Three Essays on Internal Migration

By

Hongchen Yue

A Thesis Submitted to the Faculty of Graduate Studies of

The University of Manitoba

In Partial Fulfillment of the Requirement of the Degree of

DOCTOR OF PHILOSOPHY

Department of Economics
University of Manitoba
Winnipeg, Manitoba
Canada R3T 5V5

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

*****

COPYRIGHT PERMISSION

Three Essays on Internal Migration

BY

Hongchen Yue

A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirement of the degree

Of

Doctor of Philosophy

Table of Contents

	Page
Abstract	VI
Acknowledgement	VIII
1. Introduction	1
References	7
2. Internal Migration, Self-selection and Earnings of Canadian Immigrants	
2.1 Introduction	8
2.2 Theoretical and Empirical Literature Review	11
2.2.1 Internal Migration	11
2.2.2 Immigration and Immigrant Internal Migration	12
2.2.3 Econometrics Issues	15
2.2.4 Comparison Issue	17
2.3 Estimation Strategy	18
2.3.1 Estimation Model	18
2.3.2 Self-selection Problem	20
2.4 The Data	23
2.4.1 The Data for Immigrants	23
2.4.2 Propensity Score Matching	28
2.4.3 The Data for Canadian-born	32
2.4.4 Descriptive Statistics	34
2.5 Estimation Results	40
2.5.1 Estimation Results for Immigrants	40
2.5.2 Estimation Results for Canadian-born	63
2.6 Conclusions	75
References	78
Appendix	83
3. Immigrant and Canadian-born Family Migration and the Labor Supply Consequences of Women and Men	
3.1 Introduction	90
3.2 Theoretical Framework	93
3.3 Modeling Strategy	100
3.4 The Data and Variables	103
3.4.1 The Data	103
3.4.2 The Variables	106
3.4.3 Descriptive Statistics	109
3.5 Regression Results	112
3.5.1 Regression Results of Family Migration Model	112

3.5.2 Fairlie Decomposition—Extension of the Blinder-Oaxaca Decomposition 122
3.5.3 Regression Results of Working-Hours Change Model 126
3.6 Conclusions 137
References 140
Appendix 144

4. Migration and Job Search: Evidence from Canada
4.1 Introduction 161
4.2 Theoretical Framework 166
4.3 Estimation Strategy 170
4.3.1 Competing-Risks Model 171
4.3.2 Semi-parametric Estimation 172
4.3.3 Parametric Estimation 173
4.3.4 Unobserved Heterogeneity 175
4.3.5 Marginal Effect 175
4.4 The Data 177
4.4.1 Descriptive Analysis 183
4.5 Estimation Results 191
4.5.1 Cox Proportional Hazard Model Estimation Results 192
4.5.2 Log-logistic Model Estimation Results 199
4.5.3 Marginal Effect of Covariates 202
4.6 Conclusions 205
References 207
Appendix 210

5. Conclusion 213

List of Tables

Table	Page
2.1 Migration Rates for Immigrants (from Longitudinal Survey of Immigrants to Canada) and Canadian-born (from Survey of Labor and Income Dynamics)	33
2.2 Means of Selected Variables for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	35
2.3 Means of Selected Variables for Canadian-born, Survey of Labor and Income Dynamics (SLID)	39
2.4 Reduced Form Migration Probit Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	41
2.5 Probit Model of Labor Force Participation Equation Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	44
2.6 Wage Equations Regressions Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	47
2.7 Wage Growth Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	55
2.8 Structural Probit Migration Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)	62
2.9 Reduced Form Probit Migration Model Regression Results for Canadian-born Males, Survey of Labor and Income Dynamics (SLID)	64
2.10 Probit Model for Participation Selection Equation Regression Results, Canadian-born, Survey of Labor and Income Dynamics (SLID)	66
2.11 Wage Equations Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)	68
2.12 Wage Growth Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)	72
2.13 Structural form Probit Migration Model Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)	74
A.2.1(a) Propensity Score Coefficient Estimates	83
A.2.1(b) Balancing Test—Standardised Difference Test	84
A.2.1(c) Balancing Test—t-Test	84
A.2.1(d) Balancing Test—Test of Joint Equality of Means (Hotelling Test)	85
A.2.2 Heckman Selection Model – Two-step Estimates for Wage at Wave 1, Longitudinal Survey of Immigrants to Canada (LSIC)	86
A.2.3 Heckman Selection Model – Two-step Estimates for Wage at Year 1, Survey of Labor and Income Dynamics (SLID)	88
3.1 Descriptive Statistics: Migration Rates by Different Family Characteristics	109
3.2 Selected Results of Family Migration Model (Probability of Family	

Migration), Pooled Sample 113
3.3 Selected Results of Family Migration Model (Probability of Family Migration), Native Family Sample, Immigrant Family Sample, Mixed Family Sample and Immigrant and Mixed Family Combined Sample 120
3.4 Decomposition of Immigrant Family/Native Family Differences in Migration Probability 124
3.5 Selected Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Husbands 128
3.6 Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Wives 133
A.3.1 Descriptive Statistics (Means, SD) 144
A.3.2 Full Results of Family Migration Model (Probability of Family Migration), Pooled Sample 149
A.3.3 Full Results of Family Migration Model (Probability of Family Migration), Native Family Sample, Immigrant Family Sample, Mixed Family Sample and Immigrant and Mixed Family Combined Sample 152
A.3.4 Results of OLS Estimation of the Changes in Total Annual Hours (from t-1 to t+1, ΔH) for Husbands and Wives 155
A.3.5 Full Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Husbands 157
A.3.6 Full Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Wives 159
4.1 Descriptive Statistics of the Variables, SLID 185
4.2 Kaplan-Meier Survival and Hazard Estimates 187
4.3 Cox Proportional Hazard Model Estimation Results, Males of 21-54 Years of Age, Survey of Labor and Income Dynamics 193
4.4 Log-logistic Survival Time Model Estimation Results, Males of 21-54 Years of Age, Survey of Labor and Income Dynamics 200
4.5 Marginal Effect of Covariates on the Probability of Exiting Jobless State via Migration 203
A.4.1 Proportion assumption test for Cox proportional hazard model (the regression for the risk of ending joblessness via migration) 210
A.4.2 Proportion assumption test for Cox proportional hazard model (the regression for the risk of ending joblessness at local market) 211
A.4.3 Proportion assumption test for Cox proportional hazard model (the regression for the single risk of ending joblessness) 212

List of Figures

Figure	Page
4.1 Kaplan-Meier Survival Estimates, Migrants vs. Non-migrants	187
4.2 Smoothed Hazard Estimate of Employment for the Whole Sample (single risk)	188
4.3 Estimated Smoothed Hazard Curve for Migrants and Non-migrants	188
4.4 Smoothed Hazard Estimate of Migration Event	190

Abstract

This dissertation is composed of three essays on internal migration. The first essay entitled "*Internal Migration, Self-selection and Earnings of Canadian Immigrants*" investigates the post-arrival human capital investment behavior of immigrants, migration particularly, and its effect on individual earnings, compared with Canadian-born using the up-to-date longitudinal datasets—the Longitudinal Survey of Immigrant to Canada (LSIC) and the Survey of Labor and Income Dynamics (SLID). The double self-selectivity of migration and labor force participation are considered in the wage and wage growth models. The investment in internal migration activity is analyzed by employing the endogenous switching model. This study finds that migration behavior has a significant positive effect on immigrants' early career wage development in Canada. Both migration and labor force participation selection bias are found to significantly affect the wages of immigrants and native-born.

The second essay entitled "*Immigrant and Canadian-born Family Migration and the Labor Supply Consequences of Women and Men*" investigates the family migration behavior of immigrants and Canadian-born and the consequences of labor supply for men and women. Even though immigrant families (in which both spouses are immigrants) have the lowest average migration rate compared with native families (in which both spouses are native-born) and mixed families (in which one spouse is immigrant and one spouse is native-born), the regression results show that immigrant families are not significantly less mobile than the other two family types after controlling for

characteristics differences. The empirical results from the hours change model suggest that internal migration has a positive and significant effect on labor supply of men and native women.

The third essay entitled "*Migration and Job Search: Evidence from Canada*" examines the association between migration and unemployment exit rate that has not previously been examined in the Canadian literature. By employing job search and human capital theories, this study investigates the search strategies of unemployed workers. Independent competing risks framework is used to examine the transition from unemployment to employment under different search strategies. Semi-parametric stratified Cox proportional hazard model and parametric log-logistic model are applied. The results indicate that individual and family characteristics have a stronger effect on the transition rates than other factors like labor market conditions and previous-job-related characteristics do. There is evidence that current EI program affects search strategy of unemployed individuals.

Acknowledgements

This research would not be possible without the support of many people. I would like to thank my advisor Laura Brown who has spent a considerable amount of time reading the early drafts and discussing with me the issues. She also gave me a lot of invaluable encouragement during the years in my Ph.D. study. Thanks to my committee members, Wayne Simpson, Janice Compton and Evelyn Forget for their guidance and support. Special thanks to Wayne Simpson for his advice and comments on the drafts of the essays, especially the econometrics work. Many thanks are due to Janice Compton who gave me generous help and constructive comments. Evelyn Forget, who served as the internal external advisor and from the Community Health Science Department, also gave me constructive suggestions for my research, which is appreciated. I would also like to thank those graduate students at Economics Department of University of Manitoba, with whom I have gone through the impressive study life in Canada. I would also thank my family for all of the support through the years.

The Statistics Canada Research Data Center at the University of Manitoba is acknowledged. I was permitted the access to confidential longitudinal micro data—the Survey of Labor and Income Dynamics and the Longitudinal Survey of Immigrants to Canada. Financial support from the University of Manitoba Research Data Center, the Prairie Metropolis Center for Research on Immigration and Integration and the Global Political Economy Research Grant is grateful acknowledged.

Chapter 1
Introduction

Migration, including internal migration and international migration, can be described as the phenomenon of labor flow and the analysis of migration is a "central ingredient in any discussion of labor market equilibrium" (Borjas 2000). Migration plays the role of an economic adjustment mechanism.

This dissertation consists of three essays. Internal migration is the main issue for all the three essays, but each of them has its own focus. The first essay focuses on the internal migration of Canadian new immigrants and Canadian-born and individual earnings. The second essay investigates immigrant and Canadian-born family migration and its effect on labor supply mobility of men and women. The third essay examines the association between internal migration and unemployment exit rate. The first two essays have the same concern about immigrants, but the analysis unit is different and the samples of immigrants come from two different longitudinal datasets. In the first essay, the Longitudinal Survey of Immigrant to Canada (LSIC) is the dataset used for the immigrant sample and the Canadian-born sample comes from the Survey of Labor and Income Dynamics (SLID). In the second essay, the SLID provides both the immigrant and Canadian-born sample. The third essay focuses on the unemployed individuals in Canada and their jobless spells, and the study sample are also from the SLID.

The United States, Canada, and Australia have been the major immigrant receiving countries by 2000 in the world. There is considerable concern over immigrants' economic performance in the host country. Economic integration of immigrants has been studied by many researchers. Previous studies indicate that immigrants' earnings grow with their

residence time in the host country. However, previous studies also show that recent immigrants have been doing worse and experience a much slower process of integration than past immigrants (see Baker and Benjamin 1994; Borjas 1995; Bloom, Grenier and Gunderson 1995; Hum and Simpson 2004).

Studies of immigrants' assimilation process, especially the human capital accumulation process after landing, however, are few. The integration process in the host country can be viewed as a process of human capital investment. Receiving formal education, training and work experience accumulation are the most often studied format of human capital investment for immigrants. The process of labor mobility across labor markets after landing (also called 'secondary migration') is another human capital investment activity, which can contribute to immigrants' career development, as well as the process of integration. Immigrants migrate after landing to find a location which can match their skills better. Since immigrants have experienced at least one migration, there is the potential of more migration behaviors for such a group. Secondary migration, however, is an element that drew little attention in previous immigrant research.

The slow assimilation process is usually attributed to limited ability in English or French communication and lack of recognition of education qualifications and foreign experience for immigrants from non-English-speaking or non-French-speaking countries. It is noticed that, in Canada, new immigrants are inclined to live in large urban centers and less likely to move away (Nogle 1994; Edmonston 2002; Hou 2004; Schellenberg 2004). Over seventy percent of immigrants choose to live in Toronto, Vancouver and Montreal, the three biggest gateway cities. The spatial concentration of immigrants has raised some concerns. Lack of mobility between labor markets can cause the so-called

'negative enclave effect' in the long run, which would delay the assimilation process.

The first essay with the title *Internal Migration, Self-selection and Earnings of Canadian Immigrants* empirically examines the internal migration, as a form of human capital investment, of Canadian immigrants. This study makes several contributions. It is one of the first to explicitly examine internal migration behavior of new immigrants to Canada by exploiting the up-to-date longitudinal datasets—the Longitudinal Survey of Immigrant to Canada (LSIC). LSIC has the advantage of having rich data on settlement process, especially human capital investment after arrival, which is not available from census. This study will shed new light on the role of internal migration in immigrants' early career wage development in Canada. Moreover, the double self-selectivity of migration and labor force participation are considered. The investment in internal migration activity is analyzed by employing the endogenous switching model. Previous studies usually ignore one or two of the endogenous self-selection effects (migration or/and labor force participation), which may cause biased and inconsistent estimation. The results from this study are useful for policy making, especially immigrant selection policy and settlement policy for rapid assimilation.

The second essay, titled *Immigrant and Canadian-born Family Migration and the Labor Supply Consequence of Women and Men*, investigates the family migration of immigrants and Canadian-born. Mincer (1978) was among the first to suggest that the modeling of migration decisions should take the whole family into consideration. Family migration behavior differs with that for singles, because family migration involves complex trade-offs and bargain interactions, not just personal cost and benefit comparison. Gendered understanding of the migration process is becoming more important after the

family migration model.

In much of the previous literature on migration, the role of women is generally ignored. During recent decades, we saw a great increase in the participation and employment attachment of women in the formal labor market. The number of dual earner families has significantly increased. It is believed that the number of families with 'egalitarian' structure would dominate the traditional family structure where women take a compromising and supportive role. At the same time, the relocation strategies and behavior of dual earner families are likely to become more complicated. The migration and labor supply decision becomes a joint decision with intra-household bargaining and compromise.

Most previous studies on immigration focus on male immigrants and their wage or earnings assimilation in the host country. Recent studies have begun to analyze the 'family' unit and suggest that there is a relationship between family structure and assimilation. This essay tries to answer the following questions: Do immigrant families behave differently from Canadian-born families in migration activity? If controlling for personal and family attributes such as age, education, and family income, what effect does family type[1] have on migration behavior? How is gender related to the migration decision making? What is the difference in labor supply mobility between men and women?

Facing a new environment, immigrants might stay away from their traditional culture and immigrant women are more likely to experience the role change in family. This study helps to understand how immigrant status, gender and employment interact in

[1] Family types are immigrant families, in which both husband and wife are foreign born; mixed families, in which one member of the couple is foreign born and the other is native-born; and native families, in which both are native-born.

the process of internal migration and integration.

The impact of migration on post-migration labor supply was basically ignored in previous literature about internal migration of immigrants. To my knowledge, there is no Canadian literature systematically discussing the labor supply consequence of internal migration for married immigrants, in a family perspective, compared with that for native born. This study intends to fill this gap. The empirical analysis is based on data from the SLID master file.

For the first two essays, the efficiency of migration evaluation is based on examining its effect on wages and working hours for immigrant and Canadian-born population. For the third essay, titled *Migration and Job search: Evidence from Canada*, attention is on the unemployed group and examines the relationship between migration and unemployment exit rate, which have been ignored in the Canadian literature.

Unemployment is a popular issue in economics literature. Recently, long-term joblessness and repeated unemployment has been more than ever observed in many western countries. Unemployment has become a more complicated issue than before. The pattern of unemployment could be affected by market conditions, personal characteristics and government policies. Lack of geographical mobility particularly may cause prolonged jobless spell as the job-losers are more likely to 'wait' for a job in the local market.

Migration can be viewed as spatial job-search for unemployed individuals. Improved information technology makes geographically extensive search more convenient and affordable. By extending their job search efforts geographically, unemployed workers could face more employment opportunities and create better

matches between employer and workers.

Based on the detailed event histories now available in longitudinal data, the unemployment-migration-reemployment dynamics can be better examined. This essay intends to investigate the efficiency of migration within a job-search strategy by analyzing the hazard rate of state change from jobless state to employment. The questions asked regard the role of migration in completing a job search, such as "Are migrants more likely to escape from unemployment than those who stay?", "How does the search strategy differ with different geographical mobility?", "Do individual, family and regional characteristics affect such strategy?" In addition, the paper investigates whether the Canadian Employment Insurance program has a positive effect on the re-employment likelihood as well as its role in exiting unemployment via migration. Duration models are used since exact durations provide more information than a binary variable. The empirical analysis is based on the data from Survey of Labor and Income Dynamics (SLID) longitudinal data.

The contributions of the study include the following: it is one of the few studies using competing-risks model to study migration and unemployment duration; it adds to Canadian literature about the micro-studies on the issue of migration and employment transition, and it adds evidence in the job-search literature on the search strategies of unemployed job seekers.

In all, the three essays provide explicit investigations on internal migration behavior of immigrant and Canadian-born population, using up-to-date longitudinal data. The study results can help us better understand the assimilation process of immigrants and the job search process of individuals, which are the key issues in our economy but less

studied so far. The research results also have important policy implications, for both federal and provincial government perspectives.

References:

Baker, M. and Benjamin, D. (1994) "The Performance of Immigrants in the Canadian Labor Market." *Journal of Labor Economics* 12(3), 369-405

Bloom, D. E., Grenier, G. and Gunderson, M, (1995) "The Changing Labor Market Position of Canadian Immigrants." *Canadian Journal of Economics* 28(4b): 987-1005.

Borjas, G. J. (1995) "Assimilation and Changes in Cohort Quality Revisited: What Happened to Immigrant Earnings in the 1980s?" *Journal of Labor Economics*, 13(2): 201-245.

Borjas, G. J. (2000) "Economics of Migration." *International Encyclopedia of the Social and Behavioral Sciences*, No. 3.4 (38)

Edmonston, B. (2002) "Interprovincial Migration of Canadian Immigrants" Vancouver Center of Excellence—Research on Immigration and Integration in the Metropolis. Working Paper Series No. 01-10.

Hou, F. (2004) "Recent Immigration and the Formation of Visible Minority Neighborhoods in Canada's Largest Cities" Statistics Canada, Business and Labor Market Analysis Division Research Paper Series, No. 11F0019MIE2004221.

Hum, D. and Simpson, W. (2004) "Reinterpreting the Perormance of Immigrant Wages from Panel Data." *Empirical Economics* 29: 129-147.

Mincer, J. (1978) "Family Migration Decisions." *The Journal of Political Economy*, 86 Oct.: 749-773.

Schellengerg, G. (2004) "Immigrants in Canada's Census Metropolitan Areas" Catalogue No. 89-613-MIE (Ottawa: Statistics Canada).

Chapter 2

Internal Migration, Self-selection and Earnings of Canadian Immigrants

2.1 Introduction

There is considerable concern over immigrants' economic performance in the host country. Economic integration of immigrants has been studied by many researchers. Previous studies indicate that immigrants' earnings grow with their residence time in the host country (see Borjas 1999 for a survey). The acquisition of host country-specific human capital, like formal education, training and work experience, has been mostly explained as the reason for the income growth of immigrants. Previous studies also show that recent immigrants experience a much slower process of integration than past immigrants (see Baker and Benjamin 1994; Borjas 1995; Bloom, Grenier and Gunderson 1995; Hum and Simpson 2004). Studies by Borjas (1995) and Baker and Benjamin (1994) indicate substantial declines in the entry earnings for recent immigrants in United States and Canada respectively. Most researchers explain such phenomenon by skill level decline, decline of return to foreign experience, and/or the composition of source country change (e.g. Borjas 1985; Aydemir and Skuterud 2003). Duleep and Regets (2002), however, note that greater investment in human capital in host country by immigrants may cause lower entry earnings and will be rewarded by larger earnings growth afterwards.

However, studies of immigrants' assimilation process, especially the human capital

accumulation process after landing are few.[1] The limited availability of longitudinal datasets for immigrants is one reason for the scarcity of studies. Most studies on immigrants are based on cross-sectional census data or census from different years (also called 'quasi-panel'). This empirical study of Canadian immigrants, using the up-to-date Longitudinal Survey of Immigrants to Canada (LSIC), adds to this literature by focusing on the post-arrival human capital investment behavior, migration particularly, and on its effect on individual earnings.

The post-arrival investment in human capital by immigrants becomes crucial for successful integration. Limited ability in English or French communication and lack of recognition of education qualifications and foreign experience for immigrants from non-English-speaking or non-French-speaking countries is usually the obstacle to their success (Chiswick and Miller 1994). Internal migration, which is viewed as human capital investment, can contribute to immigrant's income development. Immigrants migrate after landing to find a location which can match their skills better. Since immigrants have experienced at least one migration, there is the potential of more migration behaviors for such a group. The researches on immigrants' internal migration and returns to geographic mobility are few so far, especially when migration behavior is estimated in a structural framework considering the self-selection from migration and labor force participation, compared with Canadian-born.

The goal of the study is to empirically examine the internal migration, as a form of human capital investment, of Canadian immigrants based on the expected earnings differential of moving and staying, considering the double self-selectivity from migration

[1] Few studies investigate the effect of English fluency on earnings (e.g. Chiswick and Miller 1992, 1994). Some researchers' studies on foreign credential recognition and age are in this direction, which affect the immigrant assimilation process in the host country (e.g. Schaafsma and Sweetman 200; Friedberg 2000).

and labor force participation. This study makes several contributions. It is one of the first to explicitly examine internal migration behavior of new immigrants to Canada by exploiting the up-to-date longitudinal datasets—Longitudinal Survey of Immigrants to Canada (LSIC). Internal migration is an element that drew little attention in the previous immigrant research. This study will shed new light on the role of internal migration in immigrants' early career wage development in Canada. Moreover, the double self-selectivity of migration and labor force participation is considered. The investment in internal migration activity is analyzed by employing the endogenous switching model. Previous studies usually ignore one or two of the endogenous self-selection effects (migration or/and labor force participation), which may cause biased estimation. The results from this study are useful for policy making, especially with respect to immigrant selection policy and settlement policy for rapid assimilation. If immigrants have difficulties in transferring their skills or if immigrants are unable to achieve faster wage growth through rapid human capital investment, the divergence in earnings over the country will be larger. If Canadian immigrants' settlement choices continually concentrate on the three biggest cities but result in lower wages and higher unemployment rate compared with those settled in other regions, the social burden would increase and the goal of immigration policy would be hard to achieve.

The essay is organized as follows. Section two summarizes the literature on internal migration, immigration and relevant econometric issues. Section three and four discuss the model and the data respectively. Section five analyses the empirical results. Section six concludes the essay.

2.2 Theoretical and Empirical Literature Review

2.2.1 Internal Migration

Both internal migration and international migration can be described as the phenomenon of labor flow and the analysis of migration is a "central ingredient in any discussion of labor market equilibrium" (Borjas 2000). Migration plays the role of an economic adjustment mechanism.

Migration has been looked at as a human capital investment by economists. Individuals migrate if the expected returns exceed the costs incurred (Sjaastad 1962). Factors such as age, education, experience, family characteristics, and location characteristics can affect the decision to migrate according to the human capital theory of migration. The model predicts that the propensity to migrate declines with age and work experience. Highly educated individuals are more likely to migrate than less educated people. A larger family and amenities of origin increase the migration costs.

Polachek and Horvath (1977) extend the above basic human capital model in a lifecycle perspective. The lifecycle perspective of migration indicates that we need a long-term vision when studying migrant behavior. An immediate negative effect is possible under this perspective. Borjas, Bronars and Trejo (1992) find negative returns for a short period of time after migration.

Empirical research on internal migration can be classified into two areas: the first is concerned with the determinants and direction of moves, that is, who moves and where they move to, and the second is about the effect of migration on wages and earnings. Bartel (1979) provides evidence for positive contemporaneous returns for younger workers. Polachek and Horwath (1977) predict that mobility declines after peaking in the

mid-twenties. Goss and Schoening (1984) find that propensity to migrate declines with the duration of unemployment. Yankow (2003) finds that less-educated workers receive positive contemporaneous gains from migration, but there are insignificant returns for more highly educated workers. Based on a longitudinal dataset, Finnie (2001) finds that inter-provincial mobility is associated with substantial individual earnings changes in Canada. The findings include much greater earnings increase for younger workers than for older workers, strong positive effect for men but weakly positive or negative for women. Also using a longitudinal dataset, Rashid (2004) investigates whether internal migration leads to higher family income for Swedish immigrants. Positive return from internal migration is found only for refugee-immigrant families, but not for immigrants from Asia, Europe and Nordic countries. Axelsson and Westerlund (1998) examine the influence of internal migration on total household real income using Swedish panel data. This study takes into account the self-selection problem of migration behavior, but self-selection effect is not found and the authors conclude that there is no significant effect on real household total income from migration. For the above stated studies, especially the analysis of the earnings effect of migration, using longitudinal dataset is an improvement compared with their alternatives using cross-sectional datasets, since longitudinal data can control for the fixed effect and derive more accurate estimates. The conclusion about the returns to migration could be different if using different datasets, considering different length of time after migration and even different earnings and migration definition.

2.2.2 Immigration and Immigrant Internal Migration

If labor flows across country borders, it is called immigration. United States, Canada,

and Australia have been the major immigrant receiving countries by 2000 in the world. Many studies on immigration examine how immigrants perform compared with natives in economic terms, both at the time of entry and over time—economic assimilation. How immigration affects the labor market in the host country is another research interest in the immigration literature. An early study by Chiswick (1978) investigates the age-earnings profile of immigrants and natives using cross-sectional data. The cross-sectional evidence shows that there is upward mobility of immigrants as their earnings increase in the host country and immigrant earnings eventually surpass native earnings (see Borjas 2000 for a survey). Borjas (1985), however, points out that wrong conclusions could be drawn by using cross-sectional data to evaluate the assimilation process of immigrants if skill differentials among immigrant cohorts exist when they entered the host country. Subsequent studies estimate the 'cohort effects' by using repeated cross-sectional data or longitudinal data (e.g. Baker and Benjamin 1994; Borjas 1995; Grant 1999; Green and Worswick 2003; Aydemir and Skuterud 2003). Studies find that recent immigrants suffer from lower wages compared with natives and that the growth path does not converge (e.g. Baker and Benjamin 1994; Borjas 1995; Bloom, Grenier and Gunderson 1995; Hum and Simpson 2004). Duleep and Regets (1997), however, argue that immigrants with lower entry earnings may have a faster wage growth rate in the future.

The assimilation of immigrants relies on the process of settlement into the host country, particularly in their first few years after landing. The process of human capital investment in the host country is the key for us to understand their assimilation. We expect that recent immigrants, especially from non-English speaking countries, would experience a period of time to invest in human capital, such as English learning. Groups

with different human capital endowments may have different investment behaviors and achieve different economic progress afterwards. Very few studies on post-arrival human capital investment have been done.

Borjas (1999) presents a model of immigrant human capital investment, which is based on human capital theory. The human capital production function is expressed as:

$$gH = (sH)^{\alpha} H^{\beta}$$

Where s is the fraction of time used in the production of human capital, H is initial effective human capital that can be used to produce human capital. g is the rate of increase of human capital. The above human capital production function can be written as:

$$g = s^{\alpha} H^{\alpha+\beta-1}$$

The relationship between the return from investment and initial level of effective human capital depends on the sign of $(\alpha+\beta-1)$. Borjas (1999) argues that the highly skilled invest more if initial human capital is complementary with the effective human capital required in host country $(\alpha+\beta>1)$, and invest less if the relationship is substitutable $(\alpha+\beta<1)$. The preferable situation is that highly skilled immigrants invest more in host country, so that the wage growth rate and the entry wage have a positive relationship. The investment decision can be affected by the transferability of the human capital accumulated in the source country (Duleep and Regets 1997). With less transferable human capital (e.g. for those from non-English speaking countries) and if the human capital is more efficient in producing new human capital than in gaining earnings in the labor market in the host country, immigrants would invest more. Following the Ben-Porath's (1967) life-cycle human capital model, most empirical studies in human capital use the log earnings of life

trend to analyze the growth of earnings and human capital investment.

The secondary migration of immigrants has been studied by some researchers (e.g. Newbold 1996; Ram and Shin 1999; Edmonston 2002; Trovato and Halli 1990). Studies find that there are similarities for the determinants of migration between immigrants and natives (Moore and Rosenberg 1995; Newbold 1996; Lin 1998; Edmonston 2002). Trovato and Halli (1990) find that social networks and cultural needs are important factors in migration decision-making in immigrant communities. A sharp decrease in mean migration after immigrants' first year of residence is found by Nogle (1994). He suggests that focusing on the initial arrival period is crucial to an understanding of the adjustment of immigrants. In Canada, new immigrants are inclined to live in large urban centers and are less likely to move away (Nogle 1994; Edmonston 2002; Hou 2004; Schellenberg 2004). Over seventy percent of immigrants choose to live in Toronto, Vancouver and Montreal, the three biggest gateway cities. The commonly used data in the above studies are census data. By using census data, migration can only be identified by comparing the location at one census with the one of five years prior. The settlement process, especially the internal migration during the first several years after landing, of immigrants can not be appropriately addressed by only using census data. Furthermore, census does not include details of specific settlement issues and immigration policy information like immigration class category.

2.2.3 Econometrics Issues

In this study, I focus on the human capital investment in migration of new immigrants and its effect on individual earnings, compared with Canadian-born. In this section, I only present the literature related to the above issues.

The practical problem when analyzing the return from migration is that we can only observe the outcome of migrants who migrate but cannot compare this with the case if the migrants did not migrate. The comparison results based on ordinary least square estimates of wage equation for migrants and non-migrants could be biased, since the migrants are not randomly selected (see e.g., Heckman 1979; Maddala 1983). If there is a premium for migrants, the premium might not come from migration but the unobserved factors such as higher ability or/and motivations compared with those of non-migrants. Migrants can be self-selected. The selection problem essentially is a missing variable problem, which causes biased and inconsistent estimation.

Nakosteen and Zimmer (1980) investigate the problem of self-selectivity in estimating the returns from inter-state migration in the United States. They employ a simultaneous equations model which considers the decision to migrate and returns to migrations. An "endogenous switching model" is estimated and separate income equations for migrants and non-migrants are used. They find that there is a significant self-selection effect on the income for non-migrants but not for migrants. They also find that the expected returns from migration affect the probability of moving in the expected direction. Robinson and Tomes (1982) study inter-provincial migration in Canada using the 1971 census data. They find evidence of self-selection in the earnings equation and that the expected wage gain is a significant factor in migration decision. Nakosteen and Zimmer (1982) estimate an income selectivity model by considering the region and industry migration decision. They find significant self-selection among region and industry migrants. The results imply that the earnings distributions of individuals who decide to migrate may differ from those of the population as a whole. Borjas, Bronars and

Trejo (1992), however, do not find evidence of self-selection.

Self-selection in labor force participation is a common econometric problem in the study of labor supply, especially female labor supply (Heckman 1979). Since the absence of non-participants is not random, we can not just use the sample of participants to estimate the earnings equation. Applying the ordinary least squares (OLS) to a single earnings equation for participant sample would be biased and inconsistent. The problem is usually solved by modeling the earnings and participation decision simultaneously.

Previous migration studies, in a self-selection framework, suggest that there is either positive selection or the selection effect is not obvious (see Greenwood 1997 for a review). The double selection problem was seldom investigated.

The instrumental variable method has been used by some studies to control for the endogenous migrant selectivity (e.g. Rashid 2004; Pekkala and Tervo 2002). The factors determining the migration probability can be used as instruments in the two-stage least square estimation procedure.

2.2.4 Comparison Issue

The integration of immigrants relies on the comparison of immigrants and natives. How to define the 'comparable group' is the key. Almost all of the studies on immigrant assimilation are based on repeated cross-sectional census data, where native-born are randomly selected. (Bloom and Gunderson 1991; Borjas 1999; Baker and Benjamin 1994). Borjas (1995) matches birth cohort of immigrants and natives from different years of census. Attention has been focused on working men or full-time employed men (Baker and Benjamin 1994; Borjas 1999).

Green and Worswick (2003) use the native new labor market entrants as the

comparison group to study the immigrant earnings. They define the year of entering the mature labor market as the year in which individuals turn 25 years old. They find that native new labor market entrants experienced a similar earnings decline in both the 1980s and 1990s as do immigrants. The findings contrast strongly with earlier research conclusions, where immigrants earnings decline were mainly attributed to skills decline and country of origin shift.

Canadian immigrant policy has been based on a "point system" in recent decades. Age, education, language skills and work experience are within the evaluation system to assign these "points". On the demand side of immigrant labor, the immigrated population is not randomly selected. It is generally believed that the supply side is also self-selected. We can predict that substantial differences exist regarding the distribution in age, education, experience and mother tongue between Canadian-born and immigrant population.

2.3 Estimation Strategy

2.3.1 Estimation Model

A framework of models used in this study is based on the human capital theory of migration since Sjaastad's work (1962) and Polachek and Horvath's (1977) refinement stressing a life cycle perspective. The model presented below also is inspired by the work of Nakosteen and Zimmer (1980), where the migration decision and returns to migration are determined simultaneously considering endogenous selectivity in the modeling.

Assume an individual considers whether to migrate. The anticipated earnings if migrate is Y_m, which is in present-value terms. Likewise, the anticipated earnings if not migrate is Y_n, also in present-value terms. The anticipated cost of migration is C_m, which

is a one-time cost. Letting

$v = Y_m - Y_n - C_m$ (1)

the individual's decision to migrate is based on v. He/she will migrate if $v>0$, and not migrate if $v<=0$. v depends on the wage differentials and migration cost which is determined by factors from family and individual factors such as age, education level, number of children, housing ownership, employment status of the individual as well as that of spouse. Location factors like housing price index of origin and destination also affect migration cost and should be included in C_m.

A structural probit model of migration can be modeled as:

$M^* = \alpha_0 + \alpha_1 (Log(w_m) - Log(w_n)) + \alpha_3 X + \varepsilon$ (2) where

$M=1$ *if* $M^* >0$ and

$M=0$ *if* $M^* <=0$.

M^* is a latent variable. Individual's migration decision is based on M^*, that is he/she migrates if M^* is greater than zero and not migrate if equal to or less than zero. The term $Log(w_m)$-$Log(w_n)$ in equation (2) is the wage differential between migration and non-migration. X represents other exogenous variables affecting migration decision, such as education level, number of children, marital status, social ties, etc. The terms M^* and $(Log\ (w_m)$-$Log(w_n))$ are endogenous. The error term, ε, is assumed to be normally distributed with zero mean and unit variance.

Since the counterfactual wage if migrants had not migrated and the counterfactual wage if non-migrants had migrated can not be observed, they can be imputed from the wage equations for migrants and non-migrants. Wage equations for migrants and non-migrants can be modeled respectively to complete the model.

$$\ln w_m = \beta_0 + \beta_1 X_m + \varepsilon_m \quad (3)$$

$$\ln w_n = \beta_0 + \beta_1 X_n + \varepsilon_n \quad (4)$$

where lnw_m is the natural logarithm of the wages for migrants in destination and lnw_n is the natural logarithmic wages for non-migrants who stay in origin. X_m and X_n represent the variables affecting wages for migrants and non-migrants respectively, such as education level, work experience, mother tongue, fluency in English and French, receiving training indicator, etc. To make the model work well, we should have some variables that affect migration but do not affect wages. I assume variables like number of children, ownership of housing and whether or not the spouse worked meet the above requirement. Equations (2) to (4) describe the structural form of the migration model.

The reduced form migration model can be derived by substituting (3) and (4) into (2), which is written as

$$M^* = Z\gamma + u \,. \quad (5)$$

The individual migrates if $M^*>0$. Z represents all of the exogenous variables affecting migration decision. Equation (5) can be estimated by the maximum likelihood probit model.

2.3.2 Self-selection Problem

a. Migration & Non-migration Selection

Since we can only observe the wage change of migrants from origin to destination (also from period one to period two) and the wage change from period one to period two in origin for non-migrants, we can not observe neither migrants nor non-migrants' counterfactual wage, that is migrants' wage if he chose not to migrate and non-migrants' wage if he chose to migrate. Under the condition that only the wages of migrants are

observed, the expected value of $ln\ w_m$ is:

$$E(\ln w_m | X_m, M^* > 0) = \beta_0 + \beta_1 X_m + E(\varepsilon_m | M^* > 0)$$

Likewise the expected value of $ln\ w_n$ is:

$$E(\ln w_n | X_n, M^* \leq 0) = \beta_0 + \beta_1 X_n + E(\varepsilon_n | M^* \leq 0)$$

Estimations of equations (3) and (4) by OLS is inappropriate and biased, because the means of the conditional error terms, ε_m and ε_n, in (3) and (4) are not zero and constant for all observations. Consistent estimates can be derived by using the Heckman two-step procedure (Heckman 1979). A probit estimation of the reduced form migration model (5) is the first step and the estimation of the wage equation with a selectivity correction term (from step 1) by OLS is the second step.

The wage equations for migrants can be written as

$$\ln w_m = X_m \beta_m + \sigma_m \lambda_m (Z\gamma) + u_m \quad (6)$$

and the wage equation for non-migrants is

$$\ln w_n = X_n \beta_n + \sigma_n \lambda_m (-Z\gamma) + u_n \quad (7).$$

The migration self-selection correction term λ_m enters the wage equations for migrants and non-migrants, where $\lambda_m (Z\gamma) = \varphi (Z\gamma)/ \Phi(Z\gamma)$ is the inverse Mills ratio, φ is the standard normal probability density function and Φ is the standard normal cumulative distribution function. The self-selection correction term for non-migrants is $\lambda_m(-Z\gamma)$, which is equal to $-\varphi (Z\gamma)/ (1-\Phi(Z\gamma))$.

b. Labor Force Participation Selection

Since wages are only observed for those who participate in the labor market, there's another selection problem, which is usually met in labor supply studies. The participation model has a similar form to the migration model which can be expressed as

$$p^* = \delta X_I + \theta M + u_I \quad (8)$$

where p^* is latent variable. X_I are explanatory variables that are assumed to affect participation decisions, including family and individual characteristics. δ are coefficients to be estimated. M, the migration indicator, is included assuming the participation decision is affected by the migration decision. u_I is assumed to be normally distributed with zero mean and unit variance. Individuals will choose to work if $p^*>0$.

The selection correction term, λ_{lf}, calculated from estimates of equation (8) should also be included in the wage equation to derive consistent estimates. The approach to derive the inverse Mills ratio, λ_{lf}, is similar to that for migration selection correction term stated above, that is

$$\lambda_{lf} = \frac{\phi(\delta X_I, \theta M)}{\Phi(\delta_I X_I, \theta M)}$$

where φ is the standard normal probability density function and Φ is the standard normal cumulative distribution function. The coefficients δ and θ can be estimated by the probit model.

We assume individuals make decisions as to whether to migrate and whether to work at the same time. These two decisions can be correlated. The econometrics technique used to test the relationship is the bivariate probit model (Greene 2003), where u in equation (5) and u_I in equation (8) are assumed to be correlated. Whether the estimated ρ (covariance of the two error terms in (5) and (8)) significantly differs from zero can help us test whether there is interdependence between the two decisions. If ρ is significantly different from zero at conventional confidence level, we can conclude that these two decisions are interdependent. On the other hand, if we cannot reject the assumption that ρ equals zero at conventional confidence level, we conclude that these two decisions are

independent and M in the participation equation is exogenous. In this case, the two selection equations can be estimated separately. Inverse Mills ratios from each selection equation, that is migration selection and participation selection equation, can be derived and serve as selection correction terms in the wage equations. Rewrite equation (6) and (7) of the wage equation for migrants and non-migrants respectively:

$$\ln w_m = X_m\beta_m + \sigma_m\lambda_m + \eta_m\lambda_{lf} + u_m \quad (9)$$

$$\ln w_n = X_n\beta_n + \sigma_n\lambda_m + \eta_n\lambda_{lf} + u_n \quad (10).$$

If error terms in (5) and (8) are correlated, it indicates that the two decisions are made jointly and the estimates from the bivariate probit model should be used to derive the selection correction terms.

Finally, we can impute lnw_m and lnw_n from (9) and (10) and they are consistent estimates. The imputed wage differential for each individual can then be used to estimate the structural form of the migration model (2).

There are limitations for the above analysis framework. Migration is only examined as a binary choice problem. Individuals should have many different destination choices, such as migrating to large census metropolitan areas (CMAs), small CMAs or non-CMAs. In this study, the migration is only considered as a binary choice. The small number of migrants in the sample makes it impossible to analyze the multiple destination model.

2.4 The Data

2.4.1 The Data for Immigrants

In this section, I first discuss the sample for immigrants and then for Canadian-born. In this study, I take advantage of the new dataset, Longitudinal Survey of Immigrants to Canada (LSIC), which provides longitudinal data for a recent cohort of immigrants to

Canada. The target population of the LSIC consists of immigrants who arrived in Canada between October 1, 2000 and September 30, 2001, aged 15 or older at the time of landing and who were 'landed' from abroad (Statistics Canada 2005). Wave 1 took place about six months after landing; wave 2 occurred about two years after landing, and wave 3, four years after landing. The interview for each wave spread for around one year. In this study, I only consider the immigrants who were in Canada from the time of wave 1 interview till wave 3 interview, so only the wave 3 of the LSIC is used. Attrition is another sampling selection problem. For simplicity, I ignore this issue in this study.

Considering only one cohort has advantages, because all of them have experienced similar labor market conditions and the effect of macroeconomic situation on earnings does not need to be considered in the model. From the panel nature of the data, pre- and post-migration (internal migration) characteristics of the individuals can be identified. By contrast, using a multi-cross sectional sample has the problem of unobserved heterogeneity. LSIC also has the advantage of having rich data on human capital investment after arrival, especially education and work experience, which is not available from census.

For the immigrant sample, I choose the males between ages of 25 and 55 inclusive in the first interview who remain in the sample until the third interview. Considering the ages in this range, migrants are most likely to move due to labor market reasons. Green and Worswick (2003) choose the sample aged equal to or over 25, which they call the age of 'entering the mature labor market'. Full-time students and retired people are excluded. Since female migrations are usually due to family reasons, only male sample is used. The

resulting sample for immigrants consists of 2712[2] males of whom 314 (11.6 %) are migrants.

In this study, migration is defined as the change of CMA residence, since CMAs are usually seen as labor markets. An individual in the immigrant sample is defined as a migrant if his CMA residence in wave 1 interview (around 6 months after arrival) differs from that in wave 2 interview (around two years after arrival) or residence in wave 2 interview differs from that in wave 3 interview (around four years after arrival). I do not separate single migrations, multiple migrations and return migrations. Since only a very small number of immigrants live in non-CMAs, I do not identify each non-CMA but use an indicator 'non-CMA' to identify whether the residence is non-CMA. Residence change from a CMA to any non-CMA or from a non-CMA to a CMA is also regarded as a migration.

It is likely that immigrants are more mobile within the first six months after landing. The data in LSIC indicate that many of these migrations are to improve living conditions but not for labor market reasons. I examine those migrations that occurred a short period (at least six months) after immigrants' initial settlement in Canada, during which they collect more accurate labor market information and make their migration decisions to correct their initial location choices, which were based on imperfect information collected in their home country. It is thus likely that most of the migrations under examination are based on rational decisions.

The dependent variable in the migration model is the binary indicator of migration. The explanatory variables in the reduced form migration model include those factors that

[2] This is the number of observations without dropping those having missing values for some variables. Based on different regressions, the final sample size can be different. Another reason for not dropping those observations with missing values is that changes in sample size afterwards might cause insufficient numbers of change to meet disclosure requirements.

affect the costs of migration, such as number of children, marital status, education level, ownership of housing, housing price index, unemployment rate, whether or not the spouse worked, ethnic background, and social ties in Canada.

The dependent variable in the participation selection equation is a binary variable indicating whether the individual participates or not in the labor force. Participation is defined as non-zero work hours for paid job and non-zero average wage for the period specified. The explanatory variables in the labor force participation decision equation include family and individual characteristic variables normally used in the literature, including marital status, number of children, ownership of housing, other income, experience and its square, and education level.

The dependent variable in the wage equation is the natural logarithmic weekly wage at wave 3, four years after arrival. For those who hold more than one job at the same time, the main job's wage is used. In the wage growth model, the difference in logarithm of wage between wave 1 and wave 3 is used as the dependent variable.

Independent variables in the wage equation include logarithmic hours worked per week, number of years schooling before immigration, mother tongue, receiving training (excluding language training) indicator, receiving language training indicator, receiving formal Canadian education indicator, Canadian labor market experience (number of years worked), foreign work experience, fluency in English indicator, fluency in French indicator, visible minority status indicator, regional dummy variables, immigrant category dummy variables and correction terms for the self-selection of migration and labor force participation. Since more than one job might be held in a specified period, the 'weekly hours worked' is the average working hours for all jobs.

All the explanatory variables in the migration models are measured at wave 1 (LSIC), the time when the migration decision is assumed to be made. The participation equation and the wage equations for wave 3 use variables (except human capital investment variables, variables describing pre-immigration characteristics like foreign experience, foreign education and mother tongue) measured at wave 3. Migration, formal education in Canada and training dummy variables in the wage and participation equation at wave 3 are indictor variables indicating whether those activities occurred between wave 1 interview and wave 3 interview.

In this study, we can only examine the immediate return to migration. The observed wage following a migration might be a transitory wage, but not a pay-off wage from a human capital investment. With these limitations of the data, LSIC is still a valuable resource for us to understand the immigrant settlement process in Canada. If immigrants are responsive to regional differences in economic opportunities and generate a better match for their skills by realizing economic returns (higher wages), we can say that "immigrants grease the wheels of the labor market." (Borjas 2001)

The choice for training and receiving education can also be self-selected. To make the framework of analysis simpler, this study ignores the endogeneity of education and training selection but only considers the endogeneity of self-selection from migration and participation. Since the sample is small, separate regression by different immigrant groups is not allowed, such as by ethnic groups, immigrant category, and education level.

The limitation of LSIC is that there is no information on native Canadians. By using the Survey of Labor and Income Dynamics (SLID) in conjunction with LSIC, we can investigate the variation between immigrants and natives and explore how migration as a

human capital investment behavior matters for the two groups.

2.4.2 Propensity Score Matching

To make a comparable Canadian-born sample for immigrants, the technique of Propensity Score Matching is employed, where the immigrant sample is taken as the treated group and Canadian-born is the control group. The goal of the matching method is to select a sub-sample of the control group which has covariate values similar to those in the treated group. The propensity score matching, suggested by Rosenbaum and Rubin (1983), is a matching method based on the propensity score, which is defined as the probability of receiving treatment. The subjects having the same propensity score are expected to have the same distribution of the observed covariates.

To derive the sample for Canadian-born, only the observations of Canadian-born men in the SLID are used. Two overlapping panels are selected (1999-2004 and 2002-2004, the two most current panels). The panel of 2002-2004 is the most comparable panel to the LSIC (wave 1 to wave 3), since it has a similar investigated time period of migration and earnings growth. Unfortunately, the big difference between the immigrant sample in LSIC and the native sample in SLID makes the balancing test for propensity score matching fail to pass (which is based on the covariates used to estimate the propensity score, see details below). To increase the sample size of Canadian-born, I include another panel of 1999-2001 with a similar number of observations as the 2002-2004 panel to execute the propensity score matching. The two panels are combined with the number of observations 19,421 in total. To make a comparable Canadian-born sample, the same selection restrictions are used. Only males aged between 25 and 55 are selected. Full-time students and retired are excluded.

From the statistics of the immigrant sample (Table A.2.1(c)), we notice that 66.1% have a university degree or above. The average age is 36.2 (recall only males aged between 25 and 55 are selected in the sample). 84.8 % are in married or in a common law partnership. The education level of the immigrants is much higher than that of the Canadian-born as a whole. For the Canadian-born (of 19,421 observations stated above) from SLID, only around 15.6% have a university and above education. The average age is 40.6 (appendix table A.2.1(c)). 76.8% of the native-born sample are married or in common-law partnership. Most of the immigrants live in CMAs and only very few live in non-CMAs, which is in great contrast with the settlement choice of the Canadian-born

Matching is conducted based on the propensity score and implemented through STATA by command 'psmatch2' (Leuven and Sianesi 2006). The procedure is stated below. I retrieve the data on age, education, marital status, province of residence for the Canadian-born and immigrant sample to be the variables for propensity score matching (stated below). Immigrant sample (with 2712 observations) from LSIC is combined with the SLID sample. An immigrant dummy is created, equal to one for all immigrants and equal to zero for Canadian-born. A logit model (with 'immigrant' as dependent variable, see Appendix Table A.2.1(a)) is employed and each observation is assigned a propensity score. The variables used to estimate the propensity score include those factors that could predict the possibility of being an immigrant and also affect the earnings. Variables indicating education level, age, marital status, region dummy were chosen. The one-to-one nearest neighbor matching with no replacement was used. For each immigrant, one Canadian-born with the closest propensity score (nearest neighbor) is selected. Balancing tests were conducted to test whether the immigrant sample (treatment) and the

Canadian-born sample (matching) have the same distribution for those factors chosen for propensity score matching.

The standard balancing tests suggested by Smith and Todd (2005) are used in this study. They are the test for standardized difference (Rosenbaum and Rubin 1985), test for the equality of each covariate mean across groups using t-test (Rosenbaum and Rubin 1985), test for the joint equality of covariate means across groups using the Hotelling test or F-test (Smith and Todd 2005b) and regression test. If balancing test was not passed on one or more covariates, then the propensity score model needs to be re-specified.

The standardized difference for covariate X used in the standardized difference test is the difference between the treatment group and the comparison group, with the formula

$$D_b(X) = 100.\frac{\overline{X}_T - \overline{X}_C}{\sqrt{\frac{[V_T(X) + V_C(X)]}{2}}} \quad \text{and} \quad D_a(X) = \frac{\overline{X}_{TM} - \overline{X}_{CM}}{\sqrt{\frac{[V_T(X) + V_C(X)}{2}}}$$

where $D_b(X)$ is the standardized difference before matching and $D_p(X)$ is the standardized difference after matching. The numerator in the first formula is the difference of mean of X ($\overline{X}_T$ - $\overline{X}_C$) based on the treated and full comparison group and the denominator is the average of the sample variance of the above two samples. $V_T(X)$ is the variance of the treatment group and $V_C(X)$ is the variance of the comparison group. The numerator of the second formula is based on the treated and matched group and the denominator is the same as the first one. Rosenbaum and Rubin (1985) suggest that if the standardized difference is greater than 20, it is 'large'.

The results of the standardized difference test are provided in Appendix Table A.2.1(b). Before matching, the differences in covariate between the treatment and original comparison group are large. The standardized differences are mostly greatly than

20. After matching, the differences between the treatment group and matched group are significantly reduced with most standardized differences close to zero.

The t-test is to test whether the means of the treatment and comparison groups are equal for each variable chosen for propensity score matching. From the results in Table A.2.1(c), we can see that before matching all of the p-values are significant at the 1% confidence level, indicating that most of the variables differ greatly. After matching, all of the p-values of t-test are insignificant. The test of joint equality (or Hotelling) of means in the treatment and comparison groups is conducted and the result is below the t-test. Before matching, the null of joint equality of means is rejected and the variables are not balanced in the two samples. After matching, the Hotelling test shows that all the variables are balanced jointly and the p-values indicate that we can not reject the null of equality of the variable means across the two groups.

Another test suggested by Smith and Todd (2005b) is the regression test, where the regression is expressed as

$$X_k = \beta_0 + \beta_1 \hat{P}(X) + \beta_2 \hat{P}(X)^2 + \beta_3 \hat{P}(X)^3 + \beta_4 \hat{P}(X)^4 + \beta_5 D + \beta_6 D\hat{P}(X) + \beta_7 D\hat{P}(X)^2 + \beta_8 D\hat{P}(X)^3 + \beta_9 D\hat{P}(X)^4 + \varepsilon$$

where X_k indicates the variable included in propensity score estimation and $\hat{P}(X)$ is the estimated propensity score. D is the dummy variable indicating treatment. After the regression of the above model, we can do the test of the joint null that the coefficients on all the terms including D equal zero. If the null is rejected, it means D contributes to the value of X and the samples are not balanced. The test results show that the null cannot be rejected for variables like age, education and location dummies, except the partnership dummy. Smith and Todd (2005b) mentioned that the weakness of the test is that the

choice of the order of the polynomial may affect the test result.

The results of the balancing tests indicate that propensity score matching did a good job. The variables are well balanced. Propensity score matching balances the control variables like education, marital status, age and regional distribution which differ greatly before matching.

2.4.3 The Data for Canadian-born

For the Canadian-born sample, each panel chosen in SLID is three years duration to match the duration of observations in LSIC (from wave 1 to wave 3 is approximately 3.5 years). By using one-to-one matching, the resulting Canadian-born sample contains the same number of individuals as in the immigrant sample, 2712[3], of whom 186 (6.8%) are migrants. For the whole sample of Canadian-born, 1465 of them come from the panel of 1999-2001 and 1247 from the panel of 2002-2004.

Likewise, migrants in the native sample are defined as those who change their CMA residence between year 1 and year 2 or between year 2 and year 3, since the SLID is based on annual interviews. Migration and other human capital investment behaviors are assumed to be implemented between year 1 and year 3. The wage variable used in the Canadian-born sample is the annual composite hourly wage of year 3, which are provided in the SLID. All other variables chosen for the Canadian-born sample are similar to those for immigrant sample. A dummy variable indicating the panel 1999-2001 is used to control the year effect.

---

[3] The sample for Canadian-born may contain observations having missing values for some variables. The final sample size should be smaller after cleaning the missing values. For the same regression, the sample size for immigrants and for Canadian-born might be different due to missing values. Except the variable wage and working hours, the missing value for other variables are assumed missing randomly. Losing those observations having random missing values will not cause biased estimation.

Table 2.1 Migration Rates for Immigrants (from Longitudinal Survey of Immigrants to Canada) and Canadian-born (from Survey of Labor and Income Dynamics)

	Immigrants	Canadian-born
Education Level		
Below or high school, trade	0.059	0.035
College, Some University	0.094	0.076
University and Above	0.126	0.062
Age Group		
Aged 25-24	0.126	0.084
Aged 35-44	0.115	0.036
Aged 45-55	0.073	0.046
Origin MTV (Montreal, Toronto and Vancouver)		
MTV	0.093	0.031
Non-MTV	0.170	0.056
Partnership		
Married/Common-law	0.112	0.048
Single, separated, dissolution	0.125	0.103
Housing Ownership		
Owner	0.065	0.042
Not owner	0.121	0.123
Training (excluding language training, immigrants, wave1-wave3)		
Training	0.138	-
No-training	0.094	-
Language Training (wave1-wave3)		
Language Training	0.108	-
No Language Training	0.116	-
Immigrant Category		
Economic Class	0.125	-
Family Class	0.056	-
Refugee	0.114	-
Principle Applicant		
Principle Applicant	0.116	-
Not principle applicant	0.102	-
Visible Minority Status		-
Visible Minority	0.112	-
Non-visible minority	0.123	-
Race		
White	0.124	-
Chinese	0.156	-
Southeast-Asian	0.057	-
Black	0.096	-
West-Asian	0.078	-
Social Ties		
Relative Near	0.074	-

	Immigrants	Canadian-born
Relative Far	0.147	-
No relative	0.138	-
Friend Near	0.112	-
Friend far	0.134	-
No friend	0.101	
Language Proficiency		
Fluent in English	0.132	-
Not fluent in English	0.085	-
Fluent in French	0.062	-
Not fluent in French	0.120	-
Spouse worked?		
Spouse worked	0.091	-
Spouse not worked	0.128	-

Notes: The statistics are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population.

2.4.4 Descriptive Statistics

Table 2.1 presents the migration rate according to different characteristics of immigrants and Canadian-born. The statistical results are in line with the predictions of human capital theory on migration. The probability of migration for immigrants in economic class (skilled, business and investor) is over two times that for family class (under family reunification clauses). Refugees have a similar migration rate as that for economic class. More educated immigrants are more mobile. Residents in MTV (Montreal, Toronto, and Vancouver) are less likely to migrate compared with residents in other CMAs or non-CMAs. The propensity to migrate for those who had training (excluding language training) between wave 1 and wave 3 is much higher than for those who did not. It is note-worthy that social ties play a significant role in the migration decision. Immigrants who have relatives who live near (in the save city) are less likely to migrate than those who have no relative or who have relatives who live far (not in the same city).

On average, Canadian-born males have a lower migration rate than the immigrant sample in LSIC. One reason is simply that there is a shorter period of observation for members of the Canadian-born sample. Immigrants are predicted to be mobile shortly after arrival because at that point, they have very little accumulated special human capital on location. For Canadian-born, the statistics in Table 2.1 show a similar relationship between migration rate and characteristics as that for immigrants.

Table 2.2 Means of Selected Variables for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

	Full Sample		Migrants		Non-migrants	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Wages, working hours, participation rate						
Weekly wage at wave1 interview	588.10	612.85	695.34	911.85	573.92	560.44
Weekly wage at wave3 interview	819.34	595.50	936.10	605.82	804.53	592.70
Wage increase from wave1 to wave 3	267.12	557.08	342.13	642.08	257.59	544.87
Log wage increase	0.44	0.57	0.46	0.69	0.43	0.55
Weekly working hours (average) from arrival to wave1 interview	27.22	18.83	26.84	19.39	27.27	18.75
Weekly working hours (average) from wave1 to wave3 interview	40.62	14.12	40.52	16.54	40.63	13.78
Participation rate wave 1	0.72	0.45	0.71	0.46	0.72	0.45
Participation rate wave 3	0.96	0.19	0.96	0.18	0.96	0.19
Experience and Education						
Foreign experience (potential experience)	14.02	7.99	12.26	7.46	14.25	8.03
Number of years foreign full-time schooling	15.96	3.12	16.56	2.90	15.886	3.14
Canadian working experience at wave1 (#of weeks worked since immigration)	15.10	11.53	14.22	11.329	15.22	11.55
Canadian working experience at wave 3	170.59	47.99	161.47	50.83	171.79	47.49
High school graduated and below	0.14	0.35	0.13	0.26	0.15	0.36
College, some university	0.17	0.37	0.14	0.34	0.17	0.38
University and Above	0.72	0.45	0.80	0.34	0.71	0.45
Fluency in English	0.69	0.46	0.80	0.40	0.68	0.47
Fluency in French	0.12	0.33	0.08	0.28	0.13	0.33
Training between wave1 and wave3	0.44	0.50	0.54	0.50	0.43	0.49
Language training between wave1 and wave3	0.20	0.40	0.19	0.39	0.20	0.40
Formal education in Canada since come to Canada	0.26	0.44	0.32	0.47	0.25	0.43

	Full Sample		Migrants		Non-migrants	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Formal education in Canada since arrival (BA and above degree)	0.09	0.29	0.17	0.38	0.09	0.28
Formal education in Canada since arrvial (BA degree below)	0.17	0.37	0.15	0.36	0.17	0.37
Demographic						
Age	36.02	7.11	34.83	6.48	36.17	7.17
Partnership (married/common-law)	0.84	0.36	0.83	0.37	0.85	0.36
Number of children at home	0.90	0.99	0.78	0.95	0.91	0.97
Visible minority	0.78	0.41	0.77	0.42	0.78	0.41
Mother tongue English/French?	0.11	0.32	0.08	0.27	0.12	0.32
Economic class category	0.81	0.39	0.89	0.31	0.80	0.39
Family class category	0.13	0.34	0.06	0.25	0.14	0.35
Refugee category	0.04	0.20	0.04	0.20	0.04	0.20
Home owners at wave1	0.12	0.33	0.07	0.26	0.13	0.34
Home owners at wave3	0.49	0.50	0.42	0.49	0.50	0.50
Family total income at wave1	16787.28	64076.16	11965.62	13658.98	17405.47	67861.41
Family total income at wave3	57050.18	39131.41	53631.56	35019.76	57495.69	39620.76
Origin						
MTV (Montreal, Toronto, Vancouver) at wave 1	0.73	0.443	0.60	0.49	0.75	0.43
MTV at wave 3	0.69	0.461	0.26	0.44	0.75	0.43
Non-MTV wave 1	0.27	0.443	0.40	0.49	0.25	0.44
Non-MTV wave 3	0.31	0.461	0.73	0.44	0.25	0.43
Ontario at wave 1	0.11	0.309	0.18	0.38	0.10	0.29
Alberta at wave 1	0.09	0.281	0.09	0.28	0.09	0.28
BC at wave 1	0.02	0.128	0.03	0.18	0.02	0.18
Quebec at wave 1	0.01	0.118	0.03	0.17	0.01	0.11
Prairies at wave 1	0.02	0.153	0.03	0.16	0.02	0.15
Atlantic at wave 1	0.00	0.066	0.01	0.11	0.01	0.06
Number of observations[4]	2712		314		2398	

Notes: The statistics are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population.

Table 2.2 and Table 2.3 present the descriptive statistics on wages, participation rate and other human capital variables as well as demographic characteristics for immigrants

[4] The sample size is the based on the sample before dropping those variables having missing value. Since different regression will result in different number of observations, using only one sample size for statistics is not appropriate, especially the variable wage at wave 1 have many missing values.

and Canadian-born respectively. The statistics show the means for the whole sample, migrants and non-migrants.

Weekly wages of migrants increase 45.5% from wave 1 to wave 3 for immigrants on average. Migrants experience about 5.5% higher growth rate of wages than non-migrants. Migrants earn a higher wage than that for non-migrants both before and after migration. There is also a large increase in weekly working hours from wave 1 to wave 3 for immigrants, around 48.1% from 27.1 hours to 40.6 hours a week. Weekly working hours at wave 3 are almost the same for migrants and non-migrants. Participation rates increase by around 0.25 from wave 1 to wave 3 on average. The average participation rate for immigrants around six months after arrival is 0.717, whereas after four years since arrival the number increases to 0.963, which is close to that for Canadian-born males with similar characteristics. However, the disadvantage in earnings for immigrants compared with Canadian-born of similar characteristics is still considerable after four years since immigration. The average weekly wage at wave 1 interview for immigrants is 588.10, which is 44.6% lower than that for Canadian-born[5] at year 1. Four years after arrival, immigrants' average weekly wage increases to 819.34, around 30% lower than Canadian-born average weekly earnings at year 3. One major reason for the observed immigrant comparative disadvantages in weekly earnings is that immigrants' hourly wages do not have a significant increase as working hours do. Moreover, the Canadian-born in the sample earn relatively higher wages among the Canadian population.

Table 2.2 shows that, as expected, migrants are comparatively more educated, have

[5] The weekly earnings for Canadian-born are calculated as 'composite hourly wage' times the 'average weekly working hours' (which is annual total paid hours worked/52).

less foreign and Canadian experience, and are more likely to invest in formal human capital including formal education and training, which is in line with the statistics from Table 2.1. The statistics from Table 2.2 show that there is a small proportional change in immigrants who live in MTV at wave 1 and wave 3, while migrants mostly originate from MTV (60%) moving to non-MTV CMAs or non-CMAs.

Table 2.3 presents the statistics for Canadian-born. Migrants are shown to have a slightly higher wage rate at year 1 but a slightly lower wage rate at year 3. The wage growth rate between year 1 and year 3 for migrants is around 6.4% lower than that of non-migrants. Basically there's no difference in weekly working hours between year 1 and year 3 for both migrants and non-migrants, with just slightly lower hours for migrants. Based on the selection criterion to match the immigrants, Canadian-borns in the sample mostly work full-time and have close to a 100% of participation rate. The 'full-time full-year equivalent work experience' is used for the Canadian-born sample analysis, which is provided by SLID. 'Full-time full-year equivalent experience' should be more accurate in measuring experience accumulated human capital. Unfortunately, this variable is not available in LSIC and the potential experience (which is age-number of years schooling-5) is used for the foreign experience of immigrant sample. One note-worthy characteristic is that Canadian-born males are more likely to live in non-MTVs, compared with immigrants. Because of the small number of migrants, the regional distribution for Canadian-born does not change a lot between year 1 and year 3.

Table 2.3 Means of Selected Variables for Canadian-born, Survey of Labor and Income Dynamics (SLID)

	Full Sample		Migrants		Non-migrants	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Wages, working hours, participation rate						
Hourly composite wage at year 1	25.54	12.34	26.18	14.00	25.49	12.22
Hourly composite wage at year 3	28.42	13.80	27.50	12.24	28.48	13.89
Wage increase from year1 to year 3	3.07	8.64	1.58	7.43	3.17	8.71
Log wage increase	0.11	0.29	0.08	0.27	0.11	0.29
Weekly total working hours (average) year 1	41.29	10.82	39.60	9.63	41.39	10.88
Weekly total working hours (average) year 3	41.21	10.99	39.95	11.35	41.29	10.96
Participation rate year 1	0.96	0.19	0.99	0.06	0.96	0.19
Participation rate year 3	0.98	0.15	0.98	0.13	0.98	0.15
Experience and Education						
Full-year full-time experience equivalent	23.07	27.72	21.06	28.71	23.19	27.66
Number of years full-time schooling	16.43	3.54	16.72	3.52	16.41	3.54
High school graduated and below	0.16	0.36	0.09	0.29	0.16	0.37
College, some university	0.14	0.35	0.18	0.39	0.14	0.35
University and Above	0.69	0.46	0.72	0.45	0.69	0.46
English is the mother tongue	0.72	0.45	0.72	0.45	0.72	0.45
French is the mother tongue	0.21	0.41	0.24	0.42	0.21	0.41
Demographic						
Age	36.53	7.04	33.56	6.67	36.53	7.03
Partnership (married/common-law)	0.79	0.40	0.65	0.48	0.81	0.39
Number of children at home	1.14	1.20	0.75	1.05	1.16	1.21
Visible minority	-	-	-	-	-	-
Home owners at wave1	0.78	0.41	0.56	0.50	0.80	0.40
Home owners at wave3	0.83	0.37	0.69	0.46	0.85	0.36
Origin						
MTV (Montreal, Toronto, Vancouver) year 1	0.30	0.46	0.16	0.36	0.31	0.46
MTV year 3	0.31	0.46	0.20	0.40	0.31	0.46
Non-MTV year 1	0.69	0.46	0.84	0.36	0.68	0.46
Non-MTV year 3	0.69	0.46	0.80	0.40	0.69	0.46
Ontario at year 1	0.38	0.49	0.33	0.43	0.38	0.48
Alberta at wave1	0.16	0.36	0.15	0.36	0.16	0.36
BC at wave 1	0.11	0.31	0.16	0.37	0.11	0.31
Quebec at wave1	0.20	0.40	0.18	0.39	0.20	0.40
Prairies at wave1	0.06	0.24	0.08	0.27	0.06	0.24
Atlantic at wave1	0.08	0.27	0.09	0.28	0.08	0.27
Number of observations	2712		186		2526	

Notes: The statistics are weighted using the cross-sectional weights in SLID.
- indicates insufficient number to meet disclosure requirements.

The great growth in wages, weekly working hours and participation rate among immigrants indicates that on average immigrants experience rapid economic development during their first few years in Canada after arrival, starting from a disadvantaged situation in the Canadian labor market — lower entry earnings. On the other hand, lower entry earnings might account for an inclination toward greater investment in human capital, including collecting labor market information, receiving formal education and training, learning the language and initiating a migration.

2.5 Estimation Results

2.5.1 Estimation Results for Immigrants

Table 2.4 presents the results of the reduced form migration model for immigrants. The estimated coefficients are in line with the predictions from human capital model, also the statistics from Table 2.1 and Table 2.2. Among the four social ties indicators, only the 'relative near' indicator is significant, which indicates that such social ties have a negative effect on the migration propensity. Having ownership of home and spouse who ever worked since immigration also deters migration. The results indicate that men can be tied-stayers if their wives participate in the labor force, which complies with the argument by Mincer (1978).

Table 2.4 Reduced Form Migration Probit Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

Variable	Coefficient	SE
Relative near	-0.161*	(0.090)
Friend near	0.007	(0.082)
Relative far	0.061	(0.137)
Friend far	0.015	(0.115)
Age	0.141*	(0.082)
Age square	-0.002*	(0.001)
Foreign experience	-0.063***	(0.024)
Foreign experience square	0.160**	(0.062)
Education 2, college, some university	0.107	(0.152)
Education 3, University degree and above	0.129	(0.156)
Fluency in English	0.155**	(0.078)
Fluency in French	-0.315**	(0.145)
Employed at wave 1 interview	0.046	(0.142)
Number of children	-0.064	(0.046)
Partnership (married/common-law)	0.135	(0.114)
Spouse worked since arrival Canada	-0.205**	(0.082)
Migration from landing to wave 1 interview	0.071	(0.118)
Having ownership of housing	-0.309**	(0.126)
Unemployment rate	-0.131**	(0.053)
Housing price index	-0.005	(0.006)
Economic Class	0.173	(0.144)
Refugee	0.158	(0.183)
Chinese	0.045	(0.104)
South-Asian	-0.084	(0.103)
Black	-0.092	(0.161)
Southeast-Asian	-0.340*	(0.173)
Latin	-0.132	(0.226)
West-Asian	-0.149	(0.139)
Urban	-0.181	(0.240)
Origin MTV	-0.375***	(0.109)
Origin Atlantic	0.987**	(0.466)
Origin Quebec	0.540**	(0.261)
Origin Prairies	-0.229*	(0.247)
Origin Alberta	-0.426***	(0.157)
Origin BC	0.443*	(0.250)
Number of Observations	2647	
Wald Chi2	123.84	
Prof >chi2	0.000	

Pseudo R2	0.0737

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population

When both age and foreign experience are included in the model, it seems that foreign experience has a more significant impact on migration. The likelihood of migration after landing decreases with the foreign experience of immigrants. The results for education indicate that a higher education level leads to higher mobility but the educational effect is not significant at conventional confidence level. Proficiency in English significantly increases the propensity to migrate, while fluency in French lowers the probability. It is likely that the small proportion (12.3% of the sample) of the immigrants who claims fluency in French chooses Quebec as the immigration destination and those immigrants are less likely to migrate away.

Taking the Ontario region (except Toronto) as the reference location, the immigrants in MTV (Montreal, Toronto and Vancouver) at wave 1 interview have a significantly lower propensity to migrate. The immigrant residents in Alberta region also have a significantly lower propensity to migrate, compared with those in Ontario region except Toronto. In contrast, immigrants in BC, Atlantic and Quebec regions are more likely to migrate than their counterparts in Ontario region (except Toronto). Holding all else constant, there is basically no significant difference in the probability of migration among ethnic groups (compared to White), except the South-Asian group has a lower propensity to migrate than White with significance at a 10% confidence level. The difference in migration probability among immigrant class category groups is not significant either.

To test whether there is correlation between the migration and labor force

participation decision, a bivariate probit model is employed. The results suggest that I can not reject the assumption that ρ, the covariance of the error terms in participation equation and migration model, equals zero, which means that the two error terms in the two selection equations are not correlated and the two decisions are independent. The results also suggest that the selectivity correction terms for migration selection and labor force participation selection can be calculated separately.

Table 2.5 presents the regression results of the labor force participation equation (at wave 3) for immigrant men. The results show that immigrants aged 35 to 44 and 45 to 55 are significantly less likely to work than those who aged 25 to 34. Noteworthy, English fluency increases the probability of participation in the labor force, while fluency in French does not increase the propensity of participation. The coefficient of migration dummy variable is not significantly different from zero, indicating that migration decision does not influence the probability of labor force participation, which is consistent with the results from the bivariate probit model stated above. Compared with the immigrants in Ontario, those who live in BC and Quebec region have a lower propensity to participate in labor force but the propensity is higher for those who live in the Prairies. It is found that the factors such as number of children, having employed spouse and ownership of home do not inhibit the likelihood of participation of immigrant men, while those factors might be important for women's labor force participation decision.

Table 2.5 Probit Model of Labor Force Participation Equation Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

Participation Selection Equation		
Variable	**Coefficient**	**SE**
Principle applicant	0.292*	(0.171)
Aged 35-44	-0.286**	(0.133)
Aged 45-55	-0.764***	(0.156)
Education 2, college, some university	0.182	(0.205)
Education 3, University and above	-0.043	(0.204)
Fluency in English	0.204*	(0.178)
Fluency in French	0.078	(0.222)
Migrant from wave1 to wave3	0.022	(0.173)
Number of children	-0.045	(0.059)
Partnership (married/common-law)	-0.107	(0.186)
Spouse worked since arrival	0.154	(0.142)
Housing owner	0.128	(0.136)
Economic Class	0.224	(0.221)
Refugee	-0.093	(0.227)
Chinese	-0.246	(0.171)
South-Asian	0.007	(0.186)
Black	0.085	(0.273)
Southeast-Asian	0.511	(0.333)
Latin	0.444	(0.346)
West-Asian	-0.291	(0.185)
Urban	0.205	(0.464)
Atlantic	-0.709	(0.497)
Quebec	-0.472**	(0.216)
Prairies	0.752*	(0.398)
Alberta	0.207	(0.266)
BC	-0.450***	(0.146)
Constant	0.832	(0.573)
Number of Observations	2712	
Wald Chi2	150.48	
Prof >chi2	0.000	
Pseudo R2	0.216	

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population.

The estimation results from the migration model (see Table 2.4) and the participation

model (see Table 2.5) are used to derive the selectivity correction terms. Only when the selectivity correction terms are included in the wage equation estimation are the results considered consistent.

To compare the probability of labor force participation and wages of immigrants at wave 1 and wave 3, the Heckman (1979) two-step model with labor force participation self-selection correction is used in the wage equation regression at wave 1. The results of the regression are presented in the Appendix Table A.2.2. The results show that there is significant sampling selection of participation at wave 1. The coefficient of λ, the inverse Mills ratio, of 0.296 is significant at a 1% confidence level, indicating that there is a positive correlation between the error terms in the participation selection equation and the wage equation. Immigrants who are more likely to participate in the labor force at wave 1, given their observed characteristics, earn a higher wage than the mean of the whole sample, which is a positive selection. In contrast, the selection into labor force at wave 3 is a negative selection, which will be stated below.

Comparing the results of participation equation at wave 1 and wave 3, there are some noteworthy findings. After six months since immigration, immigrants who are in partnership have a significantly lower probability of labor force participation compared with those who are not in partnership. After four years since immigration, the probability of participation in labor force for the above two groups is indistinguishable. Furthermore, at wave 1, refugees are significantly less likely to work than economic class immigrants, while at wave 3 the difference between them is not significant. The propensity to participate for family class immigrants is indistinguishable from that for economic class immigrants both at wave 1 and wave 3. There is a significant difference in participation

propensity among the ethnic groups at wave 1, while such difference is insignificant at wave 3.

Table 2.6 presents the regression results of wage (at wave 3) equations. Column A, B and C refer to the estimation results for the pooled sample of migrants and non-migrants. Column A presents the result without selection correction terms for both migration and labor force participation choice. Column B only includes the labor force participation selection correction term and column C includes both selection correction terms.

Table 2.6 Wage Equations Regressions Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

Wage equations	**Pooled sample** (without selection bias control, without λ_{lf}, λ_{m}) Dependent variable: log wage at wave 3	**Pooled sample** (controlling for one selection bias, without λ_{m}) Dependent variable: log wage at wave 3	**Pooled sample** (controlling for selection biases, with λ_{lf}, λ_{m}) Dependent variable: log wage at wave 3	**non-Migrants** (controlling for selection biases, with λ_{lf}, λ_{m}) Dependent variable: log wage at wave 3	**Migrants** (controlling for selection biases, with λ_{lf}, λ_{m}) Dependent variable: log wage at wave 3
Variable	**(A)**	**(B)**	**(C)**	**(D)**	**(E)**
Migrant	0.098**	0.110***	0.405**		
	(0.040)	(0.036)	(0.183)		
Log of hours worked per week (wave 3)	0.356***	0.406***	0.405***	0.668***	0.076
	(0.128)	(0.097)	(0.097)	(0.050)	(0.134)
Log of hours worked per week (wave 1)	-0.007	-0.004	-0.002	-0.002	0.014
	(0.009)	(0.009)	(0.009)	(0.008)	(0.031)
Relative near	-0.096***	-0.099***	-0.083***	-0.074**	-0.081
	(0.028)	(0.027)	(0.029)	(0.030)	(0.112)
Friend near	0.002	0.021	0.022	0.016	-0.042
	(0.028)	(0.024)	(0.024)	(0.025)	(0.085)
Relative far	-0.024	-0.019	-0.024	-0.051	0.067
	(0.041)	(0.039)	(0.039)	(0.043)	(0.130)
Friend far	0.050	0.055	0.050	0.049	0.013
	(0.042)	(0.038)	(0.038)	(0.040)	(0.129)
Principle applicant	0.116***	0.064*	0.061*	0.067*	0.089
	(0.037)	(0.037)	(0.039)	(0.038)	(0.136)
Mother tongue English/French	0.220***	0.156***	0.164***	0.214***	0.234
	(0.036)	(0.035)	(0.036)	(0.036)	(0.147)
Formal education in Canada, BA and above	-0.094*	-0.070	-0.074*	-0.051	-0.223*
	(0.052)	(0.043)	(0.043)	(0.045)	(0.131)
Formal education in Canada, BA below	-0.123***	-0.127***	-0.125***	-0.116***	0.010
	(0.033)	(0.030)	(0.030)	(0.032)	(0.111)
Canadian experience (number of weeks of working/52)	0.109***	0.066***	0.064***	0.075***	0.113*
	(0.017)	(0.016)	(0.016)	(0.016)	(0.061)
Foreign experience (age at landing - number of years schooling - 5)	-0.011***	-0.003*	-0.002	-0.007***	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)
Proficiency in English	0.074***	0.023	0.023	0.070***	0.009
	(0.024)	(0.045)	(0.023)	(0.024)	(0.093)
Fluency in French	-0.015	-0.045	-0.029	0.014	0.078

Variable	(A)	(B)	(C)	(D)	(E)
	(0.049)	(0.042)	(0.042)	(0.045)	(0.123)
Number of years schooling before immigration	0.012***	0.020***	0.019***	0.012**	0.030*
	(0.005)	(0.004)	(0.004)	(0.004)	(0.016)
Family class	-0.175***	-0.108***	-0.102***	-0.132***	-0.364**
	(0.034)	(0.034)	(0.035)	(0.035)	(0.177)
Refugee	-0.332***	-0.185***	-0.184***	-0.221***	-0.314
	(0.049)	(0.050)	(0.049)	(0.048)	(0.153)
Partnership	0.090**	0.038	0.037	0.072**	0.052
	(0.036)	(0.036)	(0.036)	(0.036)	(0.136)
Training from wave1 to wave 3 interview (excluding language training)	0.066***	0.070***	0.070***	0.054*	-0.013
	(0.028)	(0.026)	(0.026)	(0.029)	(0.085)
Language training from wave 1 to wave 3	-0.102***	-0.078***	-0.079***	-0.063**	-0.171*
	(0.031)	(0.027)	(0.027)	(0.029)	(0.103)
Visible minority	-0.155***	-0.109***	-0.105***	-0.137***	-0.032
	(0.027)	(0.025)	(0.025)	(0.028)	(0.081)
Urban	-0.120	-0.127	-0.010	-0.246	0.110
	(0.148)	(0.141)	(0.143)	(0.155)	(0.296)
Atlantic	0.464**	0.594**	0.592**	0.129	0.732**
	(0.234)	(0.265)	(0.268)	(0.208)	(0.351)
Quebec	-0.069	0.070	0.079*	-0.015	-0.242
	(0.047)	(0.043)	(0.044)	(0.046)	(0.195)
Prairies	-0.178***	-0.262***	-0.271***	-0.208***	-0.473**
	(0.066)	(0.068)	(0.069)	(0.069)	(0.196)
Alberta	0.133***	0.077**	0.080**	0.079**	0.124
	(0.032)	(0.032)	(0.032)	(0.036)	(0.090)
BC	-0.037	-0.089**	0.093**	-0.001	-0.077
	(0.033)	(0.036)	(0.036)	(0.035)	(0.106)
Constant	4.924***	4.800***	4.730***	3.912***	5.604***
	(0.526)	(0.365)	(0.367)	(0.271)	(0.714)
Selectivity correction term λ_{lf}		-2.074***	-2.083***	-0.853***	-1.605***
		(0.288)	(0.288)	(0.298)	(0.612)
Selectivity correction term λ_{m}			-0.163*	-0.449***	0.066
			(0.097)	(0.140)	(0.156)
Number of observation	2186	2168	2168	1917	251
R-square	0.305	0.393	0.393	0.385	0.396
F	36.16	35.52	34.27	38.07	5.63

Note: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population

Without controlling for the effect of migration self-selection, columns A and B show that migration activity improves the wages. The wages for migrants are about 11% higher than those for non-migrants (see column B). After controlling for migration self-selection, column C shows that the positive effect of internal migration on wages is larger, at about a 40% wage premium. In column C, the estimation result for lambda (the inverse Mills ratio) of the migration selection correction term is negative, indicating a negative selection of migrants. There are unobserved characteristics that increases the probability of migration but depress wages. If the selectivity of migration is not accounted for, the estimation results for the effect of migration on wages would be biased downwards.

Across columns A to C, the coefficients on 'relative near' indicator are negative and significant. It may indicate a negative 'ethnic enclave' effect[6] on immigrant wages.[7] Immigrants can benefit if they have friends nearby and/or far away, but such effect is not statistically significant. For the wage equation regression at wave 1, both 'relative near' and 'friend far' are found to be important factors associated with higher wages (see Appendix Table A.2.2).

The coefficient of Canadian work experience[8] indicates that the accumulated human capital of experience in host country is important for wage development. The coefficient of 'Canadian work experience' in column C indicates that wage rises by 6.4% with each

[6] The enclave effect may be that immigrants moving into an enclave get security in the form of employment at a somewhat decent wage upon arrival. However, the cost of security is the benefit of mobility. The immigrant may stay in that job, since there is no job search occurring, and pass up the opportunity for upward mobility of wages that immigrants experience when they do not settle into an enclave.

[7] Here, the 'social ties' variables are regarded as exogenous. It is possible that those immigrants choose to live close to their relative or/and friends have lower earning capability in labor market which is unobservable, thus the social ties variables are endogenous. For simplicity, I ignore the endogeneity possibilities of those variables. Since the unobserved heterogeneity of migration selection and participation selection are controlled for in the model, those unobserved characteristics associated with social ties will be partially controlled for by selection correction terms.

[8] The information of 'number of weeks worked since came to Canada' is provided in LSIC. Canadian experience is the 'number of weeks worked since came to Canada' divided by 52 to assimilate the 'years of experience'. The experience includes full-time and part-time work experience. Both Canadian experience squared and foreign experience squared were included in the regression for nonlinear relationship consideration, but those terms are not significant. The experience nonlinear terms are dropped.

year of working experience in Canada. The estimation result for foreign experience is negative across column A to C, but the coefficient in column C is insignificant. Since the foreign experience is potential experience[9] (age-years of schooling-5), it is closely correlated with age. It might indicate that older immigrants have a slower process of assimilation and have comparative disadvantages in Canadian labor market. It may also imply there is low transferability of foreign experience into the Canadian labor market. Using 1986, 1991 and 1996 Canadian census micro-data files, Schaafsma and Sweetman (2001) find that immigrants' foreign labor market experience yields little or no return in Canada and immigrants' age-earnings profile generally shifts down if their age exceeds 35 when immigrating and the negative effect is substantial for those who arrive at an older age, e.g. 45 to 64. Green and Worswick (2003) find a flat foreign experience profile for recent immigrant cohorts. The lack of return to foreign experience is usually attributed to the shift of source country of immigrants to non-English speaking and non-European countries.

It is possible that within the first few years after arrival, immigrants have difficulties in transferring their accumulated foreign human capital into the Canadian labor market and invest greatly in human capital. This would result in temporarily lower wages and lower skill level jobs. The return to post-immigration investments could be realized after a certain period of time in Canada.

The effect of receiving formal education since immigration seems negative, which is surprising. The results can not be simply understood as a negative effect of formal education on wage. It may be just an immediate effect. Greater investment may lead to

[9] If the subject has a negative value of the potential experience (age > year of schooling +5), the variable value is replaced with zero.

initial lower wages and higher rate of growth afterwards. The coefficient of foreign education is positive and significant across column A to C. The result in column C indicates that an additional year of overseas schooling increase wage by about 2%.

Investment in training (excluding language training) significantly increases weekly wages (by 7%), but language training is negatively associated with wages. Immigrants who choose language training may have poorer language ability compared with those who did not. Immigrants whose mother tongue is English or French have a 16.4% (column C) premium in wages than those whose mother tongue are other languages. It may indicate that language skill is very important in Canadian labor market. It may also suggest that human capital transferability for those immigrants from English/French-speaking countries is much higher in Canadian labor market. The results of wage equation at wave 1 (see Appendix Table A.2.2), six months after immigration, indicates that the premium to native English/French speaker (whose mother tongue is English/French) is 36% given observed characteristics, higher than above stated results of wage regression at wave 3.

The results of 'proficiency in English' and 'fluency in French'[10] variable are not significant in column C. In the regression of wages at wave 1, those immigrants who claim 'good' or 'very good' in English skills earn significantly higher wages (8.8% higher) than those who claimed a lower proficiency level, but those who claimed proficiency in French do not receive significantly higher wages. The only language proficiency

[10] Since about 66% of individuals in the sample claimed to be 'good' or 'very good' in oral English, the 'proficiency in oral English' in the wage and wage growth model is defined as a 'very good' self-assessment in oral English. Only 10% of the individuals in the sample claimed 'good' or 'very good' in oral French, 'fluent in French' is defined as a 'good' or 'very good' self-assessment in oral French. In the statistics and regressions for migration and labor force participation, 'fluency in English' is defined as a 'good' or 'very good' self-assessment in oral English. Oral English proficiency is assumed to represent the general English proficiency, which includes writing, reading, hearing and speaking skills. The self-assessment of English/French proficiency in LSIC consists of the above four categories. In this study, only the proficiency in oral English/French is used.

measurement in LSIC is based on a self-assessment of language ability, which may not be accurate.

The elasticity of weekly wages with respect to working hours per week is around 0.4 (see column C). One percent of working hours increase leads to about 0.4 percent of wage increase. Such level of elasticity is commonly derived in previous literature. Principal applicants earn higher wages than non-principal applicants. Economic class immigrants earn significantly higher wages compared with family class immigrants and refugees given all other characteristics. The wages of visible minority groups is about 10% lower than those for non-visible minority groups. Compared with those immigrants living in Ontario, immigrants who choose to live in Atlantic, Alberta, Quebec and BC earn significantly higher wages and only those in Prairies region earn a lower wage.

There are some other interesting contrasts between the results of wage regression at wave 1 and wave 3. At wave 1, visible minority group members earn 23.2% lower than non-visible minority group members controlling for observed characteristics. After three and a half years, the discrepancy reduces to 10.5%, which implies that visible minorities are doing better with their time in Canada. Compared with the wage of economic class, there is a significant wage growth for refugees. At wave 1, refugees' wage is 53.3% lower than that for economic class immigrants holding all else constant, while at wave 3 the wage gap is reduced to 18.4%. For family class immigrants, in contrast, initially (at wave 1) there is no significant difference in wages compared with economic class, however, after four years in Canada they earn 10.2% lower than that for economic class.

The significant negative coefficient of participation selection correction term λ_{lf} in column C implies that the error terms in the participation equation and wage equation are

negatively correlated. The unobserved characteristics that lead to higher labor force participation probability are associated with lower wages. Those immigrants who choose to work, given their observed characteristics, earn lower wages than the average wage of the whole sample had they all participated. There is a negative selection of participation in labor force after four years since immigration. Recall that there is a positive selection effect of participation after six months since immigration. The coefficient on λ_m the selection correction term for migration choice, is negative in the regression for the pooled sample, which suggests that, in general, selection into migrant group contributes negatively to wages. The estimation results on λ_m will be discussed below in the regression for migrants and non-migrants respectively.

Columns D and E report the estimation results for non-migrants and migrants respectively, correcting for both migration and labor force participation selections bias. Due to the small size of the migrant sample, the significance level of the estimation results for migrants is lower than that for non-migrants. The sign and significance level of the results for non-migrants is similar to that for the pooled sample in column C. The results in column E show that migrants' wages are not affected by social ties, which is different from that for non-migrants. The coefficient in column D on 'mother tongue English/French' is higher than that in column C, indicating non-migrants receive a greater wage premium from such characteristic than the whole sample do. The return to pre-immigration education for non-migrants is lower than that for migrants, at 1.2% per year of schooling compared with 3% for migrants. The return to Canadian experience is also higher for migrants than for non-migrants.

The coefficient of 'family class immigrant' for migrants in column E is negative and

significant, and the value is much lower than that for non-migrant family class in column D, which implies that the 'tied movers' during both immigration and internal migration have more disadvantages in labor market compared with economic class immigrants.

A noteworthy result in column E is that those immigrants who migrated to the Atlantic region earn significantly higher wages than those who migrated to Ontario. There is no significant wage difference between non-migrants in Atlantic region and in Ontario, however. The above results may suggest that the migration activity of immigrants to Atlantic region is rational. Holding all else constant, the investment in migration to Atlantic region generates a higher return than those migrations to Ontario.

For both non-migrants and migrants, there is a negative selection effect of labor force participation on earnings. The coefficient on λ_m in column D indicates a statistically significant selection bias of staying for non-migrants. The significant negative coefficient implies that non-migrants have unobserved characteristics which deter migration but are associated with higher wages (compared with the population at large) and the non-migrants are positively selected. The coefficient on λ_m in column E is positive but not statistically significant and the assumption that there is no migration selection bias for migrants can not be rejected.

Table 2.7 Wage Growth Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

Wage equations	Pooled sample	non-Migrants	Migrants	Pooled sample
	Dependent variable: (log wage at wave 3) -(log wage at wave 1)	Dependent variable: (log wage at wave 3) -(log wage at wave 1)	Dependent variable: (log wage at wave 3) -(log wage at wave 1)	Dependent variable (log wage at wave 3 -(log wage at wave 1)
Variable	**(A)**	**(B)**	**(C)**	**(D)**
Migrant	-0.400*			-0.382
	(0.242)			(0.246)
Log of hours worked per week (wave 3)	0.362***	0.551***	0.010	
	(0.101)	(0.074)	(0.147)	
Log of hours worked per week (wave 1)	-0.290***	-0.323***	-0.211	
	(0.079)	(0.092)	(0.131)	
Δ log hour (Log hour at wave 3 - log hour at wave 1)				0.304***
				(0.069)
Relative near	-0.020	-0.029	-0.029	
	(0.038)	(0.040)	(0.122)	
Friend near	0.025	0.034	0.106	
	(0.031)	(0.031)	(0.264)	
Relative far	-0.032	-0.058	0.106	
	(0.058)	(0.057)	(0.265)	
Friend far	0.002	0.001	0.021	
	(0.049)	(0.048)	(0.184)	
Principle applicant	0.015	0.027	-0.152	
	(0.052)	(0.053)	(0.206)	
Mother tongue English/French	-0.110**	-0.105**	-0.102	-0.080**
	(0.043)	(0.044)	(0.182)	(0.040)
Formal education in Canada, BA and above	0.086	0.109	0.045	0.073
	(0.067)	(0.070)	(0.172)	(0.067)
Formal education in Canada, BA below	0.078*	0.056	0.308*	0.084*
	(0.045)	(0.045)	(0.178)	(0.045)
Canadian experience (number of weeks of working/52)	-0.024	0.024	-0.137*	-0.008
	(0.027)	(0.028)	(0.082)	(0.026)
Foreign experience (age at landing - number of years schooling - 5)	-0.006***	-0.008***	0.003	-0.008***
	(0.002)	(0.002)	(0.009)	(0.002)
Proficiency in English	-0.009	-0.009	0.074	

Variable	(A)	(B)	(C)	(D)
	(0.031)	(0.030)	(0.135)	
Fluency in French	-0.056	-0.060	-0.006	
	(0.077)	(0.087)	(0.166)	
English proficiency improved				-0.017
				(0.035)
French proficiency improved				-0.128
				(0.010)
Number of years schooling before immigration	0.003	-0.001	0.010	0.003
	(0.006)	(0.006)	(0.024)	(0.006)
Family class	-0.023	-0.025	-0.138	-0.055
	(0.040)	(0.041)	(0.200)	(0.038)
Refugee	0.026	0.053	-0.046	-0.041
	(0.079)	(0.078)	(0.427)	(0.074)
Partnership	0.143**	0.139**	-0.060	
	(0.057)	(0.063)	(0.191)	
Training from wavel to wave 3 interview (exclude language training)	0.026	0.056	-0.267	0.019
	(0.036)	(0.036)	(0.139)	(0.037)
Language training from wave 1 to wave 3	-0.010	0.018	-0.245	-0.014
	(0.038)	(0.038)	(0.172)	(0.037)
Visible minority	0.058*	0.077**	-0.077	0.048
	(0.035)	(0.035)	(0.124)	(0.033)
Urban	0.225**	0.071	0.264	0.225*
	(0.106)	(0.092)	(0.262)	(0.115)
Atlantic	0.317	0.031	0.421	0.236
	(0.247)	(0.108)	(0.454)	(0.235)
Quebec	0.090	0.111	-0.351	0.244
	(0.070)	(0.078)	(0.255)	(0.528)
Prairies	0.061	0.069	-0.171	0.165
	(0.085)	(0.083)	(0.291)	(0.074)
Alberta	0.198***	0.169***	0.125	0.208***
	(0.046)	(0.048)	(0.141)	(0.045)
BC	0.005	0.036	-0.280*	-0.029
	(0.043)	(0.042)	(0.159)	(0.042)
Constant	-0.126	-0.527	1.739*	0.239
	0.469	(0.462)	(1.036)	(0.181)
Selectivity correction term λ_{lf}	-0.703***	-0.559***	-3.191***	-0.122
	(0.241)	(0.211)	(0.939)	(0.229)

Selectivity correction term λ_m	0.221*	0.216**	0.039	0.219
	(0.123)	(0.157)	(0.219)	(0.128)
Number of observation	1518	1346	172	1518
R-square	0.155	0.187	0.254	0.141
F	6.76	7.55	2.02	5.63

Note: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population.

Table 2.7 reports the results of wage growth models. The sample is based on those immigrants who reported their wages at both wave 1 and wave 3 interviews. Columns A, B and C use the same explanatory variables as the regressions in Table 2.6 but use the difference in log of wage between wave 1 and wave 3 as the dependent variable. The model can be used to analyze the relationship between growth of earnings and characteristics. In column D, a new model is developed to take advantage of the panel nature of the data and to explore further the wage growth of immigrants from wave 1 to wave 3 interview, their first six months to fours years in Canada.

The results for the pooled sample of migrants and non-migrants in column A show that, after controlling for selection bias, migration has a negative effect on wage growth. Internal migrants experience a slower wage growth compared with non-migrants. Across columns A to C, the social ties variables are insignificant, implying social ties do not affect the growth of wages. The coefficient for 'mother tongue is English/French' is significantly negative. It seems that even though immigrants who are native English/French speakers receive a wage premium within their first several years in Canada, but their wage growth is slower than those immigrants whose mother tongue is non-English/French.

For immigrant migrants, if they received formal post-immigration education but under the university degree, there is a faster wage growth for this group compared with their counterparts who did not receive formal education after immigration, while the return to obtaining a university degree and above is not significant. The small number of immigrants belonging to this group might be one of the reasons for insignificance. For migrants, more Canadian experience is associated with lower wage growth. Somewhat

surprisingly, investment in training does not lead to a steeper increase in wages for both migrants and non-migrants. The reason may be that the returns to such investment need a longer time to be realized in the labor market.

Visible minorities within non-migrant group experience a faster wage growth than non-visible minorities. Such difference is not significant within migrant group, however. Non-migrants in partnership experience a greater wage growth than those unmarried (not in married or common-law partnership) immigrants. This finding might indicate a situation suggested by Family Investment Hypothesis (see Long 1980; Baker and Benjamin 1997). Immigrant men usually undertake the human capital investment activity after immigration and wives, the secondary earner, take on 'dead-end' jobs to support the family consumption. Such a family investment strategy is commonly assumed due to the credit constraint faced by immigrants. Wives usually end up with a flat earning-experience profile. Husbands, however, would have a steeper earnings profile.

The results of selection correction terms are similar to those in Table 2.6. There is a negative selection into labor force participation, which is found across column A to C. Those immigrants who choose to work experience a slower wage growth. The estimation result of λ_m in column A for the pooled sample indicates a positive migration selection effect on wage growth. In general, selection into the migrant group contributes positively to wage growth.

Column D reports the results of a wage growth model which is similar to the 'first-difference' approach. Following Hum and Simpson (2000), the model contains variables describing changes in observed human capital between wave 1 and wave 3 interview, the level of human capital at wave 1 and the immigration class and visible

minority status indictors to investigate the wage growth within the period. The advantage of the model is that the unobserved time-invariant person-specific fixed effect can be controlled for. In this model, not only the changes in human capital within the period is considered, but also the changing effect of the initial accumulated human capital and immigrant class categories on wage growth with time. The model can be expressed as

$$\Delta(\ln w_{it}) = \Delta X_{it}\beta + X_{it}\Delta\beta_t + Z_{it}\Delta\delta_t + u_{it} \quad (11)$$

where $\Delta(\ln w_{it})$ is the growth of log of wage within the three and a half years (wave 1 to wave 3 interviews) for immigrants. ΔX_{it} is the change in human capital within the period, X_{it} represents the already accumulated human capital at wave 1 interview and Z_{it} is the indicators of immigrant class and visible minority status. u_{it} is assumed the standard error term. The estimated coefficients of $\Delta\beta$ and $\Delta\delta$ measure the changes in effect of accumulated human capital and immigrant class status on wage growth over time and the estimated coefficient of ΔX_{it} is the effect of change in human capital on wage growth. ΔX_{it} includes the variables such as the change in Canadian experience, whether receiving training or/and language training, whether having improvement in English/French proficiency[11], whether receiving formal education and whether migrating. The initial accumulated human capital includes the variables such as foreign experience and number of years of schooling before immigration[12]. The indicators for immigration class and visible minority status are included. In addition, the change in log of hours between wave 1 and wave 3 and regional dummy variables and urban indicators are included in the model to control for their effect on wage growth. To test whether the fixed effects are

[11] The improvement in English proficiency is defined as the assessment of non-'very good' to 'very good' on oral English. French proficiency improvement is defined as the assessment of non-'good' or non-'very good' to 'good' or 'very good' in oral French.

[12] Since the short period from landing to wave 1 interview (six months), the accumulated human capital observed at wave 1 is assumed to be the same as the observed human capital when landing.

controlled for, λ_m and λ_{lf} are included to see whether their coefficients are significantly different from zero.

In column D, the coefficient of migration is negative but insignificant, so the conclusion of negative effect of migration on wage growth derived in column A cannot be confirmed. Increase in working hours between wave 1 and wave 3 significantly increases wage growth. Similar to the results in column A, those immigrants whose mother tongue is English/French experience a slower wage growth and immigrants who received formal education but below university degree experience a faster wage growth compared with the reference group. It seems foreign experience does not play an important role in wage growth and the coefficient is close to zero. The coefficient of Canadian experience is not significant either. For most of the explanatory variables, the magnitude and significance level of the results are similar to those in column A.

The results for the selection correction term λ_m and λ_{lf} are insignificant (see column D), which is expected. Since the unobserved fixed effects are controlled for by the model, the selection correction terms which indicate unobserved selection fixed effects are cancelled out and the estimation results are considered consistent without selection bias.

To estimate the structural probit migration model, wage differentials between migration and non-migration for each individual is needed. To derive this variable, log wage differentials are imputed for each individual from the estimation results in column D for non-migrants and column E for migrants in Table 2.6. Table 2.8 presents the results of the structural probit migration model. The coefficient of the log wage differential is positive but is not significant at traditional confidence level, and I can not conclude from the regression that the expected wage growth in the short run plays an important role in

migration decision. The results for other variables are similar to those from the reduced form migration model in Table 2.4.

Table 2.8 Structural Probit Migration Model Regression Results for Immigrants, Longitudinal Survey of Immigrants to Canada (LSIC)

Variable	Coefficient	SE
Log wage differential of migrants and non-migrants	0.135	(0.096)
Relative near	-0.171*	(0.092)
Friend near	0.019	(0.082)
Relative far	0.084	(0.138)
Friend far	0.030	(0.115)
Age	0.131	(0.082)
Age square	-0.002	(0.001)
Foreign experience	-0.067***	(0.024)
Foreign experience square	0.170***	(0.063)
Education 2, college, some university	0.086	(0.154)
Education 3, University and above	0.125	(0.158)
Fluency in English	0.134*	(0.077)
Fluency in French	-0.385**	(0.148)
Employed at wave 1 interview	0.050	(0.142)
Number of children	-0.070	(0.046)
Partnership (married/common-law)	0.142	(0.114)
Spouse worked since arrival	-0.207**	(0.082)
Housing owner	-0.300**	(0.127)
Housing price index	-0.006	(0.006)
Unemployment rate	-0.134**	(0.055)
Economic Class	0.162	(0.146)
Refugee	0.074	(0.182)
Chinese	0.005	(0.127)
South-Asian	-0.108	(0.104)
Black	-0.121	(0.166)
Southeast-Asian	-0.358**	(0.174)
Latin	-0.139	(0.226)
West-Asian	-0.177	(0.141)
Urban	-0.550**	(0.233)
Origin Atlantic	1.295***	(0.475)
Origin Quebec	0.874***	(0.252)
Origin Ontario	0.353***	(0.111)
Origin Prairies	0.155	(0.243)
Origin Alberta	-0.058	(0.157)

Variable	Coefficient	SE
Origin BC	0.784***	(0.233)
Constant	-0.702	(1.720)
Number of Observations	2644	
Wald Chi2	126.70	
Prof >chi2	0.000	
Pseudo R2	0.076	

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC to reflect the Canadian immigrant population.

2.5.2 Estimation Results for Canadian-born

Comparison is made by analyzing the selected Canadian-born sample and the models used are similar to those for immigrants. The selection of Canadian-born sample is based on the propensity score matching approach stated above to make a 'similar' native group to immigrants. Since there are many differences between the SLID and LSIC on data structure and variable definition, I do not combine the two samples. Comparison is based on the regression analysis for immigrant and Canadian-born sample respectively. I intend to use the variables in SLID having close definition to those in LSIC. Since SLID provides broader variables on labor and income, I choose those that can improve the accuracy of estimation (e.g. full-time full-year equivalent experience, and composite wage). The regression results for Canadian-born are discussed below.

Table 2.9 presents the reduced form migration probit model for Canadian-born. Those individuals having below high school education are significantly less likely to migrate than those having postsecondary education but below university degree. Those native-born having above university (Bachelor) degree are not more mobile than those having postsecondary education but below university degree. For immigrants, in contrast, the estimation results show that education is not an important determinant for migration.

Table 2.9 Reduced Form Probit Migration Model Regression Results for Canadian-born Males, Survey of Labor and Income Dynamics (SLID)

Variable	Coefficient	SE
Age	-0.080	(0.083)
Age square	0.081	(0.111)
Education 1, high school graduated and below	-0.368*	(0.212)
Education 3, University and above	-0.143	(0.156)
Number of children	0.457*	(0.237)
Participated at year 1	1.119**	(0.440)
Being employed whole year (year 1)	-0.210	(0.171)
Partnership (married/common-law)	0.184	(0.240)
Family size	-0.495**	(0.229)
Family income(,000)	0.002**	(0.001)
Moved previously	0.313***	(0.116)
Housing owner	-0.492***	(0.127)
Housing price index	-0.001	(0.006)
Unemployment rate	-0.040	(0.038)
Visible minority	-0.111	(0.350)
English as mother tongue	0.133	(0.211)
French as mother tongue	0.462	(0.351)
Urban	-0.223*	(0.121)
Origin MTV	-0.632***	(0.188)
Origin Quebec	-0.364	(0.303)
Origin Ontario	-0.086	(0.248)
Origin Prairies	-0.043	(0.285)
Origin Alberta	-0.299	(0.303)
Origin BC	0.271	(0.264)
Constant	1.006	(2.004)
Number of Observations	2620	
Wald Chi2	108.05	
Prof >chi2	0.000	
Pseudo R2	0.125	

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

The cost factors such as family size and home ownership have significant negative effects on the propensity to migrate. 'Whether moved previously' is a variable only available for Canadian-born sample, which is shown to be an important predictor of the

probability of migration[13]. Previous literature (e.g. Robinson and Tomes 1982; Compton and Pollak 2007) provide evidence that 'whether moved previously' is an important predictor of migration. Noteworthy, the coefficient on 'MTV' indicator is significant and negative, indicating that Canadian-born are less likely to migrate out of the three biggest cites compared with those natives in Atlantic region. This migration inclination is similar to that for immigrants.

Table 2.10 presents the results of the labor force participation probit model for native-born. More educated individuals are strongly more likely to participate in the labor force. Education seems to be a significant factor for participation. For both immigrants and native-born, age is an important factor for participation decision. Married Canadian-born men are more likely to participate in labor force, while for immigrant men, those who are married are less likely to participate shortly after arrival in Canada, six months since immigration, and after four years since immigration the difference in probability of participation in labor force is indistinguishable between married and unmarried.

The results of the bivariate probit model indicate that the migration and participation decisions are independent, since ρ is not significantly different from zero. The results in table 2.10 also show that there is no significant effect of 'migration' on participation decision, which is similar to that for immigrant sample.

[13] In SLID we have the information of the respondents' current province of residence and the province where they had their elementary education. The dummy variable 'moved previously' is defined as one if the current province of residence is different with the province where the individuals had their elementary education.

Table 2.10 Probit Model for Participation Selection Equation Regression Results, Canadian-born, Survey of Labor and Income Dynamics (SLID)

Participation Selection Equation		
Variable	**Coefficient**	**SE**
Aged 25-34	0.547***	(0.178)
Aged 35-44	0.564***	(0.201)
Education 2, high school graduated above and below university degree	-0.033	(0.192)
Education 3, University and above	0.616***	(0.166)
Migrant from wave1 to wave3	0.035	(0.285)
Number of children	0.040	(0.072)
Partnership (married/common-law)	0.404**	(0.191)
Housing owner	0.599***	(0.165)
Other income (family income-personal earnings)	-0.007***	(0.003)
English as mother tongue	-0.282	(0.280)
French as mother tongue	-0.087	(0.325)
Urban	0.049	(0.157)
Atlantic	-0.336*	(0.195)
Quebec	-0.305	(0.328)
Prairies	-0.037	(0.225)
Alberta	-0.061	(0.231)
BC	0.107	(0.295)
Constant	-0.869**	(0.374)
Number of Observations	2592	
Wald Chi2	70.46	
Prof >chi2	0.000	
Pseudo R2	0.176	

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

Appendix Table A.2.3 presents the Heckman two-step selection estimation results for wages at year 1. The t-test of λ, inverse Mills ratio, shows that there is significant labor force participation selection at year 1 for Canadian-born, even though the number of censored observations are only 76 (3.4% of the number of observation). The coefficient for λ, the selection term, is -0.676. For the immigrant sample, there are 848 censored observations at wave 1 (33.2% of the number of observation) and the coefficient

of λ is significant at 0.268. In the regression for Canadian-born, the coefficient of λ indicates that there is a negative self-selection into labor force participants at year 1. There is, however, a positive selection into labor force for immigrant sample at wave 1. The results of wage regression for immigrants (see Table 2.6) show that, after four years since immigration, the selection into labor force has a negative effect on wage given observed characteristics, which is similar to that for Canadian-born.

The estimation results for wage equations based on the native sample are reported in Table 2.11[14]. Similar to the regressions for immigrants, columns A to C present the results based on the pooled sample of migrants and non-migrants and columns D and E are the regression for non-migrants and migrants respectively.

Since the dependent variable in the regressions for the native sample is the annual composite hourly wage, variable working hours is unnecessary in the models. Across columns A to C, the results show that experience and education are important factors determining wages and the directions of effect are within expectation. For native-born, one more year of full-time experience leads to about 2.2% increase in wage (see column C). An extra year of schooling brings a 3.1% wage increase (see column C). Recall the estimation results for immigrants in Table 2.6, an extra year of foreign education increases immigrant wage by 1.9% and formal Canadian education does not seem contribute to higher wages in the period of observation. Canadian experience of immigrants is more important for wages increase. Additional year of Canadian experience increases their wage by 6.4%. Foreign experience, however, does not contribute to wage increase. Note that the high return to Canadian experience for immigrants may only last

[14] Since the number of visible minority members is too small, the visible minority indicator has to be dropped in the wage and wage growth regressions.

during their first few years in Canada, and with their time in Canada the rate of return will diminish.

Table 2.11, Wage Equations Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)

Wage equations	**Pooled sample** (without selection control, without λ_{lf}, λ_{m}) Dependent variable: log wage at year 3	**Pooled sample** (controlling for one selection, without λ_{m}) Dependent variable: log wage at year 3	**Pooled sample** (controlling for selection, with λ_{lf}, λ_{m}) Dependent variable: log wage at year 3	**non-Migrants** (controlling for selection, with λ_{lf}, λ_{m}) Dependent variable: log wage at year 3	**Migrants** (controlling for selection, with λ_{lf}, λ_{m}) Dependent variable: log wage at year 3
Variable	**(A)**	**(B)**	**(C)**	**(D)**	**(E)**
Migrant	0.008	0.006	-0.136		
	(0.047)	(0.043)	(0.179)		
Experience (full-time full-year)	0.020***	0.022***	0.022***	0.022***	0.007
	(0.002)	(0.002)	(0.002)	(0.003)	(0.007)
Experience square	-0.019***	-0.021***	-0.021***	-0.021***	-0.007
	(0.002)	(0.002)	(0.002)	(0.002)	(0.007)
Number of years schooling	0.047***	0.031***	0.031***	0.033***	0.020**
	(0.042)	(0.004)	(0.005)	(0.005)	(0.010)
Partnership	0.231***	0.110***	0.103***	0.099**	0.063
	(0.033)	(0.035)	(0.036)	(0.039)	(0.083)
English as mother tongue	0.045	0.105	0.108*	0.110*	0.040
	(0.057)	(0.060)	(0.061)	(0.062)	(0.273)
French as mother tongue	0.035	0.040	0.050	0.059	-0.007
	(0.065)	(0.068)	(0.070)	(0.074)	(0.288)
Urban	0.135***	0.118***	0.107***	0.118***	-0.051
	(0.029)	(0.028)	(0.029)	(0.031)	(0.071)
Quebec	0.067	0.093**	0.087*	0.081	0.093
	(0.048)	(0.047)	(0.049)	(0.055)	(0.133)
Prairies	0.022	-0.063*	-0.061*	-0.066*	0.063
	(0.035)	(0.034)	(0.035)	(0.037)	(0.120)
Alberta	0.175***	0.118***	0.114***	0.107***	0.296***
	(0.034)	(0.034)	(0.034)	(0.035)	(0.109)
BC	0.131***	0.032	0.040	0.062	-0.066
	(0.032)	(0.045)	(0.042)	(0.044)	(0.134)
Ontario	0.177***	0.113***	0.109***	0.106***	0.215**
	(0.029)	(0.031)	(0.031)	(0.032)	(0.098)
Constant	2.668***	2.197***	2.230***	2.173***	2.648***

Variable	(A)	(B)	(C)	(D)	(E)
	(0.128)	(0.118)	(0.121)	(0.131)	(0.395)
Selectivity correction term λ_{lf}		-2.535***	-2.605***	-2.520***	-2.183***
		(0.286)	(0.280)	(0.300)	(0.610)
Selectivity correction term λ_{m}			0.254***	0.436***	0.060
			(0.095)	(0.150)	(0.098)
Number of observation	2186	2153	2107	1950	157
R-square	0.294	0.351	0.355	0.359	0.355
F	36.73	43.71	41.47	41.17	5.83

Note: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

In columns A and B, the migration indicator is positive but not significant. After controlling for selection bias, the coefficient is negative but insignificant. For those native-born who migrated within year 1 to year 3, their wage is lower than those who did not migrate, holding all else constant, but is not statistically significant at conventional confidence level. We can not conclude that the investment in migration brings an immediate penalty on the wages for native migrants. In contrast, the results in Table 2.6 column C indicate that immigrant migrants earn 40.5% higher than those immigrant non-migrants, controlling for selection bias and other observed characteristics and there is an immediate migration premium for immigrants.

In general, Canadian-born whose mother tongue is English receive a premium, at around 10.8% (see column C), compared with those whose mother tongue is non-English. For immigrants, if their mother tongue is English or French, this characteristic brings them about 16.4% higher weekly wages than non-English/French native speakers.

Columns D and E present the estimation results for migrants and non-migrants with selectivity correction terms. Since non-migrants constitute a large proportion of the native sample, the magnitude and significance level of the results in column D are similar to

those in column C. The sample for native migrants is small, thus the significance level is relatively low. For native internal migrants, experience is not observed to be significant. Holding all else constant, the return to education for migrants, at 2% per year of schooling, is lower than that for non-migrants at 3.3%. For immigrant migrants, the rate of return to foreign education (years of schooling) is higher than that for non-migrants, at 3% increase of wages for an additional year of schooling compared with 1.2% for non-migrants. Furthermore, holding all else constant, an extra year of Canadian work experience brings a weekly wage increase of 11.3% for immigrant migrants, which is higher than that for immigrant non-migrants at 7.5%. It implies that immigrant migrants are more efficient at transferring their human capital of foreign education into the Canadian labor market and at obtaining a higher rate of return to accumulated human capital of experience in Canada, compared with those immigrant non-migrants. For Canadian-born sample, however, migrants receive a lower rate of return to their accumulated human capital than non-migrants.

Turning to the results of selection correction terms, across columns B to E, the coefficients of labor force participation selection term λ_{lf} are negative and significant at a 99% confidence level. There is a robust negative participation selection for the whole sample of native-born. Similarly, negative and significant labor force participation selection is also found for immigrant sample. The migration selection term λ_m in column C is positive and significant, which indicates that there is a positive self-selection of migration for the Canadian-born pooled sample. Negative and significant migration self-selection is found for immigrant pooled sample. The coefficient of λ_m in column D is positive and significant, which indicates a negative selection of staying for non-migrants

and suggests that those who choose to stay have unobserved characteristics which both inhibit migration and depress wages. In contrast, there is a positive staying selection for immigrant non-migrant sample. For both immigrant and native-born migrants, the migration selection term is not significantly different from zero.

The above comparison indicates that similar estimates of λ_{lf} are obtained between immigrant and native-born sample, while the estimates of λ_m are different between the two groups. This may suggest that between the two groups there are similar unobserved participation related fixed effects on wages but different fixed effects from migration.

Similar wage growth models are applied to the native-born sample and the results are presented in Table 2.12. The results in column A indicate that there is no significant effect of migration on wage growth. For the pooled sample of Canadian-born, having more experience generally decreases the wage growth and the coefficient of number of years schooling is not significant. In column B, it is found that non-migrants who have more experience have a higher growth of wage. Language does not seem to be an important factor influencing the wage growth for the pooled native sample, while for native migrants it is a different story. For those migrants whose mother tongue is English or French, they experience a faster wage growth. Recall the results for the immigrant pooled sample (also the non-migrant sample), those whose mother tongue is English/French generally experience a slower wage growth. Across column A to C, the results of the two selection terms are not significant. For immigrants, however, significant self-selection effects of participation and migration are observed except the migration selection effect for migrant sample.

Table 2.12, Wage Growth Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)

Wage equations	Pooled sample Dependent variable: (log wage at year 3) -(log wage at year 1)	non-Migrants Dependent variable: (log wage at year 3) -(log wage at year 1)	Migrants Dependent variable: (log wage at year 3) -(log wage at year 1)	Pooled sample Dependent variable: (log wage at year 3) -(log wage at year 1
Variable	**(A)**	**(B)**	**(C)**	**(D)**
Migrant	0.311			0.030
	(0.137)			(0.139)
Experience (full-time full-year)	-0.003**	0.003**	-0.007	-0.003*
	(0.002)	(0.002)	(0.006)	(0.001)
Experience square	0.003*	-0.003*	0.006	0.003*
	(0.001)	(0.002)	(0.006)	(0.001)
Δ years of experience				-0.0003
				(0.0004)
Number of years schooling	-0.0005	-0.001	0.004	-0.0001
	(0.003)	(0.003)	(0.007)	(0.003)
Δ years of schooling				-0.004
				(0.018)
Partnership	0.036	0.030	0.024	
	(0.023)	(0.024)	(0.069)	
English as mother tongue	0.031	0.032	0.436***	0.035
	(0.040)	(0.040)	(0.114)	(0.039)
French as mother tongue	-0.008	-0.007	0.524***	-0.013
	(0.044)	(0.046)	(0.129)	(0.043)
Urban	-0.020	-0.026	-0.002	-0.022
	(0.026)	(0.028)	(0.068)	(0.026)
Quebec	-0.006	-0.012	-0.083	0.006
	(0.033)	(0.035)	(0.099)	(0.032)
Prairies	-0.021	-0.025	0.052	-0.018
	(0.023)	(0.024)	(0.098)	(0.024)
Alberta	0.005	0.007	-0.016	0.007
	(0.024)	(0.025)	(0.099)	(0.025)
BC	-0.022	-0.013	-0.030	-0.021
	(0.027)	(0.028)	(0.127)	(0.027)
Ontario	0.021	0.020	0.061	0.023
	(0.024)	(0.025)	(0.090)	(0.024)
Constant	0.083	0.115	0.408	0.072
	(0.089)	(0.096)	(0.263)	(0.090)
Selectivity correction term λ_{lf}	-0.171	-0.181	0.036	-0.165
	(0.240)	(0.262)	(0.582)	(0.241)

Variable	(A)	(B)	(C)	(D)
Selectivity correction term λ_m	-0.036	0.049	0.039	-0.035
	(0.068)	(0.107)	(0.114)	(0.069)
Number of observation	2050	1913	137	2041
R-square	0.022	0.060	0.103	0.023
F	2.11	3.29	3.28	1.85

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

A similar model as equation (11) is applied to the native sample and the results are reported in Table 2.12 column D. Variables of changes in experience and number of years of schooling are included and the variables for accumulated human capital are measured at year 1. From the results in column D, it is confirmed that migration does not significantly affect the wage growth. Similar results are also obtained for immigrants. It is also confirmed that the growth of wage decreases with experience. Somewhat surprisingly, the changes in experience and education are not significant. The small interval and small number of native-born individuals who change their number of years schooling may explain this result. The coefficients for selection correction terms again are not significant for the pooled native-born sample after controlling for the fixed effect, which is within expectation.

Table 2.13 Structural form Probit Migration Model Regression Results for Canadian-born, Survey of Labor and Income Dynamics (SLID)

Variable	Coefficient	SE
Log of wage differentials	0.165	(0.615)
Age	-0.088	(0.084)
Age square	0.091	(0.111)
Education 1, high school graduated or below	-0.408**	(0.205)
Education 3, University and above	-0.159	(0.170)
Number of children	0.443*	(0.239)
Employed at year 1	-0.208	(0.176)
Participated at year 1	1.136**	(0.443)
Partnership (married/common-law)	0.178	(0.240)
Moved previously	0.304***	(0.117)
Housing owner	-0.490***	(0.128)
Housing price index	-0.001	(0.006)
Unemployment rate	-0.040	(0.037)
Family size	-0.479**	(0.231)
Family income	0.002**	(0.001)
Visible minority	-0.080	(0.357)
English as mother tongue	0.146	(0.212)
French as mother tongue	0.487	(0.369)
Urban	-0.199	(0.143)
Origin MTV	-0.645***	(0.191)
Origin Quebec	0.347	(0.302)
Origin Ontario	-0.085	(0.250)
Origin Prairies	-0.045	(0.280)
Origin Alberta	-0.299	(0.301)
Origin BC	0.326	(0.326)
Constant	1.469	(2.244)
Number of Observations	2567	
Wald Chi2	141.93	
Prof >chi2	0.000	
Pseudo R2	0.114	

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

Finally, turning to the estimates of the structural probit migration model for Canadian-borns in Table 2.13, the wage differential is not significant at the traditional confidence level. A similar finding is obtained for immigrants. The results may suggest

that short-run expected wage changes between migration and non-migration are not important for migration decision. Does this indicate that the migration behavior is irrational? The explanation of the results for imputed wage differential need to be done carefully and it might be inappropriate to conclude that the migration behavior is irrational given the period of observations of the samples. Since in this study only immediate effect of migration on wages is investigated, negative effect or insignificant effect of migration on wages is possible and the investment in migration can be efficient in a long-run time dimension. It has been argued that individuals make migration decisions based on lifetime earnings (Greenwood 1997). The evaluation of rationality of migration needs to be in a long-run perspective.

2.6 Conclusions

The issue of immigrant assimilation has been addressed by many studies. The assimilation process, however, has received limited attention. This essay investigates the human capital investment behavior of immigrants, migration particularly, and the earnings in their first few years in Canada. The data used in this study are from the unique Longitudinal Survey for Immigrants to Canada (LSIC). The comparable Canadian-born sample is from another longitudinal dataset the Survey of Labor and Income Dynamic (SLID).

The analysis is based on adult men. It is found that a great proportion of immigrant population is attracted to the three biggest cities – Montreal, Toronto and Vancouver (MTV), and is less likely to migrate away. There is evidence that social-ties, especially having relatives in the same city, are significant factors reducing the propensity to migrate for new immigrants. Language proficiency, an important part of human capital

for immigrants, affects their probability of migration and participation. Fluency in English significantly raises the probability of migration and labor force participation. Education, however, is not found to be important in immigrants' migration and participation behavior analysis. For Canadian-born men, in contrast, education is a significant determinant of migration and labor force participation.

From the statistics, it is shown that immigrant migrants earn higher weekly wages than their counterparts who did not migrate. The raw premium is around 16.4%. After controlling for observed characteristics in the regression, the migration premium is about 9.8%. Furthermore, when the migration and participation self-selections are accounted for, there is evidence that migration behavior has a significant positive effect on immigrants' earnings. The migration premium is around 40.5%. For Canadian-born sample, in contrast, the statistics show that the hourly wage rate for migrants is 3.6% lower than that for non-migrants. In the regression analysis, taking into account observed characteristics, the coefficient for 'internal migration' is not significantly different from zero. Once the selection correction terms are included in the regression, it is found that the variable 'internal migration' takes a negative sign but insignificant which suggests that migration activity does not play an immediate significant role in the wage development of Canadian-born men.

From the regression results for the pooled sample of immigrants, there is evidence of negative migration self-selection. Migrants have unobserved characteristics which both increase the probability of migration and depress earnings. Turning to the self-selection effects for Canadian-borns, positive selection of migration is found for the pooled sample, which implies that selection into migrant group contributes positively to the wages. For

Canadian-born non-migrants, however, those who choose to stay earn relatively lower wages than the native population on average, given their observed characteristics.

In this study, it is found that the self-selection effect of labor force participation on wages is similar for immigrants and native-borns. There is significant negative selection into labor force for both immigrants (after four years in Canada) and Canadian-borns, which suggests that the observed earnings of participant immigrants and native-borns is lower than the average expected earnings of the respective whole sample for immigrants and Canadian-born had they worked. The above findings from this study indicate that it is important to consider the self-selections when analyzing the effect of migration on wages and also the general wage issues. In this study, evidence of double self-selectivity, migration and labor force participation selectivity, is found in the wage analysis for both immigrants and native-borns.

Great progress is found for immigrants in their first four years in Canada, including weekly wages, participation rate and weekly working hours. The investments in Canadian work experience, training (excluding language training) and internal migration are found to bring them higher earnings. There is evidence, however, that those immigrants who invest in formal education and language training do not obtain a significant or positive return. Large investment in human capital shortly after immigration can cause temporarily lower wages (Duleep and Regets 1997). It may be a transition effect. Further study about the pos-immigration investment in formal education and language training is necessary.

One noteworthy finding of the study is that immigrant migrants are more efficient at transferring their human capital into the Canadian labor market and obtain a higher rate

of return to their accumulated human capital in the Canadian labor market (Canadian work experience especially) compared with those immigrant non-migrants. For Canadian-born sample, however, migrants receive a lower rate of return to their accumulated human capital than that for non-migrants. Moreover, for those immigrants who migrated to Atlantic region, they earn significantly higher wages than their counterparts who migrated to Ontario. Canadian-born migrants receive higher wages if they migrated to Ontario and Alberta than if they migrated to Atlantic region.

The most important result of this study is that the internal migration activity plays an active role in immigrant wage development and assimilation process during their first four years in Canada, which suggests that the Canadian government should pay more attention to the geographical mobility of new immigrants and initiate settlement policies to encourage dispersed settlement. In this study, the immediate effect of migration on wages is examined for immigrants compared with that for Canadian-born. With proper data, the long-run effect of migration can be explored in the future and the effect of internal migration changes with their time in Canada can be examined. Furthermore, since the argument of the Family Investment Hypothesis (Long 1980), it is important and interesting to study immigrant women's assimilation process and their human capital investment behaviors. Interactions between family members and family investment strategies have been found important elements in immigrant assimilation process.

References:

Aydemir, A. and Skuterud, M. (2003) "Explaining the Deteriorating Entry Earnings of Canada's Immigration Cohorts: 1966-2000." 11F0019MIE No.225, Ottawa: Statistics Canada.

Baker, M. and Benjamin, D. (1994) "The Performance of Immigrants in the Canadian Labor Market." *Journal of Labor Economics* 12(3): 369-405.

Baker, M and Benjamin, D. (1997) "The Role of the Family in Immigrants' Labor-Market Activity: an Evaluation of Alternative Explanations" *The American Economic Review* 87 (4): 705-727.

Barteel, A.P. (1979) "The Migration Decision: What Role Does Job Mobility Play?" American Economic Review 69: 775-786.

Ben-Porath, Y. (1967) "The Production of Human Capital and the Life Cycle of Earnings." *Journal of Political Economy* 76(4): 352-365.

Bloom, D. E and Gunderson, M. (1991) "An Analysis of the Earnings of Canadian Immigrants." Abowd, J. M. and Freeman R. B., eds., Immigration, Trade, and the Labor Market Chicago: University of Chicago Press, 321-342.

Bloom, D. E., Grenier, G. and Gunderson, M, (1995) "The Changing Labor Market Position of Canadian Immigrants." *Canadian Journal of Economics* 28(4b): 987-1005.

Boehm, T. P., Herzog, H. W. and Schlottmann, A. M. (1998) "Does Migration Matter? Job Search Outcomes for the Unemployed." *The Review of Regional Studies* 28(1): 3-12.

Borjas, G. J. (1982) "The Earnings of Male Hispanic Immigrants in the United States." *Industrial Labor Relations Review* 35(3): 343-353

Borjas, G. J. (1985) "Integration, Changes in Cohort Quality, and the Earnings of Immigrants." *Journal of Labor Economics* 3(4): 463-489.

Borjas, G. J., Bronars, S. G. and Trejo, S. J. (1992a) "Assimilation and the Earnings of Young Internal Migrants." *The Review of Economics and Statistics*, 74: 170-175.

Borjas, G. J., Bronars, S. G. and Trejo, S. J. (1992b) "Self-Selection and Internal Migration in the United States." *Journal of Urban Economics*, 32: 159-185.

Borjas, G. J. (1995) "Assimilation and Changes in Cohort Quality Revisited: What Happened to Immigrant Earnings in the 1980s?" *Journal of Labor Economics*, 13(2): 201-245.

Borjas, G.. J. (1999) "The Economic Analysis of Immigration." Handbook of Labor Eonomics, Volume 3A, edited by Orley Ashenfelter and David Card. Amsterdam: North-Holland

Borjas, G. J. (2000) "Economics of Migration." *International Encyclopedia of the Social and Behavioral Sciences*, No. 3.4 (38)

Borjas, G. (2001) "Does Immigration Grease the Welfare Magnets". *Journal of Labor Economics*, 17(4): 607-737

Chiswick, B. R. and Miller, P. W. (1992) "The Endogeneity between Language and Earning: International Analysis." *Journal of Labor Economics* 13 (2): 246-88.

Chriswick, B. R., and Miller, P. W. (1994) "The Determinants of Post-immigration Investment in Education." *Economics of Education Review* 13(2): 163-177

Chiswick, B. R. (1978) "The Effect of Americanization on the Earnings of Foreign-born Men." *Journal of Political Economy* 86(5): 897-921.

Chiswick, B. R., Lee, Y.L. and Miller, P. W. (2005) "Immigrant Earnings: A

Longitudinal Analysis." Discussion Paper No. 1750

Compton, J. and Pollak, R. A. (2007) "Why are Power Couples Increasingly Concentrated in Large Metropolitan Area?" *Journal of Labor Economics 25*(3): 475-512.

Duleep H. O. and Regets, M (1997). "Measuring Immigrant Wage Growth Using Matched CPS Files." *Demography* 34(2): 239-249.

Duleep H. O. and Regets, M. (1999) "Immigrants and Human-Capital Investment" *American Economics Review* 89(2): 186-190.

Duleep H. O. and Regets, M. (2002) "The Elusive Concept of Immigrant Quality: Evidence from 1970-1990." IZA Discussion Paper 631 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=3129

Edmonston, B. (2002) "Interprovincial Migration of Canadian Immigrants" Vancouver Center of Excellence—Research on Immigration and Integration in the Metropolis. Working Paper Series No. 01-10.

Finnie, R. (1999) "Inter-Provincial Migration in Canada: A Longitudinal Analysis of Movers and Stayers and the Associated Income Dynamics" *Canadian Journal of Regional Science* (Autumn): 227-262.

Finnie, R. (2001) "The Effect of Inter-Provincial Mobility on Individuals' Earnings: Panel Model Estimates for Canada" Statistics Canada, Business and Labor Market Analysis, 11F0019MIE No. 163.

Friedberg, R. (2000) "You Can't Take It With You? Immigrant Assimilation and the Portability of Human Capital" *Journal of Labor Economics* 18(2): 221-251.

Gartel, A.P. (1979) "The Migration Decision: What Role Does Job Mobility Play?" *American Economic Review* 69: 775-786.

Goss, E. P., and Schoening, N. C. (1984) "Search Time, Unemployment and the Migration Decision." *The Journal of Human Resources* 19: 570-579.

Goss, E. P., Paul C. and Wilhite, A. (1994) "Duration on Unemployment: Geographic Mobility and Selectivity Bias" *The Review of Regional Studies* 24(2): 127-42

Grant, Mary L. (1999) "Evidence of New Immigrant Assimilation in Canada." *Canadian Journal of Economics* 32(4): 930-955.

Green, D. and Worswick,C. (2003) "Immigrant Earnings Profiles in the Presence of Human Capital Investment: Measuring Cohort and Macro Effect." September, Working Paper

Greene, W. H. (2003) Econometric Analysis. Prentice Hall International Edition.

Greenwood, M. (1975) "Research on Internal Migration in the United States: A Survey." *Journal of Economic Literature*, 13:397-433.

Greenwood, M. (1997) "Internal Migration in Developed Countries." Handbook of Population and Family Economics ED. Rosenzweig, MR and Stark, O. Elsevier Science B.V.

Heckman, J. J. (1979) "Sample Selection Bias as a Specification Error." *Econometrica*

47 (1): 153-161

Herzog, H. W., Schlottmann, A. M. and Boehm, T. P. (1993) "Migration as Spatial Job-search: A Survey of Empirical Findings" *Regional Studies*, 27(4): 327-340

Hou, F. (2004) "Recent Immigration and the Formation of Visible Minority Neighborhoods in Canada's Largest Cities" Statistics Canada, Business and Labor Market Analysis Division Research Paper Series, No. 11F0019MIE2004221.

Hum, D. and Simpson, W. (2000) "Closing the Wage Gap: Economic Assimilation of Canadian Immigrants Reconsidered." *Journal of International Migration and Integration* 1(4): 427-441

Hum, D. and Simpson, W. (2004) "Reinterpreting the Perormance of Immigrant Wages from Panel Data." *Empirical Economics* 29: 129-147.

Leuven, E. and Sianesi, B. (2006) "PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing" version 3.1.2
http://ideas.repec.org/c/boc/bocode/s432001.html

Lin, Z. (1998) "Foreign-Born vs. Native-Born Canadians: A comparison of Their Inter-Provincial Labor Mobility" *Business and Labor Market Analysis*, No.114, Ottawa, Statistics Canada.

Long, J. E. (1980) "The Effect of Americanization on Earnings: Some Evidence for Women." *Journal of Political Economy* 88(3):620-29.

Maddala, G. S. (1983) " *Limited-Dependent and Qualitative Variable Variables in Econometrics* Cambridge, England: Cambridge University Press, 1983.

Mincer, J. (1978) "Family Migration Decisions." *The Journal of Political Economy*, 86 Oct.: 749-773.

Moore, E. G. and Rosenberg, M. (1995) "Modeling Migration Flows of Immigrant Groups in Canada" *Environment and Planning A* 27(5): 699-714.

Nakosteen, R. and Zimmer, M. (1980) "Migration and Income: The Question of Self-Selection." *Southern Economic Journal* 46 (3):840-851.

Nakosteen, R. and Zimmer, M. (1982) "The Effect on Earnings of Interregional and Interindustry Migration" *Journal of Regional Science* 22(3): 325-341.

Nakostten, R. and Westerlund, O. (2004) "The Effect of Regional Migration on Gross Income of Labor in Sweden" *Papers in Regional Science* 83: 581-595.

Newbold, K.B. (1996) "Internal Migration of the Foreign-born in Canada" *International Migration Review* 30(3): 728-747.

Nogle, J. (1994) "Internal Migration for Recent Immigrants to Canada" *International Migration Review* 28(1): 31-48.

Pekkala, S. and Tervo, H. (2002) "Unemployment and Migration: Does Moving Help?" *Scandinaian Journal of Economics* 104(4): 621-639.

Polacheck, S.W. and Horwath (1977) "A Life Cycle Approach to Migration: Analysis of the Perspicacious Peregrinator." *Research in Labor Economics* 1: 103-149.

Ram, G., and Shin, Y. E. (1999) "Internal Migration of Immigrant Canada:

Demographic, Economic and Social Challenges" ED S.S. Halli and L. Dredger, L., University of Toronto Press, 148-162.

Rashid, S. (2004) "Internal Migration and Income of Immigrant Family." Working Paper http://ideas.repec.org/p/hhs/umnees/0624.html

Robinson, C. and Tomes, N. (1982) "Self-Selection and Interprovincial Migration in Canada." *The Canadian Journal of Economics* 15: 474-502

Rosenbaum. P. and Rubin, D. (1985) "Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity Score" *American Statistician* 39(1): 33-38

Schaafsma, J. and Sweetman, A. (2001) "Immigrant earnings: Age at Immigration Matters" *The Canadian Journal of Economics* 34(4): 1066-1099.

Schellengerg, G. (2004) "Immigrants in Canada's Census Metropolitan Areas" Catalogue No. 89-613-MIE (Ottawa: Statistics Canada).

Sjaastad, L.A. (1962) "The Cost and Returns of Human Migration." Journal of Political Economy, 70: 80-93.

Smith, J. and Todd, P. (2005a) "Does Matching Overcome Lalonde's Critique of Nonexperimental Estimators?" *Journal of Econometrics* 125:305-353.

Smith, J. and Todd, P. (2005b) "Rejoinder" *Journal of Econometrics* 125:365-375.

Trovato, F., and Halli, S.S. (1990) "Ethnicity and Immigration in Canada." *International Migration Review* 17(2): 245-267.

Yankow, J. J. (2003) "Migration, Job Change, and Wage Growth: A New Perspective on the Pecuniary Return to Geographic Mobility." *Journal of Regional Science*, 43: 483-516.

Appendix Table A.2.1(a) Propensity Score Coefficient Estimates

Variables	Coefficient	SE
Age	-0.153***	(0.052)
Age square	0.117*	(0.069)
Education 1 (high school graduated)	4.413***	(0.813)
Education 3 (BA and above)	-1.746**	(0.804)
Partnership?	-2.728***	(0.862)
Alberta	0.251***	(0.039)
Quebec	-0.116***	(0.034)
Age*Education1	-0.236***	(0.043)
Age square*Education1	0.317***	(0.056)
Age*Education 3	0.176***	(0.043)
Age square*Education 3	-0.246***	(0.056)
Education 1* partnership	0.050	(0.094)
Education 3* partnership	0.116	(0.086)
Age*partnership	0.142****	(0.047)
Age square*partnership	-0.149**	(0.063)
Constant	-0.264**	(0.315)
LR chi2 (6)	3974.26	
Pseudo R2	0.241	
Prob>chi2	0.000	
# of observations	22133	

Notes:
1. Logit model is used for the propensity score estimation.
2. Matching is the one-to-one nearest neighbor matching.
3. Coefficients and standard errors presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level.

Balancing Tests

Appendix Table A.2.1(b), Standardised Difference Test

Variable	Standardised difference before matching	Standardised difference after matching	% reduction in bias
Age	-58.5	-3.4	94.3
Age square	-58.4	-2.8	95.3
Education 1	-41.2	1.0	97.5
Education 3	119.6	-1.7	98.5
Partnership	20.4	1.9	90.8
Alberta	15.3	0.1	99.2
Quebec	-15.8	-1.4	90.9
Age*Education1	-44.3	0.4	99.0
Age square*Education1	-44.1	0.2	99.6
Age*Education 3	105.9	-2.5	97.7
Age square*Education 3	87.1	-2.9	96.7
Education 1* partnership	-29.1	0.8	97.2
Education 3* partnership	104.2	0.6	99.4
Age*partnership	-0.5	0.1	90.3
Age square*partnership	-15.9	-0.9	94.6

Appendix Table A.2.1(c) t-Test

Variables	Sample	Mean		t-Test	
		Treated	Control	t	P>|t|
age	Unmatched	36.243	40.586	-27.77	0.000
	Matched	36.243	36.493	-1.30	0.193
Age squared	Unmatched	13.645	17.064	-27.23	0.000
	Matched	13.645	13.807	-1.10	0.270
Edu1	Unmatched	0.184	0.364	-18.64	0.000
	Matched	0.184	0.180	0.42	0.673
Edu3	Unmatched	0.661	0.156	65.04	0.000
	Matched	0.661	0.668	-0.58	0.565
Partnership	Unmatched	0.848	0.768	9.41	0.000
	Matched	0.848	0.840	0.75	0.454
Alberta	Unmatched	0.132	0.085	8.07	0.000
	Matched	0.132	0.132	0.04	0.968
Quebec	Unmatched	0.149	0.209	-7.36	0.000
	Matched	0.149	0.154	-0.57	0.570
Age*Education1	Unmatched	7.017	14.976	-19.65	0.000
	Matched	7.017	6.938	0.19	0.848
Age2*Education1	Unmatched	2.822	6.364	-19.37	0.000
	Matched	2.822	2.808	0.08	0.936
Age*Education3	Unmatched	23.751	6.321	55.29	0.000

Variables	Sample	Mean		t-Test	
		Treated	Control	t	P>|t|
Age2*Education3	Matched	23.751	24.156	-0.84	0.402
	Unmatched	8.806	2.652	44.40	0.000
Education1*partnership	Matched	8.806	9.008	-1.00	0.318
	Unmatched	0.156	0.275	-13.20	0.000
Education3*partnership	Matched	0.156	0.153	0.34	0.735
	Unmatched	0.562	0.124	60.42	0.000
Age*partnership	Matched	0.562	0.560	0.19	0.848
	Unmatched	31.481	31.568	-0.23	0.000
Age2*partnership	Matched	31.481	31.472	0.02	0.983
	Unmatched	12.108	13.414	-7.15	0.000
	Matched	12.108	12.179	-0.36	0.716

Notes: Tests are based on the one-to-one nearest neighbor matching.

Appendix Table A.2.1(d) Test of Joint Equality of Means (Hotelling Test)

Sample	Pseudo R2	LR chi2	p>chi2
unmatched	0.241	3974.26	0.000
matched	0.002	12.76	0.621

Notes: Tests are based on the one-to-one nearest neighbor matching.

Appendix: Table A.2.2 Heckman Selection Model – Two-step Estimates for Wage at Wave 1, Longitudinal Survey of Immigrants to Canada (LSIC)

Step 1, Participation Selection Equation

Variable	Coefficient	SE
Principle applicant	0.098	(0.089)
Aged 24-34	0.537***	(0.090)
Aged 35-44	0.353***	(0.087)
Education 2, college, some university	-0.036	(0.112)
Education 3, University and above	-0.024	(0.102)
Fluency in English	0.137**	(0.061)
Fluency in French	-0.093	(0.108)
Number of children	-0.026	(0.034)
Partnership (married/common-law)	-0.269***	(0.093)
Spouse worked since arrival	0.506***	(0.065)
Housing owner	0.111	(0.093)
Family Class	0.160	(0.109)
Refugee	-0.926***	(0.116)
Chinese	-0.334***	(0.085)
South-Asian	0.308***	(0.086)
Black	0.069	(0.126)
Southeast-Asian	0.512***	(0.135)
Latin	0.040	(0.180)
West-Asian	-0.346***	(0.098)
Atlantic	0.130	(0.298)
Quebec	-0.327***	(0.097)
Prairies	0.321*	(0.184)
Alberta	0.170*	(0.093)
BC	-0.284	(0.078)
Constant	0.154	(0.164)

Step 2, Wage 1 Equation

Variable	Coefficient	SE
Log of working hours	0.838***	(0.035)
Relative near	-0.086***	(0.031)
Friend near	-0.020	(0.029)
Relative far	0.019	(0.050)
Friend far	0.109**	(0.044)
Principle applicant	0.103**	(0.043)
Foreign experience	-0.014**	(0.006)
Foreign experience square	0.028*	(0.015)

Variable	Coefficient	SE
Canadian experience (weeks worked since came to Canada)	-0.014**	(0.007)
Canadian experience square	-0.0005***	(0.0002)
Number of years schooling (before landing)	0.215***	(0.005)
Fluency in English	0.088***	(0.033)
Fluency in French	0.010	(0.055)
Mother tongue English/French	0.363***	(0.042)
Partnership (married/common-law)	-0.081**	(0.039)
Family Class	-0.075	(0.045)
Refugee	-0.533***	(0.081)
Visible Minority	-0.232***	(0.031)
Urban	-0.304***	(0.102)
Atlantic	-0.069	(0.148)
Quebec	-0.301***	(0.052)
Prairies	-0.110	(0.079)
Alberta	-0.018	(0.040)
BC	-0.093**	(0.040)
Constant	3.327***	(0.205)
Number of Observations	2557	
Censored Observations	848	
Uncensored Observations	1709	
Wald Chi2 (42)	1422.28	
Prob>chi2	0.000	
Mills (lambda)	0.296***	0.079
rho	0.542	
sigma	0.546	

Notes: Coefficients and standard errors presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in LSIC.

Appendix: Table A.2.3 Heckman Selection Model – Two-step Estimates for Wage at Year 1, Survey of Labor and Income Dynamics (SLID)

Step 1, Participation Selection Equation

Variable	Coefficient	SE
Age	-0.029	(0.085)
Age square	0.015	(0.108)
Education 2, above high school graduated and below university degree	0.258	(0.158)
Education 3, University degree and above	0.908***	(0.143)
Number of children	-0.067	(0.060)
Partnership (married/common-law)	1.028***	(0.178)
Housing owner	0.246	(0.144)
Other income	-0.021***	(0.003)
English as mother tongue	0.585**	(0.234)
French as mother tongue	0.716**	(0.285)
Quebec	-0.351	(0.238)
Prairies	-0.098	(0.180)
Alberta	-0.030	(0.182)
BC	0.205	(0.294)
Constant	0.947	(0.159)

Step 2, Wage 1 Equation

Variable	Coefficient	SE
Education 2, above high school graduated and university degree	0.080	(0.056)
Education 3, University and above	0.301***	(0.065)
Number of years schooling	0.019***	(0.006)
Experience (full-time full-year)	0.023***	(0.003)
Experience square	-0.022***	(0.003)
Partnership	0.071*	(0.043)
Visible minority	0.082	(0.119)
Atlantic	-0.219***	(0.064)
Quebec	-0.008	(0.043)
Prairies	-0.035	(0.043)
Alberta	0.086	(0.045)
BC	0.064	(0.057)
Constant	2.168***	(0.103)
Number of Observations	2259	
Censored Observations	76	
Uncensored Observations	2183	
Wald Chi2 (42)	270.93	

Table continued

Prob>chi2	0.000	
Mills (lambda)	-0.676***	0.198

Notes: Coefficients and standard errors are presented. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. The regression results are weighted using the cross-sectional weights in SLID.

Chapter 3

Immigrant and Canadian-born Family Migration and the Labor Supply Consequences of Women and Men

3.1 Introduction

Immigrants have played a significant role in the Canadian economy, but their contributions are not evenly distributed geographically. Studies show that new immigrants are more likely to live in large urban centers and less likely to move away (Nogle 1994; Edmonston 2002; Hou 2005; Schellenberg 2004). In Canada, over seventy percent of immigrants choose to live in Toronto, Vancouver and Montreal, the three biggest gateway cities. The spatial concentration of immigrants has raised public concerns (Hou 2004).

Many previous studies on immigration focus on male immigrants and their wage or earnings assimilation in the host country (e.g. Chiswick 1978; Borjas 1985, 1999; Duleep and Regets 1997). Recent studies have begun to analyze the 'family' unit and suggest that there is a relationship between family structure and assimilation (Long 1980; Duleep and Sanders 1993; Worswick 1996; Baker and Benjamin 1997). Since adult immigrants are more likely to be married than the adult Canadian population[1] and the 'family reunification' immigration class is based on family ties, the interactions between family

[1] According to Citizenship and Immigration Canada, on average, 68% (with 64% for men and 71% for women) of adult Canadian Permanent Residents are in the 'married' status from 1997 to 2006. The Canadian Census 2006 shows that 48% of Canadians are married.

members can be important factors when evaluating immigrants' performance and immigration policies.

Previous studies indicate that immigrants' income grows with the time of residence in the host country (Borjas 1999) and focus on measuring the economic assimilation of immigrants. There are few studies that investigate the process of assimilation, with some exceptions discussing the effect of English proficiency and age on economic assimilation (e.g. Chiswick and Miller 1995; Schaafsma and Sweetman 2001). The integration process in the host country can be viewed as a process of human capital investment. Receiving formal education and training, language learning and work experience accumulation are the most often addressed formats of human capital investment for immigrants. The process of labor mobility across labor markets after landing (also called secondary migration) is another human capital investment activity which can contribute to immigrants' career development, as well as the process of integration. Secondary migration, however, is less studied.

There are a few studies on immigrant internal migration in Canadian literature, but most of them focus on inter-provincial migration and analyze at a macro or individual level (e.g. Newbold 1996; Lin 1998; Edmonston 2002) rather than family level. The internal migration across labor markets for immigrants in Canada has received relatively limited attention, especially migration behavior and its effect on labor supply mobility in family and gender perspective, compared with Canadian-born. To my knowledge, there is no Canadian study on internal migration of immigrants investigating this phenomenon

from a family perspective. In previous studies on Canadian internal migration, interest is focused on individual inter-provincial migration and the potential earnings gains (Grant and Vanderkamp 1980; Robinson and Tomes 1982; Finnie 1999, 2001).

The objective of this study is to examine the family migration behavior of immigrants and Canadian-born and the consequences of labor supply for both men and women. The study of the internal migration for both Canadian-born and immigrants, especially visible minorities, is important because it can help us to understand the evolution of Canadian population systems, the assimilation process of immigrants and its effects on both national and local economies. The study results also have important policy implications, for both federal and provincial government perspectives.

This study tries to answer the following questions: Do immigrant families behave differently from Canadian-born families in their migration activity? Controlling for personal and family attributes such as age, education, and family income, what effect does family type[2] have on migration behavior? How is gender related to migration decision making? What is the difference in labor supply mobility between men and women? The predictions from human capital model of family migration might have limitations. Both native-born women and immigrant women may or may not necessarily suffer from family migration, for example experiencing post-migration unemployment, underemployment and/or reductions in wages.

The essay is organized as follows. The theoretical framework will be outlined in the

[2] Family types are immigrant families, in which both husband and wife are foreign born; mixed families, in which one member of the couple is foreign born and the other is native-born; and native families, in which both are native-born.

second section, and the method description and data are introduced in the third and forth section. In the third section, a migration model is outlined to examine the determinants of family migration and a model for analyzing the effect of migration on the annual working hours change for men and women is developed. The fifth section presents the empirical results. The sixth section concludes the essay.

3.2 Theoretical Framework

Migration, when looked at as an economic behavior, is attributed to economic factors, such as wage differentials, unemployment rate differentials, labor demand and supply, etc. Traditional migration literature ignores the gender aspects and assumes that men (or household head) implement migration and women just follow if a family migrates (see Greenwood 1997, for a literature review on migration). Migration has been viewed as an investment in human capital (Sjaastad 1962; Polachek and Horvath 1977). As new-comer, movers will invest in location specific human capital in their destination and gradually income would catch up with natives, but the speed of income improvement decreases with the time of residence (Borjas 1985).

The individual migration decision-making model developed by economists usually assumes that people make decisions about migration based on the expected costs and benefits of migration. If benefits are greater than costs, the individual migrates. Benefits are usually the increase in job-related income. The costs are moving costs and psychic costs. Such benefits and costs are generally analyzed in a lifecycle perspective. Young people are more mobile than elders because if they migrate they will have a longer period

to collect the gain from investment in migration. Immigrants face different costs and benefits of migration than native-born. They may be more mobile than the Canadian-born, because by human capital theory, immigrants have less location specific human capital, which reduces the migration cost. On the other hand, immigrants may be inclined to stay in their ethnic community for cultural reasons. Cultural factors like enclaves and social ties are important factors which will influence immigrants' migration behavior. (Trovato and Halli 1990; Frey and Liaw 2005)

For married couples, migration models based on individual level analysis ignore a spouse's effect on the migration decision. Family migration behavior differs from that for singles, because family migration involves complex trade-offs and bargaining interactions, not just personal cost and benefit comparison. Mincer (1978) was among the first to suggest that the modeling of migration decisions should take the whole family into consideration, which implies it is not appropriate to look at only males or the household-head. Here, the migration decision is based on the comparison of cost and benefits for the whole family. The implication of the family migration model is that a family may choose to migrate even though only one member gains (and/or others lose) from the migration. Only if one spouse's gains exceed the other spouse's losses, the family will relocate. Studies (Mincer 1978; Sandell 1977; Spitz 1984; Bielby and Bielby 1992, etc.) indicate that since wives are usually the secondary workers in the labor market, they are often the 'tied movers' and usually make sacrifices in their own earnings profile if they migrate. Mincer's (1978) model stated above is based on human capital theory and

argues that the family migration decision is based on the relative earning potentials of spouses, which means the decision making is egalitarian.

The gender-role model is an alternative explanation for family migration. The gender-role model focuses on how gender roles beliefs are the basis for migration decisions. Such decision making is not egalitarian (Bielby and Bielby 1992). Different families may have different beliefs in gender's role, especially families with different cultural backgrounds. The families with traditional beliefs concerning gender roles are mostly husband-dominant families. It is possible that husband-dominated families behave differently from egalitarian couple families.

Gendered understanding of the migration process is becoming more important after the family migration model. In much of the early literature on migration, the role of women is generally ignored. When analyzing the impact of gender on migration, previous studies generally treat gender as a dummy variable. During recent decades, we saw a great increase in the participation and employment attachment of women in the formal labor market. At the same time, the rate of family dissolution is also rising. One of the reasons behind this could be that women are more likely to choose a career rather than a traditional role in a family. The traditional family structure (of women taking a compromising and supportive role) would decline and the number of families with 'egalitarian' structure would increase. It is believed that wives also play a crucial role in causes, processes and consequences of family migration.

At the same time, the relocation strategies and behavior of dual earner families are

likely to become more complicated. The migration decision becomes a joint decision with intra-household bargaining and is based on compromise and forgone individual opportunities. Gemici (2007) presents a model allowing for the tradeoffs within a family when making employment and migration decisions. In the model, the possibility of divorce is an important factor in migration and labor market decisions. Costa and Kahn (2000) and Compton and Pollak (2007) investigate the family migration behavior of married couples, focusing on the effect of educational composition of couples on the migration patterns, that is, choosing different level (large, mid-size and small) of metropolitan areas in U.S.

Canadian studies about internal migration of immigrants indicate that immigrants and native-born respond similarly to the determinants of migration (Moore and Rosenberg 1995; Newbold 1996; Lin 1998; Edmonston 2002). Cultural needs may be important in internal-migration decision making for immigrants. Cultural factors, such as 'social ties', could motivate or impede internal migration (Trovato and Halli 1990; Frey and Liaw 2005). An immigrant is more likely to join his co-ethnic group if he is away and less likely to leave if he has stayed with or been close to his co-ethnic group. Since immigrants come with different cultural backgrounds, it is likely that the partnership within family is not the same. Facing a new environment, immigrants might stay away from their traditional culture and be more 'rational' in family decision making to maximize family benefit. Immigrant women are more likely to experience the role change in family and make them the heads of households. This study helps to understand how

immigrant status (including ethnicity), gender and employment interact in the process of internal migration and integration.

The 'family investment hypothesis' (FIH) is an important framework for investigating the labor market decision of immigrant couples, as first suggested by Long (1980). The model indicates that immigrant families usually face credit constraints upon arrival in the host country. Wives, as the 'secondary earner' in the family, undertake the "dead-end" jobs to finance their husband's human capital investment activities. The family investment hypothesis predicts that immigrant wives are likely to work more hours than comparable natives upon arrival but with a flatter earning-experience profile. The model, however, does not specify the husbands' labor market behavior in immigrant families.

Baker and Benjamin (1997) empirically test the family investment hypothesis using the Canadian Survey of Consumer Finance. They find evidence that immigrant women with an immigrant husband work more upon arrival and have flatter wage-experience profile compared with their counterparts who have a native-born husband. This suggests that immigrant wives in mixed immigrant families (immigrant wife and native-born husband) do not face a finance constraint problem and their labor supply and investment behavior is similar to native-born wives. They conclude that "family composition is an important correlate of immigrant assimilation." However, the estimated wage equation shows that wives in immigrant families and wives in mixed immigrant families experience similar assimilation profile in wages, which does not support the family

investment model. Blau, Kahn, Moriarty and Souza (2002) also do not find consistent evidence for the family investment hypothesis. Using the U.S. Census for 1980 and 1990, they find that both immigrant husbands and wives work and earn less upon arrival than comparable natives, and both husbands and wives experience similar positive assimilation profiles in working hours and wages.

It is likely that family migration decision, in a human capital investment perspective, is also associated with family types. An immigrant family's (both spouses are immigrants) migration behavior will be different from both mixed families (one spouse is immigrant and the other is native-born) and native families (both spouses are native-born). It is more likely that an immigrant family's migration decision is based on the husband's career development consideration, since under the family investment hypothesis wives usually have less chance to invest in human capital but take 'dead-end' job to finance their husband's human capital investment and support the family consumption. In this case, the husband is typically the lead-mover and the wife is the tied-mover. In contrast, in mixed immigrant families, without credit constraint, their migration decision making is more likely to be similar as that for native families. However, depending on family composition and cultural background, the migration decision for mixed families might be more complex.

As to the labor supply consequence of migration, it is likely that families make labor supply decisions for both spouses when families decide to migrate, and these two decisions are correlated. Previous studies indicate that family migration has a negative

effect on married women's employment, as well as labor-force participation, weeks worked and income (Long 1974; Sandell 1977; Lichter 1980; Spitze 1984; LeClere and McLaughlin 1997; Bailey and Cooke 1998; Lee and Roseman 1999; Cooke 2001). On the other hand, studies show that married men are generally unaffected and might benefit from migration(Cooke and Bailey 1996; Lee and Roseman 1999).

LeClere and McLaughlin (1997), however, suggest that the penalty from migration for women may be relatively minor, since women often experience interruptions and re-entry during their employment experience, such as childbirth and child-raising, and the labor market is structured to accommodate such interruptions. If married women make their decision to migrate with their family, the cost of migration may not be more costly than other forms of interruption. By including post-migration labor supply (hours worked per week and weeks worked) in the model for post-migration earnings, they find evidence that there is no wage penalty following migration, rather, a reduction in labor supply explains a large portion of the earnings loss.

Previous literature about internal migration of immigrants basically ignores the impact of migration on post-migration labor supply. A dummy variable indicating the immigrant status or racial status may be included in a model of employment based on the pooled sample of immigrants and native-born. To my knowledge, there is no Canadian literature systematically discussing the labor supply consequence of internal migration for married immigrants, in a family perspective, compared with that for native born. This study intends to fill this gap.

3.3 Modeling Strategies

The empirical model for family migration in this study is based on the human capital theory for migration and Mincer's family migration model (1978). The migration model takes the following form:

$$M^* = X\beta + u \quad (1)$$

$$M = 1 \text{ if } M^* > 0 \text{ and}$$

$$M = 0 \text{ if } M^* <= 0$$

where M^* is a latent variable and M is observed. X represents the explanatory variables and β is a vector of parameters to be estimated. The Xs include husband and wife's characteristics, family characteristics and regional specific characteristics. u is a random error term. A binary logit model is used to analyze the family migration behavior.

The effect of migration on annual total working hours for both men and women is examined. Of interest is the change in hours between pre-migration and post-migration. Most previous literatures on economic consequences of migration focus on the effect on earnings. Since changes in earnings are composed of changes in both working hours and wage rate, ignoring either of them may lead to the wrong conclusion. Thus, an analysis of hours will contribute to the conclusion about how earnings are affected by migration behavior. The equation for hours-change is specified as follows:

$$\Delta H = \alpha Z + \delta M + \varepsilon \quad (2)$$

where ΔH indicates the change in annual working hours for husband and wife respectively between t-1 (the year before migration, where year t is specified as the year

family migrates) and t+1(the year after migration). The change in hours is determined by explanatory variables Z, which include family and individual characteristics and M, which equals one if the family migrates and zero otherwise. α and δ are coefficients to be estimated and ε is the random error term. Since the sample of migrants and non-migrants are believed not to be randomly selected, if the equation (2) is estimated directly using OLS, results will be biased and inconsistent.

If the decision to migrate and the labor supply decision are correlated, the choice for migration is endogenous when analyzing its effect on the change in working hours. Migration is also a self-selective activity. When comparing the earnings between migrants and non-migrants, if there is a premium for migrants, the premium might not come from migration but the unobserved factors such as higher ability or/and motivations compared with those of non-migrants. Nakosteen and Zimmer (1980, 1982), Robinson and Tomes (1982) find evidence of migration self-selection in the earnings. A similar problem also applies to the relationship between working hours and migration.

To deal with the selectivity problem of migration, the treatment-effect model (Greene 2003) is used in this study, where migration's effect on change in hours is considered as a treatment effect and such 'treatment' is self-selected and endogenous. The treatment effect model is a variant of the two-step Heckman (1979) procedure. In this model, the error term ε in (2) and u in (1) are assumed to be normally distributed and have a bivariate normal distribution with correlation ρ. The expected change in hours for migrants and non-migrants can be written as

$$E(\Delta H \mid M=1) = Z\alpha + \delta + E(\varepsilon \mid M=1) = Z\alpha + \delta + \rho\sigma_\varepsilon \phi(X\beta)/\Phi(X\beta)$$

and $$E(\Delta H \mid M=0) = Z\alpha + E(\varepsilon \mid M=0) = Z\alpha - \rho\sigma_\varepsilon \phi(X\beta)/(1-\Phi(X\beta))$$

where $\varphi(.)$ is the standard normal probability density function and $\Phi(.)$ is the standard normal cumulative distribution function. $X\beta$ comes from the migration model of equation (1). The migration model can be estimated using the probit model, and $\varphi(X\hat{\beta})$ and $\Phi(X\hat{\beta})$ can be calculated for each observation. The difference between migrant and non-migrant in hours change is

$$E(\Delta H \mid M=1) - E(\Delta H \mid M=0) = \delta + \rho\sigma_\varepsilon [\frac{\phi(X\beta)}{\Phi(X\beta)(1-\Phi(X\beta))}]$$

For the whole sample, the hours-change equation can be estimated by

$$\Delta H = Z\alpha + \delta M + \rho\sigma_\varepsilon \lambda(X\hat{\beta}) + \omega \quad (3)$$

where the inverse mills ratio is $\lambda(X\beta) = \phi(X\beta)/\Phi(X\beta)$ for migrants and $\lambda(X\beta) = -(X\beta)/(1-\Phi(X\beta))$ for non-migrants, and ω is a normally distributed error term. $\rho\sigma_\varepsilon$ is a parameter to be estimated. The estimated δ is consistent after controlling for the selection effect of migration. If the estimated coefficient for λ is significant, the error terms u in migration equation (1) and ε in hours change equation (2) are correlated.

As to the specification of Zs in the hours-change equation, the factors that are expected to affect the change in working hours are included. A variant of the first-difference model is used, which can be expressed as

$$\Delta H = \kappa W_{t-1} + \eta \Delta Z' + \psi Z' + \delta M + \rho\sigma_\varepsilon \lambda(X\hat{\beta}) + \omega \quad (4)$$

where W_{t-1} refers to the wage rate at *t-1*, before migration. $\Delta Z'$ are the changes in family

characteristics or/and personal characteristics between t-1 (the year before migrate) and t+1 (the year after migrate), such as the change in number of children, the number of years schooling for both husband and wife and change in other income (family income less personal earnings). Z' represents the time-invariant and pre-migration characteristics of family and individual, like immigrant status, visible minority status, and language, which are expected to affect the labor supply decision. M, as stated above, is the family migration indicator and ω is a random error term. κ, η, δ and ψ are the parameters to be estimated. In this study, the changes in annual working hours from t-1 to t+1 are assumed to be a function of the wage at t-1, the changes in family and individual characteristics, the variables referring to family and individual characteristics at t-1 and migration indicator.

3.4 The Data and Variables

3.4.1 The Data

The empirical analysis is based on data from the Survey of Labor and Income Dynamics (SLID) master file. SLID is a longitudinal dataset of overlapping panels begun in 1993. Each panel lasts six years and every three years there is a new panel enrolled. The survey is conducted annually. The master SLID file has rich information on demographic and labor market activities. I use the currently available period from 1993 to 2004 to maximize the number of observations. The panel data are pooled into eleven two-year cross-sections for the migration model analysis. The pooled ten three-year cross sectional data was used in the hour-change model. Taking year t as the year of migration,

the year t-1 is the reference year in the migration model. Similarly, in the working-hour-change model, family migrates in year *t*, and so year t-1 is the reference year, and year t+1 is the year after migration. The comparison in hours (Δ H) is between t-1 and t+1. For this analysis, I use cross-sectional data, with overlapping observations for three year periods (1993-1995, 1994-1996, etc.). It may be preferable to use the full panel to analyze this question, however, there are too few observations on migrant to use this approach.

The main concern in this study is labor market related moves. Labor markets generally do not have the same boundaries as provincial administrative boundaries. Therefore, I define migration as the change of the family residence across CMAs or Employment Insurance Region (EIR)[3] from one year to the next. EIR is used for the administration of the employment insurance program from Human Resources Development Canada. Both CMAs and EIRs could be identified as labor market areas. Most of the CMAs are also EIRs. Since the migrations between non-CMAs cannot be captured by the change in CMA residence, such migrations are mostly captured by the changes in EIR residence. In SLID, every respondent reports their place of residence as of December 31 of a reference year and the same respondents report their place of residence in each of the following five years. This analysis does not separate those who

[3] According to SLID document, reference years prior to 1999 follow the 1991 Census geography-based boundaries. Reference years from 1999 and on follow the 2001 Census geography-based boundaries. The categories for this variable changed to incorporate the changes that occurred between the 1991 and 2001 Censuses.

migrated more than once from those who migrated once within the calendar year.

I choose the census family as the analysis unit. "Census family" corresponds to what is commonly referred to as a "nuclear family". In general, it consists of a married couple or common-law couple with or without children, or a lone-parent with a child or children. I only consider the families of married and common-law couples with or without children[4]. The couples in the family should be stable (remain married or in common law relationship) in the same household within the two/three-year period (corresponding to the migration model and working-hour model respectively). If the family migrates, the couples must migrate together. This can help us understand the true impact of family migration on women's careers. The individuals in the sample for the migration model analysis are limited to those aged 16 to 64. In the sample for hours-change model, individuals are aged 19 to 62 at the reference year. Full-time students and retired people during the period (t-1 and t in the migration equation, t-1, t and t+1 in the working-hours change equation) are excluded. Excluding those observations having missing values on major covariates, in the sample for migration analysis there are 81,963 couple-year observations with 3,149 observed migrants in the sample for migration model. In the model for hours change, the analysis is based on family members and each family is followed for three years. In total there are 47,429 observations on husbands/wives in the sample with 1,965 migrants.

In the analysis for family migration behavior, I examine how migration differs by

[4] Same-sex married couples are excluded.

family types. Following Baker and Benjamin (1997), the family types are immigrant families, in which both husband and wife are foreign born; mixed families (including immigrant-wife native-husband family and immigrant-husband native-wife family), in which one spouse is foreign born and the other is native-born; and native families, in which both are native-born. Over the whole sample for migration model (of 81,963 observations), there are 2,756 migrations over 69,112 observations on native families, 138 migrations over 3,054 immigrant-wife native-husband family observations, 139 migrations over 3,657 immigrant-husband native-wife family observations and 116 migrations over 6,140 immigrant family observations. In the sample for working-hour change analysis, since there are smaller number of family migrant observations in immigrant family and mixed family, the analysis unit is not based on family types but on men (native men, immigrant men and whole sample of men) and women (native women, immigrant women and whole sample of women). There are 42,106 observations on native born and 5,323 on immigrants in the sample of husbands, with 1,821 migrations for native born and 144 migrations for immigrants. There are 42,426 observations on native born and 5,003 on immigrants in the sample of wives, with 1,826 migrations for native born and 139 migrations for immigrants.

3.4.2 The Variables

The dependent variable in the migration model is a binary variable indicating "migrate or not" which is observed in year *t*. In the hour-change model, the change in annual total hours worked between t-1 and t+1 is the dependent variable.

The selection of independent variables is based on both previous literature and data availability. The independent variables in the migration model include family and spouses' characteristics, such as family income, family size, family type indicators[5], indicator for family member receipt of Employment Insurance (EI), indicator for family member receipt of social assistance (SA), indicator for school-age children, indicator for pre-school age children, home ownership indicator, urban indicator, age group indicators for both husband and wife, education level indicators for both husband and wife, mother tongue indicators for both husband and wife, indicator for visible minority status for husband and wife, work force participation status[6] indicator for husband and wife, strong attachment to labor market indicator[7] for husband and wife, indicator for either husband or wife having migration experience previously[8], regional indicators and year indicators. Attributes of the origin place, such as unemployment rate and housing price index[9] are

[5] The choice to belong to different family types might be endogenous in the family migration model, since, for example, the people who choose to intermarry might be more likely to invest in human capital, including internal migration. In this study, for simplicity, it is regarded as exogenous. Meng and Gregory (2005) address the relationship between intermarriage and assimilation. They take the 'endogamous marriage' and 'exogamous marriage' as exogenous and endogenous variables in the earnings equation respectively and they find that the premium of intermarriage is not a reward for unobserved individual characteristics. Natives who intermarry do not receive the premium. If there is a strong correlation between earnings and human capital investment, the above study can help relieve the concern of endogeneity problem between family type and internal migration. The authors of the study state that there is no well-defined economic literature discussing the choice between an endogamous or exogamous marriage. Furthermore, suitable instruments for intermarriage cannot be found in the SLID.

[6] Work force participation is defined as greater than zero total hours paid at all jobs in reference year. Since the variable 'total hours paid all jobs' has many missing values, the variable 'annual labor force status' is used to help define the 'work force participation indicator. If the variable 'annual labor force status' indicate that the respondent 'unemployed all year' or 'not in labor force all year', the respondent is defined as not participated. If the 'annual labor force status' indicate the respondent 'employed all year', the respondent is defined as participated.

[7] Strong attachment to labor market is defined as greater than 50 weeks being employed in the reference year.

[8] Studies indicate that whether or not an individual moved previously will greatly influence the propensity to move contemporarily, so a variable that indicates whether either husband or wife moved before is included. Including such a variable could weaken the endogeneity problems (Compton and Pollak 2007). In SLID, there is a variable indicating the province (in Canada) where the respondent received his/her elementary education. This variable was used as a proxy for the respondent's home province. If the current province of residence is different from the home province, the corresponding respondent is defined as 'having previous move experience'. For immigrants who did not receive their elementary education in Canada, there is no information available to indicate whether they moved after having immigrated to Canada, prior to entering the survey.

[9] Unemployment rate and housing price index refer to the unemployment rate and housing price index (1997 price as

also included. All independent variables are measured at year t-1, when the decision to migrate is assumed to be made.

In the hours-change model, the change in the number of working hours from t-1 to t+1 is analyzed for wives and husbands separately. The independent variables include wage (imputed[10]) for both husband and wife at t-1, change in the number years schooling from t-1 to t+1 for husband and wife, change in the number of children from t-1 to t+1, change in other income[11] from t-1 to t+1, the age and age square for husband and wife, the number of years of schooling for husband and wife, indicators of mother tongue language for husband and wife, immigrant status indicator, visible minority indicator, other income, indicator for having pre-school age children, indicator for having school-age children, urban indicator, indicator for MTV, regional indicators and year indicators. Except for explanatory variables that describe the situation (education, children and other income) changes from t-1 to t+1, all other explanatory variables are measured at t-1, the pre-migration situation.

---

the year of reference) of the origin at the reference year (t-1). Since I was unable to obtain unemployment rates for all the years (1993-2002) in all the regions (145 CMAs or 66 EI regions from SLID), the available annual unemployment rates for 73 of the CMAs from 1993-2002 are used. For other CMAs, provincial annual unemployment rates are used. The available 24 CMAs' annual housing price indexes (1997 as the reference year) are used, and the provincial annual housing price indexes are used for other CMAs.

[10] The wage is imputed by a Heckman two step procedure considering the selectivity of labor force participation. The dependent variable in the wage equation is the composite wage provided in SLID. The independent variables in the wage equation include experience, experience square, number of years schooling, weekly hours, weeks paid per year, immigrant status indicator, year indicator and regional dummy variables. The wage at t-1 is imputed for men and women respectively. The dependent variable in the labor force participation equation is an indicator for whether the respondent reports a wage, and the independent variables are individual's education, age, age square, having pre-school age children indicator, having school-age children indicator, other income, immigrant status indicator, visible minority status indicator, urban indicator, year indicator and regional dummy variables.

[11] Other income is calculated as family income minus personal earnings.

Table 3.1 Descriptive Statistics: Migration Rates by Different Family Characteristics

A. By Joint Education Level	Total	Native Families (NF)	Immigrant Families (IF)
Both Have Postsecondary Certificate	4.15%	4.31%	2.07%
Only Husband Has Postsecondary Certificate	4.10%	4.28%	2.41%
Only Wife Has Postsecondary Certificate	3.96%	4.06%	2.51%
Neither Has Postsecondary Certificate	3.54%	3.65%	1.72%
B. By Joint Employment Status			
a. By Labor Market Attachment Status			
Both Strongly Attached to Labor Market	3.16%	3.32%	1.24%
Only Husband Strongly Attached to labor Market	4.72%	4.82%	2.69%
Only Wife Strongly Attached to labor Market	4.33%	4.41%	2.08%
Neither Strongly Attached to labor Market	5.52%	5.58%	3.75%
b. By Work Force Participation Status			
Both Participate in Work Force	3.73%	3.90%	1.58%
Only Husband Participates in Work Force	4.36%	4.42%	2.82%
Only Wife Participates in Work Force	3.23%	3.30%	1.94%
Neither Participates in Work Force	3.32%	3.38%	2.00%
C. By Family Types			
Native family (NF)	4.05%		
Only-wife immigrant family (M_WIF)	4.78%		
Only- husband Immigrant (M_HIF)	3.92%		
Immigrant family (IF)	2.07%		

Notes: The data source is from SLID master file 1993-2004.

3.4.3 Descriptive Statistics

Table 3.1 presents the descriptive statistics for migration rates by different characteristics of the couples. Based on joint education level (panel A), the families with both spouses having postsecondary certificate have the highest migration rate of 4.15%. If only husband has postsecondary certificate, the family migration rate is 4.10%, close to that if both have postsecondary certificate. If neither has postsecondary certificate, the migration rate is the lowest at 3.54%. The statistics indicate that, as is case for individuals,

the migration rate for more educated couples is higher than lower educated. Since the above statistics are based on the whole sample aged 16 to 64, the distinction in migration rate is averaged among age-groups and is not as large as the statistics based on sub-age group like 16-35. Surprisingly, the migration rate for the immigrant family if only wife has postsecondary certificate is higher than that if only husband has postsecondary certificate. The regression results of the family migration model (table 3.3) indicate that the education level is significant in the regression for native families, but is not significant for immigrant families.

Panel B presents the migration rate by joint employment status. For the whole sample, if only husband is strongly attached to the labor market, the migration rate is higher than those if only wife is strongly attached (4.72% vs. 4.33%). If both are strongly attached, the migration propensity is low (of 3.16%), since moving costs are high if both spouses quit their jobs and migrate. Comparatively, when both are not strongly attached, the probability of migration is relatively high at 5.52%. The statistics indicate that wife is more likely to be the 'tied mover' if not strongly attached to labor market and husband is more likely to be the 'tied stayer' if only wife is strongly attached to labor market. The statistics for immigrant family have a similar structure as those for native family, but at a lower level.

By work force participation status, the migration rate for families in which only husbands participate is the highest. If only the wife participates, the migration rate is much lower, as is the case if both spouses are non-participants. Families in which 'neither

participates in work force' have the lowest migration rate.

On the whole, the immigrant families (IF) are the least mobile. 'Immigrant-wife native-husband' families (M_WIF) have the highest migration rate and the rate for native family (NF) and 'immigrant-husband native-wife' family (M_HIF) is similar.

Appendix Table A.3.1 presents the mean of the variables for both migrant and non-migrant, separately for four different types of families. It shows that internal migrants generally are younger and more educated than non-migrants. Couples in immigrant families (IF) are older than couples in other family types, for both internal migrants and non-migrants. For the internal migrant families, the immigrant spouses of mixed-immigrant families (MIF) and immigrant families (IF) stay a relatively shorter period in Canada than those in non-internal -migrant families. Immigrant families (IF) are more likely to live in MTV and urban areas compared with other types of families. For all types of families, internal migrants are usually from non-MTV areas.

Panel B presents the statistics of variables: annual hours, changes in hours, changes in number of children, change in years of schooling, and change in other income, which is based on the sample of hour-change model. The figure shows that the changes in mean total annual hours are positive for both native and immigrant women of non-migrants. Female migrants experience a decrease in hours worked. The reduction in hours worked for immigrant women is higher than that for native born.

3.5. Regression Results

3.5.1 Regression Results of Family Migration Model

Table 3.2 and Table 3.3 present the results for the family migration model. The coefficients are presented as odds ratios. Table 3.2 shows the results for the pooled sample of native family (NF), mixed immigrant family (MIF) and immigrant family, where immigrant family (IF) and mixed immigrant family (MIF) are indicated by dummy variables. Table 3.3 shows the results for the native family sample, immigrant family sample, mixed family sample and combined mixed and immigrant family sample respectively.

In Table 3.2 column A, the dummy variables indicating 'immigrant family' and 'mixed immigrant family' are used in the model and there are no interactions between the above dummy variables with explanatory variables, so only the intercept differs across native families, immigrant families and mixed immigrant families. In Column B and Column C, interactions between family type dummy variables and explanatory variables are included except year and regional indicators, assuming that the period and regional effect are common to immigrants and native born. By this technique, I can find whether there is difference in the probability of migration across family types, allowing for structural difference in the determinants of migration.

Table 3.2 Selected Results of Family Migration Model (Probability of Family Migration), Pooled Sample

Variables	(A)	(B)	(C)
Immigrant family (IF)	0.911	0.866	0.916
	(0.137)	(1.735)	(1.841)
Mixed immigrant family (MIF)	1.201**	0.789	
	(0.100)	(0.911)	
Immigrant-wife native-husband family (M_WIF)			1.105
			(1.313)
Immigrant-husband native-wife family (M_HIF)			0.530
			(0.625)
Visible minority family (both spouses are visible minority) (VF)	0.952	1.216	1.210
	(0.191)	(0.260)	(0.260)
Mixed visible minority family (one spouse is visible minority) (MVF)	1.241	1.329*	
	(0.184)	(0.198)	
Only-wife-visible-minority family (M_WVF)			0.950
			(0.234)
Only-husband-visible-minority family (M_HVF)			1.748***
			(0.315)
Postsecondary certificate and above (wife)	1.226***	1.213***	1.229**
	(0.083)	(0.084)	(0.086)
High School Graduated, Some postsecondary (wife)	1.126*	1.124*	1.140*
	(0.076)	(0.079)	(0.080)
Postsecondary certificate and above (husband)	1.183***	1.170***	1.157**
	(0.069)	(0.070)	(0.069)
High School Graduated, Some postsecondary (husband)	1.040	1.018	1.008
	(0.065)	(0.065)	(0.065)
Strongly attached to labor market (wife)	0.611***	0.616***	0.616***
	(0.035)	(0.038)	(0.038)
Strongly attached to labor market (husband)	0.736***	0.733***	0.735***
	(0.047)	(0.050)	(0.049)
Work force participation (wife)	1.159**	1.203***	1.202***
	(0.078)	(0.086)	(0.086)
Work force participation (husband)	1.329**	1.365***	1.364***
	(0.149)	(0.164)	(0.164)
MTV (Montreal, Toronto, Vancouver)	0.314***	0.403***	0.402***
	(0.037)	(0.053)	(0.053)
MTV*immigrant family (IF)		0.266***	0.272***
		(0.103)	(0.106)
MTV*mixed immigrant family (MIF)		0.593	0.593
		(0.203)	(0.204)
Urban	0.793***	0.823***	0.824***
	(0.035)	(0.038)	(0.038)
Urban*immigrant family (IF)		0.481***	0.472***

Variables	(A)	(B)	(C)
		(0.126)	(0.124)
Urban*mixed immigrant family (MIF)		0.806	0.814
		(0.140)	(0.141)
Family member receipt SA	0.727***	0.736***	0.737***
	(0.084)	(0.085)	(0.085)
Homeowner	0.426***	0.441***	0.441***
	(0.026)	(0.029)	(0.029)
Family member migrated previously	1.827***	1.833***	1.831***
	(0.096)	(0.104)	(0.104)
Unemployment rate	0.921***	0.918***	0.918***
	(0.009)	(0.009)	(0.009)
Unemployment rate*immigrant family (IF)		1.206***	1.205***
		(0.057)	(0.058)
Unemployment rate*mixed immigrant family (MIF)		1.078**	1.076**
		(0.035)	(0.035)
Sample size	81,963	81,963	81,963
Wald Chi2	5895.95	5964.41	5963.59
Pseudo R^2	0.228	0.232	0.232
Prob >Chi2	0.000	0.000	0.000
Wald coefficient tests (prob> χ^2)			
IF=MIF	0.075	0.966	
IF=M_WIF			0.933
IF= M_HIF			0.808
M_WIF = M_HIF			0.106
VF=MVF	0.279	0.726	
VF=M_WVF			0.455
VF= M_HVF			0.182
M_WVF= M_HVF			0.044
IF=VF	0.879	0.866	0.890
MIF =MVF	0.856	0.650	

Note: Odds ratios are presented. Standard errors are in parentheses. Other variables included in the estimation are age group dummy variables for husbands and wives, language dummy variables for husbands and wives, pre-school age children indicator, school age children indicator, family size, family income, receiving EI indicator, housing price index, interactions of YSM and family types, regional dummy variables and year dummy variables. The estimation of column B and C also include interactions of explanatory variables and family type indicators that are not presented. The full results are presented in Appendix Table A.3.2. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level. Standard errors are adjusted for clustering on census family identifier.

The results from Column A suggest that the overall migration propensity for

immigrant families is not statistically significant different from that for native families. It seems that mixed immigrant family is significantly more mobile than native family, conditionally on the assumption that there's only an intercept difference across the family types. The dummy variables of minority family status are not significant.

Most of the results in Table 3.2 column A follow the prediction of human capital theory on migration. The results indicate that both husband and wife's age significantly affect the propensity to migrate. Spouses in younger ages are more mobile than those in older ages. Both spouses' education significantly affects the family migration probability. The probability of migration for spouses both or either having a post-secondary certificate is significantly higher than those having a lower education level.

The results in column A show that the work force status for both spouses significantly affects the probability of internal migration. If husband and/or wife is strongly attached to the labor market, the migration probability is significantly lowered. Controlling for husbands' labor market attachment status, if wives change their attachment status from non-strong attachment to strong attachment, the migration probability is lowered by around 39%, whereas, if husband experience a similar change, the family migration probability is lowered by around 26%. It indicates that if the wife is highly employed, the husband is more likely to be a 'tied stayer', which is suggested by Mincer (1978). The coefficient for work force participation status shows that if husbands and/or wives work, the probability of migration significantly increases and husbands' participation status has a stronger effect. If husband changes from non-participant to

participant, controlling for wife's participation status and other characteristics, the probability of family migration will increase by about 33%. Whereas, a similar change by wife will lead to a 16% increase.

For those who live in MTV, the propensity to migrate is 69% lower than those in non-MTV area. Likewise, for residents of urban areas, the propensity to migrate is about 24% lower than residents of rural areas. If a family member received Social Assistant (SA) benefits in the reference year, the family migration probability is significantly lowered. Studies show that previous migration experience affects the migration probability contemporarily. The estimation result indicates that if a family member has migration experience, the chance of family migration is 81% greater than if no family member has migrated before.

The Wald coefficient tests for equality of the coefficients are presented at the bottom of Table 3.2. The results indicate that the equality of the coefficient for immigrant family (IF) and mixed immigrant family (MIF) is rejected at a 90% confidence level, which indicates that the probability of migration between immigrant family and mixed immigrant family is significantly different. The equality of coefficient of mixed immigrant family (MIF) and mixed visible minority family (MVF, where one spouse is visible minority and one is non-visible minority) cannot be rejected at a conventional confidence level, either the equality of visible minority family (VF, where both spouses are visible minority) and mixed visible minority (MVF) coefficients.

Column B presents the estimation results after I added the interactions between

family types (immigrant family and mixed immigrant family) and the explanatory variables, taking native family as the reference group. For simplicity, I only present the results of the interactions that are significant for at least one family type. After adding the interaction terms, the coefficient of mixed family indicator which is significant in model A, is insignificant indicating that the propensity to migrate for mixed immigrant families is not significantly different from that for native families.

Most estimation results in column B are similar to those in column A, since most of the interactions between family type indicators and explanatory variables are not statistically significant, but there are some exceptions. The coefficient of interaction between MTV and immigrant family indicator is statistically significant at a 99% confidence level, implying that immigrant families living in MTV area are least likely to migrate compared with native families and mixed families. The probability is lowered by 26.6% compared with that for native families. The probability of migration for mixed families living in MTV is not statistically significantly different from that for native families. Similarly, immigrant families living in urban areas are significantly less likely to migrate within the family types.

A noteworthy finding from the interactions between unemployment rate and family types is that immigrant families living in area with relatively high unemployment rate are more likely to migrate away, and similar results are derived for mixed families but with a smaller coefficient. These findings indicate that immigrant families and mixed immigrant families are more sensitive to the variations in regional employment situations and their

migration activities can facilitate the regional economy adjustment. Native families, in contrast, are not pro-cyclical responsive to regional employment changes and are more likely to stay when facing high unemployment. The study by Newbold (1996) suggests that foreign-born migrants behave in an economically rational way. He finds that immigrants choose to live in the provinces that have high income levels and employment growth rates and leave the provinces with high unemployment rates.

The Wald tests in Column B show the coefficient equality between 'immigrant family' (IF) and 'mixed immigrant family' (MIF) cannot be rejected at the conventional confidence level. The equality of the coefficients of 'mixed immigrant family' (MIF) and 'visible minority family' (VF) cannot be rejected either. The results in model B indicate that in general there is no statistically significant difference in the probability of migration across different family types when allowing for the effect of explanatory variables to differ among those family types. In a study on inter-provincial migration of Canadian immigrants and native-born, Lin (1998)[12] concludes that there is no statistically significant structural differences in the determinants of inter-provincial migration between the two groups by using the interactions of determinants with 'immigrant' dummy variable, even though he finds that on a whole immigrants are less mobile inter-provincially based on descriptive statistics.

In column C, the 'immigrant-husband native-wife' family (M_HIF) and 'immigrant-wife native-husband' (M_WIF) indicators replace the 'mixed immigrant family'

[12] The data used for empirical estimation is the 1988-1990 longitudinal person-file of the Labor Market Activity Survey (LMAS).

(MIF) indicator in column B and the 'only-wife-visible-minority family' (M_WVF) and 'only-husband-visible-minority family' (M_HVF) indicators replace the 'mixed visible minority family' (VF) indicator. All other variables are the same as those in model B.

The results in column C confirm the conclusion from column B that when holding all else constant the probability of migration of immigrant families is not significantly different from that for mixed immigrant families and native families. The probabilities of migration between the two types of mixed families are not significantly distinguishable. The coefficient of 'only-husband-visible-minority family' (M_HVF) dummy variable is positive and significant, which indicates that this family type is more mobile than native families. All other estimation results from column C are similar to those in column B.

The comparison on the migration propensity among family types is made using the results in Table 3.2. Table 3.3 presents the results based on a sub-sample of immigrant families, native families and mixed families. The estimation results can be used to analyze the migration propensity of visible minorities within each family group and provide detailed information on structural differences in the determinants of migration.

Table 3.3 Selected Results of Family Migration Model (Probability of Family Migration), Native Family Sample, Immigrant Family Sample, Mixed Family Sample and Immigrant and Mixed Family Combined Sample

Variables	Native Family A	Immigrant Family B	Mixed Family C
Immigrant-husband native-wife family (M_HIF)			0.851
			(0.138)
Visible minority family (VF)	0.926	1.409	0.510
	(0.426)	(0.369)	(0.370)
Mixed visible minority family (MVF)		2.291*	
		(0.976)	
Only-wife-visible-minority family (M_WVF)	0.410*		1.450
	(0.200)		(0.446)
Only-husband-visible-minority family (M_HVF)	1.411		2.082***
	(0.354)		(0.585)
Postsecondary certificate and above (wife)	1.229***	0.924	1.084
	(0.089)	(0.294)	(0.271)
High School Graduated, Some postsecondary (wife)	1.121	0.668	1.116
	(0.082)	(0.215)	(0.280)
Postsecondary certificate and above (husband)	1.162**	1.662	1.066
	(0.072)	(0.591)	(0.248)
High School Graduated, Some postsecondary (husband)	1.033	1.776*	0.868
	(0.068)	(0.619)	(0.216)
Strongly attached to labor market (wife)	0.610***	0.395***	0.609**
	(0.038)	(0.116)	(0.119)
Strongly attached to labor market (husband)	0.730***	0.554*	0.887
	(0.050)	(0.174)	(0.205)
Work force participation (wife)	1.201**	1.184	0.954
	(0.086)	(0.374)	(0.205)
Work force participation (husband)	1.359**	1.407	1.078
	(0.167)	(0.626)	(0.406)
MTV	0.396***	0.112***	0.249***
	(0.053)	(0.040)	(0.081)
Urban	0.819***	0.394***	0.741*
	(0.039)	(0.104)	(0.118)
Family member receipt SA	0.728**	0.577	0.919
	(0.092)	(0.265)	(0.356)
Homeowner	0.434***	0.322***	0.400***
	(0.029)	(0.092)	(0.072)
Family member moved previously	1.845***	2.708**	1.656***
	(0.107)	(1.173)	(0.249)
Unemployment rate	0.911***	1.134*	1.051
	(0.009)	(0.075)	(0.046)

Sample size	69,112	6,140	6,711
Wald Chi2	5415.61	339.62	417.91
Pseudo R^2	0.238	0.229	0.191
Prob >Chi2	0.000	0.000	0.000
Wald coefficient tests (prob> χ^2)			
VF=MVF		0.269	
VF=M_WVF	0.227		0.171
VF=M_HVF	0.421		0.064
M_WVF= M_HVF	0.024		0.341

Note: Odds ratios are presented. Standard errors are in parentheses. Other variables included in the estimation are age group dummy variables for husbands and wives, language dummy variables for husbands and wives, pre-school age children indicator, school age children indicator, family size, family income, receiving EI indicator, housing price index, interactions of YSM and family types, regional dummy variables and year dummy variables. The full results are presented in Appendix Table A.3.3. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level. Standard errors are adjusted for clustering on census family identifier.

Column A is the regression for native family sample. The result of the variable 'only-wife-visible-minority' (M_WVF) indicates this native family type has a lower migration propensity compared with those native families without visible minorities. Most estimation results are similar between Table 3.3 column A and column B. Column B reports the results for immigrant family sample. The migration propensity of visible minority families is not significantly different from that for non-visible minority families. It is found that wife's education is not important for family migration decision among immigrant families. However, wife's work force status plays an important role on family migration probability. Strong attachment to the labor market by wives significantly deters migration.

Column C provides the results based on mixed family sample. The results confirm the conclusion that the probability of migration between the two mixed family types is

not significantly different. The 'only-husband-visible-minority families' (M_HVF) within this group are more mobile than the families in which husbands are non-visible minority. The Wald test result suggests that the coefficients of 'visible minority family' (VF) and 'only-husband-visible-minority family' (M_HVF) are different.

Across columns A to C, the coefficients of MTV are significant with immigrant families sample the smallest, implying that in general the families living in MTV are less mobile than those in other areas. Immigrant families, in particular, are least likely to migrate away from the area. Since a greater proportion of immigrant families live in MTV, the low mobility of such group might contribute to the slower assimilation process of recent immigrants into the labor market.

3.5.2 Fairlie Decomposition—Extension of the Blinder-Oaxaca Decomposition

Using the migration model, we can identify some factors leading to migration probability difference between family types by using family-type dummy variable and the interactions between family type dummy variable and explanatory variables. To further examine the difference between family types in migration probability, the decomposition technique is used, which can provide more detailed explanation such as the contribution of explanatory variables to the gap in migration rate.

The Blinder-Oaxaca decomposition is a commonly used technique to identify the cause of differences between groups, such as gender and racial differences (or gaps) in outcome like income. The difference can be decomposed into "endowment" difference and "coefficient" difference, which is explained and unexplained respectively. However,

Fairlie (2005) argues that a problem will arise if using the Blinder-Oaxaca decomposition technique directly when the outcome is binary and the coefficients are from a logit or probit model. Under a linear model, the Blinder-Oaxaca decomposition of the difference in average migration probability $\overline{Y}$ between immigrant family and native family can be written as

$$\overline{Y}^I - \overline{Y}^N = (\overline{X}^I - \overline{X}^N)\hat{\beta}^I + \overline{X}^N(\hat{\beta}^I - \hat{\beta}^N)$$

Where $\overline{X}^I$ and $\overline{X}^N$ are the average of the explanatory variables and $\hat{\beta}^I$ and $\hat{\beta}^N$ are the estimated coefficients based on immigrant family sample and native family sample respectively. The above equation cannot be used directly if the model is non-linear, since $\overline{Y}$ does not necessarily equal $F(\overline{X}\hat{\beta})$ (Fairlie 2005). If the linear model was used to estimate the binary outcome, the average outcome value could be beyond 1 or be negative, which is impractical. There are a few authors providing the technique of decomposition under non-linear models (Gomulka and Stern 1990; Bartus 2004; Fairlie 2005). The technique provided by Fairlie (2005) can be used to compute the decomposition of binary outcome differentials and also the contribution of explanatory variables (X) to the explained outcome differentials.

Table 3.4 Decomposition of Immigrant Family/Native Family Differences in Migration Probability

	Specification (Sample Used for Coefficient)		
	Native Family	**Immigrant Family**	**Native/Immigrant Family Pooled**
Native family migration probability	0.0398	0.0398	0.0398
Immigrant family migration probability	0.0189	0.0189	0.0189
Difference	0.0209	0.0209	0.0209
Contributions of difference			
Strongly attached to labor market (wife)	-0.0017*** (-8.1%)	-0.0054* (-25.8%)	-0.0018*** (-8.6%)
	(0.0003)	(0.0028)	(0.0003)
Strongly attached to labor market (husband)	-0.0005*** (-2.4%)	-0.0018(-8.6%)	-0.0005*** (-2.4%)
	(0.0004)	(0.0015)	(0.0001)
Work force participation (wife)	0.0009** (4.3%)	0.0013 (6.2%)	0.0008** (3.8%)
	(0.0004)	(0.0032)	(0.0004)
Work force participation (husband)	0.0004*** (1.9%)	0.0001 (0.5%)	0.0004** (1.9%)
	(0.0001)	(0.0016)	(0.0002)
Age (wife)	0.0012*** (5.7%)	-0.0001 (0.5%)	0.0011*** (5.3%)
	(0.0003)	(0.0031)	(0.0003)
Age (husband)	0.0007** (3.3%)	0.0026 (12.4%)	0.0008** (3.8%)
	(0.0003)	(0.0034)	(0.0003)
Education (wife)	0.0004*** (1.9%)	-0.0002 (0.96%)	0.0004*** (1.9%)
	(0.0001)	(0.0010)	(0.0001)
Education (husband)	-0.0001** (-0.5%)	-0.0006 (-2.9%)	-0.0002*** (-0.9%)
	(0.0001)	(0.0006)	(0.0001)
MTV	**0.0053*** 25.4%)**	**0.0071*** (33.9%)**	**0.0056*** (26.8%)**
	(0.0005)	(0.0018)	(0.0004)
Urban	0.0010*** (4.8%)	0.0059*** (28.2%)	0.0011*** (5.3%)
	(0.0002)	(0.0020)	(0.0002)
Unemployment rate	-0.0044*** (-21%)	0.0066 (-31.6%)	-0.0042*** (-20.1%)
	(0.0006)	(0.0041)	(0.0006)
Moved previously	0.0033*** (15.8%)	0.0065* (31.1%)	0.0033*** (15.8%)
	(0.0003)	(0.0038)	(0.0003)
Homeowner	-0.0018*** (-8.6%)	-0.0032*** (-15.3%)	-0.0020*** (-9.6%)
	(0.0002)	(0.0011)	(0.0002)
Other family Characteristics	0.0072*** (34.4%)	0.0039 (18.6%)	0.0078*** (37.3%)
	(0.0025)	(0.0047)	(0.0019)
Year dummy	0.0012*** (5.7%)	0.0089*** (42.5%)	0.0023*** (11%)
	(0.0002)	(0.0018)	(0.0002)
Location dummy	0.0043*** (20.6%)	0.0041 (20.1%)	0.0040*** (19.7%)
	(0.0008)	(0.0039)	(0.0007)
All included variables explained	0.0168 (80.2%)	0.0198 (94.6%)	0.0187 (89.5%)

Notes: Standard errors are reported in parentheses below the coefficients. The percentages of contribution are reported beside the coefficient. The decomposition is implemented by STATA program "fairlie" by Fairlie (2006). The samples used for decomposition are the same as the sample of regression based on native families and immigrant families of Table 3.2 and Table 3.3. Other family characteristics includes the variables indicating whether having school-age children, pre-school age children, receiving social assistance, receiving employment insurance, and family size and family income.

The logit regressions are estimated using three samples—native family sample, immigrant family sample and pooled immigrant and native family sample. The decomposition can be performed by using the estimated coefficients from different samples, which has a similar effect as the weight setting in the Blinder-Oaxaca decomposition technique. The results from the native family specification and pooled specification are similar and have a higher significance level than those from the immigrant family specification. The explanation below uses the decomposition results from the pooled specification.

The difference between the immigrant family and native family in migration probability is 0.0209. The largest factor explaining the difference is living in MTV, contributing to 26.8% (from the results based on pooled sample) of the explained difference. The lower average migration probability of immigrants is strongly and greatly explained by the low migration propensity of the immigrant residents living in MTV. A big part of the explanation for the lower average migration rate of immigrants can also be attributed to the fact that immigrants are more likely to live in MTV and MTV residents are less likely to migrate.

The coefficients of the factors like couple's labor market attachment status, unemployment rate and home ownership are negative, indicating that the gaps in the above factors actually favor the immigrant families. Recall that from the regression analysis, it is found that immigrants families in areas of high unemployment rate are more likely to migrate, compared with native families. The factor of family characteristics (including having children, receiving social assistance, family size, family income) also explains a big portion of the difference, accounting for 37% of the difference. Other factors like previous migration experience and location indicators also contribute a considerable amount (15.8% and 19.7% respectively) of the difference and the coefficients are significant, which is in line with the regression results in Table 3.2 and Table 3.3. The factors like education, labor force status and work force status can explain a relatively small portion of the difference. The results indicate that the variables included in the model can explain over eighty percent of the difference.

Having analyzed the differences in migration probabilities and the factors that contribute to it, we now turn to the analysis of changes in hour worked and migration.

3.5.3 Regression Results of Working-Hours Change Model

The statistics in Appendix Table A.3.1 indicate that on average women who migrated experience an annual working hours reduction from t-1 to t+1, while women who did not migrate experience an increase in the number of hours worked. For men on average, both internal migrants and non-migrants reduced their number of hours worked, but those who migrated reduce by a smaller amount. Both immigrant men and women who migrated

reduce a greater number of annual hours compared with native migrants.

The OLS and treatment-effects models are used to estimate the hours change equation (4). Appendix Table A.3.4 presents the results of OLS estimation, where 'family migration' indicator is treated as exogenous. Appendix Table A.3.4 reports the results for husbands and wives respectively and also the results for sub-sample of native-born and immigrants[13]. Across column A to C, the regressions for men, the coefficients for 'family internal migrant' are insignificant.

The above analysis by OLS treats family migrants as exogenous. The estimation results may be biased since the selectivity of migration is considered endogenous. The treatment-effects model[14] is used in this study to resolve the problem of endogeneity on migration selectivity. The results for husbands are presented in Table 3.5 and Table 3.6 reports the results for wives. Since the first step of migration equation estimation is similar to the mode used for migration decision analysis, the results of first step are not presented.

[13] I do not divide the immigrant sample by family types due to the relative small number of observations for immigrants.
[14] The estimation results of treatment-effects model are derived by using the 'treatreg' command in STATA.

Table 3.5 Selected Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Husbands

Variables	Husbands (whole sample)	Husbands (native-born)	Husbands (immigrants)
Wage at t-1 (husband)	38.132***	39.039***	31.782***
	(2.674)	(2.838)	(7.989)
Wage at t-1 (wife)	-7.217***	-7.160***	-10.118***
	(1.215)	(1.295)	(3.511)
Family internal migrant (migrated at year t)	282.973***	227.929**	382.053*
	(73.779)	(78.951)	(229.728)
Δ children (change in number of children)	29.904***	30.030***	-0.206
	(8.162)	(8.217)	(23.805)
Δ children*immigrant	-29.272		
	(23.485)		
Δ education (husband, change in number of years schooling)	-34.022	-34.180	-35.817
	(23.248)	(23.254)	(59.224)
Δ education *immigrant (husband)	-1.244		
	(66.813)		
Δ education (wife, change in number of years schooling)	0.844	0.765	114.054*
	(20.339)	(20.343)	(61.536)
Δ education *immigrant (wife)	105.795		
	(65.276)		
Δ other income /1000	-3.805***	-3.799***	-4.119***
	(0.160)	(0.160)	(0.462)
Δ (other income/1000)*immigrant	-0.274		
	(0.480)		
Age(husband)	-8.328	-11.29*	11.530
	(6.196)	(6.650)	(18.056)
Age^2(husband)	-12.126*	-9.112	-31.207*
	(6.686)	(7.222)	(18.794)
Age (wife)	10.656*	12.466**	-1.315
	(5.708)	(6.130)	(15.888)
Age^2(wife)	-15.685**	-17.872**	-5.258
	(6.761)	(7.297)	(18.311)
Number of years schooling (husband)	-27.798***	-28.378***	-14.922**
	(2.311)	(2.414)	(6.786)
Yrs of schooling*immigrant (husband)	7.134**		
	(3.415)		
Number of years schooling (wife)	-2.941**	-3.163**	-3.827
	(1.446)	(1.454)	(3.819)
Yrs of schooling*immigrant (wife)	-2.810		
	(3.828)		
Immigrant	-82.652		
	(55.315)		
Visible minority	60.205***	114.594**	19.742

Variables	A	B	C
	(22.490)	(45.261)	(31.932)
Pre-school age children in family	-20.088**	-19.182*	-25.813
	(9.906)	(10.395)	(32.406)
School-age children in family	13.007	12.478	18.158
	(8.105)	(8.580)	(24.644)
Other income /1000	1.784***	1.878***	1.306***
	(0.181)	(0.195)	(0.478)
MTV (Montreal, Toronto, Vancouver)	9.988	8.988	-18.025
	(15.362)	(15.433)	(27.494)
MTV*immigrant (husband)	-39.179		
	(28.323)		
Urban	-21.868***	-23.620***	40.134
	(8.332)	(8.332)	(32.108)
Urban*immigrant *(husband)	44.236		
	(31.577)		
BC	-28.721**	-30.001*	-20.874
	(14.280)	(16.110)	(30.907)
Alberta	18.927	7.312	87.119**
	(14.946)	(15.942)	(43.127)
Quebec	45.481***	35.705**	86.030*
	(16.650)	(17.792)	(47.568)
Atlantic	101.884***	98.832***	111.502**
	(13.841)	(14.489)	(55.262)
Prairies	13.899	10.306	26.810
	(11.423)	(12.205)	(32.788)
Sample size	47,429	42106	5323
Lambda	-141.196***	-114.941**	-193.728*
	(35.744)	(38.371)	(109.424)
Wald chi2	5447.26	5032.95	498.90
Prob>chi2	0.000	0.000	0.000

Note: Standard errors are in parentheses. Other variables included in the estimation are language dummy variables for husbands and wives, and year dummy variables. The estimations of column A also include the interactions of immigrant and language dummy variables. The full results are presented in Appendix Table A.3.5. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level.

The results from the treatment effect model (in Table 3.5 column A) show that there is a significant positive effect of migration on hours change for men and the self-selection effect of migration is significant. The result of 'family internal migrant' in column A indicates a 282 hour increase in hours for migrants, a sharp contrast to the results in

Appendix Table A.3.4. The estimation results of 'family internal migrant' indicator across column A to C show there is a positive effect of internal migration on hours change for both native and immigrant men, controlling for the selection from migration. The effect of migration on hours for immigrant men is greater than that for natives but at a lower significance level. If a positive change in hours for immigrants indicates an 'assimilation in hours' (Baker and Benjamin 1997), the estimation results suggest that migration activity can accelerate the assimilation process for immigrant men.

The result of lambda at the end of column A indicates that the selectivity of migration is significant and negative and there is correlation between the error terms in the migration equation and hours-change equation. The negative selection means that there are unobserved characteristics that both increase the migration probability and decrease the growth in working hours. The estimation results from OLS are biased downward for not accounting for the negative selection of migration.

The results in column A indicate that, in general, the rise in husbands' own wage rate has a positive effect on their annual hours but wives' wage growth has a negative effect. The results show that the increase in the number of children in family are significantly correlated with the change in hours worked. For native-born men, one more child in family will increase the annual hours change (e.g. increase) by about 30 hours, while increasing the number of children does not have significant effect on the hours of labor supplied for immigrant men.

Increasing the number of years schooling leads to a negative change in hours for

husbands. Changes in spouse's years of schooling affect husbands' labor supply in the same direction but with a much smaller number.

The coefficient of husbands' education (number of years of schooling) is negative and significant for both native-born and immigrants. For native-born, an extra year of schooling brings about 28 hours decrease in hours change. For immigrant men, the negative effect of education on hours is smaller than that for native-born, at about 15 hours (see column C). This could be explained if husbands have a preference for leisure and education has a wealth effect. The coefficient for the interaction term between 'years of schooling' and 'immigrant' is significant at a 90% confidence level, which indicates that the effect of education on annual-hours-change for native-born and immigrants are significantly different. The results in column A show that native-born husbands' hours-change decrease with wives' education. For immigrant husbands, however, there is no significant effect of wives' education on hours supplied.

The coefficient of 'immigrant' indicator is insignificant, so there is no significant difference in labor supply change within the period between immigrant men and native-born men. The result of visible minority indicator in column A indicates that in general the increase in hours worked is higher for visible minority, at about 60 hours more than that for non-visible minorities annually. Within the native-born group, visible minorities experience a greater hours-increase than their counterparts who are non-visible minorities, at about 115 hours higher annually. In contrast, for the immigrant group, there is no significant difference in hours-change between visible minorities and non-visible

minorities.

The insignificance of the coefficients of MTV across column A to C indicates that there is no significant difference in hours-change between the residents in MTV and non-MTV area. The significance of coefficient 'MTV*immigrant' (similar to a Wald test) indicates the equality of coefficients for native-born and immigrant men group cannot be rejected. The estimation result of variable 'urban' is negative and statistically significant for native-born, which means that native-born in urban areas experience a decrease in hours-changes. The estimation result for immigrant group is insignificant. While we cannot reject the equality of the coefficients of 'urban' for the two groups, since the coefficient of the interaction term 'urban*immigrant' is insignificant.

For those who live in Atlantic and Quebec regions, both immigrant and native-born men experience a positive and significant growth in labor supply, compared with those who live in Ontario. Immigrant men living in Alberta also experience a rise in labor supply, but not for natives.

The results from OLS estimation for women are reported in column D, E and F in Appendix Table A.3.4, based on the pooled, native-born and immigrant sample. Across the three columns, the coefficients of variable 'family internal migrant' are negative and significant, indicating migration depresses women's labor supply growth.

The results for women from treatment-effect model are presented in Table 3.6. Positive and significant coefficients of 'family migration' indicator are derived for the pooled sample and native sample of women, but not for the immigrant women sample.

Similar to the case of native men, native women who migrate are negatively selected and migration has a positive and significant effect on annual hours. The effect of migration on hours for immigrant women is negative, but not significant. Since the coefficient of lambda in the regression for immigrant women is not significantly different from zero, there is no evidence of migration selection for immigrant women.

Table 3.6 Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Wives

Variables	Wives (whole sample)	Wives (native-born)	Wives (immigrants)
Wage at t-1 (husband)	20.947***	19.686***	26.488***
	(2.274)	(2.406)	(6.860)
Wage at t-1 (wife)	-57.621***	-57.500***	-62.051***
	(1.018)	(1.077)	(3.176)
Family internal migrant (migrated at year t)	261.507***	275.260***	-88.306
	(64.662)	(68.855)	(208.433)
Δ children (change in number of children)	-118.429***	-118.267***	-76.711***
	(7.165)	(7.185)	(22.000)
Δ children*immigrant	41.099*		
	(21.28)		
Δ education (husband, change in number of years schooling)	-17.485	-17.165	10.798
	(20.216)	(20.152)	(62.328)
Δ education *immigrant (husband)	34.907		
	(63.588)		
Δ education (wife, change in number of years schooling)	84.192***	84.811***	79.773
	(18.024)	(17.967)	(52.790)
Δ education *immigrant (wife)	6.262		
	(54.347)		
Δ other income /1000	-0.599***	-0.597***	-2.581***
	(0.072)	(0.072)	(0.487)
Δ (other income/1000)*immigrant	-1.431***		
	(0.464)		
Age(husband)	-6.309	-6.026	-0.085
	(5.429)	(5.763)	(16.687)
Age^2(husband)	1.528	1.248	-5.723
	(5.873)	(6.255)	(17.618)
Age (wife)	77.276***	77.248***	83.592***
	(5.034)	(5.336)	(15.562)
Age^2(wife)	-107.581***	-107.177***	-117.962***
	(5.961)	(6.342)	(17.928)

Variables	A	B	C
Number of years schooling (husband)	-14.640***	-14.022***	-15.769***
	(1.979)	(2.062)	(5.948)
Yrs of schooling*immigrant (husband)	-0.116		
	(3.174)		
Number of years schooling (wife)	17.274***	17.138***	19.216***
	(1.269)	(1.273)	(3.502)
Yrs of schooling *immigrant (wife)	-1.096		
	(3.456)		
Immigrant	-112.273**		
	(48.995)		
Visible minority	-39.263**	-83.556**	-24.668
	(19.715)	(38.403)	(27.585)
Pre-school age children in family	38.811***	42.500***	-0.768
	(8.741)	(9.143)	(29.653)
School-age children in family	54.425***	57.035***	29.265
	(7.143)	(7.534)	(22.548)
Other income /1000	-0.606***	-0.422***	-2.665
	(0.126)	(0.132)	(0.446)
MTV (Montreal, Toronto, Vancouver)	-11.005	-13.218	7.109
	(13.423)	(13.435)	(25.893)
MTV *immigrant (wife)	25.315		
	(25.520)		
Urban	-13.240*	-13.916*	46.097
	(7.358)	(7.350)	(28.427)
Urban*immigrant (wife)	44.611		
	(27.422)		
BC	17.993	26.529*	-12.648
	(12.605)	(14.035)	(29.115)
Alberta	16.552	14.231	32.040
	(13.188)	(13.964)	(40.521)
Quebec	-65.740***	-74.944***	7.989
	(14.700)	(15.522)	(46.579)
Atlantic	-140.027***	-144.235***	-68.620
	(12.101)	(12.657)	(48.900)
Prairies	-58.302***	-56.259***	-73.790**
	(10.083)	(10.716)	(30.150)
Sample size	47429	42426	5003
Lambda	-171.535***	-179.199***	-12.604
	(31.306)	(33.381)	(99.373)
Wald chi2	8076.03	7571.69	703.86
Prob>chi2	0.000	0.000	0.000

Note: Standard errors are in parentheses. Other variables included in the estimation are language dummy variables for husbands and wives. The estimations of column A also include the interactions of immigrant and language dummy variables. The full results are presented in Appendix Table 3.6. The level of

significance is as follows: significant at * 10%, ** 5% and *** 1% level.

For both immigrant and native born wives, their hours of labor supplied changes decrease with their own initial wage rate but increases with husbands' wage. From the magnitude of the results, it appears that women's labor supply is more responsive to their own and spouse's wage than that for men. There is a negative correlation between women's hours-change and own wages, while the correlation for men is positive.

The change in the number of children appears to have a strong negative effect on the change in working hours for women. The estimation results indicate that for native-born wives, one more child in family decreases the number of hours-change (e.g. increase) by 118 hours annually. The coefficient of interaction between Δchildren and immigrant shows that immigrant women's labor supply is less strongly affected by the change in number of children, at about 41 hours less per year. The results in column C on Δ children for immigrant women are consistent with the results stated above. The hours-change for native men are also significantly correlated with the change in number of children, but at a lower rate than that for native women. There is no evidence that immigrant men's hours-change is affected by Δ children.

Investments in formal education between t-1 and t+1 appear to increase the working hour growth of native women. However, the above correlation does not apply to immigrant wives. If there is an increase in other income, both native born and immigrant women will reduce the growth in working hours, but immigrant women's labor supply is

more greatly influenced. Comparing the estimates for men and women, it is shown that women's labor supply is more likely to be affected by the change in family characteristics than men's.

The hours-change for native and immigrant women is strongly correlated with their own and husbands' education. If wives are more educated, the change (e.g. increase) in hours is larger than those who are educated. Husband's education has a negative effect on wife's hours-change. The hours change for men, in contrast, is only affected by their own education but not their wives'. The coefficients on 'years of schooling (wife)*immigrant' and 'years of schooling (husband)*immigrant' are insignificant, which indicates that the effects of spouses' education on hours-change are not statistically significant different between native-born and immigrant wives.

The coefficient on 'immigrant' indicator shows that there is a significantly lower change in hours during the period for immigrant women, compared with that for natives. Visible minority women in general also experience a lower hours-change compared with those non-visible minorities. If the visible minority is native-born, there is a much lower change (e.g. positive change) in hours than those native non-visible minorities. Within the group of immigrant women, visible minorities do not experience a significant lower change in hours. While the hours change (e.g. positive change) for visible minority native-born men is greater than that for non-visible minorities. It indicates that native-born visible minority men usually experience a faster increase in their labor supply, while female native-born visible minorities experience a slower increase in labor supply,

compared with their counterparts of native non-visible minorities.

Similar to men, the hours-change of women is not significantly affected by whether or not they are living in MTV. The coefficients for native-born and immigrant women are both insignificant. For native-born women, having school-age children and/or pre-school-age children significantly affect their working hours, while immigrant women are not affected by such family characters.

3.6 Conclusions

In Canada, a large proportion of immigrants choose to live in big metropolitan areas. The spatial concentration of immigrants has raised considerable concerns. At the same time, studies show that recent immigrants experience a slower assimilation process than earlier immigrant cohorts. This study investigates the family migration behavior of immigrants and Canadian-born and the consequences of labor supply for men and women, using the data from the Survey of Labor and Income Dynamics (SLID).

Results from this study indicate that immigrant families (IF) are the least mobile across the four family types and 'immigrant-wife native-husband' families (M_WIF) have the highest migration rate. After controlling for characteristics differences among families, the regression results show that immigrant families are not significantly less mobile than mixed families and native families. Only the 'only-husband-visible-minority' families (M_HVF) are found significantly more mobile within the family groups.

This study finds that the structure of the determinants of internal migration across different family types is basically similar, but factors like unemployment rate, residence

in MTV and urban area and having pre-school aged children have different effect on family migration propensity among family types. The empirical results imply that immigrant families and mixed families are more sensitive to variations in regional employment situations than native families. It is also found that immigrant families in MTV and urban area are the least likely to migrate compared with native families and mixed families, which contributes to the low migration propensity of immigrant families. The results from decomposition technique also indicate that living in MTV contributes a great portion of the gap in average migration rate between immigrant family and native family.

In the analysis of annual hours change, the results indicate a positive effect of internal migration on the labor supply for men and native women when the self-selection of migration is controlled for. If there is an increase in hours among the above stated groups, the increase is significantly higher for migrants than for non-migrants. The selection into migrants is found to be negative, indicating that unobserved characteristics that increase the probability of migration are associated with smaller change (e.g. increase) in hours. The changes in hours of immigrant women, however, are not found to be affected by family migration and there is no evidence of migration selection. If a positive change in hours for immigrant men indicates an 'assimilation in hours' (Baker and Benjamin 1997), this study suggests that immigrant men who migrated are better off in the assimilation process[15] by moving to a new labor market. The findings from this

[15] It is assumed that the pre-move and post-move wage rates are kept constant or there is a rise in wage rate after move.

study also indicate that encouraging migration activity in Canada in general will improve the labor supply and employment situation for both labor force and labor force non-participants.

Comparing the estimation results for men and women, it is shown that women's labor supply is more likely to be affected by the changes in family characteristics like spouse's education, wage and having or having more children. This study finds that for men there is no significant difference in hours-changes within the period between immigrants and naïve born. Immigrant women, however, experience a significant reduction in hours-change relative to native-born women. Visible minority is a group who experiences significantly different mobility in labor supply. Men of visible minority increase their annual hours relative to non-visible minorities when they migrate. It is noticed that female immigrant visible minorities experience the slowest change (e.g. growth) in their labor supply, compared with native non-visible minority women.

The relatively small sample of immigrants in this study makes the analysis of migration pattern (based on destination choice) impossible. A larger data set would allow more detailed analysis based on ethnicity group or place of birth. In this study, the immediate (one to two years after migration) effect of family migration on annual hours is examined. The analysis in the future will extend to the long run consequence of migration

References:

Bailey, A. J and Cooke, T. J. (1998) "Family Migration and Employment: The Importance of Migration History and Gender." *International Regional Science Review* 21, 2: 99-118.

Baker, M and Benjamin, D. (1997) "The Role of the Family in Immigrants' Labor-Market Activity: an Evaluation of Alternative Explanations" *The American Economic Review* 87 (4): 705-727.

Bielby, W. T. and Bielby, D. D. (1992) "I Will Follow Him: Family Ties, Gender-Role Beliefs, and Reluctance to Relocate for a Better Job" *The American Journal of Sociology* 97: 1241-1267.

Blau, F. D. Kahn, L. M. Moriarty, J. Y. and Souza, A. P. (2002) "The Role of the Family in Immigrants' Labor-Market Activity: Evidence from the United States." NBER Working Paper Series 9051
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=318846

Borjas, G. J. (1985) "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants" *Journal of Labor Economics*, 3(4), 463-489.

Borjas, G. J., Bronars, S. G. and Trejo, S. J. (1992) "Assimilation and the Earnings of Young Internal Migrants." *The Review of Economics and Statistics*, 74: 170-175.

Borjas, G.. J. (1999) "The Economic Analysis of Immigration." In Handbook of Labor Economics, Volume 3A, ed. Orley Ashenfelter and David Card, 1697-1760. Amsterdam: North-Holland

Chiswick, B. R. (1978) "The Effect of Americanization on the Earnings of Foreign-born Men." *Journal of Political Economy* 86(5): 897-921.

Chiswick, B. R. and Miller, P. W. (1992) "The Endogeneity between Language and Earning: International Analysis." *Journal of Labor Economics* 13 (2): 246-88.

Compton, J. and Pollak, R. A. (2007) "Why are Power Couples Increasingly Concentrated in Large Metropolitan Area?" *Journal of Labor Economics, 25*(3): 475-512.

Cooke, T. J. and Bailey, A. (1996) "Family Migration and the Employment of Married Women and Men." *Economic Geography*, 72(1): 38-48.

Cooke, T. J. (2001) "'Trailing Wife' or 'Trailing Mother'? The Effect of Parental Status on the Relationship between Family Migration and the Labor Market Participation of Married Women." *Environment and Planning* A 33: 419-30.

Costa, D. L. and Kahn, M. E. (2000) "Power Couples: Changes in the Locational Choice of the College Educated, 1940-1990." *Quarterly Journal of Economics*, 115 (4):1287-1315.

Duleep, H. O. and Sanders, S. (1993) "The Decision to Work by Married Immigrant Women." *Industrial and Labor Relations Review* 46(4): 667-80.

Duleep, H. O. and Regets, M. C. (1997) "Measuring Immigrant Wage Growth Using Matched CPS Files." *Demography* 34(2): 239-249.

Edmonston, B. (2002) "Interprovincial Migration of Canadian Immigrants." Vancouver

Center of Excellence—Research on Immigration and Integration in the Metropolis, Working Paper Series No. 02-10.

Fairlie, R. (2005) "An Extension of the Blinder-Oaxaca Decomposition Technique to Logit and Probit Models" Journal of Economic and Social Measurement 30: 305-316.

Finnie, R. (1999) "Inter-Provincial Migration in Canada: A Longitudinal Analysis of Movers and Stayers and the Associated Income Dynamics" *Canadian Journal of Regional Science:* 227-262.

Finnie, R. (2001) "The Effects of Inter-Provincial Mobility on Individuals' Earnings: Panel Model Estimates for Canada." Catalogue No.11F0019MIE No.163 Ottawa, Statistics Canada.

Finnie, R. (2004) "Who Moves? A Logit Model Analysis of Inter-provincial Migration in Canada." *Applied Economics* 36: 1759-1779.

Frey, W. H. and Liaw, K. L. (2005) "Interstate Migration of Hispanics, Asian and Blacks: Cultural Constraints and Middle Class Flight" Population Studies Center Research Report 05-575, University of Michigan, http://www.frey-demographer.org/reports/rr05-575.pdf.

Gemici, A. "Family Migration and Labor Market Outcome." Working Paper http://www.econ.upenn.edu/~agemici/Gemici-Ahu-JobMktPaper.pdf

Grant, E. K. and Vanderkamp, J. (1980) "The Effects of Migration on Income: A Micro Study with Canadian Data 1965-71." *The Canadian Journal of Economics* 13(3): 381-406.

Greene, W. H. (2003) Econometric Analysis, Fifth Edition, Prentice Hall, New York

Greenwood, M. (1997) "Internal Migration in Developed Countries." Handbook of Population and Family Economics ED. Rosenzweig, MR and Stark, O. Elsevier Science B.V.

Hou, F. (2005) "The Initial Destinations and Redistribution of Canada's Major Immigrant Groups: Changes over the Past Two Decades" Catalogue No. 11F0019MIE, No. 254, Ottawa: Statistics Canada.

Hum, D. and Simpson, W. (2000) "Closing the Wage Gap: Economic Assimilation of Canadian Immigrants Reconsidered." *Journal of International Migration and Integration* 1(4): 427-441.

Jann, B. (2006) "Fairlie: Stata Module to Generate Nonlinear Decomposition of Binary Outcome Differentials". Available from
http://ideas.repec.org/c/boc/bocode/s456727.html

LeClere, F. B. and McLaughlin, D. K. (1997) "Family Migration and Changes in Women's Earnings: A Decomposition Analysis." *Population Research and Policy Review* 16:315-335.

Lee, S. and Roseman, C. (1999) "Migration Determinants and Employment Consequences of White and Black Families, 1985-1990." *Economic Geography*, 75: 109-133.

Lichter, D. T. (1980) "Family Migration and the Labor Market Position of Married Women." *Social Science Research* 9: 83-97.

Lin, Z. (1998) "Foreign-Born vs. Native-Born Canadians: A comparison of Their Inter-Provincial Labor Mobility" *Business and Labor Market Analysis*, No.114, Ottawa, Statistics Canada.

Long, L. H. (1974) "Women's Labor Force Participation and the Residential Mobility of Families." *Social Forces* 52: 342-348.

Long, J. E. (1980) "The Effect of Americanization on Earnings: Some Evidence for Women." *Journal of Political Economy* 88(3):620-29.

Meng, X. and Gregory, R.G. (2005) "Intermarriage and the Economic Assimilation of Immigrants." *Journal of Labor Economics* 23(1): 135-175.

Mincer, J. (1978) "Family Migration Decisions." *The Journal of Political Economy*, 86: 749-773.

Moore, E. G. and Rosenberg, M. (1995) "Modeling Migration Flows of Immigrant Groups in Canada." *Environment and Planning A* 27(5): 699-714.

Morrison, P. A. and Lichter, D. (1988) "Family Migration and Female Employment: The Problem of Under-employment among Migrant Married Women." *Journal of Marriage and the Family* 50: 161-72.

Nakosteen, R. and Zimmer, M. (1980) "Migration and Income: The Question of Self-Selection." *Southern Economic Journal* 46 (3):840-851.

Nakosteen, R. and Zimmer, M. (1982) "The Effect on Earnings of Interregional and Interindustry Migration" *Journal of Regional Science* 22(3): 325-341.

Newbold, K. B. (1996) "Internal Migration of the Foreign-Born in Canada." *International Migration Review* 30: 728-747.

Nogle, J. M. (1994) "Internal Migration for Recent Immigrants in Canada." *International Migration Review* 28:31-48.

Polacheck, S.W. and Horwath (1977) "A Life Cycle Approach to Migration: Analysis of the Perspicacious Peregrinator." *Research in Labor Economics* 1: 103-149.

Robinson, C. and Tomes, N. (1982) "Self-Selection and Interprovincial Migration in Canada." *The Canadian Journal of Economics* 15: 474-502

Sandell, S. H. (1977) "Women and the Economics of Family Migration." *The Review of Economics and Statistics*, 59: 406-414.

Schaafsma, J. and Sweetman, A. (2001) "Immigrant earnings: Age at Immigration Matters" *The Canadian Journal of Economics* 34(4): 1066-1099.

Schellengerg, G. (2004) "Immigrants in Canada's Census Metropolitan Areas" Catalogue No. 89-613-MIE, Ottawa: Statistics Canada.

Sjaastad, L.A. (1962) "The Cost and Returns of Human Migration." *Journal of Political Economy*, 70: 80-93.

Spitze, G. (1984) "The Effect of Family Migration on Wives' Employment: How Long Does it Last?" *Social Science Quarterly* 65:21-36.

Trovato, F., and Halli, S.S. (1990) "Ethnicity and Immigration in Canada."

International Migration Review 17(2): 245-267.
Worswick, C. (1996) "Immigrant Families in the Canadian Labor Market." *Canadian Public Policy* 22(4):378-96.

Appendix Table A.3.1 Descriptive Statistics According to Family Type and Migration Status (Means, SD)

Panel A (sample for family migration equation analysis)

	Non-migrants										Migrants									
Family type:	**Native family (NF)**		**Only-wife-immigrant family (M_WIF)**		**Only-husband-immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**		**Native family (NF)**		**Only-wife Immigrant family (M_WIF)**		**Only-husband Immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**		
Sample size	66,356		2,916		3,518		6,024		78,814		2,756		138		139		116		3,149	
Wife's age	**41.07**	9.05	**42.00**	8.36	**41.80**	8.85	**44.36**	9.09	**41.39**	9.06	**38.49**	9.21	**40.44**	8.51	**40.02**	9.92	**42**	9.51	**38.7**	9.25
Wife aged 16-24	**0.02**	0.13	**0.01**	0.07	**0.02**	0.12	**0.01**	0.08	**0.02**	0.13	**0.04**	0.20	**0.02**	0.15	**0.04**	0.18	**0.03**	0.16	**0.04**	0.19
Wife aged 25-34	**0.24**	0.42	**0.19**	0.39	**0.22**	0.42	**0.16**	0.37	**0.23**	0.42	**0.33**	0.47	**0.23**	0.42	**0.32**	0.46	**0.18**	0.38	**0.32**	0.47
Wife aged 35-44	**0.39**	0.48	**0.41**	0.49	**0.36**	0.48	**0.32**	0.46	**0.38**	0.48	**0.37**	0.48	**0.43**	0.49	**0.28**	0.45	**0.40**	0.49	**0.36**	0.48
Wife aged 45-64	**0.35**	0.47	**0.39**	0.48	**0.40**	0.49	**0.51**	0.50	**0.37**	0.48	**0.26**	0.44	**0.32**	0.47	**0.36**	0.48	**0.39**	0.49	**0.27**	0.44
Husband's age	**43.31**	9.24	**44.1**	8.38	**44.86**	9.37	**47.29**	9.17	**43.7**	9.27	**40.75**	9.50	**42.16**	8.53	**42.73**	10.9	**45.19**	9.55	**41.1**	0.56
Husband aged 16-24	**0.01**	0.08	**0.004**	0.06	**0.01**	0.04	**0.001**	0.04	**0.01**	0.08	**0.02**	0.14	**0.07**	0.08	**0.04**	0.19	**0.01**	0.09	**0.02**	0.13
Husband aged 25-34	**0.18**	0.38	**0.13**	0.33	**0.16**	0.36	**0.10**	0.30	**0.17**	0.38	**0.33**	0.47	**0.16**	0.37	**0.32**	0.46	**0.11**	0.31	**0.26**	0.44
Husband aged 35-44	**0.38**	0.48	**0.39**	0.48	**0.33**	0.47	**0.27**	0.45	**0.36**	0.48	**0.37**	0.48	**0.47**	0.50	**0.28**	0.45	**0.41**	0.49	**0.37**	0.48
Husband aged 45-64	**0.43**	0.49	**0.48**	0.50	**0.51**	0.50	**0.62**	0.48	**0.45**	0.50	**0.33**	0.47	**0.36**	0.48	**0.36**	0.48	**0.46**	0.50	**0.34**	0.47
Years since immigration (wife)			**29.02**	12.5	-	-	**19.50**	11.6	**22.53**	12.76			**26.89**	12.86	-	-	**17.97**	12.09	**22.7**	14.5
Years since immigration (husband)					**31.49**	11.63	**20.58**	12.0	**24.64**	13.02			-	-	**29.21**	12.5	**19.03**	12.04	**24.5**	15.7
Number of years schooling (wife)	**13.15**	3.15	**14.26**	3.22	**14.13**	3.05	**12.53**	4.04	**13.2**	3.25	**13.34**	3.22	**14.28**	3.28	**13.98**	2.97	**13.08**	4.11	**13.4**	3.26
Postsecondary certificate and above (wife)	**0.52**	0.50	**0.62**	0.48	**0.61**	0.49	**0.46**	0.49	**0.52**	0.49	**0.54**	0.49	**0.62**	0.48	**0.59**	0.49	**0.49**	0.50	**0.54**	0.49
High school graduated, some post-secondary education (wife)	**0.30**	0.46	**0.30**	0.46	**0.30**	0.46	**0.30**	0.46	**0.30**	0.46	**0.30**	0.46	**0.26**	0.44	**0.33**	0.47	**0.26**	0.44	**0.30**	0.46
High School below (wife)	**0.18**	0.38	**0.08**	0.28	**0.09**	0.28	**0.24**	0.42	**0.17**	0.38	**0.35**	0.15	**0.36**	0.32	**0.08**	0.27	**0.24**	0.43	**0.15**	0.36

	Non-migrants										Migrants									
Family type:	**Native family (NF)**		**Only-wife-immigrant family (M_WIF)**		**Only-husband-immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**		**Native family (NF)**		**Only-wife Immigrant family (M_WIF)**		**Only-husband Immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**		
Number of years schooling (husband)	**12.99**	3.62	**14.46**	3.63	**14.13**	3.05	**13.21**	4.32	**13.11**	3.70	**13.37**	3.90	**14.31**	3.77	**14.40**	3.82	**13.95**	3.85	**13.5**	3.90
Postsecondary certificate and above (husband)	**0.49**	0.50	**0.61**	0.49	**0.62**	0.49	**0.54**	0.50	**0.51**	0.49	**0.53**	0.49	**0.61**	0.49	**0.61**	0.49	**0.58**	0.49	**0.54**	0.49
High school graduate, some post-secondary education (husband)	**0.27**	0.44	**0.27**	0.45	**0.26**	0.44	**0.25**	0.43	**0.26**	0.44	**0.26**	0.44	**0.24**	0.43	**0.27**	0.45	**0.26**	0.44	**0.26**	0.44
High school below (husband)	**0.23**	0.42	**0.12**	0.32	**0.12**	0.33	**0.21**	0.41	**0.22**	0.41	**0.21**	0.41	**0.15**	0.36	**0.11**	0.32	**0.16**	0.37	**0.20**	0.40
In work force (wife)	**0.79**	0.40	**0.81**	0.39	**0.83**	0.37	**0.73**	0.44	**0.78**	0.40	**0.77**	0.42	**0.72**	0.45	**0.78**	0.41	**0.61**	0.49	**0.76**	0.42
In work force (husband)	**0.94**	0.24	**0.96**	0.20	**0.96**	0.20	**0.92**	0.27	**0.94**	0.23	**0.95**	0.22	**0.96**	0.20	**0.94**	0.23	**0.91**	0.28	**0.95**	0.22
Strongly attached (wife)	**0.66**	0.47	**0.70**	0.46	**0.71**	0.45	**0.62**	0.48	**0.66**	0.47	**0.57**	0.49	**0.53**	0.50	**0.61**	0.49	**0.43**	0.49	**0.57**	0.49
Strongly attached (husband)	**0.82**	0.38	**0.88**	0.32	**0.86**	0.34	**0.82**	0.38	**0.82**	0.37	**0.78**	0.41	**0.83**	0.38	**0.79**	0.41	**0.74**	0.44	**0.78**	0.41
English mother tongue (wife)	**0.70**	0.46	**0.56**	0.49	**0.79**	0.40	**0.22**	0.42	**0.66**	0.47	**0.71**	0.45	**0.60**	0.49	**0.82**	0.39	**0.34**	0.48	**0.69**	0.46
French mother tongue (wife)	**0.26**	0.44	**0.03**	0.18	**0.09**	0.29	**0.01**	0.11	**0.23**	0.42	**0.26**	0.44	**0.05**	0.22	**0.12**	0.32	**0.01**	0.09	**0.25**	0.42
Other language (wife)	**0.04**	0.18	**0.40**	0.49	**0.11**	0.31	**0.76**	0.43	**0.11**	0.31	**0.02**	0.15	**0.35**	0.48	**0.06**	0.25	**0.65**	0.48	**0.06**	0.24
English mother tongue (husband)	**0.69**	0.46	**0.83**	0.38	**0.52**	0.50	**0.21**	0.40	**0.66**	0.47	**0.69**	0.46	**0.85**	0.36	**0.62**	0.49	**0.27**	0.45	**0.68**	0.46
French mother tongue (husband)	**0.26**	0.43	**0.09**	0.28	**0.04**	0.20	**0.01**	0.12	**0.23**	0.40	**0.28**	0.44	**0.11**	0.32	**0.03**	0.17	**0.01**	0.09	**0.25**	0.42
Other language (husband)	**0.04**	0.19	**0.08**	0.28	**0.44**	0.49	**0.77**	0.42	**0.11**	0.32	**0.03**	0.17	**0.04**	0.19	**0.35**	0.48	**0.71**	0.45	**0.07**	0.24
Visible minority (wife)	**0.01**	0.01	**0.11**	0.32	**0.03**	0.16	**0.47**	0.49	**0.04**	0.33	**0.003**	0.06	**0.11**	0.31	**0.03**	0.17	**0.44**	0.49	**0.02**	0.16
Visible minority (husband)	**0.01**	0.07	**0.03**	0.17	**0.12**	0.32	**0.46**	0.49	**0.04**	0.23	**0.008**	0.09	**0.01**	0.08	**0.16**	0.37	**0.45**	0.50	**0.03**	0.17
Both are visible minority	-	-	**0.02**	0.14	**0.02**	0.14	**0.44**	0.50	**0.03**	0.18	-	-	**0**	0	**0.01**	0.12	**0.40**	0.49	**0.02**	0.12
Mixed visible minority family	**0.01**	0.10	**0.10**	0.30	**0.10**	0.30	**0.05**	0.21	**0.02**	0.10	**0.01**	0.10	**0.12**	0.32	**0.16**	0.37	**0.09**	0.29	**0.02**	0.16

Non-migrants											Migrants									
Family type:	**Native family (NF)**		**Only-wife-immigrant family (M_WIF)**		**Only-husband-immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**		**Native family (NF)**		**Only-wife Immigrant family (M_WIF)**		**Only-husband Immigrant family (M_HIF)**		**Immigrant family (IF)**		**Total**	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Preschool children in family	**0.25**	0.43	**0.26**	0.44	**0.26**	0.44	**0.21**	0.40	**0.24**	0.43	**0.34**	0.47	**0.26**	0.44	**0.26**	0.44	**0.28**	0.45	**0.33**	0.47
School-age children in family	**0.49**	0.49	**0.51**	0.50	**0.46**	0.50	**0.50**	0.50	**0.49**	0.49	**0.48**	0.49	**0.48**	0.50	**0.40**	0.49	**0.55**	0.50	**0.48**	0.49
Family size	**3.45**	1.18	**3.49**	1.23	**3.43**	1.14	**3.54**	1.19	**3.45**	1.18	**3.48**	1.16	**3.48**	1.28	**3.26**	1.01	**3.69**	1.34	**3.48**	1.16
MTV	**0.07**	0.25	**0.15**	0.36	**0.15**	0.36	**0.38**	0.48	**0.10**	0.29	**0.03**	0.18	**0.05**	0.22	**0.04**	0.20	**0.09**	0.29	**0.04**	0.19
Urban	**0.67**	0.47	**0.76**	0.42	**0.81**	0.39	**0.90**	0.30	**0.69**	0.46	**0.64**	0.48	**0.75**	0.44	**0.73**	0.44	**0.72**	0.45	**0.66**	0.47
Family income/1000	**54.29**	32.8	**61.59**	35.4	**65.51**	63.32	**54.67**	38.7	**55.1**	35.4	**50.09**	28.62	**56.65**	42.95	**55.30**	28.11	**45.94**	25.63	**50.5**	29.3
Family member receipt EI	**0.31**	0.46	**0.19**	0.39	**0.23**	0.42	**0.22**	0.42	**0.30**	0.46	**0.36**	0.48	**0.21**	0.41	**0.32**	0.47	**0.22**	0.42	**0.34**	0.47
Family member receipt SA	**0.04**	0.20	**0.03**	0.17	**0.02**	0.15	**0.06**	0.23	**0.04**	0.20	**0.05**	0.21	**0.04**	0.21	**0.05**	0.22	**0.08**	0.26	**0.05**	0.21
Having ownership of home	**0.89**	0.31	**0.90**	0.30	**0.90**	0.30	**0.82**	0.38	**0.89**	0.31	**0.78**	0.41	**0.72**	0.45	**0.75**	0.43	**0.68**	0.46	**0.77**	0.42
Family member moved before	**0.16**	0.37	**0.27**	0.44	**0.22**	0.42	**0.02**	0.15	**0.16**	0.37	**0.26**	044	**0.47**	0.50	**0.28**	0.45	**0.05**	0.22	**0.26**	0.44
Unemployment rate	**9.28**	3.43	**7.97**	2.29	**8.07**	2.40	**7.73**	1.99	**9.07**	3.31	**8.99**	2.80	**8.16**	2.59	**8.03**	2.41	**8.11**	2.52	**8.88**	2.78
Housing price index	**104.2**	8.16	**104.0**	8.77	**103.8**	8.81	**104.3**	8.87	**104.2**	8.27	**102.7**	4.49	**102.9**	7.23	**102.7**	6.22	**102.6**	6.92	**102**	6.5
BC	**0.07**	0.25	**0.14**	0.35	**0.17**	0.37	**0.16**	0.37	**0.08**	0.27	**0.06**	0.24	**0.17**	0.37	**0.14**	0.34	**0.164**	0.37	**0.07**	0.26
Alberta	**0.07**	0.26	**0.07**	0.25	**0.08**	0.26	**0.07**	0.26	**0.07**	0.26	**0.05**	0.22	**0.06**	0.23	**0.06**	0.23	**0.09**	0.28	**0.06**	0.22
Atlantic	**0.24**	0.42	**0.10**	0.29	**0.09**	0.28	**0.03**	0.18	**0.21**	0.41	**0.28**	0.45	**0.19**	0.39	**0.15**	0.36	**0.12**	0.32	**0.27**	0.44
Quebec	**0.21**	0.41	**0.05**	0.23	**0.07**	0.26	**0.08**	0.27	**0.19**	0.39	**0.20**	0.40	**0.06**	0.23	**0.06**	0.25	**0.06**	0.24	**0.18**	0.38
Prairies	**0.16**	0.36	**0.17**	0.38	**0.15**	0.35	**0.14**	0.35	**0.16**	0.36	**0.18**	0.38	**0.25**	0.43	**0.17**	0.38	**0.17**	0.37	**0.18**	0.38
Ontario	**0.25**	0.43	**0.46**	0.49	**0.45**	0.50	**0.51**	0.50	**0.29**	0.45	**0.22**	0.41	**0.28**	0.45	**0.41**	0.49	**0.39**	0.49	**0.24**	0.42

Panel B (samples for working-hours-change equation analysis, husband and women respectively)

	Non-migrants								Migrants							
	Native-born		Immigrant husbands		Immigrant wives		Total		Native-born		Immigrant husband		Immigrant wives		Total	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Sample Size **(wives)**	40,600		-		4,864		45,464		1,826		-		139		1,965	
Total annual hours (t-1) (wife)	**1233.85**	893.54	-	-	**1259.98**	939.79	**1236.65**	898.62	**1147.44**	886.69	-	-	**1070.2**	998.72	**1141.97**	895.02
Total annual hours (t+1) (wife)	**1256.36**	900.86	-	-	**1272.88**	951.80	**1258.12**	906.43	**1127.01**	916.00	-	-	**1020.7**	986.10	**1119.49**	921.27
Hours change (wife)	**22.50**	684.08	-	-	**12.89**	707.55	**21.47**	686.62	**-20.42**	801.16	-	-	**-49.52**	882.75	**-22.48**	806.99
Imputed wage at (t-1) (wife)	**10.35**	4.33	-	-	**9.40**	4.41	**10.25**	4.35	**9.93**	4.12	-	-	**8.97**	4.25	**9.86**	4.14
Change in number of children	**-0.018**	0.48			**-0.035**	0.47	**-0.020**	0.48	**-0.004**	0.53			**0.036**	0.51	**-0.001**	0.53
Change in number of years schooling (wife)	**0.038**	0.18			**0.037**	0.18	**0.039**	0.18	**0.042**	0.18			**0.078**	0.24	**0.045**	0.19
Change in number of years schooling (husband)	**0.028**	0.159			**0.025**	0.15	**0.028**	0.16	**0.037**	0.18			**0.081**	0.32	**0.040**	0.19
Change in other income	**3382.33**	45278.1			**3648.92**	20648	**3410.85**	43317	**3880.21**	26379.9			**3995.7**	22151	**3888.38**	26098
Sample size **(husbands)**	40,285		5,179		-		45,464		1,821		144		-	-	1,965	
Total annual hours (t-1) (husband)	**2023.25**	826.75	**2055.90**	817.34	-	-	**2026.97**	825.74	**2023.85**	809.94	**2015.55**	871.25	-	-	**2023.25**	814.35
Total annual hours (t+1) (husband)	**1982.25**	874.24	**1999.49**	887.53	-	-	**1984.22**	875.77	**1999.66**	894.15	**1907.70**	1045.9	-	-	**1992.92**	906.16
Hours change (husband)	**-40.99**	759.12	**-56.41**	757.23	-	-	**-42.75**	758.92	**-24.19**	888.07	**-107.85**	1113.3	-	-	**-30.32**	906.41
Imputed wage at (t-1) (husband)	**24.41**	4.42	**26.51**	4.62	-	-	**24.64**	4.48	**23.26**	4.46	**25.70**	4.85	-	-	**23.44**	4.53
Change in number of children	**-0.02**	0.48	**-0.021**	0.46			**-0.020**	0.48	**-0.001**	0.53	**-0.028**	0.55			**-0.002**	0.53
Change in number of year schooling (husband)	**0.028**	0.16	**0.027**	0.16			**0.028**	0.16	**0.039**	0.19	**0.052**	0.28			**0.040**	0.19

	Non-migrants								Migrants							
	Native-born		Immigrant husbands		Immigrant wives		Total		Native-born		Immigrant husband		Immigrant wives		Total	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Change in number of year schooling (wife)	**0.038**	0.18	**0.037**	0.17			**0.038**	0.18	**0.043**	0.19	**0.058**	0.18			**0.044**	0.187
Change in other income	**2359.82**	23324.3	**3024.30**	22556.7			**2435.52**	23238	**1298.09**	22895.5	**672.81**	29917.6			**1552.27**	23472

Note: The data source is from Survey of Labor and Income Dynamics (SLID) master file, 1993-2004. "-" indicates figure was not released for confidentiality reasons or there is no observation with the character.

Appendix Table A.3.2 Full Results of Family Migration Model (Probability of Family Migration), Pooled Sample

Variables	(A)	(B)	(C)
Immigrant family (IF)	0.910	0.866	0.916
	(0.137)	(1.735)	(0.842)
Mixed immigrant family (MIF)	1.201**	0.789	
	(0.100)	(0.911)	
Immigrant-wife native-husband family (M_WIF)			1.105
			(1.313)
Immigrant-husband native-wife family (M_HIF)			0.530
			(0.626)
Visible minority family (both spouses are visible minority) (VF)	0.952	1.215	1.210
	(0.191)	(0.260)	(0.260)
Mixed visible minority family (one spouse is visible minority) (MVF)	1.241	1.329*	
	(0.184)	(0.198)	
Only-wife-visible-minority family (M_WVF)			0.950
			(0.234)
Only-husband-visible-minority family (M_HVF)			1.748***
			(0.315)
Aged 16-24 (wife)	1.509***	1.468**	1.480**
	(0.242)	(0.241)	(0.242)
Aged 25-34 (wife)	1.256**	1.271**	1.272**
	(0.124)	(0.129)	(0.129)
Aged 35-44 (wife)	1.169**	1.315**	1.315**
	(0.087)	(0.146)	(0.145)
Aged 16-24 (husband)	2.280***	2.340***	2.323***
	(0.480)	(0.500)	(0.497)
Aged 25-34 (husband)	1.440***	1.433***	1.433***
	(0.139)	(0.142)	(0.142)
Aged 35-44 (husband)	1.101	1.174	1.164
	(0.080)	(0.125)	(0.125)
Postsecondary certificate and above (wife)	1.226***	1.213***	1.229***
	(0.083)	(0.084)	(0.086)
High School Graduated, Some postsecondary (wife)	1.125*	1.123*	1.140*
	(0.076)	(0.079)	(0.080)
Postsecondary certificate and above (husband)	1.183***	1.170***	1.157**
	(0.069)	(0.070)	(0.070)
High School Graduated, Some postsecondary (husband)	1.040	1.018	1.008
	(0.065)	(0.065)	(0.065)
Strongly attached to labor market (wife)	0.611***	0.616***	0.616***
	(0.035)	(0.038)	(0.038)
Strongly attached to labor market (husband)	0.737***	0.733***	0.735***
	(0.047)	(0.050)	(0.049)

Variables	(A)	(B)	(C)
Work force participation (wife)	1.159**	1.203***	1.202***
	(0.078)	(0.086)	(0.086)
Work force participation (husband)	1.329***	1.365***	1.364***
	(0.149)	(0.164)	(0.164)
English mother tongue (wife) (other language as reference)	1.279**	1.208*	1.276*
	(0.138)	(0.156)	(0.177)
French mother tongue (wife)	1.243	1.186	1.249
	(0.174)	(0.184)	(0.205)
English mother tongue (husband)	1.143	1.155	1.087
	(0.118)	(0.145)	(0.139)
French mother tongue (husband)	1.444***	1.493***	1.411**
	(0.192)	(0.222)	(0.213)
Pre-school age children in family	1.098	1.140**	1.138**
	(0.068)	(0.074)	(0.074)
Pre-school age children in family*immigrant family (IF)		0.756	0.771
		(0.237)	(0.244)
Pre-school age children in family*mixed immigrant family (MIF)		0.641**	0.639**
		(0.115)	(0.115)
School age children in family	0.952	0.948	0.947
	(0.059)	(0.059)	(0.059)
MTV	0.314***	0.403***	0.412***
	(0.038)	(0.053)	(0.053)
MTV*immigrant family (IF)		0.266***	0.272***
		(0.103)	(0.106)
MTV*mixed immigrant family (MIF)		0.593	0.593
		(0.203)	(0.204)
Urban	0.793***	0.823***	0.824***
	(0.035)	(0.038)	(0.038)
Urban*immigrant family (IF)		0.481***	0.472***
		(0.127)	(0.123)
Urban*mixed immigrant family (MIF)		0.807	0.814
		(0.140)	(0.141)
Family size (number of family members)	0.980	0.981	0.981
	(0.026)	(0.026)	(0.026)
Family income	0.999	0.999	0.999
	(0.001)	(0.001)	(0.001)
Family member receipt EI	1.023	1.027	1.028
	(0.052)	(0.052)	(0.052)
Family member receipt SA	0.727***	0.736***	0.737***
	(0.084)	(0.085)	(0.085)
Homeowner	0.426***	0.441***	0.441***
	(0.026)	(0.029)	(0.029)
Family member migrated previously	1.826***	1.833***	1.831***
	(0.097)	(0.104)	(0.104)
Unemployment rate	0.921***	0.918***	0.918***
	(0.009)	(0.009)	(0.009)

Variables	(A)	(B)	(C)
Unemployment rate*immigrant family (IF)		1.206***	1.205***
		(0.057)	(0.058)
Unemployment rate*mixed immigrant family		1.078**	1.076**
(MIF)		(0.035)	(0.035)
Housing price index	1.005	1.005	1.005
	(0.004)	(0.004)	(0.004)
BC	1.126	1.101	1.106
	(0.112)	(0.109)	(0.110)
Alberta	0.679***	0.686***	0.685***
	(0.074)	(0.075)	(0.075)
Atlantic	1.803***	1.806***	1.811***
	(0.129)	(0.129)	(0.129)
Quebec	1.242**	1.212*	1.211*
	(0.125)	(0.121)	(0.121)
Prairies	1.095	1.105	1.106
	(0.076)	(0.077)	(0.077)
Sample size	81,963	81,963	81,963
Wald Chi2	5895.95	5964.41	5963.59
Pseudo R^2	0.228	0.232	0.232
Prob >Chi2	0.000	0.000	0.000
Wald coefficient tests (prob> χ^2)			
IF=MIF	0.075	0.966	
IF = M_WIF			0.934
IF = M_HIF			0.808
M_WIF = M_HIF			0.106
VF =MVF	0.279	0.726	
VF =M_WVF			0.455
VF= M_HVF			0.182
M_WVF = M_HVF			0.044
IF =VF	0.879	0.866	0.890
MIF=MVF	0.856	0.650	

Note: Odds ratios are presented. Standard errors are in parentheses. Interactions of explanatory variables and family type dummy variables which are not presented and year dummy variables and are also included in the estimation. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level. Standard errors are adjusted for clustering on census family identifier.

Appendix Table A.3.3 Full Results of Family Migration Model (Probability of Family Migration), Native Family Sample, Immigrant Family Sample, Mixed Family Sample and Immigrant and Mixed Family Combined Sample

Variables	Native Family A	Immigrant Family B	Mixed Family C
Immigrant-husband native-wife family (M_HIF)			0.851
			(0.138)
Visible minority family (VF)	0.926	1.409	0.510
	(0.426)	(0.369)	(0.370)
Mixed visible minority family (MVF)		2.291*	
		(0.976)	
Only-wife-visible-minority family (M_WVF)	0.410*		1.450
	(0.200)		(0.446)
Only-husband-visible-minority family (M_HVF)	1.411		2.082***
	(0.354)		(0.585)
Aged 16-24 (wife)	1.588***	1.272	1.638
	(0.275)	(1.126)	(0.883)
Aged 25-34 (wife)	1.350**	0.658	0.978
	(0.147)	(0.334)	(0.264)
Aged 35-44 (wife)	1.198**	1.076	1.056
	(0.098)	(0.374)	(0.232)
Aged 16-24 (husband)	2.205***	5.558**	1.221
	(0.489)	(4.325)	(1.619)
Aged 25-34 (husband)	1.366***	1.309	2.022***
	(0.144)	(0.704)	(0.555)
Aged 35-44 (husband)	1.034	1.968**	1.422*
	(0.082)	(0.660)	(0.304)
Postsecondary certificate and above (wife)	1.229***	0.924	1.084
	(0.089)	(0.294)	(0.271)
High School Graduated, Some postsecondary (wife)	1.121	0.668	1.116
	(0.082)	(0.215)	(0.280)
Postsecondary certificate and above (husband)	1.162**	1.662	1.066
	(0.072)	(0.591)	(0.248)
High School Graduated, Some postsecondary (husband)	1.033	1.776*	0.868
	(0.068)	(0.619)	(0.216)
Strongly attached to labor market (wife)	0.610***	0.395***	0.609**
	(0.038)	(0.116)	(0.119)
Strongly attached to labor market (husband)	0.730***	0.554*	0.887
	(0.050)	(0.174)	(0.206)
Work force participation (wife)	1.201**	1.184	0.954
	(0.087)	(0.374)	(0.205)
Work force participation (husband)	1.359**	1.407	1.078
	(0.167)	(0.626)	(0.406)
English mother tongue (wife)	1.256	2.672***	1.181
	(0.190)	(0.822)	(0.218)
French mother tongue (wife)	1.192	1.043	1.493

Variables	(A)	(B)	(C)
	(0.211)	(0.829)	(0.544)
English mother tongue (husband)	1.050	0.667	1.366
	(0.143)	(0.214)	(0.274)
French mother tongue (husband)	1.391**	0.343	1.299
	(0.222)	(0.291)	(0.523)
Pre-school age children in family	1.147**	0.973	0.664**
	(0.076)	(0.308)	(0.133)
School age children in family	0.977	1.064	0.739
	(0.066)	(0.329)	(0.156)
MTV	0.396***	0.112***	0.249***
	(0.052)	(0.041)	(0.081)
Urban	0.819***	0.394***	0.741*
	(0.039)	(0.104)	(0.118)
Family size (number of family members)	0.975	1.032	1.014
	(0.028)	(0.144)	(0.082)
Family income	1.000	0.995	0.999
	(0.001)	(0.003)	(0.002)
Family member receipt EI	1.034	0.753	1.095
	(0.056)	(0.204)	(0.193)
Family member receipt SA	0.728**	0.577	0.919
	(0.092)	(0.265)	(0.356)
Homeowner	0.434***	0.322***	0.400***
	(0.029)	(0.092)	(0.072)
Family member moved previously	1.845***	2.708**	1.656***
	(0.106)	(1.173)	(0.249)
Unemployment rate	0.911***	1.134*	1.051
	(0.009)	(0.075)	(0.046)
Housing price index	1.008*	0.996	1.003
	(0.005)	(0.016)	(0.010)
BC	1.073	1.411	1.153
	(0.126)	(0.398)	(0.272)
Alberta	0.631***	1.228	0.948
	(0.076)	(0.522)	(0.312)
Atlantic	1.832***	1.683	1.519*
	(0.140)	(0.705)	(0.395)
Quebec	1.198*	1.169	1.176
	(0.126)	(0.654)	(0.543)
Prairies	1.058	1.137	1.447*
	(0.082)	(0.347)	(0.290)
Sample size	69,112	6,140	6,711
Wald Chi2	5415.61	339.62	417.91
Pseudo R^2	0.238	0.229	0.191
Prob >Chi2	0.000	0.000	0.000
Wald coefficient tests (prob> χ^2)			
VF=MVF		0.269	
VF=M_WVF	0.227		0.171

$VF=M_H VF$	0.421	0.064
$M_W VF= M_H VF$	0.024	0.341

Note: Odds ratios are presented. Standard errors are in parentheses. Year dummy variables are also included in the estimation. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level. Standard errors are adjusted for clustering on census family identifier.

Appendix Table A.3.4, Results of OLS Estimation of the Changes in Total Annual Hours (from t-1 to t+1, ΔH) for Husbands and Wives

Variables	Husbands (whole sample) (A)	Husbands (native-born) (B)	Husbands (immigrants) (C)	Wives (Whole sample) (D)	Wives (native-born) (E)	Wives (immigrants) (F)
wage at t-1 (husband)	38.035***	39.006***	32.264***	20.826***	19.719***	28.137***
	(2.673)	(2.837)	(8.058)	(2.270)	(2.402)	(6.754)
Wage at t-1 (wife)	-7.655***	-7.533***	-10.159***	-58.172***	-58.026***	-61.970***
	(1.208)	(1.288)	(3.524)	(1.010)	(1.068)	(3.143)
Family internal migrant	1.244	-1.089	-16.234	-80.761***	-82.346***	-116.150*
	(18.797)	(19.636)	(67.066)	(16.546)	(17.239)	(60.754)
Δ children (change in number of children)	30.099***	30.231***	-2.406	-118.165***	-117.925***	-77.535***
	(8.168)	(8.221)	(24.094)	(7.171)	(7.188)	(22.080)
Δ children * immigrant	-29.218*			40.529*		
	(23.491)			(21.274)		
Δ education (husband, yrs of schooling)	-33.839	-34.044	-33.625	-16.94	-16.626	11.252
	(23.277)	(23.273)	(63.583)	(20.252)	(20.184)	(62.574)
Δ education * immigrant (husband)	-2.056			30.012		
	(66.908)			(63.791)		
Δ education (wife)	0.843	0.788	108.299*	84.302***	84.908***	79.277
	(20.359)	(20.356)	(62.610)	(18.048)	(17.988)	(52.992)
Δ education * immigrant (wife)	104.798			4.019		
	(65.297)			(54.358)		
Δ other income/1000	-3.805***	-3.799***	-4.099***	-0.600***	-0.598***	-2.656***
	(0.160)	(0.160)	(0.465)	(0.072)	(0.072)	(0.448)
Δ other income/1000 *immigrant	-0.275			-1.436***		
	(0.480)			(0.464)		
Age(husband)	-9.899	-12.558*	8.473	-8.181	-8.286	-1.950
	(6.174)	(6.629)	(18.132)	(5.399)	(5.724)	(16.698)
Age^2(husband)	-10.404	-7.739	-28.352*	3.377	3.732	-3.793
	(6.659)	(7.20)	(18.849)	(5.839)	(6.211)	(17.632)
Age (wife)	10.523*	12.275**	2.264	77.135***	76.905***	82.877***
	(5.697)	(6.123)	(16.048)	(5.015)	(5.311)	(15.591)
Age^2(wife)	-15.818**	-17.889**	-6.305	-107.76***	-107.164***	-117.094***
	(6.749)	(7.289)	(18.476)	(5.938)	(6.314)	(17.950)
Number of years schooling (husband)	-27.696***	-28.350***	-16.082**	-14.506***	-14.049***	-16.941***
	(2.310)	(2.414)	(6.846)	(1.978)	(2.060)	(5.882)
Yrs schooling *immigrant (husband)	7.005**			-0.258		
	(3.415)			(3.172)		
Number of years schooling (wife)	-2.689*	-2.944**	-3.789	17.570***	17.448***	18.925***
	(1.445)	(1.452)	(3.849)	(1.268)	(1.271)	(3.507)
Yrs schooling *immigrant (wife)	-2.869			1.148		
	(3.828)			(3.455)		
English as mother tongue (husband)	-8.052	-2.954	-30.213	2.501	-3.816	46.206*
	(20.460)	(20.589)	(30.207)	(13.704)	(15.080)	(28.022)

Variables	(A)	(B)	(C)	(D)	(E)	(F)
French (husband)	37.515	46.652	49.376	8.420	6.766	22.302
	(25.001)	(25.471)	(81.563)	(18.799)	(19.880)	(67.743)
English/French*immigrant	-49.865			-18.243		
(husband)	(31.556)			(15.030)		
English (wife)	5.897	-2.041	-6.455	52.568***	51.921***	95.698***
	(15.773)	(18.000)	(30.700)	(17.801)	(17.831)	(27.459)
French (wife)	-8.709	-16.507	-19.316	36.861*	41.136*	-8.043
	(21.639)	(23.649)	(61.306)	(21.936)	(22.118)	(93.239)
English/French*immigrant	46.777***			60.651**		
(wife)	(17.589)			(27.846)		
Immigrant	-81.113			-112.805**		
	(55.309)			(48.964)		
Visible minority	58.418***	117.274***	26.193	-42.778**	-83.694**	-15.132
	(22.486)	(45.281)	(32.228)	(19.696)	(38.437)	(26.591)
Pre-school aged children in	-20.658**	-19.461*	-31.456	38.132***	41.906***	-0.989
family	(9.887)	(10.383)	(32.665)	(8.706)	(9.101)	(29.728)
School-age children in	12.659	12.145	17.852	54.004***	56.842***	28.755
family	(8.089)	(8.569)	(24.811)	(7.115)	(7.499)	(22.587)
Other income	1.786***	1.879***	1.264***	-0.615***	-0.432***	-2.656***
	(0.181)	(0.196)	(0.481)	(0.126)	(0.132)	(0.448)
MTV	10.228	9.159	-14.794	-10.638	-13.048	9.738
	(15.371)	(15.329)	(27.726)	(13.431)	(0.132)	(25.885)
MTV*immigrant	-39.107			25.859		
(husband/wife)	(28.321)			(25.503)		
Urban	-24.626***	-25.538***	25.762	-16.579**	-17.132**	46.589
	(8.289)	(8.298)	(31.59)	(7.306)	(7.293)	(28.319)
Urban*immigrant	44.496			45.224*		
(husband/wife)	(31.595)			(27.438)		
BC	-26.696*	-28.145*	-17.884	20.511	28.785**	-14.718
	(14.245)	(16.081)	(31.092)	(12.549)	(13.966)	(29.065)
Alberta	18.116	6.291	87.726**	15.521	12.303	31.030
	(14.918)	(15.920)	(43.330)	(13.135)	(13.895)	(40.595)
Quebec	42.724***	32.861*	91.972*	-69.224***	-78.970***	10.715
	(16.606)	(17.747)	(47.835)	(14.630)	(15.436)	(46.719)
Atlantic	104.823***	101.11***	127.980**	-136.587***	-140.579***	-66.302
	(13.803)	(14.458)	(55.381)	(12.048)	(12.595)	(48.922)
Prairies	17.714	13.206	39.012	-53.658***	-51.961***	-73.815**
	(11.362)	(12.153)	(32.837)	(10.008)	(10.638)	(29.904)
Constant	-137.412	-123.311	-354.631	-810.200***	-782.918***	-1229.603***
	(93.690)	(98.441)	(307.716)	(81.953)	(85.608)	(283.057)
Sample size	47429	42106	5323	47429	42426	5003
F	38.23	43.70	6.37	93.96	108.89	14.63
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000

Note: Standard errors are in parentheses. Year dummy variables are also included in the estimation. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level.

Appendix Table A.3.5 Full Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Husbands

Variables	Husbands (whole sample) (A)	Husbands (native-born) (B)	Husbands (immigrants) (C)
Wage at t-1 (husband)	38.132***	39.039***	30.782***
	(2.674)	(2.837)	(7.989)
Wage at t-1 (wife)	-7.217***	-7.160***	-10.118***
	(1.215)	(1.295)	(3.511)
Family internal migrant (migrated at year t)	282.973***	227.929***	382.053*
	(73.779)	(78.951)	(229.728)
Δ children (change in number of children)	29.904***	30.029***	-0.206
	(8.162)	(8.217)	(23.805)
Δ children*immigrant	-29.272*		
	(23.485)		
Δ education (husband, change in number of years schooling)	-34.022**	-34.181	-35.817
	(23.248)	(23.253)	(59.224)
Δ education *immigrant (husband)	-1.244		
	(66.814)		
Δ education (wife, change in number of years schooling)	0.844	0.765	114.054
	(20.339)	(20.343)	(61.536)
Δ education *immigrant (wife)	105.795		
	(65.276)		
Δ other income /1000	-3.805***	-3.798***	-4.119***
	(0.160)	(0.160)	(0.462)
Δ (other income/1000)*immigrant	-0.274		
	(0.479)		
Age(husband)	8.328	-11.290*	11.531
	(6.196)	(6.650)	(18.056)
Age^2(husband)	-12.126*	-9.112	-31.207*
	(6.685)	(7.222)	(18.794)
Age (wife)	10.656**	12.466**	1.315
	(5.708)	(6.129)	(15.888)
Age^2(wife)	-15.685**	-17.872**	-5.258
	(6.761)	(7.297)	(18.311)
Number of years schooling (husband)	-27.799***	-28.378***	-14.921**
	(2.311)	(2.414)	(6.786)
Yrs of schooling*immigrant (husband)	7.134**		
	(3.415)		
Number of years schooling (wife)	-2.941*	-3.163**	-3.827
	(1.446)	(1.454)	(3.818)
Yrs of schooling*immigrant (wife)	-2.810		
	(3.828)		
English as mother tongue (husband)	-8.297	-3.194	-30.724
	(20.479)	(20.613)	(30.025)
French (husband)	33.116	41.956	71.360
	(25.055)	(25.543)	(81.826)

Variables	A	B	C
English/French*immigrant (husband)	-51.338		
	(31.545)		
English (wife)	2.119	-2.937	-17.975
	(15.827)	(18.022)	(31.156)
French (wife)	-12.165	-16.858	-30.855
	(21.692)	(23.675)	(61.728)
English/French *immigrant (wife)	45.897***		
	(17.587)		
Immigrant	-82.652		
	(55.314)		
Visible minority	60.205***	114.593**	19.742
	(22.490)	(45.261)	(31.932)
Pre-school age children in family	-20.088**	-19.182*	-25.813
	(9.906)	(10.395)	(32.406)
School-age children in family	13.007**	12.478	18.158
	(8.105)	(8.579)	(24.644)
Other income /1000	1.784***	1.878***	1.306***
	(0.181)	(0.196)	(0.478)
MTV (Montreal, Toronto, Vancouver)	9.988	8.989	-18.025
	(15.362)	(15.432)	(27.494)
MTV*immigrant (husband)	-39.179		
	(28.323)		
Urban	-21.868***	-23.620***	40.134
	(8.332)	(8.330)	(32.108)
Urban*immigrant (husband)	44.236		
	(31.577)		
BC	-28.721**	-30.001*	-20.874
	(14.280)	(16.111)	(30.907)
Alberta	18.927	7.312	87.119**
	(14.946)	(15.942)	(43.127)
Quebec	45.480***	35.705**	86.030*
	(16.650)	(17.792)	(47.568)
Atlantic	101.884***	98.832***	111.502**
	(13.841)	(14.489)	(55.262)
Prairies	13.899	10.306	26.809
	(11.422)	(12.205)	(32.788)
Constant	-186.394**	-166.369	-397.136
	(94.656)	(99.586)	(306.542)
Sample size	47429	42106	5323
Lambda	-141.196***	-114.94**	-193.73*
	(35.743)	(38.371)	(109.42)
Wald chi2	5447.26	5232.95	498.90
Prob>chi2	0.000	0.000	0.000

Note: Standard errors are in parentheses. Year dummy variables are also included in the estimation. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level.

Appendix Table A.3.6, Full Results of Treatment-Effects Model Estimation of Change in Working-hours, ΔH, for Wives

Variables	Wives (whole sample) (A)	Wives (native-born) (B)	Wives (immigrants) ©
Wage at t-1 (husband)	20.946***	19.686***	26.489***
	(2.274)	(2.406)	(6.861)
Wage at t-1 (wife)	-57.621***	-57.450***	-62.051***
	(1.018)	(1.077)	(3.176)
Family internal migrant (migrated at year t)	261.507***	275.260***	-88.306
	(64.662)	(68.855)	(208.433)
Δ children (change in number of children)	-118.429***	-118.267***	-76.711***
	(7.165)	(7.185)	(21.06)
Δ children*immigrant	41.099*		
	(21.28)		
Δ education (husband, change in number of years schooling)	17.485	-17.165	10.798
	(20.216)	(20.152)	(62.328)
Δ education *immigrant (husband)	34.907		
	(63.588)		
Δ education (wife, change in number of years schooling)	84.192***	84.811***	79.772
	(18.024)	(17.967)	(52.790)
Δ education *immigrant (wife)	6.262		
	(54.347)		
Δ other income /1000	-0.599***	-0.597***	-2.581***
	(0.072)	(0.072)	(0.487)
Δ (other income/1000)*immigrant	-1.431***		
	(0.464)		
Age(husband)	-6.309	-6.027	-0.085
	(5.429)	(5.763)	(16.688)
Age^2(husband)	1.528	1.248	-5.723
	(5.873)	(6.256)	(17.618)
Age (wife)	77.276***	77.248***	83.592***
	(5.034)	(5.336)	(15.562)
Age^2(wife)	-107.580***	-107.178***	-117.962***
	(5.961)	(6.342)	(17.928)
Number of years schooling (husband)	-14.640***	-14.022***	-15.769***
	(1.979)	(2.062)	(5.948)
Yrs of schooling*immigrant (husband)	-0.116		
	(3.174)		
Number of years schooling (wife)	17.274***	17.139***	19.216***
	(1.269)	(1.273)	(3.502)
Yrs of schooling *immigrant (wife)	1.096		
	(3.456)		
English as mother tongue (husband)	1.126	-3.017	72.153**
	(13.756)	(15.149)	(50.599)
French (husband)	1.939	2.733	50.599
	(18.903)	(19.981)	(71.470)

Variables	A	B	C
English/French*immigrant (husband)	-0.116		
	(3.174)		
English (wife)	49.630***	47.708***	89.025***
	(17.853)	(17.928)	(27.918)
French (wife)	34.378	36.498	-15.625
	(24.004)	(22.230)	(93.646)
English/French *immigrant (wife)	59.475**		
	(27.841)		
Immigrant	-112.273**		
	(48.995)		
Visible minority	-39.263**	-83.556**	-24.668
	(19.715)	(38.403)	(27.585)
Pre-school age children in family	38.811***	42.500***	-0.768
	(8.741)	(9.144)	(29.653)
School-age children in family	54.425***	57.035***	29.265
	(7.143)	(7.534)	(22.549)
Other income /1000	-0.606***	-0.422***	-2.665***
	(0.126)	(0.132)	(0.446)
MTV (Montreal, Toronto, Vancouver)	-11.005	-13.218	7.108
	(13.434)	(13.435)	(25.893)
MTV*immigrant (wife)	25.315		
	(25.520)		
Urban	-13.241*	-13.916*	46.097
	(7.358)	(7.350)	(28.427)
Urban*immigrant (wife)	44.610		
	(27.422)		
BC	17.993	26.529*	-12.648
	(12.605)	(14.035)	(29.115)
Alberta	16.552	14.231	32.040
	(13.188)	(13.964)	(40.521)
Quebec	-65.740***	-74.944***	7.989
	(14.699)	(15.522)	(46.579)
Atlantic	140.027***	-144.235***	-68.620
	(12.101)	(12.657)	(48.901)
Prairies	-58.302***	-56.259***	-73.790**
	(10.083)	(10.716)	(30.150)
Constant	-869.926***	-854.083***	-1248.723***
	(82.964)	(86.987)	(282.275)
Sample size	47429	42426	5003
Lambda	-171.535***	-179.199***	-12.603
	(31.306)	(33.381)	(99.373)
Wald chi2	8076.03	7471.69	703.86
Prob>chi2	0.000	0.000	0.000

Note: Standard errors are in parentheses. Year dummy variables are also included in the estimation. The level of significance is as follows: significant at * 10%, ** 5% and *** 1% level.

Chapter 4

Migration and Job Search: Evidence from Canada

4.1 Introduction

Unemployment patterns have become complex in Canada recently. For many people, unemployment is a short-term event, but there also exists long-term joblessness and repeated unemployment. The pattern of unemployment could be affected by market conditions, personal characteristics and government policies. Lack of geographical mobility may cause long spells of joblessness as the job-losers are more likely to 'wait' for a job in the local market. An explicit investigation of recent Canadian unemployment duration using longitudinal data can help us better understand the search process of individuals.

At an aggregate level, migration acts as a major adjustment mechanism in regional labor market disparities equalization (Blanchard and Katz 1992). Some studies (see e.g. McCormick 1997; Faini, Galli, Gennari and Rossi 1997) have analyzed this by focusing on the effect of migration on labor market outcomes, especially the unemployment rate of the country and/or region. These aggregate-level studies, however, do not indicate whether or not migration is micro-efficient in a job-search perspective.

A few micro-level studies about migration have explored the relationship between unemployment and migration, but the findings are mixed. Herzog et al. (1993) and Boehm, Herzog and Schlottmann (1998) find that migration increases the probability of

reemployment. Others studies, however, find a negative or no effect of migration on the probability of re-employment (Herzog and Schlottmann 1984; Bailey 1994; Goss et al. 1994; Tervo 2000b).

In previous literature, migration has been considered as spatial job search. Seater (1979) concludes that expanding the radius of search, followed by migration, increases search duration proportionally more than the likelihood of finding an acceptable job offer. Bailey (1991) finds that migrants experience longer durations of unemployment than non-migrants do, especially for young workers. According to Schwartz (1976), unemployed workers face a tradeoff between the radius of search undertaken and the time to find an acceptable job offer. Goss et al. (1994) suggest that the likelihood of re-employment declines for migrants using a two-stage mode, considering the selection effect of migration. Boehm, Herzog and Schlottman (1998) find that migration significantly enhances job search outcomes. In their regression model, migration is taken as an indicator and they do not consider the endogeneity of the search strategy via migration, which causes biased results. Migration and employment status are interrelated. Studies (Greenwood 1975; Schlottmann and Herzog 1981; Goss and Paul 1990) show that the probability of migration is related to the duration of unemployment. So far, very few Canadian micro-studies on the issue of migration and employment transition have been undertaken, especially in a job search theoretical framework.

Most migration studies look at the general population and very few focus on unemployment workers' migration behavior. Migration can be viewed as spatial

job-search for unemployed individuals. At the individual level, an unemployed person may be inclined to migrate to another region if the perceived chances of finding a job there are higher than in the original location. By geographically extending their job search efforts, unemployed workers could face more employment opportunities and create better matches between employer and workers.

Some unemployed workers take a "move then search" strategy. In many instances, however, people search from origin and only move once a job offer is accepted, or the "search then move" strategy. Migration is the outcome of job search for many people, accompanying a change of employer and/or industry. For most of the current data, it is usually hard to tell whether people move because of new jobs, or they have a new job due to location change. For many occupations, especially skilled occupations, job search is conducted over extended space. Improved information technology makes such search more convenient and affordable. In a study discussing the effect of different employment status transitions on migration choice, Dessendre and Molho (1999) find that long-distance migration (of over 60 kilometers) hazard is highest among job-gainers compared with other transition groups and "search then move" strategy is more likely for long-distance movers.

Education level affects the job search and migration behavior. Basker (2003) shows that a job seeker having a higher education level is more likely to search more before moving. Shumway (1993) indicates that a job seeker taking the "move then search" strategy has a much higher risk of remaining unemployed than non-migrants.

Standard search theory indicates that unemployment benefits affect unemployment duration. More generous unemployment benefits prolong the unemployment duration for a given wage distribution (Mortensen 1977). The accessibility to government financial assistance may be another important factor affecting the migration decision. Receiving financial support makes the costly search in a distant market feasible. However, generosity of such resources would reduce the incentive to leave and conduct an extensive search. In a study by Audas and McDonald (2003) on the relationship between EI and geographic mobility of Canadian workers, they find that the effect of EI receipt on mobility depends on how the worker is attached to the labor market. The study shows that EI program does not have a significant effect for those with strong attachment (worked 50 weeks or more in the year prior moving) to the market, but inhibit migration for those moderately attached (worked between 20 to 49 weeks in the year prior to moving) to the market. The study above focuses on the whole labor force, not just the unemployed.

Past empirical studies on job-search focus on the intensity of search and ignore the extensive or geographic dimension of the search process (Holzer 1987), so the impact of migration was also ignored. Migration can induce more intensive and/or more extensive job search, and its final effect on unemployment duration is unpredictable.

Most studies that investigate migration efficiency generally apply two approaches: analyzing income gains to migrants; and analyzing the linkages between unemployment and employment states by migration. Those studies ignore the relationship between migration and job search process. There is a large body of literature studying the

employment status transitions from unemployment to employment based on job search theory. Duration models are generally used since exact durations provide more information than a binary variable indicating whether being employed or not.

This study analyzes migration in a job-search theoretic framework. Job-search theory supports both a positive and negative relationship between migration and duration of search unemployment. By searching in a geographically extensive manner, the job offer arrival rate could be increased in a given jobless spell and the duration of joblessness may fall. On the other hand, if unemployed worker raise their reservation wage because they are expanding their search horizon, then the jobless spell could be longer than if they only searched locally. When people are searching for jobs, they set a reservation wage, which depends on both individual human capital and labor market conditions. People may adjust their reservation wage according to the situation of the labor market. If the job seeker transfers to a different labor market, there is a change in unemployment compensation and the arrival rate of job offer, and the reservation wage will also change.

Based on the detailed event histories now available in longitudinal data, the unemployment-migration-reemployment dynamics can be better examined. This study intends to investigate the efficacy of migration within a job-search strategy by analyzing the hazard rate of state change from a jobless state to employment. The questions asked regard the role of migration in completing a job search, such as "Are migrants more likely to escape from unemployment than those who stay?", "How does the search strategy differ with different geographical mobility?", "Do individual, family and

regional characteristics affect such strategy?" In addition, the essay investigates whether the Canadian Employment Insurance program has a positive effect on the re-employment likelihood as well as its role in exiting unemployment via migration.

The remainder of the essay is organized as follows: in section 2 the theoretical framework is presented. The econometrics methodology applied in the essay is provided in section 3. The data are described in section 4. Section 5 discusses the estimation results. Section 6 concludes.

4.2. Theoretical Framework

Migration has been looked at as a human capital investment by economists. Individuals migrate if the expected returns exceed the costs incurred (Sjaastad 1962). Factors such as age, education, experience, family characteristics, and location characteristics can affect the decision to migrate according to the human capital theory of migration. The model predicts that the propensity to migrate declines with age and work experience. Highly educated individuals are more likely to migrate than less educated people. A larger family and amenities at the place of origin increase the migration costs.

Polachek and Horvath (1977) extend the above basic human capital model in a lifecycle perspective. Young people are more mobile than elders because if they migrate they will have a longer period to collect the gain from investment in migration. The lifecycle perspective of migration indicates that we need a long-term vision when studying migrant behavior.

The theoretical framework in this study is based on the standard job-search theory

(see Mortensen 1986) and a model developed by Molho (2001) considering migration and unemployment search. In standard job search theory, for each period, a jobseeker chooses between continued search and accepting an offer (Mortensen 1986). His optimal strategy is to maximize expected utility. The probability of exiting unemployment to employment is based on the job offer arrival rate and the probability of accepting an offer. The wage offer is drawn from a known distribution $f(w)$. Only when the wage offer is higher than the reservation wage is the offer acceptable.

The value of unemployment is composed of the value of income when unemployed b, the expected surplus of a job offer from local market multiplied by the probability of receiving a job offer locally, the expected surplus of a non-local job offer multiplied by the probability of receiving the job offer there and the cost of searching in all markets which is a negative item.

The value of being employed not considering the possibility of job loss is equal to the wage rate divided by the discount rate. In equilibrium, the value of unemployment is equal to the value of being employed. When the value of being employed is equal to the value of continuing search, the reservation wage can be derived. In comparing the reservation wages between the local market and the non-local market, there is a moving cost item which must be covered by the non-local market reservation wage.

According to the standard search model, if an unemployed individual searches simultaneously in the local and non-local market, the utility of search while unemployed can be expressed as

$$rU = b - c_L - c_N + \alpha_L \int_{w_L^R}^{\infty} (W_L(w) - U) dF_L(w) + \alpha_N \int_{w_N^R}^{\infty} (W_N(w) - U) dF_N(w) \quad (1)$$

where U is the value of being unemployed, r is the discount rate, rU is the flow value per period. b is the unemployment income, such as the employment insurance benefit. c_L and c_N are the cost of search in local market and non-local market respectively. α_L, the probability of receiving an offer from the local market, multiplied by the expected value increase associated with the offer is the expected value change from local market. Likewise, the expected value change from a non-local market is the probability of receiving an offer from non-local market, α_N, multiplied by the expected value increase from the offer. Wage offers from local market and non-local market are assumed to be drawn from the known distributions $F_L(w)$ and $F_N(w)$ respectively, with $f_L(w)$ and $f_N(w)$ representing the corresponding probability density functions. $W_L(w)$ and $W_N(w)$ are the values of employment at wage w.

At the reservation wage w_R, $W(w_R)=U$, so $W(w)-U=(w-w_R)/r$. From equation (1), the reservation wage at local market can be written as

$$w_L^R = b - c_L - c_N + \frac{\alpha_L}{r} \int_{w_L^R}^{\infty} (w - w_L^R) dF_L(w) + \frac{\alpha_N}{r} \int_{w_N^R}^{\infty} (w - w_N^R) dF_N(w) \quad (2)$$

If the individual accepts an offer from the non-local market, he will incur a moving cost which reduces the value of employment in the non-local market. The reservation wage from non-local market is similar to (2) but also includes monetary compensation for the moving cost.

$$w_N^R = w_L^R + m .$$

Unemployed workers with high marginal cost of extensive search are more likely to search locally. With a higher discount rate or if more impatient, the worker would be more likely to search in non-local markets to increase the chance of receiving job offer. Whether individuals choose the strategy of geographically extensive search via migration, moving cost is another determining factor. Individuals with low moving cost are more likely to search extensively and accept an offer from non-local market.

The Employment Insurance benefit will have an ambiguous effect on the hazard of migration. Receiving employment insurance benefit would increase the reservation wage in both local and non-local markets and lead to a lower exit rate from unemployment under either strategy. On the other hand, the benefit could finance the cost of moving, which makes the strategy of geographically extensive search more likely.

According to the standard search theory, reservation wage increases with employment insurance benefit, improved offer arrival rate, wage distribution and moving cost and decreases with search cost. If an individual employs a 'move then search' strategy and still searches extensively after the move, the chances of receiving offers from local and non-local markets together should be the same as the search in the original location. There is an immediate moving cost for this strategy (Molho, 2001). When the jobseeker finds the job offer arrival rate in the local market is lower compared with the non-local market, he would be more likely to end his unemployment spell by migration. The above statement is based on the exogeneity of the job offer arrival rate. Most likely, the offer arrival rate is endogenous and depends on the search intensity, which affects

search cost. Search intensity is also a part of the search strategy. Unemployed workers choose their search intensity (or search efforts) to maximize their utility. Furthermore, improved labor market conditions in a non-local market, such as a lower unemployment rate and an improved wage distribution would induce the jobseeker to put more search efforts into the non-local market.

Assuming individuals are allowed to search across several markets, the reservation wage and search effort is decided by individuals for each specific market. Search strategy is thus composed of reservation wage setting and search effort allocation. A competing-risks framework is useful in modeling this kind of search strategy and process. Under the assumption that the individual is searching simultaneously across markets and in a competing process, only the minimum duration of unemployment is observed. The search strategy of the job seeker will affect the competing results. Unemployed workers would search more intensively in those markets where the prediction of the job offer distribution leads to the highest utility of search.

For each individual, there are two potential competing processes: the hazard of exiting from unemployment via migration and the hazard of exiting from unemployment locally. Labor market conditions and individual characteristics like age, education and family characteristics will affect the choice of search strategy.

4.3 Estimation Strategy

A hazard function is generally used to estimate the probability of ending a jobless spell. It indicates the risk of an event occurring had the subject survived to a certain time *t*.

By estimating a hazard model, we can examine how the explanatory variables affect the hazard of the event.

4.3.1 Competing-risks Model

This study applies an independent competing-risks framework, allowing people to search simultaneously in the local labor market and non-local labor markets. Individuals can leave the jobless state locally or non-locally (via migration), and these two destination-specific exit routes and the latent duration time for each route is assumed independent. Only the minimum of the latent duration time from jobless to re-employment is observed. The other duration is censored, since it takes a longer time. Under this assumption, each individual has two options to leave the jobless or unemployment state. He/she can decide which one to take. Once the failure event (being employed) is realized from one route, the process is completed. The sum of each individual competing risk is equal to the single risk without division of the routes.

Jensen and Svarer (2003) suggest that the competing risk model can provide more information than the single risk model and should be preferred. The competing-risks hazard model has only been used by very few studies in migration and unemployment duration. Yankow (2004) employs a competing-risks Cox proportional hazard model to analyze the geographic mobility of displaced workers of America focusing on examining whether local labor market conditions affect the migration hazard of unemployed workers. Kettunen (2002) applies a Gompertz proportional hazard model to look at the mobility of Finnish unemployed in both industry and geographical mobility. Arntz (2005) studies the

geographical mobility of unemployed workers in Germany by using the competing-risk model, examining whether the workers are responsive to different labor market conditions.

The competing-risks model can help us understand both the duration of a state and the exit routes of leaving the state. In this study, the two routes of leaving the jobless state are: 'search and then be employed locally' and 'search and be employed non-locally via migration'. By using this approach, I can examine whether unemployed workers adopt a search strategy to extend their job search efforts geographically and what factors lead them to do so. In this essay, both semi-parametric proportional hazard model and a parametric model are applied in a competing-risks framework. The two models are discussed in the following section.

4.3.2 Semi-parametric Estimation

The Cox proportional hazard model is a semi-parametric modeling, which can be expressed as

$$h(t, X) = h_0(t)\exp(X\beta)$$

where $h(t)$ is the hazard of exiting from unemployment at t. $h_0(t)$ is the baseline hazard. β is the vector of the coefficients to be estimated and X is the vector of covariates. Cox proportional model is a semi-parametric model, since the shape of the baseline hazard is left unspecified and only the covariates, Xs, which are proportional to the hazard is estimated. The proportional model implies that the shape of the re-employment hazard function is the same for all individuals at any time t, only differing by a vertical shift due

to variations in *Xs*. For this model, only the baseline hazard varies with time but not the covariates. The flexibility of the Cox model makes it popular in survival analysis. The drawback of the specification is that it does not consider unobserved heterogeneity, which may cause biased estimates.

To control for the unobserved location fixed effect, a stratified Cox proportional hazard model is used. For each region, there is a specific $h_0(t)$. By using the employment insurance region as the strata, it could capture the geographical variation in job offer arrival rate and other regional unobserved fixed effects (including institutional and industrial structure differences) which could not be captured by the regional unemployment rate.

In the competing-risks framework, the ending events of exiting from jobless state are separated into ending in local market and ending in non-local market via migration, two competing events. There is a separated regression for each ending event, thus for each specific-destination event the estimation for baseline hazard and covariates is performed. The covariates can be the same for the two competing risks.

4.3.3 Parametric Estimation

To make a comparison with the Cox proportional hazard model, parametric estimation of the duration of unemployment is made. From Figure 4.2 and 4.3, we find that the non-parametric estimated hazard function is not monotonic but initially increasing and then decreasing. In the family of parametric models, log-logistic

distribution has such a characteristic.[1]

Log-logistic model is one of the accelerated failure time models. The accelerated failure time models assume the log of survival time T and covariate X is a linear relationship, which can be expressed as

$$\ln(T) = X\beta + \varepsilon$$

The distribution assumption about the error term ε needs to be decided. If the distribution of the error term is assumed to be a logistic distribution, the distribution of T is log-logistically distributed.

For the log-logistic model, the survival function is written as

$$S(t, X) = (1 + (\lambda t)^{1/\gamma})^{-1}$$

The hazard function is written as

$$h(t, X) = \frac{1/\gamma \lambda^{1/\gamma} t^{(1/\gamma - 1)}}{1 + (\lambda t)^{1/\gamma}}$$

Where $\lambda = exp(-\beta X)$ and γ is the shape parameter which needs to be estimated. The term $exp(-\beta X)$ determines whether the failure time is accelerated or not compared to the baseline state. If $exp(-\beta X) > 1$, the time is accelerated and so the duration to failure would be shorter. If $exp(-\beta X) < 1$, the time is decelerated and the duration time would be longer. When $exp(-\beta X) = 1$, the failure time does not change (and equals the baseline failure time). For the estimated result, if the coefficient for a covariate has a negative sign, it means the covariate reduces the duration time and increases the hazard rate.

[1] The shape parameter γ of the log-logistic model determines the specific shape of the hazard function. If $\gamma >= 1$ the hazard function is monotone decreasing and if $\gamma < 1$ the hazard function increases and then deceases.

4.3.4 Unobserved Heterogeneity

Lancaster (1979) firstly discussed the unobserved heterogeneity (or frailty[2]) in duration models. He proposes that if the unobserved heterogeneity is not controlled for the estimation is biased downward. Unobserved heterogeneity usually comes from omitted variables or/and measurement errors (Lancaster 1990). The hazard model with unobserved heterogeneity or frailty model can be expressed as

$$h(t_j \mid X, \alpha_j) = \alpha_j h(t_j \mid X)$$

where α_j is the frailty term of individual j, which is assumed to have a mean one and variance θ. If the value of α_j is greater than one, it means that the subject is more frail and has a higher hazard to failure. Generally the gamma distribution is assumed for the unobserved heterogeneity term distribution. In this study, unobserved heterogeneity at the individual level is introduced in the log-logistic model estimate.

4.3.5 Marginal Effect

Even though the estimation of the competing-risks model provides us information about the risk of leaving the state, the estimation results must be carefully interpreted. Thomas (1996) shows that the estimated qualitative effect of a covariate on the hazard for a particular risk of exit route cannot be interpreted as the qualitative effect on the hazard for the exit route. The reason is that the hazard of exit by a particular route depends on the hazard estimates for all exit routes but not just for a destination-specific risk. In this study, the effect of a covariate on the probability of ending a jobless spell via migration

[2] In the bio-medical science, frailty is an unobserved propensity to experience an adverse health event when modeling human survival times. (see Stephen P. Jenkins's online lecture notes)

depends on the coefficient estimate of the risk for ending both locally and non-locally. Lancaster (1990) also presents a similar idea in his study.

The probability of leaving the jobless state via migration can be written as

$$\Pi_N = \int_0^t h_N(t)(1-G(t))dt \quad (3) \quad \Pi_N = \int_0^t h_N(t)S(t)dt$$

where $h_N(t)$ is the hazard of being re-employed in non-local market via migration at t. $G(t)$ is the cumulative density function of leaving joblessness at t. $1\text{-}G(t)$ is the survival function at t. Equation (3) is the cumulative probability of exiting to employment via migration. Since the probability of survival depends on both exiting risks (the risk of employment in local market and non-local market), so both risks estimations should be used for the calculation. Lancaster (1990) shows that the probability of exiting jobless state via a specific route is the probability of exit via the route conditional on exiting at time t. It can be expressed as

$$P_N(t) = {}^{h_N(t)}\!\!\diagup\!\!_{h(t)} \quad (4)$$

where $h(t)$ is the hazard of exiting, which is the sum of risk by each route. The value calculated from (3) should be equal to the value from (4).

Thomas (1996) indicates that an increase in a covariate will increase the probability of exit via risk i if the estimated coefficient in h_i is larger than all the coefficients in all other risk estimations. If the marginal effect of a covariate X_i on the probability of leaving via a route i is of interest, we can do the calculation of $\partial\Pi_N/\partial X_i$ or $\partial P_N/\partial X_i$ to get the marginal effect of X_i on the probability of exiting jobless state via migration. According to Thomas (1996), we can simulate the value of the hazard for each risk route for a

reference person given the covariate values. After changing the value of X_i, re-simulate to get the risk of leaving unemployment locally and via migration respectively. By using equation (4), the difference between the two simulations in P_N is the marginal effect of the covariate X_i on the probability of leaving joblessness via migration.

4.4 Data

The dataset used for this study is the panel data from Survey of Labor and Income Dynamics (SLID) master file. SLID contains information on the start and ending date for jobless spells. The date of move is also available. SLID also provides sufficient information on respondents' employment histories. In this essay, jobless spells start from 1994 to 2002 and the entry to joblessness is allowed during a whole calendar year. The prior year *t-1* of the jobless spell start is the reference year. Taking the year of job loss as the first year, the individuals will be followed till the end of the third year. For example, if a person started his jobless spell from July 1, 1994, he will be followed for another two years till the end of 1996. The observation period *t, t+1* and *t+2* for each unemployed is from two to three years. Pooled cross sectional form of the data is used. Year indicators are used to indicate the year of job loss. The measure of jobless duration is the number of days in which the worker has no job till he finds a job or the survey ending date.

The sample selected consit of men aged 21 to 54 at the reference year, so they are aged 22-55 at the time of job loss. To yield the maximum sample size, the data collected in annual interviews in SLID from 1993 to 2004 are used, which is the total available observation period. Full-time students, retired and self-employed individuals are excluded

from the sample. Only those job losers who claim they looked for work during the jobless spell at least at one interview[3] are included. The observation period for each jobless spell in this study is around two to three years. The same individual might contribute more than one jobless spell. If the jobless spell does not end by the end of third year, it is recorded as a censored spell. Totally there are 4604 jobless spells in the sample with 4237 failures.

In this study, the unemployed are defined as those who lost a job and has ever searched for a job during the jobless spell, no matter whether they receive employment insurance or not, so in this essay "jobless spells" and "unemployment spells" are used as equivalent. Since the labor force status of 'unemployment' and 'nonparticipation' could vary within a very short period of time, I do not try to distinguish these two statuses.

In the study on migration, inter-provincial mobility is prevalent in the Canadian literature. Economic conditions could also differ greatly within a province. Moving across labor markets is the concern of the study. Migrants in this essay are defined as those who change their residence at the Census Metropolitan Area (CMA) level or employment insurance region level from one year to the next. The migration event has to occur between the jobless spell start date and ending date. Both the CMAs and employment insurance regions could be taken as labor markets. What I am concerned with is the migration between the labor markets but not within the markets. If individuals live in non-CMA area, I specify 'non-CMA' as a region, so only the move from CMA to

[3] Based on the length of jobless spell, each individual could have one to three annual interview information records during the period of joblessness.

non-CMA or from non-CMA to CMA is counted as migration, since the moves between non-CMAs cannot be identified from the CMA level variable. Most of these kinds of moves can be captured by the change in employment insurance regions. In this study, I do not separate single moves, multiple moves and return moves within the period of unemployment.

In the whole sample, there are three groups: migrants who experience a transition from unemployment to employment; non-migrants who experience a transition from unemployment to employment; and censored individuals, who remained unemployed over the whole observation period and could be migrants or non-migrants. Unfortunately, from the available information it is not possible to tell whether the migration is the result of the "move then search" strategy or the "search then move" strategy. In the literature, the former is usually called 'speculative migration' and the latter 'contract migration'.

The covariates used in the regression model include age, age squared, marital status, having pre-school age children indicator, having school age children indicator, education level, visible minority status, home ownership, residence in a urban area indicator, unemployment rate, previous moving experience indicator, voluntary separation from job indicator, tenure on previous job, previous job in public sector indicator, union membership in previous job indicator, previous unemployment experience indicator, receiving employment insurance indicator, receiving social assistance indicator, whether having other income indicator, and the ratio of employment insurance benefit and family

earnings. Year indicators and regional indicators[4] are included in the parametric models. In the Cox proportional model I use the employment insurance region as the strata (also combined with other strata variables), so year indicators but not region indicators are used in the Cox proportional model. To control for unobserved heterogeneity of individuals, detailed information about individual, family and previous job are included in the model. The same covariates are allowed to affect both hazards of exiting unemployment, locally and non-locally.

A study by Goss and Paul (1990) demonstrate that whether the individual voluntarily ended their previous employment will affect the search strategy and thus the jobless duration. An indicator variable denoting whether previous job separation is voluntary is included as a covariates. It is likely that those who voluntarily quit their job are more likely to search at non-local market and end up with a job there.

All the individual and family background covariates are measured at the reference year (the year before job loss) and taken as time-constant variables. The covariates about previous job are also time constant. The time-varying variables are receipt of Employment Insurance benefit indicator, receipt of Social Assistance benefit indicator and the ratio of EI benefit and family earnings, which is measured annually from the year of job loss. The unemployment rates are measured at the year of job loss and for the region at the end of reference year. For migrants, the unemployment rate is for the place

[4] The five regional indicators are Atlantic, BC, Ontario, Quebec and Prairies. Employment Insurance region indicators have been used, the coefficients estimates for other covariates are similar with using the five regional indicators, so only present the estimation results with five regional indicators.

of origin.

Under the Canadian EI program, the number of weeks of benefits and the amount a person receives is based on their previous salary, the amount of insurable hours accumulated, and the unemployment rate in their area of residence. Regular benefits can be paid from a minimum of 14 weeks to a maximum of 45 weeks. The rule of the system requires that to be eligible for the benefit, individuals need to be employed for a certain amount of hours in the previous 52 weeks. There is a two-week waiting period before EI benefits are paid. Unfortunately, the information about the length of receiving EI benefits is not available in SLID. The information we have is whether the worker received EI benefits the year during jobless spell and the amount of the EI benefits received in the year. If the worker voluntarily quit his job without just cause, he will not be paid any regular EI benefits. However, some reasons for quitting the job may be considered to be just cause, such as training and family reasons.

The replacement rate, which is the ratio of EI benefit and insurable earning[5], has been used to measure the generosity of the benefits. There is no information on insurable earnings.[6] I choose to use the ratio of EI benefit to census family earnings. This measurement is calculated annually from the year the individual becomes unemployed. An individual's decision about search strategy is believed to be closely related to family earnings, especially spouse's employment status and earnings.

[5] Some literature defines the replacement ratio as the ratio of the employment benefits to the expected labor income. (e.g. Folmer and Van Dijk 1988).

[6] When previous job wage is used, the variable 'EI benefit and previous wage ratio' shows only a small effect on the durations of unemployment. For the variable 'ratio of EI benefit and family earnings' in the estimates, the family earnings is current earnings, previous year family earnings have been used, the results are similar.

I hypothesize that age, education level, family characteristics and previous job characteristics all affect the individual's reservation wage and the expected value of search. These factors also affect moving cost, thus the individual's choice of search strategy can be modeled by these determinants. The EI benefit, SA benefit and other income can be seen as the unemployment income b. If the unemployed individual receives the above income, their reservation wage in both local and non-local market will be higher than those who do not have such income. On the other hand, if such income at non-local market is higher than in the local market, the expected moving cost can be compensated for and the probability of search in the non-local market would be high. Younger unemployed workers are hypothesized to have a lower reservation wage but also a lower job offer arrival rate, and the duration of unemployment could be longer or shorter than for older workers. Family characteristics such as marital status, having pre-school age children, having school age children and home ownership affect the moving cost directly. Generally, having a bigger family or having ownership of a home will increase the moving cost and thus, the reservation wage for the worker to search non-locally should be higher than those comparable individuals having no such family characteristics. If the individual is a visible minority, he/she might be inclined to stay with his co-ethnic group and the moving cost is relatively high. The individual's education level will affect the search cost, both at local market and non-local market. More highly educated workers are more efficient at receiving information during job search, so the search cost will be lower than for less educated individuals. Generally,

more highly educated individuals have a relatively higher reservation wage due to lower search cost and improved wage distribution. It is expected the more highly educated individuals are more likely to search extensively. Regional factors like unemployment rate and urban residence will influence the job offer arrival rate and the wage distribution. If the destination has a lower unemployment rate and is an urban center, it is expected that the job offer arrival rate and the average wage is relatively high, thus the individual might search more in the destination labor market. Furthermore, previous job characteristics like union membership, public sector and tenure may affect the search cost and moving cost of unemployed workers. Being in the public sector and a union member usually indicates the possibility of being protected by the previous employer. Such advantage will increase the cost of migration and increase non-local reservation wage. For the labor market policies design, identification of the risk groups is important, so this study can help identify who belongs to such groups.

4.4.1 Descriptive analysis

Table 4.1 presents the descriptive statistics of the variables for the whole sample (column 1 and 2), migrants (column 3 and 4) and non-migrants (column 5 and 6). According to the figures, the migrants are most often unmarried and less likely to have children, especially school-age children. Migrants are younger with the average age about 30 years, compared to stayers of 35 years. Visible minority groups are less likely to search non-local labor market and migrate. Workers choosing migration are more educated. There are 41% of migrants voluntarily separated from previous employment,

with only 25% of stayers being separated voluntarily. Voluntary quit probably leads to a more extensive search especially from non-local market for a better match. The migration propensity of this group is expected to be high. The figure also shows that migrants are more likely to be repeat-migrants, less likely to receive EI benefit but more likely to get the SA benefit. Ownership of housing is an important cost factor for migration. Stayers are more likely to be the owners of a home.

In the independent competing-risk framework, when analyzing the risk of 'ending jobless spell non-locally via migration', those jobless spells which were ended locally or did not end till the end of observation period are counted as right-censored. When analyzing the risk of 'ending jobless spell locally', those jobless spells which were ended non-locally or did not end till the end of observation period are counted as right-censored. For the whole sample of single risk (the risk of ending jobless spell), about 8% of the spells (having no failure occurred by the end of observation period, the number of censored spells 367/total number of observations 4604) are right censored. Around 95% (the number of censored spells 228/total number of observations 4604) are right censored for the spells of ending non-locally and 12.9% (the number of censored spells 4009/total number of observations 4604) for spells ending locally.

Table 4.1 Descriptive Statistics of the Variables, SLID

	Full sample		Migrants		Non-migrants	
Variable	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**
Age	35.035	9.813	30.584	8.741	35.323	9.810
Visible minority	0.040	0.197	0.029	0.167	0.041	0.198
Married	0.563	0.496	0.391	0.489	0.575	0.494
Disabled	0.087	0.281	0.074	0.262	0.088	0.283
Having pre-school age children	0.187	0.389	0.172	0.378	0.188	0.390
Having school age children	0.311	0.463	0.215	0.411	0.317	0.465
High school graduated and below	0.264	0.441	0.188	0.392	0.269	0.443
Some post-secondary	0.330	0.470	0.365	0.482	0.327	0.469
Certificate, or university degree and above	0.438	0.496	0.518	0.500	0.433	0.495
Previous job tenure	2.350	4.570	1.840	3.404	2.381	4.634
Member of union?	0.222	0.415	0.169	0.375	0.225	0.418
Previous employment in public sector?	0.100	0.300	0.105	0.307	0.099	0.299
Having jobless experience before?	0.729	0.444	0.708	0.459	0.731	0.443
Having other income?	0.158	0.365	0.117	0.321	0.160	0.367
Receipt of EI benefit	0.659	0.474	0.530	0.499	0.667	0.471
Receipt of SA benefit	0.083	0.276	0.148	0.355	0.079	0.269
Ratio of EI benefit and family earnings[7]	0.470	2.90	0.368	1.05	0.480	2.98
Voluntary separation from previous employer?	0.263	0.440	0.413	0.493	0.253	0.435
Moved previously?	0.124	0.330	0.272	0.445	0.115	0.319
Urban	0.634	0.482	0.687	0.464	0.630	0.483
Owner of home	0.736	0.441	0.515	0.500	0.750	0.433
Unemployment rate[8]	10.469	3.789	9.781	3.354	10.514	3.811
BC	0.059	0.235	0.081	0.273	0.572	0.232
Prairies	0.165	0.371	0.203	0.403	0.163	0.369
Ontario	0.187	0.389	0.186	0.389	0.187	0.389
Quebec	0.231	0.422	0.176	0.382	0.235	0.424
Atlantic	0.358	0.479	0.353	0.478	0.358	0.479
Median duration (days)	150		259		147	
Number of spell	4604		257		4347	
Number of failure	4237		228		4009	

Comparing the duration of unemployment between migrants and non-migrants, it is

[7] It is calculated after extreme values are removed. In the marginal effect calculation, the mean value used is for the whole sample, without removal of the extreme value.

[8] Since I was unable to obtain unemployment rate for all the years (1993-2002) in all the regions (145 CMAs or 66 EI regions), provincial annual unemployment rate is used.

found that the jobless spell is longer for migrant job searchers. The reason could be that those who search extensively across several labor markets need a longer time to gain information. Migrants generally require a higher reservation wage which has a negative effect on the hazard of re-employment. It is quite possible that for those migrants, the strategy of search in non-local market and migrate might be the 'second best choice' when they found out there is 'no chance' in local market. Even though the observed duration for migrants is longer than stayers, it is still preferable than waiting in local market with even longer jobless spell.

Life-table estimates of the survival and hazard function (Kaplan-Meier estimates)

Table 4.2 presents the time interval estimated survival function and hazard function, which is also named life-table estimator. These are nonparametric estimates. By supposing that the transition rate is equal within the interval, the estimator is an average value for the midpoint of the interval (Jenkins 2005). The plot of survival curves are presented in Figure 4.1. Figure 4.2 is the plot of the smoothed hazard curve for the whole sample. The plot of the smoothed hazard curve for migrants and non-migrants is presented in Figure 4.3.

Table 4.2 Kaplan-Meier Survival and Hazard Estimates[9]

Intervals (days)	Survival Estimate			Hazard Estimates		
	Whole sample	Migrants	Non-migrants	Whole sample	Migrant	Non-migrants
0-30	0.848	0.952	0.842	0.0035	0.0009	0.0037
30-60	0.740	0.905	0.730	0.0029	0.0010	0.0030
60-90	0.658	0.839	0.647	0.0026	0.0015	0.0027
90-120	0.581	0.788	0.568	0.0028	0.0013	0.0029
120-180	0.429	0.669	0.414	0.0035	0.0017	0.0036
180-240	0.299	0.565	0.283	0.0042	0.0019	0.0044
240-300	0.208	0.425	0.195	0.0041	0.0033	0.0042
300-360	0.159	0.340	0.148	0.0029	0.0026	0.0029
360-480	0.104	0.200	0.099	0.0023	0.0029	0.0022
480-600	0.076	0.144	0.071	0.0019	0.0015	0.0020
600-720	0.056	0.109	0.053	0.0021	0.0025	0.0021
720+	0.036	0.048	0.035	.		.

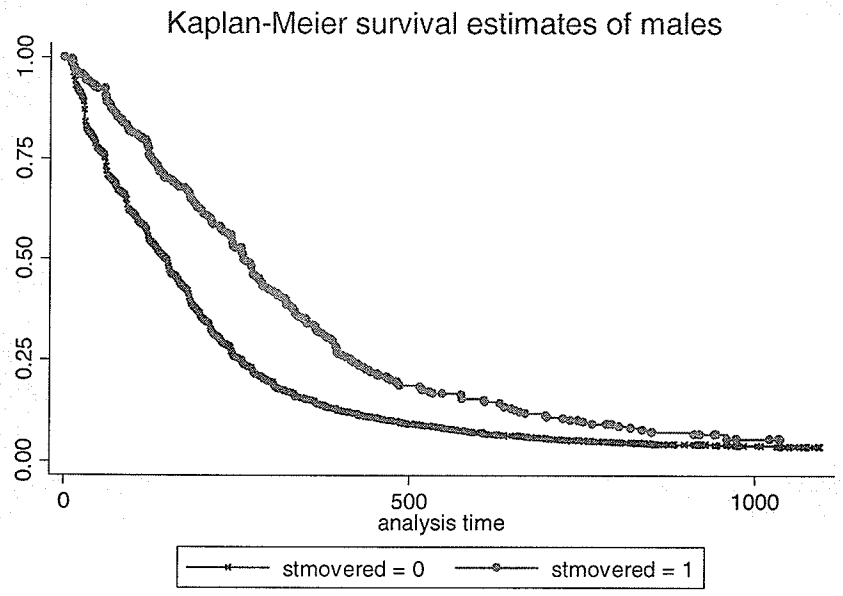

Figure 4.1 Kaplan-Meier Survival Estimates, Migrants vs. Non-migrants

Note: The 'stmovred=1' indicates the curve for migrants and 'stmovered=0' indicates the curve for non-migrants.

[9] Only the estimated vale is presented. The number of subject for migrants is relatively small, for confidential reasons, some of the absolute number of "begin total" and "death" can not be released by Research Data Center.

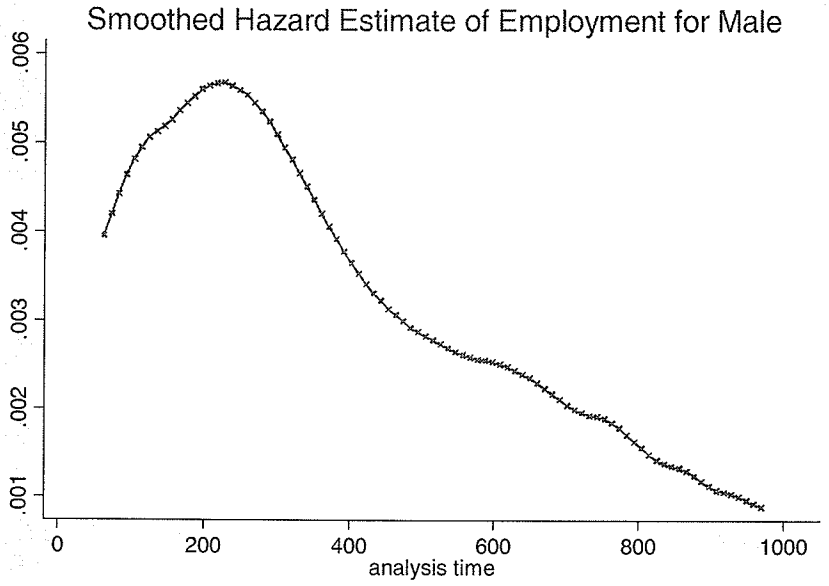

Figure 4.2 Smoothed Hazard Estimate of Employment for the Whole Sample (single risk)

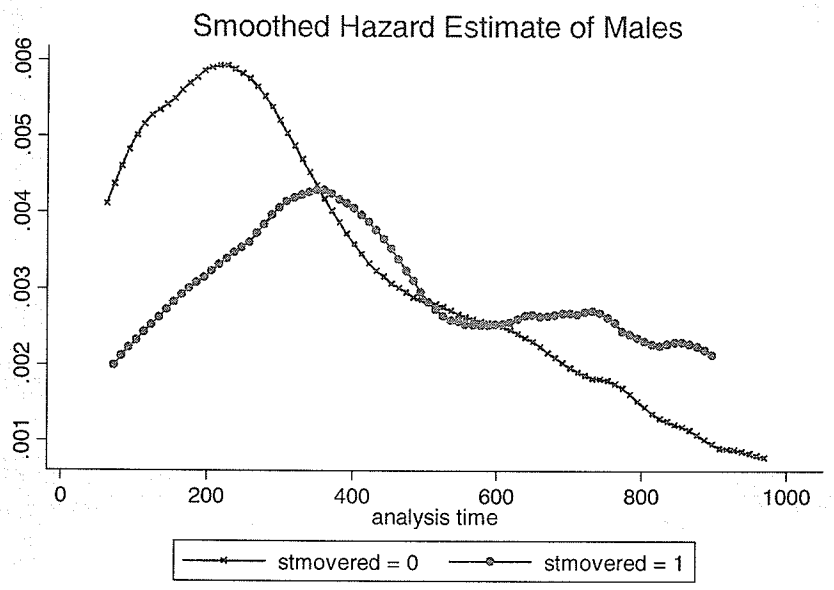

Figure 4.3 Estimated Smoothed Hazard Curve for Migrants and Non-migrants.

Notes: The 'stmovred=1' indicates the curve for migrants and 'stmovered=0' indicates the curve for non-migrants.

The survival curves and the table figures show that the survival curve for migrants is higher than non-migrants at any time (intervals) of the durations. The distance between the two curve is not constant, but increases first and then decreases, which indicates that the hazard function for the two groups would take different shape, the hazard of being employed at local market would be different than that at non-local market via migration at time *t*. Similar evidence is also found by Yankow (2004). Figure 4.3 shows that there is a big difference between the hazard of the two groups initially indicating non-migrants are more quickly exiting unemployment. When the unemployment duration has lasted approximately 300 days, the two curves cross. From Table 4.2 of the interval 300-360 days, the hazard estimates for the two risks (of exiting unemployment locally vs. via migration) is close (0.0029 and 0.0026) and the probability of survival by then for migrants is 0.340 and for non-migrants is 0.148. The log-rank test indicates that the survival functions for the two groups are different from each other. Comparing the hazard curves for single risk and the risk for stayers (Figure 4.2 and Figure 4.3), the shape of the two curves is similar, since a great proportion of the sample are stayers.

If we take migration as a risk event, defining the duration as the period from the starting date of jobless spell till the date of migration, the statistics shows that the median duration is 75 days and the mean duration is 130 days. Figure 4.4 shows the estimated smoothed hazard function of migration. We can find that the hazard is relatively high in the early period of duration and then decreasing sharply. When the duration reaches around 500 days the hazard curve has a rise. The shape of the curve indicates that if the

migration event happened at a relatively early date after unemployment, most of these migrations can be 'speculative migration'. If migrations happen at a late stage of the jobless spell, the job seekers migrate because the local job opportunities are exhausted and workers resort to migration to increase the chance of obtaining a job offer. During most time of the unemployment duration, the migration events occur at a relatively low hazard. Within the period, job seekers are more likely to search local market with greater efforts or both local and non-local markets with different effort allocations, and migrate when acceptable non-local job offer arrives.

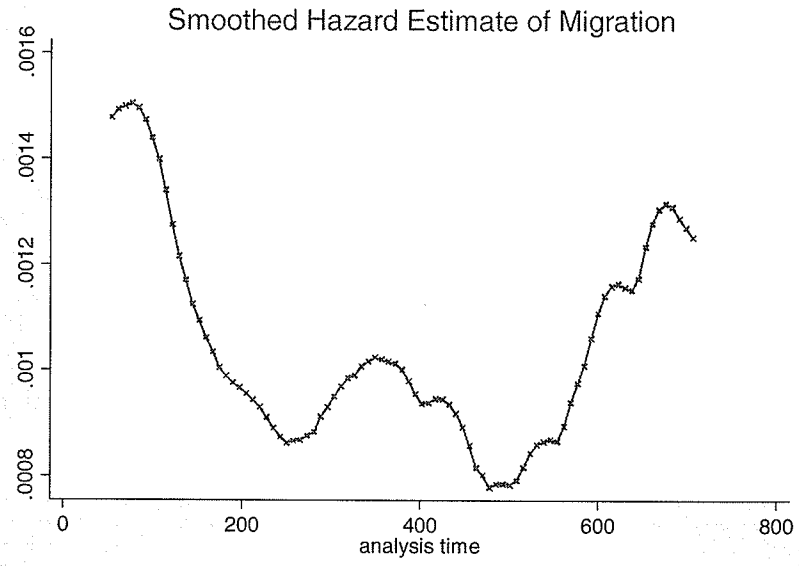

Figure 4.4 Smoothed Hazard Estimate of Migration Event

For those job seekers exiting a jobless spell via migration, if the duration start date is set as the date of migration, the median time to failure (re-employment) is 198 days, which is still longer than the median time for non-migrants of 147 days. For the

speculative migrants, the time from migration till employment could be seen as the time of search in a new market. It is possible that it takes a longer time to find a job in a new market than in local market.

4.5 Estimation Results

Semi-parametric and parametric estimation of the hazard function are conducted[10]. The models are estimated by maximum likelihood method. To satisfy the assumption of the proportional hazard model, the model is stratified by several covariates, so the estimates of those covariates can not be obtained. According to the independent competing-risks model, if the ending event is 'finding job locally', the spell ending with a non-local job is recorded as censored. Likewise, if the ending event is exiting from jobless spell to employment at non-local market via migration, the spell ending in local market employment is recorded as censored.

I firstly discuss the Cox proportional hazard model estimation results, and then the log-logistic estimation to make a comparison. Please note that the coefficient estimates of the Cox proportional hazard model take opposite signs from those for log-logistic, since the former is modeling the hazard and the latter the duration time. The estimated hazard ratio (for Cox proportional model) and time ratio (for log-logistic model) is also presented. The calculation of the marginal effect for ending non-locally via migration for each covariate is also provided. The results for the single risk model of re-employment is

[10] STATA 10 is used for the regression estimation and other data analysis in this essay.

firstly discussed and then the competing-risks of the two destination-specific routes.

4.5.1 Cox Proportional Hazard Model Estimation Results

The estimate results for Cox proportional hazard model are presented in Table 4.3. Since for each jobless spell, there is at least one observation, the robust standard error is used to deal with the clustering.

The attractiveness of the Cox hazard model is its flexibility for the shape of the baseline hazard. Whether it is appropriate to use the Cox model depends on whether the variables in the model satisfy the proportional hazard assumption. The popular test is the test of nonzero slope in a generalized linear regression of the scaled Schoenfeld residuals of time (see Grambsch and Therneau 1994). The STATA software package provides the *estat phtest* command to test individual covariates and to test globally (the whole model) the null hypothesis of zero slope. If there is a covariate which does not pass the test, the simple way to deal with the violation is to stratify the sample by the covariate. The stratified Cox model allows the form of the baseline hazard to vary across levels of stratification variables. Following this approach, I did the test for the Cox regression models. The test results for the regressions are presented in the appendix.

Table 4.3 Cox Proportional Hazard Model Estimation Results, Males of 21-54 Years of Age, Survey of Labor and Income Dynamics

Covariates	Risk of exiting jobless (single-risk) (A)		Risk of exiting jobless locally (B)		Risk of exiting jobless via migration (C)		Marginal effect (D) (existing joblessness via migration
Age	0.060*	Hazard ratio	0.048	Hazard ratio	0.096	Hazard ratio	-0.004
	(0.031)	1.061	(0.033)	1.049	(0.080)	1.101	
Age squ.	-0.104**	0.901	-0.086*	0.918	-0.192	0.825	
	(0.043)		(0.047)		(0.118)		
Visible minority	-0.436***	0.647	-0.457***	0.633	-1.329**	0.265	-0.033
	(0.128)		(0.129)		(0.636)		
Married	0.266***	1.305	-0.303***	1.354	-0.626***	0.534	-0.033
	(0.091)		(0.099)		(0.222)		
Disabled	-0.313***	0.731			-0.503	0.605	-0.010
	(0.105)				(0.337)		
Pre-school age children	0.008	1.008	-0.032	0.969	0.306	1.358	0.020
	(0.093)		(0.101)		(0.247)		
School-age children	-0.156*	0.856	-0.130	0.878	-0.027	0.974	
	(0.087)		(0.092)		(0.217)		0.007
High school graduated and below	-0.007	0.993	-0.021	1.021	-0.202	0.817	-0.019
	(0.085)		(0.094)		(0.227)		
Certificate, university above	0.158**	1.172	0.154**	1.166	0.395**	1.485	-0.012
	(0.064)		(0.070)		(0.173)		
Urban	-0.028	0.972	-0.008	1.008	-0.115	0.891	-0.004
	(0.076)		(0.084)		(0.181)		
Unemployment rate	-0.079***	0.924	-0.050	0.951	-0.212***	0.809	
	(0.029)		(0.034)		(0.045)		0.022
Moved previously?	-0.080	1.083	-0.024	0.985	0.169***	3.218	0.103
	(0.094)		(0.098)		(0.192)		
Home owner	-0.052	0.949	-0.035	0.965	-0.797***	0.451	-0.029
	(0.071)		(0.075)		(0.156)		
Previous job tenure	-0.053**	1.054	-0.062**	1.064	0.006	1.007	0.000
	(0.023)		(0.026)		(0.093)		
Previous job tenure square	-0.217**	0.804	-0.272**	0.762	0.019	1.019	
	(0.095)		(0.114)		(0.495)		
Voluntary separation from previous job	0.082	1.086	0.092	1.096	0.195	1.216	0.006
	(0.061)		(0.066)		(0.156)		
Union membership					0.220	1.247	0.013
					(0.202)		
Public sector of pre-job	-0.124	0.884	-0.176	0.838	-0.222	0.801	-0.005
	(0.099)		(0.110)		(0.250)		

Covariates	(A)		(B)		(C)		(D)
Having jobless experience	-0.167*	0.846	-0.175*	0.840	0.064	0.938	0.014
	(0.096)		(0.102)		(0.231)		
Receipt EI benefit	-0.029	1.029	-0.034	1.035	0.186	1.204	0.012
	(0.232)		(0.236)		(0.183)		
Receipt SA benefit	-0.147	0.863	-0.210*	0.811	0.209	1.232	0.025
	(0.098)		(0.110)		(0.239)		
Ratio EI/family earnings					-0.219**	0.803	-0.002
					(0.108)		
Other income?					-0.190	0.827	-0.009
					(0.219)		
Number of spells	4604		4604		4604		
Number of failures	4237		4009		228		
Log likelihood	-2548.05		-2140.23		-593.39		
Prob>chi2	0.000		0.000		0.000		

Notes: Coefficients and hazard ratios are presented. Standard errors are in parentheses. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level. Estimation on single risk of exiting jobless and hazard of exiting jobless locally is stratified by employment insurance region, other income indicator, union membership indicator and ratio of EI benefit and family earnings.

The test for non-migrants shows that there is more than one covariate violating the proportional assumption. The estimation for stayers is stratified by covariate union membership, other income indicators and ratio of EI benefit and family earnings and EI region. The cost of doing a stratified model is that the estimate for the covariates can not be derived. The test results for the regression of 'jobless spell ending via migration' presented in the Appendix indicate that there are three individual covariates, visible minority indicator and public sector indicator, that do not follow the proportional assumption, or the log hazard ratio is not significantly constant over time. Since the global test for the whole model as a whole does not show violation and those variables are important in the regression, I keep them in the model.

Column (A) refers to the estimate for single risk models, not dividing the competing risks. Column (B) refers to the estimates for risk of exiting joblessness in the local market and column (C) the risk of exiting joblessness via migration. Column (D) presents the calculation of the marginal effect of the covariates on the probability of exiting joblessness via migration given a specified change. The estimation results in column (A) show that older workers have a higher hazard of exiting jobless state to re-employment. Visible minority members significantly experience a longer jobless spell compared to the non-visible minority group. The hazard of exiting unemployment for visible minority group is only 65% of that for non-visible minority. Married men have a 30.5% higher re-employment hazard compared with their unmarried counterparts. It is possible that married men are usually the family head and supposed to have more responsibilities for supporting the family, and so are less likely to afford a costly and extended search. Disabled individuals have a lower hazard of re-employment, which is expected. Having preschool-age children does not seem to be an important factor affecting the duration of unemployment, but having school-age children prolonged the duration. Those having a postsecondary certificate or a university degree and above education level experience significantly shorter jobless spells relative to their counterparts who are less educated. Educated individuals are more able to search efficiently and effectively. The tenure for previous job has a significant positive effect on the hazard of reemployment. The probability of leaving unemployment increases with the tenure of previous job, but at a decreasing rate. One more year of job tenure increases the probability of leaving

unemployment by 4.5%.

Higher unemployment rate, reflecting a low demand level in labor market, reduces the hazard of reemployment. A one percent increase of the unemployment rate leads to a 7.6% decrease of the hazard. Those individuals having jobless experience previously experience a much longer jobless spell than those who were in joblessness for the first time. Receipt of EI benefit does not seem to be a significant factor influencing the duration of unemployment, while people who benefited from SA experience a lower hazard of exiting unemployment.

Column (B) presents the results for the local re-employment hazard. Since most unemployment spells ended locally, the size and significance of the parameters are similar with the estimation results for the single risk model of exit to employment, no matter where the spell ends. The results indicate that married men become employed earlier in local market and are more likely to choose to search locally, since family migration increases the cost of moving. Higher education level (having a postsecondary certificate, or a university degree and above) has a significant positive effect on the probability of re-employment locally. The individuals having longer tenure on previous job experience a shorter duration of unemployment in local labor market. The estimate shows that there is a negative relationship between receipt of Social Assistance benefit and the probability of exiting unemployment. Individuals receiving Social Assistance benefit experience a longer jobless spell. Receiving SA benefit could be a signal of low income and a more geographically extensive search probably is unaffordable for this

group. Another reason could be that SA programs are usually regionally specific, so individuals eligible for such benefits are more likely to stay. (Molho 2001) suggests that costly regional policy will increase the moving cost, which reduces the mobility of unemployed workers. Unemployment rate is not significant in this regression. A similar result is found by Kettunen (2002). The demand in regional market seems not to be an important determinant for re-employment, while it might affect individual's decision concerning geographical mobility.

Column (C) presents the results for the re-employment hazard via migration. Age is not an important factor affecting the hazard of migration in this regression. Married people are less likely to take the strategy of geographically extensive search, with the hazard 46% lower than for unmarried, for the reason of moving cost stated above. Visible minority group has a significantly lower probability of migration compared to non-visible minority group. Low mobility might be part of the cause for their long duration of jobless spell.

If the individual moved before, he would have a much greater chance of moving again and the probability of search in non-local market is also higher. The results indicate that the hazard of exiting joblessness via migration for repeated movers is three times the hazard for those having no previous migration experience. It seems that repeat migrants are more mobile and also more efficient at job search in new labor markets, compared with their counterparts with no previous migration experience. From column (D), the likelihood of exiting unemployment via migration increases by 14.8% if having previous

moving experience, compared to a reference individual (having no previous moving experience, see below for the definition of 'reference individual') with the probability of migration of 8.8% when the duration of joblessness reaches one year (see Table 4.5).

As expected, homeowners have a lower hazard of migration, since the ownership of housing implies a higher local specific capital investment and this investment means a higher moving cost. Homeowners are more likely to search locally rather than search extensively across non-local markets.

More educated people have a higher propensity to migrate than less educated. The hazard of migration for those having a post-secondary certificate, or university degree is 48.5% higher than those receiving some post-secondary education but no certificate. Educated individuals, having a lower search cost relatively, are more likely to search broadly to create a better employment match.

Surprisingly, a higher local unemployment rate does not lead to a higher hazard of leaving for a distant job, but a higher probability of staying. It may be because those job losers in regions with higher unemployment rate are more likely to experience a longer waiting time in jobless state before conducting an extensive job search. Migration studies show that there is a weak effect of unemployment rates on migration (Greenwood 1975; McCormick 1997). The study by Tervo (2000a) shows that higher origin unemployment rates increases out-migration, but not particularly for unemployed workers.

The parameter estimate for the receiving EI indicator takes a positive sign but is insignificant. The coefficient for the ratio 'EI benefit and family earnings' takes a

negative sign, which is expected, and its effect is significant. Generosity of the benefit makes people immobile and more likely to join the group in "waiting unemployment".

From the estimation results, it is found that the individual characteristics seem to have a stronger effect on the hazard of re-employment than the job related covariates. As stated above, only looking at the estimates for a specific-destination risk might cause misunderstanding, since the risk of failure also depends on the estimates for other specific-destination risks. Calculating the marginal effects for the interested covariates can help us confirm whether the above explanation about the estimated coefficients is correct. The calculation of marginal effect will be stated below. Checking with the Column (D), the marginal effects of the covariates are in line with the discussion above, especially those covariates that are significant.

Next, the estimates from the log-logistic model allowing for unobserved heterogeneity are briefly discussed comparing with the results from Cox proportional hazard model.

4.5.2 Log-logistic Model Estimation Results

The estimates from log-logistic model are presented in Table 4.4. The estimates for marital status, visible minority status, disability status and education level show similar direction and significance level with the estimates from the Cox proportional hazard model. A higher unemployment rate indicates a longer jobless spell for either search strategy, but the estimates from Cox proportional model indicate only the risk for migration is significantly lowered. The discrepancy between the two estimates might be

from the stratification of the Cox proportion model and different model specification about hazard distribution.

Table 4.4 Log-logistic Survival Time Model Estimation Results, Males of 21-54 Years of Age, Survey of Labor and Income Dynamics

Covariates	Risk of exiting jobless (single risk) (A)		Risk of exiting jobless locally (B)		Risk of exiting jobless via migration (C)		Marginal effect (D) (existing joblessness via migration)
Age	-0.023	Time ratio	-0.026	Time ratio	-0.023	Time ratio	-0.008
	(0.016)	0.977	(0.017)	0.974	(0.044)	0.979	
Age squ.	0.042*	1.042	0.04**	1.045	0.069	1.072	
	(0.022)		(0.022)		(0.062)		
Visible minority	0.309***	1.362	0.273***	1.314	0.855***	2.350	-0.050
	(0.087)		(0.090)		(0.267)		
Married	-0.134***	0.874	-0.154***	0.857	0.266**	1.305	-0.025
	(0.046)		(0.048)		(0.119)		
Disabled	0.121**	1.139	0.121*	1.129	0.252	1.286	-0.021
	(0.061)		(0.064)		(0.174)		
Pre-school age children	-0.009	0.991	-0.006	0.994	-0.173	0.841	0.021
	(0.049)		(0.051)		(0.135)		
School-age children	0.038	1.039	0.045	1.046	0.026	1.027	-0.002
	(0.043)		(0.045)		(0.127)		
High school graduated and below	0.006	1.006	0.003	1.003	0.091	1.096	-0.025
	(0.044)		(0.046)		(0.124)		
Certificate, university above	-0.076**	0.927	-0.067*	0.935	-0.197**	0.821	-0.018
	(0.039)		(0.040)		(0.097)		
Urban	0.028	1.029	0.030	1.031	0.069	1.071	-0.007
	(0.037)		(0.038)		(0.098)		
Unemployment rate	0.044***	1.045	0.038***	1.039	0.111***	1.118	0.028
	(0.008)		(0.009)		(0.021)		
Moved previously?	-0.123**	0.884	-0.054	0.948	-0.764***	0.466	0.130
	(0.054)		(0.057)		(0.109)		
Home owner	0.058	1.060	0.025	1.025	0.486***	1.626	-0.037
	(0.040)		(0.041)		(0.092)		
Previous job tenure	-0.022*	0.978	-0.021	0.979	0.019	1.019	0.000
	(0.012)		(0.013)		(0.036)		
Previous job tenure square	0.084*	1.087	0.080	1.083	-0.067	0.936	
	(0.050)		(0.052)		(0.161)		
Voluntary separation from previous job	-0.086**	0.918	-0.072*	0.930	-0.115	0.891	0.012
	(0.042)		(0.043)		(0.093)		

Covariates	(A)		(B)		(C)		(D)
Union membership	-0.153*** (0.042)	0.858	-0.151*** (0.043)	0.860	-0.082 (0.115)	0.922	0.007
Public sector of pre-job	0.240*** (0.055)	1.271	0.232*** (0.057)	1.261	0.199 (0.149)	1.221	-0.015
Having jobless experience	0.018 (0.051)	0.982	-0.023 (0.053)	0.977	0.101 (0.128)	1.107	-0.008
Receipt EI benefit	0.009 (0.041)	1.009	-0.001 (0.043)	0.999	-0.162 (0.098)	0.850	0.019
Receipt SA benefit	0.236*** (0.065)	1.267	0.256*** (0.067)	1.291	-0.166 (0.133)	0.847	0.026
Ratio EI/family earnings	0.031*** (0.008)	1.032	0.031*** (0.007)	1.031	0.097* (0.053)	1.102	-0.001
Other income?	0.102** (0.047)	1.108	0.092* (0.049)	1.096	0.245* (0.133)	1.278	-0.021
BC	0.070 (0.086)	1.073	0.009 (0.090)	1.009	0.652*** (0.195)	1.919	
Prairies	0.024 (0.079)	1.025	-0.038 (0.083)	0.963	0.742*** (0.174)	2.099	
Ontario	0.104 (0.069)	1.110	0.04 (0.073)	1.047	0.771*** (0.157)	2.161	
Quebec	0.101* (0.052)	1.106	0.066 (0.055)	1.068	0.524*** (0.134)	1.689	
Constant	4.572*** (0.308)		4.794*** (0.321)		5.136*** (0.790)		
Gamma	0.624***		0.646***		0.547***		
theta	1.51e-08		3.71e-09		3.09e-07		
Likelihood test of theta-=0	1.000		0.500		1.000		
Number of spells	4604		4604		4604		
Number of failures	4237		4009		228		
Log likelihood	-6642.890		-6615.141		-725.850		
Prob>chi2	0.000		0.000		0.000		

Notes: Coefficients and time ratios are presented. Standard errors are in parentheses. *** indicates significant at the 1% confidence level. ** indicates significant at the 5% confidence level. * indicates significant at the 10% confidence level.

From the log-logistic model specification, union membership increases the hazard of re-employment in local market, while being in public sector for previous job reduces such hazard. It is likely that public sector employees are more likely to search locally and

union members would be protected by employment agreement. Receiving SA benefit reduces the probability of exiting unemployment in local market, but has no significant effect on the risk of migration. A higher level of EI prolongs the duration of unemployment and decreases the risk of migration, which is consistent with the estimate from Cox proportional model. If the individual has other income, the hazard for both risks will be reduced. The region indicators show that the people in Atlantic Canada have the highest migration propensity. The time ratio estimate indicates that job seekers in Ontario will take over twice the time length to complete a transition from unemployment to employment via migration. The reason may be that the job seekers in Ontario are more likely to search locally and wait a long period before conducting a spatially extended job search.

The shape parameter estimate for the log-logistic parametric model is less than one and is positive, indicating that the hazard function increases in the early stage and then decreases. Gamma heterogeneity is allowed in the model. By using the likelihood test for H_0: $\theta=0$, the results show that there is no evidence supporting the existence of unobserved heterogeneity, so unobserved heterogeneity can be ignored.

4.5.3 Marginal Effect of Covariates

The estimation results from the Cox proportional hazard model and log-logistic parametric model are used to calculate the marginal effect of covariates on the probability of leaving unemployment via migration. The results are presented in Table 4.5.

Table 4.5 Marginal Effect of Covariates on the Probability of Exiting Jobless State via Migration Based on the Results from Table 4.4 (log-logistic model) and Table 4.3 (Cox proportional hazard model)

	Log-logistic model estimate		Cox proportional estimate	
	Probability of Exiting Jobless State via Migration	**Marginal effect**	**probability** of Exiting Jobless State via Migration	**Marginal effect**
Reference individual	0.068		0.088	0.000
Change to :				
Age=40	0.060	-0.008	0.083	-0.005
Visible minority=1	0.017	-0.051	0.039	-0.049
Married=1	0.043	-0.025	0.036	-0.052
Disabled=1	0.047	-0.021	0.055	-0.033
Preschool age children=1	0.090	0.022	0.119	0.031
School-age children=1	0.066	-0.002	0.096	0.008
Certificate, university above=0	0.050	-0.018	0.070	-0.018
High school graduated and below=1	0.043	-0.025	0.057	-0.031
Urban=1	0.062	-0.006	0.078	-0.010
Unemployment rate=8.4%	0.097	0.029	0.119	0.031
Previous move=1	0.202	0.134	0.236	0.148
Homeowner=1	0.030	-0.038	0.043	-0.045
Previous job tenure=2.82 years	0.067	-0.001	0.085	-0.003
Voluntary separation=1	0.081	0.013	0.096	0.008
Union membership=1	0.075	0.007	0.107	0.019
Public sector=1	0.052	-0.016	0.084	-0.004
Jobless experience=1	0.058	-0.010	0.097	0.009
Receipt EI=1	0.088	0.020	0.100	0.012
Receipt SA=1	0.095	0.027	0.127	0.039
Ratio of EI/family earnings=0.816	0.067	-0.001	0.085	-0.003
Other income=1	0.047	-0.021	0.074	-0.014

Note: The reference person is assumed as: who lost his job in 2002, live in Prairies region then and have a post-secondary certificate or above education. He is assumed 35 years of age; last job tenure is 2.35 years; the ratio of EI benefit to family earnings is 0.68 and the local unemployment rate is 10.5 %. All other variables are equal to zero.

I first calculate the probability of finding a job in non-local market for a reference person. Next, I change the covariate of interest and re-calculate the probability to find the difference between the two, which can be understood as the marginal effect of the

specific covariate. For the reference person, the numerical variables are set as the sample average value and most of the indicators are set to zero and when the duration of unemployment has lasted for one year (365 days)[11]. The reference person is non-visible minority, unmarried, having no pre-school-age and school-age child, not disabled, not a homeowner, not a union member, not in public sector, never being unemployed before, and involuntarily separated from previous employer. Furthermore, he lives in rural area, has no EI benefit and social assistance. I assume he lost his job in 2002, lives in Prairies region[12] and has a post-secondary certificate or a university degree. For those numerical covariates, the sample mean is set. I assume he is 35 years of age, employment tenure in previous job is 2.35 years, the ratio of EI benefit to family earnings is 0.68 and the local unemployment rate is 10.5 %. For those indictors set to zero for the reference person, I look at the change if the indicators turn to one. For the marginal effect of education, I look at if the reference person is only high school graduated or below and if he received some post-secondary education but having no certificate. The following change will be used: five years older or 40 years old; twenty percent increase in the ratio of EI benefit and family earnings to 0.84; twenty percent increase in the previous employment tenure to 2.8 years; unemployment rate reduced to 9%.

Table 4.5 shows the comparison of the marginal effect from Cox proportional hazard model and log-logistic model estimates. It shows that for most of the covariates,

[11] Since over one year duration of unemployment is usually long-term unemployment, the factors that affect entry into this risk group would be of interest to policy-makers.

[12] The 'living in Prairies' setting is only for log-logistic model estimation. For the Cox model estimation, the marginal effect is the average marginal effect of all the EI labor markets specific marginal effects, since the model is stratified by the EI regions. It is similar with other variables for stratification in the Cox model estimation.

especially the covariates with significant statistics, the marginal effect calculations are very similar. From the Cox proportional hazard, the reference person has an 8.8% probability of exiting unemployment via migration when the duration of unemployment has been one year. The calculation from Log-logistic model is 6.8%. The difference could be from the difference in model specification.

The information about marginal effect can provide a correct understanding of the estimation results in a competing-risk framework and avoid inaccurate conclusions. As discussed above, a visible minority group member has a lower probability of migration and experiences a significantly longer unemployment spell. If the reference person was a visible minority, the probability of searching extensively and obtaining a job in non-local market is reduced by 5.1% in the log-logistic model, and 4.9% in the Cox proportional model. For the reference person, if he has only a high school education, the probability of finding a job in non-local market and migration is lowered by 2.5% in the log-logistic model and 3.1% in the Cox model. The effect for other covariates could be derived from the table.

4.6 Conclusions:

In this study, semi-parametric Cox proportional hazard model and the parametric log-logistic model are employed in a competing-risk framework by using the unique Canadian longitudinal microdata to investigate the duration of unemployment by different search strategies.

The estimation results from the semi-parametric Cox proportional hazard model and

the parametric log-logistic model indicate that the individual characteristics have a stronger effect on the risk of exiting unemployment than job-related variables. The estimation results from the two models are comparable, especially when looking in a marginal effect perspective, compared with a reference person. The results indicate that married and visible minority groups are less like to conduct geographically extensive job search. Visible minority groups in general experience a prolonged jobless duration. Higher unemployment rate is found to have a significantly negative effect on the probability of exiting unemployment in general, and for the probability of migration to find a job particularly. Individual's previous moving experience is found to be an important factor influencing the probability of migration for a job. More educated individuals experience a shorter unemployment spell and are more likely to search extensively and migrate. Whether a person receives EI benefit seems to be an important factor in the models, while more generous EI income would reduce the hazard of leaving unemployment in general, as well as the risk of search in non-local market and migration. The results suggest that the current EI program does not play a significant role in encouraging the benefited individuals to search extensively and use it effectively. A higher EI level relative to family earnings would lead the individuals into the 'trap' of long-unemployment. The policy makers might improve the EI program by increasing the mobility-encouragement considerations to reduce the 'waiting unemployment'. The amount of EI benefit designation could also consider the individual's family earnings.

In future research, the econometric model can be extended to the multivariate mixed

proportional hazard (MMPH) model, which controls for unobserved heterogeneity in a competing-risks and proportional hazard framework. The identification of the model requires 'multiple spell' competing risk data, which contain multiple observations of duration time and exiting for each subject (Abbring and van den Berg 2003). Additively, it would be interesting to look at the return migration and repeat migration and their effect on the risk of employment compared with single migration.

References:

Abbring, J.H. and van den Berg, G.J. (2003) "The Identifiability of the Mixed Proportional Hazards Competing Risks Models." *Journal of the Royal Statistical Society Series* B 65: 701-710.

Arntz, M. (2005) "The Geographical Mobility of Unemployed Workers." ZEW Discussion Paper No. 05-34 ftp://ftp.zew.de/pub/zew-docs/dp/dp0534.pdf

Audas, R. and McDonald, J. T. (2003) "Employment Insurance and Geographic Mobility: Evidence From the SLID." SRDC Working Paper Series 03-03

Basker, E. "Education, Job Search and Migration" Working Paper, 2003 http://www.iza.org/en/webcontent/events/transatlantic/papers_2003/basker.pdf

Blanchard, O. J. and Katz L.F. (1992) "Regional Evolutions" *Brookings Papers on Economic Activity* 0(1): 1-61.

Boehm, T. P., Herzog, H. W. and Schlottmann, A. M. (1998) "Does Migration Matter? Job Search Outcomes for the Unemployed." *The Review of Regional Studies* 28(1): 3-12.

Cahuc, P. and Zylberberg, A. (2004) Labor Economics, The MIT Press, London, England, 147-150

Compton, J. and Pollak, R. A. (2007) "Why are Power Couples Increasingly Concentrated in Large Metropolitan Area?" *Journal of Labor Economics, 25*(3): 475-512.

Dessendre, C. D. and Molho. I. (1999) "Migration and Changing Employment Status: A Hazard Function Analysis." *Journal of Regional Science* 39(1): 103-123.

Faini, R., Galli, G., Gennari, P., and Rossi, F. (1997) "An empirical puzzle: falling migration and growing unemployment differentials." *European Economic Review* 41:571–579

Goss, E. P. and Schoening, N. C. (1984) "Search Time, Unemployment and the Migration Decision." *The Journal of Human Resources* 19: 570-579.

Goss, E. P. and Paul, C. (1990) "The Impact of Unemployment Insurance Benefit on the Probability of Migration of the Unemployed." *Journal of Regional Science* 30: 349-58.

Goss, E. P., Paul C. and Wilhite, A. (1994) "Duration on Unemployment: Geographic Mobility and Selectivity Bias" *The Review of Regional Studies* 24(2): 127-42

Grambsch, P. M. and Therneau, T. M (1994) "Proportional Hazard Tests and Diagnostics Based on Weighted Residuals." *Biometrika* 81: 515-526.

Greene, W. H. (2003) Econometric Analysis, Prentice Hall International Edition.

Greenwood, M. (1975) "Research on Internal Migration in the United States: A Survey." *Journal of Economic Literature* 13:397-433.

Herzog, H.W. Jr. and Schlottmann, A. M. "Labor Force Mobility in the United States: Migration, Unemployment, and Remigration." *International Regional Science Review* 9(1): 43-58.

Herzog, H. W., Schlottmann, A. M. and Boehm, T. P. (1993) "Migration as Spatial Job-search: A Survey of Empirical Findings" *Regional Studies* 27(4): 327-340

Holzer, H. J. (1987) "Job Search by Employed and Unemployed Youth." *Industrial and Labor Relations Review* 40(4): 601-11

Jenkins, S. P. Survival Analysis, Lecture Notes, http://www.iser.essex.ac.uk/teaching/degree/stephenj/ec968/pdfs/ec968lnotesv6.pdf

Jensen, P. and Svarer, M. (2003) "Short- and Long-term Unemployment: How Do Temporary Layoffs Affect This Distinction?" *Empirical Economics* 28:23-44.

Kettunen, J. (2002) "Labor Mobility of Unemployed Workers." *Regional Science and Urban Economics* 32, 359-380

Kiefer, N. (1988) "Economic Duration Data and Hazard Functions." *Journal of Economic Literature* 26: 646-679.

Lancaster, T. (1990) "The Econometric Method for the Duration Data." Cambridge, U.K.: Cambridge University Press.

McCormick, B. (1997) "Regional Unemployment and Labor Mobility in the UK." *European Economic Review* 41: 581-9.

Molho, I. (2001) "Spatial Search, Migration and Regional Unemployment." *Economica* 68: 269-283.

Mortensen, D. T. (1977) "Unemployment Insurance and Job Search Decision." *Industrial and Labor Relations Review* 30(4): 505-17.

Mortensen, D. T. (1986) Job Search and Labor Market Analysis. Handbook of Labor Economics Vol 2, eds. O. Ashenfeller and R. Layand, 489-919. Amsterdam: North Holland.

Schlottmann, A. M. and Herzog, H. W. Jr. (1981) "Employment Status and the Decision to Migration." *Review of Economics and Statistics* 63: 590-8.

Schwartz, A. (1976) "Migration, Age and Education." *Journal of Political Economy* 84: 701-19

Seater, J. J. (1979) "Job Search and Vacancy Contacts." *American Economic Review*

69:411-19

Shumway, J. M. "Factors Influencing Unemployment Duration with a Special Emphasis on Migration: an Investigation Using SIPP Data and Event History Methods." *Papers in Regional Science:* 72(2): 159-176.

Tervo, H. (2000a) "Migration and Labor Market Adjustment: Empirical Evidence from Finland 1985-90." *International Review of Applied Economics* 14, 331-349.

Tervo, H. (2000b) "Post-Migratory Prospects: Empirical Evidence from Finland." *Labor* 14, 331-349.

Thomas, J. M. (199) "On the Interpretation of Covariate Estimates in Independent Competing-Risks Models." *Bulletin of Economic Research* 48-1: 0307-3378.

Westerlund, O. (1998) "Internal Migration in Sweden: The Effects of Mobility Grants and Regional Labor Market Conditions." *Labor* 12, 363-388.

Yankow, J.J. (2004) "The Geographic Mobility of Displaced Workers: Do Local Employment Conditions Matter?" *The Review of Regional Studies* 34(2): 120-136.

Appendix Table A.4.1

Proportion assumption test for Cox proportional hazard model (the regression for the risk of ending joblessness via migration)

Variable	rho	Chi2	Degree of freedom	Prob>chi2
Age	0.005	0.01	1	0.905
Age squ.	-0.005	0.01	1	0.913
Visible minority	-0.127	10.90	1	**0.001**
Married	-0.038	0.58	1	0.448
Disabled	-0.019	0.17	1	0.685
Pre-school age children	0.043	0.72	1	0.396
School-age children	-0.038	0.60	1	0.438
High school graduated and below	-0.025	0.31	1	0.578
Certificate, university above	-0.002	0.00	1	0.975
Urban	-0.080	2.63	1	0.105
Unemployment rate	0.004	0.02	1	0.899
Moved previously?	-0.069	2.81	1	0.100
Home owner	0.009	0.03	1	0.871
Previous job tenure	0.006	0.08	1	0.778
Previous job tenure square	-0.012	0.35	1	0.554
Voluntary separation of previous job	-0.030	0.28	1	0.595
Union membership	0.005	0.01	1	0.919
Public sector of pre-job	0.108	3.71	1	**0.054**
Having jobless experience	0.015	0.18	1	0.674
Receipt EI benefit	0.049	0.88	1	0.347
Receipt SA benefit	0.048	0.73	1	0.392
Ratio EI/family earnings	0.050	1.50	1	0.220
Other income?	0.072	1.71	1	0.191
Yr1995	-0.075	1.93	1	0.165
Yr1996	-0.00	0.00	1	0.988
Yr1997	-0.052	0.74	1	0.391
Yr1998	0.003	0.03	1	0.956
Yr1999	-0.030	0.31	1	0.576
Yr2000	-0.024	0.52	1	0.469
Yr2001	0.002	0.00	1	0.975
Yr2002	0.001	0.00	1	0.978
Global test		35.25	31	0.274

Note: The test is based on the *estat phtest* command in STATA. Detailed test for individual covariates and global test results are presented. The estimation is stratified by employment insurance region.

Appendix Table A.4.2

Proportion assumption test for Cox proportional hazard model (the regression for the risk of ending joblessness at local market)

Variable	rho	Chi2	Degree of freedom	Prob>chi2
Age	0.024	2.19	1	0.138
Age squ.	-0.028	3.05	1	0.081
Visible minority	0.027	2.34	1	0.126
Married	-0.021	1.56	1	0.211
Pre-school age children	0.009	0.29	1	0.592
School-age children	-0.014	0.64	1	0.423
High school graduated and below	0.001	0.00	1	0.975
Certificate, university above	-0.008	0.23	1	0.630
Urban	0.015	0.72	1	0.397
Unemployment rate	-0.004	0.06	1	0.812
Home owner	0.032	3.82	1	**0.051**
Previous job tenure	0.013	0.85	1	0.356
Previous job tenure square	-0.006	0.23	1	0.630
Voluntary separation of previous job	-0.004	0.07	1	0.790
Public sector of pre-job	0.009	0.19	1	0.660
Jobless experience	0.020	1.95	1	0.163
Receipt EI benefit	0.019	1.23	1	0.268
Receipt SA benefit	-0.002	0.01	1	0.906
Ratio EI/family earnings	0.051	1.55	1	0.213
Other income?	0.077	1.90	1	0.168
Yr1995	0.010	0.36	1	0.546
Yr1996	-0.007	0.20	1	0.654
Yr1997	0.015	0.80	1	0.370
Yr1998	-0.002	0.01	1	0.922
Yr1999	-0.000	0.00	1	0.991
Yr2000	0.004	0.06	1	0.802
Yr2001	0.017	0.99	1	0.320
Yr2002	-0.011	0.40	1	0.527
Global test		31.80	26	0.200

Note: The test is based on the *estat phtest* command in STATA. Detailed test for individual covariates and global test results are presented. The estimation is stratified by employment insurance region, other income indicator, disability indicator, union membership indicator and EI and family earnings ratio.

Appendix Table A.4.3

Proportion assumption test for Cox proportional hazard model (the regression for the single risk of ending joblessness)

Variable	rho	Chi2	Degree of freedom	Prob>chi2
Age	0.023	2.20	1	0.138
Age squ.	-0.025	2.56	1	0.110
Visible minority	0.034	3.80	1	**0.051**
Married	-0.027	2.73	1	0.100
Disabled	-0.019	0.40	1	0.237
Pre-school age children	0.006	0.11	1	0.741
School-age children	-0.017	1.17	1	0.280
High school graduated and below	-0.001	0.01	1	0.939
Certificate, university above	0.012	0.48	1	0.487
Urban	-0.001	0.00	1	0.964
Unemployment rate	-0.007	0.21	1	0.647
Moved previously?	-0.021	1.86	1	0.173
Home owner	0.026	2.68	1	0.102
Previous job tenure	0.001	0.01	1	0.930
Previous job tenure square	0.002	0.02	1	0.899
Voluntary separation of previous job	-0.002	0.01	1	0.914
Public sector of pre-job	0.011	0.34	1	0.557
Jobless experience	0.018	1.64	1	0.200
Receipt EI benefit	0.015	0.89	1	0.345
Receipt SA benefit	0.003	0.04	1	0.836
Yr1995	0.008	0.24	1	0.625
Yr1996	-0.005	0.11	1	0.738
Yr1997	0.017	1.07	1	0.301
Yr1998	0.001	0.01	1	0.926
Yr1999	-0.006	0.14	1	0.711
Yr2000	0.006	0.14	1	0.705
Yr2001	0.012	0.59	1	0.444
Yr2002	-0.009	0.36	1	0.549
Global test		37.02	28	0.118

Note: The test is based on the *estat phtest* command in STATA. Detailed test for individual covariates and global test results are presented. The estimation is stratified by employment insurance region, other income indicator, union membership indicator and EI and family earnings ratio.

Chapter 5
Conclusion

Internal migration has been long looked at as a human capital investment and an important mechanism of equilibrating regional disparities in employment opportunities. This area, however, is under-studied. One important reason is the limitation of suitable data that follow migrants over time.

In Canada, immigrants have been making a significant contribution to the economy. A large proportion of immigrants choose to live in large metropolitan areas. The spatial concentration of immigrants has raised considerable concerns. At the same time, studies show that recent immigrants experience a slower assimilation process than earlier immigrant cohorts.

The goal of the dissertation, composing three essays, is to make an in-depth analysis of internal migration behavior by looking at different group of people (immigrant individuals, immigrant families and unemployed) and different aspects of migration effect, such as wages, working hours and unemployment duration. The research will contribute to an understanding of how internal migration affects the well-being of people.

The issue of immigrant assimilation has been addressed by many studies. The assimilation process, however, has received limited attention. The dissertation contributes to an understanding of immigrant assimilation process by investigating their human capital investment behavior, internal migration particularly. The first two essays of the

dissertation focus on the issue of immigrant internal migration. The first essay investigates the human capital investment behavior of immigrants, migration particularly, and the earnings in their first few years in Canada by using the unique Longitudinal Survey for Immigrants to Canada (LSIC). The comparable Canadian-born sample is from another longitudinal dataset the Survey of Labor and Income Dynamic (SLID).

The study finds that social-ties are significant factors reducing the propensity to migrate for new immigrants. Language proficiency is an important factor affecting the probability of migration and participation for new immigrant. From the statistics, it is shown that immigrant migrants earn higher weekly wages than their counterparts who did not migrate. The raw premium is around 16.4%. After controlling for observed characteristics in the regression, the migration premium is about 9.8%. Furthermore, when the migration and participation self-selections are accounted for, there is evidence that migration behavior has a significant positive effect on immigrants' earnings. The migration premium is around 40.5%. For Canadian-born sample, in contrast, the statistics show that the hourly wage rate for migrants is 3.6% lower than that for non-migrants. It is found that migration activity does not play an immediate significant role in the wage development of Canadian-born men when the selections are considered.

The regression results show that there is negative migration selection for immigrants, indicating that internal migrants have unobserved characteristics which both increase the probability of migration and depress earnings. For Canadian-born, positive

selection of migration is found, which implies that selection into migrant group contributes positively to wages. In this study, it is found that there is significant negative selection into the labor force for both immigrants (after four years in Canada) and Canadian-born. In general, selection into the labor force contributes negatively to the earnings.

Great progresses are found for immigrants in their first four years in Canada, including weekly wages, participation rate and weekly working hours. The investments in Canadian work experience, training (excluding language training) and internal migration are found to bring them higher earnings. The most important results of this study is that the internal migration activity plays an active role in immigrant wage development and assimilation process during their first four years in Canada, which suggests that the Canadian government should pay more attention to the geographical mobility of new immigrants and initiate settlement policies to encourage dispersed settlement.

Since the argument of the Family Investment Hypothesis (Long 1980), it is important and interesting to study immigrant women's assimilation process and their human capital investment behaviors. Interactions between family members and family investment strategies have been found to be important elements in immigrant assimilation process.

The second essay investigates the family migration behavior of immigrants and Canadian-born and the consequences of labor supply for men and women, using the data

from the Survey of Labor and Income Dynamics (SLID).

Statistics from this study indicate that immigrant families (IF) are the least mobile across the four family types and 'immigrant-wife native-husband' families (M_WIF) have the highest migration rate. After controlling for characteristics differences among families, the regression results show that immigrant families are not significantly less mobile than mixed families and native families.

The above study finds that the structure of the determinants of internal migration across different family types is basically similar, but factors like unemployment rate, residence in MTV and urban area and having pre-school aged children have different effect on family migration propensity among family types. The empirical results imply that immigrant families and mixed families are more sensitive to variations in regional employment situations than native families. It is also found that immigrant families in MTV and urban area are the least likely to migrate compared with native families and mixed families, which contributes to the low migration propensity of immigrant families. The results from decomposition technique also indicate that living in MTV contributes a great portion of the gap in average migration rate between immigrant family and native family.

In the analysis of annual hours change, the results indicate a positive effect of internal migration on the labor supply for men and native women when the self-selection of migration is controlled for. The selection into migrants is found to be negative,

indicating that unobserved characteristics that increase the probability of migration are associated with smaller change (e.g. increase) in hours. The changes in hours of immigrant women, however, are not found to be affected by family migration and there is no evidence of migration selection. If a positive change in hours for immigrant men indicates an 'assimilation in hours' (Baker and Benjamin 1997), this study suggests that immigrant men who migrated are better off in the assimilation process by moving to a new labor market.

The third essay has the same research interest of internal migration as the first two but focusing on analyzing the unemployed individuals in Canada. This essay investigates the duration of unemployment by different job search strategies—local search or geographically extensive search. After looking at the effect of migration on wages and labor supplies, the two key issues in labor market, unemployment duration is another one that has attracted much attention lately and that could be affected by migration behavior.

In this study, the semi-parametric Cox proportional hazard model and the parametric log-logistic model are employed in a competing-risk framework. The estimation results indicate that the individual characteristics have a stronger effect on the risk of exiting unemployment than job-related variables. The estimation results from the two models are comparable, especially when looking in a marginal effect perspective, compared with a reference person. The results indicate that married and visible minority groups are less like to conduct geographically extensive job search. Visible minority

groups in general experience a prolonged jobless duration. Individual's previous moving experience is found to be an important factor influencing the probability of migration for a job. More educated individuals experience a shorter unemployment spell and are more likely to search extensively and migrate. Whether a person receives EI benefit seems to be an important factor in the models, while more generous EI income would reduce the hazard of leaving unemployment in general, also the risk of search in non-local market and migration. The results suggest that the current EI program does not play a significant role in encouraging the benefited individuals to search extensively and use it effectively.

The findings from the studies have implication on both immigrant selection and settlement policies. Canadian government might consider adding the factor of intended destination of applicants in the point system, e.g. awarding some points if the applicants choose the less populated provinces or cities as their intended destination, since current selection criteria do not include such factor except the provincial (such as Manitoban, Prince Edward Island) nominee programs, by which applicants are encourage to settle in economically less prosperous provinces[1].

Because of language barrier and limited access to information, immigrants usually choose to live in ethnic enclaves or live close to relatives or friends to overcome the problems. These problems also make the cost of migration high. Government might consider effective way of providing information prior or post immigration and also the

[1] The nominated individuals are eligible to apply for a permanent resident visa through Citizenship and Immigration Canada (CIC) as a Provincial Nominee. CIC generally expedites permanent resident applications from Provincial Nominees.

language training programs.

Even though the internal migrants were found experienced significant wage development in the above studies, we should be careful in immigrant policy making regarding immigrant relocation. Policy encouraging immigrants migrate to less populated centers may be not ideal for new arrivals, since economic progress could slow down with less connections and supports from the community. Thus, the policy of re-direct immigrants out of MTV should have a long-run perspective. Otherwise, both high and low level of mobility could result in reduced level of integration.

The attraction of the three biggest cites comes from their large ethic communities and cultural and social environment for immigrants. To attract and retain immigrants, regional government might consider the cultural and social needs of local immigrants and provide support to access opportunities for economic advancement, as well as contacts with local communities. Furthermore, immigrant policies should consider the variances with immigrant categories, i.e., economic class, family class and refugees. Family class and refugees might not face the same policy of dispersion as that for economic class.

The findings from the third essay suggest that the current EI program does not play a significant role in encouraging the benefited individuals to search extensively and use it effectively. The government might consider include some rules in the EI program to induce unemployed workers to search geographically extensively, for example, job searchers could receive additional subsidies for relocation if job offer were received from

non-local labor market, or job seekers could be benefited for a longer period of EI benefit. On the other hand, government should provide more job market information to the unemployed workers to increase the efficiency of searching, especially the non-local market information. Since the study found a higher EI -family earnings ratio would lead to a lower unemployment exit rate, the current EI program might consider the factor of family earnings when deciding the benefit amount. Higher than a certain EI-family earnings ratio, for instance, should receiver a relatively lower level of EI benefit, given that he/she meets the requirements of the EI program.

Furthermore, evidence of self-selectivity of migration is found in the wage and labor supply analysis in my studies. This indicates that it is important to consider the self-selections when analyzing the effect of migration on wages and labor supply.

In the above studies, the immediate (one to two years after migration) effect of migration on wages, annual hours and unemployment duration is examined. The analysis in the future can be extended to the long run consequence of migration. In the future, a larger data set could be used to analyze the migration pattern based on destination choice and more detailed analysis based on ethnicity group or place of birth. Additively, it would be interesting to look at the return migration and repeat migration and their effect on the wages, working hours and risk of employment compared with single migration.