-squared value of 0.2 to 0.4 indicated a good fit.[10,11]

5.5 CONCLUSIONS

This chapter has discussed several aspects of the discrete choice approach to modelling migration. The most commonly used approach is based

on utility maximizing theory, whereby utility is partitioned into a systematic component and a random component leading to a probabilistic choice framework which may be translated into an operational model for analyzing both binary and multinomial migration problems. The logit model has a strong basis within microeconomic theory and has a sound behaviourial component. Based upon the assumption that individuals tend to migrate to that province where their utility is maximized and a set of assumptions about the random components of the model, the choice probabilities are linked to the perceived utilities via the nested logit model, which contains the departure choice submodel, the return/onward choice submodel and the destination choice submodel. The nested logit model, in particular, accounts for heterogeneity and allows the probability of migrating from i to j to be affected by attributes of all regions within the system. In this respect, it is deemed to be the most suitable model for analyzing migration patterns.

ENDNOTES

1. Entropy is a measure of uncertainty in a system.

2. Decisions are *consistent* in the sense that under identical conditions, the same alternative will be chosen. Decisions are *transitive* in the sense that if choice 1 is preferred to choice 2 and choice 2 is preferred to choice 3, then choice 1 is preferred to choice 3.

3. If it was possible to specify the source of these inconsistencies, deterministic choice theory could be used.

4. IID constrains all disturbances to have the same scale parameter μ, and therefore the variances of the random components of the utilities are equal.

5. In the binomial logit model, the assumption that the error terms are independently and identically distributed is the same as assuming that the error terms are logistically distributed. This provides a good approximation to the normal distribution, although the logistic distribution has fatter tails than the normal.

6. The probit model, which allows for correlated error components, is also theoretically applicable. However, due to the potentially large number of alternatives within a migration model, it is not an efficient estimator.

7. The variance of the random utilities is smallest at the lowest level of the tree and cannot decrease as we move to a higher level, $\mu_2 > \mu_3$. Hence, $\mu_3/\mu_2 \leq 1$.

8. Estimators may be evaluated based on three properties:
Consistent: If β is estimating B and plimβ = B, then β is consistent.
Asymptotically Normal: The distribution of β_N approaches the normal distribution as N approaches infinity.
Asymptotically Efficient: If β is consistent and asymptotically normal, then the variance of its asymptotic distribution is less than or equal to that of any other consistent estimator.
Monte Carlo simulation suggests that estimation results are good even for small samples (N > 200) (McFadden 1974).

9. For this reason, the 'best-fit' specification (see chapters 7 and 8) was estimated at each level, from which the inclusive values were estimated for

passing to the next level. It was hoped that this procedure minimized any potential bias.

10. When the sample size is small, a rho-squared value of 0.2 appears to indicate a relatively good fit (McFadden 1974). However, as the sample size increases, the value of the rho-squared tends to decrease, the upper bound of the measure is unknown.

11. This is really an adjusted rho-square.

CHAPTER 6

RETURN AND ONWARD MIGRATION IN CANADA, 1976-81: AN EXPLANATION BASED ON PERSONAL AND ECOLOGICAL VARIABLES

6.0 INTRODUCTION

The internal migration process tends to be relatively "inefficient", in the sense that a large flow is usually accompanied by a large counterflow (Ravenstein 1889; Sjaastad 1962). For a regional scientist who is concerned with interregional income disparities, a large counterflow of migrants from a high wage region to a low wage region is particularly disturbing, because these migrants may aggravate the unemployment and underemployment problems and prevent the wage from rising in the low wage region. For a cultural geographer who is concerned with the geographical polarization of ethnic groups, a large counterflow of migrants having the same ethnic background as the dominant ethnic group of the destination region can be equally disturbing. For these and other types of concerns (e.g. the impact of migration selectivity on the spatial pattern of the quality of human capital), the counterflows of migrants deserve close examination.

Examination of migration flows has revealed that **return migrants** (those migrating back to their "home" region such as the state or province of birth)

represent a rather high proportion of the counterflows, particularly those towards economically depressed regions (Eldridge 1965; Long 1988). Thus, a careful analysis of the return migration phenomenon is critical to an understanding of the complex nature of the observed migration process and its positive and negative effects.

In empirical research, return migration can be defined in different ways, depending on the nature of the available data. When the data contain detailed information on several recent moves for each migrant, a more recent migration can be defined as a return migration if its destination is the origin of a previous migration (DaVanzo and Morrison 1981; Grant and Vanderkamp 1986). Such data are particularly useful for studying the effects of the duration of residence and the number of previous migrations on the propensity to make a return migration. When the available data contain the information on only the most recent migration and an important reference region (e.g. place of birth or high school education) in an earlier stage of the migrant's life-cycle, the recent migration can be defined as return migration if its destination turns out to be the reference region (Miller 1977; Marr and Millerd 1980). To the extent that the reference region serves as a proxy for the "home" region, such data may help assess the importance of the attractions of kinship network and other forms of location-specific capital (e.g. previous clientele or family properties) in the home region. These alternative definitions of return migration, by taking advantage of

the distinct nature of the available data, help yield different but complementary insights.

For convenience, let us call the people who are at risk of making a return migration as *non-natives*. A non-native may decide against making a migration and become a *stayer*. If he/she decided to migrate, he may become an *onward migrant* by moving to a third region, or a *return migrant* by returning to his/her home region. A more complete understanding of the return migration phenomenon cannot be achieved without considering return migration in the context of these alternative possibilities.

Most of the important findings on migration in recent decades are based on the **micro approach**, through the application of properly specified propensity measures and behaviourial models to micro data. There are two main advantages of the micro approach over the macro approach. First, the micro approach allows the specification of propensity measures for individuals with particular characteristics (e.g. the outmigration rate of those unemployed) which tend to be less misleading than similar measures based on macro data (e.g. the outmigration rate of a high unemployment **area**). For example, it is easier to reveal the push effect of unemployment using behaviourial models (DaVanzo 1981) than the macro-adjustment model (Courchene 1970). Second, in assessing the effect of a key personal factor (e.g. level of education) on migration behaviour, the micro approach has more flexibility in controlling for the effects of other

factors (e.g. ethnic background, age, and family status) than the macro approach, and hence yields less biased results.

The purpose of this chapter is to explain the interprovincial migration of non-natives, aged 20-44, in Canada during the 1976-1981 period by applying a behaviourial model to micro data drawn from the 1981 census. The choice of provinces (instead of smaller areas such as metropolitan areas) as the geographical units is due to the lack of detailed geographical information from the 1981 census on the place of birth and the 1976 place of residence. The decision to focus on the non-natives was partly due to (1) the fact that non-natives tend to be much more migratory than natives and also appear to be less sensitive to the spatial variation in economic opportunities of the potential destinations (Liaw 1990), and (2) the strong suggestions in the literature that the migration choices made by the non-natives are likely to vary systematically with their personal attributes and experiences (Miller 1977; Morrison and DaVanzo 1986). The choice of the broad age interval, 20-44, is motivated by our desire to see if the behaviour of the individuals in the middle labour force age groups and those in the young labour force age groups vary in some systematic way. The behaviourial model, called the nested logit model, is based on the random-utility choice theory (Clark and Onaka 1985; Kanaroglou *et al.* 1986) and is capable of including both personal factors (the attributes of the potential migrants) and "ecological" variables (the attributes of the provinces in the choice set) as the explanatory variables.

The chapter is organized as follows. Section 6.1 describes the behaviourial model and the estimation method. Section 6.2 presents simple characterizations of the basic migration measures and discusses the specification of the potentially influential personal factors. Section 6.3 discusses the selection and specification of the ecological variables. Sections 6.4, 6.5 and 6.6 present the multivariate results from the application of the behaviourial model. Section 6.7 summarizes the main findings.

6.1 THE BEHAVIOURIAL MODEL

To model the behaviour of a *non-native*, a potential migrant (PM) at the beginning of the 1976-81 interval is defined as a person whose province of residence in 1976 differed from their province of birth and who remained alive in 1981. For analytical convenience, we structure the choices available to the PM into three levels, without assuming any particular temporal order in the actual choices. At the top level, the PM chose to **depart** (and become an interprovincial migrant) or to **stay** in the current province of residence (and become a stayer). At the middle level, if the PM departed, the choice was between *return migration* by moving back to the province of birth (and thus becoming a return migrant) and *onward migration* by moving to some other province (and thus becoming an

onward migrant). At the bottom level, if the PM was known to have become an onward migrant, the choice was to **select a specific destination among the remaining provinces**.

The propensities to make these choices are represented by a set of well defined probabilities. For a non-native PM residing in province i in 1976, being born in province l, and having the personal attributes a, the propensities to make the choices at the three levels are represented by **departure probability** $P_{D|i,a,l}$ and **stayer probability** $P_{S|i,a,l}$ at the upper level; **return probability** $P_{R|i,a,l,D}$ and **onward probability** $P_{O|i,a,l,D}$ at the middle level; and **destination choice probability** $P_{j|i,a,l,O}$ (for j not equal to i and l) at the lower level. All these probabilities are conditional on the information given on the right side of the vertical bar.

The choice probabilities are assumed to be functions of the **perceived utilities** of the provinces in the choice set. Consistent with the three-level choice structure, the perceived utility of any province j is defined as a random variable of the following form:

$$U_{j|l,a,l} = V_{j|l,a,l} + E_{\delta(l,j)|l,a,l} + E_{\gamma(l,l,j)|i,a,l} + E_{j|i,a,l} \qquad (6.1)$$

where $V_{j|i,a,l}$ is a non-random component, and the remaining three terms on the right-hand-side are random components, each corresponding to one of the levels of the choice framework. The symbol $\delta(i,j)$ in the first random component is a dichotomous variable, assuming the value S (stay) for j equal to i, or the value D (depart) for j not equal to i. The symbol $\gamma(i,j,l)$ in the second random component is a trichotomous variable, assuming the value S (stay) for j equal to i, the value R (return) for j equal to l, or the value O (onward) for j unequal to i and l.

Based on the assumption that people tend to choose a province with the highest utility and a set of sensible assumptions about the random components that are similar to those used in Kanaroglou *et. al.*, (1986), the choice probabilities are linked to the perceived utilities via a **nested logit model** which contains the following three submodels.

First, the **destination choice submodel** at the bottom level of the choice framework is

$$P_{j|l,a,l,o} = \frac{\exp(V_{j|l,a,l}/\mu_3)}{\sum_{k \neq l,l} \exp(V_{k|l,a,l}/\mu_3)} \qquad (6.2)$$

where μ_3 is an unknown parameter reflecting the amount of uncertainty in the third-level random components $E_{j|i,a,l}$ and $E_{k|i,a,l}$. This submodel is operationalized by letting

$$V_{j|i,a,l} = CZ_{j|i,a,l} \tag{6.3}$$

where **C** is a row vector of unknown parameters, and $Z_{j|i,a,l}$ is a column vector containing **observable explanatory variables** (e.g. the log of the distance between origin i and the potential destination j, the employment growth rate of j, and the interaction variable between the employment growth rate of j and a dummy variable representing the 20-24 age group).

Second, the **return/onward choice submodel** at the middle level of the choice framework is

$$P_{R|i,a,l,D} = \frac{\exp(V_{1|i,a,l}/\mu_2 - \mu_3 I_{O|i,a,l}/\mu_2)}{1 + \exp(V_{1|i,a,l}/\mu_2 - \mu_3 I_{O|i,a,l}/\mu_2)} \tag{6.4}$$

where μ_2 is another unknown parameter reflecting the uncertainty in the sum of the second- and third-level random components such that both μ_2 and μ_3/μ_2 are bounded between 0 and 1; and

$$I_{O|i,a,l} = \ln[\sum_{k \neq l,1} \exp(V_{k|i,a,l}/\mu_3)] \tag{6.5}$$

Note that $I_{O|i,a,l}$ is called the **inclusive variable of the onward branch** and can be considered as an index of the perceived attractiveness of the set of provinces which are the potential destinations for onward migration, because the mode of the maximum utility of this set is $\mu_3 I_{O|i,a,l}$. This submodel is operationalized by letting

$$V_{l|i,a,l}/\mu_2 = BY_{l|i,a,l} + B_o \qquad (6.6)$$

where **B** is a row vector of unknown parameters, $Y_{l|i,a,l}$ is a column vector of observable explanatory variables (e.g. the log of distance between i and l, the income level of l, and a set of dummy variables used to capture the negative effect of the level of education on the perceived utility of the province of birth), and B_o is an unknown constant term that insures the comparability of the utilities between the return and onward branches.

Third, the **departure choice submodel** at the top level of the choice framework is

$$P_{D|i,a,l} = \frac{\exp(A_o + \mu_2 I_{D|i,a,l} - V_{i|i,a,l})}{1 + \exp(A_o + \mu_2 I_{D|i,a,l} - V_{i|i,a,l})} \qquad (6.7)$$

where

$$I_{D|i,a,l} = \ln[\exp(V_{i|i,a,l}/\mu_2) + \exp(\mu_3 I_{O|i,a,l}/\mu_2) \quad (6.8)$$

and A_o is an unknown parameter used (1) to capture the positive effect of the length of the time interval available for making the migration decision, and (2) to insure the comparability of the utilities between the stayer and departure branches. Since the time interval for our data is fixed at five years, A_o is simply a constant term. The variable $I_{D|i,a,l}$ is called the **inclusive variable of the departure branch** and reflects the attractiveness of the rest of Canada (i.e. the whole system excluding i), because the mode of the maximum utility of the alternatives under the departure branch is $\mu_2 I_{D|i,a,l}$. This submodel is operationalized by letting

$$V_{i|i,a,l} = AX_{i|i,a,l} \quad (6.9)$$

where **A** is a row vector of unknown parameters, **X** is a column vector containing observable explanatory variables (e.g. the income level of province i, and a dummy variable used to capture the positive effect of French mother tongue on the perceived utility of Quebec).

We estimate the unknown parameters in the nested logit model by the maximum quasi-likelihood method (Wedderburn 1974; McCullagh 1983) in a sequential way (Ben-Akiva and Lerman 1985, pp. 295-298), using the Newton-Raphson algorithm. The t-ratio accompanying each estimated parameter is used

to test the null hypothesis that, in the context of the other variables in the model, the corresponding explanatory variable does not have explanatory power. Since the t-ratio is asymptotically normally distributed, and since our sample size is very large, we consider the magnitude of 2.0 for the t-ratio as an indication of statistical significance. Based on the likelihood criterion, the greater the magnitude of the t-ratio, the more important the corresponding variable.

The goodness-of-fit of a given specification of a submodel is measured by the Rho-square, which is defined as

$$\text{Rho-square} = 1 - L(\beta)/L(0) \tag{6.10}$$

where $L(\beta)$ is the log of maximum quasi-likelihood of the given specification of the submodel, and L(0) is the log of maximum quasi-likelihood of the corresponding null submodel (i.e. the submodel where the coefficients of all explanatory variables, excluding B_o and A_o, are set to zero). The Rho-square has a lower bound of 0 (for a very poor fit) and an upper bound that is substantially less than 1.0. According to some simulation results, a Rho-square of about 0.2 for micro data can indicate a very good fit (McFadden 1974). Since their upper bounds may be different among the three levels of the choice framework, the Rho-square values computed for the three submodels may not be comparable. Thus, we use Rho-square to assess the relative explanatory powers of different specifications of the same submodel rather than the relative explanatory powers of different

submodels.

To assess the importance of a set of explanatory variables (say, all economic variables) in the context of other explanatory variables, we delete the set of variables in question and observe the resulting decrease in Rho-square: the greater the decrease, the more important the deleted variables.

Before turning to the multivariate analysis, it is useful to examine certain observed rates and proportions which approximate the unobservable probabilities defined in the choice theory. The departure probability $P_{D|i,a,l}$ is approximated by the **departure rate**

$$P_{D|i,a,l} = \frac{K_{D|i,a,l}}{K_{i,a,l}} \qquad (6.11)$$

where $K_{i,a,l}$ is the number of non-natives in province i in 1976 who survived to 1981, were born in province l and had personal attribute a, and $K_{D|i,a,l}$ is the part of $K_{i,a,l}$ who departed (outmigrated) to other provinces in 1976-1981.[1] The ratio of the return probability $P_{R|i,a,l,D}$ to the onward probability $P_{O|i,a,l,D}$ is approximated by the **return/onward ratio**

$$R/O = \frac{K_{R|i,a,l}}{K_{O|i,a,l}} \qquad (6.12)$$

where $K_{R|i,a,l}$ and $K_{O|i,a,l}$ are the return and onward parts of $K_{D|i,a,l}$, respectively. The destination choice probability $P_{j|i,a,l,O}$ of the onward migrants is approximated by the **destination choice proportion**

$$P_{j|i,a,l,O} = \frac{K_{j|i,a,l}}{K_{O|i,a,l}} \tag{6.13}$$

where $K_{j|i,a,l}$ is the number of onward migrants in $K_{O|i,a,l}$ who selected province j as their destination.

Since the rates, ratios and proportions computed directly from equations (6.11) to (6.13) are too detailed to be useful for characterizing the migration patterns, we simplify them by suppressing various distinctions. For example, to see if the departure rates differed by gender, we compute the gender-specific departure rates by suppressing the distinctions in i and l, and let a stand only for gender.

6.2 SIMPLE CHARACTERIZATIONS OF THE OBSERVED MIGRATION PATTERNS AND SELECTION OF PERSONAL FACTORS

The micro data are drawn from the two-percent Public Use Sample (PUS) of the 1981 Canadian census. To avoid revealing confidential information, the individuals of the smallest province (Prince Edward Island), Yukon, and Northwest Territories were given the same provincial code by Statistics Canada. Since such

a "province" is not a meaningful geographical entity, all individuals with this provincial code, representing less than one percent of the sample, are excluded from this study. Thus, our **geographical system** contains the remaining nine provinces of Canada.

In the PUS, there are 23,508 identifiable non-natives, aged 20-44 as of 1981. Among these non-natives, 4,867 persons were found to have migrated among the provinces in 1976-81, yielding an overall departure rate of 21 percent, which was about four times the departure rate of the corresponding natives (5 percent). Among the 4,867 non-native migrants, 2,624 (54 percent) became return migrants and 2,243 (46 percent) onward migrants. Thus, the overall return/onward ratio (1.17) was somewhat higher than unity.

6.2.1 Departure Rates

In characterizing the geographical pattern of the departure rates, it is useful to divide the provinces into two sets: (1) the set consisting of the smaller (i.e. less populated) and poorer provinces of the Atlantic region (Newfoundland, Nova Scotia, and New Brunswick) and the two agricultural provinces on the Prairies (Manitoba and Saskatchewan); and (2) the set of larger and richer provinces (Quebec, Ontario, Alberta, and British Columbia). The non-natives in the former tended to have higher departure rates than those in the latter (Table 6.1). Among the smaller and poorer provinces, the departure rates ranged from 31 percent in Saskatchewan to as high as 47 percent in Newfoundland. Among

Table 6.1
Departure Rates of Non-native Adults (aged 20-44 in 1981) by Personal Attributes, 1976-81

Personal Attribute	Nfld.	N.S.	N.B.	Que.	Ont.	Mtb.	Sask.	Alta.	B.C.	Total	At-Risk Population
SEX:					(percent)						(person)
Female	45	36	32	23	17	31	29	21	15	20	11822
Male	49	35	38	29	17	35	33	20	14	21	11686
MOTHER TONGUE:											
English	45	34	35	38	16	34	32	20	14	21	19635
French	56	51	33	12	21	34	34	28	20	20	2951
Minority	75	29	43	28	16	20	17	17	17	18	922
EDUCATION:											
High-ed	41	43	38	39	20	35	29	20	16	25	2445
Mid-ed	44	37	37	24	19	35	33	20	14	21	9478
Low-ed	53	29	27	22	14	29	25	20	14	18	8006
Student	48	37	44	26	17	36	41	23	16	22	3579
MARITAL STATUS:											
Married	41	30	34	22	15	33	28	18	12	18	13250
Wedded	49	43	31	30	19	34	37	24	19	24	3306
Single	65	39	41	29	20	33	33	22	17	24	4975
D.S.W.	33	47	30	35	21	32	34	26	14	23	1977
FAMILY TYPE:											
HWC	42	31	31	22	14	29	28	18	13	18	12878
HW	58	42	43	26	18	40	34	21	16	22	3476
All Others	54	41	39	33	22	36	34	24	17	25	7154
AGE:											
20-24	57	37	33	33	19	33	32	18	19	24	4390
25-29	49	49	44	29	25	40	38	27	20	28	5280
30-34	47	37	34	23	18	34	27	22	14	21	5388
35-39	29	23	31	24	13	31	26	17	11	16	4623
40-44	41	24	26	18	11	24	29	13	7	13	3827
TOTAL	47	35	35	26	17	33	31	21	14	21	
AT-RISK POP. (persons)	190	914	685	2192	7190	1227	856	4503	5751		23508

D.S.W. = Divorced, Separated or widowed.
HWC = Husband and wife family with at least one child.
HW = Husband and wife family without children.

the larger and richer provinces, they ranged from only 14 percent in British Columbia to 26 percent in Quebec. Three specific points are worth making. First, the exceptionally high departure rate for Newfoundland was associated with the highest unemployment rate (14.7 percent, compared with the national rate of 7.7 percent) as well as the smallest population size. Second, with the lowest departure rate for the non-natives, British Columbia had the greatest capacity to retain its previous inmigrants and was dubbed "the end of line" in chapter 3, borrowing the phrase from Long's (1988) characterization of California. Third, despite being the second largest province (with 26 percent of the Canadian population), Quebec had the highest departure rate in the set of the four larger and richer provinces, suggesting that the domination of French culture made the retention of its previous inmigrants difficult.

6.2.2 Return/Onward Ratios

Next, we turn our attention to the choices between return and onward migration (Table 6.2). With Saskatchewan being a minor exception, the non-native outmigrants from all of the smaller and poorer provinces were less likely to return than to migrate onward, perhaps because a relatively high proportion of their previous inmigrants were originally from economically less well-off provinces and chose not to return to their province of birth. The two provinces with the lowest return/onward ratios were Newfoundland (0.78) and Manitoba (0.77). In contrast, the non-native outmigrants from the larger and richer provinces were

Table 6.2
Return/Onward Ratios of the Non-Native Adults (aged 20-44 in 1981) by Personal Factors, 1976-81

Personal Attribute	Nfld.	N.S.	N.B.	Que.	Ont.	Mtb.	Sask.	Alta.	B.C.	Total
SEX:										
Female	0.95	0.96	0.92	1.39	1.30	0.88	1.25	1.44	1.45	1.26
Male	0.67	0.84	0.98	1.76	1.10	0.69	0.96	1.11	1.18	1.09
MOTHER TONGUE:										
English	0.73	0.81	0.82	1.34	0.99	0.78	1.06	1.30	1.28	1.08
French	0.67	1.67	2.36	2.84	2.68	0.50	1.20	0.90	1.53	1.99
Minority	—	—	0.50	3.50	0.86	1.00	2.00	1.00	1.58	1.27
EDUCATION:										
High-ed	1.40	0.90	0.52	1.23	1.09	0.79	1.00	0.77	1.16	0.98
Mid-ed	0.48	1.22	1.21	1.47	1.10	0.79	0.95	1.40	1.28	1.17
Low-ed	1.00	0.61	0.97	1.67	1.56	0.70	1.32	1.36	1.40	1.27
Student	0.86	0.77	0.78	2.23	1.03	0.86	1.12	1.12	1.30	1.14
MARITAL STATUS:										
Married	1.21	0.92	1.14	1.41	1.26	0.71	0.98	1.11	1.14	1.12
Wedded	0.55	0.88	0.72	1.73	1.24	0.73	0.72	1.33	1.20	1.12
Single	0.30	0.67	0.70	1.61	0.99	0.74	1.62	1.45	1.44	1.13
D.S.W.	—	1.73	1.00	2.17	1.48	1.67	1.71	1.55	2.94	1.77
FAMILY TYPE:										
HWC	0.81	1.07	1.31	1.66	1.42	0.87	1.01	1.23	1.35	1.27
HW	1.33	0.61	0.56	1.40	0.98	0.46	0.46	1.10	1.12	0.90
All Others	0.65	0.86	0.72	1.55	1.06	0.87	1.73	1.38	1.37	1.19
AGE:										
20-24	0.40	0.66	0.53	1.46	0.91	0.68	1.27	1.51	1.21	1.04
25-29	0.81	1.16	1.03	0.67	1.15	0.97	1.11	1.51	1.51	1.32
30-34	0.85	0.91	1.58	1.71	1.68	0.79	1.00	1.26	1.37	1.31
35-39	2.00	0.90	0.78	1.00	1.08	0.62	1.31	0.99	1.20	1.01
40-44	1.25	0.87	1.27	1.67	1.23	1.09	0.67	0.69	1.06	1.02
TOTAL	0.78	0.90	0.95	1.57	1.20	0.77	1.09	1.26	1.31	1.17

D.S.W. = Divorced, separated or widowed.
HWC = Husband and wife family with at least one child.
HW = Husband and wife family without children.

more likely to return than to migrate onward. The moderately high ratios for Ontario (1.20), Alberta (1.26), and British Columbia (1.31) suggest that the relatively small proportion of non-natives who decided to leave these provinces of high income levels were mostly those who had a disappointing experience and hence had a stronger tendency to make return migration. The very high ratio for Quebec (1.57) was probably associated with the very high proportion of its non-native population who where born in the neighbouring high-income province of Ontario.

6.2.3 Destination Choice Proportions of Onward Migrants

Where did the onward migrants go? Consider Table 6.3. First, most of the onward migrants, particularly those from the western provinces, avoided Quebec, the second largest but French-dominated province of the country. With 26 percent of the national population, Quebec attracted only about 5 or 6 percent of the onward migrants from the Atlantic provinces and Ontario, and less than 3 percent of the onward migrants from each of the four western provinces. Second, with the minor exception of Newfoundland which sent 24 percent of its onward migrants to Nova Scotia, the Atlantic provinces sent more than 50 percent of their onward migrants to Ontario and Alberta, each receiving more than 20 percent. Third, the onward migrants from Quebec showed very strong preferences for the three provinces with the highest per capita income: Ontario (39 percent), Alberta (25 percent), and British Columbia (22 percent). Fourth, the onward migrants from

Table 6.3
The Observed Destination Choice Pattern of Onward Adults (aged 20–44 in 1981) in 1976-81

Province of Origin	Nfld.	N.S.	N.B.	Que.	Ont.	Mtb.	Sask.	Alta.	B.C.	Total Onward Migrants
					(percent)					(persons)
Nfld.	—	24.0	8.0	6.0	24.0	4.0	2.0	20.0	12.0	50
N.S.	4.1	—	13.5	5.9	22.9	2.9	5.9	27.7	17.1	170
N.B.	0.8	15.6	—	4.9	33.6	5.7	4.1	24.6	10.7	122
Que.	1.4	3.6	2.7	—	38.6	4.1	2.7	25.0	21.8	220
Ont.	1.4	5.6	4.3	6.1	—	7.5	3.8	45.8	27.6	559
Mtb.	0.0	3.5	1.3	2.2	11.4	—	7.5	40.4	35.8	228
Sask.	0.0	3.9	0.8	1.6	14.2	7.9	—	53.5	18.1	127
Alta.	0.5	3.2	2.0	1.7	15.1	5.9	10.0	—	61.7	410
B.C.	0.6	6.2	1.1	2.8	16.5	5.3	7.8	59.7	—	357

Ontario, Manitoba, Saskatchewan, and British Columbia showed their strongest preferences (46, 40, 54, and 60 percent) for Alberta where the rapid expansion of the oil industry led to an extremely high employment growth rate (6.3 percent per year, compared with the national value of 3.0 percent). Fifth, a large majority of the onward migrants from Alberta (62 percent) went to the neighbouring province of British Columbia which is endowed with a mild winter, scenic environment and rich natural resources.

Now we consider the migration selectivity with respect to personal factors. Among the numerous personal factors that could be identified in the micro data, we selected six that are potentially influential: **gender**, **mother tongue**, level of completed **education**, **marital status**, **family type**, and **age**. Those excluded are considered likely to be relatively unimportant (e.g. housing tenure) or to have changed so much in the five-year migration interval that the values recorded in the 1981 census could be quite different from their 1976 values. The categorization of the selected factors is as follows (with symbols as they appear in Table 6.1 and subsequent tables).

Gender: **Female** and **Male**.

Mother tongue: **English**, **French**, and **Minority**.

Education: **High-ed** (with degree), **Mid-ed** (with certificate or diploma), **Low-ed** (without degree, certificate and diploma), and **Student** (still attending school in 1981).

Marital status: **Married** prior to 1976, **Wedded** during the 1976-81 interval, **Single**, and **DSW** (divorced, separated or widowed).

Family type: **HWC Family** (family with husband, wife and at least one child), **HW Family** (husband-wife family without child) and **Other Household**.

Age: **20-24**, **25-29**, **30-34**, **35-39**, and **40-44**, defined as of 1981.

The migration measures computed for these categories allow the characterizations of the effects of the personal factors (Tables 6.1 and 6.2). Note that these characterizations tend to be less reliable than those from the estimated results of the multivariate model, particularly since some factors (e.g. marital status and family type) are correlated.

6.2.4 Departure Rates by Personal Attributes

Gender: In the system as a whole, the non-natives of each gender had nearly identical departure rates (20 percent for females and 21 percent for males). In Quebec and most of the lower income provinces, the departure rates were somewhat higher for males.

Mother tongue: In the system as a whole, the departure rates of the non-natives differed little among the three mother tongue groups: 21 percent for English, 20 for French, and 18 percent for Minority. However, the mother tongue effects were quite strong at the provincial level. In Quebec, the departure rate of the French (12 percent) was less than one-half and one-third of those of the Minority and the English (28 and 38 percent), respectively.[2] In most of the other

provinces, the departure rate of the French group tended to be higher than those of the other two groups.

Education: In the system as a whole, the departure rate of the non-natives showed a clear tendency to increase with the level of education: 18 percent for low-ed, 21 percent for mid-ed, and 25 percent for high-ed. The departure rate of the non-native students (22 percent) was similar to that of the mid-ed group. To various extents, the tendency for the rate to increase with education was also revealed in most of the provinces.

Marital status: In the system as a whole, the basic contrast was between the low departure rate of the married non-natives (18 percent) on the one hand and the high departure rates of the other three groups of non-natives: 24 percent for the wedded and single groups, and 23 percent for the DSW group. This contrast could also be observed in six of the nine provinces.

Family type: In the system as a whole, the non-natives in the HWC families had a low departure rate (18 percent), those in the HW families had a moderate rate (22 percent), and those in other households had a high rate (25 percent). This pattern could also be seen in the four larger and richer provinces.

Age: In the system as a whole, the departure rate for non-natives showed a clear age pattern. It rose from a moderately high level (24 percent) in the 20-24 age group to a maximum (28 percent) in the 25-29 age group and then declined with increasing age: 21 percent in the 30-34 age group, 16 percent in

the 35-39 age group, and 13 percent in the 40-44 age group. Such a pattern held in most individual provinces. For comparison, we note that the maximum departure rate among natives was in the 20-24 age group. This difference between non-natives and natives was also observed in the migration data of several American censuses (Miller 1977; Long 1988). It seems that much of the migration of natives in the 20-24 age group was based on unrealistic expectations, resulting in many repeat migrations observed for the non-natives in the 25-29 age group.

6.2.5 Return/Onward Ratios by Personal Attributes

Gender: Among the non-native migrants, the non-native females (R/O=1.26) appeared to be more prone to return than the non-native males (R/O=1.09). This observation applies to most provinces.

Mother tongue: Among non-native migrants, the French group (R/O=1.99) was much more prone to return than the Minority (R/O=1.27) and the English (R/O=1.08). It is worth noting that this was particularly true for French-speaking non-native migrants leaving not only Ontario (R/O=2.68) but also Quebec (R/O=2.84). It seems that those French-speaking non-natives of Quebec who came from New Brunswick (where Francophones represented about one-third of the provincial population) and Ontario and became disappointed in Quebec were most likely to return to their provinces of birth.

Education: Among non-native migrants, the propensity to return tended

to decrease with education: the return/onward ratio was 1.27 for the low-ed group, 1.17 for the mid-ed group, and 0.98 for the high-ed group. The return/onward ratio of non-native students (1.14) was similar to that of the mid-ed group. At the provincial level, the negative effect of the education factor on the return propensity could be clearly observed in Quebec, Ontario, and British Columbia.

Marital status: The propensities of the non-native migrants to return were much stronger in the DSW group (R/O=1.77) than in the other three marital groups (R/O ratio about 1.12). This contrast was evident also in a large majority of provinces.

Family type: The propensities of non-native migrants to return were stronger in the HWC families (R/O=1.27), weaker in the HW families (R/O=0.90), and intermediate in other households (R/O=1.19). This contrast was evident also in most of eastern and central provinces.

Age: The propensities of non-native migrants to return tended to be stronger in the 25-29 and 30-34 age groups (R/O=1.32 and 1.31) than in the other three age groups (R/O between 1.00 and 1.05). At the provincial level, this tendency was clear in a few provinces (Ontario, Manitoba, and British Columbia).

6.2.6 Destination Choice Proportions of Onward Migrants with Selected Personal Attributes

To help characterize the destination choice patterns of the onward migrants, some choice proportions have been selected for presentation in Table

6.4. Except for mother tongue, most personal factors did not show strong and systematic effects on the destination choice patterns. Among onward migrants from most of the provinces, French-speakers were clearly more likely than English-speakers to go to Quebec. The oil boom of Alberta seemed to attract higher proportions of males than females, singles than "marrieds", and younger adults (aged 20-24) than older adults. Ontario seemed to be somewhat more attractive to the high-ed group than the low-ed group.

6.3 SPECIFICATION AND SELECTION OF ECOLOGICAL VARIABLES

The perceived utility underlying the migration decision depends not only on personal factors but also on the ecological variables, representing the economic, cultural, environmental and geographic characteristics of the provinces. The specification and selection of the ecological variables within each submodel are guided by previous research results, substantive theories, and the desire to avoid high collinearity among the explanatory variables. The data sources are all described in Liaw and Ledent (1986), except for Statistics Canada (1966-1986) and Statistics Canada (1988).

To represent the income opportunity of a province, we use two measures of **income level**: (1) the value of annual provincial "wages, salary and other labour income" per employed person; and (2) the value of annual provincial "personal

disposable income" per member of the population. Both measures are 'real' in the sense that they have been adjusted for the temporal and spatial variation in consumer price index (100 for Ontario in 1986) and are in thousands of dollars per person per year. The average of the values over the period between 1976 and 1981 inclusive is used. To avoid collinearity, we select only the measure with stronger explanatory power in each submodel. According to human capital investment theory (Sjaastad 1962), income is hypothesized to have a positive effect on perceived utility and hence positive coefficients in both the destination choice and return/onward submodels and a negative coefficient in the departure submodel. Note that since the second income measure is less influenced by the severity of unemployment, its inclusion is more likely to mean that the unemployment variable will not be statistically significant in the submodel.

To represent employment opportunities in a province, we use the provincial **employment growth** rate (percent per year) between 1976 and 1981, and the provincial annual **unemployment** rate (percent of labour force) averaged over the five year period 1976 to 1980 inclusive. It is hypothesized that employment growth will have a positive effect on the province's perceived utility, and unemployment will have a negative effect. Again, the unemployment variable may turn out to be unimportant in some submodels as a result of multicollinearity.

To represent the quality of physical environment of a province, we use the index of **coldness**, which is defined as the annual number of degree-days

Table 6.4

Percentage of Adult Migrants Headed for Quebec, Ontario, Alberta and British Columbia by Province of Origin and Selected Personal Attributes: 1976-81

	Sex		Mother Tongue		Education		Marital Status		Family Type		Age	
Origin	Female	Male	English	French	High-e	Low-ed	Married	Single	HWC	HW	20-24	25-44
					Chosen Destination: Quebec							
Nfld.	5	7	7	0	40	5	7	5	7	0	0	9
N.S.	4	8	5	13	0	10	5	9	8	3	4	7
N.B.	5	5	5	9	5	2	5	6	6	4	0	7
Que.	—	—	—	—	—	—	—	—	—	—	—	—
Ont.	5	7	4	24	6	5	6	6	5	8	1	8
Mtb.	2	2	1	14	3	3	1	4	1	2	2	2
Sask.	2	1	1	20	0	0	0	8	0	0	3	1
Alta.	1	3	1	7	4	2	1	4	1	1	5	1
B.C.	2	3	3	11	0	3	3	4	2	3	4	3
					Chosen Destination: Ontario							
Nfld.	30	20	23	33	0	27	23	25	19	67	27	23
N.S.	22	24	24	13	41	17	24	20	20	28	21	24
N.B.	35	32	32	55	33	30	39	21	39	36	28	36
Que.	41	36	40	29	40	35	39	38	41	43	37	39
Ont.	—	—	—	—	—	—	—	—	—	—	—	—
Mtb.	10	13	10	21	7	16	11	11	11	14	8	12
Sask.	11	17	13	20	27	15	15	8	13	12	10	15
Alta.	10	19	14	31	25	13	15	16	15	17	8	16
B.C.	19	14	16	32	26	16	17	14	20	15	8	19
					Chosen Destination: Alb ta							
Nfld.	20	20	20	17	20	32	23	15	22	33	20	20
N.S.	24	31	27	33	17	31	24	37	26	19	36	24
N.B.	21	28	26	18	19	30	17	42	19	8	31	22
Que.	24	26	24	32	28	27	22	33	18	20	38	19
Ont.	42	46	45	32	39	45	44	43	42	47	54	41
Mtb.	38	43	41	36	59	34	40	45	36	43	42	40
Sask.	54	54	55	40	36	53	53	54	56	54	60	52
Alta.	—	—	—	—	—	—	—	—	—	—	—	—
B.C.	55	64	60	47	42	62	57	63	51	63	67	57
					Chosen Destination: B.C.							
Nfld.	15	10	9	33	20	5	7	20	7	0	13	11
N.S.	22	13	18	7	17	16	18	15	16	28	15	18
N.B.	13	8	12	0	10	11	10	12	7	20	8	12
Que.	22	22	22	19	17	21	20	23	18	20	15	25
Ont.	30	25	30	17	30	28	26	30	27	25	26	28
Mtb.	38	30	34	29	14	34	36	30	40	29	36	33
Sask.	16	20	18	20	18	22	19	21	16	23	20	18
Alta.	62	61	64	31	48	65	61	63	60	60	52	63
B.C.	—	—	—	—	—	—	—	—	—	—	—	—

HWC = Husband and wife family with at least one child.

HW = Husband and wife family without children.

below 18°C, averaged over the 1951-1980 period. The unit is in thousands of degree-days. This variable is hypothesized to have a negative effect on a province's perceived utility.

The preference for living in a familiar cultural milieu is represented by an index of **cultural similarity**. For each province, this index is defined as the proportional share of the 1976 provincial population by the ethnic group that matched the mother tongue of the potential migrant. This variable is hypothesized to have a positive effect on a province's perceived utility.

For a province as a potential destination, the lack of information about opportunities and the monetary and psychic costs of moving are represented by the **log of distance to the potential destination from the 1976 province of residence**. The distance (in thousands of kilometres) is defined as the weighted average distance between the metropolitan areas in the two provinces, with the weights being metropolitan population sizes. The log transformation is applied because the marginal decrease in information and the marginal increase in moving costs tend to weaken as distance increases. This variable is hypothesized to have a negative effect on the potential destination's **perceived** utility. Among all potential destinations, the province of birth may be associated with a weaker distance decay effect, because non-native migrants tend to be relatively familiar with the opportunities in the province of birth and have some (perhaps partially depreciated) location-specific capital left there (DaVanzo 1981).

The disappointment at the opportunities in the current (1976) province of residence may be greater if the distance to the origin of the previous migration was longer, for the following reasons (Grant and Vanderkamp 1986). First, the greater this distance, the more likely that the previous migration was based on a wrong assessment of the utility of the chosen destination. Second, this wrong assessment is likely to be positively biased, because those who under-estimated the utility of a potential destination would be more likely to stay put. Third, this positive bias is likely to result in disappointment and hence a downward reassessment of the utility of the current province of residence. To the extent that the province of birth was also the origin province of the previous migration, we may hypothesize that the **log of distance from the province of birth to current residence** had a negative effect on the perceived utility of the current province of residence and hence a positive effect on the departure probability.

Finally, we let the provincial size of ecumene be represented by its proportional share of the 1976 national **population size**. To some extent, this variable may represent also the relative availability of high-level urban amenities. We hypothesize that the population variable has a positive effect on a province's perceived utility.

6.4 ESTIMATION RESULTS OF THE DESTINATION CHOICE MODEL

The parameters of the destination choice submodel were estimated based on the individual records of 2,243 onward migrants via equations (6.2) and (6.3). The ecological variables, together with various interaction variables created by multiplying an ecological variable by dummy variables representing the personal factors, were entered into the submodel in various combinations (see Chapter 6 Appendix, Table 6.A.1). Most of the interaction terms turned out to be statistically insignificant. The main estimation results are summarized in Table 6.5.

In the 'general' specification (i.e. the specification that contains a large number of substantively meaningful explanatory variables), the coefficients of all ecological variables turned out to have the hypothesized signs. Except for the destination population size, they are also statistically significant. In terms of the t-ratios, distance (-19.0), unemployment (-15.7), and cultural similarity (11.3) are the most important ecological variables. The only two significant interaction terms in the general specification suggest that onward migrants in the youngest age group (20-24) were somewhat more sensitive to the attraction of employment growth at a potential destination, and that onward migrants from Newfoundland were particularly prone to go to Nova Scotia (the core of the Atlantic region). With a Rho-square of 0.317, the explanatory power of the general specification of the destination choice submodel appeared to be rather strong.

Table 6.5

The Estimation Results of the Destination Choice Submodel for Onward Interprovincial Migrants Aged 20-44 in Canada, 1976-81

Explanatory Variable	General Specification		Test 1 - All Econ.		Test 2 - Distance		Test 3 - Cultural Sim.		Test 4 - Coldness		Test 5 Best Spec.	
	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)
1. ECOLOGICAL VARIABLES												
Distance to P.D.	-0.709	-19.0	-0.570	-18.0	---	---	-0.655	-17.9	-0.709	-18.9	-0.716	-19.1
Cultural Similarity	2.226	11.3	0.526	4.7	1.941	9.4	---	---	2.318	12.0	2.281	11.6
Coldness	-0.215	-2.6	-0.252	-8.8	-0.185	-2.2	-0.465	-5.6	---	---	-0.123	-2.0
Employment Growth	0.200	5.0	---	---	0.208	5.2	0.307	7.5	0.127	4.8	0.147	6.4
Income Level	0.146	3.7	---	---	0.119	3.0	0.043	1.1	0.239	16.3	0.199	8.8
Unemployment	-0.314	-15.7	---	---	-0.307	-15.6	-0.252	-12.8	-0.325	-17.2	-0.332	-19.9
Population	0.742	1.6	1.973	9.0	1.000	2.2	1.372	2.9	-0.014	0.0	---	---
2. INTERACTIONS												
Nfld. to N.S.	1.424	3.9	0.481	1.3	2.345	6.3	1.787	4.9	1.487	4.0	1.428	3.9
Employment * 20-24	0.083	2.6	---	---	0.058	1.8	0.084	2.6	0.081	2.5	0.084	2.6
Rho-Squared	0.317		0.066		0.274		0.300		0.316		0.317	
Difference	---		0.251		0.043		0.017		0.001		0.000	

Definition of Variables:

Difference = rho-squared of general specification - rho-squared of the test model.

Distance to P.D. = Distance from the 1976 province of residence to the potential destination for onward migration.

Income Level = Real wage, salary and other labor income per capita.

Other Variables are defined in the text.

To assess the relative importance of subsets of the explanatory variables and the redundancy of their explanatory powers, we look at the effects of selectively deleting some explanatory variables. If the deletion results in a large decrease in Rho-square, then the deleted variables are considered to be highly important. If the deletion results in an increase in the magnitude of the t-ratio of a remaining variable, then this remaining variable and the deleted variables are mutually redundant in explanatory power.

From Tests 1 to 5, where various variables are deleted, we can make the following assessments. First, the set of the three economic variables (income level, employment growth and unemployment) at the potential destination were extremely important, as indicated by the very large reduction in Rho-square (from 0.317 to only 0.066) when they are deleted. Second, coldness was much less important than distance, cultural similarity, and the economic variables, suggesting that the quality of the environment at potential destination was not a major concern to the onward migrants in the 20-44 age interval. Third, the weak explanatory power of the destination population size in the full model was mostly due to its high redundancy with the economic variables, whose deletion causes the t-ratio of the population variable to increase sharply (from 1.6 to 9.0).

Finally, we may infer that personal factors were much less important than the ecological ones in accounting for the destination choice behaviour of onward migrants. Among all personal factors, mother tongue (which does not appear

explicitly but underlies the creation of the cultural similarity variable) seemed to be most important: the onward migrants of a given mother tongue tended to go to a destination with a relatively high concentration of the matching ethnic group. We have tried several interaction terms to test whether (1) males were more sensitive to the attraction of employment growth, and (2) the best educated were less subject to the distance-decay effect. Except for the positive interaction between the 20-24 age group and employment growth, they all turned out to be statistically insignificant.

The inclusive values of the onward branch, computed from the "best" specification (test 5, the specification with all coefficients statistically significant), have a sensible spatial pattern, when averaged for the origin provinces (see Chapter 6 Appendix, Table 6.A.2). Note that the inclusive value of a province does not show its own attractiveness. Rather, it indicates the attractiveness (utility) of **the rest of the system** (excluding the province of birth), perceived by the province's residents. The relatively low inclusive values at the eastern and western extremes of the country (especially Newfoundland: -0.32) were due to their large average distances to most other parts of the system. In contrast, the high inclusive values of Manitoba and Saskatchewan (0.17 and 0.41) were due to the fact that these two provinces were located near three major attractors in the system: Ontario on the eastern side and Alberta and British Columbia on the western side. Ontario, though being in the centre of the country, had a very low

average inclusive value (-0.42), mainly because the provinces around it were relatively less attractive.

6.5 ESTIMATION RESULTS OF THE RETURN/ONWARD CHOICE SUBMODEL

The parameters of the return/onward choice submodel were estimated from the records of 4,867 non-native migrants via equations (6.4), (6.5) and (6.6). The general specification in Table 6.6 contains not only the potentially useful ecological variables but also many dummy variables for capturing the effects of personal factors suggested by the Return/Onward ratios in Table 6.2. Note that the unemployment variable is not included in the general specification, because of its lack of explanatory power in the context of employment growth and income level (see Chapter 6 Appendix, Table 6.A.3). Other specifications in Table 6.6 are used to assess the relative importance of different subsets of explanatory variables and to study how their explanatory powers overlap.

The general specification has a moderate Rho-square of 0.096 and yields the following results. First, all ecological variables have coefficients of hypothesized signs and, except for destination population size, are highly significant. Second, in terms of t-ratio, the two most important ecological variables are cultural similarity (9.4) and distance to the province of birth (-8.2).

Note that the distance coefficient (-0.357) in this submodel was only half as large as the distance coefficient (-0.709) of the destination choice submodel, indicating that a return migration, relative to an onward migration, was less subject to the distance decay effect. Third, with two exceptions involving the 20-24 age group and the French-speaking group, the dummy variables representing personal factors have mostly significant signs that are consistent with the contrasts revealed previously by the return/onward ratios. For example, those who had divorced-separated-widowed marital status or belonged to the husband-wife-child family type were more likely to return, whereas those who had the highest level of education were less likely to return. Fourth, the large magnitude of the t-ratio (-8.2) associated with the inclusive variable indicates strongly that the more attractive the alternatives under the onward branch, the weaker the return propensity.

Tests 1 and 2 reveal the overlap in explanatory power between economic variables (income level and employment growth in the province of birth) on the one hand and population size of the province in birth on the other. The deletion of the economic variables caused the t-ratio of population size to increase from 0.8 to 6.6 (Test 1). Similarly, the deletion of population size caused the t-ratios of income level and employment growth to increase from 4.1 and 3.5 to 8.5 and 3.9, respectively (Test 2). The sizable decrease of Rho-square in Test 1, compared with practically no change of Rho-square in Test 2, indicates that the

destination economic variables were much more important: the provinces of birth with high income level and employment growth were particularly attractive to their native daughters/sons who decided to migrate again.

Test 3 is used to understand why the French dummy variable in the general specification had a negative sign, thereby contradicting our earlier statement that French-speaking non-native migrants were much more likely to return than to migrate onward. This contradiction disappeared in Test 3 where cultural similarity and the inclusive variable were deleted; the French dummy variable then has a positive coefficient. We may infer from this result that the main reason for the strong return propensity among the French-speaking migrants was the heavy concentration of the French population in Quebec and, to a lesser extent, in New Brunswick. The inclusive variable includes not only the effect of cultural similarity but also the greater response of the 20-24 age group to the employment growth in the choice set under the onward branch; we observe in Test 3 that the deletion of the inclusive variable resulted in a near zero coefficient for the dummy variable representing the 20-24 age group. Thus, the relatively low return/onward ratio of this age group reported in Table 6.2 was due to the attraction of the employment growth in provinces which were not the province of birth.

Test 4 shows that the deletion of all dummy variables representing personal factors resulted in a sizable reduction in Rho-square. Thus, personal

Table 6.6

The Estimation Results of the Return/Onward Submodel for Non-Native Migrants Aged 20-44 in Canada, 1976-81

Explanatory Variable	General Specification		Test 1 - All Econ.		Test 2 - Pop.		Test 3 - Incl. & Eth		Test 4 - Interact.		Best Specification	
	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)
Constant	-1.020	-1.8	0.661	1.8	-1.287	-3.0	0.615	1.2	-1.123	-2.2	-1.623	-4.2
1. ECOLOGICAL VARIABLES												
Inclusive Variable	-0.948	-8.2	-1.481	-15.2	-0.954	-8.3	—	—	-0.838	-11.2	-0.851	-10.8
Distance to P.B.	-0.357	-8.2	-0.270	-6.4	-0.356	-8.2	-0.322	-7.9	-0.353	-8.3	-0.352	-8.2
Cultural Similarity	1.525	9.4	1.195	7.8	1.546	9.6	—	—	0.016	10.1	1.546	9.6
Employment Growth	0.144	3.5	—	—	0.125	3.9	0.345	9.2	0.144	3.7	0.141	4.7
P.D. Income	0.187	4.1	—	—	0.216	8.5	0.059	1.4	0.203	4.5	0.213	8.4
Population	0.316	0.8	1.521	6.6	—	—	1.232	3.1	0.001	0.2	—	—
2. PERSONAL FACTORS												
Age Group: Reference = 35-44												
20-24	0.356	3.4	0.594	5.9	0.360	3.4	0.031	0.3	—	—	0.335	3.3
25-29	0.371	4.3	0.361	4.3	0.373	4.4	0.373	4.4	—	—	0.361	4.2
30-34	0.312	3.5	0.284	3.2	0.312	3.5	0.329	3.8	—	—	0.298	3.4
Marital Status: Reference = All others												
DSW	0.518	4.2	0.536	4.4	0.515	4.2	0.551	4.6	—	—	0.606	5.2
Level of Education: Reference = All others												
High-ed	-0.203	-2.1	-0.187	-1.9	-0.201	-2.0	-0.221	-2.3	—	—	-0.254	-2.7
Low-ed	0.130	1.9	0.111	1.6	0.129	1.8	0.157	2.3	—	—	—	—
Mother Tongue: Reference = Minority												
French	-0.474	-2.3	-0.964	-4.8	-0.451	-2.2	0.303	1.6	—	—	—	—
English	-0.257	-1.5	-0.081	-0.5	-0.239	-1.4	-0.320	-1.9	—	—	—	—
Gender:												
Male	-0.090	-1.4	-0.090	-1.5	-0.089	-1.4	-0.112	-1.8	—	—	—	—
Family Type: Reference = All others												
HWC Family	0.234	2.9	0.246	3.1	0.233	2.9	0.258	3.3	—	—	0.307	4.4
HW Family	-0.166	-1.7	-0.143	-1.5	-0.167	-1.7	-0.171	-1.8	—	—	—	—
Rho-squared	0.096		0.081		0.096		0.069		0.086		0.094	
Difference	—		0.015		0.000		0.027		0.011		0.002	

Definition of variables:

Difference = rho-squared of full model - rho-squared of test model.

Distance to P.B. = Distance to the province of birth from the 1976 province of residence.

Income Level = Personal disposable income income per capita

factors were only somewhat less important than the set of ecological variables in the return/onward choice.

The most important finding from the return/onward choice submodel is that return migration is clearly sensitive to income and employment opportunities. Among the provinces of birth, those with higher income levels and employment growth exerted greater attraction on their native daughters/sons, despite the somewhat misleading fact that the migration flows to economically depressed areas usually contain a high proportion of return migrants.[3] However, in light of the overwhelming importance of the economic variables in the destination choice submodel under the onward branch, we may infer that return migrants were less sensitive to economic variables than onward migrants.

The inclusive values of the departure branch computed from the "best" specification of the return/onward choice submodel for the origin provinces have a spatial pattern rather similar to that of the inclusive values of the onward branch, suggesting the strong role played by the distance variable in both the destination choice and return/onward choice submodels (see Chapter 6 Appendix, Table 6.A.4). Being close to three highly attractive provinces (Ontario, Alberta and British Columbia), Manitoba and Saskatchewan had the highest inclusive values (0.81 and 1.00). Being at the eastern and western peripheries of Canada, Newfoundland and British Columbia had very low inclusive values (0.49 and 0.56). Surrounded by relatively less attractive destination provinces, Ontario had the

lowest inclusive value (0.46).

6.6 ESTIMATION RESULTS OF THE DEPARTURE CHOICE SUBMODEL

The parameters of the departure choice submodel were estimated from records of 23,508 non-natives via equations (6.7), (6.8) and (6.9). Due to its high collinearity with income level and employment growth, the unemployment variable was excluded from the set of ecological variables in the general specification of the submodel (see Chapter 6 Appendix, Table 6.A.5). A dozen dummy variables were also included in the general specification to represent the effects of personal factors. Various subsets of explanatory variables were then deleted from the general specification in a series of tests to evaluate their relative importance. Because of the very large sample size, the value of the Rho-square in the general specification was quite small (0.064), despite the fact that the t-ratios associated with several variables were large (Table 6.7).

The most important ecological variable in the general specification was the income level of the origin province (t=-16.3): the higher the income, the lower the propensity to depart. Of similar importance is the distance to the province of birth (t=14.5): the greater the distance of previous migration, the more likely the disappointment, and the greater the propensity to migrate again. Of moderate importance was cultural similarity (t=-4.1): the better the match between the

Table 6.7

The Estimation Results of the Departure Choice Submodel for Non-Natives Aged 20-44 in Canada, 1976-81

Explanatory Variable	General Specification		Test 1 - Economic		Test 2 - Population		Test 3 - Cultural Sim.		Test 4 - Family Type		Best Specification	
	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)	Coeff.	(t)
Constant	0.327	1.1	-3.612	-16.5	0.018	0.1	-0.218	-0.8	0.246	0.8	0.074	0.3
1. ECOLOGICAL VARIABLES												
Inclusive Variable	0.499	8.0	0.622	10.1	0.471	7.7	0.532	8.6	0.431	7.0	0.464	7.6
Distance from P.B.	0.355	14.5	0.214	9.1	0.342	14.3	0.345	14.2	0.356	14.6	0.341	14.2
Cultural Similarity	-0.739	-4.1	0.359	1.9	-0.671	-3.8	—	—	-0.768	-4.3	-0.667	-3.8
Employment Growth	0.028	1.7	—	—	-0.003	-0.2	0.031	1.8	0.027	1.6	—	—
P.D. Income	-0.368	-16.3	—	—	-0.322	-21.7	-0.352	-16.0	-0.367	-16.3	-0.324	-24.4
Population	0.607	2.8	-1.395	-9.7	—	—	0.490	2.3	0.569	2.6	—	—
2. PERSONAL FACTORS												
Mother Tongue:												
English in Que.	0.204	1.8	1.214	11.2	0.302	2.8	0.565	7.8	0.205	1.8	0.306	2.9
French not in Que.	0.199	2.0	0.786	7.6	0.247	2.5	0.537	9.0	0.176	1.7	0.250	2.6
French in Que.	-0.373	-3.3	-0.098	-0.9	-0.342	-3.0	-0.521	-4.8	-0.394	-3.5	-0.344	-3.0
Age Group: Reference = 40-44												
20-24	0.499	7.2	0.529	7.7	0.505	7.3	0.490	7.1	0.480	7.0	0.464	7.2
25-29	0.783	12.7	0.778	12.7	0.787	12.8	0.776	12.6	0.775	12.7	0.762	12.7
30-34	0.441	7.3	0.428	7.1	0.444	7.3	0.433	7.1	0.449	7.4	0.437	7.2
35-39	0.227	3.6	0.218	3.5	0.229	3.6	0.224	3.5	0.224	3.5	0.227	3.6
Level of Education: Reference = All others												
Low-ed	-0.136	-3.6	-0.137	-3.7	-0.136	-3.7	-0.135	-3.6	-0.126	-3.4	-0.132	-3.6
Hi-ed	0.221	4.0	0.313	5.8	0.224	4.1	0.224	4.1	0.217	4.0	0.219	4.0
Family Type: Reference = All others												
HWC Family	-0.377	-8.3	-0.371	-8.3	-0.375	-8.3	-0.380	-8.4	—	—	-0.332	-8.8
HW Family	-0.180	-3.3	-0.193	-3.6	-0.184	-3.4	-0.178	-3.3	—	—	-0.151	-3.0
Marital Status: Reference = All others												
Married	0.080	1.7	0.100	2.2	0.078	1.7	0.081	1.8	-0.125	-3.2	—	—
Rho-squared	0.064		0.044		0.064		0.064		0.062		0.064	
Difference	—		0.020		0.000		0.000		0.002		0.000	

Definition of variables:

Difference = rho-squared of null model - rho-squared of the test model.

P.D. Income = Personal disposable income per capita

Null Model: Coeff. of constant = -1.34, t=-83.4

mother tongue of the potential migrants and the ethnic composition of the province of origin, the lower the departure propensity. The strong drawing power of the perceived utility of the rest of the system was indicated by the large t-ratio associated with the inclusive variable (t=8.0).

The coefficients of employment growth and population size in the general specification were misleading, because of the high collinearity between the economic variables on the one hand and population size on the other. When the economic variables are deleted, the coefficient of population size becomes negative and highly significant (t=-9.7): the larger the population size in the province of origin, the stronger its retention power (Test 1). When population size is deleted, the coefficient of employment growth also becomes negative and significant: the greater the employment growth in the origin province, the smaller the departure propensity (Test 2). Note that the large decrease of Rho-square that resulted from the deletion of economic variables in Test 1 (from 0.064 to 0.044) indicates strongly that economic opportunities in the province of origin were very powerful in preventing non-natives from departing.

With respect to personal factors, the dummy variable representing gender was found to be insignificant and was excluded from the general specification. The coefficients of the dummy variables representing mother tongue allow the inference that the departure propensity of a non-native was enhanced by being English in Quebec or French in the rest of Canada and was reduced by being

French in Quebec. Since the effect of mother tongue was partly reflected in the coefficient of cultural similarity, it is not surprising to see in Test 3 that the deletion of the cultural similarity variable resulted in rather large t-ratios for these mother tongue effects: 9.2 for English in Quebec, 9.3 for French in the rest of Canada, and -4.7 for French in Quebec.

The level of education had a moderate effect (t=-3.6 for low-ed group and 4.0 for high-ed group): the higher the level of education, the higher the departure propensity. Since better educated non-native migrants were less likely to return than to migrate onward, we found the probability that a non-native would make a return migration (i.e. the departure probability times the return probability) to be nearly independent of the level of education.[4] This is similar to Long's (1988) finding that the propensities for primary and onward interstate migration in the United States increase strongly with education, whereas the propensity for return migration does not.

The coefficients of the two dummy variables representing family type were significant in the general specification: t= -8.3 for HWC type and -3.3 for HW type. They allow the inference that the departure propensity was reduced markedly by being in a husband-wife-child family and moderately by being in a husband-wife family. However, marital status did not have a significant effect in the general specification because it was highly collinear with family type. Test 4 shows that the dummy variable representing the married status turned out to have a

significant negative effect (t=-3.2) after family type was excluded.

The highly significant coefficients of the four dummy variables representing age confirm the basic age pattern of the departure propensity: a rise from a high level in the 20-24 age group to a high peak in the 25-29 age group, followed by a continuous decline toward the 40-44 age group.

Finally, we see that the effects of the personal factors revealed by the departure choice submodel were quite similar to those suggested by the departure rates in Table 6.1. The multivariate result further indicates that the effect of marital status on the departure propensities of non-natives are not important when family type is taken into account.

6.7 CONCLUSIONS

By using properly defined propensity measures and a three-level nested logit model, we have shown that the migration behaviour of the non-natives in the 20-44 age groups in Canada during 1976-81 were subject to the effects of ecological variables and personal factors in readily interpretable ways.

The departure propensities of the non-natives were (1) negatively affected by economic opportunities (income level and employment growth) of the province of origin and (2) positively affected by the inclusive variable which summarized the various aspects of the attractiveness of the remaining provinces. To the

extent that the distance from the province of birth was a reasonable proxy for the lack of accurate information in the previous migration and hence for the likelihood of disappointment in the current (1976) province of residence, we found indirect support for the idea that disappointed non-natives were more likely to migrate again. The departure propensities were also significantly affected by several personal factors. They were enhanced by being (1) English in Quebec, (2) French in the rest of Canada, and (3) best educated, and were reduced by being (1) French in Quebec, (2) poorly educated, and (3) in a husband-wife-child family.

Onward and return migrants differed in two important respects. First, onward migrants were much more sensitive to economic opportunities in choosing a specific destination, while the return migrants were subject mostly to the attractions of the economic opportunities in the province of birth. Second, return migrants were less affected by the friction of distance, although both return and onward migrants were clearly subject to a distance decay effect.

The return propensities of non-native migrants were enhanced by the divorced-separated-widowed marital status and the husband-wife-child family type, and reduced by the highest education level. Since education has a positive effect on departure propensity and a negative effect on return propensity, we found the non-native's probability of a return migration (i.e. departure probability times return probability) to be nearly independent of level of education. This is similar to Long's (1988) finding that the primary and onward migration rates increase

strongly with level of education, whereas the return migration rate does not. Thus, onward migration tends to be more helpful than return migrations in improving the quality of the human capital of the destination.

We found age selectivity at all three levels of the choice framework. It was the strongest at the top level and the weakest at the bottom level. The onward migrants in the youngest age group (20-24) were somewhat more attracted by the employment growth at the potential destination. The non-native migrant's propensity to return was enhanced by being relatively young (less than 35). The departure schedule of non-natives had a clear peak in the 25-29 age group, which was five years later than the peak of the departure schedule of natives.

We also found significant effects of cultural similarity at all three choice levels. These effects worked against the mixing of cultural groups. It seems that cultural polarization is likely to remain or even to intensify in Canada. The hope for reducing income disparities and cultural polarization among the provinces hinges on the responses of potential migrants to economic opportunities. Our finding that even return migrants responded to these opportunities in a rational way is a hopeful sign.

ENDNOTES

1. Since the census questionnaire allows us to detect **at most** one migration for each person in the five year interval, it is well known that $K_{D[i,a,]}$ understates the actual number of migrants.

2. The rather high departure rates of the English and Minority groups in Quebec were related to the provincial government's introduction of regulations in 1977 to limit the use of the English language in education and business.

3. It was shown in chapter 4 that this high proportion was due to the large size of the previous outmigration from the economically depressed provinces.

4. The estimated probability of making a return migration was 10.1 percent for the low-ed group, 11.3 percent for the mid-ed group and 12.4 percent for the high-ed group. The corresponding probability of making an onward migration was 7.9 percent for the low-ed group, 9.7 percent for the mid-ed group and 12.6 percent for the high-ed group.

CHAPTER 6 APPENDIX

Table 6.A.1
Simple Correlation Coefficients of the Ecological Variables in the Destination Choice Submodel, 1976-81

Variable	1	2	3	4	5	6	7	8
1. Distance to Potential Destination	1.00	0.20	0.06	0.13	-0.07	0.22	-0.11	-0.15
2. Cultural Similarity	0.20	1.00	0.00	0.05	-0.29	0.41	-0.35	-0.18
3. Employment Growth	0.06	0.00	1.00	0.40	0.64	-0.36	0.03	-0.13
4. Wages	0.13	0.05	0.40	1.00	0.55	0.28	0.54	-0.84
5. P.D. Income	-0.07	-0.29	0.64	0.55	1.00	-0.62	0.56	-0.35
6. Unemployment	0.22	0.41	-0.36	0.28	-0.62	1.00	-0.17	-0.40
7. Population	-0.11	-0.35	0.03	0.54	0.56	-0.17	1.00	-0.32
8. Coldness	-0.15	-0.18	-0.13	-0.84	-0.35	-0.40	-0.32	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.

Table 6.A.2
Inclusive Values From the Best-Fit Destination Choice Submodel, 1976-81

Province of Origin	Overall	English		French		Minority	
		20-24	Other	20-24	Other	20-24	Other
Nfld.	-0.32	-0.01	-0.30	-0.93	-1.22	---	---
N.S.	-0.26	0.03	-0.28	-0.70	-1.04	---	---
N.B.	-0.08	0.21	-0.07	-0.68	-1.02	---	-0.57
Quebec	-0.01	0.33	0.07	-0.80	-1.06	0.13	-0.22
Ontario	-0.42	0.00	-0.41	-0.77	-1.10	-0.20	-0.67
Manitoba	0.17	0.54	0.15	-0.34	-0.72	0.35	-0.14
Sask.	0.41	0.75	0.35	---	-0.48	---	0.30
Alberta	-0.15	0.15	-0.11	-0.78	-1.06	-0.31	-0.48
B.C.	-0.19	0.18	-0.25	-0.65	-1.07	-0.12	-0.29

Table 6.A.3
Simple Correlation Coefficients of the Ecological Variables in the Return/Onward Choice Submodel, 1976-81

Variable	1	2	3	4	5	6	7	8	9
1. Inclusive Variable	1.00	0.18	-0.04	-0.27	-0.24	-0.18	-0.02	-0.15	0.08
2. Distance to P.B.	0.18	1.00	0.17	0.09	0.19	0.10	0.08	0.04	-0.17
3. Cultural Similarity	-0.04	0.17	1.00	-0.04	0.15	-0.22	0.45	-0.10	-0.26
4. Employment Growth	-0.27	0.09	-0.04	1.00	0.30	0.53	-0.34	-0.06	-0.05
5. Wages	-0.24	0.19	0.15	0.30	1.00	0.63	0.30	0.67	-0.86
6. P.D. Income	-0.18	0.10	-0.22	0.53	0.63	1.00	-0.53	0.65	-0.43
7. Unemployment	-0.02	0.08	0.45	-0.34	0.30	-0.53	1.00	-0.08	-0.44
8. Population	-0.15	0.04	-0.10	-0.06	0.67	0.65	-0.08	1.00	-0.48
9. Coldness	0.08	-0.17	-0.26	-0.05	-0.86	-0.43	-0.44	-0.48	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.
Distance to P.B. = Distance to the province of birth from the 1976 province of residence.

Table 6.A.4
Inclusive Values From the Best-Fit Return/Onward Choice Submodel, 1976-81

Province of Origin	Overall	High-ed	DSW Marital Status	HWC Family	Age 20-24	Age 25-29	Age 30-34
Nfld.	0.49	0.37	0.61	0.55	0.55	0.46	0.54
N.S.	0.61	0.44	0.74	0.64	0.72	0.63	0.61
N.B.	0.73	0.60	1.09	0.75	0.81	0.75	0.76
Quebec	0.73	0.63	0.86	0.79	0.86	0.70	0.77
Ontario	0.46	0.31	0.68	0.49	0.58	0.48	0.49
Manitoba	0.81	0.64	1.06	0.82	1.01	0.81	0.78
Sask.	1.00	0.81	1.28	0.98	1.21	1.00	1.00
Alberta	0.64	0.47	0.94	0.65	0.78	0.68	0.64
B.C.	0.56	0.40	0.78	0.57	0.74	0.55	0.52

Table 6.A.5
Simple Correlation Coefficients of the Ecological Variables in the Departure Choice Submodel, 1976-81

Variable	1	2	3	4	5	6	7	8	9
1. Inclusive Variable	1.00	-0.09	-0.15	0.04	-0.26	-0.18	-0.09	-0.28	0.18
2. Distance from P.B.	-0.09	1.00	0.14	0.16	0.23	0.28	-0.04	-0.08	-0.25
3. Cultural Similarity	-0.15	0.14	1.00	0.00	0.12	-0.00	0.19	-0.08	-0.20
4. Employment Growth	0.04	0.16	0.00	1.00	0.15	0.46	-0.52	-0.44	0.09
5. Wages	-0.26	0.23	0.12	0.15	1.00	0.78	0.33	0.39	-0.89
6. P.D. Income	-0.18	0.28	0.00	0.46	0.78	1.00	-0.31	0.32	-0.59
7. Unemployment	-0.09	-0.04	0.19	-0.52	0.33	-0.31	1.00	0.06	-0.53
8. Population	-0.28	-0.08	-0.08	-0.44	0.39	0.32	0.06	1.00	-0.22
9. Coldness	0.18	-0.25	-0.20	0.09	-0.88	-0.59	-0.53	-0.22	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.
Distance from P.B. = Distance from the province of birth to the 1976 province of residence.

CHAPTER 7

RETURN AND ONWARD INTERPROVINCIAL MIGRATION THROUGH ECONOMIC BOOM AND BUST IN CANADA: FROM 1976-81 TO 1981-86

7.0 INTRODUCTION

Rapid economic growth through the 1950s and the 1960s in most industrialized countries was followed in the early 1970s by what appeared to be a permanent transition in the migration process. The transition was variously called 'counter-urbanization', 'metropolitan deconcentration', 'rural renaissance', and 'U-turn' (Vining and Strauss 1977; Kuroda 1979; Frey 1990). Since the transition was observed in various forms in many developed countries, it appeared to be a very general and significant historical phenomenon -- perhaps as important as the demographic (vital) transition (Zelinski 1971). To the extent that urbanization-metropolitanization is an integral part of the Age of Industrialization, the migration transition may be considered *prima facie* evidence of the entry into the Post-Industrial Age. In the words of Vining and Strauss (1977), it was a 'clean break'.

When data on migration patterns in the early 1980s became available in many developed countries however, it became clear that the traditional pattern

of net migration into metropolitan areas, including some very large ones, had reemerged, although the gain of migrants by metropolitan areas was much less massive than in earlier decades. This reemergence has caused a change in research focus from ascertaining and explaining a permanent migration transition to understanding the on-going complex interactions between migration and the changing economic system. Because of this, the migration process appears to be a rather unpredictable process operating upon an unstable and shifting spatial economic system: the net transfer of migrants can be in any direction, depending on the changes in relative economic strength of different areas.

In Canada, the most marked change in the migration pattern between the 1970s and the 1980s was not related to the exchange of migrants between metropolitan areas and non-metropolitan areas. Rather, it involved a massive change in **interprovincial migration**, with the main cause being the marked change in the spatial pattern of economic opportunities. Although the statistical analysis of the intermetropolitan and interprovincial migration data of Canada up to the very beginning of the 1980s suggests that as a result of the prolonged and substantial increase in the standard of living, economic variables (relative to quality of life considerations) have become less important in influencing the migration process (Shaw 1985; Liaw and Ledent 1987), the drastic change in the interprovincial migration pattern from 1976-81 to 1981-86 suggests the overwhelming importance of economic variables.

For Canada, 1976-81 was basically a period of **economic boom**. Although the quadrupling of oil price in 1973 resulted in the so-called 'oil crisis' (serious economic setback) in most industrialized countries, it led to an 'oil boom' (rapid economic growth based on the expansion of energy industries) in western Canada (mostly in Alberta), which lasted until 1981. The increases in the prices of other primary commodities in the 1970s, especially those of forest products, stimulated rapid economic growth in western Canada (mainly in British Columbia) through the late 1970s. The employment growth rates of Alberta and British Columbia during 1976-81 were spectacular: 6.3 and 4.5 percent per year, respectively. In Ontario (the industrial heartland of Canada), as a consequence of an increase in energy cost and the reduced competitiveness of its major industries (automobile and steel), the economy was doing less well in the late 1970s. However, the economies of Ontario and other provinces were able to expand under the shelter of the energy-price control imposed by the federal government and expansive fiscal and monetary policies (Carmichael 1986; Simeon and Robinson 1990, p. 216). The 1976-81 employment growth rate of the whole country was at the respectable level of 3.0 percent per year.

With an average employment growth of only 0.9 percent per year, the 1981-86 period was a period of **economic bust** for Canada. The severity of the global recession around 1982 was a major blow. As a major net exporter of primary commodities, the Canadian economy was particularly vulnerable to the

collapse of the price of oil and the decline in the prices of other primary commodities. The impact on Alberta and British Columbia was particularly severe: the 1981-86 employment growth rates of these two provinces were negative 0.2 and zero percent, respectively. Even in Ontario where the economy benefitted from the reduction in energy costs and a large influx of foreign capital, the 1981-86 employment growth rate was only 1.6 percent per year -- the highest among all provinces but less than its own 1976-81 figure (2.7 percent).

The effects of the spatially-differentiated economic boom and bust on migration behaviour are expected to vary systematically with certain **personal factors** such as nativity and level of education. For example, with respect to interprovincial migrations, the outmigration rate of the **natives** (those who resided in the province of birth at the beginning of the migration interval) declined sharply from 3.4 percent in 1976-81 to 2.2 percent in 1981-86, whereas the return outmigration rate of the **non-natives** (those whose province of birth was different from the province of residence at the beginning of the migration interval) dropped slightly from 8.3 to 7.7 percent. The control for such personal factors is essential in an attempt to study the effects of economic changes on migration behaviour. The control can be implemented either by excluding certain types of individuals from the sample or by including personal factors explicitiy in a multivariate explanatory model.

The purpose of this chapter is to study the effects of 'ecological'

variables (attributes of provinces) and personal factors on the interprovincial migration behaviour of non-native young adults in Canada through the economic boom of 1976-81 and the economic bust of 1981-86, based on the micro data of the 1981 and 1986 censuses. The effects are assessed with a multivariate choice model, namely a three-level nested logit model. At the outset it was hoped that the findings would show not only how migration behaviours changes in response to a major economic fluctuation but also reveal certain persistent characteristics of migration behaviour.

Our interest in analyzing interprovincial migration stems partly from the uncertain role that migration plays in reducing interprovincial economic inequality -- a threat to the unity of Canada as a federated state. The choice of the five-year periods (rather than single years) is due to the fact that the 1981 and 1986 census data used in this research yield migration information only for five-year periods: 1976-81 and 1981-86. Native and foreign-born individuals are set aside for later study, since we wish to focus upon the differences between *return* and *onward* migrations. The young adults in the 20-44 age interval (defined as of the 1981 census date for the 1976-81 migration period and the 1986 census date for the 1981-86 migration period) are chosen, because these adults are more likely to migrate in response to the spatial variation in economic opportunities than are those in other age groups. The three-level nested logit model is based on a natural way of structuring the choice set of the non-natives and is capable of

including both personal factors (attributes of the choice makers) and ecological variables (attributes of the alternatives in the choice set).

The chapter is organized as follows. Section 7.1 briefly describes the choice model and the estimation method. Section 7.2 presents the empirical results. Section 7.3 identifies the salient features in migration behaviour and shows how well these features are revealed by the predicted values of the model. Section 7.4 concludes this chapter.

7.1 THE CHOICE MODEL

At the beginning of each migration interval, every non-native is considered a potential migrant (PM), making a choice within a three-level choice framework. At the top level, the PM chooses to **depart** (and become an interprovincial migrant) or to **stay** in the current province of residence. At the middle level, if the PM is known to have chosen to depart, the choice is between *return migration* (moving back to the province of birth) and *onward migration* (moving to some other province). At the bottom level, if the PM is known to have become an onward migrant, the choice is to **select a specific destination among the remaining provinces.**

The propensities to make these choices are represented by a set of probabilities. For a non-native PM residing in province i at the start of the census

period t, being born in province l, and having personal attributes a, the propensities to make the choices at the three levels are represented by **departure probability** ($P_{D|i,a,l,t}$) and **stayer probability** ($P_{S|i,a,l,t}$) at the upper level; **return probability** ($P_{R|i,a,l,t,D}$) and **onward probability** ($P_{O|i,a,l,t,D}$) at the middle level; and **destination choice probability** ($P_{j|i,a,l,t,O}$) (for j not equal to i and l) at the bottom level, respectively.

The choice probabilities are assumed to be functions of the **perceived utilities** of the provinces in the choice set. Based on the assumptions that the perceived utilities are random variables, and that the PM chooses a province with the highest perceived utility (Kanaroglou *et al.* 1986), the choice probabilities are linked to the perceived utilities via the **nested logit model** which contains the following three submodels.[1] First, the **destination choice submodel** at the bottom level of the choice framework is written as

$$P_{j|l,a,t,O} = \frac{\exp[V_{j|l,a,l,t}/\mu_3]}{\sum_{k \neq l,l} \exp[V_{k|i,a,l,t}/\mu_3]} \qquad (7.1)$$

where $V_{j|i,a,l,t}$ is the fixed component of the random utility of province j perceived at time t by the PM with personal attribute a in province i who was born in province l; and μ_3 is an unknown parameter.

Second, the **return/onward choice submodel** at the middle level is

$$P_{R|i,a,l,t,D} = \frac{\exp[V_{I|i,a,l,t}/\mu_2 - \mu_3 I_{O|i,a,l,t}/\mu_2]}{1 + \exp[V_{I|i,a,l,t}/\mu_2 - \mu_3 I_{O|i,a,l,t}/\mu_2]} \quad (7.2)$$

where $I_{O|i,a,l,t}$ is the 'inclusive variable of the onward branch' which represents the maximum utility of the provinces under the onward branch of the choice framework perceived by the PM in province i; and μ_2 is another unknown parameter.

Finally, the **departure choice submodel** at the top level is

$$P_{D|i,a,l,t} = \frac{\exp[A_o + \mu_2 I_{D|i,a,l,t} - V_{I|i,a,l,t}]}{1 + \exp[A_o + \mu_2 I_{D|i,a,l,t} - V_{I|i,a,l,t}]} \quad (7.3)$$

where $I_{D|i,a,l,t}$ is the 'inclusive variable of the departure branch', which represents the maximum utility of all provinces under the departure branch of the choice framework, perceived by the PM in province i; and A_o is an unknown parameter.

The model is operationalized by expressing the perceived utilities as linear-in-parameters functions of **observable** personal factors and ecological variables. The unknown parameters associated with the explanatory variables (i.e. the ecological variables and the dummy variables representing the personal factors) are estimated sequentially using the maximum quasi-likelihood method (Ben-Akiva and Lerman 1985; McCullagh 1983; Wedderburn 1974) and a Newton-Raphson algorithm. The t-ratio accompanying each estimated parameter is used to assess the statistical significance of the variable. Since the t-ratio is asymptotically normally distributed and the sample size is very large (50,959 non-

natives aged 20 to 44, of which 23,508 were from the 1981 census and the remaining 27,451 were from the 1986 census), a magnitude of 2.0 or greater for the t-ratio is used as an indication of statistical significance. Based on the likelihood criterion, the greater the magnitude of the t-ratio, the more important the corresponding variable.

To the extent that the model performs well, most of the changes in the observed measures of migration behaviours are accounted for by (1) changes in the values of the explanatory variables (mostly economic variables), and (2) changes in the values of the parameters. The changes in the parameters between the two migration periods are represented in the model by interaction terms involving a multiplication by a dummy variable with 0 for 1976-81 and 1 for 1981-86.

For a given specification of a submodel, the overall goodness of fit is measured by:

$$\text{Rho-square} = 1 - L(\beta)/L(0) \qquad (7.4)$$

where $L(\beta)$ is the natural log of the maximum quasi-likelihood of the given specification and $L(0)$ is the corresponding quantity of the 'null' specification.[2] Since the actual upper bound of Rho-square is much less than 1.0, even the Rho-square of a specification with very strong explanatory power may be much closer to zero than to one.

The data are drawn from the Public Use Samples (PUS) of the 1981 and 1986 censuses, representing 2 percent of the individuals in the Canadian population. Only the individuals at risk to making a return or onward migration (non-natives) are considered in this study. Migrants are defined as those whose province of residence at the start of the census period differed from their province of residence at the end of the period. Since Statistics Canada uses a single code to represent the Northwest Territories, the Yukon and Prince Edward Island for the 1981 sample, only nine provinces are included in this study. These nine provinces contain more that 99 percent of the national population.

The specification and justification of the ecological variables and personal factors are reported in chapter 7. Their definitions are shown in Chapter 7, Appendix B. Only statistically significant and theoretically important explanatory variables are retained in each submodel.

To reveal the salient features of the migration behaviours, the unobservable probabilities defined in the choice model are represented by the following indices to be computed from the census data. The departure probability is represented by the **departure rate**:

$$P_{Dli,a,l,t} - K_{Dli,a,l,t}/K_{i,a,l,t} \qquad (7.5)$$

where $K_{i,a,l,t}$ is the number of non-natives in province i at time t who were born in province l and had personal attribute a; and $K_{D|i,a,l,t}$ is the part of $K_{i,a,l,t}$ who departed (outmigrated) to other provinces during time (t,t+5)[3].

The return probability is represented by the **return proportion**:

$$P_{R|l,a,l,t,D} = K_{R|l,a,l,t}/K_{D|l,a,l,t} \tag{7.6}$$

where $K_{R|i,a,l,t}$ is the return part of $K_{O|i,a,l,t}$. The destination choice probability under the onward branch is represented by the **destination choice proportion**:

$$P_{j|l,a,l,t,O} = K_{j|l,a,l,t}/K_{O|l,a,l,t} \tag{7.7}$$

where $K_{O|i,a,l,t}$ is the onward part of $K_{D|i,a,l,t}$; and $K_{j|i,a,l,t}$ is the number of onward migrants in $K_{O|i,a,l,t}$ who selected province j as the destination.

7.2 EMPIRICAL FINDINGS

There was a general decline in the migration level from the economic boom of 1976-81 to the economic bust of 1981-86. The departure rate for non-native young adults decreased from 21 percent to 19 percent, while that of the corresponding natives declined from 5 percent to 3 percent. The decline is a commonly observed phenomenon in many developed countries. The basic reasons seem to be (1) that people are more averse to taking the risk of migration during the period of poor economic prospect, (2) that the spatial variation in

economic opportunities tends to diminish during an economic recession, and (3) that employment opportunities tend to decline in most regions during a stagnant economic period.

For non-native migrants, we found that the propensity to select the return option increased as economic conditions worsened: the return proportion increased from 54 percent in 1976-81 to 57 percent in 1981-86. This increase was mainly due to the reduction in economic opportunities which was the main motivation for onward migrations (rather than to an increased attraction of the province of birth as a safety net under difficult economic circumstances). It is therefore better to describe the change in terms of the onward proportion: a decrease from 46 percent in 1976-81 to 43 percent in 1981-86.

It is important, however, to note that even during the period of high employment growth (1976-81), more than 50 percent of non-native young adult migrants went back to their province of birth. Such a high propensity to return indicates the overwhelming importance of the province of birth in the mental map of the non-native migrants.

7.2.1 Estimation Results of the Destination Choice Submodel

The estimated parameters for the destination choice submodel are based on the individual records of 4,830 onward migrants, of which 2,243 migrated during the 1976-81 interval. The main estimation results are summarized in Table 7.1. With a rho-square of 0.268, the submodel appears to provide a

Table 7.1
The Estimation Results of the Destination Choice Submodel for Onward Interprovincial Migrants Aged 20-44 in Canada, 1976-81 and 1981-86

Explanatory Variable	Coeff.	(t)
1. ECOLOGICAL VARIABLES		
Employment Growth	0.155	6.9
Income Level	0.182	9.2
Unemployment	-0.335	-20.3
Ln of Distance to Province of Destination	-0.718	-19.4
Cultural Similarity	2.264	11.5
Coldness	-0.176	-3.3
2. INTERACTIONS		
Employment Growth * 20-24	0.085	2.6
Newfoundland to Nova Scotia	1.432	5.4
3. PERIOD EFFECTS		
Employment Growth * 1981-86	0.317	4.4
Employment Growth * 20-24 * 1981-86	-0.217	-2.4
Income Level * 1981-86	0.141	9.2
Unemployment * 1981-86	0.114	4.8
Alberta * 1981-86	0.860	5.9
Ln of Distance to P.D. * 1981-86	0.170	3.2
Cultural Similarity * 1981-86	-0.735	-2.8
Rho-Squared	0.268	

Definition of variables:
Income Level = Real wage, salary and other labor income per capita.

good fit. The destination choice behaviour of onward migrants was affected by the economic conditions in the potential destination provinces in a rational way through both boom and bust periods: income level and employment growth had positive effects, whereas unemployment rate had a negative effect. However, the sensitivities to the effects of these economic variables changed between the two periods. The sensitivities to the effects of income level and employment growth intensified. The coefficient of income level increased from 0.182 in 1976-81 to 0.323 (0.182+0.141) in 1981-86. The coefficient of employment growth increased from 0.240 to 0.340 for the 20-24 age group and from 0.155 to 0.472 for other age groups. In contrast, the sensitivity to the unemployment rate decreased: the coefficient changed from -0.335 to -0.227.

An interesting question about the relationship between migration and the economic system is the responsiveness of migration to a drastic economic change. In the case of Alberta, which experienced the most drastic economic decline between 1976-81 and 1981-86, we found that the decrease in its attraction to non-native migrants, though quite large, was not as large as what could be inferred from the changes in the values of the economic variables. This is indicated by the positive coefficient (0.860) of the interaction term between a dummy variable representing Alberta as a destination and a dummy variable representing the 1981-86 period. Thus, there appeared to be some momentum or inertia in the destination choice process.

The sensitivities to the effects of physical and cultural proximity variables decreased from 1976-81 to 1981-86. The coefficient of distance changed from -0.718 to -0.548, whereas the coefficient of cultural similarity changed from 2.264 to 1.529. Without longer time-series data, we are not sure whether the decrease in the sensitivities to the proximity variables indicates a secular trend or not, although an analysis of the 1961-1982 annual aggregate interprovincial migration data suggests a secular decline in the sensitivities to these variables (Liaw and Ledent 1987). More important than the changes, however, is the fact that distance had a clear negative effect and cultural similarity had a clear positive effect through both periods.

Since non-natives in our sample are all young adults in the 20-44 age interval, it is not surprising that the spatial variation in the quality of environment did not appear to be very important in affecting the destination choice of onward migrants through both periods. The coefficient of coldness has the expected negative sign but is associated with a relatively small t-ratio (-3.3). It remained constant through both periods.

In addition, we found that Nova Scotia (the core of the Atlantic Region) had a particularly strong attraction to the onward migrants from Newfoundland through both periods. This is reflected by the positive coefficient (1.432) of the 'Newfoundland to Nova Scotia' variable.

Finally, we found that the population size of the potential destination

area, mainly due to its high positive correlation with income level, did not have statistically significant effect on the destination choice of onward migrants. To the extent that the population size should have a positive effect, the statistical result overstates somewhat the positive income effect.

7.2.2 Estimation Results of the Return/Onward Choice Submodel

The parameters of the return/onward choice submodel were estimated from the records of 10,089 non-native migrants (4,867 in 1976-81 and 5,222 in 1981-86). The results are reported in Table 7.2. Note that unemployment rate is not included because of its lack of explanatory power when both employment growth and income level are included. The rho-squared is 0.093. All statistically significant explanatory variables have 'correct' signs.

With respect to the economic variables of the provinces of birth, we found that the choices made between the return and onward options were rational in both boom and bust periods: non-native migrants were more likely to return to provinces with high income levels and employment growth in both periods. The sensitivity to income level became stronger in the second period: the coefficient of income was 0.177 in 1976-81 and 0.287 in 1981-86. The sensitivity to cultural similarity remained the same: the coefficient was 0.177 in both periods.

With respect to the proximity variables, we found that the return propensities of non-native migrants in both periods were also subject to (1) the negative effect of distance to the province of birth and (2) the positive effect of

Table 7.2
The Estimation Results of the Return/Onward Submodel for Non-Native Migrants Aged 20-44 in Canada, 1976-81 and 1981-86

Explanatory Variable	Coeff.	(t)
Constant	-0.672	-2.3
1. ECOLOGICAL VARIABLES		
Employment Growth	0.177	7.0
Income Level	0.177	7.6
Ln of Distance to Province of Birth	-0.455	-12.3
Cultural Similarity	1.617	14.8
Inclusive Variable	-0.705	-11.8
Return * Alberta (origin)	0.288	5.7
2. PERSONAL FACTORS		
Age Group: Reference = 35-44		
20-24	0.256	3.7
25-29	0.392	6.6
30-34	0.293	4.8
Level of Education: Reference = Mid-ed		
High-ed	-0.222	-3.5
Low-ed	0.137	2.8
Gender:		
Male	-0.109	-2.5
Family Type: Reference = All others		
Husband-Wife-Child Family	0.128	2.3
Husband-Wife Family	-0.181	-2.7
Mother Tongue: Reference = All others		
English	-0.280	-3.8
Marital Status: Reference = All others		
Divorced-Separated-Widowed	0.474	5.5
3. PERIOD EFFECTS		
Income Level * 1981-86	0.110	4.4
Ln of Distance to Prov. of Birth * 1981-86	0.259	6.0
Rho-squared	0.093	

Definition of variables:
Income Level = Personal disposable income per capita
Null Model: Coeff. of constant = 0.292, t=14.5

cultural similarity to the province of birth. The sensitivity to the distance decay effect was weakened substantially during the period of economic bust: the coefficient was -0.455 in 1976-81 and -0.196 in 1981-86. The sensitivity to employment growth remained the same: the coefficient was 0.177 in both periods.

There is a strong theoretical reason to expect that return migration is much less subject to the distance decay effect than is onward migration. In general, the information about the potential destinations for onward migration is relatively scarce and requires deliberate effort to collect so that it tends to decline sharply within a relatively short distance. In contrast, the information about the province of birth tends to be relatively plenty and does not tend to decline with distance. To the extent that people are more likely to migrate to familiar places than to *tera incognita*, the distance decay effect should be much weaker for return migration than for onward migration. This difference is clearly demonstrated by the difference in the distance coefficients between the onward/return submodel (Table 7.2) and the destination choice submodel (Table 7.1).

We found very strong evidence that the propensity for non-native migrants to return to their birth province was reduced by the perceived utility of the onward migration option in both periods. This is indicated by the negative coefficient of the 'inclusive variable' ($-\mu_3/\mu_2 = -0.702$), which is associated with a t-ratio of very large magnitude (-11.8). (For each origin province, the inclusive variable summarizes the attractiveness of all potential destinations under the

onward branch of the choice framework.)

Experiencing the greatest economic boom and bust among all the provinces, Alberta might have a large number of non-natives who had come to the province as part of the 'oil rush' with unrealistically high expectations and later became disappointed. Disappointed non-native migrants are more likely to return than to migrate onward; we found that such migrants from Alberta were indeed more likely to return in both periods. This is indicated by the positive coefficient (0.288) on the interaction variable that combines the dummy variables representing the return option and Alberta as the province of origin.

The propensities of the non-native migrants to return varied systematically with several personal factors in the same way in both boom and bust periods. It would seem that younger adults (aged 20-34) migrated previously with less reliable information and higher expectations than did the older adults (aged 35-44) so that the younger ones were more likely to be disappointed and hence to return to the province of birth. The fact that the 25-29 age group had the highest propensity to return suggests that in previous migrations, the natives in the 20-24 age group who later became non-natives in the 25-29 age group often had highly unrealistic expectations of the 'greener pastures over the hill'.

Since both the amount and the quality of information tend to increase with the level of education, better educated non-natives are less likely to be disappointed and, when they migrate again, are less likely to return. Consistent

with this line of reasoning, we found that the higher the level of education, the lower the propensity to return.

We also found that the propensity to return was affected to some extent by other personal factors (gender, mother tongue, household type, and marital status). The propensity to return was weakened by being a male, an English-speaker, or a member of husband-wife household. It was enhanced by being a member of husband-wife-child household, or having divorced-widowed-separated marital status.

7.2.3 Estimation Results of the Departure Choice Submodel

The parameters of the departure choice submodel were based upon the records of 50,959 non-natives, of which 23,508 were at risk to migration in the first period. Again, unemployment rate is not included in the submodel because of its correlation with employment growth and income level. The Rho-square is 0.062. Because of its importance in choice theory, the inclusive variable is retained (Table 7.3) even if its estimated coefficient is not statistically significant.

We found that the interprovincial variation in the non-natives' propensities to depart in both periods depended very strongly on the income level and employment growth of the origin province in a rational way: the higher the income level and employment growth, the lower the departure propensities.

According to the disappointment hypothesis developed by Yezer and Thurston (1976) and Grant and Vanderkamp (1986), the propensity to make a

Table 7.3
The Estimation Results of the Departure Choice Submodel for Non-Natives Aged 20-44 in Canada, 1976-81 and 1981-86

Explanatory Variable	Coeff.	(t)
Constant	1.216	5.4
1. ECOLOGICAL VARIABLES		
Employment Growth	-0.140	-14.2
Income Level	-0.256	-21.5
Ln of Distance from Province of Birth	0.302	18.3
Cultural Similarity	-0.598	-4.8
Population Size	-0.512	-4.1
Alberta * Ln of Distance	0.063	15.1
Inclusive Variable	0.001	0.1
2. PERSONAL FACTORS		
Age Group: Reference = 40-44		
20-24	0.648	14.5
25-29	0.881	21.4
30-34	0.566	13.6
35-39	0.285	6.5
Education: Reference = Mid-ed		
Low-ed	-0.110	-4.3
High-ed	0.163	4.7
Mother Tongue:		
English in Quebec	0.362	4.3
French in Rest of Canada	0.210	2.6
French in Quebec	-0.539	-6.6
Family Type: Reference = all others		
Husband-Wife-Child Family	-0.303	-10.4
Husband-Wife Family	-0.127	-3.5
Marital Status: Reference = All others		
Divorced-Separated-Widowed	0.089	2.0
3. PERIOD EFFECTS		
National Unemployment	-0.144	-7.7
French in Rest of Canada * 1986	0.218	2.7
Rho-squared	0.062	

Definition of variables:
Income Level = Personal disposable income per capita
Null Model: Coeff. of constant = 0.292, t=14.5

repeat migration tends to **increase** with the distance involved in the **previous** migration. The greater the distance, the less accurate the information used in the previous migration decision. Those who **overestimated** the utility of potential destinations were more likely to become migrants, whereas those who **underestimated** it were more likely to become stayers. For natives who migrated and became non-natives, the longer the distance to the province of birth, the less accurate the information, the more likely the overestimation of the utility, the greater the probability of a subsequent disappointment, and the higher the tendency of repeat migration. We found very strong evidence that this hypothesized relationship was true in both boom and bust periods: the positive coefficient (0.302) of the distance to the province of birth is associated with a very large t-ratio (18.3). Furthermore, we found that this relationship was particularly strong for the non-natives who resided in Alberta (including many previous participants of the 'oil rush'): for them, the distance coefficient is 0.365 (0.302+0.063).

We found also some evidence that in both periods, the retention ability of an origin province was enhanced by its relative population size and its similarity to the cultural background (mother tongue) of a potential migrant. We are, however, somewhat disappointed to find that the positive effect of the inclusive variable (a proxy for the attraction of the rest of the system) turned out to be statistically insignificant.[4]

We found clear evidence that the departure propensities of non-natives were affected strongly by several personal factors. There was a clear age pattern through both boom and bust periods: a high level in the 20-24 age group, a maximum in the 25-29 age group, and a monotonic decline with age thereafter. It is interesting to note that the maximum of the departure schedule of the natives was also in the 20-24 age group. This difference between the non-natives and natives suggests that the migrations of many natives in the 20-24 age group were based on unrealistically high expectations and often resulted in repeat migrations (in fact, mostly return migrations) in the 25-29 age group.

As a form of **long-distance** migration, interprovincial migration of either the primary or onward type depends strongly on the ability to gather reliable information on the opportunities at distant places. Such ability is in turn a positive function of the level of education. Thus, the propensity for interprovincial migration is expected to be a positive function of the potential migrant's level of education. We found that the departure propensity of non-natives was indeed a positive function of the non-native's level of education in both boom and bust periods.

The distinction of Quebec as a French-speaking province is vividly reflected by the fact that in both boom and bust periods, the non-native's propensity to depart was enhanced by being an English-speaker in Quebec, or a French-speaker in the rest of Canada (especially in 1981-86), and reduced by

being a French-speaker in Quebec.

With respect to household type, the departure propensity of non-natives in both boom and bust periods was reduced moderately by being a member of husband-wife family and strongly by being a member of husband-wife-child family. This finding is consistent with (1) Marr and Millerd's (1980) estimate that a wife's income tends to decrease as a consequence of migration, and (2) the idea that parents tend to avoid changing the social environment (school) of their children.

With respect to marital status, we found some evidence that the non-native's departure propensity was enhanced somewhat by being divorced-separated-widowed. It seems that the transition away from the married status tended to enhance the non-native's propensity to migrate again.

The departure submodel also shows that the general decline of non-natives' departure propensities from 1976-81 to 1981-86 could be attributed, in fact, to a rise in the national unemployment rate.

7.3 SALIENT FEATURES EXPLAINED BY THE NESTED LOGIT MODEL

The two tasks we want perform in this section are (1) to identify the major **changing** and **persistent** features of the migration process through the periods of economic boom and bust and (2) to see whether these factors are also revealed by prediction based on an application of the nested logit model. The

reasons for performing these tasks are (1) that the statistical results reported in Tables 7.1 to 7.3 appear to be too abstract to convey satisfactorily the idiographic knowledge (Brown 1992) about Canada, and (2) that for those who are used to interpreting the R-square values of a regression model, the Rho-square values may appear low, leaving the wrong impression that the explanatory power of the model is weak.

With respect to the observed destination choice proportions of onward migrants in Table 7.4, we can identify the following major changes from 1976-81 to 1981-86. First, for all provinces of origin, the proportions of the onward migrants selecting Alberta (the province that experienced the greatest reduction in job opportunities) decreased markedly, while the proportions selecting Ontario (the province that was most capable of climbing out of the 1982 economic recession) increased substantially. Second, for most provinces of origin, the attractiveness of British Columbia decreased and that of Quebec increased. The bottom panel of the table shows that both observed changes are well reflected by the predicted values of the model. The correlation between the observed and predicted changes is as high as 0.91.

A persistent feature in the destination choice pattern that is worth emphasizing is the extremely weak attractive power of the French-speaking province of Quebec to the onward migrants from all other provinces. Although it has more than 25 percent of the national population, Quebec attracted less than

Table 7.4

Observed Destination Choice Proportions of Onward Migrants, 1976-81 (%)

Origin	Destination Province								
Residence	Nfld.	N.S.	N.B.	Quebec	Ontario	Manitob	Sask.	Alberta	B.C.
Nfld.	—	24.0	8.0	6.0	24.0	4.0	2.0	20.0	12.0
N.S.	4.1	—	13.5	5.9	22.9	2.9	5.9	27.6	17.1
N.B.	0.8	15.6	—	4.9	33.6	5.7	4.1	24.6	10.7
Quebec	1.4	3.6	2.7	—	38.6	1.1	2.7	25.0	21.8
Ontario	1.4	5.5	4.3	6.1	—	7.5	3.8	43.8	27.5
Manitoba	0.0	3.5	1.3	2.2	11.4	—	7.5	40.4	33.8
Sask.	0.0	3.9	0.8	1.6	14.2	7.9	—	53.5	18.1
Alberta	0.5	3.2	2.0	1.7	15.1	5.9	10.0	—	61.7
B.C.	0.6	6.2	1.1	2.8	16.5	5.3	7.8	59.7	—

Observed Destination Choice Proportions of Onward Migrants, 1981-86 (%)

Origin	Destination Province								
Residence	Nfld.	N.S.	N.B.	Quebec	Ontario	Manitob	Sask.	Alberta	B.C.
Nfld.	—	24.4	8.9	0.0	46.7	0.0	0.0	13.3	6.7
N.S.	2.2	—	5.2	6.8	35.3	7.5	2.3	20.3	20.3
N.B.	5.0	11.1	—	7.1	41.4	5.0	4.0	22.2	4.1
Quebec	0.8	5.8	2.1	—	50.7	5.1	1.4	15.2	18.8
Ontario	1.4	8.9	7.3	9.8	—	10.3	5.6	32.9	23.7
Manitoba	0.7	3.3	4.6	3.3	32.2	—	6.0	27.0	23.1
Sask.	0.0	3.2	0.0	3.2	19.2	16.8	—	38.4	19.2
Alberta	0 5	6.4	3.3	4.7	30.3	6.4	9.4	—	39.2
B.C.	0.3	6.0	2.2	4.5	28.4	6.2	4.7	47.8	—

Observed Changes in Destination Choice Proportions of Onward Migrants, 1976-86 (%)

Origin	Destination Province								
Residence	Nfld.	N.S.	N.B.	Quebec	Ontario	Manitob	Sask.	Alberta	B.C.
Nfld.	—	0.4	0.9	-6.0	22.7	-4.0	-2.0	-6.7	-5.3
N.S.	-1.9	—	-8.3	0.9	12.4	4.6	-3.6	-7.3	3.2
N.B.	4.2	-4.5	—	2.2	7.8	-0.7	-0.1	-2.4	-6.6
Quebec	-0.6	2.2	-0.6	—	12.1	1.0	-1.3	-9.8	-3.0
Ontario	0.0	3.4	3.0	3.7	—	2.8	1.8	-10.9	-3.8
Manitoba	0.7	-0.2	3.3	1.1	20.8	—	-1.5	-13.4	-10.7
Sask.	0.0	-0.7	-0.8	1.6	5.0	8.9	—	-15.1	1.1
Alberta	0.0	3.2	1.3	3.0	15.2	0.5	-0.6	—	-22.5
B.C.	-0.3	-0.2	1.1	1.7	11.9	0.9	-3.1	-11.9	—

Predicted Changes in Destination Choice Proportions of Onward Migrants, 1976-86 (%)

Origin	Destination Province								
Residence	Nfld.	N.S.	N.B.	Quebec	Ontario	Manitob	Sask.	Alberta	B.C.
Nfld.	—	0.0	0.1	0.6	16.3	0.6	-1.4	-9.7	-6.5
N.S.	-1.3	—	-0.9	1.6	17.1	0.5	-1.2	-8.5	-7.3
N.B.	-0.8	-1.8	—	3.0	12.0	0.7	-0.9	-5.8	-6.3
Quebec	-0.5	1.4	0.5	—	10.5	1.5	-1.0	-6.1	-6.3
Ontario	0.0	4.1	2.1	2.6	—	2.6	-0.9	-4.5	-6.1
Manitoba	0.0	1.8	1.0	1.6	16.6	—	-2.1	-10.2	-8.7
Sask.	0.1	1.6	0.9	1.8	13.4	1.1	—	-12.8	-6.1
Alberta	0.0	2.2	1.1	2.3	14.6	1.9	-2.4	—	-19.7
B.C.	0.0	1.9	1.0	2.2	15.3	1.9	-1.6	-20.8	—

10 percent of onward migrants from each of the provinces in both boom and bust periods. This feature is also well reflected by the predicted values of the model.

With respect to the choice of non-native migrants between the return and onward options, we found the following salient features in the observed data (Table 7.5). First, the nationwide sharp reduction in job opportunities in 1981-86 was reflected by the fact that for every province of origin, the onward migration propensity declined. Second, the onward propensity of Alberta's non-native migrants declined most sharply. This seemed to be related to (1) that a high proportion of them were probably participants of the previous 'oil rush', and (2) that the neighbouring province of British Columbia (usually a very strong attractor of onward migrants) had no employment growth in 1981-86. Third, the relatively low onward migration propensity for non-native migrants from Quebec in both boom and bust periods. This is consistent with the fact that the outmigrants from the Atlantic provinces (the long-term net exporters of migrants to the rest of Canada) are not likely to use Quebec as a 'stepping stone' in their westward movement. These characteristics of onward migration are to a large extent revealed by the predicted onward propensities (Table 7.5). The correlation between the observed and predicted changes in the spatial pattern of onward proportions is 0.45.

With respect to the departure propensities, we found the following salient features from the observed data (Table 7.6). First, despite having less than half

Table 7.5
Observed Onward Propensities of Non-Native Migrants by Period and Origin: 1976-81 and 1981-86 (%)

Province of Residence	1976-81	1981-86	Change
Newfoundland	56.2	47.4	-8.8
Nova Scotia	52.6	52.2	-0.5
New Brunswick	51.3	46.5	-4.8
Quebec	38.9	36.7	-2.2
Ontario	45.4	41.0	-4.4
Manitoba	56.4	52.6	-3.8
Saskatchewan	47.9	44.6	-3.3
Alberta	44.3	33.6	-10.7
British Columbia	43.3	40.2	-3.1

Predicted Onward Propensities of Non-Native Migrants by Period and Origin: 1976-81 and 1981-86 (%)

Province of Residence	1976-81	1981-86	Change
Newfoundland	48.4	48.1	-0.4
Nova Scotia	44.3	46.4	2.1
New Brunswick	43.7	43.2	-0.5
Quebec	42.5	38.9	-3.6
Ontario	45.6	42.9	-2.7
Manitoba	52.6	44.6	-8.0
Saskatchewan	51.7	45.1	-6.6
Alberta	42.7	34.4	-8.2
British Columbia	48.4	41.3	-7.1

Table 7.6
Observed Departure Rates of Non-Native Migrants by Period and Origin: 1976-81 and 1981-86 (%)

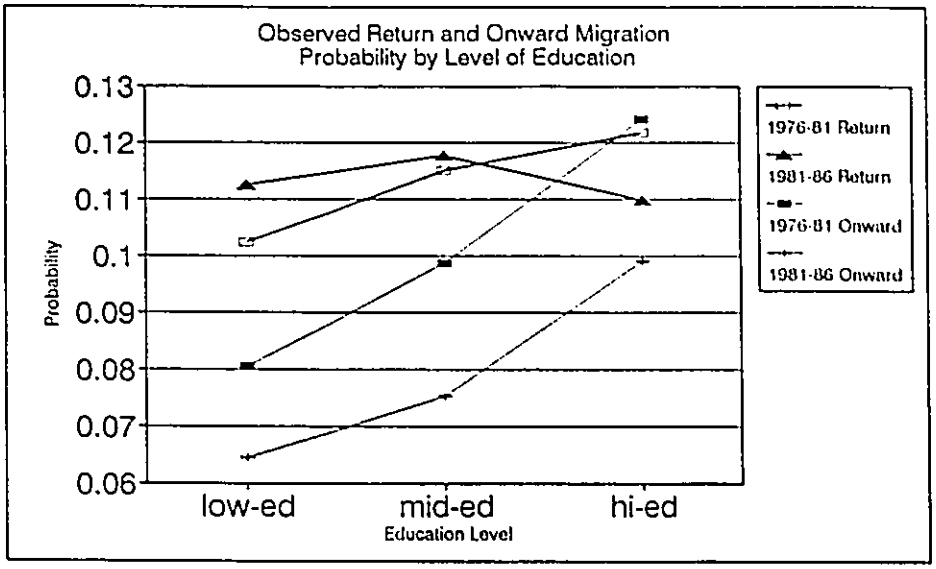
Province of Residence	1976-81	1981-86	Change
Newfoundland	46.8	42.0	-4.8
Nova Scotia	35.3	24.0	-11.3
New Brunswick	34.7	26.3	-8.4
Quebec	25.8	18.2	-7.6
Ontario	17.1	12.0	-5.2
Manitoba	33.0	23.1	-9.9
Saskatchewan	31.0	25.1	-5.9
Alberta	20.6	25.9	5.3
British Columbia	14.3	15.4	1.1

Predicted Departure Rates of Non-Native Migrants by Period and Origin: 1976-81 and 1981-86 (%)

Province Residence	1976-81	1981-86	Change
Newfoundland	39.7	34.7	-5.0
Nova Scotia	35.4	25.0	-10.4
New Brunswick	35.7	29.0	-6.7
Quebec	25.5	19.2	-6.3
Ontario	16.9	12.0	-4.9
Manitoba	34.9	22.2	-12.7
Saskatchewan	30.8	20.8	-10.0
Alberta	21.0	25.9	4.9
British Columbia	14.2	15.8	1.6

the population size of Ontario and experiencing a sharp economic downturn in the early 1980s, British Columbia (a province with high income levels and attractive physical environment) exercised very strong holding power on its non-native population in both periods: the very low departure rates of its non-native population were similar to those of Ontario. Second, the departure rates of non-natives increased in Alberta and British Columbia, the two provinces with the sharpest reduction in employment growth, and decreased in all others. Third, the large increase in the departure rate of non-natives in Alberta suggests that large numbers were pushed out by the very unfavourable employment situation in 1981-86, with two-thirds returning to their provinces of birth. These salient features are revealed by the predicted values of the departure choice submodel. The correlation between the changes in the observed and predicted departure rates is as high as 0.99.

The differences in migration measures by several personal factors are also well predicted by the model. Due to space limitation, we report only the changes in the **return outmigration rate** (departure rate times return proportion) and the **onward outmigration rate** (departure rate times onward proportion) for three educational groups (Figure 7.1). The salient features are as follows. First, for every level of education, the return outmigration rate remained about the same in both periods, whereas the onward outmigration rate declined substantially from the economic boom to the economic bust. Second, in both boom and bust



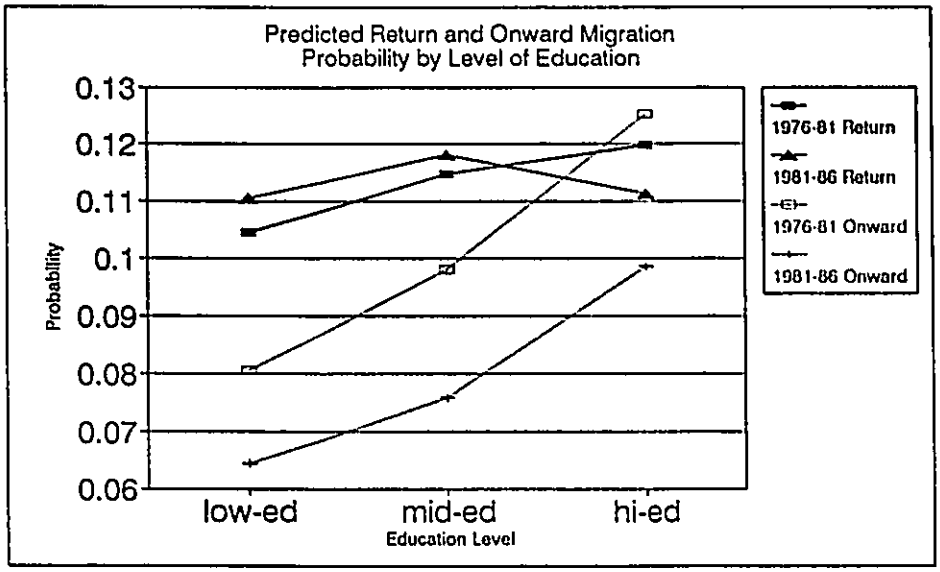


Figure 7.1 Observed and Predicted Return and Onward Migration Probabilities by Level of Education

periods, onward migration propensity increased sharply with the level of education, whereas the propensity to make a return migration was nearly independent of the level of education. Figure 7.1 shows that both of these features are very well predicted by our model. The correlation between the observed and predicted values is nearly perfect (r = 0.99). The correlation between the observed and predicted changes is just as good (r = 0.99).

7.4 CONCLUSIONS

In this chapter, we have investigated the effects of ecological variables and personal factors on the interprovincial migration behaviour of young adult (aged 20-44) non-natives through the periods of economic boom (1976-81) and bust (1981-86) in Canada. The major findings are as follows.

Although migration researchers in the century since Ravenstein (1889) have been impressed by the large volume of 'counter streams' and tended to view return migration as being in the 'wrong' direction, we have found strong evidence that in both boom and bust periods, both return and onward migration were in the 'right' directions, in the sense that they clearly responded to economic variables in a rational way: the attractiveness of a province was enhanced by higher income and better employment opportunities. However, the fact that more than 50 percent of non-native migrants chose the return option in both boom and bust

periods indicates the overwhelming importance of the province of birth in the mental map of the non-natives.

While the quality of physical environment (as indicated by a measure of the severity of winter) turned out to have an effect on the migration behaviour of adult non-natives, its effect is much less important than those of the economic variables. More generally, there is a suggestion in the migration data of the 1960s and 1970s that with the substantial increase in living standards, quality-of-life considerations (relative to economic considerations) became more important in the migration decision, we found that it was still relatively unimportant for adult non-natives in the late 1970s and the early 1980s.

The negative effect of physical distance and the positive effect of cultural similarity were rather strong in both boom and bust periods, although there seemed to be a declining secular trend in these effects. Not only onward but also return migrants were subject to these effects. Because of the inherent difference in the amount of information between non-birth province and birth province, the distance decay effect was much stronger on onward migration than on return migration in periods of both boom and bust.

Consistent with the disappointment hypothesis developed by Yezer and Thurston (1976) and Grant and Vanderkamp (1986), we found that distance to the province of birth had a strong **positive** effect on the departure propensity of the non-native migrants in both boom and bust periods. The greater the distance

from the residence at the beginning of the migration period to the province of birth, the poorer the information on which the previous migration was based and hence the greater the disappointment and the greater the propensity to migrate again.

The migration behaviour of non-natives varied systematically with several personal factors (age, education, mother tongue, household type, marital status, and gender). Since the level of education is related to the spatial pattern of the quality of human capital, it is probably the substantively most significant personal factor. Consistent with Long's (1988) finding in the United States, we found that the propensity to make onward migration increased sharply with the level of education, whereas the propensity to make return migration was about the same at all levels of education. This was true in both boom and bust periods. An important implication of this finding is that the provinces receiving a large share of onward migrants tend to experience an increase in the quality of human capital through both good and bad economic times.

According to our findings, an important difference between onward and return migration is that the propensity to make onward migration tends to decline sharply during an economic recession, whereas the propensity to make return migration is quite insensitive to economic fluctuations. This implies that the effect of onward migration on the spatial pattern of the quality of human capital is substantially weaker during a period of economic recession.

ENDNOTES

1. For a more detailed description of the nested logit model, the reader is referred to chapters 6 and 7.

2. The null model specification is the submodel where the coefficients of all the explanatory variables, excluding that of the constant term, are set to zero.

3. Since the census questionnaire allows us to detect at most one migration for each person in the five year census interval, $K_{D|i,a,l,t}$ understates the actual number of migrants.

4. When the departure choice submodel was applied only to the data of the 1976-81 period, the theoretically meaningful result was found that the coefficient of the inclusive variable was estimated to be about 0.5 with a t-ratio of about 8. When the coefficient was allowed to vary with time, we found it to be 1.79 for 1976-81 and -1.64 for 1981-86. Since both of these values are outside of the theoretically meaningful range (0 to 1), the coefficient was constrained to be the same through both periods. However, our inferences about the effects of other variables are not affected by this complication, because the deletion of the inclusive variable had little effect on the coefficients of the other explanatory variables.

CHAPTER 7 APPENDIX

Table 7.A.1
Simple Correlation Coefficients of the Ecological Variables in the Destination Choice Submodel, 1976-86

Variable	1	2	3	4	5	6	7	8
1. Distance to P.D.	1.00	0.22	-0.01	0.12	-0.14	0.28	-0.08	-0.17
2. Cultural Similarity	0.22	1.00	-0.03	0.00	-0.29	0.38	-0.35	-0.18
3. Employment Growth	-0.01	-0.03	1.00	0.19	0.09	-0.51	0.06	-0.02
4. Wages	0.12	0.00	0.19	1.00	0.51	0.19	0.55	-0.80
5. P.D. Income	-0.14	-0.29	0.09	0.51	1.00	-0.47	0.52	-0.26
6. Unemployment	0.28	0.38	-0.51	0.19	-0.47	1.00	-0.18	-0.39
7. Population	-0.08	-0.35	0.06	0.55	0.52	-0.18	1.00	-0.33
8. Coldness	-0.17	-0.18	-0.02	-0.80	-0.26	-0.39	-0.33	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.
Distance to P.D. = Distance from the 1976 province of residence to the potential destination for onward migrants.

Table 7.A.2
Inclusive Values From the Best-Fit Destination Choice Submodel, 1976-81 to 1981-86

Province of Origin	Period 1976-81	Period 1981-86	English 20-24	French 20-24	Minority 20-24
Nfld.	-1.00	3.38	1.75	-0.16	---
N.S.	-0.94	3.36	0.33	1.08	---
N.B.	-0.76	3.47	1.17	0.81	---
Que.	-0.69	3.49	0.66	0.25	1.90
Ont.	-1.10	2.96	0.72	0.51	0.13
Mtb.	-0.50	3.51	1.32	-0.02	-0.31
Sask.	-0.27	3.66	1.85	---	---
Alta.	-0.82	3.24	1.55	1.53	1.05
B.C.	-0.88	3.18	1.24	-0.21	0.13

Table 7.A.3
Simple Correlation Coefficients of the Ecological Variables in the Return/Onward Choice Submodel, 1976-86

Variable	1	2	3	4	5	6	7	8	9
1. Inclusive Variable	1.00	0.12	-0.02	-0.09	0.00	-0.02	0.02	0.03	-0.01
2. Distance to P.B.	0.12	1.00	0.19	0.04	0.24	0.10	0.13	0.13	-0.22
3. Cultural Similarity	-0.02	0.19	1.00	-0.02	0.14	-0.19	0.41	-0.10	-0.25
4. Employment Growth	-0.09	0.04	-0.02	1.00	0.29	0.51	-0.33	-0.06	-0.07
5. Wages	0.00	0.24	0.14	0.29	1.00	0.64	0.27	0.69	-0.86
6. P.D. Income	-0.02	0.10	-0.19	0.51	0.64	1.00	-0.54	0.68	-0.45
7. Unemployment	0.02	0.13	0.41	-0.33	0.27	-0.54	1.00	-0.11	-0.41
8. Population	0.03	0.13	-0.10	-0.06	0.69	0.68	-0.11	1.00	-0.50
9. Coldness	-0.01	-0.22	-0.25	-0.07	-0.86	-0.45	-0.41	-0.50	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.
Distance to P.B. = Distance to the province of birth from the 1976 province of residence.

Table 7.A.4
Inclusive Values From the Best-Fit Return/Onward Choice Submodel, 1976-81 to 1981-86

Province	Period				HWC		Age	
of Origin	1976-81	1981-86	High-ed	DSW	Family	20-24	25-29	30-34
Nfld.	0.02	3.15	1.78	2.32	1.45	2.00	1.21	1.32
N.S.	0.16	3.16	1.60	1.62	1.41	1.27	1.52	1.36
N.B.	0.30	3.30	1.98	2.34	1.68	1.66	1.78	1.59
Quebec	0.28	3.28	1.68	1.49	1.43	1.37	1.54	1.67
Ontario	0.05	2.96	1.47	1.30	1.23	1.26	1.23	1.34
Manitoba	0.31	3.31	1.86	1.98	1.55	1.60	1.70	1.51
Sask.	0.50	3.39	2.31	2.40	2.01	1.94	2.01	2.20
Alberta	0.32	3.39	2.34	2.64	2.30	2.33	2.48	2.41
B.C.	0.09	3.13	1.99	2.23	1.64	1.65	1.82	1.77

Table 7.A.5
Simple Correlation Coefficients of the Ecological Variables in the Departure Choice Submodel, 1976-86

Variable	1	2	3	4	5	6	7	8	9
1. Inclusive Variable	1.00	0.02	-0.03	-0.64	-0.13	0.23	0.47	-0.09	0.07
2. Distance to P.B.	0.02	1.00	0.11	-0.04	0.23	0.29	0.04	-0.13	-0.20
3. Cultural Similarity	-0.03	0.11	1.00	-0.02	0.09	-0.04	0.20	-0.07	-0.19
4. Employment Growth	-0.64	-0.04	-0.02	1.00	0.08	-0.16	-0.66	0.01	-0.02
5. Wages	-0.13	0.23	0.09	0.08	1.00	0.67	0.21	0.35	-0.80
6. P.D. Income	0.23	0.29	-0.04	-0.16	0.67	1.00	-0.03	0.24	-0.40
7. Unemployment	0.47	0.04	0.20	-0.66	0.21	-0.03	1.00	-0.11	-0.44
8. Population	-0.09	-0.13	-0.07	0.01	0.35	0.24	-0.11	1.00	-0.25
9. Coldness	0.07	-0.19	-0.25	-0.02	-0.80	-0.40	-0.44	-0.25	1.00

P.D. Income = Personal disposable income per capita.
Wages = Real wage, salary and other labour income per capita.
Distance to P.B. = Distance to the province of birth from the 1976 province of residence.

CHAPTER 7 APPENDIX B
SPECIFICATION AND SELECTION OF ECOLOGICAL VARIABLES AND PERSONAL ATTRIBUTES

The perceived utility underlying the migration decision depends upon both personal factors and a set of ecological variables, representing the economic, cultural, environmental and geographic characteristics of the provinces. The specification and selection of the ecological variables are guided by previous research and substantive theories.[1]

Income Level: Two measures of income are defined;

i) Annual value of wages, salary and other labour income divided by provincial employment size.

ii) Average value of provincial personal disposable income divided by the population size.

Both have been adjusted for spatial and temporal differences in consumer price index (100 for Ontario in 1986). The unit is $1,000 per person per year. The choice between these two measures in each submodel is determined by their relative explanatory power.

Employment Growth: Provincial employment growth rate (percent per year) between 1976 and 1986.

Unemployment Rate: Provincial annual unemployment rate (percent of labour force) averaged over the five-year census period.

Coldness: The annual number of degree-days below 18°C, averaged over the 1951-80 period. The unit is in 1000 degree days.

Cultural Similarity: The proportional share of the 1976 (1981) provincial population by the ethnic group that matched the mother tongue of the potential migrant.

Log of Distance to the Potential Destination: The weighted average distance between the metropolitan areas in the province of residence at the start of the census period to those in the potential destination, with the weights being the metropolitan population sizes.

Log of Distance to the Province of Birth: The weighted average distance between the metropolitan areas in the province of residence at the start of the census period to those in the province of birth, with the weights being the metropolitan population sizes.

Population Size: The proportional share of the national population size by the origin province at the start of the census interval.

Information on personal attributes pertain to the status at the e. d of the migration period (the time of the census).[2] The following six factors were chosen.

Gender: Female and Male.

Mother Tongue: English, French and Minority.

Education: High-ed (with degree), Mid-ed (with certificate or diploma or attending school) and Low-ed (without degree, certificate or diploma).

Marital Status: Married, Single and DSW (divorced-separated-widowed).

Family Type: HWC family (husband-wife-child family), HW family (husband-wife family without child) and Other Households.

Age: 20-24, 25-29, 30-34, 35-39 and 40-44, defined as of the end of the census interval.

ENDNOTES

1. The data sources are fully described in Liaw and Ledent (1986), except for Statistics Canada (1966-86) and Statistics Canada (1988).

2. Because the 1986 census does not contain enough information to allow the creation of the 'student' or 'wedded' groups, the 1976-81 groups (see chapter 6) were consolidated based on the cross-tabulation results for that period. Students are grouped with the middle-educated, whereas the wedded (those who were married in the 1976-81 interval) are grouped with the singles.

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.0 INTRODUCTION

This thesis has sought to characterize and explain primary, return and onward interprovincial migration in Canada between 1976-81 and 1981-86. The existence of migration counterflows, while often regarded as being 'inefficient', suggests that migration is motivated by differing sets of factors and is not necessarily economically rational. Therefore, looking at the problem of migration from an aggregate viewpoint is neither completely realistic nor is it completely accurate. For some individuals, migration begets further migration, with subsequent moves building upon previous migration experience. A more complete understanding of the migration process can therefore be achieved by considering primary, return and onward migration. Return migrants are more likely to possess information about an area than primary or onward migrants and are therefore likely to exhibit different decision making processes than their counterparts.

Three major themes with respect to primary, return and onward

migration have been explored in this dissertation, namely (i) the characterization of primary, return and onward migration flows; (ii) the explanation of return and onward migration flows using the multivariate nested logit model and (iii) the explanation and evaluation of temporal patterns between 1976-81 and 1981-86. Sections 8.1 through 8.3 review the major findings of each of these areas. Since migration does not occur in a vacuum - but has consequences for both individuals and society as a whole, section 8.4 explores the possible policy implications arising from the results. Section 8.5 discusses avenues of potential future research.

8.1 CHARACTERIZATION OF PRIMARY, RETURN AND ONWARD MIGRATION

The distinction among primary, return and onward migration is based on information on the province of birth, the province of residence at the start of the census interval and the province of residence at the end of the census interval. Although non-natives represent a rather small proportion of the at-risk population (14.5 percent), they contributed approximately 44 percent of the interprovincial migration flows during 1976-81 and were four times as migratory as primary migrants. Amongst the non-native migrants, slightly greater than 50 percent were return migrants.

In general, interprovincial migration in Canada and inter-state migration in the United States exhibit the same properties with respect to age patterns, net-effects and the dependence on education. British Columbia, for example, is in some ways similar to California. Both areas have a strong power to re-capture their native-born population and to retain their native and non-native populations. Hence, they may both be called 'the end of the line', following Long's (1988) description of California.

The propensities to undertake one of these three types of migration vary systematically with personal attributes. For example, two points are worth making with respect to age effects. First, primary migration schedules are most similar to the 'typical' age-schedule, with a labour force peak in the early twenties and a subsequent decline beyond the peak. Return migration schedules, on the other hand, tend to have an elevated young dependent peak (aged 5 to 9) and a shift in the labour force peak to the late twenties and early thirties. Second, the spatial pattern of the age-specific outmigration rates varies with age more drastically than those of the inmigration rates. Therefore, for migration at different stages of the life-cycle, provinces function less consistently as senders of migrants than as attractors.

Previous migrants from economically depressed regions do not have a very high propensity for return inmigration, although they tend to represent a large portion of the inflow. The main reason is not a high rate of return, but rather that

such areas attract relatively few primary or onward migrants from other areas. Finally, primary migration dominates the overall distributional potential of the system, whereas return migration tends to weaken the effect and onward migration reinforces the effect. However, during the early 1980s when the Canadian economy was in serious recession, the redistribution potential of return migration became greater than that of primary migration.

8.2 EXPLANATION OF RETURN AND ONWARD MIGRATION

The second major theme of this thesis was to 'explain' return and onward migration. The migration decision was conceptualized as a three level choice process involving the destination choice, return/onward choice and departure choice process.

The notion of imperfect information suggests that the initial migration may be an unwise decision, generating 'disappointed' migrants whose income and employment expectations did not materialize, leading to a return migration (Morrison and DaVanzo 1981; Grant and Vanderkamp 1986). We found indirect evidence to support this proposition. First, distance from province of birth to province of residence at the start of the census interval increased the departure propensity. Second, the poorly educated migrants, who presumably possess less knowledge of national employment opportunities, are more likely to return.

The departure propensities of non-natives were (1) negatively affected by the economic opportunities (income level and employment growth) of the origin provinces and (2) positively affected by the general attractiveness of the rest of the system. They were also affected by several personal factors: enhanced by being (1) English in Quebec, (2) French in the rest of Canada, and (3) best educated; and reduced by being (1) French in Quebec, (2) poorly educated, and (3) belonging to a husband-wife-child family.

Return and onward migrants differ in two important respects. First, although return migrants were subject to the attractions of economic opportunities in their province of birth, onward migrants were much more sensitive to these factors. This difference may be partly due to the location-specific capital associated with the province of birth. Second, return migrants were less affected by the friction of distance. It may be that the costs of making a return migration, measured by either psychic or monetary costs, do not increase strongly with distance due to familiarity with the province of birth.

Place and individual characteristics should be examined as inter-dependent effects (Brown 1991). In the Canadian context, mother tongue effects are especially variable from province to province. Although the overall departure rates of French non-natives were similar to the English and Minority groups, they vary quite strongly among provinces. In Quebec, the departure rate of the French was only 12 percent, which was one-half to one-third less than those of the

English or Minority. In most other provinces, the departure rates of the French tended to be higher. The effects of other personal attributes such as age, gender or education also showed some provincial variation, but much less so.

The return propensities of the non-native migrants were enhanced by the divorced-separated-widowed marital status and the husband-wife-child family type, and reduced by the highest education level. Since education has a positive effect on departure propensity and a negative effect on return propensity, non-natives probability of making a return migration was nearly independent of the level of education. This was observed in both the 1976-81 and 1981-86 periods. Thus, onward migrants tend to be more helpful than return migrants in improving the average level of human capital in the destination area.

Age selectivity was found at all three levels of the choice framework, being strongest at the departure choice level and weakest at the destination choice level. The onward migrants in the youngest age group (20-24) were somewhat more attracted by employment growth at the potential destination. The non-native migrant's propensity to return was enhanced by being relatively young (less than 35). The departure schedule of the non-natives had a clear peak in the 25-29 age group, which was five years later than the peak of the departure schedule of the natives, suggesting that a high proportion of primary migrations in the 20-24 age groups were based on unreliable information.

Cultural similarity had a significant effect at all three levels of the choice

framework, working against the mixing of cultural groups.

8.3 TEMPORAL EFFECTS: 1976-81 AND 1981-86

In order to gain an in-depth understanding of the temporal aspects of the migration process, migration must be delineated in terms of general spatial processes and location specific characteristics (Brown 1991). Economic structures, for example, are likely to vary over time resulting from either local, regional or global policies and/or events. During the 1976 to 1986 decade, large changes in interprovincial migration flows occurred, largely due to changes in the spatial patterns of economic opportunities. Within Canada, the 1976-81 period was one of economic boom, while the 1981-86 period was one of economic bust.

The changing national and provincial economic conditions create variability in migration flows resulting in changing destination choice preferences. The cause of these changes lies in the major events of the period, such as Alberta's oil boom and bust and the national (global) economic recession of the early 1980s. The choice between the return and onward options was economically rational in both periods. However, the sensitivity towards income level became stronger in the second period at both the destination and return/onward choice levels. The sensitivity towards employment growth increased at the destination choice level only. Without longer-run data, it is

uncertain whether the changes in sensitivity is indicative of a trend. However, the shifts in the migration patterns between the two periods suggests the overwhelming importance of economic variables in the migration process.

The sensitivity to distance was reduced at both the destination and return/onward level of the model. While reasons for this are speculative, it is suggested that this is due to two reasons. First, increasing communications technology and speed of transportation has effectively shortened the distance between two points (Shaw 1985; Anderson and Papageorgiou 1993). Second, distance may be observed as less of a hindrance during recessionary periods since information about onward destinations is scarce and difficult to obtain, while information concerning the province of birth is plentiful. Individuals may therefore be less willing to risk an onward migration to a relatively unknown destination and more willing to make a longer migration back to their province of birth.

Cultural similarity was observed to be significant at all three levels of the choice hierarchy although the sensitivity to cultural similarity decreased from 1976-81 to 1981-86. However, the cultural isolation of Quebec was still visible in both periods, with non-native's propensity to depart enhanced by being English-speaking in Quebec or French-speaking in the rest of Canada and reduced by being French-speaking in Quebec. Consequently, there would appear to be much work left to be done regarding the integration of the two founding cultures as well as newer arrivals.

Finally, the adjustment process linking migration with economic change is not instantaneous. Instead, there appears to be some momentum built into the migration system. The decline of Alberta's economy decreased its relative attractiveness, but not as much as could be inferred from the changes in the economic variables.

8.4 TOWARDS A NATIONAL MIGRATION POLICY?

The imposition of a national policy on migration, however defined, is unrealistic and would be difficult to implement. Since migration is only partially responsive to differential economic opportunities, regional disparities are bound to continue to exist (Vanderkamp 1987). At this time, there is no explicit or implicit Federal policy regarding migration and settlement patterns and goals. Instead, migration is largely a 'side-issue' in the context of regional policy debates. The following points may be made as to why a national policy on migration would be unsuccessful.

First, assuming that income levels are targeted as a tool for promoting migration, such actions may have a negligible effect. More importantly, it is impossible to determine *a priori* that income (or whichever factor is manipulated) will have an independent effect on migration propensities. Although small shifts in income may be made by provincial governments via minimum wage programs,

it is uncertain how these effects will relate or interact with other effects and personal attributes. Hence, attempts to alter the macro-economic situation are largely beyond the scope and influence of the government and instead rely upon the international economy.

Second, it is uncertain as to how time affects migration decisions. The finding that onward migrants continued to be attracted to Alberta in the later period, even after the collapse of its oil-based economy, provides indirect evidence that there is a time-lag between cause (information) and effect (migration).

Third, a more serious problem may be the selectivity of migration. Migration re-distributes the population such that some members may be concentrated in expanding regions, reinforcing income differentials. However, return migration is not necessarily detrimental to a region. Return migrants may also have a positive effect on provincial economies, aiding regional growth and development (King 1986) through sources of accumulated capital (which may be invested in new enterprises) and new human capital and skills. Clearly, further research is needed.

If one was forced to articulate a national policy on migration, the most effective and appropriate migration policy may be 'laissez-faire', whereby individuals are allowed to maximize their own utility or benefits. Such a policy represents a formalization of existing conditions. The costs associated with

migration most likely represent less of a barrier now than they did in the past. However, such effects are still significant. Although the findings were indirect only, the significance of the disappointment effect at the departure choice level suggests that there may be returns (in the sense of macro-economic efficiency) associated with an implicit mobility policy providing information to potential migrants. Information dissemination may increase the rate of response to existing opportunities by reducing the uncertainty associated with migration.

Of course, this still implies a tradeoff between equity and efficiency (see Chapter 2). A policy such as the one above allows individuals to benefit from migration and in doing so they may;

(i) increase their personal income levels;

(ii) alter their personal marginal productivity (either up or down);

(iii) alter their net fiscal benefit which is equal to the value of public services less what they pay in taxes.

That is, migration may still not operate in either an equitable or efficient manner.

8.5 FUTURE RESEARCH

Much work remains to be done in the area of primary, return and onward migration. The following discussion is meant to outline some of the tentative areas for future research.

8.5.1. Long-run Trends

The results of the temporal analysis of primary, return and onward migration are largely as expected, but does not represent a complete analysis. Observed differences between the 1976-81 and 1981-86 periods may be functions of period-specific events and the corresponding adjustment of migration to these events. But what of the longer-run trends? Growth cycles may alter the composition of migrants into and out-of an area, increasing or decreasing the proportion of natives versus non-natives. It may also be the case that some regions such as British Columbia are persistent winners of migrants over the long-run. The relative shares of migrants within the system have also been observed to change systematically over time. Rogers and Belanger (1990), for example, observed that in the United States the percentage share of primary migrants tended to decline over time and that the percentage share of outmigrants by type tended to narrow over time.

It is possible to apply the same techniques to the previous public use samples and the soon to be released file from the 1991 census. By looking at this twenty-five year period, the following matters could be addressed;

i) the persistence of provincial net gainers and losers over time;

ii) the relative importance of migration in determining the gain or loss of a provincial population;

iii) the time-paths of migration shares by province and migrant type.

Such results would be directly comparable with those obtained by Rogers and Belanger (1990) and Long (1988) for the United States.

8.5.2. Net-Effects of Return and Onward Migration

Research aimed at explaining return and onward migration should be complemented by research on the net effects or population redistribution potential of such migration flows. Since there is little variation in fertility or mortality, interprovincial migration is the most important process determining the relative growth or decline of provincial populations. However, because of the selectivity in migration (Liaw 1990b), there is the potential for some provinces to be 'stuck' with an overabundance of young or old dependents and a distortion of the age pattern. The outmigration of certain population sub-groups such as the highly educated may impact negatively on some provinces in terms of their labour supply and health and welfare provision. Likewise, the concentration of specific groups, such as the elderly in British Columbia, may have somewhat similar effects and this raises the question of the societal costs (and benefits) associated with migration. By providing (i) a descriptive analysis focusing upon the positive and negative components of growth (births, deaths, migration, immigration and emigration) and (ii) an analytical account based upon population projection techniques incorporating primary, return and onward migration, the analysis may provide greater insight into regional population structures over both the short and long run.

8.5.3. Impact of Return Migration

Return migrants may embody new skills or human capital that is of benefit to the home region; thus they may receive higher wages upon returning than those who did not migrate. Several studies (Courchene 1974; Grant and Vanderkamp 1976, 1980; Marr and Millerd 1980; Robinson and Tomes 1982; Islam 1985) have attempted to determine the change in income associated with migration.

Mixed results have been obtained to date. Using aggregate migration data, Grant and Vanderkamp (1976) found that the percentage increase in income for migrants was only slightly higher than that of stayers over a one-year migration interval. But, migrants from low-income provinces did better than stayers in those provinces, while migrants from high income provinces did worse than stayers. When the income effects of migration were examined over a five-year interval, migrants were found to have had a considerably greater increase in income as compared to stayers. Those who returned received lower increases in income than those not returning, but return migrants were still better off than those who never migrated (Grant and Vanderkamp 1976). In a later study using micro-data, Grant and Vanderkamp (1980) found it difficult to detect a positive effect on income associated with migration.

A major problem with such studies is to control for self-selectivity. Failure to untangle the effects of individual self-selection (i.e. the difference

between migrants and non-migrants) may lead to potentially biased results (Greenwood 1975; Robinson and Tomes 1982). That is, returns to migration may be associated with other investments in human capital coinciding with migration (such as job-training), increasing income with age or differing marginal propensities to work between provinces.

No study (as far as the author is aware) to date has differentiated between primary, return and onward migration in order to gauge its effects upon income. While the use of micro-data helps to account for heterogeneity within the population, a model correcting for self-selectivity bias is required (Heckman 1979; Maddala 1983), allowing the income effects to be isolated.

8.5.4. Longitudinal Analysis

Until recently, much of the research on migration has relied upon cross-sectional data such as the census. Davies and Pickles (1985, 1991) argued that cross-sectional analysis of migration was biased and seriously flawed and could not reveal the true characteristics of migration. Hence, cross-sectional methods and results were misleading. Clark (1992) compared cross-sectional and longitudinal models of migration and concluded that we do not need to throw out existing cross-sectional results. In an analysis of cross-sectional versus longitudinal models of mobility, Clark concluded that although longitudinal analysis increases understanding of the migration process, it does not undermine cross-sectional results. As Clark points out, longitudinal analysis promises a

'rich' path for future work. Such data sources may be better able to reveal the 'triggers' or events that are associated with the migration decision. To this end, if suitable data were available, this analysis could be expanded while using similar methodology.

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