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# Social Capital and Employment Entry of Recent Immigrants to Canada

Evidence from the Longitudinal Survey  
of Immigrants to Canada (LSIC)

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Canada

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## Abstract

This paper looks at the role of social networks on the economic performance of recent immigrants to Canada in terms of employment probability. It addresses literature gaps by performing an empirical analysis of the relationship between social capital, ethnic diversity and labour market 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 labour market status of immigrants who landed between October 2000 and September 2001, with a specific focus on employment entry in a longitudinal context, using panel data models including fixed-effects logit model, random-effects logit model and generalized estimating equations (GEE) population-averaged logit models to control for unobserved heterogeneity. 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 the probability of employment 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. In particular, making the friendship network more ethnically diversified appears to be beneficial to the immigrants who landed in the categories other than the family class, especially male skilled workers and female Filipino immigrants.

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## 1. Introduction

There is growing evidence that the economic outcomes of recent immigrants to Canada have declined in comparison with earlier cohorts (e.g. Bloom, Grenier and Gunderson 1995; Picot, Hou and Coulombe 2007). Examining the determinants of labour market outcomes for recent immigrants, including social capital components, is an essential step in understanding this phenomenon. 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 such as educational attainment (Sun 1999; Israel and Beaulieu 2004), job search (Montgomery 1991), and health services utilization (Deri 2005). 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.

This paper addresses these gaps through an empirical analysis of the relationship between social capital and employment likelihood of recent immigrants to Canada, taking the advantages of a recent dataset --- the Longitudinal Survey of Immigrants to Canada (LSIC) Wave 1, 2 and 3 micro data. The LSIC provides unique information on immigration class, ethnic group, social interactions and labour market performance, which is required for my analysis. Furthermore, its longitudinal nature affords the possibility of a panel data analysis 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 labour force status? How do immigrants with a more co-ethnic social network perform relative to those with a diversified network?

The research 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 probability of employment 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. Finally, 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.

The paper is structured as follows: Literature review; data and methodology issues; model framework; construction of social capital indicators; descriptive analysis are then presented; followed by empirical results from estimation of the econometric model.

## 2. Literature Review

### 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 et al. 1999; Stone et al. 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). 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.

### 2.2. Relationship between social capital and labour market outcomes

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 (Calvo-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 the wage. Early work by Granovetter (1973) has pointed out 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. In contrast, Montgomery (1992) shows that networking has a positive impact on employment transition, but this does not imply higher wages, even when weak ties are used.

In summary, the evidence suggests that social capital does affect labour market outcomes, especially job transitions. 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.

### **2.3. Social capital in the context of immigrant labour market 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).

There is evidence that social capital influences immigrant economic performance significantly, especially in the initial years. Evidence from both Australia (Giorgas 2000) and the US (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 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 US 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.

Most of the existing literature on the relationship between social capital and immigrant labour market outcomes is about the U.S. As data with information on employment, wage and detailed social network structure are relatively rare, most studies focus on a specific group of immigrants and use network-based job search methods as a proxy for social capital. For example, Livingston (2006) used the Mexican Migration Project (MMP) data to examine the effects of different network-based job searching. Munshi (2003) also made use of the MMP data to identify network effects among Mexican immigrants in the US 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 researches are 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.

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 neighbourhood characteristics as a proxy for social capital. The effect of social networks on immigrants’ employment status and earnings may significantly differ according to how we define and measure them. 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 United States. 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 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 influence negatively the economic performance of immigrants in the US. 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 to 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.

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 employment probability. 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.

## **2.4. Research using the Longitudinal Survey of Immigrants to Canada (LSIC)**

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 Wave 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. The present research is among the first to examine the network effects on immigrants’ labour market outcomes using the complete three waves of the LSIC.

### 3. Data and Methodology

The Longitudinal Survey of Immigrants to Canada (LSIC) is a survey designed to study how newly arrived immigrants adjust to living in Canada during their first four years of settlement. The LSIC is a “longitudinal” survey, with the same respondents being interviewed at six months, two years and four years after arrival in Canada. By interviewing the same people over time, the LSIC information provides a dynamic picture of the experiences of these newly arrived immigrants, rather than a static “snapshot”.

To participate in the LSIC immigrants must: have arrived in Canada between October 2000 and September 2001; have been 15 years of age and over at the time of landing and landed from abroad. There was only one participant per family unit.<sup>1</sup> Twelve thousand immigrants were interviewed in Wave 1 while 9,300 and 7,700 of them participated in Wave 2 and 3, respectively.

The survey covers a variety of modules including demographic characteristics of the Longitudinal Respondents,<sup>2</sup> Citizenship, Social Interactions, Group Organizations, Language Skills, Housing, Education, Employment, Health, Values and Attitudes, Income, and Perceptions of Settlement. Information contained within LSIC expands upon datasets currently available to assess integration experiences, such as the Census, the Longitudinal Immigration Data Base (IMDB) and the Ethnic Diversity Survey (EDS), by providing longitudinal information, identifying immigration category, and capturing information that goes beyond the economic to include the social and cultural aspects of integration. This information is critical to understanding the determinants of immigrant integration outcomes.

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 study is the construction of social capital indicators based on the network-based concept, using information unique to the LSIC data, with a focus on the Social Interactions and Group Organizations modules. Indicators of social capital are constructed in different dimensions, size, density, and diversity, for various types of social capital for each wave.

Based on the indicators, 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.

The current study 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 territories are excluded from the analysis due to the extremely small size of this group.

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 analyses.

Taking advantage of the longitudinal characteristic of the LSIC, some of the relationships between social capital indicators and labour force status are examined with panel models, including fixed and random

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<sup>1</sup> See “Statistics Canada (2007), Longitudinal Survey of Immigrants to Canada, Wave 3 – Microdata User Guide” for sample selection and survey design.

<sup>2</sup> The Longitudinal Respondent (LR) entity includes LR characteristics such as age, sex, religion, ethnicity and countries where the LR resided for more than six 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 the immigrant came in Canada.

effects logit models and generalized estimating equations (GEE) population-averaged logit model, in order to capture the unobserved individual specific effects.

## 4. Social capital indicators

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.

### 4.1. 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:<sup>3</sup>

**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. An immigrant diversity index 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 Wave 2 and 3, immigrants were asked

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<sup>3</sup> There is a descriptive analysis of the social capital indicators – the presence of social networks upon landing and the development of new networks for the LSIC immigrants, which is available upon request.

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.<sup>4</sup>

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<sup>4</sup> In the following regression analyses, not all indicators for network reciprocity are present. 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 estimation not as the absolute numbers, but as dummy variables indicating whether an immigrant volunteered time for groups or provided newcomers with help.

## 5. Model framework

### 5.1. Theoretical environment

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)<sup>5</sup> to information asymmetries (e.g. Boorman, 1975). I borrow a simple network model developed by Calvó-Armengol and Jackson (2004) as the theoretical initiative. The authors show that, in situations of information asymmetries, through information transmission within 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 information with a probability  $\alpha$  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:

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

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).<sup>6</sup> 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 network members. Employment increases with network diversity. Clusters exist in equilibrium as workers with poor networks have 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). The current study 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 the current paper, 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 further work.

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<sup>5</sup> Montgomery emphasizes the advantages of network for the employer relative to other hiring channels as it provides a screening against low-ability workers.

<sup>6</sup> For detailed proof of propositions, see Calvó-Armengol and Jackson (2004).



## 5.2. Estimation framework and model specification

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  $y_i^*$  such that

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

where  $X$  is a collection of  $p$  independent variables denoted by the vector  $\mathbf{x}' = (x_1, x_2, \dots, x_p)$ , which consists of a set of factors, such as immigration category, age, marital status, human capital and social capital, explaining the employment outcome, and  $\varepsilon$  is an error term. I do not observe  $y_i^*$ , 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:

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

Assuming that  $\varepsilon$  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 CMAs (Census Metropolitan Area) – 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 4.1. See Table A.1 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.

### 5.2.1. Panel data models

Taking the advantage of the longitudinal feature of the LSIC, this paper presents longitudinal analyses in a panel data model framework in addition to the cross-sectional analyses. The panel data models are taking 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:

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

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

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  $\mathbf{X}_{it}$ , which are observable, either varying with time or not. The unobserved individual effect  $z_i$  capturing the heterogeneity across individuals that determine 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  $\mathbf{X}_{it}$ , in which case the model is:

$$(2) \quad y_{it}^* = X'_{it} \beta + z_i + \varepsilon_{it}, \quad i = 1, \dots, n; \quad t = 1, \dots, T_i$$

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

$$(3) \quad \Pr(y_{it} = 1 | X_{it}) = \Pr(y_{it}^* > 0 | X_{it}) = F(X'_{it} \beta + z_i)$$

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  $\mathbf{Y}_i = (y_{i1}, \dots, y_{iT})$  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,<sup>7</sup> 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  $\alpha_i$  in the general model (1) are unrelated to the observed explanatory variables  $\mathbf{X}_{it}$ :  $Cov(\mathbf{X}_{it}, \alpha_i) = 0, t = 1, 2, \dots, T$ , so that the conditional distribution  $f(\alpha_i | \mathbf{X}_{it})$  is independent on  $\mathbf{X}_{it}$ , the random effects model is obtained:

$$(4) \quad y_{it}^* = \mathbf{X}'_{it} \boldsymbol{\beta} + v_{it}, \quad i = 1, \dots, n; \quad t = 1, \dots, T_i$$

$$E(v_{it} | \mathbf{X}_{it}) = 0,$$

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

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

Time invariant variables such as immigration category, ethnic group, region of origin, can be included in the regression as part of  $\mathbf{X}_{it}$  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).

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<sup>7</sup> See Greene (2003) Chapter 21 for a discussion.

One of the nice features of the GEE model is that the estimate of  $\beta$  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  $E(y_{it} | x_{it}) = E(y_{it} | x_{it})$  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.<sup>8</sup>

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 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.

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<sup>8</sup> 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).

## 6. 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 paper, the results of cross-sectional regressions (Wave 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 classes 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 less 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 (2007) 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 their education or get foreign credentials recognized before settling for underemployment.

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

### 6.1. Probability of employment

Conditional on labour force participation,<sup>9</sup> 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 1 and Table 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.

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<sup>9</sup> 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 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)														
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.
<b>Social networks</b>														
<i>_ Family and relatives</i>														
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
<i>_ Friends</i>														
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
<i>_ Groups and organizational network</i>														
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 <sup>2</sup>	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	
<b>Prob &gt; Chi-Square</b>														
<i>Joint test for network size (number of relatives in Canada, number of sources meeting friends and number of organizations participated in) = 0</i>	0.0006		0.1157		0.0311		0.0000		0.0041		0.0000		0.0000	
<i>Joint test for network diversity (ethnic diversity of friends, ethnic diversity of organizational network) = 0, if applicable</i>	0.0004		0.0074		0.0051		0.0262		0.2399		0.0403		0.0447	
<i>Joint test for network density (frequency of contact with family sponsors, frequency of contact with friends and frequency of activity with organizations) = 0</i>	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 3 and Table 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. Again, 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 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)													
	M 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.
<b>Social networks</b>														
<i>_ Family and relatives</i>														
Spouse currently employed	0.336**	0.130	0.255**	0.127	-0.022	0.148	0.142**	0.071	0.077	0.090	0.19***	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	0.33**	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
<i>_ Friends</i>														
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
<i>_ Groups and organizational network</i>														
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 <sup>2</sup>	1.109		0.123		0.1046		0.112							
Percent correctly predicted	0.669		0.716				0.721		0.584		0.703		0.719	
<b>Prob &gt; Chi-Square</b>														
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	

\* 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 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 No social capital		Model M.2 All social capital		Model M.3 Kinship and		Model M.4 Social capital		Model M.5 Final		Marginal Effects Final	
Independent variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx <sup>1</sup>	Std. Err.
<b>Social networks</b>												
<i>_ Family and relatives</i>												
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						
<i>_ Friends</i>												
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
<i>_ Groups and organizational network</i>												
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								
<b>Time effects</b>												
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		
<b>No. of observations</b>	9843		9843		9843		9843		9843		9843	
<b>No. of groups</b>	3659		3659		3659		3659		3659		3659	
<b>Percent correctly predicted</b>	0.787		0.790		0.789		0.791		0.788			

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

<sup>1</sup> 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 1 and 3) are to a large extent consistent with what are expected from relevant literature. The last columns in Table 3 report marginal effects of the social capital variables.

For male newcomers, relative networks have little impact on employment status except the positive impact 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 2.8% higher probability in finding a job than having no kinship or having 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: 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		Model F.2		Model F.3		Model F.4		Model F.5		Marginal Effects	
	No social capital	All social capital	Kinship and	Social capital	Final	Final	dy/dx <sup>1</sup>	Std. Err.	Std. Err.	Std. Err.	Std. Err.	Std. Err.
<b>Social networks</b>												
<i>_ Family and relatives</i>												
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						
<i>_ Friends</i>												
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
<i>_ Groups and organizational network</i>												
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	12.13**	0.501	0.277	0.538	0.304	0.536	-0.274	0.646	0.382	0.518		
<b>No. of observations</b>	7674		7674		7674		7674		7674			7674
<b>No. of groups</b>	3201		3201		3201		3201		3201			3201
<b>Percent correctly predicted</b>	0.711		0.719		0.720		0.719		0.720			

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

<sup>1</sup> 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 2 and 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 3 and 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 components and quality (at the bottoms of Table 1 and 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.<sup>10</sup> 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 3 waves or unemployed at 3 waves). The fixed effects estimator is very inefficient since, as noted in the Table 1 and Table 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.

## 6.2. Time effects

As the cross sectional regressions for different periods (Wave 1, 2 and 3) showed in Table 1 and Table 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) (1) can be extended to include a time-specific effect as well.

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<sup>10</sup> See Appendix B for a detailed discussion of the test.

$$(5) y_{it}^* = x'_{it} \beta + z_i + s_t + \varepsilon_{it}, \quad i = 1, \dots, n, t = 1, \dots, T_i$$

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

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 Table 3 and Table 4), it shows that time effects are not significantly present on the employment probability for both female and male immigrants.

### 6.3. 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 5 and Table 6):

**Table 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 Time effect		Model M.int.2 Immigration		Model M.int.3 Ethnic group		Model M.int.4 Education		Model M.int.5 Official	
Independent variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<b>Social networks</b>										
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	-0.08***	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
<b>Time effects</b>										
Wave2	-0.055	0.395								
Wave3	0.437	0.431								
<b>Interactions</b>										
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
<b>No. of observations</b>	9843		9843		9843		9843		9843	
<b>No. of groups</b>	3659		3659		3659		3659		3659	
<b>Percent correctly predicted</b>	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 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 Time effect		Model F.int.2 Immigration		Model F.int.3 Ethnic group		Model F.int.4 Education		Model F.int.5 Official	
Independent variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<b>Social networks</b>										
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	-0.14***	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
<b>Time effects</b>										
Wave2	-1.006**	0.424								
Wave3	-0.827*	0.466								
<b>Interactions</b>										
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
<b>No. of observations</b>	7674		7674		7674		7674		7674	
<b>No. of groups</b>	3201		3201		3201		3201		3201	
<b>Percent correctly predicted</b>	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).

### 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 5 and Model F.int.1 in Table 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.

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, shown 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.

## 7. Conclusions

This study suggests that social capital does have impacts on the immigrants' labour market outcomes for both 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,<sup>11</sup> 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 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

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<sup>11</sup> 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 & Hughes' research, the size of network is measured by the absolute number of friends.



higher probability of getting employment. However, due to data limitations, 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.



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## 9. Appendix A

**Table A.1: Social Capital and Employment Estimation Variables**

Variable	Definition
<b>Dependent variable</b>	
em	1if LR was employed at the time of the interview, 0 otherwise
<b>Independent variables</b>	
<b>Immigration category</b>	
Family	1if LR is in Family class, 0 otherwise. (Reference category)
Skilled Workers (PA)	1if LR landed as a Skilled Worker principal applicant, 0 otherwise
Skilled Workers (S&D)	1if LR landed as a Skilled Worker spouse and dependant, 0 otherwise
Refugees	1if LR landed as a Refugee, 0 otherwise
Others	1if 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
<b>Demographic variables</b>	
Female	1if LR is female, 0 otherwise
Male	1if LR is male, 0 otherwise
Age	Age in years
Age <sup>2</sup>	Age square/100
Married	1if 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)
<b>Province of residence</b>	
Atlantic Provinces	1if LR is living in Atlantic provinces: New Brunswick, Nova Scotia, Prince Edward Island or Newfoundland, 0 otherwise.
Quebec	1if LR is living in Quebec, 0 otherwise.
Ontario	1if LR is living in Ontario, 0 otherwise. (Reference category)
Manitoba and Saskatchewan	1if LR is living in Saskatchewan or Manitoba, 0 otherwise.
Alberta	1if LR is living in Alberta, 0 otherwise.
BC	1if LR is living in British Columbia, 0 otherwise.
<b>Census metropolitan areas (CMAs)</b>	
Not in the Big 5 CMAs	1if LR is living in an area other than the big 5 CMAs: Toronto, Montreal, Vancouver, Ottawa and Calgary, 0 otherwise.
<b>Region of birth</b>	
Asia and Pacific	1if region of birth is Asia and Pacific, 0 otherwise.
North America, UK and Western Europe	1if region of birth is North America, UK and Western Europe, 0 otherwise. (Reference category)
Central and South America	1if region of birth is Central America and South America, 0 otherwise.
Europe except UK and Western Europe	1if region of birth is Europe except UK and Western Europe, 0 otherwise.
Africa and Middle-East	1if region of birth is Africa and Middle-East, 0 otherwise.
<b>Population group</b>	
white	1if LR is white, 0 otherwise. (Reference category)
Chinese	1if LR is Chinese, 0 otherwise.
South Asian	1if LR is South Asian, 0 otherwise.
Black	1if LR is Black, 0 otherwise.
Filipino	1if LR is Filipino, 0 otherwise.
Latin	1if LR is Latin, 0 otherwise.
West Asian and Arab	1if LR is West Asian and Arab, 0 otherwise.
Other Asian	1if LR is other Asian---South East Asian, Korean, Japanese, 0 otherwise.
Other Visible Minority	1if LR is other visible minority---Visible minority n.i.e., Multiple visible minorities, White and visible minority, 0 otherwise.

**Table A.1: Social Capital and Employment Estimation Variables (cont'd)**

<b>Languages</b>	
Eng	1if LR has the knowledge of English (speaking fairly well or better), 0 otherwise (poorly or none).
Fre	1if LR has the knowledge of French (speaking fairly well or better), 0 otherwise (poorly or none).
<b>Education</b>	
High school diploma or less	1if LR has less than high school education or a high school diploma, 0 otherwise.
Some post-secondary education	1if LR has some post-secondary education, 0 otherwise.
College diploma or some university	1if LR has a college diploma or some university education, 0 otherwise.
Bachelor's Degree	1if LR has a bachelor's degree, 0 otherwise. (Reference category)
Master's degree or above	1if LR has a master's degree or above, 0 otherwise.
Currently in school	1if LR is in school at the time of the interview, 0 otherwise
<b>Experience</b>	
Had work experience before landing	1if 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 <sup>2</sup>	(Number of weeks in Canada after landing) <sup>2</sup> /100
Had an arranged job upon landing	1if LR had an arranged job when landing, 0 otherwise
Visited Canada before landing	1if LR visited relatives or friends in Canada or visited Canada as a tourist before landing, 0 otherwise
Worked in Canada before landing	1if LR worked in Canada before landing, 0 otherwise
Studied in Canada before landing	1if LR studied in Canada before landing, 0 otherwise
<b>Social capital</b>	
<b>_Family and relatives</b>	
Spouse currently employed	1if 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	1if 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.
<b>_Friends</b>	
Friends living nearby upon landing	1if 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	Ethnic 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.



**Table A.1: Social Capital and Employment Estimation Variables (cont'd)**

**\_ Group and organizational network**

<p>Number of organizations participated in Ethnic diversity of organizational network</p>	<p>Number of organizations or groups LR participated in, ranging from 0 to 13. Ethnic 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.</p>
<p>Frequency of activity with organizations</p>	<p>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. 1if LR volunteered time for organizations or groups, 0 otherwise.</p>
<p>Volunteered time for organizations</p>	<p>1if observation is in Wave 2 and 0 otherwise. 1if observation is in Wave 3 and 0 otherwise.</p>
<p><b>Time effect</b></p>	
<p>Wave2 Wave3</p>	<p>1if observation is in Wave 2 and 0 otherwise. 1if observation is in Wave 3 and 0 otherwise.</p>
<p><b>Interactions</b></p>	
<p>Wave2 * Ethnic diversity of friends Wave3 * Ethnic diversity of friends SWPA * Ethnic diversity of friends SWSD * Ethnic diversity of friends Refugees * Ethnic diversity of friends Others * Ethnic diversity of friends Chinese * Ethnic diversity of friends South Asian * Ethnic diversity of friends Black * Ethnic diversity of friends Filipino * Ethnic diversity of friends Latin * Ethnic diversity of friends West Asian and Arab * Ethnic diversity of friends Other Asian * Ethnic diversity of friends Other Visible Minority * Ethnic diversity of friends High school diploma or less * Ethnic diversity of friends Some post-secondary education * Ethnic diversity of friends College diploma or some university * Ethnic diversity of friends Master's degree or above * Ethnic diversity of friends English * Ethnic diversity of friends French * Ethnic diversity of friends</p>	<p>Time effect in Wave 2 interacts with diversity of friendship Time effect in Wave 3 interacts with diversity of friendship Skilled worker dummy variable interacts with diversity of friendship Skilled worker spouse and dependant dummy variable interacts with diversity of friendship Refugee dummy variable interacts with diversity of friendship Other immigration category dummy variable interacts with diversity of friendship Chinese dummy variable interacts with diversity of friendship South Asian dummy variable interacts with diversity of friendship Black dummy variable interacts with diversity of friendship Filipino dummy variable interacts with diversity of friendship Latin dummy variable interacts with diversity of friendship West Asian and Arab dummy variable interacts with diversity of friendship Other Asian dummy variable interacts with diversity of friendship Other visible minority dummy variable interacts with diversity of friendship High school or less dummy variable interacts with diversity of friendship Some post-secondary education dummy variable interacts with diversity of friendship College diploma or some university dummy variable interacts with diversity of friendship Master's degree dummy variable interacts with diversity of friendship English ability interacts with diversity of friendship: Eng*frdiv French ability interacts with diversity of friendship: Fre*frdiv</p>

<sup>1</sup> 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 <sup>2</sup>	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

**Table A.2: Survey means of variables in the estimations (cont'd)**

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 <sup>2</sup>	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)													
	M o d e l s													
	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.
<b>Immigration category [Family]</b>														
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
<b>Demographic variables</b>														
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 <sup>2</sup>	-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
<b>Province of residence [Ontario]</b>														
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
<b>Census metropolitan areas (CMAs)</b>														
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
<b>Region of birth [North America, UK and Western Europe]</b>														
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
<b>Population group [White]</b>														
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
<b>Education [Bachelor's Degree]</b>														
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

**Table A.3: Estimation of employment likelihood of male immigrants in the labour force in the initial 4 years in Canada (cont'd)**

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.
<b>Language Proficiency</b>														
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
<b>Experience</b>														
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 <sup>2</sup>	-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	1.44***	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
<b>Social networks</b>														
<i>_ Family and relatives</i>														
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
<i>_ Friends</i>														
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
<i>_ Groups and organizational network</i>														
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
<b>No. of observations</b>	2996		3360		3450		9843		3880		9843		9843	
<b>No. of groups (for panel models)</b>									1379		3659		3659	
<b>Pseudo R<sup>2</sup></b>	0.196		0.124		0.1227		0.145						0.186	
<b>Percent correctly predicted</b>	0.753		0.789				0.789		0.584		0.780		0.790	
<b>Prob &gt; Chi-Square</b>														
<b>Joint test for network size = 0</b>	0.0006		0.1157		0.0311		0.0000		0.0041		0.0000		0.0000	
<b>Joint test for network diversity = 0, if applicable</b>	0.0004		0.0074		0.0051		0.0262		0.2399		0.0403		0.0447	
<b>Joint test for network density = 0</b>	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	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.
<b>Immigration category [family]</b>														
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
<b>Demographic variables</b>														
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 <sup>2</sup>	-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
<b>Province of residence [Ontario]</b>														
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
<b>Census metropolitan areas (CMAs)</b>														
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
<b>Region of birth [North America, UK and Western Europe]</b>														
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
<b>Population group [White]</b>														
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	1.2***	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
<b>Education [Bachelor's Degree]</b>														
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

**Table A.4: Estimation of employment likelihood of female immigrants in the labour force in the initial 4 years in Canada (cont'd)**

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

Dependent variable	participation in the labour force)													
	M o d e l s													
	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.
<b>Language Proficiency</b>														
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
<b>Experience</b>														
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 <sup>2</sup>	-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
<b>Social networks</b>														
<i>_ Family and relatives</i>														
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
<i>_ Friends</i>														
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
<i>_ Groups and organizational network</i>														
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
<b>No. of observations</b>	2070		2724		2851		7674		3477		7674		7674	
<b>No. of groups (for panel models)</b>									1284		3201		3201	
<b>Pseudo R<sup>2</sup></b>	1.109		0.123		0.1046		0.112				0.703		0.719	
<b>Percent correctly predicted</b>	0.669		0.716				0.721		0.584				0.719	
<b>Prob &gt; Chi-Square</b>														
<b>Joint test for network size = 0</b>	0.0399		0.0000		0.0000		0.0000		0.0391		0.0000		0.0000	
<b>Joint test for network diversity = 0, if applicable</b>	0.4541		0.0008		0.2298		0.0006		0.1426		0.0006		0.0006	
<b>Joint test for network density = 0</b>	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 No social capital		Model M.2 All social capital indicators		Model M.3 Kinship and friendship		Model M.4 Social capital and time effects		Model M.5 Final specification		Marginal Effects Final specification	
Independent variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx <sup>1</sup>	Std. Err.
<b>Immigration category [family]</b>												
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
<b>Demographic variables</b>												
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 <sup>2</sup>	-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
<b>Province of residence [Ontario]</b>												
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
<b>Census metropolitan areas (CMAs)</b>												
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
<b>Region of birth [North America, UK and Western Europe]</b>												
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
<b>Population group [White]</b>												
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
<b>Education [Bachelor's Degree]</b>												
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



**Table A.5: GEE population-averaged estimations of employment likelihood of male immigrants in the initial 4 years in Canada (cont'd)**

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		Model M.2		Model M.3		Model M.4		Model M.5		Marginal Effects	
	No social capital		All social capital indicators		Kinship and friendship		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 <sup>1</sup>	Std. Err.
<b>Language Proficiency</b>												
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
<b>Experience</b>												
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 <sup>2</sup>	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
<b>Social networks</b>												
<b>_ Family and relatives</b>												
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						
<b>_ Friends</b>												
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
<b>_ Groups and organizational network</b>												
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								
<b>Time effects</b>												
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		
<b>No. of observations</b>	9843		9843		9843		9843		9843		9843	
<b>No. of groups</b>	3659		3659		3659		3659		3659		3659	
<b>Percent correctly predicted</b>	0.787		0.790		0.789		0.791		0.788			

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

<sup>1</sup> 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											
	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		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 <sup>1</sup>	Std. Err.
<b>Immigration category [family]</b>												
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
<b>Demographic variables</b>												
Age	0.053**	0.023	0.051**	0.024	0.051**	0.024	0.048**	0.024	0.05**	0.024	0.0**	0.005
Age <sup>2</sup>	-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
<b>Province of residence [Ontario]</b>												
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
<b>Census metropolitan areas (CMAs)</b>												
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
<b>Region of birth [North America, UK and Western Europe]</b>												
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
<b>Population group [White]</b>												
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
<b>Education [Bachelor's Degree]</b>												
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

**Table A.6: GEE population-averaged estimations of employment likelihood of female immigrants in the initial 4 years in Canada (cont'd)**

Sample coverage: Female immigrants who participated in the labour force.												
em (conditional on the participation in the labour force)												
Dependent variable												
Models												
Independent variables	Model F.1		Model F.2		Model F.3		Model F.4		Model F.5		Marginal Effects	
	No social capital		All social capital indicators		Kinship and friendship		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 <sup>1</sup>	Std. Err.
<b>Language Proficiency</b>												
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
<b>Experience</b>												
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 <sup>2</sup>	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
<b>Social networks</b>												
<b>_ Family and relatives</b>												
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						
<b>_ Friends</b>												
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
<b>_ Groups and organizational network</b>												
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	1213**	0.501	0.277	0.538	0.304	0.536	-0.274	0.646	0.382	0.518		
<b>No. of observations</b>	7674		7674		7674		7674		7674		7674	
<b>No. of groups</b>	3201		3201		3201		3201		3201		3201	
<b>Percent correctly predicted</b>	0.711		0.719		0.720		0.719		0.720		0.719	

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

<sup>1</sup> 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.
<b>Immigration category [family]</b>										
Skilled Workers (P A)	-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
<b>Demographic variables</b>										
Age	0.116***	0.023	0.12***	0.023	0.118***	0.023	0.115***	0.023	0.117***	0.023
Age <sup>2</sup>	-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
<b>Province of residence [Ontario]</b>										
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	-0.77***	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
<b>Census metropolitan areas (CMAs)</b>										
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
<b>Region of birth [North America, UK and Western Europe]</b>										
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
<b>Population group [White]</b>										
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
<b>Education [Bachelor's Degree]</b>										
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
<b>Language Proficiency</b>										
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
<b>Experience</b>										
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 <sup>2</sup>	-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

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

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.int.1		Model M.int.2		Model M.int.3		Model M.int.4		Model M.int.5	
	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.
<b>Social networks</b>										
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
<b>Time effects</b>										
Wave2	-0.055	0.395								
Wave3	0.437	0.431								
<b>Interactions</b>										
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
<b>No. of observations</b>	9843		9843		9843		9843		9843	
<b>No. of groups</b>	3659		3659		3659		3659		3659	
<b>Percent correctly predicted</b>	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 Time effect interactions		Model F.int.2 Immigration category		Model F.int.3 Ethnic group interactions		Model F.int.4 Education interactions		Model F.int.5 Official language	
Independent variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<b>Immigration category [family]</b>										
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
<b>Demographic variables</b>										
Age	0.047**	0.024	0.051**	0.024	0.049**	0.024	0.05**	0.024	0.05**	0.024
Age <sup>2</sup>	-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	-0.837***	0.083
<b>Province of residence [Ontario]</b>										
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
<b>Census metropolitan areas (CMAs)</b>										
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
<b>Region of birth [North America, UK and Western Europe]</b>										
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
<b>Population group [White]</b>										
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
<b>Education [Bachelor's Degree]</b>										
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
<b>Language Proficiency</b>										
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
<b>Experience</b>										
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 <sup>2</sup>	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	1596***	0.235	157***	0.233	1572***	0.232	1573***	0.232	1576***	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

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

Sample coverage: Female immigrants who participated in the labour force.										
Dependent variable	em (conditional on the participation in the labour force)									
<b>Social networks</b>										
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
<b>Time effects</b>										
Wave2	-1.006**	0.424								
Wave3	-0.827*	0.466								
<b>Interactions</b>										
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					1.30†	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
<b>No. of observations</b>	7674		7674		7674		7674		7674	
<b>No. of groups</b>	3201		3201		3201		3201		3201	
<b>Percent correctly predicted</b>	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).



## 10. Appendix B

### 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  $\mathbf{x}_{it}$ :  $\text{Cov}(\mathbf{x}_{it}, z_i) = 0$ ,  $t=1, 2, \dots, T$ , so that the conditional distribution  $f(z_i | \mathbf{x}_{it})$  is independent on  $\mathbf{x}_{it}$ , I get the random effects model:

$$y_{it}^* = \mathbf{x}_{it}' \boldsymbol{\beta} + v_{it}, \quad i=1, \dots, n, t=1, \dots, T_i$$

$$E(v_{it} | \mathbf{x}_{it}) = 0,$$

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

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

and  $\varepsilon_{it}$  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  $\rho$  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  $\rho$  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

Log likelihood = -3839.4768            Wald chi2(58)   =   831.86
                                           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  $\rho$  as being the (analogous) equivalent of the intra-cluster correlation (icc) in a multilevel model. Therefore when  $\rho$  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.