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Social Capital and Labour Market Outcomes of Recent Immigrants to Canada: Employment Entry, Wages and Duration of Access to the First Job in Intended Occupation

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Social Capital and Labour Market Outcomes of Recent Immigrants to Canada: Employment Entry, Wages and Duration of Access to the First Job in Intended Occupation

Li Xue

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Acceptance

Dedications

This thesis is dedicated to

Mom, Ruirong Luo

Husband, Hong Tan

&

Daughter, Ally Tan

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Legend

CA	Census Agglomeration
CMA	Census Metropolitan Area
EDS	Ethnic Diversity Survey
FE model	Fixed-effects model
GEE	Generalized Estimating Equations
HT model	Hausman-Taylor model
IMDB	Longitudinal Immigration Database
IV model	Instrumental Variable model
LR	Longitudinal Respondent
LSIC	Longitudinal Survey of Immigrants to Canada
LSIA	Longitudinal Survey of Immigrants to Australia
MMP	Mexican Migration Project
NAICS	North American Industry Classification System
NOC	National Occupation Classification
RE model	Random-effects model
SOC	Standard Occupational Classification

Abstract

This thesis consists of three studies on the role of social capital on the economic performance of recent immigrants to Canada in terms of employment probability, wages and time taken to access to the first job in intended occupation.

The first study addresses literature gaps by performing an empirical analysis of the relationship between social capital and employment entry of recent immigrants using the Longitudinal Survey of Immigrants to Canada (LSIC). The research builds indicators of social capital based on a network-based concept using information unique to the LSIC, considering the types of networks (kinship, friendship, organization) and their content (size, diversity, density, quality). The study further explores the relationship between those indicators and employment likelihood of immigrants, using panel logit models including fixed-effects, random-effects and generalized estimating equations (GEE) population-averaged models to control for unobserved individual heterogeneity. The analysis reveals significant variability in the social capital stock across immigration classes and ethnic groups; furthermore, social capital stock, as measured by various indicators, influences the probability of employment in the initial four years. Possibly through a more ethnically diverse network, social capital plays an important role in facilitating the economic assimilation of recent immigrants in terms of a higher probability of getting employment.

The second study of the thesis investigates the interactions between social capital and immigrants' wages, attempting to deal with some of the difficulties faced by previous studies on returns to social capital. The suspected correlation between social capital and unobserved individual ability motivates the study to treat social capital as endogenous. The estimator proposed by Hausman and Taylor (1981) is used to take into account this endogeneity. This estimator is then shown to be efficient and consistent and is favoured over other panel data estimators. The results indicate that social capital adds to human capital and has important effects on immigrant wages during their first years in Canada. Strong ties such as family networks and friends dominate weak ties such as organizations in helping immigrants get higher wages during their first four years in Canada. This is true especially for those who are disadvantaged with respect to their human capital. Meanwhile, the ethnic

diversity of the workplace network is the most influential factor within social capital that affects wages for both male and female immigrants.

Using detailed information on employment trajectory and intended occupation provided by the LSIC, the third study of the thesis examines the occupational outcomes of recent immigrants in terms of duration of access to the first job in intended occupation. The matching between actual and intended occupations is obtained from the first two digits of occupational codes, considering both occupation type and skill level. Using a Cox proportional hazard model framework, the study investigates the roles of both human capital and social capital in speeding up the matching process of actual and intended occupations. It finds that the initial year in Canada is critical for an immigrant to land a job in intended field and after this period the hazards of finding employment in intended occupation flatten down for both genders. The results confirm the hypothesis that while human capital such as education and language ability, especially English proficiency and Canadian work experience, facilitates an immigrant's employment access to his or her intended occupation, social capital, mainly friend networks, also plays a role in hastening access to employment in desired occupational fields for both genders.

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Chapter 1 Introduction

Section 1.1 Social capital and economic integration of immigrants

There is growing evidence that the economic outcomes of recent immigrants declined in comparison with earlier cohorts (e.g. Bloom, Grenier and Gunderson 1995; Picot, Hou and Coulombe 2007). In light of the difficulties of recent immigrants to assimilate into the Canadian labour market, the role of social capital as a mechanism for understanding the socio-economic progress of immigrants is increasingly prompting public interest (Kunz 2005). Different definitions of social capital have been used to examine broad contexts including, but not limited to, educational attainment (Sun 1999; Israel and Beaulieu 2004), job search (Montgomery 1991), health services utilization (Deri 2005), second generation outcomes (Aydemir, Chen and Corak 2005), and private philanthropy (Apinunmahakul and Devlin 2008).

Recent theoretical developments on social networks and employment based on matching models suggest that social capital may facilitate the job-skill matching process and offer a better fit between employees and employers through information transmission within social networks (e.g. Calvó-Armengol and Jackson 2003, 2007; Granovetter 1995; Lin 2001). It is now well established that social capital is a resource that resides in interpersonal networks and that workers draw upon it to access employment and better job opportunities (e.g. Granovetter 1995; Lin 2001).

Among various indicators of labour market outcomes, employment entry and returns to social capital in the labour market for general population have been explored increasingly over the last decade (e.g. Lin 1999; Staiger 1990; Calvó-Armengol and Jackson 2003). Despite an important theoretical literature arguing that using contacts or networks increases wages and occupational status (e.g. Granovetter 1995; Lin 2001), the empirical results on the effects of social capital on labour market outcomes vary with the contexts of the studies. The disparity of measurements of social capital and the unavailability of relevant data leave the

empirical question open.

When the question on the role of social capital in the labour market is extended to the immigrant population, new issues arise. While it is often argued that immigrants are at a disadvantage in the labour market because they have less social capital than natives (Aguilera 2003; Sanders, Nee and Sernau 2002), most of the research into the determinants of labour market outcomes has focused on the role of human capital and the structure of the labour market. Limited attention has been paid to the empirical investigation of the influence of social networks on the economic performance of newcomers, let alone to a potential correlation between social capital and labour market outcomes. Examining the determinants of labour market outcomes for recent immigrants, including social capital components, is an essential step in understanding the deterioration of economic outcomes.

Contrary to the quite consistent findings that social capital enhances employment outcomes for non-immigrants, some existing studies on social capital and immigrant economic outcomes indicate that this positive relationship does not necessarily hold for immigrants (e.g. Potocky-Tripodi 2004). Meanwhile, some other studies support the argument that social capital is important for the economic integration of immigrants, especially for those disadvantaged in the labour market (e.g. with less human capital) (e.g. Livingston 2006).

Mainly because of data limitations, most studies focus on specific immigrant groups, ignoring unobserved individual heterogeneity. In addition, the potential endogeneity of social capital effects is another arguable issue. One explanation for the wage differentials is unobserved individual heterogeneity, which is likely to affect a person's social network characteristics as well. However, the existing literature in the context of immigrant integration does not deliver endogenous social capital effects on wage outcomes.

Occupational outcomes are considered an important indicator of labour market performance and employment quality. For immigrants, the matching between skills and labour market demand in terms of occupational distribution is particularly crucial for the successful integration into the receiving country's labour market. Research indicates that Canadian immigrants, especially those who landed recently, face a tough labour market and experience deteriorating economic outcomes (e.g. Picot, Hou and Coulombe, 2007; Zietsma, 2007)

compared to their Canadian born counterparts and immigrants in earlier cohorts. Stories about underemployment in low-skilled occupations, such as an immigrant with a Ph.D. driving a cab, are not uncommon in real life. Skill under-utilization resulting from an occupational gap could have significant effects on the economy, impairing the premise of the Canadian immigration policy which is "to pursue the greatest social cultural and economic benefits of immigration across the country".[1] Policies to facilitate the entry of immigrants into their intended occupations or skill-matched fields focus on such factors as official language skills, recognition of foreign credentials, and accumulation of Canadian experience. These determining factors are all related to human capital. Other factors related to the matching process between skill supply and skill requirements of labour demand are not yet well understood. Furthermore, while a large number of empirical studies on immigrants' labour market outcomes make reference to employment and earnings, little research looks at occupational outcomes.

Thus, while theoretical analyses on effects of social networks on employment outcomes have been developed, empirical evidence on social capital effects on labour market outcomes is still limited, especially in the immigrant contexts. In the current thesis, multidimensional social capital indicators are built and included in the estimations of employment entry, wages and duration of the first job access in intended occupation to address the empirical gap in this area.

Section 1.2 Objectives and contribution of the thesis

This thesis addresses the empirical gaps in the literature through an empirical analysis of the relationship between social capital and labour market outcomes, namely employment likelihood, wages and duration of access to the first job in intended occupation, of recent immigrants to Canada, taking the advantages of a recent dataset – the Longitudinal Survey of Immigrants to Canada (LSIC) Waves 1, 2 and 3 micro data. The LSIC provides unique information on immigration class, ethnic group, social interactions and labour market

[1] *You Asked about ... Immigration and Citizenship 2005*, Citizenship and Immigration Canada, 2005, pp.9.

performance, which is required for the current analysis. Furthermore, its longitudinal nature affords the possibility of panel data analyses to examine the role of social capital.

The analysis tries to answer the following questions: Does social capital based on networks play a role in recent immigrant economic integration? Do different sizes and types of social capital lead to different outcomes in employment status and quality? How do immigrants with a more co-ethnic social network perform relative to those with a diversified network?

The thesis contributes to the existing literature on immigrant labour market outcomes in several ways. First, using information unique to the LSIC, it builds multidimensional indicators of social capital based on a network-based concept: the types of networks (kinship, friendship, organizations) and their dimensions (size, diversity, density and quality). Second, the study reveals significant variability in the presence of social networks at landing and in the social capital stock across immigration classes and ethnic groups. The analysis also shows that social capital stock, as measured by various indicators, influences the Canadian labour market outcomes of recent immigrants in the initial four years. Possibly through a more ethnically diverse network, social capital plays an important role in facilitating economic assimilation of recent immigrants in terms of a higher probability of getting employment, higher wages and a faster access to the intended occupation. Third, employing panel data modelling, individual specific effects are taken into account, an issue that has not been addressed much in the immigrant labour market outcomes literature. Finally, by using duration analysis, the analysis contributes to the understanding of the relationship between human capital, social capital and employment quality of immigrants measured in terms of time taken to access the first job in intended occupation.

This thesis features several ways of dealing with the aforementioned methodological difficulties in the literature. First, taking advantage of the longitudinal nature of the LSIC, it is possible to take into account unobserved individual heterogeneity by using panel data models. In the current research, different panel data models are employed to estimate social capital effects: random-effects model, fixed-effects model, generalized estimating equations (GEE) population-averaged model, Hausman-Taylor (HT) model and instrumental variables (IV) model for panel data. Second, the potential endogeneity of social capital motivates the study to examine the return to social capital, treating social capital indicators as endogenous

variables. In the thesis, instrumental variables (IV) methods and a generalized method of moments (GMM) estimator proposed by Hausman and Taylor (1981) are used to take into account endogeneity when estimating wage outcomes of immigrants. The HT estimator is shown to be efficient and consistent and is favoured over other panel estimators including IV ones.

The current thesis also addresses the gap in immigrants' occupational outcomes research by examining the relationship between various socio-economic factors including human capital and social networks, and the time taken to enter into the first job in intended occupation of recent immigrants to Canada. Detailed information on intended occupations stated by immigrants after they arrive and actual employment history from the LSIC facilitates this aspect of the analysis. The matching between the intended and actual occupations is obtained by comparing the first two digits of the *National Occupational Classification* (NOC) codes. Those two digits indicate occupation type and skill level respectively.

Specifically, the results show that unlike the previous literature (e.g. Granovetter 1973), strong ties such as family network and friends dominate weak ties including organizations in getting immigrants jobs and better jobs in terms of higher wages and a faster access to intended occupation in the first four years in Canada. Personal ties are most useful or important for those disadvantaged in human capital in the labour market. The return to social capital is generally much higher for these groups. The results confirm the substitution effects of social capital on human capital. Meanwhile, ethnic diversity of networks is the most influential factor within social capital that affects the labour market outcomes of both male and female immigrants. Possibly through information transmission across ethnically diverse networks, social capital alleviates labour market matching frictions so as to facilitate newcomers' employment access to the Canadian labour market.

Furthermore, through the Cox proportional hazard models, the thesis finds that the initial year is critical for a new immigrant to find employment in intended occupation and after this period the hazards of accessing the employment in intended field flatten down for both male and female immigrants. While human capital including education, language skills and pre-migration Canadian experience is the main factor determining the occupational outcomes of recent immigrants, foreign work experience does not have a significant effect on intended

occupation access.

Section 1.3 Structure of the thesis

The outline of the thesis is as follows. In the following chapter, a brief review of the literature is provided in order to situate the current research. In Chapter 3, a description of the data and the construction of social capital indicators are presented. The theoretical framework is also presented in this chapter. Then, detailed empirical analyses on employment entry, wages and duration of access to the first job in intended occupation are provided in Chapter 4, 5 and 6. Specifically, Chapter 4 presents the estimation results and discussions for social capital and employment likelihood, with a focus on the differences among various panel data estimators. Chapter 5 investigates social capital effects on wage outcomes of recent immigrants, taking into account the potential endogeneity of social capital indicators. A duration analysis on the time taken to find the first job in intended occupation is presented in Chapter 6.

Chapter 2 Literature Review

Section 2.1 Social capital definition and measurement

During the last two decades, the concept of social capital has become a very popular term used across a number of disciplines of the social sciences. While it has been used in various ways, the definitions of social capital differ by field of study. In the literature on sociology and political science, social capital generally refers to networks of social relations which are characterized by norms of trust and reciprocity (Bourdieu, 1993; Putman, Leonardi and Nanetti, 1993) and which lead to outcomes of mutual benefit (Lochner, Kawachi and Kennedy, 1999; Stone, Gray and Hughes 2003). For instance, Coleman defined the classic concept that a social structure "facilitates certain actions of actors within the structure" (Coleman 1988, pp.98). The concept includes not only informal horizontal relationships and vertical hierarchical organizations, but it also formalizes institutional relationships and structures. In addition to this definition, economists emphasize the contribution of social capital to economic growth and performance, for individuals, communities and the aggregate economy (e.g. Chou 2006; Iyer, Kitson and Toh 2005). Some view it as economic relations embedded in a nexus of social activities, while some others see it as networks.

The reference to "capital" suggests that it is an economic good and not a natural given. Social capital must be constructed through investment and augmented by usage. However, while the term social capital has gained wide awareness, it has also been the object of much debate about its precise definition, especially among economists (e.g. Arrow 2000; Solow 2000). While some share the "network" definitions, others have focused on the fact that social capital may exist in the group or community to which any given individual belongs.

In particular, there is a discussion of the idea that social capital effect on individuals involves an identification problem and is an example of the "reflection problem". Manski (1993) points out that identification problems arise when one needs to differentiate among the effect of sharing the same information or similar institutional environments (a correlated effect),

the effect of exogenous individual characteristics of the group (exogenous social effect or contextual effect), and the effect of behaviour of the group (endogenous social effect) on individuals belonging to the same group. Because outcome data do not usually deliver enough information on group composition to differentiate endogenous social effects, it is difficult to "reveal whether group behaviour actually affects individual behaviour or group behaviour is simply the aggregation of individual behaviour" (Manski 2000). As Manski (2000) characterizes it, this reflection problem relates to the identification issue in terms of interpreting the almost simultaneous movements of cause and effect, therefore raising the difficulty of drawing inferences from the data on observed outcomes. He calls for the development of well-designed experimental and subjective data to address this issue.

Sobel (2002), in his review of relevant research on social capital, also argues that Putman's book "*Bowling Alone*" (2000) often confuses cause and effect when interpreting measurable declines in groups activities with bad outcomes. Ioannides and Loury (2004) again emphasize the importance of the identification problem when interpreting evidence of correlations in the behaviour of individuals who are physically and socially connected.

Some resolutions are proposed to resolve the identification problem (e.g. Manski 1993; Brock and Durlauf 2000). All these alternatives require some prior information about the behaviour of the group or groups with whom an individual interacts. Given that outcome data usually do not contain information on group composition, economists typically make assumptions on reference groups which actually impose such proxies for groups as neighbourhood, ethnic group and communities in relevant geographic areas (Manski 2000).

In their review of research on social capital, Durlauf and Fafchamps (2004), on the one hand, point out a number of conceptual and statistical problems existing in the current social capital research including the identification problem; on the other hand, they suggest that the social capital literature pays far more attention to formal issues of identification and unknown group characteristics, and sometimes mixes social capital effects and alternative types of group effects. They recommend that the focus of the analysis on social capital should be less on social capital per se than on the role of social networks.

Actually, there is no consensus on this issue, but as pointed out by Durlauf (2002), the

different underlying theories do not seem to oppose to each other.

Among the possible definitions of social capital, the one based on networks has been used widely in the socioeconomic literature (e.g. Montgomery 1991; Woolcock 2000; Rose 2000). In this way, measures of social capital are basically measures of networks. Bourdieu (1985) decomposes social capital into two elements: the social relationship itself, and its amount and quality. While there is considerable variation in network-based measurement, most approaches share Bourdieu's view that measures of social capital must consider both the structure and the content of the networks. Stone (2001) provides a clear distinction between these two concepts. Structure includes size and density while content measures quality and trust within the structure. In this way, social capital can be thought as "structure multiplied by content" (Stone 2001). Furthermore, Stone, Gray and Hughes (2003) extend the analysis by providing multi-dimensional measures of social capital and by estimating the impact of both the structure and the quality of social networks. The present study will use a similar network-based concept and multi-dimensional measurement of social capital.

Section 2.2 Relationship between social capital and labour market outcomes

2.2.1 Employment status, wages and social capital

There has been a growing recognition among researchers using the term "social capital" that these social networks can have a lot of effects. Social capital or its key element – social networks – plays an important role in the labour market matching processes. Access to employment and mobility through career can be facilitated by social capital, although researchers do not always conceptualize it explicitly in that way. The role of social capital in the job market has been widely developed in the sociology literature (e.g. Lin 1999), but empirical applications are still limited. Moreover, due to conceptual difficulties in quantifying social capital and to limitations in social capital measures available in existing data, there are few economic studies on the effect of social capital on labour market outcomes.

The existing economic literature has analyzed mainly the theoretical effects of social relationships on labour force participation and job search processes within job matching models (e.g. Montgomery 1991; Cahuc and Fontaine 2002). Particular consideration has been given to problems related to workers' mobility in terms of employment status and wage (Calvó-Armengol and Zenou 2005). According to these theoretical models, various types and patterns of social networks lead to better transitions from unemployment to work by reducing the cost of job search for potential employees and employers, and by producing a better quality of job match. Specifically, models have suggested that obtaining a job through networking is associated with higher acceptance rates of job offers (Holzer 1987), higher reported job satisfaction (Granovetter 1995) and lower quit rates (Datcher 1983), though not necessarily higher wages (Granovetter 1995) or new externalities (Fontaine 2003).

On the empirical side, studies have examined the efficiency of networking in terms of finding a job and the quality of jobs as mainly measured by wages. Many studies have examined the direct relationship between the use of informal networks in finding jobs and labour market earnings, while some research focuses on the effects of social capital resources or stocks on employment outcomes.

On the one hand, a number of studies have found a positive relationship between measures of social capital and wages (e.g. Flap and Boxman 2001; Lai, Lin and Leung 1998). Granovetter (1973) concludes that, while immediate social networks (relatives and close friends) do have an impact on job transitions, weak ties (distant relationships, e.g. workmates) dominate strong ties for both transitions and wages. On the other hand, there is mixed evidence on the effects of informal search methods on wages. Montgomery (1992) finds that while networking has a positive impact on employment transition, this does not necessarily imply higher wages, even when weak ties are used. Given the difficulties and disparities in measuring the social capital stock, some of the relevant research using job search methods as a proxy for social network resources indicates that the use of social networks does not have strong effects on labour market earnings (e.g. Mouw 2002).

However, due to data limitations, it is difficult to know exactly which method led to the observed job; most studies connect the forms of social capital to job search methods and use cross-sectional methods to estimate social capital effects. As a consequence there is still

limited empirical evidence to test the theoretical questions: How do the characteristics of social networks, such as size, diversity and density, affect employment quality? Do the jobs acquired through informal networks pay higher or lower wages than similar jobs found via formal methods, considering unobserved individual heterogeneity?

Some research has focused on the role that social networks have played in securing jobs in certain industries or for particular groups. For example, Green, Tigges and Diaz (1999) show that the use of informal job search strategies, such as using personal contacts like friends or relatives during a job search, results in lower-paid jobs for Hispanics, whereas this strategy results in higher paying jobs for whites. Barros (2006) estimates a human capital model for cooperative managers and compares the results with the social capital model, based on data from Portugal in 2003. He concludes that cooperative managers' earnings are a function of both human capital and social capital.

Borghans, Weel and Weinberg (2006) show that social interactions are an important determinant of labour market outcomes, including occupations and wages. They particularly focus on how the increased importance of people skills has affected the labour-market outcomes of under represented groups: the increase in the importance of people skills between the late 1970s and early 1990s may help explain why women's wages increased more rapidly while the wages of blacks grew more slowly over these years relative to earlier years. Bayer, Ross and Topa (2005) use the U.S. Census data to empirically detect the effect of social interactions among neighbours on labour market outcomes. They provide evidence that the increased availability of neighborhood referrals has a significant impact on a wide range of labour market outcomes including employment and wages.

Studies show that people with limited human and financial capital are particularly more likely to use social networks to help them succeed in the labour market. Elliot (1999) shows that less educated workers in high-poverty neighbourhoods were more likely to use informal connections to search for jobs and the informal contacts are the main resource through which these workers actually found work.

In summary, the evidence suggests that social capital does affect labour market outcomes. The role of social capital on employment status and earnings has been identified empirically

as one of the driving forces of individual disparity in conjunction with human capital and external factors. However, there are substantial measurement differences in defining social networks and selection issues in interpreting the results of these studies, so the economic effects of social networks remain an open empirical question.

2.2.2 Social capital and occupational attainment

While an individual's occupational status depends mainly on his or her education, social capital residing in this person's social networks affects occupational mobility and skill match process, which in turn influence the ultimate occupational outcomes (Lin, Vaughn and Ensel, 1981).

Employing the United States, West German, Dutch data, De Graaf and Flap (1988) give a cross-national comparison of the effects of using social ties on occupational status and incomes. The findings show that while there is more use of informal sources in the U.S. than in West Germany and the Netherlands, informal sources do not generally lead to higher occupational prestige and income. Taking advantage of the Dutch data, they find that contacts with relatively high occupational prestige do lead to a job with a higher prestige.

Using a social survey dataset from Spain, Requena (1991) empirically tests three propositions which are derived from the relationship between social networks and occupation attained in Spain. Social resources are defined as a person's social ties which are directly or indirectly linked to an individual. His findings confirm previous relevant studies, except that in Spain, the effect of social capital on the attainment of occupational status is not greater than in other countries.

Davern (1999) derives several hypotheses on the relationships between social networks and occupational prestige attainment measured by the Siegel-Hodges Occupational Prestige Scale. Using data from the 1970 Detroit Area Study, Davern provides an empirical test of the hypotheses. While there exists an empirically strong relationship between the prestige of a social network contact and prestige attainment, Davern finds very limited evidence for the hypothesis that weaker ties have greater occupational prestige effects compared to stronger ties.

Section 2.3 Social capital in the context of immigrant labour market integration

2.3.1 Recent immigrants in the Canadian labour market

Given the large immigrant population and the relative abundance of data, there has been substantial research on the economic outcomes of immigrants in Canada. The findings of many of the relevant studies indicate that recent immigrants are experiencing more difficulties finding employment than the earlier cohorts, and relative earnings and incomes of recent immigrants are declining, despite their high average educational attainment and skill level (e.g. Baker and Benjamin 1994; Bloom, Grenier, and Gunderson 1995; Aydemir and Skuterud 2005; Picot and Sweetman 2005; Picot, Hou, and Coulombe 2007). These findings are of particular concern to Canadian policy makers as this raises questions about the role of immigration in the Canadian labour market.

A great deal of effort has been made in the attempt to explain this deterioration in the economic outcomes of recent Canadian immigrants. Ferrer, Green and Riddell (2006) use the International Adult Literacy Survey (IALS) to examine the role of literacy on the differences between immigrant earnings and native-born earnings. They find that there are shortfalls in immigrant literacy compared to that of their Canadian-born counterparts. Low literacy among immigrants is an important explanatory factor for immigrant-Canadian born earnings differentials, though it is not the dominant explanation. However, there is a concern whether that finding is on the role of literacy or on the official language skills of immigrants, as the literacy scores from the IALS were assessed in English or French.

Using the 1986, 1991 and 1996 Canadian Censuses and a school quality index, Sweetman (2004) suggests that pre-migration educational quality is an important factor in explaining Canadian labour market earnings of immigrants. Immigrants from source countries with lower quality educational outcomes, as measured by international test scores, are observed to receive a lower average return to their schooling in the Canadian labour market than those from countries with higher quality results. Aydemir and Skuterud (2005) use the 1981 to 2001 Canadian Censuses to examine the possible causes of the deterioration in entry earnings of recent immigrant cohorts. Taking into account all the existing explanations in the

literature, they conclude that the main reasons behind the greater challenges faced by recent immigrants are compositional shifts in language ability and region of origin, declines in the return to foreign work experience and labour market conditions at landing. MacDonald and Worswick (1998) discuss in more detail the importance of macroeconomic conditions to the estimation of immigrant assimilation outcomes.

Picot and Sweetman (2005) review the possible causes of the increase in the earnings gap and in low-income rates between immigrants and the Canadian-born in the last two decades. The paper particularly points out that in Canada's major cities all of the increase in the low-income rates during the 1990s was concentrated among the immigrant population. The paper identifies three major causes of this deterioration of immigrant economic outcomes: the change in the characteristics of immigrants which includes shifting composition of source countries, mother tongue and visible minority status, the decline in returns to pre-migration foreign work experience, and the decline in the labour market outcomes of all new labour market entrants in general. Other possible explanations reviewed include decreases in return to foreign education, fluctuation in macro-economic conditions, and competition from the highly educated Canadian-born.

The most recent research shows that the economic outcomes of recent immigrants deteriorated after 2000 (Picot, Hou and Coulombe 2007). Results from the Labour Force Survey (LFS) 2006 further show that while established immigrants (those who landed more than 10 years ago) had comparable labour market outcomes to those the Canadian-born population, very recent immigrants (those who have landed in Canada for five years or less) had the poorest outcomes in the Canadian labour market (Zietsma 2007). The downturn in the information technology (IT) sector after 2000 might be a partial explanation, as the share of skilled workers in IT and related occupations was large.

2.3.2 Social capital, employment and wages of immigrants

Immigrants may behave differently from natives in terms of the kind of resources they rely on to access the labour market, especially in the initial periods of settlement and integration. Social networks are expected to facilitate immigrants' integration into their host countries.

Recent research has indicated that higher levels of economic wellbeing are not themselves sufficient to lead to positive integration outcomes, but social capital, defined as social networks relating to both the structure and quality of social interactions, plays a critical role on the integration process of immigrants (Kunz 2005). While it is now well established in the migration literature that social capital is a resource that resides in the interpersonal networks and that migrants draw upon it to find jobs, the effects of social networks on labour market outcomes of immigrants vary considerably across studies.

There is evidence that social capital influences immigrant economic performance significantly, especially in the initial years. Evidence from both Australia (Giorgas 2000) and the U.S. (Amuedo-Dorantes and Mundra 2004) finds that ethnicity and social networking have served as a positive strategy for immigrants in general in their new labour market. Giorgas argues that social capital was used more effectively by groups with stronger cultural boundaries. Amuedo-Dorantes and Mundra use the Mexican Migration Project (MMP) data to find that social networks not only affect the likelihood of finding employment, but they also play an important role in facilitating the economic assimilation of Mexican immigrants in the U.S. in terms of a higher hourly wage. In general, social networks provide a temporary shelter against unemployment for newcomers, and there are differences in social capital impact among groups of immigrants.

Aguilera and Massey (2003) indicate that social capital plays a more significant role in determining the wages of undocumented migrants than documented migrants. Aguilera and Massey use the same dataset as Amuedo-Dorantes and Mundra (2004) to find no relationship between job search method and wages among Mexican Immigrants, with the exception of a positive relationship between kin networks and formal sector employment among undocumented Mexican workers in the U.S. These findings suggest that social capital can act as a substitute for human capital, though only imperfectly, for those disadvantaged in the labour market, such as those with less human capital or with legal restrictions, to overcome employment barriers.

Most of the existing literature on the relationship between social capital and immigrant labour market outcomes is primarily for the U.S. context. As data with information on employment, wage and detailed social network structure are relatively rare, most studies

have similar characteristics: they focus on specific groups of immigrants and using network-based job search methods or neighbourhoods as a proxy for social capital.

For example, Livingston (2006) also uses the MMP data to identify network effects among Mexican immigrants in the U.S. labour market. He used the method that each respondent employed to obtain the most recent U.S. job to examine network effects on employment, occupational status and wages. The study finds different effects of networks across gender. Women who used network-based job searches were less likely to obtain formal sector employment than women who found jobs through more formal channels, while using networks to find a job increased the likelihood that men would find work in the formal sector. As employment in the formal sector is related to wages, networks have different effects on wages.

Some empirical work focusing on Latin immigrants in the U.S. has revealed a negative relationship between network-based job search methods and employment outcomes. For instance, Smith (2000) suggests that using networks to obtain employment is associated with a significant decrease in wages and earnings.

Munshi (2003) also made use of the MMP data to identify network effects among Mexican immigrants in the U.S. labor market. He used variation within each origin-community's network over time to examine network effects. Sanders, Nee and Sernau (2002) looked at how the reliance on interpersonal ties in job search affected Asian immigrants' labour market outcomes in greater Los Angeles. Beaman (2007) paid special attention to the refugees resettled in the U.S., examining the linkage between the size of a social network, the employment status of network members and labour market outcomes.

In the context of Canada, despite the large immigrant population, little attention has yet been paid to the potential relationship between social networks and immigrant labour market performance. Again, probably due to the limitation of available data, existing Canadian research is restricted to qualitative studies and case analyses focusing on small groups. For instance, Marger (2001) found that Canadian business immigrants had minimally relied on social capital in forms of ethnic networks and family ties to run their firms, based on a survey of 70 entrepreneurs in Ontario between 1993 and 1995. Bauder (2005) found that

South Asian immigrants developed ethnic networks to overcome labour market barriers, while immigrants from the former Yugoslavia were reluctant to use personal ties as a job search channel.

Using Census data from 1981 to 1996, Hou and Picot (2003) examine the association between living in a visible minority enclave and immigrants' labour market outcomes in Canada's three largest metropolitan areas – Toronto, Montréal and Vancouver. The results show that the association between exposure to own-group neighbours and employment is negative, but generally not significant. Exposure to own-group neighbours and working in a segregated occupation are positively, but not significantly, associated. Little association exists between exposure and employment earnings.

Employing the Censuses, Warman (2005) uses Borjas' measurement of ethnicity – concentration of co-ethnic group in the neighbourhoods between 1990 and 2000 to find a negative impact of enclaves based on country of birth on the ten-year wage growth of immigrants in Canada. While the results indicate a negative effect of enclaves on wage growth, little evidence is found of the effects of enclaves on changes in employment. Warman also points out that ethnic concentration has a divergent effect on different landing cohorts: a positive impact on the wage growth of the more recent cohorts and a negative impact on earlier cohorts.

Within the context of social network and immigrant labour market outcomes, a much-debated issue is the interpretation of high co-ethnic levels of social capital among immigrant groups. One influential argument is that family, friendship and neighbourhood ties ("bonding") help people get by, while overlapping or diverse networks ("bridging" or "linking") help people get better (Narayan 1999; Woolcock 2000; Stone, Gray and Hughes 2003). However, in the context of immigrant integration, there has not been much research so far showing whether a more heterogeneous social network is likely to result in a better outcome compared with a more homogeneous one.

A group of related studies lends some evidence on this issue by looking at ethnic or neighborhood characteristics as a proxy for social capital. The effects of social networks on immigrants' employment status and earnings may differ significantly according to how

social capital is defined and measured. For instance, employing home language as a proxy for social networks, Bertrand, Luttmer and Mullainathan (2000) uncover evidence that these social networks influence welfare participation in the U.S. Chiswick and Miller (1996) measure social networks by the extent of linguistic concentration in the area where the immigrant resides in the U.S. They conclude that the concentration of the home language has a negative effect on earnings. Borjas (1995) looks at one element of social capital – ethnic capital as measured by residential segregation of ethnic groups, and finds that ethnic neighbourhoods negatively influence the economic performance of immigrants in the U.S.

It is also to be noticed that the immigrant labour market outcomes literature focuses mostly on earnings as the measurement of economic performance, with few studies applying the concept of social capital to other indicators such as employment probability and occupational outcomes. Considering the different measures of labour market outcomes and the disparity of definitions and measures of social networks, the role of social capital in the immigrant integration process remains unknown.

2.3.3 Immigrants' occupational outcomes

Most previous research has used earnings to make inferences about the skills composition of immigrants and very few studies have looked at occupations. However, occupational outcomes of immigrants are an inherent part of their social and economic adjustment and integration. The few existing studies focus mainly on the effects of various socio-economic characteristics (e.g. age, gender, education, language skills, country of origin, and etc.) on occupational status of immigrants, with very rare evidence on employment outcomes in their intended occupations.

The research on factors affecting differences in occupational attainment of immigrants reveals that, similar to the general population, human capital is the main factor determining the incidence of occupational convergence towards natives' status. For example, Toussaint-Comeau (2004) investigates the factors that determine occupational assimilation of Hispanics in the U.S., based on a random effects model using the Panel Study of Income Dynamics (PSID) data from 1990 to 1993. The results suggest that the level of individuals' human capital affects the rate of occupational mobility and determines whether convergence occurs

in occupational status.

Chiswick, Lee and Miller (2003) develop a model of occupational mobility of immigrants and test their hypotheses using data on adult males from the Longitudinal Survey of Immigrants to Australia (LSIA). The model indicates that immigrants tend to experience an occupational trajectory that follows a U-shaped pattern, in terms of occupational status, from the pre-migration jobs in the country of origin to the post-migration jobs in the destination country. The steeper the initial decline of occupational status, the steeper the subsequent increase will be for a highly-skilled immigrant from a country of origin that is unlike the host country. Their empirical analysis supports this hypothesis. The analysis also reveals that living in an immigrant or ethnically concentrated area tends to improve the occupational status of immigrants, although the effect is of marginal significance. While geographic ethnic concentration is often employed as a proxy for social networks or social capital, this result lends obvious evidence on social capital effects on occupational outcomes.

Education-job match is often used to measure occupational outcomes of immigrants. For instance, Morissette and Galarneau (2004) explore the Canadian Census data and find that highly educated recent immigrants to Canada had a higher education-job mismatch rate compared to their Canadian-born counterparts. Among the recent immigrants with a university degree who were employed between 1991 and 2001, at least one in four had a job requiring no more than high school education. Green, Kler and Leeves (2007) employ a similar measure to investigate the over-education of immigrants to Australia, using the LSIA. They compare an immigrant's education qualifications with the minimum required qualifications of the actual jobs. The results of their study show that immigrants with Non-English Speaking Background (NESB) had higher rates of education to occupation mismatch than English Speaking Background (ESB) immigrants and lower returns to required and surplus education. There were also large variations in the incidence of over-education by visa category.

While skill or education levels or earnings status of occupations are largely used as indicators of the occupational outcomes of immigrants, employment in the intended occupations may be a more accurate measure in terms of measuring the matching results between the employment intention and actual outcome. The results of Green (1999), drawing

upon the 1981, 1986, and 1991 Canadian Censuses and special tabulations from immigrant landing records, indicate that immigrants experience a rapid adjustment in the first three years in Canada, moving out of non-employment and less skilled jobs and towards the more skilled occupations matching their original intentions. The patterns after this initial assimilation process are not obvious, suggesting that entry into intended occupation is most likely to happen in the initial years of integration.

Grondin (2007) uses the LSIC data to examine the relationship between official language skills and employment outcomes of new immigrants. Among the five employment outcome indicators that she constructs, four are related to occupational outcomes: employment in a high-skilled occupation, in an intended occupation, in a field similar to an immigrant's pre-migration job, or related to an immigrant's education or training. The matching between the intended and the actual occupations was done only at the first classification level, corresponding to the major occupational types. As Grondin mentioned, this measure does not take into account the skill level of jobs. Thus, an immigrant working in a clerical job with an intention to be a professional in the same sector was deemed as working in the intended occupation, which may not be an appropriate measure of occupational outcomes for immigrants. Her findings indicate that proficiency in official languages, especially English, has a significant effect on the probability of having an appropriate job. However, due to the methodology limitation,[2] it is difficult to differentiate the effects of the ability to speak English from those of other phenomena which might be strongly related to the English speaking ability on employment outcomes.

Section 2.4 Measurement of occupational outcomes

There exist different approaches to measure occupational outcomes in empirical studies. The most commonly used indicators of occupational outcomes are quantitative measures.

Quite a few composite indexes of the occupational status score or scale have been

[2] Grondin (2007) uses cross-sectional models for this study. Thus it can not capture the timing of the major activities or the unobserved individual heterogeneity which could be addressed in panel data models.

constructed in various studies and are used mainly by sociologists. For example, Toussaine-Comeau (2004) uses a composite index of the socioeconomic occupational status score developed by Nam and Powers (1983) to measure immigrant occupational outcomes. The NAM-POWERS score is an ordinal scale, ranging from 0 to 99, derived from the education requirements and wages of the job. Similarly, Davern (1999) employs the Siegel-Hodges Occupational Prestige Scale, ranging from 0 to 99 as well, to measure his dependent variable – outcome prestige. The ANU3 index of occupational prestige developed for Australia is used in Chiswick, Lee, and Miller's study (2003). This indicator measures relative differences in labour market power, occupational prestige and requirements and earnings, including both a prestige scale and a socioeconomic status measure.

A scale for ranking occupations developed by Blishen, Carroll and Moore (1987) has been used in Canadian studies. The Blishen scale assigns socio-economic status (SES) codes to the occupations listed in the *1981 Canadian Classification and Dictionary of Occupations*, based on 1981 Census data. For each occupational category indicated by occupational titles, indicators of prevailing education and income levels are derived. Specifically, income indicators are based on the pooled median employment income for all paid labour force participants in each occupation and education level is based on the proportion of people with higher education in that occupational category.

Section 2.5 Research using the Longitudinal Survey of Immigrants to Canada

The LSIC Wave 1 has been employed to explore immigrants' housing choices (Renaud, Bégin, Ferreira and Rose 2006) and inter-provincial migration (Mendez, Hiebert and Wyly 2006) without social networks included in the analyses. The social network effect has also received some attention in the area of intra-Canada migration (Houle, 2006). Houle used Waves 1 and 2 micro data of the LSIC to examine the internal migration behaviour of the LSIC immigrants in a survival analysis framework. He included several social network indicators in his analysis: presence and location of network upon landing; origin of new friends and participation in associations and found that geographic closeness determines immigrants' intra-Canada migration significantly while other social network indicators show

no significant effects. Although the structure elements of the networks were taken into account, the measurement was not specifically categorized according to types of networks.

In addition, since the completion of the LSIC and the release of the final microdata in April 2007, there has been a lot of research ongoing using this dataset to explore various aspects of early settlement and integration process of immigrants. The topics vary from employment and education pathways, housing behaviour, and health care utilization to remittances, integration barriers and life satisfaction among recent immigrants. For example, Grondin (2007) uses the LSIC complete all three waves to investigate the relationship between official language skills and employment outcomes of recent immigrants.[3] The present research is among the first to examine the social network effects on immigrants' labour market outcomes using the complete three waves of the LSIC.

[3] See Section 2.3 for a review of Grondin (2007).

Chapter 3 Data, social capital indicators and theoretical framework

Section 3.1 Longitudinal Survey of Immigrants to Canada (LSIC)

The Longitudinal Survey of Immigrants to Canada (LSIC) is designed to study how newly arrived immigrants adjust to living in Canada during their first four years of settlement. Information gathered through the LSIC expands upon datasets currently available to assess integration experiences, such as the Census, the Longitudinal Immigration Database (IMDB) and the Ethnic Diversity Survey (EDS), by providing longitudinal information, identifying immigration category, and by capturing information that moves beyond the economic aspects to include the social and cultural aspects of integration – information critical to understanding the determinants of immigrant integration outcomes.

The target population of the LSIC was immigrants who arrived in Canada between October 2000 and September 2001, were 15 years of age or over at the time of landing and landed from abroad. There was only one participant per family unit.[4] The survey includes a variety of modules including demographic and household characteristics of the longitudinal respondents,[5] Citizenship, Social Interactions, Groups and Organizations, Language Skills, Housing, Education, Employment, Health, Values and Attitudes, Income, and Perceptions of Settlement.

The LSIC is longitudinal – that is, the same respondents were interviewed repeatedly over time: at six months, two years and four years after arrival in Canada. Specifically, the first wave interview took place between April 2001 and May 2002, the second between

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[4] See "Statistics Canada (2007), Longitudinal Survey of Immigrants to Canada, Wave 3 – Microdata User Guide" for sample selection and survey design.

[5] The Longitudinal Respondent (LR) entity includes LR characteristics such as age, sex, religion, ethnicity and countries where the LR resided for more than 6 months. In addition to data collected in the survey, this entity also contains some basic pre-landing information gathered from a Citizenship and Immigration Canada administrative database such as, class of immigrant and special program under which immigrant came in Canada. And the Household (HH) entity includes household characteristics of a LR.

December 2002 and December 2003, and the third between December 2004 and December 2005. Twelve thousand immigrants were interviewed in Wave 1, while 9,300 and 7,700 of them participated in Waves 2 and 3 respectively. The final survey sample represents 157,600 immigrants of the target population who still resided in Canada at the time of the Wave 3 interview. By interviewing the same people over time, the LSIC information provides a dynamic picture of the integration experiences of these recent immigrants, rather than a static "snapshot".

Besides, the survey provides a job calendar that outlines the complete employment trajectory during immigrant's first four years, including employment details such as start date, end date, occupation, earnings and hours worked per week and so on for each job that an immigrant ever held.

There are differences in factors determining earnings and employment status between men and women in the labour market. Thus the LSIC immigrants are separated by gender to conduct all analyses.

Section 3.2 Construction of social capital indicators

The key concept in this research, social capital, is not straightforward to measure. Various indicators have been proposed, such as concentration of ethnicity in neighbourhood, indexing systems considering size and frequency of contacts, and the density of the language group in an area. However, a single measure, or just a few measures, cannot capture the multi-dimensional nature of social capital. One contribution of this thesis is the construction of social capital indicators based on the network-based concept, using information unique to the LSIC data, with focus on the Social Interactions and Group Organizations modules.

The definition of social capital emphasizes both structure and content of networks. The structure of networks (across network types) includes size and diversity. The size of networks can be measured by the number of friends or relatives, and the number of types of groups or organizations a person is involved with. The diversity of networks is measured by the relative numbers of co-ethnic members and other members in a person's networks. The

content of networks is defined by the amount of social involvement and social support such as frequency of contact, number of types of help from networks, and contribution made by a respondent to the relationships.

3.2.1 Social capital indicators

According to the LSIC data structure, social networks are categorized into three types. The first type is *kinship network*, which includes relationships with family members and relatives living in Canada. The second type is *friendship network*, which consists of ties with friends and workmates. The third type is *organizational network*, defined as the relationships immigrants have with groups and organizations, such as community organizations, religious groups, ethnic or immigrant associations, etc. Different dimensions of social capital are also considered. For each type of network, the following indicators are built to measure the social capital stock:

Network size: the number of people or units with whom immigrants maintain different types of relationships (family, friends, organizations, etc). While the LSIC does not provide information on the absolute numbers of people in all networks, there are some good substitutes for network size. For example, information is collected on the types of relatives in Canada (spouse, children, parents, grandparents, brothers and sisters, uncles and aunts, cousins, etc). By counting the types of relatives, the paper gets an approximation of network size for families.

Network diversity: heterogeneity of the social and ethnic characteristics of network members. The LSIC collects information on the relative number of co-ethnic members among friends, workplace networks and organizational networks. An ethnic diversity index is created for each type of network, which ranges from 0 to 1. The higher the index, the more ethnically diversified an immigrant's network is. For Waves 2 and 3, there is an additional indicator for the diversity of friendship network: relative number of immigrant members in friends' network. A cohort diversity index reflecting the composition of immigrants within the network is built in a similar fashion as the ethnic diversity index.

Network density: frequency of contact between network members. Using the information on

the frequency of contact with people in the networks, a density index (ranging from 0 to 1) is created for each type of network. The higher the index, the more frequently an immigrant contacts with network members or takes part in activities.

Geographic dispersion indicators are also built for relative and friend networks.

Network reciprocity (quality of network): help from networks and contribution made to networks. The LSIC shows that social networks are important to new immigrants, especially in the settlement process of finding accommodations, getting employment, accessing education or training and receiving health care service. Indicators have been created to measure the different types of help (among the above mentioned four settlement fields) an immigrant gets from a particular type of network. However, contribution to networks is not easy to measure within the LSIC. As a measurement, a variable indicating the number of organizations to which an immigrant volunteered time is used. In Waves 2 and 3, immigrants were asked about the help provided to other newcomers, thus, this is used as an indicator measuring the number of types of help provided for other immigrants.[6]

Section 3.3 Theoretical environment

3.3.1 Social capital and employment

There are a variety of theoretical explanations for the importance of social networks in the labour market. They vary from assertive matching (e.g. Montgomery 1991)[7] to information asymmetries (e.g. Boorman 1975). In the current thesis a simple network model developed by Calvó-Armengol and Jackson (2004) is borrowed as the theoretical initiative. The authors show that, in situations of information asymmetries, through information transmission within

[6] In the following regression analyses, not all indicators for network reciprocity are included. Because of low variability, the indicators for number of types of help got from a certain kind of network are not included. Furthermore, the contribution indicators enter the estimations not as the absolute numbers, but as dummy variables indicating whether an immigrant volunteered time for groups or provided newcomers with help.

[7] Montgomery emphasizes the advantages of network for the employer relative to other hiring channels as it provides a screening against low-ability workers.

social networks, social capital alleviates matching frictions, influences the job-worker matching process and that employment status is positively correlated across time and connected individuals. The basic structure of the model is as follows:

N agents live and work in discrete periods indexed by t. At the end of period t, if agent i is employed, then $s_{it} = 1$ and $s_{it} = 0$ if he or she is unemployed. A period begins with some agents employed and others not. In each period, a specific agent learns about a job opening with a probability α that is between 0 and 1. It is assumed that the job information arriving process is independent across agents. If the agent is unemployed, he or she will take the position. If an agent is employed, he or she will pass on the job information to a randomly chosen relative, friend, or acquaintance that is currently unemployed. Information flows only between agents who know each other. If all of the agent's acquaintances are employed, then the job opportunity information is lost. Meanwhile, some agents lose jobs in a given period at an exogenous break-up probability b. Then the probability of the joint event that agent i hears about a job and this job ends up in agent j's hands, is $p_{ij}(\mathbf{s})$, where $\mathbf{s}$ is the employment status of all the agents at the beginning of the period:

$$p_{ij}(\mathbf{s}) = \begin{cases} \alpha & \text{if } s_i = 0 \text{ and } i = j, \\ \dfrac{\alpha}{\sum_{k:S_K=0} n_{ik}} & \text{if } s_i = 1, s_j = 0 \text{ and } n_{ij} = 1, \\ 0 & \text{otherwise.} \end{cases}$$

where $n_{ij} = 1$ when individuals i and j know each other and equals 0 when they do not know each other.

In this model, employment status changes as a function of past employment status and the person's network. The model provides a tool for analyzing effects of social networks on employment dynamics. Calvó-Armengol and Jackson used this model to provide some key explanations for the relationship between employment and network structure (size, diversity).[8] Despite the short run conditional negative correlation between employment status and network size, in the long run, network size is positively related to employment across

[8] For detailed proof of propositions, see Calvó-Armengol and Jackson (2004).

network members. Employment increases with network diversity. Clusters exist in equilibrium as workers with poor networks have a higher unemployment rate than their counterparts with better quality networks. The results of this model were also extended to wage dynamics (Calvó-Armengol and Jackson, 2003 and 2007). The current thesis is an empirical test in the immigration context of the results implied by the network model, especially on the claim that network structure matters.

In Chapter 4, the focus is on the empirical evidence of the effect of social capital on the employment probability of immigrants while the relationship between social capital and earnings will be explored later in Chapter 5.

3.3.2 Social networks and wage dynamics

The theoretical framework of this aspect of the thesis is inspired by a model proposed by Calvó-Armengol and Jackson (2007). The labour market includes social networks through which economic agents hear about jobs. The authors model the transmission of job information among individuals by a function that keeps track of job turnover and show that an improvement in the wage or employment status is positively associated with social networks across time and agents.

The model extends the previous Calvó-Armengol and Jackson (2003) model by adding features allowing for heterogeneity in jobs (so in wages) and agents' skills, multiple offers, higher wages due to outside offers, switching of jobs and so on. A brief description of the model follows.

Similar to the model on employment status presented in Section 3.3.1, N agents live and work in discrete periods indexed by t. In addition, w_{it} keeps track of the wage of agent i at time t. At the end of period t, $w_{it} = 0$ if agent i is unemployed. From an agent's wage, his or her employment status s_i can be deduced. When agent i is employed, then $s_{it} = 1$ and $s_{it} = 0$ if he or she is unemployed. So the vectors w_t and s_t represent realizations of the wage levels and employment status at time t.

A period begins with some agents employed and others not. In each period, a specific agent i

learns about a job opening offering a wage w_i with a probability $\alpha_i^{w_i}$ that is between 0 and 1. If the agent is unemployed, he or she will take the position. If an agent is employed, depending on whether the job constitutes an improvement over the current one, he or she will choose to keep the information or pass it on to a randomly chosen relative, friend, or acquaintance that is currently either unemployed or employed at a wage lower than that of the new job, depending on the current status of the connections. Generally, the higher the current wage of the agent, the higher the probability that the new job will not be an improvement and the agent will pass on the information. Information flows only between agents who know each other. Meanwhile, some agents lose jobs in a given period at an exogenous break-up probability b. Then the probability of the joint event that agent i hears about a job and this job ends up in agent j's hands, is $p_{ij}(\boldsymbol{w})$, where $\boldsymbol{w}$ is the wage status of all the agents at the beginning of the period:

$$p_{ij}(\boldsymbol{w}) = \begin{cases} \sum_{w_i' > w_i} \alpha_i^{w_i'} & \text{if } i = j, \\ \sum_{w_i' : w_i \geq w_i' > w_j} \dfrac{\alpha_i^{w_i'} \cdot n_{ij}}{\sum_{k : w_k < w_i'} n_{ik}} & \text{if } w_i > w_j \text{ and } n_{ij} \neq 0, \\ 0 & \text{otherwise.} \end{cases}$$

where $n_{ij} = 1$ when individuals i and j know each other and equals 0 when they do not know each other.

In this model, the wage that agent i obtains is a function of past wage status and the person's network. The model provides a tool for analyzing effects of social networks on employment and wage dynamics. Calvó-Armengol and Jackson used this model to show that the wages of any connected agents are positively correlated across network under the steady-state distribution and furthermore, the wages of connected individuals are positively correlated across time periods.[9] There exists a short run negative correlation between employment status, wages and network size, which results from competition for information about certain jobs. However, the long-run benefits of improved wage status of networks outweigh the short run competition effects. Wages increase with network diversity and quality. Different social

[9] For detailed proof of propositions, see Calvó-Armengol and Jackson (2007).

groups with identical job information networks but different starting wages have different wage outcomes across groups.

Chapter 5 empirically tests the results implied by this network model in the immigration context, especially on the claim that network size and content matters to labour market outcomes.

Chapter 4 Social capital and employment entry

Section 4.1 Estimation framework

4.1.1 Sample restriction and model specification

Based on the indicators illustrated in Section 3.2, the individual stock of social capital is used along with other socioeconomic variables to model the probability of getting a job conditional on labour force participation in the first six months, two years and four years in Canada in panel logistic regression models.

This analysis restricts the sample to individuals who participated in all three interviews. The estimation of employment probability was restricted to the immigrants who were in the labour force in a specific wave (including currently employed and currently unemployed). Those immigrants who did not participate in the labour force (i.e. had not looked for jobs in a specific wave) were excluded, as they were expected to achieve different outcomes than those actively participating in the labour force in terms of employment likelihood. Furthermore, the immigrants who resided in the Territories are excluded from the analysis due to the extremely small size of this group.

There are differences in factors determining employment status between men and women in the labour market. Thus the LSIC immigrants are separated by gender to conduct analyses.

The basic estimating equation used in the research is a logit regression of the probability of employment. An immigrant's likelihood of getting employment can be thought as an unobserved latent variable y^* such that

$$y_i^* = X_i\beta + \varepsilon_i,$$

where X is a collection of p independent variables denoted by the vector $\boldsymbol{x}' = (x_1, x_2, \ldots, x_p)$, which consists of a set of factors, such as immigration category, age, marital status, human

capital and social capital, explaining the employment outcome, and ε is an error term. One does not observe y^*, but rather that the LR (longitudinal respondent) was employed (y = 1) or not (y = 0) at the time of the interview, which takes on values of 0 or 1 according to the following rule:

$$y = \begin{cases} 1 & if \quad y_i^* > 0 \\ 0 & otherwise \end{cases}$$

Assuming that ε has mean zero and has a standardized logistic distribution with variance $\pi^2/3$, I get the binary logit model.

The estimated models are reduced form. The structural labour supply and labour demand models are not estimated. The analysis extends the human capital earnings function. The basic estimating equation used in the research is a logit regression of the probability of employment on the exogenous variables, covering a range of individual, household and local characteristics:

1) Demographic variables: age, marital status, number of children, number of school age children and number of young children at the age between 0 and 4.

2) Immigration category: dichotomous variables equal to unity if Skilled Worker Principal Applicants, Skilled Worker Spouses and Dependants, Refugees and Others, with Family Class immigrants as the reference category.

3) Region of birth: dichotomous variables equal to unity if born in Asia and Pacific, Central and South America, Europe other than UK and Western Europe, and Africa and Middle East, with North America, UK and Western Europe as the reference category.

4) Province of residence: dichotomous variables equal to unity if lived in Atlantic Provinces, Quebec, Prairies Provinces and British Columbia with Ontario as the reference category; A dichotomous variable equal to unity if lived in an area other than the top five Census Metropolitan Areas (CMAs) – Toronto, Montreal, Vancouver, Ottawa and Calgary. Inclusion of these variables is to capture the local labour market disparity.

5) Ethnic group: dichotomous variables equal to unity if Chinese, South Asian, Black,

Filipino, Latin, West Asian and Arab, Other Asian (Southeast Asian, Korean and Japanese), and Other Visible Minority, with White as the reference category.

6) Education: dichotomous variables equal to unity if had a master's degree, college diploma or some university education, some post-secondary education, a high school diploma or less, with a bachelor's degree as the reference category; A dichotomous variable equal to unity if in school at the time of interview.

7) Languages: dichotomous variables equal to unity if has the knowledge of English (speaking fairly well, well, very well and with English as the native language), the knowledge of French (speaking fairly well, well, very well and with French as the native language).

8) Experience: length of time in Canada measured in months and a set of dichotomous variables equal to unity if had work experience before immigration, had visited Canada before, had worked in Canada on a work permit before, had studied in Canada on a study permit before, and had an arranged job in Canada when landing.

9) Social capital variables: social network indicators specified in Section 3.2. See Table A.1 in Appendix A for details. In addition, spouses' employment status is likely to determine the attachment to and opportunities in the labour market, so it is included in the explanatory variables and categorized as family factors.

4.1.2 Panel data models

Taking advantage of the longitudinal feature of the LSIC, this chapter presents longitudinal analyses in panel data model framework in addition to the cross-sectional analyses. The panel data models take unobserved individual specific effects into account, which addresses the problems of omitted variables in cross-sectional modelling. The fundamental advantage of a panel data set over a cross section is that it allows modelling differences in behaviour across individuals. In a typical panel, there are a large number of cross-sectional units and only a few periods, like the LSIC micro data. Thus, panel data modelling techniques are focusing on heterogeneity across units rather than time series autocorrelations.

The basic framework for the binary panel data models is a single equation model:

(4.1) $y_{it}^{*} = X'_{it}\beta + z_i + \varepsilon_{it}, \quad i = 1,\ldots, n;\ t = 1,\ldots, T_i.$

$$y_{it} = \begin{cases} 1 & if \quad y_{it}^{*} > 0 \\ 0 & otherwise \end{cases}$$

where i is an index for cross section units and t is an index for time periods. In the current analysis, $T = 3$. There are p independent variables in X_{it}, which are observable, either varying with time or not. The unobserved individual effect z_i capturing the heterogeneity across individuals that determines the employment probability includes a set of individual specific factors which are unobservable, such as individual difference in personality or ability, health, group or family specific characteristics and cultural attitudes towards labour market participation and so on. If z_i contains only a constant term, then the model reduces to an ordinary cross sectional model. If z_i contains unobserved variables, pooled cross sectional estimation will provide biased and inconsistent estimates due to omitted variables (i.e. neglected heterogeneity), thus panel models would be more appropriate.

(1) Fixed effects logit model

The fixed effects logit model makes the assumption that the unobserved individual effects z_i are correlated with X_{it}, in which case the model is:

(4.2) $y_{it}^{*} = X'_{it}\beta + z_i + \varepsilon_{it}, \quad i = 1,\ldots, n;\ t = 1,\ldots, T_i.$

$$y_{it} = \begin{cases} 1 & if \quad y_{it}^{*} > 0 \\ 0 & otherwise \end{cases}$$, so that

(4.3) $\Pr(y_{it} = 1 \mid X_{it}) = \Pr(y_{it}^{*} > 0 \mid X_{it}) = F(X'_{it}\beta + z_i)$

where F is the cumulative logistic distribution $F(a) = exp(a) / (1+exp(a))$.

As fitting this model using a full maximum-likelihood approach leads to difficulties, a conditional probability of $\boldsymbol{Y}_i = (y_{i1},\ldots, y_{iT})$ conditional on $\sum_{t=1}^{T} y_{it}$ (Chamberlain 1980). This

conditional probability does not involve the time invariant characteristics such as region of birth and ethnic group and the unobserved heterogeneity.

The fixed effects model does have some virtues such as that it increases the degree of freedom and the dependence of the explanatory variables is taken into account. However, in logistic regression, fixed effects model would lead to inconsistent estimates due to the so-called incidental parameters problem,[10] especially when T_i is fixed and small, like the case in current analysis where $T_i = 3$. Moreover, fixed effects make inference based on intra-individual rather than inter-individual comparison of employment status so that the fixed effects are also called within-subject effects. Thus only the observations for individuals who switched employment status are used in the estimation, as such a small sample (small T_i) bias is presented in the estimators. Furthermore, by using fixed effects model, I cannot estimate the effects of the variables which do not vary over time but are of interest to me, such as immigration category and ethnic group. Meanwhile, fixed effects model could only be used to deal with balanced panels which have no missing data.

(2) Random effects logit model

When assuming that the unobserved individual effects z_i in the general model (4.1) are unrelated to the observed explanatory variables $\boldsymbol{X}_{it}$: $Cov\ (\boldsymbol{X}_{it}, z_i) = 0$, $t = 1, 2, \ldots, T$, so that the conditional distribution $f(z_i \mid \boldsymbol{X}_{it})$ is independent on $\boldsymbol{X}_{it}$, the random effects model is obtained:

$$(4.4)\quad y_{it}^{*} = X'_{it}\,\beta + v_{it},\quad i = 1,\ldots, n;\ t = 1,\ldots, T_i.$$

$$E\,(v_{it} \mid \boldsymbol{X}_{it}) = 0,$$

where $v_{it} = z_i + \varepsilon_{it}$,

$$y_{it} = \begin{cases} 1 & if \quad y_{it}^{*} > 0 \\ 0 & otherwise \end{cases}$$

Time invariant variables such as immigration category, ethnic group, region of origin, can be

[10] See Greene (2003) Chapter 21 for a discussion.

included in the regression as part of X_{it} which is impossible in the fixed effects model. Under the random effects assumption, the individual effects are strictly uncorrelated with the observed explanatory variables. This view would be appropriate if sampled cross-sectional units are drawn from a large population, which is the case for the longitudinal data set used in this research. The random effects estimator is more efficient than the fixed effects estimator. However, as the assumption places a strong restriction on the distribution of the heterogeneity, the estimates may be inconsistent should the assumption be inappropriate.

(3) Generalized Estimating Equations (GEE) population-averaged logit model

An alternative to the random effects assumptions is the generalized estimating equations (GEE) method of Zeger, Liang and Albert (1988). The GEE model for the binary outcome is an extension of the standard logistic regression model from the generalized linear model approach (GLM).

One of the nice features of the GEE model is that the estimate of β is consistent as the assumption of independence of the unobserved individual effects with the explanatory variables is not needed, as required in the random effects model. The population-averaged model does not fully specify the distribution of the population, but rather specifies only a marginal distribution, so that $E(y_{it} \mid x_{it}) = E(y_{it} \mid x_i)$ for all t. The GEE approach relaxes the strict independence assumption of random effects estimation and takes the dependence among units into consideration. The advantage of the GEE over ordinary logistic regression is twofold: when the working correlation structure resembles the true dependence structure, more efficient estimates can be obtained; even if the dependence across periods is not properly modelled, the GEE estimator is still more efficient than pooled logit model.[11]

The GEE models are appropriate when inferences about the population-average are the focus. In this research, the average difference between groups with varied stock of social capital is of most importance, not the difference for any one immigrant. Furthermore, the GEE models could take the survey design into consideration by including the survey weights

[11] For a detailed discussion on the comparison of GEE and subject-specific approaches (random effects and fixed effects estimation) for analyzing binary outcomes in longitudinal data, see Neuhaus, Kalbfleisch and Hauck (1991).

in the regressions. Thus while the estimates from pooled logit model, fixed effects logit model, random effects logit model and the GEE logit model are contrasted in the results table for a comparison, the GEE logit model is used as the benchmark model for further investigation of time effects and group effects.

Section 4.2 Estimation and results

The estimation of the employment probability is undertaken in cross-sectional models as well as longitudinal ones. As discussed before, pooled estimation is subject to biased and inconsistent estimates when observed individual effects are present. However, for the purpose of this study, the results of cross-sectional regressions (Waves 1, 2, 3 respectively and pooled Waves 1, 2 and 3) are presented in Appendix A for comparison.

The estimated effects of the non-social capital variables are consistent with the theoretical explanations and the findings of other related empirical studies. These results are not discussed in detail in the paper. Several findings related to the non-social capital variables are briefly mentioned here.

It is worth noting that controlling for other characteristics, male immigrants landed in the categories other than family class are less likely to find employment in the initial period of settlement and integration, regardless of the quality or earnings of the employment, which is showed by the negative coefficients of the immigration category dummy variables in the regressions (see Table A.6 in Appendix A). While it looks surprising in terms of the lower employment likelihood of skilled worker principal applicants than family class, this result is consistent across models with social capital indicators or without. This finding is inline with relevant research on integration challenges of recent immigrants. Xue (2008) finds that skilled workers, both principal applicants and spouses and dependants, were most likely to report problems finding employment across all three waves of the LSIC. It may be associated with skilled workers' higher expectations and reservation wages, and problems relating to recognition of foreign qualifications or experience. Family class immigrants may have lower expectations about wages and occupational status, which leads them to more easily settle for

an initially unsatisfactory job. Skilled workers may choose to further education or get foreign credentials recognized before settling for an underemployment.

The population group dummy variables coefficients confirm to some extent what the descriptive statistics showed, i.e., Chinese male immigrants seem to be less likely to find employment and immigrants from Philippines perform better (see Table A.6 and A.7 in Appendix A).

4.2.1 Probability of employment

Conditional on labour force participation,[12] the observations that are not in the labour force (neither employed nor looking for a job) are excluded for the estimations. The analysis separates the sample into male and female groups. Table 4.1 and Table 4.2 below show the estimation results for the social capital variables of the employment likelihood of male and female immigrants respectively, from cross sectional models to panel models.

[12] As the outcome – employment status – is conditional on the participation in the labour force, I also estimate the probability of participating in the labour force using various indicators of the stock of social capital along with other socioeconomic variables. The results from the labour force participation estimations are available upon request.

Table 4.1
Estimation of employment likelihood of male immigrants in the labour force in the initial 4 years in Canada

Sample coverage: Male immigrants who participated in the labour force.														
Dependent variable	em (conditional on the participation in the labour force)													
	Models													
	Ordinary Logit Models (No individual specific effects)								**Panel Models (With individual specific effects)**					
Independent variables	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
Social networks														
_Family and relatives														
Spouse currently employed	0.392***	0.123	0.599***	0.118	0.148	0.172	0.383***	0.073	0.45***	0.098	0.486***	0.078	0.368***	0.073
Number of relatives in Canada	0.121	0.088	-0.137*	0.080	-0.108	0.087	-0.048	0.049	-1.075***	0.392	-0.076	0.056	-0.046	0.053
Relatives living nearby upon landing	0.115	0.157	0.319**	0.152	0.184	0.167	0.246***	0.090			0.278***	0.107	0.252**	0.100
Frequency of contact with family sponsors	0.222	0.239	0.174	0.220	-0.224	0.215	0.16	0.125	0.594**	0.249	0.389***	0.142	0.203	0.129
_Friends														
Friends living nearby upon landing	0.183	0.112	0.049	0.107	0.125	0.117	0.119*	0.063			0.168**	0.075	0.123*	0.070
Number of sources meeting friends	-0.159***	0.040	-0.041	0.030	-0.097**	0.043	-0.109***	0.019	-0.071**	0.030	-0.131***	0.022	-0.103***	0.019
Ethnic diversity of friends	0.84***	0.213	-0.337	0.255	-0.537*	0.274	0.291**	0.121	0.275	0.172	0.283**	0.126	0.283**	0.124
Cohort diversity of friends			0.743***	0.232	0.865***	0.245								
Frequency of contact with friends	0.155	0.200	0.097	0.210	-0.344	0.401	0.235*	0.130	0.206	0.198	0.298**	0.143	0.251*	0.129
_Groups and organizational network														
Number of organizations participated in	0.189	0.229	-0.18	0.185	-0.209	0.200	-0.083	0.115	-0.076	0.172	-0.056	0.123	-0.077	0.115
Ethnic diversity of organizational network	0.19	3.557	3.673	3.016	-0.512	3.285	1.685	1.825	1.324	2.860	1.766	1.996	1.549	1.812
Frequency of activity with organizations	-0.251	0.303	-0.211	0.282	0.379	0.307	-0.085	0.164	-0.284	0.238	-0.207	0.177	-0.111	0.167
Volunteered time for organizations	-0.086	0.206	-0.087	0.191	0.404*	0.221	0.086	0.113	0.353**	0.162	0.177	0.120	0.122	0.112
_cons	-4.51*	2.448	24.726**	10.835	0.274	28.116	-1.067**	0.513			-1.336**	0.594	-1.024*	0.529
No. of observations	2996		3360		3450		9843		3880		9843		9843	
No. of groups (for panel models)									1379		3659		3659	
Pseudo R^2	0.196		0.124		0.1227		0.145						0.186	
Percent correctly predicted	0.753		0.789				0.789		0.584		0.780		0.790	
	Prob > Chi-Square													
Joint test for network size (number of relatives in Canada, number of sources meeting friends and number of organizations participated in) = 0	0.0006		0.1157		0.0311		0.0000		0.0041		0.0000		0.0000	
Joint test for network diversity (ethnic diversity of friends, ethnic diversity of organizational network) = 0, if applicable	0.0004		0.0074		0.0051		0.0262		0.2399		0.0403		0.0447	
Joint test for network density (frequency of contact with family sponsors, frequency of contact with friends and frequency of activity with organizations)= 0	0.5319		0.7052		0.3831		0.1579		0.0454		0.0050		0.0823	

* p<0.1; ** p<0.05; *** p<0.01.
Reference categories are in brackets.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table 4.2
Estimation of employment likelihood of female immigrants in the labour force in the initial 4 years in Canada

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)													
	Models													
	Ordinary Logit Models (No individual specific effects)								Panel Models (With individual specific effects)					
Independent variables	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
Social networks														
_Family and relatives														
Spouse currently employed	0.336**	0.130	0.255**	0.127	-0.022	0.148	0.142**	0.071	0.077	0.090	0.191***	0.072	0.125*	0.069
Number of relatives in Canada	0.055	0.083	0.019	0.072	0.119	0.085	0.069	0.045	-0.126	0.374	0.052	0.051	0.075	0.050
Relatives living nearby upon landing	0.189	0.160	0.331**	0.140	-0.021	0.160	0.17*	0.087			0.273***	0.097	0.169*	0.095
Frequency of contact with family sponsors	0.07	0.258	-0.123	0.204	-0.056	0.186	0.011	0.114	0.357	0.238	-0.013	0.124	0.012	0.117
_Friends														
Friends living nearby upon landing	0.304**	0.125	0.382***	0.111	0.104	0.112	0.289***	0.065			0.337***	0.073	0.283***	0.069
Number of sources meeting friends	-0.124***	0.044	-0.16***	0.031	-0.177***	0.040	-0.154***	0.020	-0.086***	0.031	-0.168***	0.022	-0.148***	0.021
Ethnic diversity of friends	0.258	0.226	0.55**	0.250	0.332	0.243	0.45***	0.118	0.367**	0.186	0.479***	0.124	0.454***	0.118
Cohort diversity of friends			0.333	0.214	0.081	0.210								
Frequency of contact with friends	0.337	0.217	0.52**	0.207	0.89**	0.352	0.517***	0.129	0.413**	0.195	0.527***	0.136	0.499***	0.130
_Groups and organizational network														
Number of organizations participated in	0.083	0.257	0.127	0.215	0.308	0.227	0.159	0.127	0.143	0.187	0.212	0.131	0.144	0.127
Ethnic diversity of organizational network	-2.616	3.694	2.548	2.962	-1.071	3.339	0.025	1.875	-0.242	2.795	-0.395	1.932	0.129	1.860
Frequency of activity with organizations	0.067	0.319	-0.379	0.316	-0.531	0.332	-0.262	0.183	-0.05	0.252	-0.308*	0.183	-0.234	0.185
Volunteered time for organizations	0.219	0.237	-0.068	0.209	-0.09	0.208	-0.037	0.120	-0.102	0.169	-0.089	0.124	-0.047	0.122
_cons	-2.937	2.736	5.552	9.247	-18.864	20.570	0.309	0.526			0.31	0.551	0.277	0.538
No. of observations	2070		2724		2851		7674		3477		7674		7674	
No. of groups (for panel models)									1284		3201		3201	
Pseudo R^2	1.109		0.123		0.1046		0.112							
Percent correctly predicted	0.669		0.716				0.721		0.584		0.703		0.719	
	Prob > Chi-Square													
Joint test for network size (number of relatives in Canada, number of sources meeting friends and number of organizations participated in) = 0	0.0399		0.0000		0.0000		0.0000		0.0391		0.0000		0.0000	
Joint test for network diversity (ethnic diversity of friends, ethnic diversity of organizational network) = 0, if applicable	0.4541		0.0008		0.2298		0.0006		0.1426		0.0006		0.0006	
Joint test for network density (frequency of contact with family sponsors, frequency of contact with friends and frequency of activity with organizations)= 0	0.4632		0.0484		0.0329		0.0005		0.0971		0.0007		0.0012	

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of
Reference categories are in brackets.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table 4.3 and Table 4.4 present estimation results across multiple model specifications, the final specifications and the marginal effects for male and female immigrants respectively, based on the GEE population-averaged panel models.

The estimations find evidence of some significant relationships between social networks and labour market outcomes. The findings are robust for different time periods and different statistical models. The directions of the relationships between social capital indicators within various types of social networks and labour market outcomes are mixed. While a more

diverse network is associated with higher employment probability, the absolute number of sources meeting friends has a small but negative impact on immigrants' employment likelihood.

Table 4.3
GEE population-averaged estimations of employment likelihood of male immigrants in the initial 4 years in Canada

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
	Model M.1		Model M.2		Model M.3		Model M.4		Model M.5		Marginal Effects	
Independent variables	No social capital		All social capital indicators		Kinship and friendship indicators		Social capital and time effects		Final specification		Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Social networks												
_Family and relatives												
Spouse currently employed	0.36***	0.072	0.368***	0.073	0.367***	0.073	0.393***	0.073	0.372***	0.073	0.055***	0.010
Number of relatives in Canada			-0.046	0.053	-0.046	0.053						
Relatives living nearby upon landing			0.252**	0.100	0.248**	0.100	0.184**	0.076	0.183**	0.076	0.028**	0.012
Frequency of contact with family sponsors			0.203	0.129	0.206	0.129						
_Friends												
Friends living nearby upon landing			0.123*	0.070	0.122*	0.069						
Number of sources meeting friends			-0.103***	0.019	-0.103***	0.018	-0.08***	0.019	-0.097***	0.018	-0.015***	0.003
Ethnic diversity of friends			0.283**	0.124	0.298**	0.124	0.301**	0.124	0.288**	0.123	0.045**	0.019
Frequency of contact with friends			0.251*	0.129	0.244*	0.129	0.185	0.129	0.256**	0.128	0.04**	0.020
_Groups and organizational network												
Number of organizations participated in			-0.077	0.115								
Ethnic diversity of organizational network			1.549	1.812								
Frequency of activity with organizations			-0.111	0.167								
Volunteered time for organizations			0.122	0.112								
Time effects												
Wave2							-0.213	0.373				
Wave3							0.196	0.418				
_cons	-0.275	0.500	-1.024*	0.529	-1.029*	0.529	-1.507**	0.620	-0.826	0.518		
No. of observations	9843		9843		9843		9843		9843		9843	
No. of groups	3659		3659		3659		3659		3659		3659	
Percent correctly predicted	0.787		0.790		0.789		0.791		0.788			

* p<0.1; ** p<0.05; *** p<0.01.

[1] Marginal effects for dummy variables are for discrete change from 0 to 1.

Reference categories are in brackets.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

The coefficients of estimations for male immigrants' employment probability (Table 4.1 and 4.3) are to a large extent consistent with what are expected from relevant literature. The last columns in Table 4.3 report marginal effects of the social capital variables.

For male newcomers, relatives' network has few impacts on employment status except the

positive impacts of the employment status of spouses and geographic closeness of relatives upon landing. Having a spouse who is currently working is associated with a 5% higher employment likelihood while having a relative living nearby at landing is related to a probability of 2.8% higher to find a job than having no kinship or relatives living far.

Friendship network has a mixed impact on males' employment likelihood. Friendship size, ethnic diversity and frequency of contact with friends are the main elements affecting male immigrants' employment probability, with marginal effects of -1.5% and 4.5% and 4% respectively.

There is no evidence of a linkage between organizational network and employment likelihood for male immigrants.

Table 4.4
GEE population-averaged estimations of employment likelihood of female immigrants in the initial 4 years in Canada

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
	Model F.1		Model F.2		Model F.3		Model F.4		Model F.5		Marginal Effects	
Independent variables	No social capital		All social capital indicators		Kinship and friendship indicators		Social capital and time effects		Final specification		Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Social networks												
_Family and relatives												
Spouse currently employed	0.079	0.067	0.125*	0.069	0.125*	0.069	0.148**	0.072	0.125*	0.068	0.026*	0.014
Number of relatives in Canada			0.075	0.050	0.073	0.050						
Relatives living nearby upon landing			0.169*	0.095	0.169*	0.095	0.254***	0.075	0.255***	0.074	0.053***	0.016
Frequency of contact with family sponsors			0.012	0.117	0.014	0.117						
_Friends												
Friends living nearby upon landing			0.283***	0.069	0.276***	0.068	0.278***	0.069	0.279***	0.068	0.057***	0.014
Number of sources meeting friends			-0.148***	0.021	-0.143***	0.020	-0.136***	0.020	-0.142***	0.020	-0.03***	0.004
Ethnic diversity of friends			0.454***	0.118	0.455***	0.118	0.457***	0.117	0.458***	0.117	0.095***	0.024
Frequency of contact with friends			0.499***	0.130	0.487***	0.129	0.463***	0.130	0.484***	0.129	0.101***	0.027
_Groups and organizational network												
Number of organizations participated in			0.144	0.127								
Ethnic diversity of organizational network			0.129	1.860								
Frequency of activity with organizations			-0.234	0.185								
Volunteered time for organizations			-0.047	0.122								
Wave2							-0.569	0.410				
Wave3							-0.462	0.455				
_cons	1.213**	0.501	0.277	0.538	0.304	0.536	-0.274	0.646	0.382	0.518		
No. of observations	7674		7674		7674		7674		7674		7674	
No. of groups	3201		3201		3201		3201		3201		3201	
Percent correctly predicted	0.711		0.719		0.720		0.719		0.720			

* p<0.1; ** p<0.05; *** p<0.01.

[1] Marginal effects for dummy variables are for discrete change from 0 to 1.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Tables 4.2 and 4.4 indicate that more social network indicators relate to female immigrants' employment probability than to males: Besides spouse's employment status, geographic closeness of relatives upon landing, ethnic diversity, size of friendship network and frequency of contacts with friends which are significantly related to male immigrants' labour market entry, there is also a significant positive association between geographic closeness of existing friends upon landing and female newcomers' employment likelihood in the labour force.

It is worth mentioning that social capital indicators affect female immigrants to a greater degree than males. As indicated by the last columns in Table 4.3 and 4.4 with marginal effects of the social capital variables, geographic closeness of relatives upon landing increases males' employment likelihood by 2.8% while raising the chance for female immigrants to find a job by 5.3%. Ethnic diversity and frequency of contact with friends both could increase the employment likelihood for females by about 10% while they only work for male immigrants at around 4%.

Like the results for male immigrants, no convincing evidence was found to suggest that organizational network affects the probability of employment for female immigrants.

The joint Wald tests for network structure and content components (at the bottoms of Table 4.1 and 4.2) further reveal that network size (joint test for three independent variables – number of relatives living in Canada, number of sources meeting with friends and number of organizations participated in), diversity (joint test for two variables – ethnic diversity of friends and ethnic diversity of organizational network) and density (joint test for three explanatory variables – frequency of contact with family sponsors, frequency of contact with friends and frequency of activities with organizations) are all significantly related to females' labour market outcomes, whereas density or frequency of contact tends to have no relationship with male immigrants' employment outcomes.

The results from cross sectional models and panel models tell a consistent story. And the likelihood ratio tests for the presence of panel-level variance component reject the null

hypothesis of no panel-level variance component for both male and female estimations.[13] So panel models with individual specific effects are more appropriate for my analysis.

Comparing the results from panel models, it is not surprising to see the differences between fixed effects estimator with other panel data model estimators. The much smaller sample size in fixed effects model compared to the random effects and the GEE population averaged estimators results from dropping subjects with same outcomes across periods (i.e. employed at three waves or unemployed at three waves). The fixed effects estimator is very inefficient since, as noted in the Table 4.1 and Table 4.2, six out of 10 units whose outcome were all 0 or 1 cannot contribute to the analysis. The random effects estimator and the GEE population averaged estimator are more efficient and tend to yield smaller standard errors leading to smaller p-values.

4.2.2 Time effects

As the cross sectional regressions for different periods (Waves 1, 2 and 3) showed in Table 4.1 and Table 4.2, the coefficients are quite different across periods. There may be differential impacts of the second wave (two years after landing) or the third wave (four years after landing) on the immigrants' employment probability relative to the first wave (six months after landing). The panel model (or individual-specific model) (4.1) can be extended to include a time-specific effect as well.

$$(4.5)\quad y_{it}^{*} = x'_{it}\beta + z_i + s_t + \varepsilon_{it}, \quad i = 1,\ldots, n;\ t = 1,\ldots, T_i.$$

$$y_{it} = \begin{cases} 1 & if \quad y_{it}^{*} > 0 \\ 0 & otherwise \end{cases}$$

where s_t captures the omitted variables that are related to immigrants' employment outcomes, varying over time but not across individuals, such as the changes in national economic conditions.

When time effects are incorporated into the employment probability models (Models 4 in

[13] See Appendix B for a detailed discussion of the test.

Table 4.3 and Table 4.4), it shows that time effects are not significantly present on the employment probability for both female and male immigrants.

4.2.3 Differential ethnic diversity effects

As already noted in the above analysis, ethnic diversity of friendship network appears to be the main factor within social network indicators linked to labour market outcomes for both male and female immigrants. Based on the GEE population averaged model, the ethnic diversity effects are further examined across different explanatory variables by interacting friendship diversity indicator with a variety of independent variables, to find some interesting patterns (Table 4.5 and Table 4.6):

(1) Interactions of friendship ethnic diversity with time effects (Model M.int.1 and F.int.1).

When interactions of time effects with ethnic diversity of friendship (see Model M.int.1 in Table 4.5 and Model F.int.1 in Table 4.6) are added to the model, the time effects significantly show for female immigrants. Female immigrants are less likely to find employment in Wave 2 (i.e. from six months to two years in Canada) and Wave 3 (i.e. from two years to four years after landing) relative to the base period – Wave 1 (the first six months in Canada). As the LSIC target population is the immigrants who landed from abroad from October 2000 to September 2001, the Wave 2 and 3 time periods cover the time span from April 2001 to late 2005 when the macroeconomic condition was generally getting worse after the economic downturn. Furthermore, for female newcomers, friendship diversity has more impact on employment likelihood in Wave 2 and 3 than in Wave 1, showed by the positive and statistically significant coefficient of the interaction terms.

While time effect is not presented for male immigrants' employment probability, the ethnic diversity of friendship network displays significantly less effect on employment in Wave 3 than in Wave 1 for this group. This result suggests that as time goes on, the effect of ethnic diversity decreases for male immigrants. In other words, the effect of ethnic concentration increases. If the first six months are treated as short run and the second and third waves are treated as longer run, this result seems to be consistent with the longer run implication of

Calvó-Armengol and Jackson's theoretical model (Calvó-Armengol and Jackson 2004). In the short run, newcomers compete against each other. In the longer run, after some members get jobs, members of the same ethnic group are more likely to pass information to each other so that the effect of ethnic diversity decreases with the time spent in Canada.

Table 4.5
GEE population-averaged estimations of employment likelihood of male immigrants in the initial 4 years in Canada with interaction effects

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)									
	Models									
	Model M.int.1		Model M.int.2		Model M.int.3		Model M.int.4		Model M.int.5	
Independent variables	Time effect interactions		Immigration category interactions		Ethnic group interactions		Education interactions		Official language interactions	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Social networks										
Spouse currently employed	0.392***	0.073	0.376***	0.073	0.37***	0.073	0.373***	0.073	0.372***	0.073
Relatives living nearby upon landing	0.183**	0.075	0.183**	0.076	0.18**	0.076	0.182**	0.075	0.183**	0.076
Number of sources meeting friends	-0.081***	0.019	-0.095***	0.018	-0.098***	0.018	-0.097***	0.018	-0.097***	0.018
Ethnic diversity of friends	0.584***	0.175	-0.334	0.281	0.448**	0.219	0.332*	0.192	0.323	0.324
Frequency of contact with friends	0.145	0.130	0.312**	0.131	0.267**	0.130	0.269**	0.128	0.256**	0.129
Time effects										
Wave2	-0.055	0.395								
Wave3	0.437	0.431								
Interactions										
Wave2 * Ethnic diversity of friends	-0.355	0.242								
Wave3 * Ethnic diversity of friends	-0.526**	0.243								
SWPA * Ethnic diversity of friends			0.831***	0.317						
SWSD * Ethnic diversity of friends			0.824**	0.407						
Refugees * Ethnic diversity of friends			0.342	0.382						
Others * Ethnic diversity of friends			0.447	0.466						
Chinese * Ethnic diversity of friends					0.426	0.372				
South Asian * Ethnic diversity of friends					-0.194	0.328				
Black * Ethnic diversity of friends					-0.955**	0.461				
Filipino * Ethnic diversity of friends					-1.521**	0.653				
Latin * Ethnic diversity of friends					0.639	0.658				
West Asian and Arab * Ethnic diversity of friends					0.018	0.341				
Other Asian * Ethnic diversity of friends					-1.021**	0.504				
Other Visible Minority * Ethnic diversity of friends					-0.571	1.091				
High school diploma or less * Ethnic diversity of friends							-0.286	0.289		
Some post-secondary education * Ethnic diversity of friends							0.139	0.525		
College diploma or some university * Ethnic diversity of friends							0.03	0.341		
Master's degree or above * Ethnic diversity of friends							0.027	0.315		
English * Ethnic diversity of friends									-0.055	0.321
French * Ethnic diversity of friends									0.05	0.259
_cons	-1.611**	0.624	-0.659	0.520	-0.927*	0.544	-0.831	0.521	-0.834	0.524
No. of observations	9843		9843		9843		9843		9843	
No. of groups	3659		3659		3659		3659		3659	
Percent correctly predicted	0.792		0.789		0.789		0.789		0.788	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table 4.6
GEE population-averaged estimations of employment likelihood of female immigrants in the initial 4 years in Canada with interaction effects

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)									
	Models									
	Model F.int.1		Model F.int.2		Model F.int.3		Model F.int.4		Model F.int.5	
Independent variables	Time effect interactions		Immigration category interactions		Ethnic group interactions		Education interactions		Official language interactions	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Social networks										
Spouse currently employed	0.145**	0.072	0.12*	0.069	0.13*	0.069	0.125*	0.069	0.127*	0.068
Relatives living nearby upon landing	0.255***	0.075	0.257***	0.074	0.252***	0.075	0.253***	0.075	0.254***	0.074
Friends living nearby upon landing	0.279***	0.069	0.281***	0.068	0.283***	0.069	0.277***	0.069	0.278***	0.068
Number of sources meeting friends	-0.134***	0.020	-0.141***	0.020	-0.143***	0.020	-0.142***	0.020	-0.141***	0.020
Ethnic diversity of friends	-0.094	0.193	0.12	0.206	0.303	0.204	0.612***	0.189	0.263	0.303
Frequency of contact with friends	0.543***	0.133	0.515***	0.130	0.482***	0.130	0.483***	0.129	0.487***	0.130
Time effects										
Wave2	-1.006**	0.424								
Wave3	-0.827*	0.466								
Interactions										
Wave2 * Ethnic diversity of friends	0.89***	0.252								
Wave3 * Ethnic diversity of friends	0.731***	0.246								
SWPA * Ethnic diversity of friends			0.597*	0.323						
SWSD * Ethnic diversity of friends			0.437*	0.263						
Refugees * Ethnic diversity of friends			0.427	0.359						
Others * Ethnic diversity of friends			0.85*	0.462						
Chinese * Ethnic diversity of friends					0.249	0.377				
South Asian * Ethnic diversity of friends					0.183	0.288				
Black * Ethnic diversity of friends					-0.664	0.439				
Filipino * Ethnic diversity of friends					1.301*	0.680				
Latin * Ethnic diversity of friends					0.165	0.654				
West Asian and Arab * Ethnic diversity of friends					0.455	0.378				
Other Asian * Ethnic diversity of friends					-0.329	0.497				
Other Visible Minority * Ethnic diversity of friends					1.559*	0.864				
High school diploma or less * Ethnic diversity of friends							-0.132	0.269		
Some post-secondary education * Ethnic diversity of friends							-0.08	0.443		
College diploma or some university * Ethnic diversity of friends							-0.197	0.303		
Master's degree or above * Ethnic diversity of friends							-0.473	0.328		
English * Ethnic diversity of friends									0.307	0.299
French * Ethnic diversity of friends									-0.3	0.262
_cons	-0.152	0.648	0.459	0.521	0.497	0.537	0.312	0.523	0.431	0.521
No. of observations	7674		7674		7674		7674		7674	
No. of groups	3201		3201		3201		3201		3201	
Percent correctly predicted	0.720		0.721		0.722		0.720		0.721	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Note: The estimations also include control variables for immigration category, demographic and household characteristics (age, marital status, number of children), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada. See Appendix for the complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

(2) Interaction of friendship ethnic diversity with immigration class (Model M.int.2 and F.int.2)

Ethnic diversity of friendship has more impacts on the probability finding employment for male skilled workers (both principal applicants and spouses and dependants) than for the reference group – family class male immigrants. For female immigrants, friendship ethnic diversity does not show significantly different impacts across immigration categories.

(3) Interaction of friendship ethnic diversity with population group (Model M.int.3 and F.int.3)

When looking across the various visible minority groups, the directions of the effects of ethnic diversity are quite different. For the Chinese male immigrants, an ethnic diversified network has more impact on employment probability than for the reference group – White immigrants, but the effect is not statistically significant. For Black, Filipino and Southeast Asian and Japanese and Korean male immigrants, the effect of friendship diversity on employment entry is less relative to White immigrants, indicated by significant negative coefficients. For female immigrants, ethnic diversity plays a stronger and marginally significant role only for Filipino and other visible minority newcomers in the labour market relative to the reference group – White female immigrants.

(4) Interactions of friendship ethnic diversity with education and official languages ability (Model M.int.4, M.int.5 and F.int.4, F.int.5)

In the literature, it is argued that social capital substitutes for human capital and has stronger effects for those disadvantaged in human capital (e.g. Livingston 2006). Thus human capital variables – education level and official languages proficiency are interacted with friendship diversity to see if social capital serves as a (non-perfect) substitute for human capital. If the argument holds, it is expected to see that social capital has stronger effects for those with lower education or less knowledge of official languages.

However, the results do not show any evidence of the substitute role of social capital on employment probability. Friendship diversity has no different effects for immigrants with different official language abilities and education levels on the likelihood of employment

entry.

In summary, for female immigrants, ethnic diversity effects are mostly captured by the interaction terms, showed by the insignificant coefficient of the diversity indicator and significant coefficients of interaction terms for some specific groups. A diversified friendship network is especially important for female economic class immigrants and Filipino newcomers in the Canadian labour market. For male immigrants, social capital is more related to employment status of some specific groups. After controlling for disparity within different groups, a diverse friendship has stronger effects on the employment likelihood of male skilled workers but weaker impacts on employment entry of Black, Filipino and Southeast Asian, Japanese and Korean.

Section 4.3 Conclusions

This study suggests that social capital does have impacts on the immigrants' labour market outcomes, both for males and females. Social capital affects female newcomers' employment entry to a greater degree than males. The following empirical findings are robust across statistical specifications.

First, the attachment to the labour market for female immigrants is more related to social networks than for males. Female immigrants' employment probability tends to be associated with all the elements of social network structure: size, diversity and density, while the frequency of contact with the networks seems to have no significant effects on the employment status for male immigrants.

Second, the role played by different types of social networks on employment was examined. The study confirms some of the findings in the literature on social networks, such as the effects of weak ties (organizational network vs. friendship and kinship networks) and network diversity. Specifically, the analysis suggests that friendship network is the most important relationship in the labour market entry outcomes. However, there is no evidence suggesting any effects from the relatively distant relationships – groups or organizational networks – on employment status. Furthermore, the geographic closeness of friendship

shows a positive effect on female immigrants' employment likelihood. Nonetheless, given the short period that the analysis covers relative to the long integration process, the results tend to suggest that in the initial years in Canada, weak ties end up with few impacts on improving immigrants' employment probability.

The directions of the relationships between social capital indicators and labour market outcomes are mixed. While a more diversified network is associated with higher employment probability, the absolute number of sources meeting friends has a small but negative impact on employment likelihood. On the one hand, these findings further emphasize the importance of diverse networks on immigrants' employment outcomes, which is consistent with the findings of Borjas (1995) and Warman (2005) that high co-ethnic levels of social capital among immigrant groups negatively affect their labour market outcomes. On the other hand, unlike the Australian evidence (Stone, Gray and Hughes, 2003) of positive effects of network size, the results here indicate a negative impact of friendship size. However, given the measurement disparity between the analyses,[14] this result should be interpreted with caution.

Finally, while an ethnic diversified friendship increases the probability of employment for both male and female immigrants, ethnic diversity of the network seems to have a differential impact on the employment likelihood across ethnic groups and immigration categories. In particular, making the friendship network more ethnically diverse is much more beneficial to the immigrants landed in the immigration categories other than the family class, especially male skilled workers, female economic class and female Filipino immigrants.

Some results confirm the implications of Calvó-Armengol and Jackson's theoretical model (Calvó-Armengol and Jackson 2004). While employment likelihood increases with network diversity for both genders, the effect of ethnic diversity decreases over time for male immigrants. This result, echoing with the finding that friendship network size has a negative impact on employment during the initial four years, reinforces the possible competition within the same ethnic group of immigrants and the negative effect of network size in the

[14] Note that in the analysis, the size of friendship is measured by the number of sources meeting new friends according to the data structure of the LSIC, while in Stone, Gray and Hughes' research, the size of network is measured by the absolute number of friends.

short run implied by Calvó-Armengol and Jackson.

Overall, the analysis reveals significant variability in the presence of social networks at landing and in the social capital stock across immigration classes and ethnic groups; furthermore, social capital stock as measured by various indicators influences immigrants' probability of employment in the Canadian labour market in the initial four years in Canada. In addition, possibly through a more diverse network, social capital plays an important role in facilitating the economic assimilation of recent immigrants in terms of a higher probability of getting employment. However, due to data limitation, this study focuses only on the relatively short period of the first four years after landing. Further research will be required to improve our understanding of the role of social capital in newcomers' employment entry process over a longer time span.

Employment entry is the first step leading to a successful integration in the Canadian labour market for immigrants. The research on the economic return to social capital will further provide evidence on other labour market outcomes for immigrants, namely, employment earnings and occupational outcomes.

Chapter 5 Social capital and wages

Section 5.1 Estimation framework and model specification

5.1.1 Sample selection

Based on the network-based concept using information that is unique to the LSIC data, with focus on the Social Interactions and Group Organizations modules, indicators of social capital were constructed in different dimensions: size, density, and diversity for various types of social capital for each wave (Section 3.2). In addition, benefiting from the information in the LSIC on the actual channels through which immigrants found jobs, it is for the first time possible to identify which connections lead to which job so that indicators of job-found channels can be created: through family members or relatives, through co-ethnic friends, through non co-ethnic friends or through formal channels.[15]

Based on the indicators, the individual stock of social capital and job-found channels is used along with other socioeconomic variables to model the log of the real weekly wages conditional on employment in the first six months, two years and four years in Canada in panel data models.

The sample is restricted to individuals who participated in all three interviews and were employed and paid at the time of a specific interview. Immigrants who were self-employed and those who were employed without pay are excluded from the analysis. Furthermore, the immigrants who resided in the Territories are excluded from the analyses due to the extremely small size of this group. In addition, individuals for whom information concerning the included variables was missing are excluded. In order to capture the gender differences in the predictors and wage outcomes, the sample is separated into male and female immigrants for regression analyses.

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[15] For each individual, the job-found channel is determined by the channels through which the current main job was found.

5.1.2 Methods

All analyses are longitudinal, taking advantage of this characteristic of the LSIC. The relationships between social capital indicators and weekly wages are examined with panel data models, including fixed and random effects models in order to capture the unobserved individual heterogeneity. The Hausman-Taylor (HT) models and panel instrumental variable (IV) models are also used to further address the endogeneity on the returns to social capital. Ethnic concentration ratios in the CMAs and CAs (Census Agglomerations), where the longitudinal respondents (LRs) lived are derived from 2001 Census, are included in the IV models as external instrumental variables.[16]

Hausman model specification tests are conducted under different assumptions about endogeneity of social capital, the results of which suggest that the HT estimators are consistent and efficient and favoured over other panel data model estimates, including IV ones. Thus the interaction effects are further explored based on the HT estimators.

(1) Panel data models

Panel or longitudinal data provide more information than cross-sectional data, which increases estimation precision and also enables researchers to control for unobserved heterogeneity related to the omitted variable bias in cross-section models. Thus the empirical work in this chapter uses panel data models to identify social capital effects on immigrant wages, taking advantage of the longitudinal nature of the data.

The basic panel data model takes the form

$$(5.1) \qquad y_{it} = x_{it}\beta + \alpha_i + \varepsilon_{it}$$

where y_{it} is the log of wages, and x_{it} is socio-economic characteristics of the LSIC immigrants including social networks. Among x_{it}, some variables vary with time such as age, marital status, while others do not, such as country of origin and immigration category. $\alpha_i + \varepsilon_{it}$ is the residual term. α_i is the individual specific effect, which differs between

[16] The ethnic concentration ratios in CMA/CAs are derived from 2001 Census 20% sample data.

individuals but for any particular individual, its value is constant. ε_{it} is the usual residual that is strictly exogenous with the usual properties, i.e. mean *0*, uncorrelated with itself, uncorrelated with *x*, uncorrelated with α_i, and homoskedastic.

(5.2) $E\left[\varepsilon_{it} \mid \alpha_i, x_{i1}, \ldots, x_{iT}\right] = 0$

The various panel data models depend on the assumptions made about the individual specific effects α_i.

(2) Random effects model

One variant of the model (4.1) assumes that the unobserved individual effects are random variables that are distributed independently of the explanatory variables (assumption (5.3) below). This is called the random effects (RE) model.

(5.3) $E(\alpha_i \mid x_{it}) = 0$

The RE estimator is a generalised least squares (GLS) estimator, which uses both within-group (deviation from individual mean) and between-group (individual mean) variations, but weights them according to the relative sizes of $\sigma_\varepsilon^2 + T_i\sigma_\alpha^2$ and σ_ε^2. It is equivalent to the following two steps: 1) transform the data: $y_{it}^+ = y_{it} - \theta_i \overline{y_i}$ and $x_{it}^+ = x_{it} - \theta_i \overline{x_i}$, where $\theta_i = 1 - \sqrt{\frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + T_i\sigma_\alpha^2}}$; 2) regress y_{it}^+ on x_{it}^+. The variance parameters σ_ε^2 and σ_α^2 can be estimated from the within-group and between-group regression residuals.

However, assumption (5.3) is unlikely to hold in many cases. In the present study, the unobserved individual invariant effects α_i could include personal characteristics such as ability, motivation and preferences which are very likely related to some explanatory variables for wages, like educational attainment, social network type and content and so on. In this case $E(\alpha_i \mid x_{it}) \neq 0$ and the random effects estimator is biased and inconsistent.

(3) Fixed effects model

The fixed effects (FE) model treats the unobserved individual effects as random variables

that are potentially correlated with the explanatory variables. Unlike the random effects estimators, the FE estimator assumes nothing regarding the correlation structure between α_i and the explanatory variables. As we don't know the statistical properties of α_i, it can be eliminated from the model. Among various ways to eliminate α_i, the within-group transformation or deviation from mean is easy to understand: The FE estimator is a regression of $y_{it} - \overline{y_i}$ on $x_{it} - \overline{x_i}$. Given the assumption (2), $\boldsymbol{\beta}$ can be consistently estimated using the FE estimator.

Regarding the choice between random effects model and fixed effects model, Hausman (1978) suggests a specification test comparing the RE estimator and the FE estimator, both of which are consistent under the null hypothesis H_0: $E(\alpha_i \mid x_{it}) = 0$. A rejection would be interpreted as an adoption of the fixed effects model and non-rejection as an acceptance of the random effects model. This test was done for the current study and the results are reported in the estimation results table.

However, a major limitation of the fixed effects estimator is that the coefficients of time-invariant explanatory variables are not identified. Thus it is not suited to estimate the effects of time constant variables, such as ethnic group, education before landing and immigration class on earnings in the current study.

(4) Hausman-Taylor model

As social capital is very likely to be correlated with the individual-specific effect α_i, which may consist of ability and motivation, an obvious choice would be the use of a fixed effects model. However, if the effect of a time-invariant variable is of main interest, a fixed effects model cannot estimate it. Hausman and Taylor (1981) considered the following model

$$(5.4) \quad y_{it} = x_{1it}\beta_1 + x_{2it}\beta_2 + w_{1i}\gamma_1 + w_{2i}\gamma_2 + \alpha_i + \varepsilon_{it}$$

where $\boldsymbol{x_{1it}}$ and $\boldsymbol{x_{2it}}$ are time varying variables (e.g. age, marital status, and number of friends) while $\boldsymbol{w_{1i}}$ and $\boldsymbol{w_{2i}}$ are time-invariant variables (e.g. immigration category, country of origin, pre-migration experience and social networks upon landing). $\boldsymbol{x_{1it}}$ and $\boldsymbol{w_{1i}}$ are assumed to be uncorrelated with individual effect α_i (e.g. age and country of origin), whereas $\boldsymbol{x_{2it}}$ and $\boldsymbol{w_{2i}}$ are assumed to be correlated with α_i (e.g. education and social networks upon landing), i.e.

endogenous,

(5.5) $E(\alpha_i \mid w_{1i}) = 0$ and $E(\alpha_i \mid x_{1it}) = 0$

Hausman and Taylor suggested using the time-varying exogenous variables x_{1it} to estimate β_1 and meanwhile as instruments for w_{2i} permitting estimation of γ_2. So compared to the random effects model which assumes exogeneity of all the explanatory variables with the unobserved heterogeneity, and to the fixed effects model which allows for endogeneity of all the independent variables with the individual heterogeneity, the Hausman-Taylor model instead allows for only some of the independent variables to be correlated with the individual effects. In the current earnings equation, individual specific terms α_i may denote ability, personality, motivation and attitudes towards networking and work and this may be correlated to social capital variables as well as educational attainment, skill level, job tenure and working hours. Thus such variables are assumed to be endogenous (i.e. x_{2it} or w_{2i}) with individual specific effects. All the other variables are assumed to be exogenous (i.e. x_{1it} or w_{1i}).

Under assumptions (5.2) and (5.5), the Hausman-Taylor estimator consistently and efficiently provides estimates of β, while the fixed effects estimator consistently estimates β under weaker assumptions (5.2) but not efficiently. Thus a Hausman test based on the difference between the Hausman-Taylor estimator and the fixed effects estimator is used to test assumption (5.5). The test results, presented in the estimation results table, indicate that instrumentation of the social capital variables, education, skill level, job tenure and working hours is sufficient to remove any correlation between the individual specific effects (ability, motivation and so on) and the remaining explanatory variables.

(5) Instrumental variables estimator for panel data models

There are two forms of endogeneity in this context. One is the unobserved common factors[17] which are addressed by the Hausman-Taylor estimator. The other is the so-called two-way causation: social capital is rewarded with higher pay and workers tend to develop social

[17] Here, unobserved ability is rewarded with high pay and people with high innate ability tend to have higher levels of social capital and education.

networks in high-paid jobs (i.e. $cov(SocialK_{it}, \varepsilon_{it}) \neq 0$). This potential endogeneity of social capital variables with the disturbance term ε_{it} would require instrumental variables (IV) methods like two stage least squares (2SLS) to obtain consistent parameter estimates.

To check the sensitivity of the results towards the identifying assumptions about endogeneity of social capital, the panel data regression is expanded to include exogenous variables from outside the LSIC dataset. Inspired by Warman (2005), the ethnic concentration ratio in the CMA/CA where a LR lived is constructed from the 2001 Census and used as an instrument. Then the interaction terms of ethnic concentration ratio in Census CMA/CAs with LRs' ethnic groups are used as additional instrumental variables. Job-found channels, network diversity and organizational participation are instrumented by these instrumental variables.

Fixed effects IV (FE2SLS), random effects IV (RE2SLS) and Baltagi (1981)'s error component two-stage least squares (EC2SLS) estimates are employed to allow for the endogeneity of social capital variables and labour market success in terms of wages. While fixed effects 2SLS cannot provide estimates for time invariant variables, Baltagi's EC2SLS is a matrix-weighted average of between 2SLS and fixed effects 2SLS.[18] So the EC2SLS estimates are reported in the paper as representative of panel IV models to be compared with ordinary panel data models. Hausman tests are conducted to compare the results from various panel data models including instrumental variable ones.

Despite the large change in the social capital coefficients when IV models are used, there is no significant evidence of endogeneity in social capital with disturbances term.

5.1.3 Variables used and model specification

Within all models of the study, the dependent variable is the log of real weekly wages of the current job(s). Weekly wages are determined by summing weekly wages of all the current jobs at each wave interview. The nominal wages are converted to real values based on 2005 Canadian dollars (i.e. Wave 3 interview period is treated as base year) using annual CPI from

[18] For technical details on Baltagi's EC2SLS, see Baltagi (2005), Section 7.1 in Chapter 7.

2001 to 2005.[19]

Control variables cover a range of individual, household and local characteristics:

1) Demographic variables: age, marital status, which are time varying and exogenous with α_i.

2) Immigration category: dichotomous variables equal to unity if Skilled Worker Principal Applicants, Skilled Worker Spouses and Dependants, Refugees and Others, with Family Class immigrants as the reference. These variables are time invariant and exogenous.

3) Region of birth: dichotomous variables equal to unity if born in Asia and Pacific, Central and South America, Europe other than UK and Western Europe, and Africa and Middle East, with North America, UK and Western Europe as the benchmark. These variables are time invariant and assumed to be exogenous.

4) Province of residence: dichotomous variables equal to unity if lived in Atlantic Provinces, Quebec, Prairies Provinces and British Columbia with Ontario as the reference category; five dichotomous variables equal to unity if lived in the top five CMAs – Toronto, Montreal, Vancouver, Ottawa and Calgary. Inclusion of these variables is to capture the local labour market disparity. These variables are time varying and exogenous.

5) Ethnic group: dichotomous variables equal to unity if Chinese, South Asian, Black, Filipino, Latin, West Asian and Arab, Other Asian (Southeast Asian, Korean and Japanese), and Other Visible Minority, with White as the benchmark. Similar to region of birth variables, these variables are time constant and exogenous.

6) Education: dichotomous variables equal to unity if LR had a master's degree, college diploma or some university education, some post-secondary education, a high school diploma or less, with a bachelor's degree as the reference; A dichotomous variable equal to unity if in school at the time of interview. The education variables are time varying and assumed to be correlated with unobserved ability.

[19] The conversion considers Wave 1 to be in 2001, Wave 2 in 2003 and Wave 3 in 2005.

7) Languages: dichotomous variables equal to unity if has knowledge of English (speaking fairly well, well, very well and with English as the native language), or knowledge of French (speaking fairly well, well, very well and with French as the native language). Both variables are time varying and assumed exogenous.

8) Experience: length of time in Canada measured in weeks and a set of dichotomous variables equal to unity if had work experience before immigration, had visited Canada before, had worked in Canada on a work permit before, had studied in Canada on a study permit before, or had an arranged job in Canada when landing. Obviously the time spent in Canada is time varying while other variables indicating experience before or upon landing are time constant. All of these are assumed to be exogenous.

9) Occupation and skill level: Occupation major groups are defined using the Standard Occupational Classification (SOC) 1991 while skill levels are determined using the National Occupational Classification (NOC) 2001. Management occupations are considered as skill level A. For multiple-job holders, occupation group and skill level are determined by the current main job.[20] These variables changes over time. Occupational variables are exogenous while the skill levels are assumed to be endogenous with individual ability as they are highly correlated with education level.

10) Number of current jobs and total hours worked per week are included in the control variables to account for comparability, as the weekly wages are the summation of weekly wages of all current jobs. Job tenure is measured as the number of weeks worked at the job and is included as a control variable. These variables are all time varying. Hours worked per week and job tenure are assumed to be endogenous.

Social capital indicators are built according to the LSIC data structure. As specified in Section 3.2, social networks are categorized into three types. The first type is *kinship network*, which includes relationships with family members and relatives living in Canada. The second type is *friendship network*, which consists of ties with friends and workmates.

[20] Current main job is identified by the following criteria: 1. If the LR only had one current job, it was the main job. 2. If the LR had more than one current job, the job with the most hours worked per week was the main job. 3. If more than one current job met the above criteria, the job with the earliest start date was selected. 4. If the above criteria did not help to identify one job among the current jobs, the first job reported was selected.

The third type is *organizational network*, defined as the relationships immigrants have with groups and organizations, such as community organizations, religious groups, ethnic or immigrant associations, etc. Different dimensions of social capital are also considered. For each type of network, indicators are built to measure the social capital stock: size, geographic closeness, diversity, frequency of contact.

Different from what are included in the empirical analysis for employment likelihood in Chapter 4, workplace network is added in friendship network to further investigate the effects of characteristics of workplace interpersonal network on wages outcome of immigrants. Specifically, while meeting new friends at workplaces was excluded from the number of sources of meeting new friends in Chapter 4 for analysis of employment likelihood given the endogeneity of the two variables, it is counted as one source of meeting friends, i.e. size of friendship, in the current chapter, since the current sample only includes those who were employed. A new variable, ethnic diversity of workplace network, considering the relative number of supervisors and co-workers of the same ethnic group as an immigrant worker, is included in social capital indicators in the estimations for wages.

For group and organizational networks, due to the low participation in groups and organizations among all immigrants, only one dummy variable indicating whether an immigrant participated in any kind of groups or organizations is included in the estimation models instead of size, diversity, density indexes for organizational networks.[21]

In order to capture the direct effects of networks on wages, job search channels through which immigrants obtained their current main job are also included in the models in addition to the aforementioned social capital indicators. For complete variable descriptions, see the variable definition table – Table C.1 in Appendix C.

All the social capital variables are assumed endogenous with unobserved individual heterogeneity in the Hausman-Taylor models. This assumption is tested through Hausman

[21] In the preliminary estimations, size, diversity and density indexes were used to capture the characteristics of group and organizational networks, which leads to insignificant coefficients for all organizational networks indicators. This could result from the large number of missing values for size, diversity and density indicators of organizational networks due to the low participation in organizations among all immigrants. However, the results including size, diversity and density indexes of organizational networks in the estimations are available upon request.

tests between different pairs of estimates.

Section 5.2 Descriptive Statistics of the Estimation Sample

After the selection of the sample[22], there were 3014 males and 2399 females left for the estimations. Table 5.1 presents the weighted survey means for the dependent and selected independent variables for both male and female immigrants included in the sample.[23]

The real weekly wages for male and female immigrants were 705 and 485 in 2005 Canadian dollars, respectively. Among male immigrants in the sample, 59% landed as a skilled worker principal applicant while 20% were family class immigrants and 5% were refugees. About 4 in 10 female immigrants in the sample were skilled worker spouses and dependants, followed by family class (29%), skilled worker principal applicants (24%) and refugees (4%). The mean ages were 36 and 34 years for males and females and most of them were married or living with a common-law partner. South Asian, Chinese, White and Filipino were the main ethnic groups. A majority of these newcomers had at least a university degree (64% of male and 55% of female) and knowledge of English (92% and 86% of male and female immigrants, respectively).

Among the employed newcomers, 17% got their current main job through a coethnic friend, compared to at least 6% through family ties (6% for male newcomers and 8% for females). A friend with an ethnic background different from that of the respondent contributes 3% of job hunting successes.

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[22] Please see Section 5.3 for sample restrictions.

[23] For survey means of complete variables, see Table C.2 in Appendix C.

Table 5.1
Survey means of selected variables in the estimations of weekly wages

	Males		Females	
	Weighted Mean	Standard Error	Weighted Mean	Standard Error
Real weekly wage	705.442	6.803	485.029	5.993
Immigration category				
Family (Reference category)	0.204	0.005	0.290	0.007
Skilled Workers (PA)	0.593	0.007	0.239	0.007
Skilled Workers (S&D)	0.107	0.004	0.390	0.008
Refugees	0.050	0.002	0.041	0.003
Others	0.045	0.003	0.039	0.003
Demographic variables				
Age	36.078	0.126	34.388	0.149
Married	0.788	0.006	0.787	0.007
Ethnic group				
White (Reference category)	0.213	0.005	0.220	0.006
Chinese	0.176	0.005	0.215	0.007
South Asian	0.302	0.006	0.253	0.007
Black	0.055	0.003	0.047	0.003
Filipino	0.103	0.004	0.115	0.005
Latin	0.024	0.002	0.034	0.003
West Asian and Arab	0.085	0.004	0.066	0.004
Other Asian	0.030	0.002	0.034	0.003
Other Visible Minority	0.012	0.001	0.016	0.002
Education				
High school diploma or less	0.186	0.005	0.225	0.006
Some post-secondary education	0.063	0.003	0.051	0.003
College diploma or some university	0.114	0.004	0.173	0.006
Bachelor's degree (Reference category)	0.404	0.007	0.381	0.008
Master's degree or above	0.233	0.006	0.171	0.006
Language ability				
English	0.916	0.004	0.862	0.005
French	0.147	0.005	0.143	0.006
Channels through which current main job was found				
Job found through family ties	0.064	0.003	0.083	0.004
Job found through coethnic friends	0.165	0.005	0.171	0.006
Job found through non-coethnic friends	0.033	0.002	0.035	0.003
Social capital indicators				
Number of relatives in Canada	0.800	0.013	0.881	0.015
Relatives living nearby upon landing	0.487	0.007	0.549	0.008
Relatives living far upon landing	0.036	0.003	0.033	0.003
Frequency of contact with family sponsors	0.218	0.005	0.294	0.007
Number of sources meeting friends	2.772	0.022	2.727	0.027
Friends living nearby upon landing	0.512	0.007	0.483	0.008
Friends living far upon landing	0.112	0.004	0.091	0.005
Ethnic diversity of friends	0.495	0.004	0.494	0.005
Frequency of contact with friends	0.791	0.003	0.792	0.003
Ethnic diversity of workplace network	0.790	0.003	0.770	0.004
Participation in organization	0.298	0.006	0.286	0.007
Number of individuals	3014		2399	
Number of observations	6235		4448	

Data source: Longitudinal Survey of Immigrants to Canada (2005).

At the time of landing, around 50% of immigrants had relatives already living nearby (49% of men and 55% of women). And also about half of the immigrants had friends living in the same province or city (51% and 48% for male and female newcomers, respectively). Participation in organizations was relatively low: only three in 10 immigrants took part in any kind of groups or organizations (30% and 29% for males and females respectively). As the ethnic diversity indexes are scaled to run from 0 to 1, the immigrants in the sample demonstrated relatively diverse networks (about 0.5 for friendship diversity and nearly 0.8 for workplace diversity).

Female immigrants had more relatives in Canada than males whereas male newcomers made more friends in Canada than females. While the LSIC does not provide information on the absolute number of people in all networks, there are some good substitutes for network size. For example, information is collected on the types of relatives in Canada (spouse, children, parents, grandparents, brothers and sisters, uncles and aunts, cousins, etc.). By counting the types of relatives, the study gives an approximation of network size for families. In a similar way, the size of friendship network is obtained by counting the sources from where an immigrant met new friends. However, these relative measurements for network size tend to underestimate the true size; thus the effects of network size should be interpreted with caution when compared with those from other studies using absolute numbers.

Section 5.3 Empirical Results

The estimation of the log of real weekly wages is undertaken in longitudinal models, including random effects, fixed effects, Hausman-Taylor models and instrumental variables (IV) model for panel data. Table 5.2 shows the estimation and relevant test results of the log of real weekly wages for male and female immigrants.[24]

As the estimated effects of the non-social capital variables are consistent with the theoretical explanations and the findings of related empirical literature, they will not be discussed in

[24] Table 5.2 only shows the coefficient estimates for social capital variables. For complete estimation results, see Appendix C.

detail, but presented in Appendix C instead.

5.3.1 Social capital effects

Looking at social capital variables included in Table 5.2, it is clear that there are significant relationships between social networks and weekly wages. The results are robust across different statistical models. The directions of the relationships between social capital indicators within various types of social networks and weekly wages are mixed. The channels through which a newcomer gets a job do not make much difference for male immigrants in terms of wages, which is reflected by the always non-significant coefficients of personal contacts as job-found channels. In contrast, jobs found through family ties provide higher wages for female newcomers than those found through other methods, varying from 4.5% (random effects model) to 15.1% (panel IV model), but the significance is not observed in the panel IV model. The size of kinship network always has a negative coefficient for both male and female newcomers, but only sometimes statistically significant (in fixed effects model and Hausman-Taylor model). The size of the friendship network has different impacts on wages of different genders. It has a non-significant positive effect on male immigrants' wages but has a significant negative impact on female newcomers' wages. While a more diverse workplace network is associated with higher employment earnings for both male and female newcomers, the magnitude of the effect differs across models.

The coefficients from panel IV models are quite different from those obtained from non IV ones and Hausman-Taylor models, not only in the magnitude but also in the significance. This difference may result from different assumptions about endogeneity of social capital: with unobserved heterogeneity or with disturbances term. Hausman tests between different pairs of estimates provide evidence towards identifying assumptions and choosing among models.

The p-values of the Hausman tests are shown in the bottom row of Table 5.2. For male and female immigrants, the Hausman tests for (fixed effects – random effects) are X^2 (44) = 269.71 with p-value of 0.0000 and X^2 (44) = 254.35 with p-value of 0.0000, respectively. Thus we can reject the null hypothesis that assumption (5.3) holds and the fixed effects model is favoured over the random effects model for both men and women samples. In

contrast, the Hausman tests for (Hausman-Taylor estimator – fixed effects) show that we cannot reject the null hypothesis of assumption (5.5) for both gender samples; therefore the set of instruments x_1 and z_1 chosen are legitimate and the Hausman-Taylor estimator is consistent and efficient.

Table 5.2
Estimated effects of social capital variables on the log of real weekly wages

	Males				Females			
	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)
Social capital variables								
Channels through which the current main job was found								
Job found through family ties	-0.007	0.030	0.029	-0.068	0.045**	0.069**	0.071***	0.151
Job found through coethnic friends	-0.018	0.010	0.009	-0.219*	-0.017	0.005	0.004	-0.153
Job found through non-coethnic friends	0.005	0.037	0.040	-0.194	-0.040	-0.012	-0.015	-0.638**
Relatives								
Number of relatives in Canada	-0.004	-0.097**	-0.103***	-0.006	0.000	-0.115*	-0.119***	-0.013
Relatives living nearby upon landing	-0.017	-	-0.520*	-0.007	-0.004	-	-0.444	0.017
Relatives living far upon landing	0.055	-	1.515*	0.044	0.038	-	1.642	0.051
Frequency of contact with sponsors	0.040*	0.051	0.056**	0.026	0.020	0.033	0.031	0.010
Friends								
Number of sources meeting friends	0.003	0.003	0.003	0.010	-0.011**	-0.010*	-0.010***	-0.008
Friends living nearby upon landing	-0.008	-	-0.114	-0.007	0.028	-	0.046	0.024
Friends living far upon landing	0.050**	-	0.243	0.041	0.038	-	-1.359	0.036
Ethnic diversity of friends	0.021	0.028	0.025	-0.327*	0.012	0.034	0.029	-0.373*
Frequency of contact with friends	0.003	-0.021	-0.022	0.122*	0.013	0.031	0.034	0.175**
Ethnic diversity of workplace network	0.180***	0.130***	0.138***	0.600**	0.186***	0.142***	0.145***	0.957***
Group and organizational network								
Participation in organization	0.007	0.023*	0.023*	0.084	0.017	0.003	0.003	0.210
No. of observations	6235	6235	6235	6235	4448	4448	4448	4448
No. of individuals	3014	3014	3014	3014	2399	2399	2399	2399
Chi2	9088.07	5505.69	5863.969	5872.993	7446.827	4711.48	5370.115	5369.095
R^2	0.510	-	-	-	0.543	-	-	-
rho	0.527	0.764	0.858	0.397	0.427	0.830	0.979	0.378
p-value of Hausman test	0.000	-	0.320	0.000	0.000	-	1.000	0.000

* p<0.1; ** p<0.05; *** p<0.01.
Note: The Hausman-Taylor estimates assume the endogeneity of social capital variables, education, skill level, job tenure and working hours with unobserved heterogeneity. The estimations also include control variables for immigration category, demographic characteristics (age, marital status), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada and occupational characteristics. See Appendix C for complete results.
Data source: Longitudinal survey of immigrants to Canada (2005).

The Hausman tests for (FE2SLS – EC2SLS) are X^2 (43) = 108.02 with p-value of 0.0000 and X^2 (43) = 151.53 with p-value of 0.0000 for male and female immigrants, respectively. This result shown in Table 5.2 rejects the null hypothesis that EC2SLS yields a consistent estimator. An additional Hausman test based on the difference between fixed effects 2SLS and ordinary fixed effects estimators fail to reject the null hypothesis that ordinary fixed

effects estimators are consistent. In other words, there is no significant evidence that social capital variables are correlated with the disturbances term ε_{it} in the wages equation. Recall that the Hausman-Taylor estimators are consistent and efficient compared with fixed effects. Thus the Hausman-Taylor (HT) estimators are favoured among all panel data models in the current research, and the rest of the paper will focus on the results from the HT estimators.

For male immigrants, the elements within social networks which play a role in determining employment wages are workplace ethnic diversity, kinship size and frequency of contact with family sponsors. An increase in workplace ethnic diversity from a total concentration in one ethnic group to a total diverse workplace network would increase the log of real weekly wage by 13.8%. The frequency of contact with sponsors shows a return of 5.6% in wages. The geographic closeness of relatives and participation in organizations also shows marginally significant (at 10% level) effects on real weekly wages, though the directions of the effects differ. Size of kinship has a significant negative return for male newcomers. One more relative[25] in Canada is associated with a 10.3% wage discount.

The effect of using personal contacts (i.e. family or friends) to obtain work on wages is generally positive but not significant for male immigrants.

For female newcomers, while a job found through family members or relatives pays 7.1% higher than jobs found through other methods, the kinship size does not do the same: one more relative in Canada relates to 11.9% less wages. Friendship size also has a significant and negative effect on real weekly wages, though the effect is small (-1%). Again, a totally ethnic diverse workplace implies a big wage gain of 14.5%, compared to 13.8% for male newcomers.

Allowing social network variables to be endogenous with unobserved heterogeneity has a large effect on the estimated returns to social capital. It can be seen that introducing the endogeneity of social capital indicators with individual effects reduces or increases the return to social capital by about 20 to 30 percent for both sexes. Comparing column 1 and column 3 in Table 5.2, the return to workplace diversity decreases from 18% using random effects

[25] As the number of relatives is measured by the number of types of relatives in Canada, this result should be interpreted with caution.

model to 13.8% using the Hausman-Taylor estimator for male immigrants, a decrease of 23%. For females, the return to social capital estimated with random effects model is also very different from the return using the Hausman-Taylor estimator: the return to family ties as a job search channel increases to 7.1% from 4.5% while the return to workplace diversity drops from 18.6% to 14.5%, a drop of 22%. When taking into account the endogeneity of social capital variables with individual effects, the negative effects of kinship size also become bigger and statistically significant, for both male and female immigrants.

5.3.2 Differential social capital effects

To further explore the differential effects of social capital indicators, interaction terms of social network variables with education, language skills, ethnic group and immigration class are included separately in the Hausman Taylor models. The final specifications presented in Table 5.3 put all significant interaction terms together, excluding non-significant interactions for men and women immigrants respectively. In Table 5.3, the specifications of interaction models for male and female immigrants are presented based on the same assumption that social capital variables, education, skill level, job tenure and working hours are endogenous with individual specific effects. This closer look at the coefficients of interaction terms reveals that social capital affects wages of immigrants with varied characteristics quite differently.

For male immigrants, social capital, especially family networks, has stronger effects on less-educated immigrants' earnings. Specifically, when interacted with education attainment, the size of family ties plays different roles on weekly real wages for immigrants with varied education levels. Relative to those with university degrees, those less educated benefit more from the number of relatives – having much higher returns to the number of relatives in Canada: 20.9% higher for those who had some post-secondary education, 14.1% more for those with a college diploma and 2.2% more gain (though not significant) for those who had a high school diploma or less. Furthermore, the return to family ties as a channel for finding a job is also larger for those with less education: 21.1% more gain for those high school graduates, 18.5% more for those with some post-secondary schooling and 13% more for college graduates, relative to the jobs found through non family members or relatives. It is

interesting that those with higher education are also more likely to benefit from family ties in terms of 16.1% higher return in the jobs found through relatives than jobs found through other ways, though the effect is only marginally significant at the 10% level.

Jobs found through relatives earn 25% more and those obtained through co-ethnic friends pay 9.7% less for francophone immigrants than for those without any French knowledge. Despite that the pure effect of number of relatives is significantly negative (- 42.5%), the effects of these close ties are more positive (or less negative) for almost all visible minorities, especially for Chinese, West Asian and Arab male immigrants (33.1% and 50.5% more, respectively) compared to White immigrants. When looking at disparity among immigration categories, kinship size has less negative effects on wages of economic immigrants (skilled workers and business immigrants), particularly on those of skilled worker principal applicants (-20.8% = - 42.5% + 21.7%, compared to other classes).

For female newcomers, there is not much differential effect across ethnic groups or immigration categories. Using family ties as a method for finding a job is 16.2% less beneficial to those with English language skills.

However, workplace diversity seems to be most beneficial for those with a university degree, and not for the less educated, neither more educated. For example, workplace diversity has 35.5% weaker effects for those with a high school diploma or less, 46% less returns for those with some post-secondary education, and 34.3% weaker for female immigrants with a master's degree or a PhD.

The literature indicates that there are differences in social capital impacts among groups of immigrants - social capital effect on wages is amplified for unskilled workers or undocumented migrants (e.g. Beine, Docquier and Ozden 2007; Aguilera and Massey 2003). Most of the results in this study seem to support the previous literature that social capital effects, especially strong ties with family members and relatives, are amplified for immigrants with disadvantaged human capital, such as education and official language skills.

Table 5.3
Interaction effects of social capital on the log of real weekly wages

	Males		Females	
	Coefficient	Standard Error	Coefficient	Standard Error
Social capital variables				
Channels through which the current main job was found				
Job found through family ties	-0.132***	0.038	0.196***	0.038
Job found through coethnic friends	0.018	0.014	0.002	0.016
Job found through non-coethnic friends	0.039	0.024	0.032	0.032
Relatives				
Number of relatives in Canada	-0.425***	0.127	-0.121***	0.043
Relatives living nearby upon landing	-0.785**	0.364	-0.489	0.683
Relatives living far upon landing	0.784	0.994	1.439	1.921
Frequency of contact with sponsors	0.05*	0.026	0.025	0.030
Friends				
Number of sources meeting friends	0.003	0.003	-0.01**	0.004
Friends living nearby upon landing	-0.033	0.371	-0.004	0.649
Friends living far upon landing	0.62	0.649	-1.456	1.222
Ethnic diversity of friends	0.026	0.020	0.024	0.023
Frequency of contact with friends	-0.012	0.024	0.043	0.027
Ethnic diversity of workplace network	0.126***	0.029	0.336***	0.052
Group and organizational network				
Participation in organization	0.023**	0.011	-0.001	0.013
Interaction effects				
High school diploma or less * Kinship size	0.022	0.076		
Some post-secondary education * Kinship size	0.209***	0.080		
College diploma or some university * Kinship size	0.141*	0.080		
Master's degree or above * Kinship size	0.008	0.054		
Skilled Workers (PA) * Kinship size	0.217**	0.091		
Skilled Workers (S&D) * Kinship size	0.469	0.294		
Refugees * Kinship size	-0.065	0.211		
Others * Kinship size	0.333	0.222		
Chinese * Kinship size	0.331***	0.127		
South Asian * Kinship size	0.093	0.100		
Black * Kinship size	0.362*	0.187		
Filipino * Kinship size	0.219*	0.130		
Latin * Kinship size	0.038	0.190		
West Asian and Arab * Kinship size	0.505**	0.251		
Other Asian * Kinship size	1.012	2.167		
Other Visible Minority * Kinship size	-0.413	2.133		
High school diploma or less * Job found through family ties	0.211***	0.046		
Some post-secondary education * Job found through family ties	0.185***	0.062		
College diploma or some university * Job found through family ties	0.13**	0.064		
Master's degree or above * Job found through family ties	0.161*	0.083		
English * Job found through family ties			-0.162***	0.043
French * Job found through family ties	0.25***	0.091		
French * Job found through co-ethnic friends	-0.097**	0.041		
French * Job found through non-coethnic friends			-0.206***	0.068
High school diploma or less * Workplace diversity			-0.355***	0.081
Some post-secondary education * Workplace diversity			-0.46***	0.122
College diploma or some university * Workplace diversity			-0.099	0.088
Master's degree or above * Workplace diversity			-0.343***	0.094
No. of observations	6235		4448	
No. of individuals	3014		2399	
rho	0.927		0.978	

* p<0.1; ** p<0.05; *** p<0.01.

Note: The interaction effects are estimated with Hausman-Taylor estimator assuming the endogeneity of social capital variables, education, skill level, job tenure and working hours with unobserved heterogeneity. The estimations also include control variables for immigration category, demographic characteristics (age, marital status), province of residence, region of birth, ethnic group, education, official language skills, previous experience or attachment in Canada and occupational characteristics. See Appendix C for complete results.

Data source: Longitudinal survey of immigrants to Canada (2005).

Section 5.4 Discussions and Conclusions

This Chapter addresses in a longitudinal analysis the relationship between social networks and labour market earnings, taking into account the potential endogeneity of social capital with the unobserved individual specific effects including personality, ability and so on, using Hausman-Taylor models. The results from HT estimates reveal that social capital does have an impact on the wages of recent immigrants. The effects are mixed and varied across gender.

Workplace ethnic diversity is the most influential factor within social capital variables examined. The return to ethnic diversity of workplace network is significantly positive for both genders, while it is larger for female immigrants. The channels through which newcomers actually obtain jobs do not make a difference to male immigrants' earnings generally, but the return to using family ties as a job-finding method for females is significantly positive. Network size generally has a negative impact on wages; however its magnitude differs with the type of networks. The number of relatives in Canada has a large negative impact on immigrants' wages while the number of friends in Canada also affects negatively female newcomers' earnings, though the effect is very small.

In the attempt to identify differential effects of social capital indicators on wages for different groups, the HT estimates were also obtained by including interaction terms. For men, social capital effects are much more different across groups than for women. Immigrants with lower education levels gain more from jobs obtained through family ties and have higher returns to kinship size. Relative to White immigrants, all visible minority newcomers seem to benefit more (or be affected less negatively by) from the size of their kinship network. In addition, there is significant evidence that skilled worker principal applicants, Chinese and West Asian and Arab immigrants have higher returns to kinship size.

For women, the social capital effects are quite universal, except for groups with different human capital stock in terms of education and language skills. Jobs found through family ties give much higher premiums over jobs found through other methods to those female immigrants without English speaking skills than those who could converse in English fluently. Francophone immigrants who found jobs through non-coethnic friends receive

much less than those without knowledge of French obtaining jobs through the same way. However, it is interesting that the impact of ethnic diversity of workplace network is not enlarged for those women newcomers short of educational capital. Those female immigrants with lower education level are penalized more for a diverse workplace network.

Most of the results from the interaction effects analysis confirm previous research that suggests that social capital adds to human capital on labour market outcomes, but only limited to close ties or strong ties. Those who are disadvantaged by education attainment or official language skills are most likely to benefit from close social networks, such as family ties or coethnic friends, in getting higher wages than their counterparts without the assistance of strong ties. While weak ties such as participation in organizations affect male immigrants' wage outcomes positively, the effects are not always significant. Although workplace network diversity gives a significantly positive impact on immigrant's wages generally, it is less important for female immigrants without a university degree.

To summarize, social capital plays a significant role in helping immigrants integrate into the Canadian labour market and get better jobs in terms of higher wages. Family ties, friends and workmates are all helping to make immigrants succeed in the labour market. Contrary to the conventional argument that weak ties dominate, in the initial years strong ties are the most productive networks within an immigrant's social capital. Kinship size, using family ties as method for finding a job and frequency of contact with family sponsors have significant influence on the wages of immigrants. Consistently with what Calvó-Armengol and Jackson (2007) suggest, in the short run, network size has a negative impact on labour market outcomes due to competition for job information within the network; kinship and friendship size both show negative effects on immigrants' wages whereas only the effect of kinship size is large and significant. Workplace diversity plays a significant role in getting immigrants a higher wage. As the workplace network including both coworkers and supervisors is of the type between strong and weak ties, this result could be a potential support of the literature finding that weak ties work.

Meanwhile, the results show that personal ties are most useful or important for those disadvantaged by human capital in the labour market. The return to social capital is generally much higher for these groups. These findings confirm the previous literature that social

capital substitutes for human capital to some extent, and its effects are amplified for those lacking labour market skills as well.

The study also shows gender differences in the return to social capital. Female immigrants would have larger returns to the use of family ties to obtain a job and to workplace ethnic diversity. Male newcomers have more returns to participation in organizations while female newcomers seem not to benefit from this network.

While determining the returns to social capital indicators in the labour market for recent immigrants, several questions remain. For example, how social capital continues to affect labour market outcomes of immigrants in the integration process for a longer period of time? In the long term, will network size become positively related to employment and wages, and furthermore will weak ties outweigh strong ties one day to help immigrants make wage gains? To answer these questions would require longitudinal data covering longer time spans. The current study is a good starting point in understanding the importance of social capital for immigrants in the initial years in a new labour market, and in understanding essential elements within social networks playing roles in the settlement and integration stages for new immigrants.

Chapter 6 Duration of access to the first job in intended occupation

Section 6.1 Sample restriction

A sub-sample of the LSIC respondents was extracted for this study. There were questions in the LSIC asking about intention to work in Canada and actual participation in the labour force. In all three waves, as immigrants were interviewed on their labour force participation activities, those who did not participate in the labour force during the four years after landing were excluded from the analysis.

In addition, immigrants were asked, six months after landing, if they planned to work in Canada when they decided to migrate. If the answer was yes, they were asked further if they had an idea of what kind of job they wanted. For those respondents who planned to work in Canada and had an idea of the kind of job they wanted, a specific description of the job was asked, which was coded into Industry and Occupation categories, using the *1997 North American Industrial Classification System* (NAICS – 1997) and the *1991 Standard Occupation Classification* (SOC – 1991). Based on questions about labour market intention, the immigrants who did not plan to work in Canada or did not have an intended occupation in mind, or whose reported intended occupation could not be coded, were further excluded.[26]

As well, the respondents residing in the three territories were excluded from the study due to the extremely small sample size. A very small number of immigrants were dropped due to possible collection errors in employment dates. Given gender differences of labour market participation experiences, the sample was separated by sex. Further restriction resulting from data availability (records with missing values on employment dates and other control variables were excluded) reduced the sample size to a total of 3921 immigrants, 2246 male and 1675 female immigrants, respectively. The current study does not make any age

[26] While 814 respondents did not participate in the labour force during the first four years in Canada, among those who actually participated in the Canadian labour force, 2876 (1373 male and 1503 female) immigrants reported either no intention to work in Canada (14%) when arriving, or having no idea about intended occupation (58%), or non-coded intended occupations (23%), or no response.

limitation as the alternative estimations based on the core working age immigrants (aged 25 to 54) produced very similar estimates to the analysis for all ages.

Section 6.2 Methodology

6.2.1 Duration analysis

The research question is how quickly immigrants find their first job in their intended occupational fields. Thus, a duration analysis is conducted to examine the occurrence of the event – access to the first job in intended occupations – over time. Using a proportional hazards model, the paper examines the differences in the time taken by immigrants with various socio-economic characteristics, including different human capital and social capital, to find the first job in their intended occupation during the first four years in Canada.

A basic proportional hazards (PH) duration analysis model is specified as follows:

(6.1) $h(t_j) = h_0(t)g(x_j)$

where $h(t_j)$ is the hazard function for a randomly selected individual of the population, i.e. the instantaneous conditional probability of exiting from the state of not being employed in intended occupation, when he or she has been at the risk of experiencing the event for at least a period of length t_j, expressed as below:

$$(6.2)\ h(t_j) = \lim_{\Delta t>0}\{\frac{\Pr[t_j < T < (t_j + \Delta t) \mid T > t_j]}{\Delta t}\},$$

T is a continuous random variable whose value T_i indicates the precise instant when individual i experiences the target event, i.e. finding the first job in intended occupation. $g(x_j)$ is a non-negative function of the covariates that hazard function. A popular choice is to let $g(x_j) = exp(x_j\beta)$.

Equation (6.2) further gives:

(6.3) $h(t_j) = f(t_j) / S(t_j)$, where $S(t) = 1\text{-}F(t)$.

where $F(t)$ is the cumulative distribution function of t and $f(t) = F'(t)$, is the probability density of the duration. $S(t)$ is the survival function representing the probability that the duration of not finding a job in intended occupation lasts at least a period of length t.

The baseline hazard function $h_0(t)$ is assumed identical for all individuals; it may either be left unspecified, resulting in a Cox proportional hazard model,[27] or take a specific parametric form, such as the exponential (depending on a single parameter) or Weibull models (depending on two parameters). Specifically, the Cox model gives estimates of the effect of covariates but provides no direct estimate of the baseline hazard $h_0(t)$, which is the raison d'être of Cox's approach. A Cox model can be fitted regardless of whether the baseline hazard function is flat or peaked, monotonic or non-monotonic. This flexibility has made the Cox model the most popular method for analyzing continuous time event occurrence data. In contrast, parametric assumptions about the shape of the baseline hazard function required by other parametric models may not always be met in practice. For instance, the Weibull distribution depends on two parameters and is suitable for modeling data with monotone hazard rates that either increase or decrease exponentially with time, while the exponential distribution depending on a single parameter is only appropriate for modeling data with constant hazard.

In the current study, the target event is the occurrence of finding the first job in intended occupation. The initial point of time (t_0) under study is the time of landing. Since landing, every immigrant in the population of interest, i.e. those who intended to work in Canada and had an intended occupation in mind, was at risk of experiencing the event. As the LSIC records the exact dates of the job history for each worker, this information facilitates measuring time as precisely as possible and treating analysis time as continuous in the Cox proportional hazard models. Thus the duration is measured as the number of days between the landing date and the date at which an immigrant started the first job in intended occupation.

Besides the Cox model, multiple distributions of the baseline hazard are used for the parametric models in the current study. Statistical criteria and graphical methods are then

[27] See the following part for a detailed description of the Cox proportional hazard model.

used for best fit. Section 6.6.3 gives a detailed model selection between the parametric and the Cox models.

6.2.2 Cox proportional hazard model

This model, proposed by Cox (1972) makes it possible to estimate the relationship between the hazard rate and explanatory variables without having to make any assumptions about the shape of the baseline hazard function compared with parametric models. Hence, this model is often referred to as a semi-parametric model.

(6.4) $h_i(t) = \lambda_0(t) * \exp(\beta_1 x_{i1} + ... + \beta_k x_{ik})$

This equation says that the risk of the event (access to the first job in intended occupation) for an immigrant i at time t is the product of two factors: a base hazard $\lambda_0(t)$ which is not specified except that it is positive; the exponential of a linear function of a series of k independent variables. As the base hazard function is the same for different individuals, the risk ratio of two immigrants i and j is only associated with the difference in the values of the independent variables.

Section 6.3 Model specification

The dependent variable is the duration of access to the first job in intended occupation, measured in days.

While labour economics indicates that females, in general, occupy a marginal position in the labour market, the occupational distribution among women is very different from that among men, reflecting different occupational preferences and family responsibilities between the two genders. It is expected that occupational outcomes of female immigrants are determined by different factors, or by similar factors with different magnitudes, from those of males. Thus the empirical analysis is done separately for male and female immigrants.

The main independent variables used in the regression models consider variables that affect

both the demand and supply sides of the labour market and the matching process of employers and employees, based on a simple matching model with the presence of transaction costs.[28] These explanatory variables are related to occupation or skill demand, wage rate that an employer may offer, or are factors affecting skill set, reservation wage, search efforts, attitudes towards varied occupational choices of an immigrant worker:

1) Human capital including knowledge and skills coming from education, training and pre-migration work experience. Human capital theory suggests that human capital – education and work experience – is the main indicator of a person's labour market outcomes, including wages and occupational destination.[29] For immigrants, proficiency in official languages plays a crucial role to find adequate employment (e.g. Grondin 2007). In line with most research on immigrants' economic outcomes which includes these variables as explanatory variables, the current study takes account of years of education at the time of landing, English and French ability, and incidence of pre-migration work experience.

2) While the point system awards pre-migration Canadian experiences in terms of study, employment and family ties when admitting skilled workers, research also indicates that immigrants with some Canadian attachments outperform other immigrants in economic integration into the Canadian society (e.g. Chapter 4 and Chapter 5 of this thesis). Canadian experiences – education or work experience – are fully transferable compared to foreign qualifications. Previous Canadian experience and personal ties also pre-familiarize newcomers with the new labour market and remove or alleviate some market frictions, so as to prepare immigrants to better integrate into the Canadian labour market. Attachment with Canada prior to immigration such as having visited, studied or worked in Canada is included in the estimations.

3) In addition to human capital and pre-migration Canadian experience, socio-demographic characteristics influence immigrants' occupational status. Immigration category is also a key factor affecting labour market outcomes. A point system that rewards human capital attributes and labour market needs is used to screen skilled worker principal applicants into

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[28] Cahuc and Zylberberg (2004), *Labour Economics*, The MIT Press, Chapter 9, Section 3.

[29] Ehrenberg and Smith (2003), *Modern Labor Economics – Theory and Public Policy*, Pearson Education, Chapter 9.

Canada based on their adaptability to the Canadian labour market. However, refugees and immigrants in family class make their migration decision based on different considerations than economic immigrants (Chiswick, Lee and Miller 2003). As a result, immigrants who land in categories other than economic class are expected to have less favourable labour market outcomes than their economic class counterparts.

Age at migration is another important factor in an immigrant's employment and occupational outcomes. Older immigrants may have difficulty updating new skills and adapting to a new labour market and occupational requirements. Province and CMA of residence are expected to have impacts on occupational outcomes as well, as these variables may capture regional differences in economic conditions and the demand in local labour markets.

Ethnic background may also impact on the labour market adjustment of immigrants, in terms of qualitative differences in education or official language proficiency, or traditional attitudes towards labour force participation and occupational choices. Some studies have found evidence that there are intergenerational transfers of "ethnic capital" (e.g. Borjas 1992). Therefore, ethnic groups are included in the estimation models.

4) The integration process of immigrants is context-dependent. Forces of supply and demand in specific occupations and skills affect immigrants' employment outcomes in their intended occupation. The transferability of skills also affects the ultimate occupational outcomes of immigrants: some occupations such as clerical jobs can be easily transferred while others are harder to transfer, requiring for example special licenses (e.g. lawyers and health professionals) or depending heavily on official language skills (e.g. teachers). Thus occupation type and skill level of intended occupation are included in the estimation to address the occupational disparities.

5) Both theoretical and empirical evidence shows that social capital, embedded in social networks or ethnic enclaves, affects skill match processes, thus influencing occupational outcomes (Calvó-Armengol and Jackson 2003; Lin, Vaughn and Ensel, 1981; Chiswick, Lee and Miller 2003). As previous chapters of this thesis show that social capital indicators have impacts on employment likelihood and earnings of the LSIC immigrants, social capital indicators are also included in the current study to test the hypothesis that they impact on

employment entry into the intended occupation.

Time varying variables describing changes of immigrant characteristics over time are included in the estimations. This includes demographic variables such as age and marital status, region of residence (provinces and CMAs), participation in education or training after landing, proficiency of official languages and indicators of social networks developed in Canada.[30] As the information on changes was collected only at the time of the interviews for these time varying variables, the exact timings of the transitions are unknown. Alternatively, the interview dates are employed to approximate the transition timings of time varying variables in order to create a person-period data file.[31]

Section 6.4 NOC code match for employment in intended occupation

The LSIC contains two variables that are related to intended occupation: first, among the detailed information imported from the administrative database of all landed immigrants to Canada – the Field Operations Support System (FOSS), trade or occupation that they practiced or intended to practice when applying for immigration to Canada was recorded into one variable; second, at the time of the first wave interview, all respondents were asked about labour market intention when they decided to come to Canada. The first information from applications mixed up intended occupations and pre-migration occupations, which does not necessarily capture labour market intention. Furthermore, immigrants who landed as skilled workers may have been tempted to report an intended occupation that was not only listed on a General Occupations List (GOL), but which was also consistent with their past work experience, awarding them more points under Canada's immigrant selection system.[32] Thus, this information is likely to be distorted to some extent, not capturing the real labour

[30] Table D.1 in Appendix D presents the complete definitions of variables.

[31] A detailed description how to include time varying variables in the time-occurrence data and create a person-period data file is attached in Appendix F.

[32] This selection criterion was regulated by 1976 Immigration Act, which has been replaced by Immigration and Refugee Protection Act (IRPA) in 2002. Under the new IRPA, intended occupation is neither a selection criterion nor a required field to fill out. All the LSIC immigrants were selected or admitted under the 1976 Immigration Act.

market intention of the LSIC immigrants. Therefore, the current study uses intended occupation information collected at the Wave 1 interview, which not only points to intended occupation exclusively, but also tends to reflect their true labour market intention.[33]

The LSIC also captures actual occupation for each job held during the period of the survey. Both intended and actual occupations are coded in the LSIC micro dataset using the *Standard Occupational Classification 1991* (SOC). With the help of a concordance table, occupations can be reclassified by the *2001 National Occupational Classification* (NOC), which is denoted by four-digit codes.[34]

The first digit of the NOC code designates the job's skill type, ranging from management occupations (code 0), business, finance and administration (code 1) to occupations unique to processing, manufacturing and utilities (code 9). Skill type is based on the type of work performed, but it also reflects the field of training or experience that is normally required for entry into the occupation. This includes the educational area of study required, as well as the industry of employment in cases where experience within an internal job ladder is required for entry.

The second digit, ranging from 1 to 6, represents four skill levels identified A through D and corresponds to the type and/or amount of training or education typically required to work in an occupation. This designation also reflects the experience required for entry and the complexity of the responsibilities involved in the work, compared with other occupations. Specifically, skill level A occupations, coded as 1, require university education; skill level B usually requires college education or apprenticeship, with the second digit being either 2 or 3; skill level C, coded 4 or 5, usually requires secondary school and/or occupation-specific

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[33] There is a well-discussed issue that survey data on occupation and industry affiliation are subject to measurement error in coding, especially when identifying industrial or occupational switches. Specifically in panel data, although there may be considerable variation in occupations across individuals, there is typically much less variation in changes across time in occupations for a given individual. Changes in measured occupations may partly represent measurement error. One would expect this measurement error to bias the estimated returns to occupational and industry tenure. Kambourov and Manovskii (2004a, 2004b) discuss that problem in detail. In the current study, the matching between intended and actual occupations is realized at a high aggregation level by comparing only the first two digits of the occupational codes; hence the extent of measurement error is expected to be minimal.

[34] Please see Appendix E for the NOC description of skill types and skill levels. For more information on NOC codes, please consult "National Occupational Classification Training Tutorial" provided by Human Resources and Social Development Canada (HRSDC) at http://www23.hrdc-drhc.gc.ca/2001/e/tutorial/NOC_TRAINING_TUTORIAL.pdf.

training; skill level D, where the second digit is 6, corresponds to occupations where on the job training is usually provided.

Management occupations are not assigned to a skill level in the NOC, on the basis of the fact that factors other than education and training, such as previous experience, ownership of real property and capital, inherent decision-making skills and organizational capabilities, are usually the most significant determinants for employment in management occupations. In the paper, the occupation or skill type 0 – management occupations – is considered equivalent to skill level A occupations which normally require university training.

Then the matching between intended and actual occupations is obtained by comparing the first two digits of the NOC codes, which takes into consideration both the occupation type and the skill level.

Section 6.5 Descriptive analysis

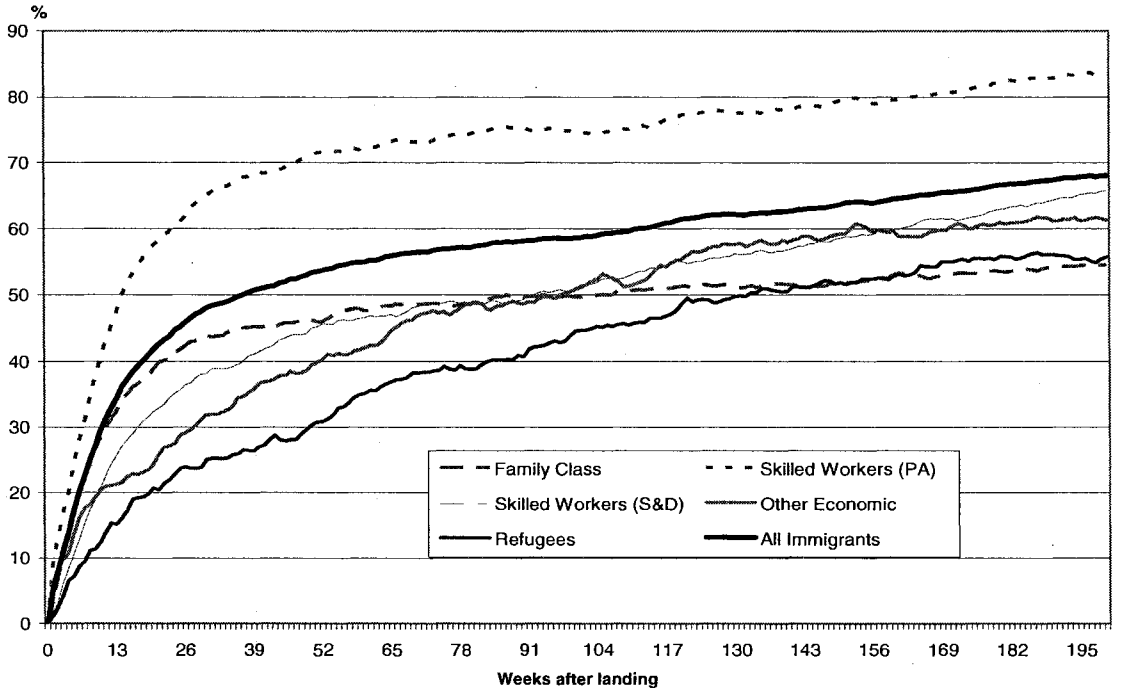
6.5.1 Employment outcomes at a glance during the first four years

(1) Weekly employment to population ratio during the first four years

Despite a number of barriers to enter the Canadian labour market, the LSIC immigrants made great gains in terms of the employment growth over time. Figure 6.1 shows the weekly employment to population ratio for the LSIC immigrants by category during the first four years. For all immigrants, the employment to population ratio increased constantly from 45% at six months after landing to 59% at two years and 68% at four years after arrival. This rate caught up with and surpassed the Canadian average employment rate of 62.7% in 2005.[35]

[35] Source: Statistics Canada, CANSIM, tables 282-0002 and 282-0022 and Catalogue no. 71F0004XCB.

Figure 6.1 Employment to population ratio by weeks after landing, by immigration category



Source: Longitudinal Survey of Immigrants to Canada, 2005.

Skilled worker principal applicants were the main drivers behind the employment rate increase. During the first four years in Canada, this group had a higher-than-average employment rate at any point in time.

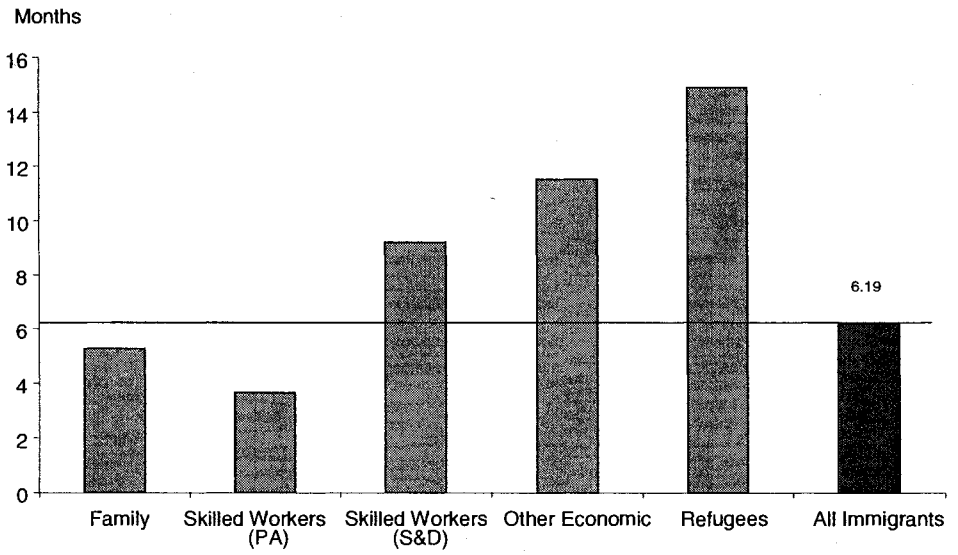
Despite the initial inferior performance compared to family class and other economic immigrants, skilled worker spouses and dependants managed to increase their employment rate steadily, surpassing the family class two years after landing and the other economic immigrants three years after landing. After four years in Canada, the employment rate of skilled worker spouses and dependants reached 65%, close to the average rate of all the LSIC immigrants at 68%.

In spite of the lower employment rate compared to most of the other categories, refugees experienced the biggest gain in the labour market as time passed. As shown in Figure 1, the strongest upward trend was found in the employment rate dynamic for refugees. Three years after landing, refugees outperformed family class immigrants when looking at employment rates. In contrast, family class immigrants noted minimal gains in the employment to

population ratio after large increases in the initial months in Canada.

(2) Time taken to obtain the first Canadian job

Figure 6.2 Number of months between landing and the date when the first job was attained, by immigration category



Source: Longitudinal Survey of Immigrants to Canada, 2005.

On average, it took about six months for an LSIC immigrant to obtain their first Canadian job (Figure 6.2). It is not surprising to see that skilled worker principal applicants secured the first jobs (3.7 months) most quickly among all immigration categories. Probably benefiting from the availability of a family network, family class immigrants had a faster access to employment (5.3 months) compared to other immigrants: it took about nine months for skilled worker spouses and dependants, 11.5 months for other economic immigrants, 14.9 months for refugees to find the first job in the Canadian labour market.

6.5.2 Intended occupation and occupational outcomes

(1) Intended occupation

When they decided to move to Canada, most immigrants (71%) planned to continue their career in the occupation in which they had been working before landing (Table 6.1).

Immigrants who intended to work in business, finance and administrative occupations (74%), natural and applied sciences and related occupations (90%) and health occupations (91%) were the most likely to have worked in their specific intended field before coming to Canada.

Table 6.1
Intended occupations and pre-migration occupations

	Total	Pre-migration employment	
		Worked in this intended occupation before landing	Worked in other occupations before landing
All immigrants who had an intended occupation [1]	89306	57126 [2]	23755 [2]
Intended occupation		**71%**	**29%**
Management Occupations	3612	26%	74%
Business, Finance and Administrative Occupations	14961	74%	26%
Natural and Applied Sciences and Related Occupations	33004	90%	10%
Health Occupations	7979	91%	9%
Occupations in Social Science, Education, Government Services and Religion	9222	62%	38%
Occupations in Art, Culture, Recreation and Sport	3063	66%	34%
Sales and Service Occupations	8707	57%	43%
Trades, Transport and Equipment Operators and Related Occupations	5112	67%	33%
Occupations Unique to Primary Industry	933	54%	46%
Occupations Unique to Processing, Manufacturing and Utilities	2712	41%	59%

[1] Exclude those for whom the intended occupation cannot be coded.

[2] Exclude those who did not work before landing and those for whom the pre-migration occupation could not be coded.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

The skill levels of intended occupation were generally consistent with those of pre-migration occupations, shown by the large proportions of immigrants who intended to work in a specific field had actually worked in an occupation with the same skill level before landing (Table 6.2). Nearly nine in 10 (87%) immigrants who wanted to work in occupations requiring university education (skill level A) actually worked in such occupations before immigrating to Canada.

Table 6.2
Skill levels of intended occupation and pre-migration occupation

	Skill level of pre-migration occupation				
Skill level of intended occupation	**O**	**A**	**B**	**C**	**D**
All immigrants who had worked before landing and had an intended occupation when coming to Canada	8242	44277	16799	10600	962
All skill levels of intended occupation					
O	26%	1%	3%	X	F
A	X	87%	20%	20%	F
B	9%	6%	60%	15%	26%
C	X	5%	15%	60%	F
D	X	1%	2%	3%	F

F: Too unreliable to be released.

X: Suppressed for confidentiality.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

As the skill level of an occupation is indicated by the education or training required by the job, Table 6.3 further contrasts skill level of intended occupation with an immigrant's education level at the time of landing.

Table 6.3
Skill level of intended occupation and education level

	Education level before landing				
Skill level of intended occupation	University degree or above	College or apprenticeship training	High school graduation	No formal education or some education without high school diploma	Total
All immigrants who had an intended occupation[1]	**60931**	**17104**	**6211**	**4353**	**88599**
O	X	5%	6%	F	4%
A	70%	34%	21%	21%	57%
B	13%	31%	30%	35%	19%
C	12%	28%	37%	26%	18%
D	X	2%	6%	X	2%

[1] Exclude those for whom the intended occupations cannot be code and those who did not report education level.

F: Too unreliable to be released.

X: Suppressed for confidentiality.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

It is found that a large proportion (70%) of immigrants with university degree or above planned to work in occupations requiring university education (skill level A). However, those who did not have a university degree before landing tended to have varied labour market intentions in terms of skill levels.

(2) Occupational outcomes

Table 6.4 lists the occupational distribution of pre-and-post migration jobs over time, in contrast with intended occupations for the LSIC immigrants.

Before landing, of 121,200 immigrants who had worked, 27% worked in natural and applied sciences and related occupations, 16% worked in business, finance and administrative categories and 13% worked in the occupations in social science, education, government service and religion. These occupations are characterized as professional and high-skilled jobs.

When deciding to move to Canada, about 89,300 immigrants planned to work in Canada and had an idea about their intended occupation. The distribution of intended occupations

replicates that of pre-migration jobs to a large extent, with some variations in managerial occupations and natural and applied sciences and related occupations. Again, intended occupations are concentrated in professional and high-skilled jobs.

Six months after landing, the occupational distribution shifted to become more concentrated in sales and services occupations (29%) and occupations unique to processing, manufacturing and utilities (22%), which are classified as lower skilled and require lower levels of education. It appeared that in the initial settlement process, new immigrants had to accept lower-skilled occupations to start with.

With the time elapsed in Canada, more immigrants found jobs in management occupations, business, finance and administrative occupations, natural and applied sciences and related occupations and health occupations, all of which are high-skilled. The proportions of immigrants working in professional jobs approached pre-migration levels. For instance, four years after landing, 16% of the employed immigrants worked in business, finance and administrative occupations, the same percentage as before landing, while six months after landing it was only 12%.

Table 6.4
Occupational distribution of pre-migration jobs, intended occupation and post-migration jobs *

	Before landing	Intended occupation	6 months after landing	2 years after landing	4 years after landing
All immigrants employed at the time of the interview or had an intended occupation[1]	**121200**	**89306**	**71214**	**82269**	**107000**
Occupation group					
Management Occupations	11%	4%	3%	6%	7%
Business, Finance and Administrative Occupations	16%	17%	12%	14%	16%
Natural and Applied Sciences and Related Occupations	27%	37%	14%	16%	17%
Health Occupations	6%	9%	3%	4%	5%
Occupations in Social Science, Education, Government Service and Religion	13%	10%	6%	6%	6%
Occupations in Art, Culture, Recreation and Sport	3%	3%	1%	1%	2%
Sales and Service Occupations	11%	10%	29%	26%	23%
Trades, Transport and Equipment Operators and Related Occupations	6%	6%	7%	8%	9%
Occupations Unique to Primary Industry	2%	1%	2%	2%	1%
Occupations Unique to Processing, Manufacturing and Utilities	4%	3%	22%	16%	14%

* Post-migration jobs refer to the current main jobs at the time of the interviews only.

[1] Immigrants who were employed exclude those for whom the occupation was not reported or could not be coded.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

However, there still exists an occupational gap when comparing post-migration jobs with pre-migration and intended occupations. Specifically, the proportions of immigrants working

in natural and applied sciences and related occupations, in social sciences, education, government and service and religion, were lower than the pre-migration and intended levels. In contrast, much higher proportions of immigrants were employed in lower-skilled occupations, such as sales and service, and occupations unique to processing, manufacturing and utilities, compared to their jobs before landing and their intended occupations.

The distribution of skill levels of pre-migration jobs, intended occupations and post-migration jobs further pointed to both progress towards higher-skilled occupations and gaps between post-migration jobs and pre-migration and intended occupations (Table 6.5). Before landing, most of immigrants (81%) worked in skilled occupations which usually required university, college education or apprenticeship training (skill level 0, A, B). A similar proportion (80%) of immigrants desired to work in those skilled occupations. Six months after landing, four in 10 employed immigrants worked in skilled jobs. The proportion increased to 50% two years after landing, and to 54% four years after landing. Although there was still a distance between the pre-migration level and the proportion four years after landing, the upward trend over time indicated progress with respect to high-skilled employment.

Table 6.5
Skill level of pre-migration jobs, intended occupations and post-migration jobs *

	Before landing	Intended occupation	6 months after landing	2 years after landing	4 years after landing
All immigrants employed at the time of the interview [1]	**121200**	**89306**	**71214**	**80859**	**107000**
Skill level [2]					
0	11%	4%	3%	6%	7%
A	48%	57%	19%	22%	23%
B	22%	19%	18%	22%	24%
C	16%	18%	35%	32%	32%
D	2%	2%	25%	17%	14%
Skilled jobs (0, A, B)	**81%**	**80%**	**40%**	**50%**	**54%**

* Post-migration jobs refer to the current main jobs at the time of the interviews only.

[1] Immigrants who were employed exclude those for whom the occupation or skill level was not reported or could not be coded.

[2] Skill level was decided according to the National Occupational Classification (NOC) 2001.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

The biggest gap between pre-and-post migration jobs is in skill level A, which generally requires university education. Compared to 48% of all immigrants employed in occupations with skill level A before landing, and to 57% who planned to work in these occupations when deciding to come to Canada, only 23% were employed in such occupations four years

after landing.

Table 6.6
Most common occupations of post-migration jobs by gender - Wave 1, 2 and 3

Occupations[1]	6 months after landing			2 years after landing			4 years after landing		
	Male	Female	All Immigrants	Male	Female	All Immigrants	Male	Female	All Immigrants
Immigrants employed at the time of the interview	43792	27861	71652	49180	33379	82559	60802	46466	107268
Most common occupations									
Professional Occupations in Natural and Applied Sciences	14%	5%	11%	15%	6%	11%	17%	6%	12%
Clerical Occupations	6%	13%	8%	6%	13%	9%	6%	14%	9%
Sales and Service Occupations n.e.c.	10%	16%	12%	7%	12%	9%	5%	10%	7%
Machine Operators in Manufacturing	10%	7%	9%	8%	6%	7%	8%	5%	6%
Labourers in Processing, Manufacturing and Utilities	7%	9%	7%	4%	4%	4%	3%	4%	4%

[1] Based on the second level (i.e. two-digit) of occupational groupings from the Standard Occupational Classification (SOC).
Source: Longitudinal Survey of Immigrants to Canada, 2005.

Gender differences exist among occupations (Table 6.6). Four years after landing, the most common employment grouping for male immigrants was professionals in natural and applied sciences while the most common for female newcomers were clerical occupations. Compared to the situation six months after landing, fewer immigrants, both males and females, worked in the lower skilled occupations such as sales and services, machine operators in manufacturing and labourers in processing, manufacturing and utilities as time went on.

(3) Employment outcomes in intended occupation

While more immigrants found employment as time went on in Canada, occupational outcomes in terms of employment in intended occupation for all LSIC immigrants did not change much across the three waves of the Survey, for all skill levels of intended occupations (Table 6.7).

Table 6.7
Employment in intended occupation by skill level of intended occupation, Wave 1, 2 and 3

	Skill level of intended occupation					All intended occupations
	O	A	B	C	D	
Immigrants who were employed at the time of the interviews [1]						
Wave 1 – 6 months after landing	**2019**	**27232**	**9419**	**7980**	**786**	**47436**
Employed in a different than intended occupation	66%	64%	62%	60%	56%	63%
Employed in intended occupation	34%	36%	38%	40%	44%	37%
Wave 2 – 2 years after landing	**2317**	**29622**	**10600**	**9538**	**940**	**53017**
Employed in a different than intended occupation	72%	64%	71%	70%	70%	67%
Employed in intended occupation	28%	36%	29%	30%	30%	33%
Wave 3 – 4 years after landing	**2722**	**39838**	**12756**	**11560**	**1119**	**67994**
Employed in a different than intended occupation	76%	64%	74%	70%	78%	68%
Employed in intended occupation	24%	36%	26%	30%	22%	32%

[1] Exclude immigrants for whom the intended occupation was not reported or could not be coded.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

As intended occupation was one of the criteria under the point system of immigration for skilled worker principal applicants, further exploration of employment outcomes in intended occupations is done for this group (Table 6.8). After four years in Canada, 35% of skilled worker principal applicants who were employed found jobs in their intended occupations. Compared to previous LSIC waves, this proportion was similar during all interviews.[36]

Table 6.8
Worked in an intended occupation by selected intended occupations, skilled worker principal applicants - 4 years after landing

	Selected Intended Occupations					
	Professional Occupations in Business and Finance	Clerical Occupations	Professional Occupations in Natural and Applied Sciences	Technical Occupations Related to Natural and Applied Sciences	Teachers and Professors	All Intended Occupations
Skilled worker principal applicants employed at the time of the interview - 4 years after landing[1]	**2820**	**1574**	**17865**	**1946**	**1987**	**36351**
Employed in a different than intended occupation	63%	75%	60%	84%	51%	65%
Employed in intended occupation	37%	25%[E]	40%	16%[E]	49%	35%

[1] Exclude skilled worker principal applicants for whom the intended occupation was not reported or could not be coded.

[E] Use with caution.

Source: Longitudinal Survey of Immigrants to Canada, 2005.

Among the top intended occupations, about half (49%) of skilled worker principal applicants

[36] The proportion of skilled worker principal applicants who worked in intended occupations was 41% and 38% at six months and two years after landing respectively. Although the proportion declined a bit over time, this should not be viewed as a negative employment outcome. The intended occupation was asked during Wave 1, and the intended occupation measurement here cannot capture the possible changes of occupational intentions over time. Thus the comparison across time should be interpreted with caution.

who intended to work as teachers and professors were employed in this occupational group, which included teaching assistants (TA) and research assistants (RA).

Meanwhile, four in 10 employed skilled worker principal applicants with the intention to work in the professional occupations in natural and applied sciences worked in this field. This share remained constant throughout all three waves of the LSIC. The proportion of immigrants working in professional occupations in business and finance was 37% four years after landing, a slight improvement from 34% two years after landing.

Section 6.6 Empirical Analysis

6.6.1 Description of event occurrence data

After the selection of the sample, there were 2246 males and 1675 females left for the estimations.[37] Table 6.9 highlights some characteristics of the estimation sample of the LSIC immigrants by gender. The immigration categories vary vastly between genders. Male immigrants were overwhelmingly in the skilled worker principal applicants category (about two thirds) while female newcomers were more likely to have come to Canada in the skilled worker spouses and dependants category (46%). There is not much difference between female and male immigrants in the average age and marriage status and choice of location of residence. Most of these immigrants were married and chose to reside in CMAs in Ontario, British Columbia and Quebec. Education attainment was slightly higher for male immigrants than for female immigrants (16 years versus 15 years of schooling). Nearly two in 10 immigrants were enrolled in school at the time of interviews for both male and female immigrants (17% and 19% respectively).

The vast majority of immigrants could communicate in English (92% and 88% for male and female immigrants respectively). The distribution of ethnic groups reflected the trend of source countries. White, Chinese, South Asian, and Filipino were the main ethnic groups.

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[37] Please see Section 6.1 for sample restrictions.

Before coming to Canada, most immigrants had work experience (94% and 86% for male and female newcomers, respectively). Some 16% of the LSIC immigrants visited Canada before landing. The intended occupations for male immigrants were concentrated in Natural and Applied Sciences (51%) while their female counterparts had more diverse choices in desired occupations. Business and Finance occupations, Natural and Applied Sciences occupations, Health and Social Sciences occupations were the main intended fields for female immigrants. Skill level wise, most immigrants intended to work in high-skilled occupations which require university education, college education or apprenticeship training (skill level A or B) (89% and 76% for male and female immigrants, respectively) while about two in 10 female immigrants intended to work in occupations requiring secondary school and/or occupation-specific training (skill level C).

Table 6.9 Sample means of variables in Cox proportional hazard estimations

	Males	Females
Dependent variable		
Analysis time _t (in days)	697.988	729.301
Independent variables		
Immigration category		
Family Class (Reference category)	0.118	0.211
Skilled Workers (PA)	0.665	0.246
Skilled Workers (S&D)	0.118	0.458
Refugees	0.046	0.043
Others	0.053	0.042
Demographic variables		
Age	36.798	34.607
Married	0.806	0.847
Province and CMA of residence		
Atlantic Provinces	0.007	0.007
Quebec	0.192	0.178
Ontario (Reference category)	0.560	0.588
Manitoba and Saskatchewan	0.029	0.023
Alberta	0.085	0.087
BC	0.127	0.117
Toronto	0.451	0.456
Montreal	0.114	0.105
Vancouver	0.171	0.152
Ottawa-Hull	0.049	0.047
Calgary	0.029	0.039
Areas out of the main 5 CMAs (Reference category)	0.187	0.201
Ethnic group		
White (Reference category)	0.210	0.237
Chinese	0.224	0.239
South Asian	0.232	0.208
Black	0.050	0.048
Filipino	0.072	0.078
Latin	0.025	0.040
West Asian and Arab	0.122	0.088
Other Asian	0.055	0.048
Other Visible Minority	0.009	0.014
Education		
Years of schooling	16.002	15.202
Currently in school	0.172	0.193

Table 6.9 Sample means of variables in Cox proportional hazard estimations (cont'd)		
Language ability		
English	0.921	0.878
French	0.197	0.183
Experience		
Visited Canada before landing	0.164	0.160
Studied in Canada before landing	0.041	0.037
Worked in Canada before landing	0.032	0.019
Had work experience before landing	0.944	0.863
Skill level of intended occupations		
Skill level A [1] (Reference category)	0.665	0.575
Skill level B	0.223	0.182
Skill level C	0.092	0.223
Skill level D	0.019	0.019
Occupation group of intended occupations		
Management (Reference category)	0.052	0.027
Business and Finance	0.103	0.253
Natural and Applied Sciences	0.513	0.218
Health	0.043	0.148
Social Science	0.060	0.149
Art, Culture and Recreation	0.026	0.048
Sales and Services	0.078	0.111
Trades, Transport and Equipment Operators	0.085	0.017
Primary Industry	0.012	0.005
Processing Manufacturing and Utilities	0.028	0.025
Relatives		
Having relatives upon landing	0.447	0.518
Number of relatives in Canada	0.655	0.745
Frequency of contact with sponsors	0.139	0.239
Friends		
Having friends upon landing	0.691	0.614
Having made new friends	-	0.916
Number of sources meeting friends	2.907	2.855
Ethnic diversity of friends	0.497	0.494
Frequency of contact with friends	0.778	0.773
Group and organizational network		
Participation in organization	0.298	0.278
Volunteered time for organizations	0.163	0.144
Number of observations	5332	4219
Number of individuals	2246	1675

[1] Management occupations are considered as of skill level A which usually requires university education.
Data source: Longitudinal survey of immigrants to Canada (2005).

At the time of landing, around 50% of immigrants had relatives already living in Canada (45% of men and 52% of women) while over 60% had friends in Canada (69% and 61% for male and female respectively). Consistent with the immigration category distributions by gender, female immigrants had more relatives in Canada than males, whereas male newcomers made more friends in Canada than females upon landing.

While the LSIC does not provide information on the absolute number of people in all networks, there are some good substitutes for network size. For example, information is collected on the types of relatives in Canada (spouse, children, parents, grandparents, brothers and sisters, uncles and aunts, cousins, etc.). By counting the types of relatives, the

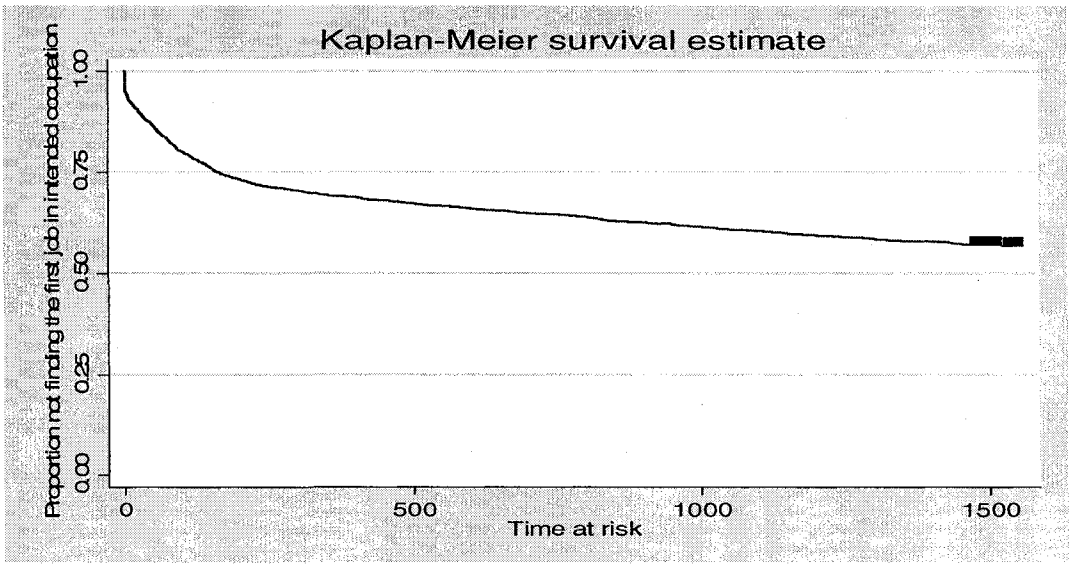
study gets an approximation of network size for families. In a similar way, the size of friendship network is obtained by counting the sources from where an immigrant met new friends. However, these relative measurements for network size tend to underestimate the true size; thus the effects of network size should be interpreted with caution when compared with those from other studies using absolute numbers.

As the ethnic diversity indexes are scaled to from 0 to 1, these immigrants had relatively diverse networks (about 0.5 for friendship diversity) for both genders. Participation in organizations was relatively low: nearly three in 10 immigrants took part in groups or organizations (30% and 28% for males and females, respectively). Accordingly, the proportion of immigrants who volunteered time for groups or organizations was also low: 16% and 14% for male and female newcomers, respectively).

6.6.2 Kaplan-Meier survivor functions

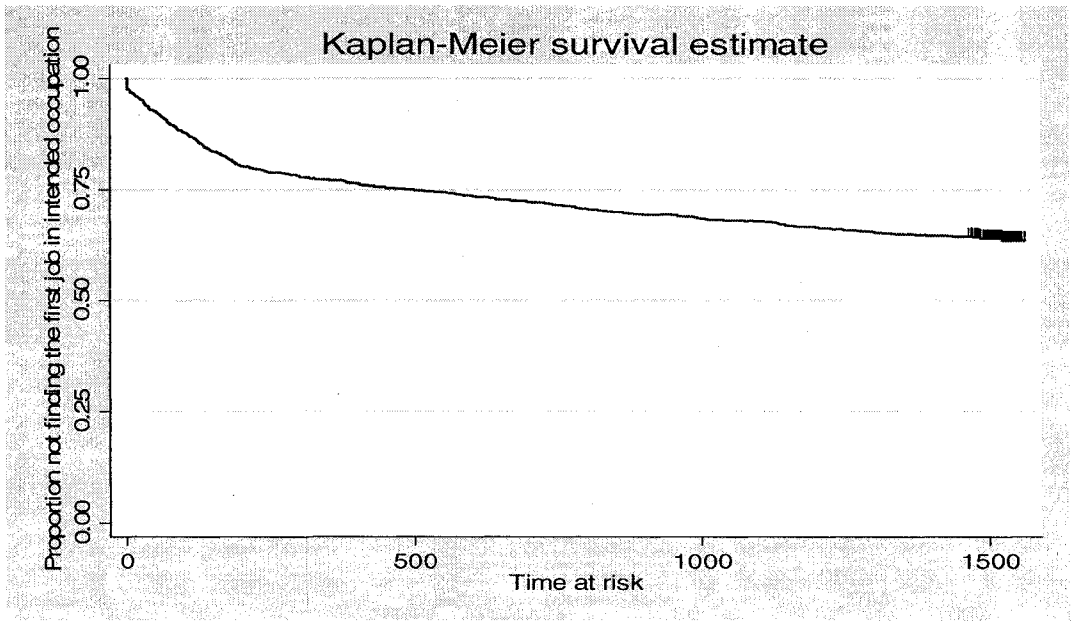
A complete perspective on the time taken to find the first job in intended occupation is obtained by plotting the proportion of immigrants who had not found their first job in their intended field at each day since landing in Canada (until the end of the survey, i.e. approximately the fourth year in Canada). The Kaplan-Meier survivor function curves in Figure 6.3 and 6.4 show the speeds of the first job access in intended occupation of male and female immigrants respectively.

Figure 6.3 Kaplan-Meier survival estimate for male immigrants



n=2246
Data Source: Longitudinal Survey of Immigrants to Canada, 2005.

Figure 6.4 Kaplan-Meier survival estimate for female immigrants



n=1675
Source: Longitudinal Survey of Immigrants to Canada, 2005.

Both curves exhibit a very quick transition into the employment in intended occupation during the first six months in Canada. Between the first six months (day 183) and the first 12

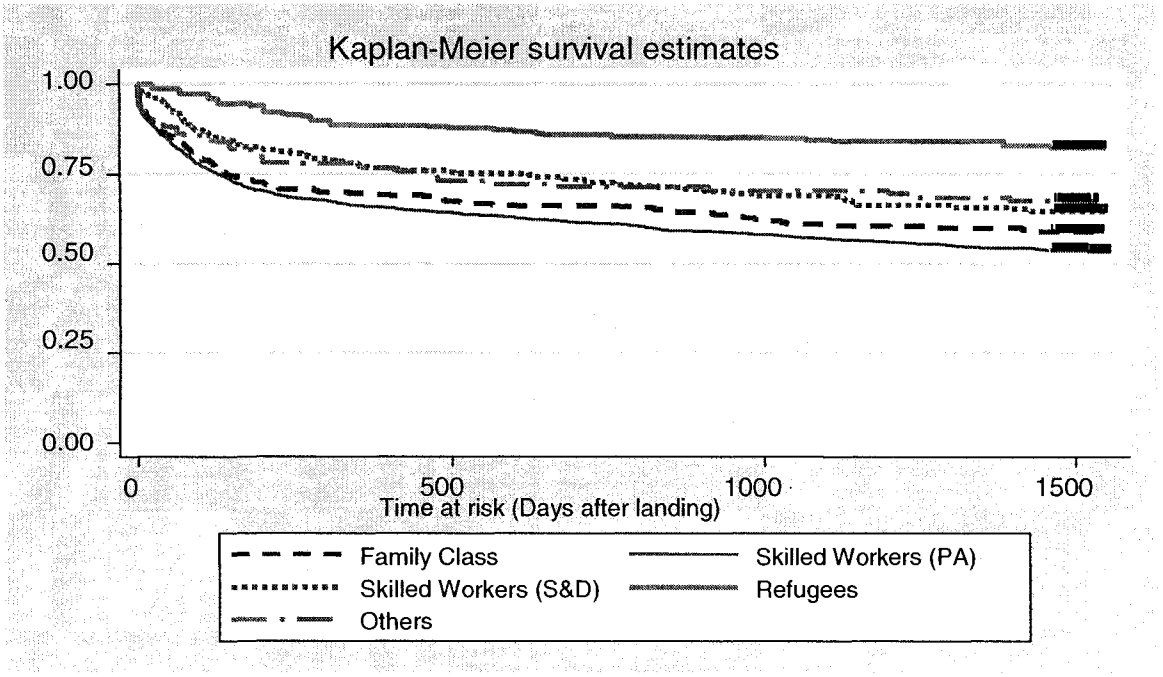
months (day 365), the curves flatten a bit but do not stabilize until the last months of the first four years. The plots show that the initial year was critical for both male and female newcomers to find jobs in their intended jobs.

Male immigrants were able to find their intended occupations more quickly than their female counterparts, reflected by a steeper survival curve. Four years after landing, about 43% of male immigrants who planned to work in Canada found employment in their intended occupations, while only 36% of female immigrants who participated in the labour force managed to work in their intended occupation.

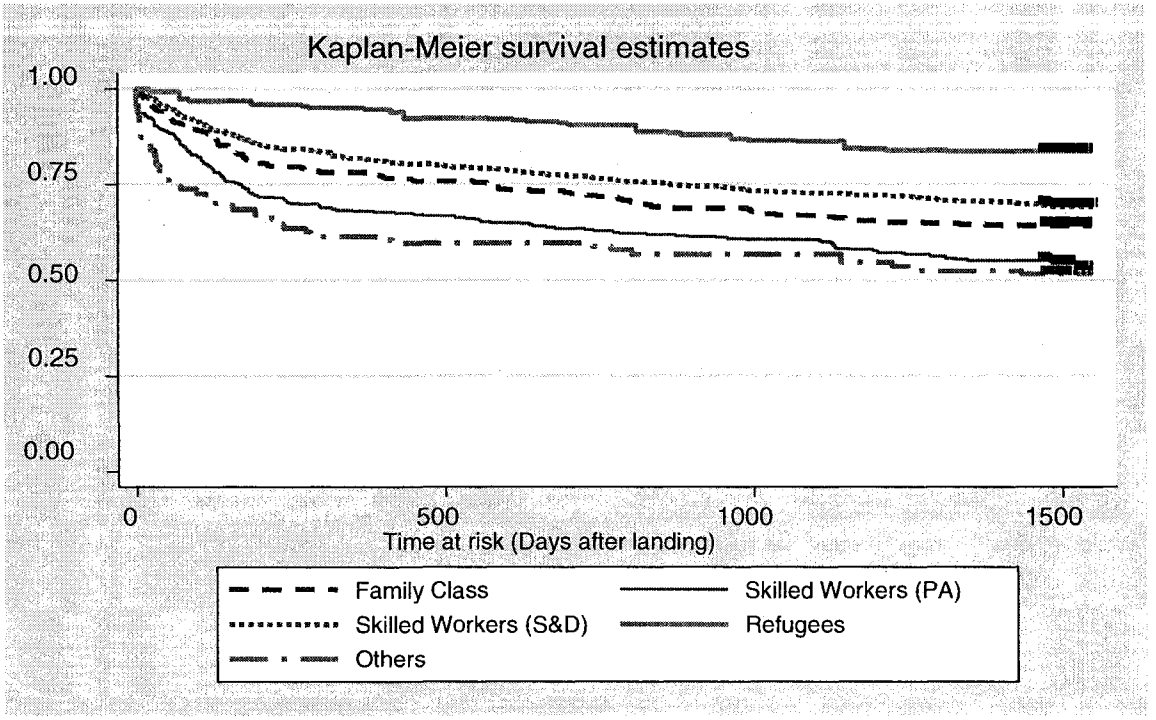
Exploring the immigration categories, the survival curves exhibit some obvious differentials across classes (Figure 6.5). It is not surprising to see that male skilled worker principal applicants were the most likely to find employment in their intended occupations throughout the first four years among all immigration categories (Figure 6.5(a)). However, for female immigrants (Figure 6.5(b)), those who landed in other categories which were mostly of other economic class had been able to find jobs in their intended occupations most quickly, followed by skilled worker principal applicants.

Figure 6.5 Kaplan-Meier survival estimates, by immigration category, male and female immigrants

(a) Proportion not finding the first job in intended occupation, by immigration category, male immigrants



(b) Proportion not finding the first job in intended occupation, by immigration category, female immigrants



6.6.3 Duration analysis

In order to choose between parametric models and semi-parametric the Cox model, multiple models are fitted, including the Weibull, the Cox models as well as non-proportional models such as the log-logistic and log-normal models. Statistical criteria and graphical methods are then used for best fit. Within the parametric models, the AICs and BICs lead to prefer the Weibull distribution to other distributions.[38]

As the Weibull and the Cox models differ in parametric assumptions about the baseline hazard function, smoothed hazard functions are plotted to graphically identify the suitability of different models. Figure 6.6 and Figure 6.7 show the estimated kernel-smoothed hazard functions for the data in contrast with the hazard curves from the Cox models, for male and female immigrants in the sample, respectively. Both hazard curves on the left describe non-

[38] Detailed regression results and statistical criteria from the Weibull, Log-logistic and Log-normal models are available upon request.

monotone hazard functions, with which parametric models such as the Weibull models can hardly deal (Figure 6.8 gives the predicted hazard function from the Weibull model estimation for male immigrants, as an example). Meanwhile, the Cox models fit the data well, as demonstrated by the similarity between the shapes of the actual and predicted hazard functions. The flexibility of the Cox model about the shape of the baseline hazard function helps to deal with the non-monotony and multiple peaks in the hazard curves. Therefore, while the results are quite robust across statistical models, the Cox models are preferred in the current study. The discussions of regression results below are all based on this model choice.

Figure 6.6 Smoothed hazard function and predicted hazard function from Cox regression, male immigrants

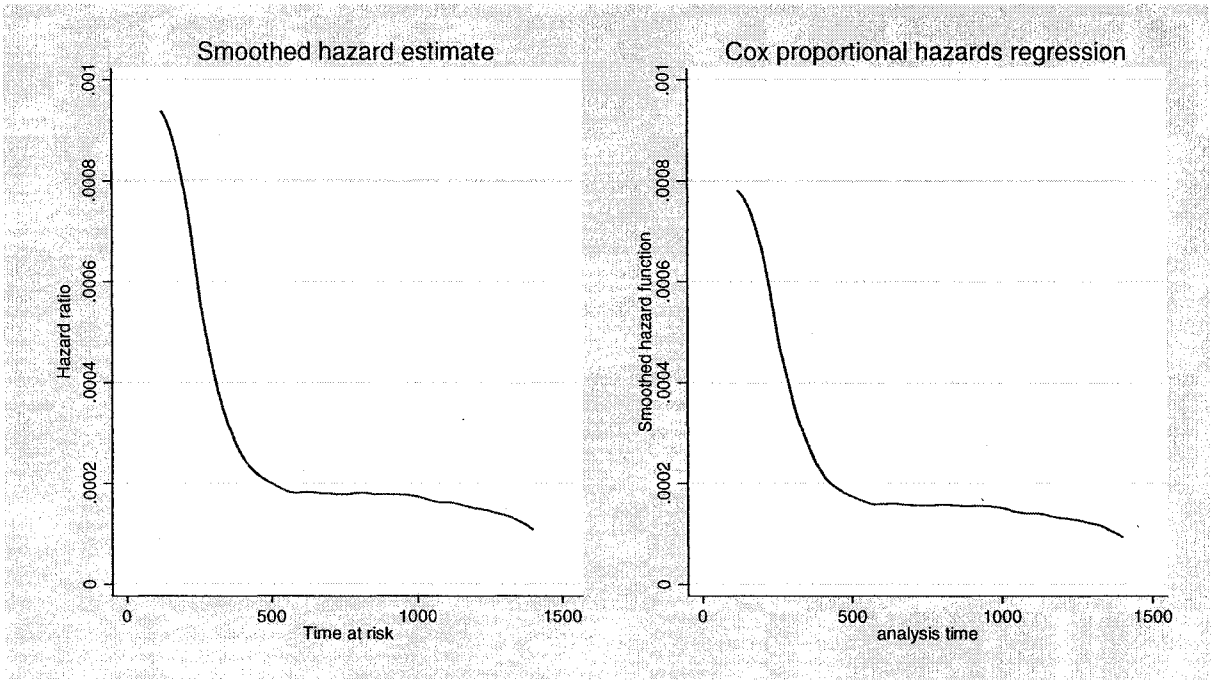


Figure 6.7 Smoothed hazard function and predicted hazard function from Cox regression, female immigrants

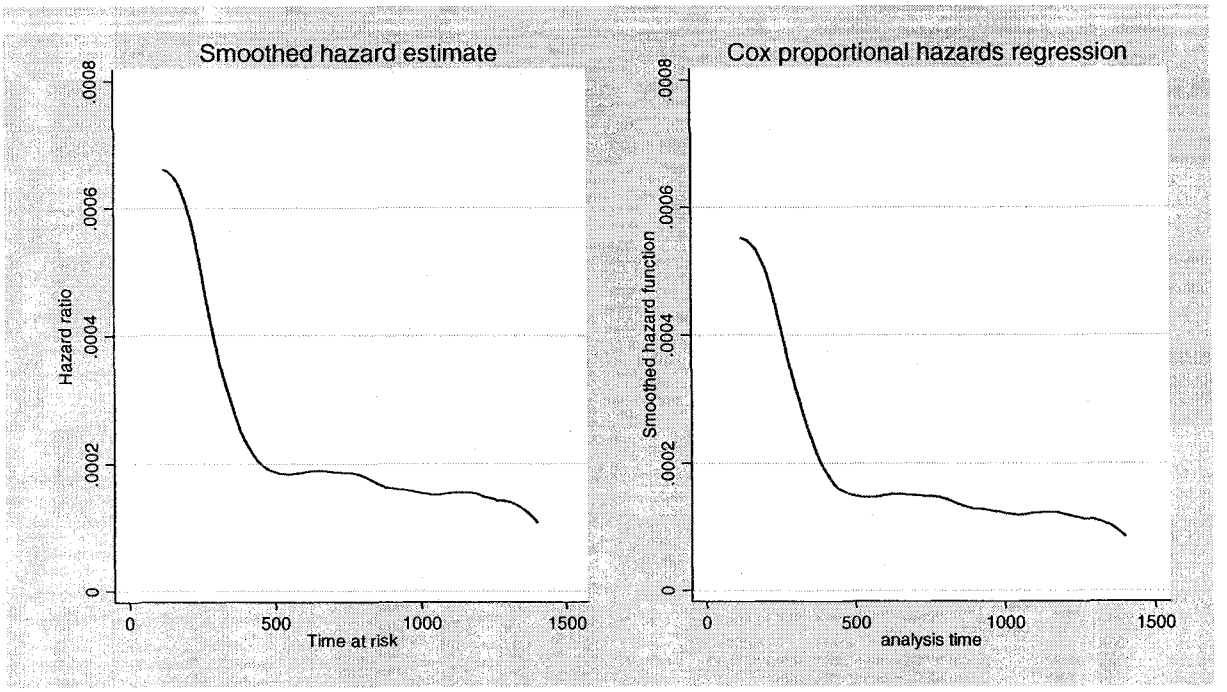
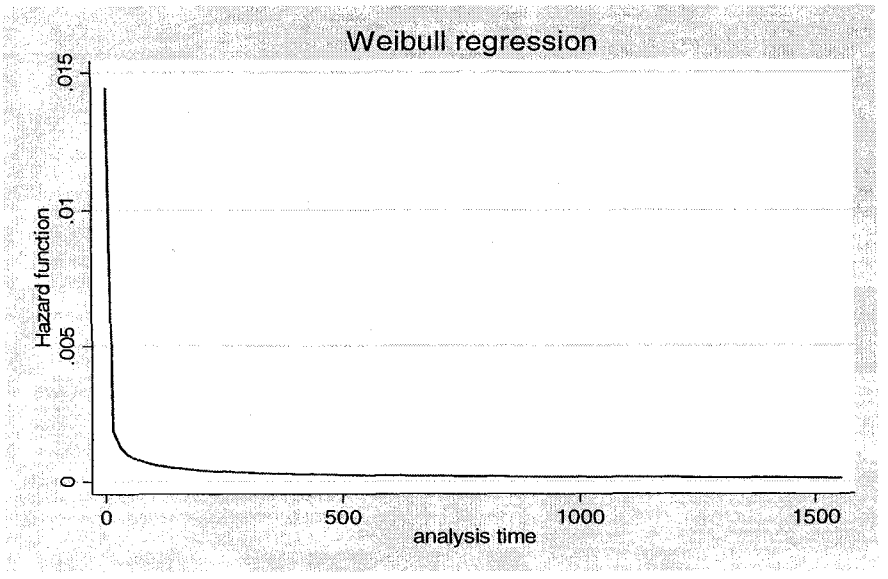


Figure 6.8 Predicted hazard function from the Weibull model, male immigrants



The results from the Cox regression models including the full set of social capital indicators, which are estimated separately for the samples of men and women immigrants, are presented in Table 6.10 and Table 6.11. The estimates are presented in the form of hazard ratios, which are easier to interpret when most of the independent variables are categorical, as is the

current study.[39]

Columns (1) in Table 6.10 and 6.11 present a specification without social capital effects on employment entry in intended occupation for male and female immigrants respectively, while Columns (2) add social capital indicators. The effects of social capital on intended occupation access are not prevalent, as reflected by the generally insignificant hazard ratios associated with most social capital indicators (Column (2) for males in Table 6.10 and Column (2) for females in Table 6.11). The final specifications with only significant social capital indicators are reported in Columns (3) for male and female immigrants, respectively. The addition of social capital indicators in the estimations generally improves the goodness of fit indicated by AIC and BIC, compared with the basic models without any social capital indicators (Columns (1) in both tables). The predicted survival curves from the final Cox models (Columns (3)) are plotted with the Kaplan-Meier survival curves for male and female immigrants in Figures D.1 and D.2 in Appendix D. The contrast between pairs of curves shows that the final models fit the data well, as indicated by the similarity between the fitted curves and the corresponding Kaplan-Meier curves, especially for female immigrants.

The regression results generally support the hypothesis that, while human capital (including education, language skills and work experience) is the main determinant of occupational outcomes of immigrants in terms of the employment access to intended occupational fields, social capital indicators, especially ethnic diversity of friendship, significantly affect the speed of access to the first job in intended occupations.[40]

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[39] The standard errors reported in Tables 6.10 and 6.11 are for the hazard ratios. Please note an ACI (Asymptotic confidence interval) for a hazard ratio is not computed using its own asymptotic standard error. For instance, adding and subtracting 1.96 times a hazard ratio's asymptotic standard error from the hazard ratio does **not** yield a 95% ACI. To construct the appropriate interval, one must antilog the symmetric limits for the coefficient itself. However, the Z statistics and p-values based on tests of the original hazard coefficients being significantly different from zero provide the same statistical inference as testing whether the hazard ratios reported in these tables are significantly different from one.

[40] Complete regression results can be found in Appendix D.3.

Table 6.10 Cox proportional hazard estimations of access to the first job in intended occupation, male immigrants

	(1)		(2)		(3)	
	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error
Immigration category (Family Class)						
Skilled Workers (PA)	1.197	0.153	1.541**	0.317	1.603**	0.326
Skilled Workers (S&D)	0.882	0.144	1.12	0.246	1.166	0.253
Refugees	0.474***	0.124	0.564*	0.173	0.594*	0.178
Others	0.78	0.168	0.982	0.248	1.008	0.255
Education						
Years of schooling	1.061***	0.017	1.056***	0.017	1.058***	0.017
Currently in school	0.422***	0.053	0.414***	0.052	0.419***	0.052
Language ability						
English	1.249	0.201	1.165	0.188	1.185	0.192
French	0.739**	0.107	0.733**	0.105	0.73**	0.105
Pre-migration attachment to Canada and experience						
Visited Canada before landing	1.534***	0.150	1.516***	0.150	1.49***	0.146
Studied in Canada before landing	1.602***	0.269	1.624***	0.268	1.596***	0.266
Worked in Canada before landing	2.752***	0.483	2.606***	0.453	2.713***	0.472
Had work experience before landing	1.172	0.229	1.194	0.236	1.205	0.235
Skill level of intended occupation (Skill level A)						
Skill level B	0.932	0.126	0.903	0.122	0.908	0.122
Skill level C	1.22	0.212	1.194	0.208	1.2	0.208
Skill level D	1.034	0.393	1.002	0.387	1.007	0.385
Occupation group of intended occupation (Management)						
Business and Finance	1.451	0.358	1.583*	0.402	1.56*	0.394
Natural and Applied Sciences	1.427*	0.301	1.561**	0.343	1.523*	0.330
Health	1.386	0.368	1.542	0.421	1.49	0.404
Social Science, Education, Government Service and Religion	1.566*	0.385	1.7**	0.430	1.663**	0.420
Art, Culture and Recreation	0.815	0.326	0.883	0.348	0.866	0.341
Sales and Services	1.885**	0.530	2.09**	0.600	2.055**	0.586
Trades, Transport and Equipment Operators	2.069***	0.563	2.313***	0.648	2.226***	0.616
Primary Industry	2.211**	0.816	2.431**	0.909	2.338**	0.878
Processing Manufacturing and Utilities	2.178**	0.745	2.419**	0.849	2.312**	0.807
Relatives						
Having relatives upon landing			0.901	0.108		
Number of relatives in Canada			0.98	0.066		
Frequency of contact with sponsors			1.453**	0.267	1.413*	0.258
Friends						
Having friends upon landing			0.919	0.084		
Number of sources meeting friends			1.029	0.026		
Ethnic diversity of friends			1.498***	0.209	1.572***	0.209
Frequency of contact with friends			1.174	0.211		
Group and organizational network						
Participation in organization			1.091	0.109		
Volunteered time for organizations			1.029	0.130		
Number of observations	5332		5332		5332	
Number of individuals	2246		2246		2246	
Log pseudo likelihood	-6974.734		-6961.93		-6966.160	
AIC	14037.47		14029.87		14024.32	
BIC	14327.05		14378.68		14327.07	

* p<0.1; ** p<0.05; *** p<0.01. Standard Errors are adjusted for 2246 clusters in individuals.

Reference categories are indicated in parentheses.

The regressions in the Table are also controlled for age, marital status, province and CMA of residence and ethnic groups. Please find the complete results in Table D.3 in Appendix D.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table 6.11 Cox proportional hazard estimations of access to the first job in intended occupation, female immigrants

	(1)		(2)		(3)	
	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error
Immigration category (Family Class)						
Skilled Workers (PA)	1.289*	0.180	1.686**	0.387	1.281*	0.179
Skilled Workers (S&D)	0.877	0.111	1.131	0.236	0.864	0.110
Refugees	0.583**	0.157	0.716	0.215	0.581**	0.156
Others	1.559*	0.364	1.987**	0.555	1.532*	0.360
Education						
Years of schooling	1.03	0.022	1.028	0.021	1.029	0.021
Currently in school	0.432***	0.060	0.42***	0.059	0.427***	0.060
Language ability						
English	1.629***	0.282	1.585***	0.278	1.593***	0.277
French	1.027	0.180	1.033	0.180	1.028	0.180
Pre-migration attachment to Canada and experience						
Visited Canada before landing	1.36**	0.169	1.311**	0.165	1.351**	0.168
Studied in Canada before landing	1.339	0.314	1.325	0.313	1.352	0.318
Worked in Canada before landing	3.23***	0.726	3.138***	0.709	3.254***	0.730
Had work experience before landing	1.348*	0.222	1.333*	0.220	1.34*	0.222
Skill level of intended occupations (Skill level A)						
Skill level B	1.068	0.158	1.051	0.158	1.061	0.158
Skill level C	1.847***	0.288	1.857***	0.291	1.826***	0.286
Skill level D	1.573	0.619	1.587	0.626	1.524	0.605
Occupation group of intended occupations (Management)						
Business and Finance	1.324	0.436	1.296	0.432	1.333	0.439
Natural and Applied Sciences	1.349	0.438	1.324	0.435	1.35	0.438
Health	1.346	0.446	1.307	0.439	1.348	0.446
Social Science, Education, Government Service and Religion	1.549	0.507	1.501	0.496	1.541	0.504
Art, Culture and Recreation	1.41	0.522	1.378	0.517	1.431	0.528
Sales and Services	1.304	0.461	1.259	0.449	1.328	0.469
Trades, Transport and Equipment Operators	0.152	0.186	0.135	0.168	0.156	0.189
Primary Industry	3.189**	1.672	3.215**	1.713	3.189**	1.663
Processing Manufacturing and Utilities	2.591**	1.129	2.576**	1.135	2.603**	1.134
Relatives						
Having relatives upon landing			1.234	0.189		
Number of relatives in Canada			0.91	0.077		
Frequency of contact with sponsors			1.331	0.254		
Friends						
Having friends upon landing			0.984	0.104		
Made new friends after landing					1.453**	0.263
Number of sources meeting friends			1.004	0.033		
Ethnic diversity of friends			1.211	0.206		
Frequency of contact with friends			1.226	0.277		
Group and organizational network						
Participation in organization			1.134	0.147		
Volunteered time for organizations			0.959	0.153		
Number of observations	4219		4219		4219	
Number of individuals	1675		1675		1675	
Log pseudo likelihood	-4232.050		-4227.467		-4229.661	
AIC	8552.1		8560.933		8549.321	
BIC	8831.384		8897.343		8834.952	

* p<0.1; ** p<0.05; *** p<0.01. Standard Errors are adjusted for 1675 clusters in individuals.

Reference categories are indicated in parentheses.

The regressions in the Table are also controlled for age, marital status, province and CMA of residence and ethnic groups. Please find the complete results in Table D.3 in Appendix D.

Data source: Longitudinal survey of immigrants to Canada (2005).

(1) Non-social capital factors determining time taken to access the first job in intended occupations

In line with the literature, human capital – education and language skills – affects the occupational outcomes of immigrants significantly. Both years of schooling and English speaking ability have positive effects on the speed of finding the first job in intended occupations for both male and female newcomers. However, the effect of education is significant for men and the English language effect is significant for women. Specifically, for male immigrants, controlling for other variables, the hazard or risk of getting a first job in intended occupation increases by about 6% with each year of full-time education at arrival. Controlling for other variables, hazard or speed of access to the first job in intended occupation is 59.3% greater for those female immigrants who could converse in English compared with those with no English speaking ability.

It is worth noting that the attachment to Canada before migration plays a significant role in facilitating the finding of employment in intended occupation, especially Canadian work experience before landing. While foreign work experience also hastens the access to the first job in desired fields as indicated by higher-than-one hazard ratios for both genders, the effects are insignificant for males or only marginally significant for females.

Consistently with the Kaplan-Meier descriptive survival curves, for male and female immigrants, skilled worker principal applicants have a significantly quicker access to employment in intended occupation compared to the reference category – family class immigrants (60.3% and 20.1% higher for males and females respectively). While skilled worker spouses and dependants also have a faster speed of landing the first employment in intended occupation shown by hazard ratios higher than one, the effects are not significant.

Desired occupational group significantly affects the speed of the employment access to intended fields for both male and female immigrants. For male newcomers, the occupational groups with the "advantage" in terms of an easier and quicker access are located in the two extremes. On the one hand, male immigrants intending to work in some professional occupations such as business and finance, natural and applied sciences and social sciences occupations have significantly higher hazard ratios for access to the first intended

occupations. On the other hand, those with intention to work in non-professional jobs, such as sales and services, trades, transport and equipment operators, primary industry, and processing and manufacturing occupations, enter the first job in intended occupation even more quickly (5.5%, 22.6%, 33.8% and 31.2% faster than those intending to work in managerial occupations, respectively).

The easier access to the non-professional occupations is more prominent for female immigrants: those desiring to work in primary industry and processing, manufacturing and utilities occupations are much more likely to find employment in these fields. The hazard ratios for skill levels of intended occupations confirm the findings from occupational groups somewhat. Immigrants who planned to work in occupations requiring lower education and/or skills (skill levels C and D) had a faster access to their intended occupations, compared to those desiring to work in a higher-skilled field (skill level A or managerial occupations).

The other factors most influencing the speed of the access to the first job in intended occupation include age, current school participation, and ethnic groups. Factors playing roles for different genders are quite similar, with a little variation in magnitude and significance.

(2) Social capital effects on speed of access to the first job in intended occupation

For male immigrants, "frequency of contact with family sponsors" and "ethnic diversity of friendship network" are the two main factors significantly hastening entry into employment in intended fields. Compared with those who have no contact with their family sponsors, those who talk to their family sponsors every day or live with sponsors have a 41.3% faster access to the first job in intended occupation. An ethnically diverse friend network helps male immigrants find employment in intended occupation in terms of a 57.2% faster speed, compared to an ethnically concentrated friendship.

While most of the other social network indicators play positive roles in facilitating the access to the desired occupations, as shown by the higher-than-one hazard ratios, the effects are not all statistically significant.

For female immigrants, none of the social capital indicators has a significant effect on speed

of access to employment in desired occupations (Column (2) in Table 6.11). However, as the hazard ratios for the three indicators about friendship network developed in Canada after landing (number of sources for meeting friends, ethnic diversity of friend networks and frequency of contact with friends) are all greater than one, although insignificant, an alternative indicator is developed to identify the incidence of making new friends after landing, attempting to capture the general effect of friend networks. When this indicator enters the estimation for female immigrants (Column (3) in Table 6.11), a significant positive effect is found on the intended job access. For female immigrants who made new friends after landing, controlling for other characteristics and factors, the hazard of getting a first job in intended occupation is 45.3% higher than the one of those without new friends in Canada.

This result suggests that while it is hard to identify which elements within the friendship networks are playing roles in speeding up the process of finding the first job in intended occupation, making new friends or developing new social networks in Canada helps the occupational matching process for those female immigrants.

The effects of social capital indicators that play significant roles in accelerating the entry into the employment in intended fields are illustrated in the forms of predicted survival curves, shown in Figure 6.9 and Figure 6.10.

Figure 6.9 Predicted survival curves from the Cox regression, by ethnic diversity of friendship, male immigrants

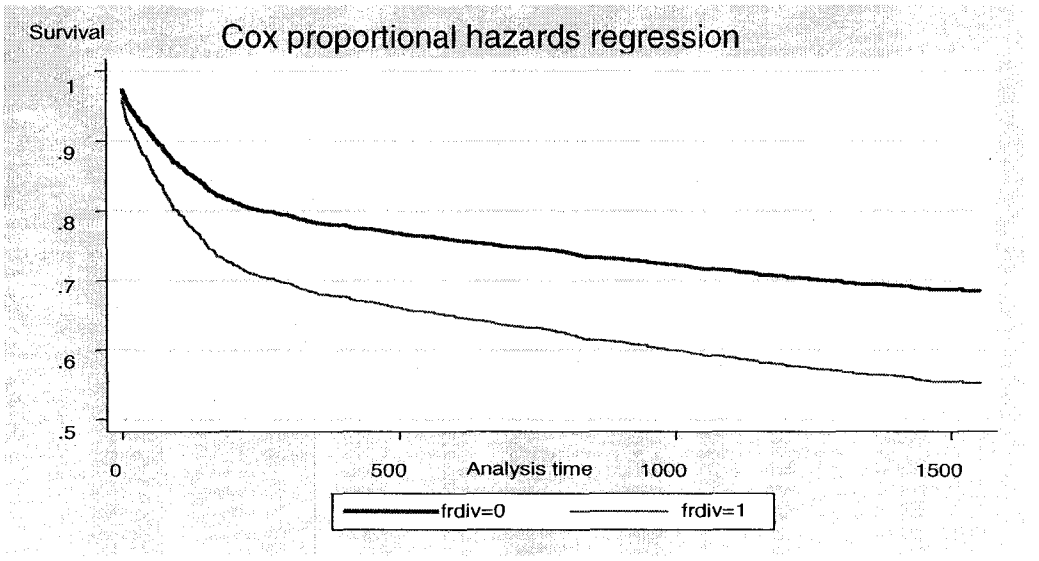
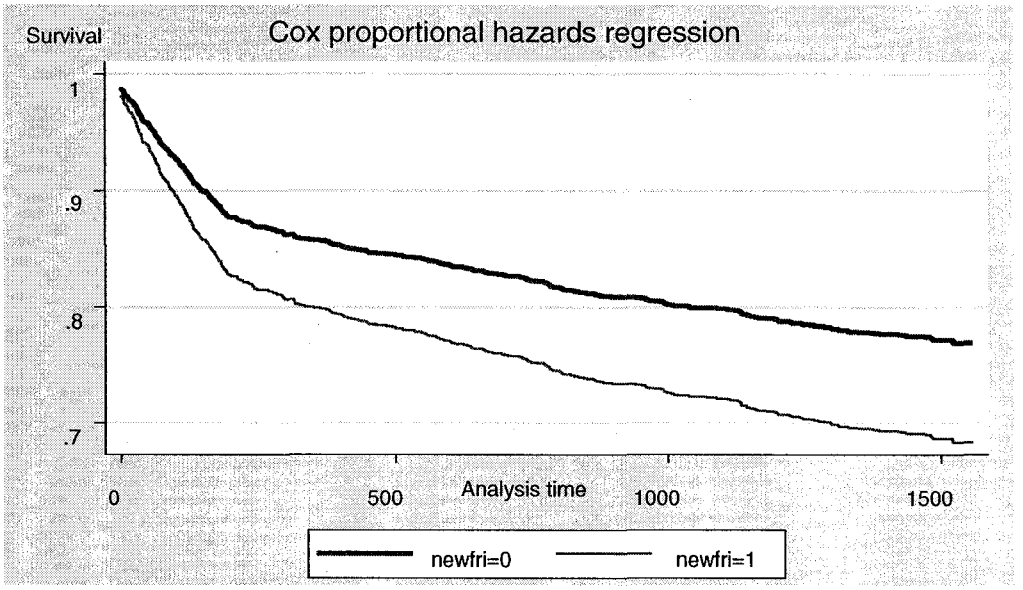


Figure 6.10 Predicted survival curves from the Cox regression, by incidence of making new friends, female immigrants



Compared to the male immigrants who have totally ethnic concentrated friendship networks (i.e. all friends are of the same ethnic background), those who have developed more ethnically diverse friend networks have a much quicker access to employment in intended occupations (Figure 6.9): about four years after landing, 45% (or 1 – 55%) of male newcomers with ethnically diverse friendship land a first job in intended occupation compared to about 31% (or 1 – 69%) of those with closed networks do so. Similarly, female immigrants having made new friends in Canada have an easier access to employment in intended fields, compared to those who do not make friends after landing (Figure 6.10).

Section 6.7 Conclusions

Descriptive analysis based on three waves of the LSIC shows that quite a number of immigrants have difficulties in finding employment in their intended occupations during their first four years in Canada. The paper suggests that while human capital is the main factor determining the fit into intended occupations, social capital can act as a stimulant to help immigrants find matching employment in their desired occupations. Empirical analysis

confirms the hypothesis that social capital, mainly friendship networks, has a significant effect on hastening the employment access in intended occupation for new immigrants.

Information contained in the LSIC on detailed job trajectory and occupational anticipation at the time of landing affords the possibility to match the actual jobs to the intended occupations and to identify the sequence of the job matching occurrence. Specifically, the matching is realized by using the first two digits of the occupational classification codes for jobs, which takes into account both occupation type and skill level. Occupational outcome is then measured by the duration of access to the first job in intended occupation during the first four years in Canada. This measure considers both the skill match and the timing of the access, improving the accuracy of occupational outcome measurement, compared with other measures in the literature.

Based on semi-parametric Cox proportional hazard models, the study further investigates factors that determine the speed of access to employment in intended occupation for male and female immigrants respectively. Both the survival curves and the hazard functions from the Kaplan-Meier estimates and the Cox regressions show that while more immigrants found employment in their intended occupation the longer they were in Canada, the critical period for an immigrant to find employment in his or her desired field is the initial one year in the Canadian labour market. The hazards of finding a job in intended occupation, both for males and females, dropped significantly during the first year in Canada and flattened afterwards.

While consistent with the literature that human capital such as education and language skills are essential factors determining the occupational outcomes, it is found that foreign work experience does not have any significant effects on occupational destination, compared to the significant positive effect of Canadian work experience prior to landing on the employment access to intended occupation. This result provides rationale for the implementation of the Canadian Experience Class 2008 for permanent immigration for certain skilled temporary workers and international students with Canadian degrees and Canadian work experience.

The study also arrives at some new findings regarding the role of social capital in facilitating the employment access in intended fields in the initial occupational matching process for

immigrants:

First, the speed of access to the first job in intended occupation may be explained by some social capital indicators, although the elements playing roles are limited in numbers.

Second, there are gender differences in both significance and magnitude of social capital effects on the speed of entry into the first job in intended occupation. For male immigrants, ethnic diversity of friend networks and frequency of contact with family sponsors are the two key elements within social networks that help immigrants speed up the access to the first desired job. For female immigrants, while no single social capital indicator shows significant effects on intended occupation access, the incidence of making new friends itself exhibits a significant effect on accelerating the employment access in intended occupation.

Third, consistently with previous studies on social capital effects on employment probability and earnings, this study arrives at the conclusion that the most important social networks helping immigrants integrate into the Canadian labour market are strong ties, i.e. family members or relatives (e.g. family sponsors) and friends, during the initial settlement and assimilation period. Possibly through a more diverse network, the information gap between skill demand and skill supply is filled to some extent, which facilitates the matching procedure between immigrants' occupational intention and actual employment.

While intended occupations of immigrants are very likely to change over time, especially during the initial adaptation and adjustment to the Canadian labour market, intended occupations are identified in this study by the desire at the time of landing or before living in Canada. Should more information capturing changes in occupational intentions become available after immigrants arrive, the research on the employment access in intended fields would enable better understandings of the job-skill matching process for immigrants.

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Appendix A

(Chapter 4)

Table A.1: Variable definitions

Table A.2: Survey means of variables in the estimations

Table A.3 – Table A.8: Complete estimation results

Table A.1: Social Capital and Employment Estimation Variables

Variable	Definition
Dependent variable	
em	1 if LR was employed at the time of the interview, 0 otherwise
Independent variables	
Immigration category	
Family	1 if LR is in Family class, 0 otherwise. (Reference category)
Skilled Workers (PA)	1 if LR landed as a Skilled Worker principal applicant, 0 otherwise
Skilled Workers (S&D)	1 if LR landed as a Skilled Worker spouse and dependant, 0 otherwise
Refugees	1 if LR landed as a Refugee, 0 otherwise
Others	1 if LR landed in a immigration category other than Family, Skilled Worker (principal applicant and spouse and dependant), and Refugee, which mostly consists of business immigrants in economic class
Demographic variables	
Female	1 if LR is female, 0 otherwise
Male	1 if LR is male, 0 otherwise
Age	Age in years
Age^2	Age square/100
Married	1 if LR is married or living with a common-law partner, 0 if LR is single, separated or divorced, or widowed
Number of children	Number of children.
Number of children in school age	Number of children in 4-14
Number of preschool children	Number of young kids (younger than 4)
Province of residence	
Atlantic Provinces	1 if LR is living in Atlantic provinces: New Brunswick, Nova Scotia, Prince Edward Island or Newfoundland, 0 otherwise.
Quebec	1 if LR is living in Quebec, 0 otherwise.
Ontario	1if LR is living in Ontario, 0 otherwise. (Reference category)
Manitoba and Saskatchewan	1 if LR is living in Saskatchewan or Manitoba, 0 otherwise.
Alberta	1 if LR is living in Alberta, 0 otherwise.
BC	1 if LR is living in British Columbia, 0 otherwise.
Census metropolitan areas (CMAs)	
Not in the Big 5 CMAs	1 if LR is living in an area other than the big 5 CMAs: Toronto, Montreal, Vancouver, Ottawa and Calgary, 0 otherwise.
Region of birth	
Asia and Pacific	1 if region of birth is Asia and Pacific, 0 otherwise.
North America, UK and Western Europe	1 if region of birth is North America, UK and Western Europe, 0 otherwise. (Reference category)
Central and South America	1 if region of birth is Central America and South America, 0 otherwise.
Europe except UK and Western Europe	1 if region of birth is Europe except UK and Western Europe, 0 otherwise.
Africa and Middle-East	1 if region of birth is Africa and Middle-East, 0 otherwise.
Population group	
white	1 if LR is white, 0 otherwise. (Reference category)
Chinese	1 if LR is Chinese, 0 otherwise.
South Asian	1 if LR is South Asian, 0 otherwise.
Black	1 if LR is Black, 0 otherwise.
Filipino	1 if LR is Filipino, 0 otherwise.
Latin	1 if LR is Latin, 0 otherwise.
West Asian and Arab	1 if LR is West Asian and Arab, 0 otherwise.
Other Asian	1 if LR is other Asian---South East Asian, Korean, Japanese, 0 otherwise.
Other Visible Minority	1 if LR is other visible minority---Visible minority n.i.e., Multiple visible minorities, White and visible minority, 0 otherwise.
Languages	
Eng	1 if LR has the knowledge of English (speaking fairly well or better), 0 otherwise (poorly or none).
Fre	1 if LR has the knowledge of French (speaking fairly well or better), 0 otherwise (poorly or none).
Education	
High school diploma or less	1 if LR has less than high school education or a high school diploma, 0 otherwise.
Some post-secondary education	1 if LR has some post-secondary education, 0 otherwise.
College diploma or some university	1 if LR has a college diploma or some university education, 0 otherwise.
Bachelor's Degree	1 if LR has a bachelor's degree, 0 otherwise. (Reference category)
Master's degree or above	1 if LR has a master's degree or above, 0 otherwise.
Currently in school	1 if LR is in school at the time of the interview, 0 otherwise
Experience	
Had work experience before landing	1 if LR had work experience before landing, 0 otherwise
Number of weeks in Canada after landing	Number of weeks in Canada
Number of weeks in Canada after landing^2	(Number of weeks in Canada after landing)^2/100
Had an arranged job upon landing	1 if LR had an arranged job when landing, 0 otherwise
Visited Canada before landing	1 if LR visited relatives or friends in Canada or visited Canada as a tourist before landing, 0 otherwise
Worked in Canada before landing	1 if LR worked in Canada before landing, 0 otherwise
Studied in Canada before landing	1 if LR studied in Canada before landing, 0 otherwise

(Continued on next page)

(Table A.1 continued)

Social capital	
_Family and relatives	
Spouse currently employed	1 if spouse is currently working at the time of the interview, 0 otherwise.
Number of relatives in Canada	Number of types of relatives (spouse, children, parents, grandparents, brothers or sisters, etc.) in Canada, ranging from 0 to 11.
Relatives living nearby upon landing	1 if most of relatives are living in the same city or same province as LR, 0 otherwise.
Frequency of contact with family sponsors	Frequency of contact with family sponsor (0~1) : 0--- No sponsor or having not seen or talked to sponsors since arriving; Between 0 and 1 --- Seeing or talking to sponsors in varied frequencies; the higher the index is, the more frequently LR contacts with sponsors. 1--- Seeing or talking to sponsors every day.
_Friends	
Friends living nearby upon landing	1 if most of the existing friends are living in the same city or same province as LR, 0 otherwise.
Number of sources meeting friends	Number of sources meeting new friends other than workplace, ranging from 0 to 14.
Ethnic diversity of friends	Ethnical diversity of friend network (0~1): 0--- No friends or all friends belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some friends belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the friend network. 1--- None of the friends belong to the same ethnic or cultural groups as LR.
Cohort diversity of friends	Immigrant diversity of friend network (0~1) (only available in Wave 2): 0--- No friends or all friends are newcomers to Canada; Between 0 and 1 --- Some friends are newcomers; the higher the index is, the relatively less friends are newcomers. 1--- None of the friends are newcomers.
Frequency of contact with friends	Frequency of contact with friends (0~1) : 0--- No friends or having not seen or talked to friends since arriving; Between 0 and 1 --- Seeing or talking to friends in varied frequencies; the higher the index is, the more frequently LR contacts with friends. 1--- Seeing or talking to friends every day.
_Group and organizational network	
Number of organizations participated in	Number of organizations or groups LR participated in. ranging from 0 to 13.
Ethnic diversity of organizational network	Ethnical diversity of organizational network (0~1): 0--- Not participated in any organization or all the members of all organizations belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some members of organizations belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the organizational network. 1--- None of the members of organizations belong to the same ethnic or cultural groups as LR.
Frequency of activity with organizations	Frequency of activities with organizations (0~1): 0--- Not participated in any organization; Between 0 and 1 --- Having taken part in organizational activities in varied frequencies; the higher the index is, the more frequently LR takes part in activities. 1--- Having taken part in activities every day.
Volunteered time for organizations	1 if LR volunteered time for organizations or groups, 0 otherwise.
Time effect	
Wave2	1 if observation is in Wave 2 and 0 otherwise.
Wave3	1 if observation is in Wave 3 and 0 otherwise.
Interactions	
Wave2 * Ethnic diversity of friends	Time effect in Wave 2 interacts with diversity of friendship
Wave3 * Ethnic diversity of friends	Time effect in Wave 3 interacts with diversity of friendship
SWPA * Ethnic diversity of friends	Skilled worker dummy variable interacts with diversity of friendship
SWSD * Ethnic diversity of friends	Skilled worker spouse and dependant dummy variable interacts with diversity of friendship
Refugees * Ethnic diversity of friends	Refugee dummy variable interacts with diversity of friendship
Others * Ethnic diversity of friends	Other immigration category dummy variable interacts with diversity of friendship
Chinese * Ethnic diversity of friends	Chinese dummy variable interacts with diversity of friendship
South Asian * Ethnic diversity of friends	South Asian dummy variable interacts with diversity of friendship
Black * Ethnic diversity of friends	Black dummy variable interacts with diversity of friendship
Filipino * Ethnic diversity of friends	Filipino dummy variable interacts with diversity of friendship
Latin * Ethnic diversity of friends	Latin dummy variable interacts with diversity of friendship
West Asian and Arab * Ethnic diversity of friends	West Asian and Arab dummy variable interacts with diversity of friendship
Other Asian * Ethnic diversity of friends	Other Asian dummy variable interacts with diversity of friendship
Other Visible Minority * Ethnic diversity of friends	Other visible minority dummy variable interacts with diversity of friendship
High school diploma or less * Ethnic diversity of friends	High school or less dummy variable inteacts with diversity of friendship
Some post-secondary education * Ethnic diversity of friends	Some post-secondary education dummy variable interacts with diversity of friendship
College diploma or some university * Ethnic diversity of friends	College diploma or some university dummy variable interacts with diversity of friendship
Master's degree or above * Ethnic diversity of friends	Master's degree dummy variable interacts with diversity of friendship
English * Ethnic diversity of friends	English ability interacts with diversity of friendship: Eng*frdiv
French * Ethnic diversity of friends	French ability interacts with diversity of friendship: Fre*frdiv

[1] LR: Longitudinal Respondent.
Source: Longitudinal survey of immigrants to Canada (2005).

Table A.2: Survey means of variables in the estimations

	Male N=9843		Female N=7674	
	Weighted Mean	Standard Error	Weighted Mean	Standard Error
Employed at the time of the interview	0.766	0.005	0.685	0.006
Family	0.187	0.004	0.288	0.006
Skilled Workers (PA)	0.574	0.005	0.212	0.005
Skilled Workers (S&D)	0.123	0.004	0.397	0.006
Refugees	0.053	0.002	0.047	0.002
Others	0.062	0.003	0.055	0.003
Age	36.301	0.106	34.611	0.119
Age^2	14.155	0.084	12.923	0.093
Married	0.778	0.004	0.795	0.005
Number of children	1.020	0.012	1.013	0.012
Number of children in school age	0.529	0.009	0.515	0.010
Number of preschool children	0.197	0.005	0.195	0.005
Atlantic Provinces	0.007	0.001	0.007	0.001
Quebec	0.155	0.004	0.136	0.004
Ontario	0.554	0.005	0.565	0.006
Manitoba and Saskatchewan	0.026	0.002	0.024	0.002
Alberta	0.096	0.003	0.089	0.003
BC	0.161	0.004	0.178	0.004
Not in the Big 5 CMAs	0.198	0.004	0.193	0.005
Asia and Pacific	0.593	0.005	0.615	0.006
North America, UK and Western Europe	0.054	0.002	0.054	0.003
Central and South America	0.056	0.002	0.068	0.003
Europe except UK and Western Europe	0.109	0.003	0.119	0.004
Africa and Middle-East	0.188	0.004	0.144	0.004
White	0.204	0.004	0.212	0.005
Chinese	0.194	0.004	0.222	0.005
South Asian	0.271	0.005	0.253	0.005
Black	0.053	0.002	0.046	0.003
Filipino	0.080	0.003	0.085	0.004
Latin	0.022	0.002	0.032	0.002
West Asian and Arab	0.109	0.003	0.082	0.003
Other Asian	0.054	0.003	0.054	0.003
Other Visible Minority	0.012	0.001	0.014	0.002
High school diploma or less	0.191	0.004	0.240	0.005
Some post-secondary education	0.055	0.002	0.049	0.003
College diploma or some university	0.116	0.003	0.170	0.005
Bachelor's degree	0.405	0.005	0.375	0.006
Master's degree or above	0.232	0.005	0.167	0.005
Currently in school	0.140	0.004	0.146	0.004
English	0.904	0.003	0.847	0.004
French	0.166	0.004	0.155	0.004
Had work experience before landing	0.889	0.003	0.759	0.005
Number of weeks in Canada after landing	72.888	0.332	74.893	0.364
Number of weeks in Canada after landing^2	62.429	0.419	64.830	0.459
Had an arranged job upon landing	0.089	0.003	0.043	0.002
Visited Canada before landing	0.171	0.004	0.168	0.005
Worked in Canada before landing	0.041	0.002	0.023	0.002
Studied in Canada before landing	0.041	0.002	0.040	0.002
Spouse currently employed	0.275	0.005	0.412	0.006
Number of relatives in Canada	0.752	0.010	0.849	0.012
Relatives living nearby upon landing	0.464	0.005	0.537	0.006
Frequency of contact with family sponsors	0.201	0.004	0.296	0.006
Friends living nearby upon landing	0.517	0.005	0.463	0.006
Number of sources meeting friends	1.950	0.017	1.969	0.020
Ethnic diversity of friends	0.491	0.003	0.479	0.003
Frequency of contact with friends	0.782	0.002	0.773	0.003
Number of organizations participated in	0.367	0.007	0.348	0.008
Ethnic diversity of organizational network	0.017	0.000	0.017	0.000
Frequency of activity with organizations	0.168	0.003	0.160	0.003
Volunteered time for organizations	0.166	0.004	0.148	0.004

Data source: Longitudinal Survey of Immigrants to Canada (2005).

Table A.3: Estimation of employment likelihood of male immigrants in the labour force in the initial 4 years in Canada

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)													
	Models													
	Ordinary Logit Models (No individual specific effects)								**Panel Models (With individual specific effects)**					
Independent variables	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Immigration category [Family]														
Skilled Workers (PA)	-0.272	0.284	-0.26	0.260	-0.629**	0.254	-0.342**	0.149			-0.23	0.173	-0.314**	0.159
Skilled Workers (S&D)	-0.568**	0.289	-0.473*	0.267	-0.685***	0.251	-0.544***	0.153			-0.437**	0.180	-0.533***	0.161
Refugees	-0.297	0.292	-0.543**	0.261	-0.437	0.268	-0.405***	0.153			-0.742***	0.179	-0.393**	0.166
Others	-0.404	0.324	-0.067	0.281	-0.498*	0.277	-0.235	0.166			-0.166	0.196	-0.212	0.182
Demographic variables														
Age	0.024	0.039	0.183***	0.038	0.229***	0.043	0.12***	0.022	0.047	0.107	0.147***	0.026	0.119***	0.023
Age^2	-0.082*	0.048	-0.25***	0.045	-0.294***	0.049	-0.182***	0.026	0.173	0.113	-0.224***	0.031	-0.182***	0.027
Married	-0.028	0.161	-0.123	0.166	0.192	0.185	0.038	0.096	-0.512**	0.224	-0.058	0.112	0.019	0.098
Number of children	0.03	0.097	0.082	0.098	0.12	0.094	0.105*	0.054	0.59***	0.171	0.146**	0.060	0.11*	0.057
Number of children in school age	-0.052	0.111	-0.159	0.105	-0.26**	0.111	-0.171***	0.060	-0.54***	0.160	-0.227***	0.067	-0.18***	0.063
Number of preschool children	-0.042	0.147	0.01	0.144	-0.038	0.150	-0.052	0.081	-0.502***	0.191	-0.146	0.092	-0.058	0.086
Province of residence [Ontario]														
Atlantic Provinces	0.382	0.698	-0.53	0.570	1.86**	0.922	0.181	0.409	0.062	0.989	0.573	0.440	0.165	0.365
Quebec	-0.759***	0.190	-0.842***	0.194	-0.736***	0.257	-0.785***	0.117	-1.39**	0.623	-0.885***	0.138	-0.763***	0.129
Manitoba and Saskatchewan	0.66*	0.367	0.017	0.366	0.026	0.389	0.234	0.222	-0.903	0.816	0.242	0.233	0.234	0.230
Alberta	0.345**	0.166	0.02	0.167	0.425**	0.193	0.252**	0.099	-0.466	0.497	0.265**	0.113	0.261**	0.110
BC	-0.339**	0.138	-0.207	0.140	-0.171	0.154	-0.205**	0.080	0.183	0.408	-0.264***	0.095	-0.189**	0.088
Census metropolitan areas (CMAs)														
Not in the Big 5 CMAs	0.03	0.141	-0.022	0.136	-0.163	0.145	-0.048	0.080	-0.329	0.227	-0.041	0.091	-0.058	0.087
Region of birth [North America, UK and Western Europe]														
Asia and Pacific	0.516	0.360	-0.608	0.409	-0.426	0.468	-0.23	0.234			-0.294	0.274	-0.228	0.272
Central and South America	0.181	0.394	0.069	0.460	0.166	0.513	0.062	0.257			0.039	0.289	0.079	0.283
Europe except UK and Western Europe	0.243	0.294	-0.297	0.327	0.147	0.347	-0.085	0.180			-0.248	0.215	-0.094	0.198
Africa and Middle-East	-0.428	0.322	-0.527	0.364	0.22	0.388	-0.344*	0.201			-0.396*	0.233	-0.34	0.230

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(Table A.3 continued)

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable em (conditional on the participation in the labour force)

Independent variables	Models													
	Ordinary Logit Models (No individual specific effects)								Panel Models (With individual specific effects)					
	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Population group [White]														
Chinese	-1.209***	0.300	-0.5	0.319	-0.185	0.381	-0.66***	0.191			-0.798***	0.231	-0.685***	0.220
South Asian	-0.47*	0.284	0.228	0.319	0.38	0.378	0.059	0.188			0.077	0.222	0.045	0.218
Black	-0.352	0.310	-0.042	0.334	-0.5	0.377	-0.287	0.191			-0.359*	0.207	-0.302	0.219
Filipino	0.011	0.352	0.748*	0.397	1.000**	0.455	0.6***	0.230			0.598**	0.270	0.596**	0.259
Latin	-0.307	0.451	-0.272	0.491	0.04	0.549	-0.272	0.283			-0.327	0.325	-0.308	0.288
West Asian and Arab	-0.457*	0.272	-0.245	0.274	-0.835***	0.310	-0.481***	0.161			-0.598***	0.186	-0.5***	0.190
Other Asian	-1.399***	0.345	-0.254	0.365	-0.509	0.411	-0.673***	0.212			-0.781***	0.261	-0.705***	0.249
Other Visible Minority	0.006	0.462	-0.484	0.453	-0.638	0.554	-0.284	0.276			-0.344	0.350	-0.288	0.324
Education [Bachelor's Degree]														
High school diploma or less	-0.177	0.181	0.173	0.177	-0.462**	0.198	-0.231**	0.104	-0.942	0.831	-0.228*	0.123	-0.25**	0.116
Some post-secondary education	0.045	0.252	0.194	0.248	0.487	0.316	0.144	0.149	-0.893	0.858	0.181	0.169	0.122	0.159
College diploma or some university	-0.039	0.164	0.112	0.171	-0.268	0.183	-0.058	0.096	-0.409	0.587	-0.175	0.118	-0.058	0.105
Master's degree or above	-0.032	0.128	-0.079	0.133	-0.262*	0.157	-0.091	0.077	0.35	0.507	-0.07	0.095	-0.085	0.087
Currently in school	-1.212***	0.115	-0.819***	0.130	-0.246	0.260	-0.868***	0.075	-0.826***	0.112	-1.03***	0.083	-0.838***	0.075
Language Proficiency														
English	-0.1	0.154	0.315*	0.173	0.554***	0.190	0.186*	0.096	0.111	0.172	0.207**	0.105	0.174*	0.098
French	-0.164	0.193	-0.126	0.204	-0.013	0.260	-0.102	0.118	-0.726***	0.257	-0.13	0.133	-0.137	0.127
Experience														
Had work experience before landing	0.624***	0.201	0.108	0.183	0.096	0.187	0.352***	0.109			0.415***	0.130	0.379***	0.117
Number of weeks in Canada after landing	0.334**	0.157	-0.602**	0.253	-0.067	0.572	0.003	0.009	0.003	0.012	0.001	0.009	0.001	0.008
Number of weeks in Canada after landing^2	-0.5*	0.257	0.343**	0.147	0.043	0.290	0.007	0.007	0.004	0.011	0.01	0.008	0.009	0.007
Had an arranged job upon landing	2.161***	0.325	0.857***	0.296	1.007***	0.306	1.373***	0.179			1.495***	0.194	1.41***	0.189
Visited Canada before landing	0.168	0.167	0.017	0.162	0.492***	0.185	0.186*	0.095			0.179	0.115	0.178*	0.106
Worked in Canada before landing	-0.212	0.382	0.744	0.454	0.501	0.470	0.309	0.238			0.408	0.271	0.279	0.250
Studied in Canada before landing	0.615**	0.253	0.681**	0.278	-0.23	0.281	0.33**	0.162			0.282	0.192	0.355*	0.195

(Continued on next page)

(Table A.3 continued)

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)													
	Models													
	Ordinary Logit Models (No individual specific effects)								**Panel Models (With individual specific effects)**					
Independent variables	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Social networks														
_Family and relatives														
Spouse currently employed	0.392***	0.123	0.599***	0.118	0.148	0.172	0.383***	0.073	0.45***	0.098	0.486***	0.078	0.368***	0.073
Number of relatives in Canada	0.121	0.088	-0.137*	0.080	-0.108	0.087	-0.048	0.049	-1.075***	0.392	-0.076	0.056	-0.046	0.053
Relatives living nearby upon landing	0.115	0.157	0.319**	0.152	0.184	0.167	0.246***	0.090			0.278***	0.107	0.252**	0.100
Frequency of contact with family sponsors	0.222	0.239	0.174	0.220	-0.224	0.215	0.16	0.125	0.594**	0.249	0.389***	0.142	0.203	0.129
_Friends														
Friends living nearby upon landing	0.183	0.112	0.049	0.107	0.125	0.117	0.119*	0.063			0.168**	0.075	0.123*	0.070
Number of sources meeting friends	-0.159***	0.040	-0.041	0.030	-0.097**	0.043	-0.109***	0.019	-0.071**	0.030	-0.131***	0.022	-0.103***	0.019
Ethnic diversity of friends	0.84***	0.213	-0.337	0.255	-0.537*	0.274	0.291**	0.121	0.275	0.172	0.283**	0.126	0.283**	0.124
Cohort diversity of friends			0.743***	0.232	0.865***	0.245								
Frequency of contact with friends	0.155	0.200	0.097	0.210	-0.344	0.401	0.235*	0.130	0.206	0.198	0.298**	0.143	0.251*	0.129
_Groups and organizational network														
Number of organizations participated in	0.189	0.229	-0.18	0.185	-0.209	0.200	-0.083	0.115	-0.076	0.172	-0.056	0.123	-0.077	0.115
Ethnic diversity of organizational network	0.19	3.557	3.673	3.016	-0.512	3.285	1.685	1.825	1.324	2.860	1.766	1.996	1.549	1.812
Frequency of activity with organizations	-0.251	0.303	-0.211	0.282	0.379	0.307	-0.085	0.164	-0.284	0.238	-0.207	0.177	-0.111	0.167
Volunteered time for organizations	-0.086	0.206	-0.087	0.191	0.404*	0.221	0.086	0.113	0.353**	0.162	0.177	0.120	0.122	0.112
_cons	-4.51*	2.448	24.726**	10.835	0.274	28.116	-1.067**	0.513			-1.336**	0.594	-1.024*	0.529
No. of observations	2996		3360		3450		9843		3880		9843		9843	
No. of groups (for panel models)									1379		3659		3659	
Pseudo R^2	0.196		0.124		0.1227		0.145						0.186	
Percent correctly predicted	0.753		0.789				0.789		0.584		0.780		0.790	
	Prob > Chi-Square													
Joint test for network size = 0	0.0006		0.1157		0.0311		0.0000		0.0041		0.0000		0.0000	
Joint test for network diversity = 0, if applicable	0.0004		0.0074		0.0051		0.0262		0.2399		0.0403		0.0447	
Joint test for network density = 0	0.5319		0.7052		0.3831		0.1579		0.0454		0.0050		0.0823	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table A.4: Estimation of employment likelihood of female immigrants in the labour force in the initial 4 years in Canada

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	participation in the labour force)													
	Models													
	Ordinary Logit Models (No individual specific effects)								Panel Models (With individual specific effects)					
Independent variables	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Immigration category [family]														
Skilled Workers (PA)	0.314	0.318	0.335	0.250	0.363	0.253	0.345**	0.147			0.384**	0.166	0.356**	0.154
Skilled Workers (S&D)	0.189	0.289	0.078	0.222	-0.073	0.210	0.096	0.129			0.078	0.143	0.11	0.136
Refugees	-0.089	0.325	0.059	0.256	-0.511**	0.232	-0.198	0.151			-0.357**	0.163	-0.194	0.162
Others	-0.003	0.352	-0.12	0.282	-0.215	0.267	-0.086	0.165			-0.106	0.184	-0.086	0.169
Demographic variables														
Age	0.014	0.044	0.073*	0.039	0.045	0.044	0.05**	0.023	0.178	0.111	0.059**	0.024	0.051**	0.024
Age^2	-0.044	0.057	-0.113**	0.048	-0.092*	0.052	-0.091***	0.029	-0.112	0.125	-0.109***	0.029	-0.092***	0.030
Married	-0.349*	0.187	-0.075	0.181	0.295	0.183	-0.01	0.102	-0.578**	0.257	-0.061	0.108	-0.016	0.104
Number of children	-0.039	0.112	-0.008	0.089	0.096	0.085	0.038	0.052	-0.021	0.174	0.022	0.056	0.037	0.055
Number of children in school age	0.022	0.123	-0.105	0.102	-0.273***	0.098	-0.134**	0.059	-0.482***	0.161	-0.146**	0.064	-0.142**	0.061
Number of preschool children	-0.609***	0.180	-0.965***	0.136	-0.848***	0.130	-0.827***	0.080	-1.063***	0.188	-0.903***	0.088	-0.832***	0.083
Province of residence [Ontario]														
Atlantic Provinces	-0.081	0.614	-0.395	0.652	-0.95*	0.533	-0.535	0.349	-0.561	0.875	-0.411	0.348	-0.554	0.353
Quebec	-0.279	0.202	-0.488**	0.220	-0.391	0.239	-0.406***	0.121	-0.737	0.554	-0.43***	0.136	-0.415***	0.131
Manitoba and Saskatchewan	0.299	0.390	0.477	0.367	0.241	0.403	0.386*	0.222	-0.184	0.782	0.407*	0.231	0.375	0.241
Alberta	0.544***	0.182	-0.036	0.151	0.318*	0.183	0.244**	0.096	-0.747	0.510	0.328***	0.108	0.244**	0.100
BC	-0.089	0.147	-0.069	0.133	0.034	0.139	-0.046	0.079	-1.085*	0.564	-0.096	0.088	-0.047	0.083
Census metropolitan areas (CMAs)														
Not in the Big 5 CMAs	-0.001	0.150	-0.168	0.132	0.135	0.142	-0.022	0.079	-0.307	0.258	0.004	0.087	-0.022	0.083
Region of birth [North America, UK and Western Europe]														
Asia and Pacific	-0.274	0.408	-0.841*	0.429	-0.7	0.479	-0.599**	0.244			-0.692***	0.266	-0.596**	0.271
Central and South America	-0.469	0.407	-0.793*	0.445	-0.209	0.486	-0.576**	0.244			-0.665**	0.279	-0.57**	0.256
Europe except UK and Western Europe	-0.39	0.307	-0.418	0.338	-0.526	0.375	-0.449**	0.183			-0.566***	0.204	-0.458**	0.201
Africa and Middle-East	-0.888**	0.362	-1.006***	0.387	-0.78*	0.414	-0.904***	0.213			-1.019***	0.232	-0.911***	0.235

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(Table A.4 continued)

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable participation in the labour force)

Independent variables	Models													
	Ordinary Logit Models (No individual specific effects)								Panel Models (With individual specific effects)					
	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Population group [White]														
Chinese	0.054	0.346	-0.004	0.328	-0.146	0.346	-0.106	0.196			-0.157	0.222	-0.113	0.215
South Asian	-0.035	0.337	0.244	0.326	0.046	0.343	0.093	0.193			0.057	0.217	0.083	0.212
Black	0.146	0.339	0.512	0.336	0.62*	0.345	0.423**	0.193			0.505**	0.214	0.429**	0.211
Filipino	0.695*	0.385	1.149***	0.378	1.12***	0.427	0.973***	0.225			1.005***	0.254	0.967***	0.249
Latin	0.523	0.444	0.09	0.404	-0.174	0.464	0.192	0.244			0.157	0.285	0.194	0.260
West Asian and Arab	-0.114	0.335	-0.058	0.296	-0.026	0.302	-0.044	0.174			-0.146	0.192	-0.042	0.196
Other Asian	-0.396	0.417	-0.053	0.365	0.018	0.385	-0.114	0.220			-0.188	0.249	-0.123	0.241
Other Visible Minority	0.133	0.473	0.495	0.517	-0.722	0.463	0.008	0.287			-0.15	0.327	0.012	0.286
Education [Bachelor's Degree]														
High school diploma or less	-0.053	0.168	-0.002	0.151	-0.218	0.161	-0.102	0.090	1.255*	0.684	-0.093	0.102	-0.098	0.093
Some post-secondary education	0.013	0.243	0.109	0.231	0.26	0.247	0.115	0.137	0.242	0.754	0.085	0.151	0.107	0.139
College diploma or some university	0.196	0.165	0.118	0.144	-0.069	0.155	0.08	0.088	0.133	0.576	0.058	0.100	0.084	0.092
Master's degree or above	-0.101	0.156	-0.119	0.154	0.173	0.176	-0.049	0.090	1.173	0.714	-0.032	0.104	-0.047	0.097
Currently in school	-0.904***	0.121	-0.914***	0.136	-0.268	0.263	-0.794***	0.082	-0.816***	0.122	-0.926***	0.088	-0.796***	0.083
Language Proficiency														
English	-0.193	0.148	0.11	0.152	0.162	0.156	0	0.087	0.103	0.157	0.071	0.092	0.006	0.091
French	-0.305	0.199	-0.018	0.207	-0.14	0.234	-0.156	0.118	-0.202	0.266	-0.244*	0.128	-0.158	0.127
Experience														
Had work experience before landing	0.154	0.163	0.368***	0.140	0.422***	0.142	0.335***	0.083			0.42***	0.092	0.343***	0.088
Number of weeks in Canada after landing	0.234	0.174	-0.166	0.215	0.356	0.419	-0.029***	0.009	-0.03**	0.013	-0.029***	0.009	-0.029***	0.009
Number of weeks in Canada after landing^2	-0.364	0.286	0.109	0.126	-0.164	0.214	0.031***	0.007	0.03***	0.011	0.032***	0.007	0.031***	0.007
Had an arranged job upon landing	2.185***	0.439	1.424***	0.395	0.822**	0.374	1.528***	0.230			1.781***	0.243	1.55***	0.230
Visited Canada before landing	-0.228	0.173	0.265	0.166	0.265	0.177	0.109	0.096			0.155	0.108	0.098	0.104
Worked in Canada before landing	0.125	0.488	0.123	0.417	0.532	0.474	0.224	0.255			0.052	0.278	0.224	0.251
Studied in Canada before landing	0.249	0.293	-0.097	0.282	0.109	0.361	0.059	0.174			-0.031	0.196	0.062	0.190

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(Table A.4 continued)

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable participation in the labour force)

Independent variables	Models													
	Ordinary Logit Models (No individual specific effects)								Panel Models (With individual specific effects)					
	Wave 1 (6 months after landing)		Wave 2 (2 years after landing)		Wave 3 (4 years after landing)		Pooled Logit Model (W1, 2 & 3)		Fixed-effects Logit Model		Random-effects Logit Model		GEE Population-averaged Model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std.Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Social networks														
_Family and relatives														
Spouse currently employed	0.336**	0.130	0.255**	0.127	-0.022	0.148	0.142**	0.071	0.077	0.090	0.191***	0.072	0.125*	0.069
Number of relatives in Canada	0.055	0.083	0.019	0.072	0.119	0.085	0.069	0.045	-0.126	0.374	0.052	0.051	0.075	0.050
Relatives living nearby upon landing	0.189	0.160	0.331**	0.140	-0.021	0.160	0.17*	0.087			0.273***	0.097	0.169*	0.095
Frequency of contact with family sponsors	0.07	0.258	-0.123	0.204	-0.056	0.186	0.011	0.114	0.357	0.238	-0.013	0.124	0.012	0.117
_Friends														
Friends living nearby upon landing	0.304**	0.125	0.382***	0.111	0.104	0.112	0.289***	0.065			0.337***	0.073	0.283***	0.069
Number of sources meeting friends	-0.124***	0.044	-0.16***	0.031	-0.177***	0.040	-0.154***	0.020	-0.086***	0.031	-0.168***	0.022	-0.148***	0.021
Ethnic diversity of friends	0.258	0.226	0.55**	0.250	0.332	0.243	0.45***	0.118	0.367**	0.186	0.479***	0.124	0.454***	0.118
Cohort diversity of friends			0.333	0.214	0.081	0.210								
Frequency of contact with friends	0.337	0.217	0.52**	0.207	0.89**	0.352	0.517***	0.129	0.413**	0.195	0.527***	0.136	0.499***	0.130
_Groups and organizational network														
Number of organizations participated in	0.083	0.257	0.127	0.215	0.308	0.227	0.159	0.127	0.143	0.187	0.212	0.131	0.144	0.127
Ethnic diversity of organizational network	-2.616	3.694	2.548	2.962	-1.071	3.339	0.025	1.875	-0.242	2.795	-0.395	1.932	0.129	1.860
Frequency of activity with organizations	0.067	0.319	-0.379	0.316	-0.531	0.332	-0.262	0.183	-0.05	0.252	-0.308*	0.183	-0.234	0.185
Volunteered time for organizations	0.219	0.237	-0.068	0.209	-0.09	0.208	-0.037	0.120	-0.102	0.169	-0.089	0.124	-0.047	0.122
_cons	-2.937	2.736	5.552	9.247	-18.864	20.570	0.309	0.526			0.31	0.551	0.277	0.538
No. of observations	2070		2724		2851		7674		3477		7674		7674	
No. of groups (for panel models)									1284		3201		3201	
Pseudo R^2	1.109		0.123		0.1046		0.112							
Percent correctly predicted	0.669		0.716				0.721		0.584		0.703		0.719	
	Prob > Chi-Square													
Joint test for network size = 0	0.0399		0.0000		0.0000		0.0000		0.0391		0.0000		0.0000	
Joint test for network diversity = 0, if applicable	0.4541		0.0008		0.2298		0.0006		0.1426		0.0006		0.0006	
Joint test for network density = 0	0.4632		0.0484		0.0329		0.0005		0.0971		0.0007		0.0012	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table A.5: GEE population-averaged estimations of employment likelihood of male immigrants in the initial 4 years in Canada

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
	Model M.1		Model M.2		Model M.3		Model M.4		Model M.5		Marginal Effects	
Independent variables	No social capital		All social capital indicators		Kinship and friendship indicators		Social capital and time effects		Final specification		Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Immigration category [family]												
Skilled Workers (PA)	-0.519***	0.125	-0.314**	0.159	-0.309*	0.159	-0.435***	0.131	-0.431***	0.131	-0.067***	0.020
Skilled Workers (S&D)	-0.737***	0.127	-0.533***	0.161	-0.525***	0.161	-0.672***	0.135	-0.655***	0.134	-0.117***	0.027
Refugees	-0.558***	0.146	-0.393**	0.166	-0.388**	0.165	-0.508***	0.149	-0.494***	0.149	-0.085***	0.028
Others	-0.394**	0.156	-0.212	0.182	-0.206	0.182	-0.33**	0.162	-0.317*	0.161	-0.053*	0.029
Demographic variables												
Age	0.116***	0.023	0.119***	0.023	0.119***	0.023	0.114***	0.023	0.117***	0.023	0.018***	0.004
Age^2	-0.178***	0.028	-0.182***	0.027	-0.181***	0.027	-0.176***	0.027	-0.179***	0.027	-0.028***	0.004
Married	0.006	0.098	0.019	0.098	0.02	0.098	0.017	0.098	0.025	0.098	0.004	0.015
Number of children	0.113*	0.058	0.11*	0.057	0.11*	0.057	0.111*	0.057	0.111*	0.057	0.017*	0.009
Number of children in school age	-0.191***	0.063	-0.18***	0.063	-0.181***	0.063	-0.18***	0.063	-0.181***	0.063	-0.028***	0.010
Number of preschool children	-0.064	0.086	-0.058	0.086	-0.06	0.086	-0.067	0.086	-0.06	0.086	-0.009	0.013
Province of residence [Ontario]												
Atlantic Provinces	0.151	0.356	0.165	0.365	0.166	0.366	0.15	0.369	0.149	0.365	0.022	0.052
Quebec	-0.782***	0.129	-0.763***	0.129	-0.762***	0.128	-0.785***	0.128	-0.771***	0.128	-0.139***	0.026
Manitoba and Saskatchewan	0.267	0.235	0.234	0.230	0.225	0.231	0.214	0.232	0.211	0.232	0.031	0.032
Alberta	0.261**	0.108	0.261**	0.110	0.261**	0.110	0.243**	0.109	0.247**	0.109	0.036**	0.015
BC	-0.176**	0.086	-0.189**	0.088	-0.191**	0.088	-0.204**	0.087	-0.207**	0.087	-0.033**	0.015
Census metropolitan areas (CMAs)												
Not in the Big 5 CMAs	-0.041	0.086	-0.058	0.087	-0.055	0.087	-0.068	0.087	-0.065	0.086	-0.01	0.014
Region of birth [North America, UK and Western Europe]												
Asia and Pacific	-0.248	0.270	-0.228	0.272	-0.233	0.271	-0.219	0.273	-0.226	0.271	-0.035	0.042
Central and South America	0.139	0.283	0.079	0.283	0.072	0.282	0.08	0.282	0.071	0.280	0.011	0.042
Europe except UK and Western Europe	-0.093	0.196	-0.094	0.198	-0.1	0.197	-0.083	0.196	-0.092	0.196	-0.015	0.032
Africa and Middle-East	-0.319	0.229	-0.34	0.230	-0.34	0.229	-0.332	0.229	-0.341	0.228	-0.056	0.039

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(Table A.5 continued)

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable em (conditional on the participation in the labour force)

Independent variables	Models											
	Model M.1 No social capital		Model M.2 All social capital indicators		Model M.3 Kinship and friendship indicators		Model M.4 Social capital and time effects		Model M.5 Final specification		Marginal Effects Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Population group [White]												
Chinese	-0.766***	0.220	-0.685***	0.220	-0.685***	0.219	-0.682***	0.220	-0.679***	0.220	-0.12***	0.043
South Asian	0.068	0.217	0.045	0.218	0.048	0.217	0.039	0.217	0.041	0.217	0.006	0.033
Black	-0.312	0.219	-0.302	0.219	-0.289	0.218	-0.287	0.218	-0.29	0.217	-0.048	0.039
Filipino	0.629**	0.256	0.596**	0.259	0.598**	0.258	0.59**	0.258	0.591**	0.257	0.078***	0.028
Latin	-0.359	0.291	-0.308	0.288	-0.298	0.288	-0.294	0.288	-0.3	0.286	-0.051	0.052
West Asian and Arab	-0.497***	0.189	-0.5***	0.190	-0.504***	0.189	-0.494***	0.188	-0.495***	0.188	-0.085**	0.036
Other Asian	-0.775***	0.246	-0.705***	0.249	-0.718***	0.247	-0.748***	0.248	-0.748***	0.247	-0.14***	0.053
Other Visible Minority	-0.276	0.324	-0.288	0.324	-0.282	0.324	-0.255	0.321	-0.244	0.321	-0.041	0.057
Education [Bachelor's Degree]												
High school diploma or less	-0.215*	0.114	-0.25**	0.116	-0.247**	0.116	-0.242**	0.115	-0.246**	0.115	-0.04**	0.019
Some post-secondary education	0.177	0.158	0.122	0.159	0.124	0.159	0.138	0.157	0.129	0.157	0.019	0.023
College diploma or some university	-0.03	0.104	-0.058	0.105	-0.058	0.105	-0.055	0.105	-0.055	0.104	-0.009	0.017
Master's degree or above	-0.093	0.086	-0.085	0.087	-0.081	0.086	-0.081	0.086	-0.082	0.086	-0.013	0.014
Currently in school	-0.853***	0.074	-0.838***	0.075	-0.836***	0.075	-0.822***	0.075	-0.84***	0.075	-0.154***	0.016
Language Proficiency												
English	0.183*	0.097	0.174*	0.098	0.177*	0.098	0.175*	0.098	0.178*	0.098	0.029*	0.017
French	-0.131	0.127	-0.137	0.127	-0.136	0.126	-0.12	0.126	-0.126	0.126	-0.02	0.021
Experience												
Had work experience before landing	0.373***	0.117	0.379***	0.117	0.381***	0.117	0.401***	0.117	0.381***	0.117	0.064***	0.021
Number of weeks in Canada after landing	-0.01	0.008	0.001	0.008	0	0.008	0.035**	0.017	0.001	0.008	0	0.001
Number of weeks in Canada after landing[2]	0.018***	0.007	0.009	0.007	0.009	0.007	-0.019*	0.011	0.009	0.007	0.001	0.001
Had an arranged job upon landing	1.43***	0.188	1.41***	0.189	1.411***	0.189	1.417***	0.188	1.402***	0.188	0.15***	0.012
Visited Canada before landing	0.222**	0.104	0.178*	0.106	0.182*	0.106	0.195*	0.105	0.189*	0.105	0.028*	0.015
Worked in Canada before landing	0.259	0.247	0.279	0.250	0.286	0.250	0.29	0.251	0.283	0.249	0.04	0.033
Studied in Canada before landing	0.363*	0.194	0.355*	0.195	0.359*	0.195	0.375*	0.195	0.368*	0.195	0.051**	0.024

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(Table A.5 continued)

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
Independent variables	**Model M.1** **No social capital**		**Model M.2** **All social capital indicators**		**Model M.3** **Kinship and friendship indicators**		**Model M.4** **Social capital and time effects**		**Model M.5** **Final specification**		**Marginal Effects** **Final specification**	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Social networks												
_Family and relatives												
Spouse currently employed	0.36***	0.072	0.368***	0.073	0.367***	0.073	0.393***	0.073	0.372***	0.073	0.055***	0.010
Number of relatives in Canada			-0.046	0.053	-0.046	0.053						
Relatives living nearby upon landing			0.252**	0.100	0.248**	0.100	0.184**	0.076	0.183**	0.076	0.028**	0.012
Frequency of contact with family sponsors			0.203	0.129	0.206	0.129						
_Friends												
Friends living nearby upon landing			0.123*	0.070	0.122*	0.069						
Number of sources meeting friends			-0.103***	0.019	-0.103***	0.018	-0.08***	0.019	-0.097***	0.018	-0.015***	0.003
Ethnic diversity of friends			0.283**	0.124	0.298**	0.124	0.301**	0.124	0.288**	0.123	0.045**	0.019
Frequency of contact with friends			0.251*	0.129	0.244*	0.129	0.185	0.129	0.256**	0.128	0.04**	0.020
_Groups and organizational network												
Number of organizations participated in			-0.077	0.115								
Ethnic diversity of organizational network			1.549	1.812								
Frequency of activity with organizations			-0.111	0.167								
Volunteered time for organizations			0.122	0.112								
Time effects												
Wave2							-0.213	0.373				
Wave3							0.196	0.418				
_cons	-0.275	0.500	-1.024*	0.529	-1.029*	0.529	-1.507**	0.620	-0.826	0.518		
No. of observations	9843		9843		9843		9843		9843		9843	
No. of groups	3659		3659		3659		3659		3659		3659	
Percent correctly predicted	0.787		0.790		0.789		0.791		0.788			

* p<0.1; ** p<0.05; *** p<0.01.

[1] Marginal effects for dummy variables are for discrete change from 0 to 1.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table A.6: GEE population-averaged estimations of employment likelihood of female immigrants in the initial 4 years in Canada

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
Independent variables	Model F.1 No social capital		Model F.2 All social capital indicators		Model F.3 Kinship and friendship indicators		Model F.4 Social capital and time effects		Model F.5 Final specification		Marginal Effects Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Immigration category [family]												
Skilled Workers (PA)	0.279**	0.114	0.356**	0.154	0.36**	0.154	0.325***	0.121	0.33***	0.121	0.065***	0.023
Skilled Workers (S&D)	0.021	0.091	0.11	0.136	0.117	0.136	0.076	0.100	0.082	0.099	0.017	0.020
Refugees	-0.301**	0.142	-0.194	0.162	-0.197	0.162	-0.226	0.145	-0.22	0.145	-0.047	0.032
Others	-0.165	0.138	-0.086	0.169	-0.079	0.169	-0.118	0.142	-0.112	0.142	-0.024	0.031
Demographic variables												
Age	0.053**	0.023	0.051**	0.024	0.051**	0.024	0.048**	0.024	0.05**	0.024	0.01**	0.005
Age^2	-0.096***	0.029	-0.092***	0.030	-0.093***	0.030	-0.089***	0.029	-0.091***	0.029	-0.019***	0.006
Married	-0.043	0.102	-0.016	0.104	-0.02	0.104	-0.025	0.104	-0.02	0.104	-0.004	0.021
Number of children	0.031	0.056	0.037	0.055	0.037	0.055	0.04	0.056	0.04	0.055	0.008	0.012
Number of children in school age	-0.158**	0.061	-0.142**	0.061	-0.143**	0.062	-0.144**	0.062	-0.143**	0.062	-0.03**	0.013
Number of preschool children	-0.832***	0.084	-0.832***	0.083	-0.832***	0.083	-0.835***	0.083	-0.832***	0.083	-0.173***	0.017
Province of residence [Ontario]												
Atlantic Provinces	-0.671*	0.343	-0.554	0.353	-0.568	0.352	-0.571	0.356	-0.578	0.354	-0.132	0.086
Quebec	-0.448***	0.131	-0.415***	0.131	-0.419***	0.130	-0.431***	0.131	-0.419***	0.130	-0.092***	0.030
Manitoba and Saskatchewan	0.368	0.246	0.375	0.241	0.384	0.240	0.402*	0.241	0.397	0.242	0.076*	0.042
Alberta	0.245**	0.100	0.244**	0.100	0.245**	0.100	0.258**	0.100	0.253**	0.100	0.05***	0.019
BC	-0.019	0.082	-0.047	0.083	-0.049	0.083	-0.041	0.083	-0.04	0.083	-0.008	0.017
Census metropolitan areas (CMAs)												
Not in the Big 5 CMAs	0.007	0.082	-0.022	0.083	-0.016	0.083	-0.019	0.083	-0.017	0.083	-0.003	0.017
Region of birth [North America, UK and Western Europe]												
Asia and Pacific	-0.632**	0.267	-0.596**	0.271	-0.603**	0.269	-0.612**	0.269	-0.604**	0.270	-0.123**	0.054
Central and South America	-0.514**	0.259	-0.57**	0.256	-0.576**	0.256	-0.56**	0.257	-0.562**	0.257	-0.127**	0.062
Europe except UK and Western Europe	-0.495**	0.197	-0.458**	0.201	-0.471**	0.200	-0.479**	0.200	-0.473**	0.200	-0.104**	0.046
Africa and Middle-East	-0.885***	0.229	-0.911***	0.235	-0.908***	0.233	-0.91***	0.233	-0.912***	0.234	-0.208***	0.056

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(Table A.6 continued)

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
Independent variables	**Model F.1** **No social capital**		**Model F.2** **All social capital indicators**		**Model F.3** **Kinship and friendship indicators**		**Model F.4** **Social capital and time effects**		**Model F.5** **Final specification**		**Marginal Effects** **Final specification**	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Population group [White]												
Chinese	-0.251	0.214	-0.113	0.215	-0.115	0.214	-0.111	0.214	-0.119	0.214	-0.025	0.046
South Asian	0.113	0.209	0.083	0.212	0.08	0.211	0.095	0.212	0.093	0.212	0.019	0.043
Black	0.373*	0.208	0.429**	0.211	0.416**	0.211	0.406*	0.212	0.407*	0.212	0.078**	0.037
Filipino	0.965***	0.248	0.967***	0.249	0.962***	0.248	0.974***	0.249	0.977***	0.249	0.165***	0.032
Latin	0.113	0.268	0.194	0.260	0.187	0.260	0.161	0.262	0.166	0.262	0.033	0.051
West Asian and Arab	-0.058	0.191	-0.042	0.196	-0.053	0.196	-0.058	0.196	-0.055	0.196	-0.011	0.041
Other Asian	-0.22	0.239	-0.123	0.241	-0.134	0.240	-0.131	0.240	-0.138	0.240	-0.029	0.052
Other Visible Minority	0.069	0.294	0.012	0.286	0.006	0.285	0	0.286	0.013	0.287	0.003	0.059
Education [Bachelor's Degree]												
High school diploma or less	-0.061	0.093	-0.098	0.093	-0.099	0.093	-0.099	0.093	-0.1	0.093	-0.021	0.020
Some post-secondary education	0.127	0.140	0.107	0.139	0.106	0.139	0.108	0.139	0.103	0.139	0.021	0.028
College diploma or some university	0.095	0.092	0.084	0.092	0.082	0.092	0.085	0.093	0.082	0.093	0.017	0.019
Master's degree or above	-0.066	0.096	-0.047	0.097	-0.044	0.097	-0.048	0.097	-0.047	0.097	-0.01	0.020
Currently in school	-0.778***	0.082	-0.796***	0.083	-0.793***	0.083	-0.788***	0.083	-0.796***	0.083	-0.181***	0.020
Language Proficiency												
English	0.041	0.090	0.006	0.091	0.005	0.091	0.006	0.091	0.005	0.091	0.001	0.019
French	-0.125	0.126	-0.158	0.127	-0.16	0.127	-0.158	0.127	-0.163	0.127	-0.035	0.027
Experience												
Had work experience before landing	0.387***	0.088	0.343***	0.088	0.344***	0.088	0.342***	0.088	0.342***	0.088	0.073***	0.019
Number of weeks in Canada after landing	-0.045***	0.009	-0.029***	0.009	-0.03***	0.009	-0.001	0.019	-0.03***	0.009	-0.006***	0.002
Number of weeks in Canada after landing[2]	0.044***	0.007	0.031***	0.007	0.031***	0.007	0.015	0.012	0.032***	0.007	0.007***	0.001
Had an arranged job upon landing	1.58***	0.232	1.55***	0.230	1.567***	0.230	1.577***	0.232	1.573***	0.232	0.225***	0.019
Visited Canada before landing	0.149	0.103	0.098	0.104	0.098	0.104	0.104	0.104	0.103	0.104	0.021	0.021
Worked in Canada before landing	0.217	0.248	0.224	0.251	0.23	0.248	0.23	0.248	0.224	0.248	0.044	0.047
Studied in Canada before landing	0.135	0.190	0.062	0.190	0.07	0.190	0.078	0.191	0.078	0.190	0.016	0.038

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(Table A.6 continued)

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)											
	Models											
Independent variables	**Model F.1** No social capital		**Model F.2** All social capital indicators		**Model F.3** Kinship and friendship indicators		**Model F.4** Social capital and time effects		**Model F.5** Final specification		**Marginal Effects** Final specification	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx[1]	Std. Err.
Social networks												
_Family and relatives												
Spouse currently employed	0.079	0.067	0.125*	0.069	0.125*	0.069	0.148**	0.072	0.125*	0.068	0.026*	0.014
Number of relatives in Canada			0.075	0.050	0.073	0.050						
Relatives living nearby upon landing			0.169*	0.095	0.169*	0.095	0.254***	0.075	0.255***	0.074	0.053***	0.016
Frequency of contact with family sponsors			0.012	0.117	0.014	0.117						
_Friends												
Friends living nearby upon landing			0.283***	0.069	0.276***	0.068	0.278***	0.069	0.279***	0.068	0.057***	0.014
Number of sources meeting friends			-0.148***	0.021	-0.143***	0.020	-0.136***	0.020	-0.142***	0.020	-0.03***	0.004
Ethnic diversity of friends			0.454***	0.118	0.455***	0.118	0.457***	0.117	0.458***	0.117	0.095***	0.024
Frequency of contact with friends			0.499***	0.130	0.487***	0.129	0.463***	0.130	0.484***	0.129	0.101***	0.027
_Groups and organizational network												
Number of organizations participated in			0.144	0.127								
Ethnic diversity of organizational network			0.129	1.860								
Frequency of activity with organizations			-0.234	0.185								
Volunteered time for organizations			-0.047	0.122								
Wave2							-0.569	0.410				
Wave3							-0.462	0.455				
_cons	1.213**	0.501	0.277	0.538	0.304	0.536	-0.274	0.646	0.382	0.518		
No. of observations	7674		7674		7674		7674		7674		7674	
No. of groups	3201		3201		3201		3201		3201		3201	
Percent correctly predicted	0.711		0.719		0.720		0.719		0.720			

* p<0.1; ** p<0.05; *** p<0.01.

[1] Marginal effects for dummy variables are for discrete change from 0 to 1.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table A.7: GEE population-averaged estimations of employment likelihood of male immigrants in the initial 4 years in Canada with interaction effects

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)									
	Models									
	Model M.int.1		Model M.int.2		Model M.int.3		Model M.int.4		Model M.int.5	
Independent variables	Time effect interactions		Immigration category interactions		Ethnic group interactions		Education interactions		Official language interactions	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Immigration category [family]										
Skilled Workers (PA)	-0.443***	0.131	-0.821***	0.191	-0.429***	0.131	-0.421***	0.130	-0.432***	0.131
Skilled Workers (S&D)	-0.678***	0.135	-1.04***	0.236	-0.649***	0.135	-0.636***	0.135	-0.655***	0.135
Refugees	-0.515***	0.149	-0.607***	0.230	-0.49***	0.150	-0.477***	0.149	-0.496***	0.149
Others	-0.335**	0.162	-0.506*	0.262	-0.324**	0.162	-0.305*	0.161	-0.318**	0.161
Demographic variables										
Age	0.116***	0.023	0.12***	0.023	0.118***	0.023	0.115***	0.023	0.117***	0.023
Age^2	-0.179***	0.027	-0.184***	0.027	-0.179***	0.028	-0.177***	0.027	-0.179***	0.027
Married	0.019	0.098	0.024	0.098	0.03	0.098	0.023	0.098	0.025	0.098
Number of children	0.111*	0.057	0.109*	0.057	0.108*	0.058	0.113**	0.057	0.111*	0.057
Number of children in school age	-0.181***	0.063	-0.178***	0.063	-0.18***	0.063	-0.181***	0.063	-0.181***	0.063
Number of preschool children	-0.068	0.086	-0.055	0.086	-0.065	0.086	-0.06	0.086	-0.061	0.086
Province of residence [Ontario]										
Atlantic Provinces	0.141	0.366	0.145	0.369	0.181	0.372	0.139	0.365	0.153	0.366
Quebec	-0.782***	0.128	-0.774***	0.128	-0.77***	0.128	-0.772***	0.128	-0.771***	0.129
Manitoba and Saskatchewan	0.212	0.232	0.209	0.233	0.209	0.232	0.22	0.232	0.211	0.232
Alberta	0.24**	0.109	0.241**	0.109	0.229**	0.109	0.247**	0.109	0.248**	0.109
BC	-0.204**	0.087	-0.214**	0.087	-0.211**	0.087	-0.21**	0.087	-0.207**	0.087
Census metropolitan areas (CMAs)										
Not in the Big 5 CMAs	-0.065	0.087	-0.067	0.086	-0.064	0.087	-0.065	0.087	-0.065	0.086
Region of birth [North America, UK and Western Europe]										
Asia and Pacific	-0.217	0.273	-0.215	0.272	-0.244	0.270	-0.223	0.271	-0.224	0.271
Central and South America	0.076	0.282	0.084	0.283	0.012	0.277	0.075	0.279	0.075	0.280
Europe except UK and Western Europe	-0.082	0.196	-0.081	0.197	-0.087	0.198	-0.083	0.196	-0.089	0.196
Africa and Middle-East	-0.334	0.229	-0.332	0.229	-0.342	0.228	-0.335	0.228	-0.339	0.228
Population group [White]										
Chinese	-0.683***	0.220	-0.68***	0.219	-0.806***	0.272	-0.677***	0.220	-0.68***	0.219
South Asian	0.039	0.217	0.012	0.217	0.157	0.272	0.036	0.217	0.041	0.217
Black	-0.29	0.217	-0.29	0.218	0.263	0.331	-0.293	0.216	-0.289	0.217
Filipino	0.594**	0.258	0.582**	0.256	1.319***	0.401	0.593**	0.257	0.59**	0.257
Latin	-0.299	0.288	-0.309	0.288	-0.6	0.455	-0.306	0.285	-0.302	0.286
West Asian and Arab	-0.49***	0.187	-0.506***	0.187	-0.501*	0.262	-0.499***	0.187	-0.495***	0.187
Other Asian	-0.749***	0.248	-0.749***	0.247	-0.211	0.356	-0.742***	0.248	-0.748***	0.247
Other Visible Minority	-0.25	0.323	-0.248	0.321	0.037	0.571	-0.246	0.321	-0.244	0.321
Education [Bachelor's Degree]										
High school diploma or less	-0.238**	0.115	-0.276**	0.115	-0.232**	0.116	-0.118	0.176	-0.246**	0.115
Some post-secondary education	0.136	0.157	0.122	0.157	0.141	0.158	0.062	0.272	0.129	0.157
College diploma or some university	-0.056	0.105	-0.058	0.104	-0.04	0.105	-0.073	0.197	-0.056	0.104
Master's degree or above	-0.081	0.086	-0.078	0.086	-0.076	0.086	-0.095	0.169	-0.082	0.086
Currently in school	-0.83***	0.075	-0.84***	0.075	-0.84***	0.075	-0.842***	0.075	-0.84***	0.075
Language Proficiency										
English	0.171*	0.098	0.216**	0.100	0.174*	0.099	0.189*	0.099	0.199	0.157
French	-0.12	0.126	-0.128	0.126	-0.137	0.126	-0.126	0.126	-0.153	0.190
Experience										
Had work experience before landing	0.393***	0.117	0.377***	0.116	0.375***	0.117	0.377***	0.116	0.381***	0.117
Number of weeks in Canada after landing	0.035**	0.017	0	0.008	0.001	0.008	0	0.008	0.001	0.008
Number of weeks in Canada after landing^2	-0.019*	0.011	0.009	0.007	0.009	0.007	0.009	0.007	0.009	0.007
Had an arranged job upon landing	1.413***	0.188	1.394***	0.188	1.415***	0.189	1.395***	0.188	1.403***	0.188
Visited Canada before landing	0.192*	0.105	0.195*	0.105	0.195*	0.105	0.191*	0.105	0.188*	0.105
Worked in Canada before landing	0.286	0.250	0.279	0.250	0.268	0.251	0.286	0.250	0.283	0.249
Studied in Canada before landing	0.369*	0.194	0.349*	0.195	0.36*	0.196	0.364*	0.195	0.369*	0.196

(continued on next page)

(Table A.7 continued)

Sample coverage: Male immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)									
	Models									
Independent variables	**Model M.int.1** Time effect interactions		**Model M.int.2** Immigration category interactions		**Model M.int.3** Ethnic group interactions		**Model M.int.4** Education interactions		**Model M.int.5** Official language interactions	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Social networks										
Spouse currently employed	0.392***	0.073	0.376***	0.073	0.37***	0.073	0.373***	0.073	0.372***	0.073
Relatives living nearby upon landing	0.183**	0.075	0.183**	0.076	0.18**	0.076	0.182**	0.075	0.183**	0.076
Number of sources meeting friends	-0.081***	0.019	-0.095***	0.018	-0.098***	0.018	-0.097***	0.018	-0.097***	0.018
Ethnic diversity of friends	0.584***	0.175	-0.334	0.281	0.448**	0.219	0.332*	0.192	0.323	0.324
Frequency of contact with friends	0.145	0.130	0.312**	0.131	0.267**	0.130	0.269**	0.128	0.256**	0.129
Time effects										
Wave2	-0.055	0.395								
Wave3	0.437	0.431								
Interactions										
Wave2 * Ethnic diversity of friends	-0.355	0.242								
Wave3 * Ethnic diversity of friends	-0.526**	0.243								
SWPA * Ethnic diversity of friends			0.831***	0.317						
SWSD * Ethnic diversity of friends			0.824**	0.407						
Refugees * Ethnic diversity of friends			0.342	0.382						
Others * Ethnic diversity of friends			0.447	0.466						
Chinese * Ethnic diversity of friends					0.426	0.372				
South Asian * Ethnic diversity of friends					-0.194	0.328				
Black * Ethnic diversity of friends					-0.955**	0.461				
Filipino * Ethnic diversity of friends					-1.521**	0.653				
Latin * Ethnic diversity of friends					0.639	0.658				
West Asian and Arab * Ethnic diversity of friends					0.018	0.341				
Other Asian * Ethnic diversity of friends					-1.021**	0.504				
Other Visible Minority * Ethnic diversity of friends					-0.571	1.091				
High school diploma or less * Ethnic diversity of friends							-0.286	0.289		
Some post-secondary education * Ethnic diversity of friends							0.139	0.525		
College diploma or some university * Ethnic diversity of friends							0.03	0.341		
Master's degree or above * Ethnic diversity of friends							0.027	0.315		
English * Ethnic diversity of friends									-0.055	0.321
French * Ethnic diversity of friends									0.05	0.259
_cons	-1.611**	0.624	-0.659	0.520	-0.927*	0.544	-0.831	0.521	-0.834	0.524
No. of observations	9843		9843		9843		9843		9843	
No. of groups	3659		3659		3659		3659		3659	
Percent correctly predicted	0.792		0.789		0.789		0.789		0.788	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table A.8: GEE population-averaged estimations of employment likelihood of female immigrants in the initial 4 years in Canada with interaction effects

Sample coverage: Female immigrants who participated in the labour force.

Dependent variable	em (conditional on the participation in the labour force)									
	Models									
	Model F.int.1		Model F.int.2		Model F.int.3		Model F.int.4		Model F.int.5	
Independent variables	Time effect interactions		Immigration category interactions		Ethnic group interactions		Education interactions		Official language interactions	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Immigration category [family]										
Skilled Workers (PA)	0.322***	0.122	0.04	0.199	0.324***	0.121	0.331***	0.121	0.33***	0.121
Skilled Workers (S&D)	0.07	0.100	-0.121	0.157	0.078	0.101	0.081	0.100	0.084	0.099
Refugees	-0.223	0.147	-0.402*	0.215	-0.212	0.145	-0.223	0.146	-0.211	0.145
Others	-0.117	0.142	-0.485*	0.251	-0.112	0.143	-0.117	0.142	-0.112	0.141
Demographic variables										
Age	0.047**	0.024	0.051**	0.024	0.049**	0.024	0.05**	0.024	0.05**	0.024
Age^2	-0.087***	0.030	-0.093***	0.030	-0.09***	0.030	-0.091***	0.029	-0.092***	0.029
Married	-0.018	0.105	-0.01	0.104	-0.022	0.104	-0.019	0.104	-0.022	0.104
Number of children	0.04	0.056	0.041	0.056	0.04	0.056	0.041	0.055	0.038	0.055
Number of children in school age	-0.144**	0.062	-0.142**	0.062	-0.145**	0.062	-0.145**	0.062	-0.142**	0.062
Number of preschool children	-0.83***	0.084	-0.837***	0.083	-0.834***	0.083	-0.835***	0.083	-0.831***	0.083
Province of residence [Ontario]										
Atlantic Provinces	-0.558	0.364	-0.597*	0.358	-0.619*	0.351	-0.582*	0.351	-0.575	0.354
Quebec	-0.434***	0.131	-0.423***	0.130	-0.438***	0.131	-0.418***	0.131	-0.416***	0.131
Manitoba and Saskatchewan	0.386	0.242	0.38	0.243	0.395	0.241	0.399	0.243	0.396	0.243
Alberta	0.262***	0.100	0.245**	0.100	0.248**	0.100	0.252**	0.100	0.252**	0.100
BC	-0.043	0.083	-0.052	0.083	-0.04	0.083	-0.043	0.083	-0.04	0.083
Census metropolitan areas (CMAs)										
Not in the Big 5 CMAs	-0.018	0.083	-0.023	0.083	-0.005	0.083	-0.015	0.083	-0.014	0.083
Region of birth [North America, UK and Western Europe]										
Asia and Pacific	-0.594**	0.271	-0.583**	0.270	-0.629**	0.270	-0.609**	0.270	-0.618**	0.270
Central and South America	-0.552**	0.260	-0.516**	0.258	-0.621**	0.255	-0.577**	0.257	-0.58**	0.257
Europe except UK and Western Europe	-0.465**	0.202	-0.463**	0.200	-0.502**	0.200	-0.477**	0.200	-0.488**	0.200
Africa and Middle-East	-0.891***	0.235	-0.895***	0.234	-0.915***	0.232	-0.915***	0.234	-0.927***	0.234
Population group [White]										
Chinese	-0.114	0.216	-0.114	0.215	-0.236	0.279	-0.115	0.214	-0.112	0.215
South Asian	0.088	0.214	0.072	0.213	-0.004	0.263	0.096	0.212	0.098	0.212
Black	0.401*	0.213	0.403*	0.212	0.787**	0.310	0.412*	0.213	0.405*	0.212
Filipino	0.963***	0.250	0.978***	0.249	0.419	0.372	0.98***	0.249	0.986***	0.249
Latin	0.165	0.264	0.134	0.263	0.113	0.503	0.177	0.263	0.178	0.262
West Asian and Arab	-0.059	0.197	-0.054	0.196	-0.302	0.275	-0.057	0.197	-0.051	0.196
Other Asian	-0.134	0.242	-0.137	0.241	0.01	0.336	-0.137	0.240	-0.13	0.241
Other Visible Minority	-0.021	0.290	0.016	0.286	-0.784	0.538	0.011	0.288	0.008	0.288
Education [Bachelor's Degree]										
High school diploma or less	-0.104	0.094	-0.112	0.094	-0.097	0.094	-0.038	0.147	-0.102	0.094
Some post-secondary education	0.113	0.140	0.107	0.138	0.106	0.140	0.138	0.251	0.101	0.139
College diploma or some university	0.089	0.093	0.084	0.093	0.087	0.093	0.173	0.170	0.082	0.092
Master's degree or above	-0.044	0.097	-0.046	0.097	-0.043	0.097	0.179	0.187	-0.045	0.097
Currently in school	-0.784***	0.083	-0.789***	0.083	-0.797***	0.083	-0.796***	0.083	-0.799***	0.083
Language Proficiency										
English	0.008	0.091	0.019	0.091	0.007	0.092	0.002	0.091	-0.109	0.140
French	-0.159	0.127	-0.167	0.126	-0.155	0.126	-0.16	0.127	0.002	0.194
Experience										
Had work experience before landing	0.35***	0.088	0.349***	0.088	0.336***	0.089	0.34***	0.088	0.343***	0.088
Number of weeks in Canada after landing	0.001	0.019	-0.03***	0.009	-0.03***	0.009	-0.03***	0.009	-0.03***	0.009
Number of weeks in Canada after landing^2	0.013	0.012	0.031***	0.007	0.031***	0.007	0.032***	0.007	0.031***	0.007
Had an arranged job upon landing	1.596***	0.235	1.57***	0.233	1.572***	0.232	1.573***	0.232	1.576***	0.232
Visited Canada before landing	0.097	0.105	0.11	0.104	0.102	0.104	0.11	0.105	0.101	0.104
Worked in Canada before landing	0.23	0.247	0.225	0.249	0.216	0.247	0.231	0.249	0.218	0.249
Studied in Canada before landing	0.075	0.192	0.061	0.192	0.087	0.190	0.071	0.191	0.068	0.190

(continued on next page)

(Table A.8 continued)

Sample coverage: Female immigrants who participated in the labour force.										
Dependent variable	em (conditional on the participation in the labour force)									
Social networks										
Spouse currently employed	0.145**	0.072	0.12*	0.069	0.13*	0.069	0.125*	0.069	0.127*	0.068
Relatives living nearby upon landing	0.255***	0.075	0.257***	0.074	0.252***	0.075	0.253***	0.075	0.254***	0.074
Friends living nearby upon landing	0.279***	0.069	0.281***	0.068	0.283***	0.069	0.277***	0.069	0.278***	0.068
Number of sources meeting friends	-0.134***	0.020	-0.141***	0.020	-0.143***	0.020	-0.142***	0.020	-0.141***	0.020
Ethnic diversity of friends	-0.094	0.193	0.12	0.206	0.303	0.204	0.612***	0.189	0.263	0.303
Frequency of contact with friends	0.543***	0.133	0.515***	0.130	0.482***	0.130	0.483***	0.129	0.487***	0.130
Time effects										
Wave2	-1.006**	0.424								
Wave3	-0.827*	0.466								
Interactions										
Wave2 * Ethnic diversity of friends	0.89***	0.252								
Wave3 * Ethnic diversity of friends	0.731***	0.246								
SWPA * Ethnic diversity of friends			0.597*	0.323						
SWSD * Ethnic diversity of friends			0.437*	0.263						
Refugees * Ethnic diversity of friends			0.427	0.359						
Others * Ethnic diversity of friends			0.85*	0.462						
Chinese * Ethnic diversity of friends					0.249	0.377				
South Asian * Ethnic diversity of friends					0.183	0.288				
Black * Ethnic diversity of friends					-0.664	0.439				
Filipino * Ethnic diversity of friends					1.301*	0.680				
Latin * Ethnic diversity of friends					0.165	0.654				
West Asian and Arab * Ethnic diversity of friends					0.455	0.378				
Other Asian * Ethnic diversity of friends					-0.329	0.497				
Other Visible Minority * Ethnic diversity of friends					1.559*	0.864				
High school diploma or less * Ethnic diversity of friends							-0.132	0.269		
Some post-secondary education * Ethnic diversity of friends							-0.08	0.443		
College diploma or some university * Ethnic diversity of friends							-0.197	0.303		
Master's degree or above * Ethnic diversity of friends							-0.473	0.328		
English * Ethnic diversity of friends									0.307	0.299
French * Ethnic diversity of friends									-0.3	0.262
_cons	-0.152	0.648	0.459	0.521	0.497	0.537	0.312	0.523	0.431	0.521
No. of observations	7674		7674		7674		7674		7674	
No. of groups	3201		3201		3201		3201		3201	
Percent correctly predicted	0.720		0.721		0.722		0.720		0.721	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are in brackets.

Data source: Longitudinal survey of immigrants to Canada (2005).

Appendix B (Chapter 4)

Log likelihood test of panel-level variance component in the random effects model

Assuming that the unobserved individual effects z_i in the general model are unrelated to the observed explanatory variables x_{it}: Cov (x_{it}, z_i) = 0, t = 1, 2, ..., T, so that the conditional distribution $f(z_i | x_{it})$ is independent on x_{it}, I get the random effects model:

$$y_{it}^{*} = x'_{it}\beta + v_{it}, \quad i = 1,\ldots, n; t = 1,\ldots, T_i.$$

$$E(v_{it} | x_{it}) = 0,$$

where $v_{it} = z_i + \varepsilon_{it}$,

$$y_{it} = \begin{cases} 1 & if \quad y_{it}^{*} > 0 \\ 0 & otherwise \end{cases}$$

and ε_{it} are iid logistic distributed with mean zero and variance $\sigma_{\varepsilon}^2 = \pi^2/3$, independently of z_i.

The proportion of the total variance contributed by the panel-level (i.e. subject level) variance component is $\rho = \frac{\sigma_z^2}{\sigma_z^2 + \sigma_{\varepsilon}^2}$. When ρ is zero, the panel-level variance component is unimportant, and the panel estimator is not different from the pooled estimator. A likelihood-ratio test of the null hypothesis that ρ equals zero compares the pooled estimator with the random effects estimator. In our analysis, a likelihood ratio test of this is included at the bottom of the Stata output of the random effects estimation (e.g. see following output for the random estimation of the employment probability of male immigrants):

```
> /*Random-effects logit regression*/
> xtlogit em swpa swsd refugee other
>              age agesq married nkid nkid4_14 nykid
>              Atlantic Quebec Prairies BC noncma
>              bregion1 bregion3-bregion5
>              min1-min8
>              ed1-ed3 ed5 insch
>              Eng Fre
>              prework  lengthca lengthsq
>              jobarranged visitbf workbf studybf
>              spwkcur spwage relative nr rlnear fsdensity
>              friend frnear newfri nfoutwk frdiv frdensity
>              pgo ngo godiv godensity govo
>              if male==1 & lf==1, i(id) re;
```

```
Random-effects logistic regression              Number of obs      =      7632
Group variable (i): id                          Number of groups   =      4239

Random effects u_i ~ Gaussian                   Obs per group: min =         1
                                                               avg =       1.8
                                                               max =         2

                                                Wald chi2(58)      =    831.86
Log likelihood  = -3839.4768                    Prob > chi2        =    0.0000
```

em	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
swpa	-.1475564	.1960424	-0.75	0.452	-.5317926	.2366797
swsd	-.3746873	.2039548	-1.84	0.066	-.7744313	.0250567
refugee	-.8966477	.199611	-4.49	0.000	-1.287878	-.5054172
other	.0392413	.2225304	0.18	0.860	-.3969102	.4753928
age	.133618	.0283932	4.71	0.000	.0779684	.1892677
agesq	-.2100867	.0344855	-6.09	0.000	-.2776769	-.1424964
married	-.0579413	.1197569	-0.48	0.629	-.2926605	.1767778
nkid	.0307523	.0682012	0.45	0.652	-.1029196	.1644242
nkid4_14	-.1334155	.0772561	-1.73	0.084	-.2848346	.0180037
nykid	-.0653268	.1039146	-0.63	0.530	-.2689957	.1383421
Atlantic	-.2547173	.4284288	-0.59	0.552	-1.094422	.5849877
Quebec	-1.00029	.1457717	-6.86	0.000	-1.285998	-.7145831
Prairies	.2874948	.1151471	2.50	0.013	.0618107	.5131789
BC	-.3100151	.1035028	-3.00	0.003	-.5128768	-.1071534
cma7	.4066035	.1910132	2.13	0.033	.0322246	.7809824
bregion1	-.2648533	.2925672	-0.91	0.365	-.8382744	.3085678
bregion3	.0995336	.305917	0.33	0.745	-.5000527	.69912
bregion4	-.3280924	.228842	-1.43	0.152	-.7766145	.1204298
bregion5	-.702198	.244845	-2.87	0.004	-1.182085	-.2223106
min1	-.9100354	.2500677	-3.64	0.000	-1.400159	-.4199117
min2	.0407751	.2390026	0.17	0.865	-.4276613	.5092115
min3	-.1819008	.2183392	-0.83	0.405	-.6098377	.2460361
min4	.6222302	.2898216	2.15	0.032	.0541902	1.19027
min5	-.5215466	.3444505	-1.51	0.130	-1.196657	.1535639
min6	-.2768887	.1967725	-1.41	0.159	-.6625557	.1087783
min7	-.8182016	.2831731	-2.89	0.004	-1.373211	-.2631926
min8	-.065734	.3900471	-0.17	0.866	-.8302123	.6987443
ed1	.1318664	.1350965	0.98	0.329	-.1329179	.3966507
ed2	.1330504	.1757951	0.76	0.449	-.2115017	.4776025
ed3	-.0327392	.1278272	-0.26	0.798	-.2832758	.2177974
ed5	-.0111976	.0995632	-0.11	0.910	-.2063379	.1839427
insch	-1.140078	.0864846	-13.18	0.000	-1.309585	-.9705717
Eng	.1298138	.115577	1.12	0.261	-.0967131	.3563406
Fre	.0156922	.1419002	0.11	0.912	-.2624271	.2938114
prework	.4016835	.1404277	2.86	0.004	.1264502	.6769167
lengthca	.1853822	.0685596	2.70	0.007	.0510079	.3197565
lengthsq	-.5139186	.2567438	-2.00	0.045	-1.017127	-.01071
jobarranged	1.743389	.2073841	8.41	0.000	1.336924	2.149855
visitbf	-.0391938	.1179006	-0.33	0.740	-.2702747	.191887
workbf	.2173325	.2750612	0.79	0.429	-.3217776	.7564426
studybf	.649554	.2066795	3.14	0.002	.2444696	1.054638
spwkcur	.7706661	.1185297	6.50	0.000	.5383523	1.00298
spwage	-.0003937	.0002214	-1.78	0.075	-.0008277	.0000402
relative	-.1288294	.2097851	-0.61	0.539	-.5400005	.2823418
nr	-.0072518	.0648803	-0.11	0.911	-.1344149	.1199113
rlnear	.275572	.198389	1.39	0.165	-.1132632	.6644072
fsdensity	.3784671	.1665552	2.27	0.023	.0520248	.7049094
friend	-.1587796	.1272786	-1.25	0.212	-.408241	.0906818
frnear	.2339187	.1186878	1.97	0.049	.001295	.4665425
newfri	.1444655	.1722342	0.84	0.402	-.1931073	.4820382
nfoutwk	-.1062178	.0265518	-4.00	0.000	-.1582584	-.0541771
frdiv	.3795836	.1718096	2.21	0.027	.0428428	.7163243
frdensity	.1736812	.1589156	1.09	0.274	-.1377877	.4851501
pgo	.2223838	.2611897	0.85	0.395	-.2895385	.7343062
ngo	.0097016	.1699385	0.06	0.954	-.3233718	.3427749
godiv	1.358319	2.41174	0.56	0.573	-3.368604	6.085243
godensity	-.5040376	.3178618	-1.59	0.113	-1.127035	.1189601
govo	-.0037153	.1373188	-0.03	0.978	-.2728551	.2654246
_cons	-1.991571	.6896534	-2.89	0.004	-3.343267	-.6398755
/lnsig2u	.2068822	.1191101			-.0265693	.4403338
sigma_u	1.10898	.0660454			.9868032	1.246285
rho	.2721057	.0235915			.2283914	.3207094

```
Likelihood-ratio test of rho=0: chibar2(01) =    87.23 Prob >= chibar2 = 0.000
```

We can think of rho (ρ) as being the (analogous) equivalent of the intra-cluster correlation (icc) in a multilevel model. Therefore when ρ is zero the panel model is not a significant improvement on the pooled one. Here, the p value of the likelihood-ratio test of $\rho = 0$ tells us that the null hypothesis is rejected and there exists unobserved heterogeneity so that panel data model is favoured over the pooled estimator.

Appendix C (Chapter 5)

Table C.1. Definitions of Social Capital and Wages Outcomes Estimation Variables

Dependent variable	
Log of real weekly wage	Log of real weekly wage of current job(s)
Independent variables	
Immigration category	
Family	1 if LR is in Family class, 0 otherwise. (Reference category)
Skilled Workers (PA)	1 if LR landed as a Skilled Worker principal applicant, 0 otherwise
Skilled Workers (S&D)	1 if LR landed as a Skilled Worker spouse and dependant, 0 otherwise
Refugees	1 if LR landed as a Refugee, 0 otherwise
Others	1 if LR landed in a immigration category other than Family Class, Skilled Workers (principal applicants and spouses and dependants) and Refugees, which mostly consists of business immigrants in economic class.
Demographic variables	
Age	Age in years
Age Square	Age square/100
Married	1 if LR is married or living with a common-law partner, 0 if LR is single, separated or divorced, or widowed
Province of residence	
Atlantic Provinces	1 if LR is living in Atlantic provinces: New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador, 0 otherwise.
Quebec	1 if LR is living in Quebec, 0 otherwise.
Ontario	1if LR is living in Ontario, 0 otherwise. (Reference category)
Manitoba and Saskatchewan	1 if LR is living in Saskatchewan or Manitoba, 0 otherwise.
Alberta	1 if LR is living in Alberta, 0 otherwise.
BC	1 if LR is living in British Columbia, 0 otherwise.
Census metropolitan areas (CMAs)	
Toronto	1 if LR is living in Toronto, 0 otherwise.
Montreal	1 if LR is living in Montreal, 0 otherwise.
Vancouver	1 if LR is living in Vancouver, 0 otherwise.
Ottawa-Hull	1 if LR is living in Ottawa-Hull, 0 otherwise.
Calgary	1 if LR is living in Calgary, 0 otherwise.
Not in the Big 5 CMAs	1 if LR is living in an area other than the big 5 CMAs, 0 otherwise.
Region of birth	
Asia and Pacific	1 if region of birth is Asia and Pacific, 0 otherwise.
North America, UK and Western Europe	1 if region of birth is North America, UK and Western Europe, 0 otherwise. (Reference category)
Central and South America	1 if region of birth is Central America and South America, 0 otherwise.
Europe except UK and Western Europe	1 if region of birth is Europe except UK and Western Europe, 0 otherwise.
Africa and Middle-East	1 if region of birth is Africa and Middle-East, 0 otherwise.
Population group	
White	1 if LR is white, 0 otherwise. (Reference category)
Chinese	1 if LR is Chinese, 0 otherwise.
South Asian	1 if LR is South Asian, 0 otherwise.
Black	1 if LR is Black, 0 otherwise.
Filipino	1 if LR is Filipino, 0 otherwise.
Latin	1 if LR is Latin, 0 otherwise.
West Asian and Arab	1 if LR is West Asian and Arab, 0 otherwise.
Other Asian	1 if LR is other Asian---South East Asian, Korean, Japanese, 0 otherwise.
Other Visible Minority	1 if LR is other visible minority---Visible minority n.i.e., Multiple visible minorities, White and visible minority, 0 otherwise.
Languages	
English	1 if LR has the knowledge of English (speaking fairly well or better), 0 otherwise (poorly or none).
French	1 if LR has the knowledge of French (speaking fairly well or better), 0 otherwise (poorly or none).

Table C.1. Definitions of Social Capital and Wages Outcomes Estimation Variables (Cont'd)

Education	
High school diploma or less	1 if LR has a master's degree or above, 0 otherwise.
Some post-secondary education	1 if LR has a bachelor's degree, 0 otherwise. (Reference category)
College diploma or some university	1 if LR has a college diploma or some university education, 0 otherwise.
Bachelor's Degree	1 if LR has some post-secondary education, 0 otherwise.
Master's degree or above	1 if LR has less than high school education or a high school diploma, 0 otherwise.
Currently in school	1 if LR is in school at the time of the interview, 0 otherwise
Experience	
Had work experience before landing	1 if LR had work experience before landing, 0 otherwise
Number of weeks in Canada after landing	Number of weeks in Canada
Number of weeks in Canada after landing^2	(Number of weeks in Canada) square/100
Had an arranged job upon landing	1 if LR had an arranged job when landing, 0 otherwise
Visited Canada before landing	1 if LR visited relatives or friends in Canada or visited Canada as a tourist before landing, 0 otherwise
Worked in Canada before landing	1 if LR worked in Canada before landing, 0 otherwise
Studied in Canada before landing	1 if LR studied in Canada before landing, 0 otherwise
Number of current jobs	Total number of current jobs
Hours worked per week	Hours currently worked per week
Weeks in employment	Number of weeks at work since landing
Skill level	Skill level of current main job: 1=O or A (i.e. management level is treated as skill level A), 2=B, 3=C, and 4=D.
Occupation group	
Management	1 if the current main job is in the Management Occupations, 0 otherwise
Business and Finance	1 if the current main job is in the Business, Finance and Administrative Occupations
Natural and Applied Sciences	1 if the current main job is in the Natural and Applied Sciences and Related Occupations, 0 otherwise
Health	1 if the current main job is in the Health Occupations, 0 otherwise
Social Science	1 if the current main job is in the Occupations in Social Science, Education, Government Service and Religion, 0 otherwise
Art, Culture and Recreation	1 if the current main job is in the Occupations in Art, Culture, Recreation and Sport, 0 otherwise
Sales and Services	1 if the current main job is in the Sales and Service Occupations, 0 otherwise
Trades, Transport and Equipment Operators	1 if the current main job is in the Trades, Transport and Equipment Operators and Related Occupations, 0 otherwise
Primary Industry	1 if the current main job is in the Occupations Unique to Primary Industry, 0 otherwise
Processing Manufacturing and Utilities	1 if the current main job is in the Occupations Unique to Processing Manufacturing and Utilities, 0 otherwise
Social capital	
_Channels through which current main job was found	
Job found through family ties	1 if the current main job was found through family members or relatives, 0 otherwise.
Job found through coethnic friends	1 if the current main job was found through friends in the same ethnic group as the LR, 0 otherwise.
Job found through non-coethnic friends	1 if the current main job was found through friends in the ethnic group different than the LR, 0 otherwise.
_Relatives	
Number of relatives in Canada	Number of types of relatives (spouse, children, parents, grandparents, brothers or sisters, etc.) in Canada, ranging from 0 to 11.
Relatives living nearby upon landing	1 if most of the existing relatives upon landing were living in the same city or same province as LR, 0 otherwise.
Relatives living far upon landing	1 if most of the existing relatives upon landing were living in a place other than the city or province in which LR lived, 0 otherwise.

Table C.1. Definitions of Social Capital and Wages Outcomes Estimation Variables (Cont'd)

Frequency of contact with family sponsors	Frequency of contact with family sponsor (0~1) : 0--- No sponsor or having not seen or talked to sponsors since arriving; Between 0 and 1 --- Seeing or talking to sponsors in varied frequencies; the higher the index is, the more frequently LR contacts with sponsors. 1--- Seeing or talking to sponsors every day.
_Friends	
Friends living nearby upon landing	1 if most of the existing friends upon landing were living in the same city or same province as LR, 0 otherwise.
Friends living far upon landing	1 if most of the existing friends upon landing were living in a place other than the city or province in which LR lived, 0 otherwise.
Number of sources meeting friends	Number of sources meeting new friends, ranging from 0 to 14.
Ethnic diversity of friends	Ethnical diversity of friend network (0~1): 0--- No friends or all friends belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some friends belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the friend network. 1--- None of the friends belong to the same ethnic or cultural groups as LR.
Frequency of contact with friends	Frequency of contact with friends (0~1) : 0--- No friends or having not seen or talked to friends since arriving; Between 0 and 1 --- Seeing or talking to friends in varied frequencies; the higher the index is, the more frequently LR contacts with friends. 1--- Seeing or talking to friends every day.
Ethnic diversity of workplace network	Ethnic diversity of workplace network (0~1): 0--- All the people with whom LR worked belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some people with whom LR worked belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the friend network. 1--- None of the people with whom LR worked belong to the same ethnic or cultural groups as LR.
_Group and organizational network	
Participation in organization	1 if LR participated in any organization or group, 0 otherwise.
Time effect	
Wave 2	1 if the observation is in Wave 2 and 0 otherwise.
Wave 3	1 if the observation is in Wave 3 and 0 otherwise.
Instrumental variable	
Ethnic concentration ratio	The ethnic group concentration ratio in the CMA/CA where LR lived, derived from 2001 Census.

[1] LR: Longitudinal Respondent.

Table C.2. Survey means of variables in the estimations

	Males		Females	
	Weighted Mean	Standard Error	Weighted Mean	Standard Error
Real weekly wage	705.442	6.803	485.029	5.993
Log of weekly wage	6.352	0.009	5.963	0.011
Immigration category				
Family	0.204	0.005	0.290	0.007
Skilled Workers (PA)	0.593	0.007	0.239	0.007
Skilled Workers (S&D)	0.107	0.004	0.390	0.008
Refugees	0.050	0.002	0.041	0.003
Others	0.045	0.003	0.039	0.003
Demographic variables				
Age	36.078	0.126	34.388	0.149
Age^2	13.899	0.100	12.680	0.114
Married	0.788	0.006	0.787	0.007
Province and CMA of residence				
Atlantic Provinces	0.008	0.001	0.006	0.001
Quebec	0.130	0.005	0.119	0.005
Ontario	0.576	0.007	0.580	0.008
Manitoba and Saskatchewan	0.033	0.002	0.028	0.003
Alberta	0.107	0.004	0.102	0.004
BC	0.145	0.005	0.166	0.006
Toronto	0.459	0.007	0.471	0.008
Montreal	0.126	0.004	0.147	0.005
Vancouver	0.114	0.004	0.100	0.005
Ottawa-Hull	0.062	0.003	0.061	0.003
Calgary	0.032	0.002	0.030	0.003
Not in the Big 5 CMAs	0.208	0.005	0.192	0.006
Region of birth				
Asia and Pacific	0.603	0.007	0.618	0.008
North America, UK and Western Europe	0.057	0.003	0.061	0.004
Central and South America	0.063	0.003	0.072	0.004
Europe except UK and Western Europe	0.114	0.004	0.125	0.005
Africa and Middle-East	0.162	0.005	0.124	0.005
Ethnic group				
White	0.213	0.005	0.220	0.006
Chinese	0.176	0.005	0.215	0.007
South Asian	0.302	0.006	0.253	0.007
Black	0.055	0.003	0.047	0.003
Filipino	0.103	0.004	0.115	0.005
Latin	0.024	0.002	0.034	0.003
West Asian and Arab	0.085	0.004	0.066	0.004
Other Asian	0.030	0.002	0.034	0.003
Other Visible Minority	0.012	0.001	0.016	0.002
Education				
High school diploma or less	0.186	0.005	0.225	0.006
Some post-secondary education	0.063	0.003	0.051	0.003
College diploma or some university	0.114	0.004	0.173	0.006
Bachelor's degree	0.404	0.007	0.381	0.008
Master's degree or above	0.233	0.006	0.171	0.006
Currently in school	0.104	0.004	0.106	0.005

Table C.2. Survey means of variables in the estimations (Cont'd)

	Males		Females	
	Weighted Mean	Standard Error	Weighted Mean	Standard Error
Language ability				
English	0.916	0.004	0.862	0.005
French	0.147	0.005	0.143	0.006
Experience				
Had work experience before landing	0.898	0.004	0.781	0.007
Number of weeks in Canada after landing	138.501	1.220	146.614	1.442
Number of weeks in Canada after landing^2	272.339	3.521	295.574	4.198
Had an arranged job upon landing	0.111	0.004	0.054	0.004
Visited Canada before landing	0.156	0.005	0.162	0.006
Worked in Canada before landing	0.050	0.003	0.026	0.002
Studied in Canada before landing	0.043	0.003	0.043	0.003
Job characteristics				
Number of current jobs	1.064	0.003	1.080	0.005
Hours worked per week	41.046	0.162	36.003	0.234
Weeks in employment	100.573	0.966	92.404	1.089
Skill level	2.371	0.014	2.674	0.017
Occupation group				
Management	0.042	0.003	0.022	0.002
Business and Finance	0.104	0.004	0.208	0.007
Natural and Applied Sciences	0.220	0.006	0.088	0.005
Health	0.018	0.002	0.073	0.004
Social Science	0.052	0.003	0.068	0.004
Art, Culture and Recreation	0.007	0.001	0.013	0.002
Sales and Services	0.208	0.005	0.332	0.007
Trades, Transport and Equipment Operators	0.125	0.004	0.021	0.002
Primary Industry	0.015	0.001	0.019	0.002
Processing Manufacturing and Utilities	0.209	0.006	0.158	0.006
Channels through which current main job was found				
Job found through family ties	0.064	0.003	0.083	0.004
Job found through coethnic friends	0.165	0.005	0.171	0.006
Job found through non-coethnic friends	0.033	0.002	0.035	0.003
Social capital indicators				
Number of relatives in Canada	0.800	0.013	0.881	0.015
Relatives living nearby upon landing	0.487	0.007	0.549	0.008
Relatives living far upon landing	0.036	0.003	0.033	0.003
Frequency of contact with family sponsors	0.218	0.005	0.294	0.007
Number of sources meeting friends	2.772	0.022	2.727	0.027
Friends living nearby upon landing	0.512	0.007	0.483	0.008
Friends living far upon landing	0.112	0.004	0.091	0.005
Ethnic diversity of friends	0.495	0.004	0.494	0.005
Frequency of contact with friends	0.791	0.003	0.792	0.003
Ethnic diversity of workplace network	0.790	0.003	0.770	0.004
Participation in organization	0.298	0.006	0.286	0.007
Number of individuals	3014		2399	
Number of observations	6235		4448	

Data source: Longitudinal Survey of Immigrants to Canada (2005).

Table C.3.

Estimated effects of non-social capital and social capital variables on the log of real weekly wages

	Males				Females			
	Random effects	Fixed effects	Hausman -Taylor	Panel IV (EC2SLS)	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)
Immigration category								
Skilled Workers (PA)	0.100***		-0.204	0.063*	0.095***		-0.100	0.046
Skilled Workers (S&D)	0.020		-.324**	-0.005	0.010		-0.334	-0.042
Refugees	-.084**		-.534***	-.084**	-0.048		-0.342	-0.061
Others	-0.057		-.310***	-0.050	-0.061		-0.215	-0.063
Demographic variables								
Age	0.041***	0.069***	.082***	0.041***	0.037***	-0.030	0.020	0.043***
Age^2	-.051***	-.087***	-.102***	-.050***	-.052***	-0.023	-.033**	-.060***
Married	0.027	0.011	-0.001	0.017	0.013	-0.017	-0.009	0.005
Province and CMA of residence								
Atlantic Provinces	-.137*	-0.166	-.230**	-.142*	-.201**	-.542***	-.533***	-.238**
Quebec	-.316***	- 1.245***	-.593***	-.274***	-.113**	-.296*	-.281**	-.137*
Manitoba and Saskatchewan	-.167***	-0.108	-.173**	-.173***	-0.080	-.975***	-.701***	-.117*
Alberta	-0.027	0.061	-0.076	-0.044	-0.053	-.340**	-.262***	-0.057
BC	-0.061	-0.205	-.142*	-0.019	-0.039	-0.030	-0.043	-0.016
Toronto	0.008	0.019	0.020	-0.001	0.009	0.034	0.019	0.018
Montreal	0.061	0.021	0.061	0.034	0.020	0.002	0.002	0.050
Vancouver	0.184***	0.788***	0.419***	0.138**	0.067	0.311**	0.256***	0.082
Ottawa-Hull	0.046	-0.129	-0.049	0.065*	0.092**	0.445***	0.331***	0.082*
Calgary	-0.035	-0.039	0.021	-0.041	0.032	-0.189	-.176*	0.036
Region of birth								
Asia and Pacific	-.178***		-0.113	-.191***	0.006		-0.057	-0.017
Central and South America	-.122**		-0.177	-.144**	-0.034		-0.186	-0.041
Europe except UK and Western Europe	-.239***		-0.061	-.263***	-0.060		-0.066	-.120**
Africa and Middle-East	-.113**		-0.094	-.136**	-0.003		-0.039	-0.050
Ethnic group								
Chinese	-.181***		-.161*	-.189***	-.092*		0.009	-0.051
South Asian	-.071*		0.124	-.084*	-0.070		0.122	-0.091
Black	-.076*		0.062	-.109**	0.001		0.244	-0.103
Filipino	-.107**		0.140	-.139***	-0.037		0.151	-0.089
Latin	-0.104		0.096	-.127**	-0.010		0.142	-0.081
West Asian and Arab	-.170***		-0.065	-.160***	-.117**		-0.055	-.123**
Other Asian	-.154***		-.197*	-.158***	-.203***		-0.259	-.195***
Other Visible Minority	-.266***		-0.023	-.276***	0.013		0.250	-0.003
Education								
High school diploma or less	-.085***	0.189	0.116	-.075***	-.088***	0.093	0.026	-0.041
Some post-secondary education	-0.046	-0.006	-0.035	-0.037	-0.054	-0.031	-0.067	-0.039
College diploma or some university	-.071***	0.070	0.030	-.056**	-.063***	-0.042	-0.060	-0.039
Master's degree or above	0.016	-0.061	-0.076	0.008	0.031	-0.091	-0.091	0.015
Currently in school	-.088***	-.067***	-.069***	-.089***	-.075***	-.043*	-.047***	-.064***
Language ability								
English	0.027	0.063**	0.055**	0.005	-0.011	-0.014	-0.018	-0.028
French	-0.023	-0.024	-0.006	-0.037	0.005	-0.003	-0.003	-0.001
Experience								
Had work experience before landing	0.052*		0.077	0.040	0.070***		0.255**	0.061**
Number of weeks in Canada after landing	0.000	0.002***	0.002***	0.000	0.000	0.002***	0.001**	0.000
Number of weeks in Canada after landing2	0.000	-.000***	-.000***	0.000	0.000	-.000**	-.000*	0.000

Table C.3.

Estimated effects of non-social capital and social capital variables on the log of real weekly wages (Cont'd)

	Males				Females			
	Random effects	Fixed effects	Hausman -Taylor	Panel IV (EC2SLS)	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)
Had an arranged job upon landing	0.167***		0.139**	0.172***	0.148***		0.230	0.119**
Visited Canada before landing	0.105***		0.218***	0.110***	0.072***		0.171	0.066**
Worked in Canada before landing	0.195***		0.178**	0.189***	-0.013		0.078	0.028
Studied in Canada before landing	-0.002		-0.108	-0.003	0.023		-0.029	0.020
Job characteristics								
Number of current jobs	-.130***	-.063**	-.064***	-.141***	-.046**	0.025	0.027	-0.037
Hours worked per week	0.022***	0.019***	0.019***	0.022***	0.028***	0.023***	0.023***	0.028***
Weeks in employment	0.001***	-0.001	0.000	0.001***	0.001***	0.001*	0.001***	0.001***
Skill level	-.115***	-.088***	-.090***	-.122***	-.091***	-.084***	-.086***	-.087***
Occupation group								
Business and Finance	-0.047	0.019	0.019	-.068*	0.109**	0.050	0.059	0.094*
Natural and Applied Sciences	0.197***	0.181***	0.216***	0.160***	0.352***	0.201***	0.212***	0.328***
Health	0.177***	0.391***	0.310***	0.112*	0.257***	0.242***	0.257***	0.251***
Social Science	-.122***	-0.025	-0.047	-.161***	0.024	0.037	0.037	0.038
Art, Culture and Recreation	-.151**	0.093	0.019	-.200***	-.162**	-.713***	-.656***	-0.096
Sales and Services	-.205***	-.142***	-.147***	-.216***	-.112**	-0.097	-.092*	-0.090
Trades, Transport and Equipment Operators	-0.046	-0.002	0.005	-0.053	-.155**	-0.095	-0.088	-0.133
Primary Industry	-.091*	0.035	0.007	-.123**	-0.009	0.033	0.027	0.020
Processing Manufacturing and Utilities	0.037	0.117**	0.114***	0.010	0.021	0.080	0.088*	0.011
Channels through which current main job was found								
Job found through family ties	-0.007	0.030	0.029	-0.068	0.045**	0.069**	0.071***	0.151
Job found through coethnic friends	-0.018	0.010	0.009	-.219*	-0.017	0.005	0.004	-0.153
Job found through non-coethnic friends	0.005	0.037	0.040	-0.194	-0.040	-0.012	-0.015	-.638**
Social capital indicators								
Number of relatives in Canada	-0.004	-.097**	-.103***	-0.006	0.000	-.115*	-.119***	-0.013
Relatives living nearby upon landing	-0.017		-.520*	-0.007	-0.004		-0.444	0.017
Relatives living far upon landing	0.055		1.515*	0.044	0.038		1.642	0.051
Frequency of contact with family sponsors	0.040*	0.051	0.056**	0.026	0.020	0.033	0.031	0.010
Number of sources meeting friends	0.003	0.003	0.003	0.010	-.011**	-.010*	-.010***	-0.008
Friends living nearby upon landing	-0.008		-0.114	-0.007	0.028		0.046	0.024
Friends living far upon landing	0.050**		0.243	0.041	0.038		-1.359	0.036
Ethnic diversity of friends	0.021	0.028	0.025	-.327*	0.012	0.034	0.029	-.373*
Frequency of contact with friends	0.003	-0.021	-0.022	0.122*	0.013	0.031	0.034	0.175**
Ethnic diversity of workplace network	0.180***	0.130***	0.138***	0.600**	0.186***	0.142***	0.146***	0.957***
Participation in organization	0.007	0.023*	0.023*	0.084	0.017	0.003	0.003	0.210
_cons	4.926***	4.270***	4.377***	4.820***	4.356***	6.359***	5.148***	3.753***
No. of observations	6235	6235	6235	6235	4448	4448	4448	4448
No. of individuals	3014	3014	3014	3014	2399	2399	2399	2399
chi2	9088.07	5505.69	5863.97	5872.99	7446.83	4711.48	5370.115	5369.095
r2	0.510				0.543			
rho	0.527	0.764	0.858	0.397	0.427	0.830	0.979	0.378

* p<0.1; ** p<0.05; *** p<0.01.

Note: The Hausman-Taylor estimates assume the endogeneity of social capital variables, education, skill level, job tenure and working hours with unobserved heterogeneity.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table C.4. Estimates of interaction effects of social capital on the log of real weekly wages

	Male		Female	
	Coefficient	Standard Error	Coefficient	Standard Error
TVexogenous *				
Demographic variables				
Age	0.079***	0.010	0.017	0.012
Age^2	-0.098***	0.012	-0.029*	0.015
Married	0.000	0.021	-0.004	0.025
Province and CMA of residence				
Atlantic Provinces	-0.213**	0.104	-0.511***	0.118
Quebec	-0.73***	0.113	-0.255**	0.110
Manitoba and Saskatchewan	-0.164**	0.081	-0.685***	0.131
Alberta	-0.037	0.071	-0.25***	0.091
BC	-0.17**	0.084	-0.041	0.101
Toronto	0.02	0.042	0.027	0.051
Montreal	0.063	0.071	-0.001	0.081
Vancouver	0.524***	0.115	0.257***	0.094
Ottawa-Hull	-0.074	0.057	0.333***	0.098
Calgary	0.002	0.067	-0.158*	0.094
Education				
Currently in school	-0.067***	0.015	-0.042**	0.018
Language ability				
English	0.061***	0.023	0.001	0.025
French	-0.014	0.030	0.003	0.036
Experience				
Number of weeks in Canada after landing	0.002***	0.000	0.001***	0.000
Number of weeks in Canada after landing^2	0.000***	0.000	0.000**	0.000
Number of current jobs	-0.068***	0.020	0.028	0.021
Occupation group				
Business and Finance	0.014	0.038	0.064	0.047
Natural and Applied Sciences	0.195***	0.033	0.21***	0.053
Health	0.331***	0.068	0.254***	0.056
Social Science	-0.047	0.046	0.033	0.056
Art, Culture and Recreation	0.036	0.071	-0.644***	0.087
Sales and Services	-0.149***	0.038	-0.084*	0.050
Trades, Transport and Equipment Operators	0.004	0.037	-0.072	0.070
Primary Industry	0.032	0.068	0.05	0.079
Processing Manufacturing and Utilities	0.115***	0.039	0.101*	0.053
TVendogenous *				
Education				
High school diploma or less	0.191*	0.113	0.309***	0.100
Some post-secondary education	-0.209*	0.106	0.311**	0.131
College diploma or some university	-0.07	0.089	0.036	0.100
Master's degree or above	-0.078	0.053	0.182*	0.096
Job characteristics				
Hours worked per week	0.019***	0.000	0.023***	0.001
Weeks in employment	0.000	0.000	0.001***	0.000
Skill level	-0.09***	0.010	-0.091***	0.011
Channels through which current main job was found				
Job found through family ties	-0.132***	0.038	0.196***	0.038
Job found through coethnic friends	0.018	0.014	0.002	0.016
Job found through non-coethnic friends	0.039	0.024	0.032	0.032

Table C.4. Estimates of interaction effects of social capital on the log of real weekly wages (Cont'd)

	Male		Female	
	Coefficient	Standard Error	Coefficient	Standard Error
Social capital indicators				
Number of relatives in Canada	-0.425***	0.127	-0.121***	0.043
Frequency of contact with family sponsors	0.05*	0.026	0.025	0.030
Number of sources meeting friends	0.003	0.003	-0.01**	0.004
Ethnic diversity of friends	0.026	0.020	0.024	0.023
Frequency of contact with friends	-0.012	0.024	0.043	0.027
Ethnic diversity of workplace network	0.126***	0.029	0.336***	0.052
Participation in organization	0.023**	0.011	-0.001	0.013
Interaction effects				
High school diploma or less * Kinship size	0.022	0.076		
Some post-secondary education * Kinship size	0.209***	0.080		
College diploma or some university * Kinship size	0.141*	0.080		
Master's degree or above * Kinship size	0.008	0.054		
Skilled Workers (PA) * Kinship size	0.217**	0.091		
Skilled Workers (S&D) * Kinship size	0.469	0.294		
Refugees * Kinship size	-0.065	0.211		
Others * Kinship size	0.333	0.222		
Chinese * Kinship size	0.331***	0.127		
South Asian * Kinship size	0.093	0.100		
Black * Kinship size	0.362*	0.187		
Filipino * Kinship size	0.219*	0.130		
Latin * Kinship size	0.038	0.190		
West Asian and Arab * Kinship size	0.505**	0.251		
Other Asian * Kinship size	1.012	2.167		
Other Visible Minority * Kinship size	-0.413	2.133		
High school diploma or less * Job found through family ties	0.211***	0.046		
Some post-secondary education * Job found through family ties	0.185***	0.062		
College diploma or some university * Job found through family ties	0.13**	0.064		
Master's degree or above * Job found through family ties	0.161*	0.083		
English * Job found through family ties			-0.162***	0.043
French * Job found through family ties	0.25***	0.091		
French * Job found through co-ethnic friends	-0.097**	0.041		
French * Job found through non-coethnic friends			-0.206***	0.068
High school diploma or less * Workplace diversity			-0.355***	0.081
Some post-secondary education * Workplace diversity			-0.46***	0.122
College diploma or some university * Workplace diversity			-0.099	0.088
Master's degree or above * Workplace diversity			-0.343***	0.094

Table C.4. Estimates of interaction effects of social capital on the log of real weekly wages (Cont'd)

	Male		Female	
	Coefficient	Standard Error	Coefficient	Standard Error
Tlexogenous *				
Immigration category				
Skilled Workers (PA)	-0.591***	0.220	-0.093	0.310
Skilled Workers (S&D)	-0.882***	0.297	-0.325	0.329
Refugees	-0.737***	0.227	-0.344	0.260
Others	-0.787***	0.273	-0.209	0.246
Region of birth				
Asia and Pacific	-0.077	0.132	-0.053	0.305
Central and South America	-0.259	0.203	-0.176	0.367
Europe except UK and Western Europe	-0.086	0.109	-0.055	0.239
Africa and Middle-East	-0.101	0.122	-0.036	0.294
Ethnic group				
Chinese	-0.398***	0.141	0.022	0.249
South Asian	0.091	0.168	0.134	0.267
Black	-0.179	0.170	0.257	0.234
Filipino	-0.082	0.259	0.185	0.299
Latin	0.1	0.245	0.14	0.309
West Asian and Arab	-0.376*	0.195	-0.044	0.220
Other Asian	-0.748	1.140	-0.241	0.277
Other Visible Minority	0.424	2.138	0.27	0.372
Experience				
Had work experience before landing	0.077	0.078	0.268**	0.112
Had an arranged job upon landing	0.112	0.084	0.236	0.189
Visited Canada before landing	0.204**	0.081	0.179	0.161
Worked in Canada before landing	0.163	0.115	0.073	0.221
Studied in Canada before landing	-0.102	0.124	-0.015	0.203
Tlendogenous *				
Relatives living nearby upon landing	-0.785**	0.364	-0.489	0.683
Relatives living far upon landing	0.784	0.994	1.439	1.921
Friends living nearby upon landing	-0.033	0.371	-0.004	0.649
Friends living far upon landing	0.62	0.649	-1.456	1.222
_cons	4.926***	0.388	5.05***	0.507
No. of observations	6235		4448	
No. of individuals	3014		2399	
rho	0.927		0.978	

* p<0.1; ** p<0.05; *** p<0.01.

Note: The interaction effects are estimated with Hausman-Taylor estimator assuming the endogeneity of social capital variables, education, skill level, job tenure and working hours with unobserved heterogeneity.

* TV: Time-varying variables. TI: Time-invariant variables.

Data source: Longitudinal Survey of Immigrants to Canada (2005).

Appendix D (Chapter 6)

Table D.1. Definitions of the First Job in Intended Occupation Access Estimation Variables

Dependent variable	
Duration of access to the first intended occupation	Duration of access to the first intended occupation by the first 4 years since landing, in days
Independent variables	
Immigration category	
Family	1 if LR is in Family class, 0 otherwise. (Reference category)
Skilled Workers (PA)	1 if LR landed as a Skilled Worker principal applicant, 0 otherwise
Skilled Workers (S&D)	1 if LR landed as a Skilled Worker spouse and dependant, 0 otherwise
Refugees	1 if LR landed as a Refugee, 0 otherwise
Others	1 if LR landed in a immigration category other than Family Class, Skilled Workers (principal applicants and spouses and dependants) and Refugees, which mostly consists of business immigrants in economic class.
Demographic variables	
Age	Age in years
Married	1 if LR is married or living with a common-law partner, 0 if LR is single, separated or divorced, or widowed
Province of residence	
Atlantic Provinces	1 if LR is living in Atlantic provinces: New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador, 0 otherwise.
Quebec	1 if LR is living in Quebec, 0 otherwise.
Ontario	1if LR is living in Ontario, 0 otherwise. (Reference category)
Manitoba and Saskatchewan	1 if LR is living in Saskatchewan or Manitoba, 0 otherwise.
Alberta	1 if LR is living in Alberta, 0 otherwise.
BC	1 if LR is living in British Columbia, 0 otherwise.
Census metropolitan areas (CMAs)	
Toronto	1 if LR is living in Toronto, 0 otherwise.
Montreal	1 if LR is living in Montreal, 0 otherwise.
Vancouver	1 if LR is living in Vancouver, 0 otherwise.
Ottawa-Hull	1 if LR is living in Ottawa-Hull, 0 otherwise.
Calgary	1 if LR is living in Calgary, 0 otherwise.
Not in the Big 5 CMAs	1 if LR is living in an area other than the big 5 CMAs, 0 otherwise. (Reference category)
Population group	
White	1 if LR is white, 0 otherwise. (Reference category)
Chinese	1 if LR is Chinese, 0 otherwise.
South Asian	1 if LR is South Asian, 0 otherwise.
Black	1 if LR is Black, 0 otherwise.
Filipino	1 if LR is Filipino, 0 otherwise.
Latin	1 if LR is Latin, 0 otherwise.
West Asian and Arab	1 if LR is West Asian and Arab, 0 otherwise.
Other Asian	1 if LR is other Asian---South East Asian, Korean, Japanese, 0 otherwise.
Other Visible Minority	1 if LR is other visible minority---Visible minority n.i.e., Multiple visible minorities, White and visible minority, 0 otherwise.
Languages	
English	1 if LR has the knowledge of English (speaking fairly well or better), 0 otherwise (poorly or none).
French	1 if LR has the knowledge of French (speaking fairly well or better), 0 otherwise (poorly or none).
Education	
Years of schooling	Years of full-time schooling, in years
Currently in school	1 if LR is in school at the time of the interview, 0 otherwise
Experience	
Visited Canada before landing	1 if LR visited relatives or friends in Canada or visited Canada as a tourist before landing, 0 otherwise
Studied in Canada before landing	1 if LR studied in Canada before landing, 0 otherwise
Worked in Canada before landing	1 if LR worked in Canada before landing, 0 otherwise
Had work experience before landing	1 if LR had work experience before landing, 0 otherwise

Table D.1. Definitions of the First Job in Intended Occupation Access Estimation Variables (Cont'd)

Skill level of intended occupations	
Skill level A	1 if the second digit of the NOC code for the intended occupation is 1 or the first digit is 0 (i.e. management level is treated as skill level A), 0 otherwise. (Reference Category)
Skill level B	1 if the second digit of the NOC code for the intended occupation is 2 or 3, 0 otherwise.
Skill level C	1 if the second digit of the NOC code for the intended occupation is 4 or 5, 0 otherwise.
Skill level D	1 if the second digit of the NOC code for the intended occupation is 6, 0 otherwise.
Occupation group of intended occupations	
Management	1 if the current main job is in the Management Occupations, 0 otherwise. (Reference Category)
Business and Finance	1 if the current main job is in the Business, Finance and Administrative Occupations
Natural and Applied Sciences	1 if the current main job is in the Natural and Applied Sciences and Related Occupations, 0 otherwise
Health	1 if the current main job is in the Health Occupations, 0 otherwise
Social Science, Education, Government Service and Religion	1 if the current main job is in the Occupations in Social Science, Education, Government Service and Religion, 0 otherwise.
Art, Culture and Recreation	1 if the current main job is in the Occupations in Art, Culture, Recreation and Sport, 0 otherwise.
Sales and Services	1 if the current main job is in the Sales and Service Occupations, 0 otherwise
Trades, Transport and Equipment Operators	1 if the current main job is in the Trades, Transport and Equipment Operators and Related Occupations, 0 otherwise.
Primary Industry	1 if the current main job is in the Occupations Unique to Primary Industry, 0 otherwise.
Processing Manufacturing and Utilities	1 if the current main job is in the Occupations Unique to Processing Manufacturing and Utilities, 0 otherwise.
Social capital	
_Relatives	
Having relatives in Canada upon landing	1 if LR had relatives living in Canada at the time of landing, 0 otherwise.
Number of relatives in Canada	Number of types of relatives (spouse, children, parents, grandparents, brothers or sisters, etc.) in Canada, ranging from 0 to 11.
Frequency of contact with family sponsors	Frequency of contact with family sponsor (0~1) : 0--- No sponsor or having not seen or talked to sponsors since arriving; Between 0 and 1 --- Seeing or talking to sponsors in varied frequencies; the higher the index is, the more frequently LR contacts with sponsors. 1--- Seeing or talking to sponsors every day.
_Friends	
Having friends in Canada upon landing	1 if LR had friends living in Canada at the time of landing, 0 otherwise.
Having made new friends in Canada	1 if LR made new friends in Canada, 0 otherwise.
Number of sources meeting friends	Number of sources meeting new friends, ranging from 0 to 14.
Ethnic diversity of friends	Ethnical diversity of friend network (0~1): 0--- No friends or all friends belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some friends belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the friend network. 1--- None of the friends belong to the same ethnic or cultural groups as LR.
Frequency of contact with friends	Frequency of contact with friends (0~1) : 0--- No friends or having not seen or talked to friends since arriving; Between 0 and 1 --- Seeing or talking to friends in varied frequencies; the higher the index is, the more frequently LR contacts with friends. 1--- Seeing or talking to friends every day.
_Group and organizational network	
Participation in organization	1 if LR participated in any organization or group, 0 otherwise.
Volunteered time in organizations	1 if LR volunteered time in organizations or groups, 0 otherwise.

[1] LR: Longitudinal Respondent.

Table D.2. Sample mean and standard deviation of variables in the Cox proportional hazard estimations

	Males		Females	
	Mean	Standard Deviation	Mean	Standard Deviation
Dependent variable				
Analysis time _t	697.988	540.572	729.301	534.770
Independent variables				
Immigration category (Family Class)				
Skilled Workers (PA)	0.665	0.472	0.246	0.431
Skilled Workers (S&D)	0.118	0.322	0.458	0.498
Refugees	0.046	0.210	0.043	0.202
Others	0.053	0.225	0.042	0.200
Demographic variables				
Age	36.798	8.588	34.607	8.299
Married	0.806	0.396	0.847	0.360
Province and CMA of residence				
(Ontario)	0.560		0.588	
Atlantic Provinces	0.007	0.082	0.007	0.085
Quebec	0.192	0.394	0.178	0.382
Manitoba and Saskatchewan	0.029	0.169	0.023	0.149
Alberta	0.085	0.278	0.087	0.282
BC	0.127	0.333	0.117	0.322
(Areas out of the main 5 CMAs)				
Toronto	0.451	0.498	0.456	0.498
Montreal	0.114	0.318	0.105	0.306
Vancouver	0.171	0.377	0.152	0.359
Ottawa-Hull	0.049	0.216	0.047	0.213
Calgary	0.029	0.168	0.039	0.194
Ethnic group (White)				
Chinese	0.224	0.417	0.239	0.426
South Asian	0.232	0.422	0.208	0.406
Black	0.050	0.219	0.048	0.214
Filipino	0.072	0.259	0.078	0.268
Latin	0.025	0.157	0.040	0.197
West Asian and Arab	0.122	0.328	0.088	0.283
Other Asian	0.055	0.227	0.048	0.214
Other Visible Minority	0.009	0.094	0.014	0.118
Education				
Years of schooling	16.002	3.001	15.202	3.008
Currently in school	0.172	0.378	0.193	0.395
Language ability				
English	0.921	0.271	0.878	0.327
French	0.197	0.398	0.183	0.387
Experience				
Visited Canada before landing	0.164	0.371	0.160	0.367
Studied in Canada before landing	0.041	0.198	0.037	0.189
Worked in Canada before landing	0.032	0.176	0.019	0.136
Had work experience before landing	0.944	0.231	0.863	0.344
Skill level of intended occupations (Skill level A [1])				
Skill level B	0.223	0.416	0.182	0.386
Skill level C	0.092	0.289	0.223	0.416
Skill level D	0.019	0.137	0.019	0.138

Table D.2. Sample mean and standard deviation of variables in the Cox proportional hazard estimations (Cont'd)

	Males		Females	
	Mean	Standard Deviation	Mean	Standard Deviation
Occupation group of intended occupations (Management)				
Business and Finance	0.103	0.305	0.253	0.435
Natural and Applied Sciences	0.513	0.500	0.218	0.413
Health	0.043	0.204	0.148	0.356
Social Science, Education, Government Service and Religion	0.060	0.237	0.149	0.356
Art, Culture and Recreation	0.026	0.159	0.048	0.214
Sales and Services	0.078	0.268	0.111	0.314
Trades, Transport and Equipment Operators	0.085	0.279	0.017	0.130
Primary Industry	0.012	0.109	0.005	0.070
Processing Manufacturing and Utilities	0.028	0.164	0.025	0.155
Relatives				
Having relatives upon landing	0.447	0.497	0.518	0.500
Number of relatives in Canada	0.655	0.905	0.745	0.900
Frequency of contact with sponsors	0.139	0.339	0.239	0.422
Friends				
Having friends upon landing	0.691	0.462	0.614	0.487
Having made new friends	-	-	0.916	0.277
Number of sources meeting friends	2.907	1.654	2.855	1.707
Ethnic diversity of friends	0.497	0.264	0.494	0.278
Frequency of contact with friends	0.778	0.208	0.773	0.216
Group and organizational network				
Participation in organization	0.298	0.457	0.278	0.448
Volunteered time for organizations	0.163	0.369	0.144	0.351
Number of observations	5332		4219	
Number of individuals	2246		1675	

[1] Management occupations are considered as of skill level A usually requiring university education.

Reference categories are indicated in parentheses.

Data source: Longitudinal survey of immigrants to Canada (2005).

Table D.3. Cox proportional hazard estimations of the access to the first job in intended occupation

	Males						Females					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error
Immigration category (Family Class)												
Skilled Workers (PA)	1.197	0.153	1.541**	0.317	1.603**	0.326	1.289*	0.180	1.686**	0.387	1.281*	0.179
Skilled Workers (S&D)	0.882	0.144	1.12	0.246	1.166	0.253	0.877	0.111	1.131	0.236	0.864	0.110
Refugees	0.474***	0.124	0.564*	0.173	0.594*	0.178	0.583**	0.157	0.716	0.215	0.581**	0.156
Others	0.78	0.168	0.982	0.248	1.008	0.255	1.559*	0.364	1.987**	0.555	1.532*	0.360
Demographic variables												
Age	0.97***	0.006	0.972***	0.006	0.971***	0.006	0.981***	0.006	0.981***	0.006	0.981***	0.006
Married	0.989	0.098	0.973	0.096	0.987	0.097	0.782*	0.108	0.787*	0.110	0.788*	0.109
Province and CMA of residence												
(Ontario)												
Atlantic Provinces	1.444	0.621	1.215	0.517	1.295	0.538	2.183	1.044	2.273*	1.085	2.192	1.048
Quebec	1.01	0.298	0.979	0.287	0.994	0.296	0.817	0.290	0.84	0.299	0.823	0.294
Manitoba and Saskatchewan	0.894	0.258	0.884	0.259	0.894	0.258	1.601	0.495	1.61	0.501	1.625	0.508
Alberta	1.367*	0.242	1.315	0.235	1.318	0.238	0.948	0.227	0.969	0.233	0.943	0.226
BC	1.285	0.440	1.275	0.420	1.303	0.421	1.632	0.542	1.698	0.576	1.615	0.537
(Areas out of the main 5 CMAs)												
Toronto	0.797*	0.104	0.814	0.107	0.815	0.107	1.13	0.189	1.199	0.209	1.135	0.190
Montreal	0.494**	0.173	0.517*	0.175	0.505**	0.167	0.749	0.241	0.772	0.252	0.757	0.243
Vancouver	0.882	0.238	0.927	0.250	0.914	0.250	1.049	0.361	1.1	0.383	1.061	0.368
Ottawa-Hull	0.988	0.175	0.988	0.177	1.01	0.181	1.372	0.340	1.379	0.344	1.379	0.342
Calgary	1.24	0.264	1.248	0.266	1.234	0.268	1.528	0.415	1.59*	0.435	1.546	0.422
Ethnic group (White)												
Chinese	0.657***	0.076	0.684***	0.082	0.689***	0.081	0.759**	0.106	0.791	0.114	0.755**	0.105
South Asian	0.844	0.094	0.876	0.099	0.847	0.094	0.683**	0.101	0.685**	0.102	0.694**	0.103
Black	0.8	0.148	0.798	0.149	0.794	0.146	0.593**	0.141	0.551**	0.136	0.602**	0.145
Filipino	0.643**	0.110	0.651**	0.116	0.642**	0.112	1.016	0.189	1.01	0.191	1.013	0.188
Latin	0.724	0.179	0.7	0.173	0.698	0.171	0.775	0.189	0.758	0.186	0.766	0.187
West Asian and Arab	0.616***	0.087	0.645***	0.092	0.622***	0.088	0.643**	0.139	0.63**	0.138	0.649**	0.140
Other Asian	0.566***	0.111	0.569***	0.113	0.576***	0.113	0.672*	0.148	0.686*	0.151	0.662*	0.146
Other Visible Minority	0.573	0.248	0.562	0.239	0.561	0.241	0.88	0.308	0.892	0.306	0.9	0.317

Table D.3. Cox proportional hazard estimations of the access to the first job in intended occupation (Cont'd)

	Males						Females					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error
Education												
Years of schooling	1.061***	0.017	1.056***	0.017	1.058***	0.017	1.03	0.022	1.028	0.021	1.029	0.021
Currently in school	0.422***	0.053	0.414***	0.052	0.419***	0.052	0.432***	0.060	0.42***	0.059	0.427***	0.060
Language ability												
English	1.249	0.201	1.165	0.188	1.185	0.192	1.629***	0.282	1.585***	0.278	1.593***	0.277
French	0.739**	0.107	0.733**	0.105	0.73**	0.105	1.027	0.180	1.033	0.180	1.028	0.180
Pre-migration attachment to Canada												
Visited Canada before landing	1.534***	0.150	1.516***	0.150	1.49***	0.146	1.36**	0.169	1.311**	0.165	1.351**	0.168
Studied in Canada before landing	1.602***	0.269	1.624***	0.268	1.596***	0.266	1.339	0.314	1.325	0.313	1.352	0.318
Worked in Canada before landing	2.752***	0.483	2.606***	0.453	2.713***	0.472	3.23***	0.726	3.138***	0.709	3.254***	0.730
Had work experience before landing	1.172	0.229	1.194	0.236	1.205	0.235	1.348*	0.222	1.333*	0.220	1.34*	0.222
Skill level of intended occupations (Skill level A)												
Skill level B	0.932	0.126	0.903	0.122	0.908	0.122	1.068	0.158	1.051	0.158	1.061	0.158
Skill level C	1.22	0.212	1.194	0.208	1.2	0.208	1.847***	0.288	1.857***	0.291	1.826***	0.286
Skill level D	1.034	0.393	1.002	0.387	1.007	0.385	1.573	0.619	1.587	0.626	1.524	0.605
Occupation group of intended occupations (Management)												
Business and Finance	1.451	0.358	1.583*	0.402	1.56*	0.394	1.324	0.436	1.296	0.432	1.333	0.439
Natural and Applied Sciences	1.427*	0.301	1.561**	0.343	1.523*	0.330	1.349	0.438	1.324	0.435	1.35	0.438
Health	1.386	0.368	1.542	0.421	1.49	0.404	1.346	0.446	1.307	0.439	1.348	0.446
Social Science, Education, Government Service and Religion	1.566*	0.385	1.7**	0.430	1.663**	0.420	1.549	0.507	1.501	0.496	1.541	0.504
Art, Culture and Recreation	0.815	0.326	0.883	0.348	0.866	0.341	1.41	0.522	1.378	0.517	1.431	0.528
Sales and Services	1.885**	0.530	2.09**	0.600	2.055**	0.586	1.304	0.461	1.259	0.449	1.328	0.469
Trades, Transport and Equipment Operators	2.069***	0.563	2.313***	0.648	2.226***	0.616	0.152	0.186	0.135	0.168	0.156	0.189
Primary Industry	2.211**	0.816	2.431**	0.909	2.338**	0.878	3.189**	1.672	3.215**	1.713	3.189**	1.663
Processing Manufacturing and Utilities	2.178**	0.745	2.419**	0.849	2.312**	0.807	2.591**	1.129	2.576**	1.135	2.603**	1.134

Table D.3. Cox proportional hazard estimations of the access to the first job in intended occupation (Cont'd)

	Males						Females					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error	Hazard Ratio	Robust Standard Error
Relatives												
Having relatives upon landing			0.901	0.108					1.234	0.189		
Number of relatives in Canada			0.98	0.066					0.91	0.077		
Frequency of contact with sponsors			1.453**	0.267	1.413*	0.258			1.331	0.254		
Friends												
Having friends upon landing			0.919	0.084					0.984	0.104		
Made new friends after landing											1.453**	0.263
Number of sources meeting friends			1.029	0.026					1.004	0.033		
Ethnic diversity of friends			1.498***	0.209	1.572***	0.209			1.211	0.206		
Frequency of contact with friends			1.174	0.211					1.226	0.277		
Group and organizational network												
Participation in organization			1.091	0.109					1.134	0.147		
Volunteered time for organizations			1.029	0.130					0.959	0.153		
Number of observations	5332		5332		5332		4219		4219		4219	
Number of individuals	2246		2246		2246		1675		1675		1675	
Log pseudolikelihood	-6974.734		-6961.93		-6966.160		-4232.050		-4227.467		-4229.661	
AIC	14037.47		14029.87		14024.32		8552.1		8560.933		8549.321	
BIC	14327.05		14378.68		14327.07		8831.384		8897.343		8834.952	
Number of weighted subjects	47973		47973		47973		36114		36114		36114	
Number of failures	20546		20546		20546		13017		13017		13017	

* p<0.1; ** p<0.05; *** p<0.01.

Reference categories are indicated in parentheses.

Data source: Longitudinal survey of immigrants to Canada (2005).

Figure D.1 Cox proportional hazards regression vs. Kaplan-Meier survival estimate for male immigrants

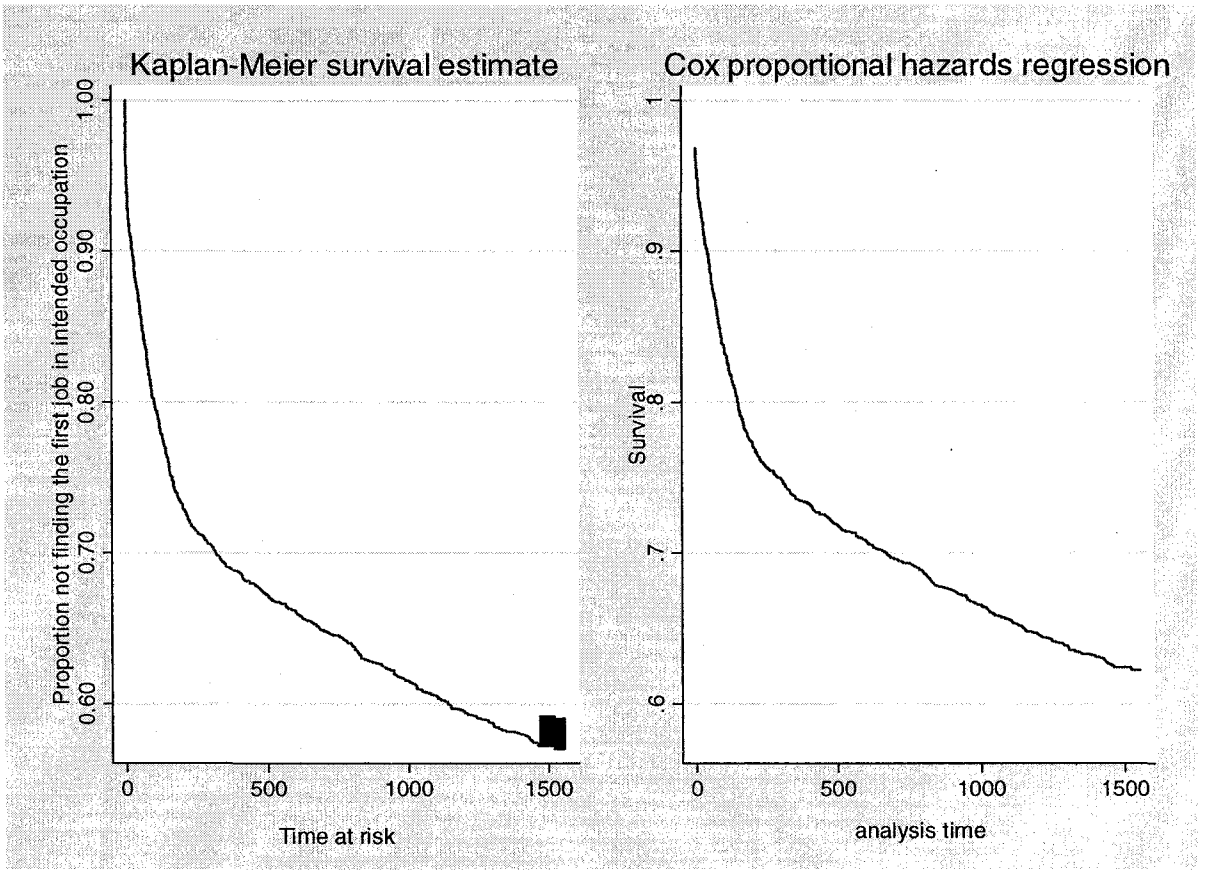
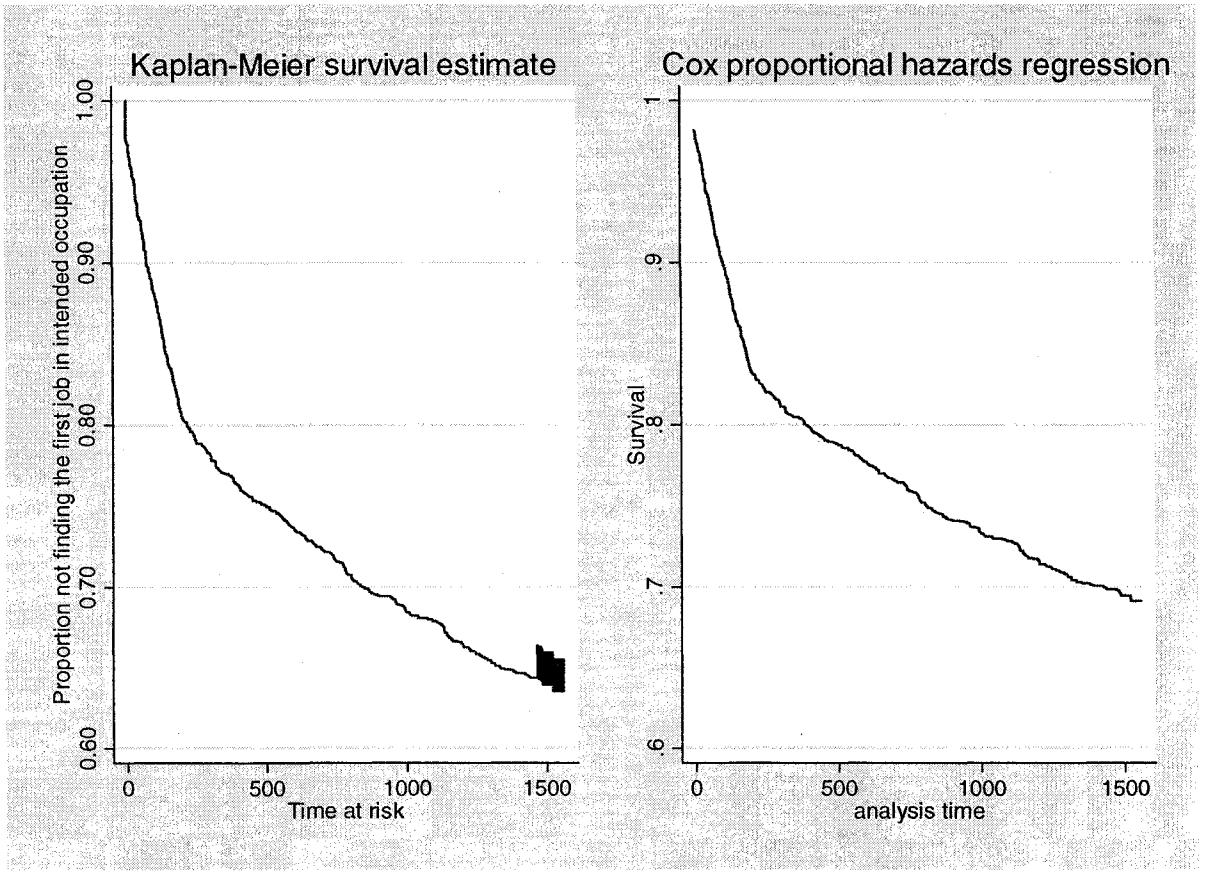


Figure D.2 Cox proportional hazards regression vs. Kaplan-Meier survival estimate for female immigrants



Appendix E (Chapter 6)

NOC Skill Types (the first digit of an NOC code)

Skill Type	Occupation
0	Management Occupations
1	Business, Finance and Administration Occupations
2	Natural and Applied Sciences and Related Occupations
3	Health Occupations
4	Occupations in Social Sciences, Education, Government Service and Religion
5	Occupations in Art, Culture, Recreation and Sport
6	Sales and Service Occupations
7	Trades, Transport and Equipment Operators and Related Occupations
8	Occupations Unique to Primary Industry
9	Occupations Unique to Processing, Manufacturing and Utilities

NOC Skill Levels (the second digit of an NOC code, both alphabetic characters and numerical values)

Skill Level (alpha)	Skill Level (digit)	Nature of Education/Training
A Occupations usually require university education.	**1**	▪ University degree at the bachelor's, master's or doctorate level.
B Occupations usually require college education or apprenticeship training.	**2 or 3**	▪ Two to three years of post-secondary education at a community college, institute of technology or CEGEP *or* ▪ Two to five years of apprenticeship training *or* ▪ Three to four years of secondary school and more than two years of on-the-job training, specialized training courses or specific work experience. ▪ Occupations with supervisory responsibilities and occupations with significant health and safety responsibilities, such as firefighters, police officers and registered nursing assistants are all assigned the skill level B.
C Occupations usually require secondary school and/or occupation-specific training.	**4 or 5**	▪ One to four years of secondary school education *or* ▪ Up to two years of on-the-job training, specialized training courses or specific work experience.
D On-the-job training is usually provided for occupations.	**6**	▪ Short work demonstration or on-the-job training *or* ▪ No formal educational requirements.

Appendix F (Chapter 6)

Creating a person-period data file with time varying variables

In Stata, command **stsplit** can be used to expand the records so that in each new record such a time varying explanatory variable as "participation in school after landing" is constant over time. For example, in the current analysis dataset, I would like to split the data and generate the explanatory variable **insch** (participation in school after landing), which takes the value 0 before participating in any school activities and 1 thereafter. As the exact date of transition of educational participation is not available in the Survey, interview dates are employed to approximate the transition timings of the time varying variables. In the illustration below, the original three variables **insch1 – insch3** become a single variable **insch** in the person-period data file, whose values reflect the incidence of educational participation in a specific wave. The time measured in days from landing **t0** to specific interview dates is identified by **i1date** (Wave 1 interview), **i2date** (Wave 2 interview) or **i3date** (Wave 3 interview, not shown), which is used to approximate the transition time of the time varying variables. **dur** is the dependent variable – time taken to find the first job in intended occupation after landing, while **cens** is the censoring indicator.

Person-record data file before *stsplit*

hhldid	_t0	_t	i1date	i2date	dur	insch1	insch2	insch3	cens
xxxxxx25	0	1497	219	853	1497	1	0	0	unobserved
xxxxxx30	0	121	X	X	121	0	X	X	observed
xxxxxx53	0	825	184	X	825	1	0	X	observed

X: Suppressed for confidentiality. The suppression does not affect the transformation of the data file to person-period file, as the changes or dates marked happened after the event of analysis occurred.

Person-period data file after *stsplit*

hhldid	_t0	_t	w2	w3	dur	insch	cens
xxxxxx25	0	219	-1	-1	219	1	
xxxxxx25	219	853	0	-1	853	0	
xxxxxx25	853	1497	0	0	1497	0	unobserved
xxxxxx30	0	121	-1	-1	121	0	observed
xxxxxx53	0	184	-1	-1	184	1	
xxxxxx53	184	825	0	-1	825	0	observed

The sample of this study tracks 2246 male and 1675 female immigrants for three waves, which yields a person-period data set with 5332 and 4219 records or observations for male and female immigrants respectively.