



Citizenship and
Immigration Canada

Citoyenneté et
Immigration Canada

Social Capital and Wages

Outcome of Recent Immigrants to Canada

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May 2008



Canada

Research and Evaluation

Acknowledgement

I would like to express my sincere appreciation to my thesis supervisor, Prof. Gilles Grenier, for his valuable insights, guidance and suggestions through the work for this paper. I am very grateful to Prof. Pierre Brochu, Prof. Chris Worswick, Prof. Ravi Pendakur and Prof. Catherine Deri Armstrong for their helpful feedback on the earlier drafts and presentations. This paper has benefited from the financial support and comments from the Research and Evaluation Branch, Citizenship and Immigration Canada. Specifically, special thanks to Martha Justus, Eden Thompson, and Jessie-Lynn MacDonald who provided great continued support for completing my PhD dissertation. In addition, I am so grateful to my colleagues at CIC, especially Stan Kustec, Colleen-Marie Dempsey and Jun Zhao who gave very helpful suggestions and comments on the earlier versions of the paper and relevant presentations.

Abstract

This paper studies the interactions between social capital and immigrants' wages, drawing upon the Longitudinal Survey of Immigrants to Canada (LSIC). The paper attempts to deal with some of the difficulties faced by previous studies on returns to social capital. Taking advantage of the longitudinal nature of the LSIC, the paper takes into account unobserved individual heterogeneity by using panel data models: random effects, fixed-effects, Hausman-Taylor (HT) and instrumental variable (IV) models for panel data. The suspected correlation between social capital and unobserved individual ability motivates the study to treat social capital as endogenous. The estimator proposed by Hausman and Taylor (1981) is used to take into account this endogeneity. This estimator is then shown to be efficient and consistent, and it is favoured over other panel data estimators, including the IV ones. The results show that social capital adds to human capital and has important effects on immigrant wages during their first years in Canada. Strong ties such as family networks and friends dominate weak ties such as organizations in helping immigrants get better jobs in terms of higher wages during their first four years in Canada. This is true especially for those who are disadvantaged with respect to their human capital. Meanwhile, the ethnic diversity of the workplace network is the most influential factor within social capital that affects wages for both male and female immigrants.

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1. Introduction

It is now well established that social capital¹ is a resource that resides in interpersonal networks and that workers draw upon it to access employment and better job opportunities (e.g. Granovetter 1995; Lin 2001). Returns to social capital in the labour market have been explored increasingly over the last decade (e.g. Lin 1999; Staiger 1990; Calvó-Armengol and Jackson 2003). Despite an important theoretical literature arguing that using contacts or networks increases wages and occupational status (e.g. Granovetter 1995; Lin 2001), the empirical results on the effects of social capital on labour market outcomes vary with the contexts of the studies. The disparity of measurements of social capital and the unavailability of relevant data leave the empirical question open.

When the question on the role of social capital in the labour market is extended to the immigrant population, new issues arise. Contrary to the quite consistent findings that social capital enhances employment outcomes for non-immigrants, some existing studies on social capital and immigrant economic outcomes indicate that this positive relationship does not necessarily hold for them (e.g. Potocky-Tripodi 2004; Xue 2007). Meanwhile, some other studies support the argument that social capital is important for the economic integration of immigrants, especially for those disadvantaged in the labour market (e.g. with less human capital) (e.g. Livingston 2006). Mainly because of data limitations, most studies focus on specific immigrant groups, ignoring the unobserved individual heterogeneity. In addition, the potential endogeneity of social capital with respect to individual unobserved heterogeneity in innate ability makes this problem particularly difficult to study.

The primary objective of this paper is to identify the effects of endogenous social capital on wages. This paper features several ways of dealing with the aforementioned difficulties in the literature. First, drawing on a recent dataset – The Longitudinal Survey of Immigrants to Canada (LSIC), because of its longitudinal nature it is possible to take into account unobserved individual heterogeneity by using panel data models. In this paper, different panel models are employed to estimate social capital effects: random effects model, fixed-effects model, Hausman-Taylor (HT) model and instrumental variables (IV) model for panel data. Second, the endogeneity of social capital motivates the study to examine the return to social capital treating social capital indicators as endogenous variables. In the paper, instrumental variables (IV) methods and a generalized method of moments (GMM) estimator proposed by Hausman and Taylor (1981) are used to take into account endogeneity. The Hausman-Taylor estimator is shown to be efficient and consistent and is favoured over other panel estimators including IV ones. The results show that endogenous social capital variables have significant effects on immigrant wages during the initial years in Canada. Unlike the previous literature (e.g. Granovetter 1973), strong ties such as family network and friends dominate weak ties, including organizations, in getting immigrants better jobs in terms of higher wages in the first years, especially for those disadvantaged in human capital. The results confirm the expected (imperfect) substitution effects of social capital on human capital. Meanwhile, the ethnic diversity of the workplace network is the most influential factor within social capital that affects wages for both male and female immigrants.

The outline of the paper is as follows. In the following section, a brief review of the literature is provided in order to situate the current paper in. In Section 3, a description of the data and methodology are presented. Then, the theoretical and empirical frameworks follow in Section 4, after which a brief descriptive analysis is provided in Section 5. Section 6 presents the estimation results, with a focus on differences among various panel data estimators. The paper ends with conclusions and a discussion in Section 7.

¹ The definition and measurement of social capital was discussed in detail in Xue (2007) “Social Capital and Employment Entry of Recent Immigrants to Canada”.

2. Literature Review

2.1. Wages and social networks

The existing economic literature on social networks and wages is mainly based on job matching models. The theoretical effects of social relationships on job quality in terms of wages have been explored extensively (e.g. Montgomery 1991; Cahuc and Fontaine 2002). Particular consideration has been given to problems related to workers' transition in the labour market in terms of employment status, wages and unemployment exits (Calvó-Armengol and Zenou 2005). According to these theoretical models, various types and patterns of social networks lead to better transitions from unemployment to work by reducing the cost of job search for potential employees and employers, and promoting the efficiency of the matching process. Specifically, theoretical 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), longer job tenure (Simon and Warner 1992; Loury 2006) and lower quit rates (Datcher 1983), though not necessarily higher wages (Staiger 1990; Granovetter 1995; Calvó-Armengol and Jackson 2004).

On the empirical side, studies have examined the efficiency of networking in terms of the quality of jobs as mainly measured by the wage. Many studies have examined the direct relationship between the use of informal networks in finding jobs and labour market outcomes, while some researches focus on the effects of social capital resources or stocks on employment outcomes. There is mixed evidence on how social networks affect labour market earnings. On the one hand, a number of studies have found a positive relationship between measures of social capital and wages (e.g. Flap and Boxman 2001; Lai, Lin and Leung 1998). Earlier work by Granovetter (1973) concludes that, while immediate social networks (relatives and close friends) do have an impact on job transitions, weak ties (distant relationships, e.g. workmates) dominate strong ties for both transitions and wages. On the other hand, there is no evidence that using networks or informal job search methods affects occupational status (e.g. Bartus 2001), and there is mixed evidence on the effects of informal search methods on wages. 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.

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

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

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

Given the difficulties and disparities in measuring social capital stock, some of the relevant research using job search methods as a proxy for social network resources indicates that use of social networks does not have strong effects on labour market earnings (e.g. Mouw 2002). Due to data limitations it is difficult to know

exactly which method led to the observed job; most studies connect the forms of social capital to job search methods and use cross-sectional methods to estimate social capital effects. As a consequence there is still limited empirical evidence to test the theoretical questions: How do the characteristics of social networks, such as size, diversity and density, affect employment quality? Do the jobs acquired through informal networks pay higher or lower wages than similar jobs found via formal methods, considering unobserved individual heterogeneity?

2.2. Social capital effects on wages of immigrants

Immigrants may behave differently from natives in terms of the kind of resources they rely on to access the labour market, especially in the initial periods of settlement and integration. There is evidence that particularly during the initial settlement period, social capital and personal ties influence immigrant economic performance significantly (Kunz 2005). While it is now well established in the migration literature that social capital is a resource that resides in interpersonal networks and that migrants draw upon it to find jobs, the effects of social networks on wages of immigrants vary considerably across studies.

For example, Amuedo-Dorantes and Mundra (2004) use the Mexican Migration Project (MMP) data to find that social networks not only affect the likelihood of finding employment, but they also play an important role in facilitating the economic assimilation of Mexican immigrants in the U.S. in terms of a higher hourly wage. Specifically, Aguilera and Massey (2003) indicate that social capital plays a more significant role in determining the wages of undocumented migrants than documented migrants. Aguilera and Massey use the same dataset as Amuedo-Dorantes and Mundra (2004) to find no relationship between job search method and wages among Mexican Immigrants, with the exception of a positive relationship between kin networks and formal sector employment among undocumented Mexican workers in the U.S. These findings suggest that social capital can act as a substitute for human capital, though only imperfectly, for those disadvantaged in the labour market, such as those with less human capital or with legal restrictions, to overcome employment barriers.

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

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

The existing literature on the relationship between social capital or social networks and immigrant labour market outcomes is primarily for the U.S. context. As the availability of data with information on employment and wages along with detailed social network structure is relatively rare in the empirical literature on social networks in labour market, most studies have similar characteristics: they focus on specific groups of immigrants and using network-based job search methods or neighbourhoods as a proxy for social capital.

While little work has examined the social capital stock and employment qualities, a group of related studies lends some evidence on this issue by looking at ethnic or neighborhood characteristics as a proxy for social capital. The effects of social networks on immigrants' employment status and earnings may differ significantly according to how social capital is defined and measured. For instance, employing home language as a proxy for social networks, Bertrand, Luttmer and Mullainathan (2000) uncover evidence that these social networks influence welfare participation in the 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 the concentration of the home language has a negative effect on earnings. Borjas (1995) looks at one element

of social capital – ethnic capital as measured by residential segregation of ethnic groups, and finds that ethnic neighbourhoods negatively influence the economic performance of immigrants in the US.

In the context of Canada, despite the large immigrant population, attention has yet to be paid to the potential relationship between social networks and immigrant labour market performance. Again, probably due to the limitation of available data, existing related research in the context of labour market outcomes of immigrants to Canada also tends to use ethnic enclaves or neighborhoods as an indicator of social capital.

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

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

Within the context of social network and immigrant labour market outcomes, a much-debated issue is the potential endogeneity of social capital effects. One explanation for the wage differentials is unobserved individual heterogeneity, which is likely to affect a person's social network characteristics as well. How does social capital stock and wage status vary among immigrants with different characteristics such as ability and attitudes towards employment? However, the existing literature in the context of immigrant integration does not deliver endogenous social capital effects on wage outcomes. The present research attempts to examine the endogenous differential social capital effects of social networks on immigrants' wages.

3. Data and Methodology

3.1. Data

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. Information provided from the 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 by capturing information that moves beyond the economic aspects to include the social and cultural aspects of integration – information critical to understanding the determinants of immigrant integration outcomes.

The LSIC is a “longitudinal” survey – that is, the same respondents were interviewed repeatedly over time. For the LSIC, interviews took place at six months, two years and four years after arrival in Canada. By interviewing the same people over time, the LSIC provides a dynamic picture of the experiences of these recent immigrants, rather than a static “snapshot”.

To participate in the LSIC immigrants must have: arrived in Canada between October 2000 and September 2001; been 15 years of age or over at the time of landing; and landed from abroad. There was only one participant per family unit.² The interviews were conducted by Statistics Canada, with the first wave taking place between April 2001 and May 2002, the second between December 2002 and December 2003, and the third between December 2004 and December 2005. Twelve thousand immigrants were interviewed in Wave 1, while 9,300 and 7,700 of them participated in Waves 2 and 3 respectively.

The survey covers a variety of topics including demographic characteristics of the longitudinal respondents,³ Citizenship, Social Interactions, Group Organizations, Language Skills, Housing, Education, Employment, Health, Values and Attitudes, Income, and Perceptions of Settlement.

Based on the network-based concept using information that is unique to the LSIC data, with focus on the Social Interactions and Group Organizations modules, indicators of social capital were constructed in different dimensions: size, density, and diversity for various types of social capital for each wave (Xue 2007).⁴ In addition, benefiting from the information in the LSIC on the actual channels through which immigrants found jobs, it is possible to identify which connections lead to specific jobs so that indicators of job-found channels were created: through family members or relatives, through co-ethnic friends, through non co-ethnic friends or through formal channels.⁵

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

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

² See “Statistics Canada (2007), Longitudinal Survey of Immigrants to Canada, Wave 3 – Microdata User Guide” for sample selection and survey design.

³ 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 immigrant came in Canada.

⁴ Details on construction of social capital indicators are illustrated in Xue (2007).

⁵ For each individual, the job-found channel is determined by the channels through which the current main job was found.

predictors and wage outcomes, the sample is separated into male and female immigrants for regression analyses.

3.2. Methods

All analyses are longitudinal, taking advantage of this characteristic of the LSIC. The relationships between social capital indicators and weekly wages are examined with panel data models, including fixed and random effects models in order to capture the unobserved individual heterogeneity. The Hausman-Taylor (HT) models and panel instrumental variable (IV) models are also used to further address the endogeneity on the returns to social capital. Ethnic concentration ratios in the Census Metropolitan Areas (CMAs) and Census Agglomerations (CAs), where the longitudinal respondents (LRs) lived are derived from 2001 Census, are included in the IV models as external instrumental variables.⁶

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

⁶ The ethnic concentration ratios in CMA/CAs are derived from 2001 Census 20% sample data.

4. Theoretical and Empirical Framework

4.1. Theoretical framework

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

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

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

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

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

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

In this model, the wage that agent i obtains is a function of past wage status and the person's network. The model provides a tool for analyzing effects of social networks on employment and wage dynamics. Calvó-Armengol and Jackson used this model to show that the wages of any connected agents are positively correlated across network under the steady-state distribution and furthermore, the wages of connected individuals are positively correlated across time periods.⁷ There exists a short run negative correlation between employment status, wages and network size, which results from competition for information about certain jobs. However, the long-run benefits of improved wage status of networks outweigh the short run competition effects. Wages increase with network diversity and quality. Different social groups with identical job information networks but different starting wage have different wage outcomes across groups.

⁷ For detailed proof of propositions, see Calvó-Armengol and Jackson (2007).

The current paper is an empirical test in the immigration context of the results implied by this network model, especially on the claim that network size and content matters to labour market outcomes.

4.2. Estimation framework and model specification

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

The basic panel data model takes the form

$$(1) \quad y_{it} = x_{it}\beta + \alpha_i + \varepsilon_{it}$$

where y_{it} is the log of wages, and x_{it} is socio-economic characteristics of the LSIC immigrants including social networks. Among x_{it} , some variables vary with time such as age, marital status, while others do not, such as country of origin and immigration category. $\alpha_i + \varepsilon_{it}$ is the residual term. α_i is the individual specific effect, which differs between individuals but for any particular individual, its value is constant. ε_{it} is the usual residual that is strictly exogenous with the usual properties, i.e. mean 0, uncorrelated with itself, uncorrelated with x , uncorrelated with α_i , and homoskedastic.

$$(2) \quad E[\varepsilon_{it} \mid \alpha_i, x_{i1}, \dots, x_{iT}] = 0$$

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

4.2.1. Random effects model

One variant of the model (1) assumes that the unobserved individual effects are random variables that are distributed independently of the explanatory variables (assumption (3) below). This is called the random effects (RE) model.

$$(3) \quad E(\alpha_i \mid x_{it}) = 0$$

The RE estimator is a generalised least squares (GLS) estimator, which uses both within-group (deviation from individual mean) and between-group (individual mean) variations, but weights them according to the relative sizes of $\sigma_\varepsilon^2 + T_i\sigma_\alpha^2$ and σ_ε^2 . It is equivalent to the following two steps: 1) transform the data:

$$y_{it}^+ = y_{it} - \theta_i \bar{y}_i \quad \text{and} \quad x_{it}^+ = x_{it} - \theta_i \bar{x}_i, \quad \text{where} \quad \theta_i = 1 - \sqrt{\frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + T_i\sigma_\alpha^2}}; \quad 2) \quad \text{regress } y_{it}^+ \text{ on } x_{it}^+.$$

The variance parameters σ_ε^2 and σ_α^2 can be estimated from the within-group and between-group regression residuals.

However, assumption (3) is unlikely to hold in many cases. In the present study, the unobserved individual invariant effects α_i could include personal characteristics such as ability, motivation and preferences which are very likely related to some explanatory variables for wages, like educational attainment, social network type and content and so on. In this case $E(\alpha_i \mid x_{it}) \neq 0$ and the random effects estimator is biased and inconsistent.

4.2.2. Fixed effects model

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

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

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

4.2.3. Hausman-Taylor model

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

$$(4) \quad y_{it} = x_{1it}\beta_1 + x_{2it}\beta_2 + w_{1i}\gamma_1 + w_{2i}\gamma_2 + \alpha_i + \varepsilon_{it}$$

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

$$(5) \quad E(a_i | w_{1i}) = 0 \text{ and } E(a_i | x_{1it}) = 0$$

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

Under assumptions (2) and (5), the Hausman-Taylor estimator consistently and efficiently provides estimates of β , while the fixed effects estimator consistently estimates β under weaker assumptions (2) but not efficiently. Thus a Hausman test based on the difference between the Hausman-Taylor estimator and the fixed effects estimator is used to test assumption (5). The test results, presented in the estimation results table, indicate that instrumentation of the social capital variables, education, skill level, job tenure and working hours is sufficient to remove any correlation between the individual specific effects (ability, motivation and so on) and the remaining explanatory variables.

4.2.4. Instrumental variables estimator for panel data models

There are two forms of endogeneity in this context. One is the unobserved common factors⁸ which are addressed by the Hausman-Taylor estimator. The other is the so-called two-way causation: social capital is rewarded with higher pay and workers tend to develop social networks in high-paid jobs (i.e. $cov(SocialK_{it}, \varepsilon_{it}) \neq 0$). This potential endogeneity of social capital variables with the disturbance term ε_{it} would require instrumental variables (IV) methods like two stage least squares (2SLS) to obtain consistent parameter estimates.

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

Fixed effects IV (FE2SLS), random effects IV (RE2SLS) and Baltagi (1981)'s error component two-stage least squares (EC2SLS) estimates are employed to allow for the endogeneity of social capital variables and labour market success in terms of wages. While fixed effects 2SLS cannot provide estimates for time invariant variables, Baltagi's EC2SLS is a matrix-weighted average of between 2SLS and fixed effects 2SLS.⁹ So the EC2SLS estimates are reported in the paper as representative of panel IV models to be compared with ordinary panel data models. Hausman tests are conducted to compare the results from various panel data models including instrumental variable ones.

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

4.2.5. Variables used and model specification

Within all models of the study, the dependent variable is the log of real weekly wages of the current job(s). Weekly wages are determined by summing weekly wages of all the current jobs at each interview. The nominal wages are converted to real values based on 2005 Canadian dollar (i.e. Wave 3 interview period is treated as base year) using annual CPI from 2001 to 2005.¹⁰

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

- 1) Demographic variables: age, marital status, which are time varying and exogenous with α_i .
- 2) Immigration category: dichotomous variables equal to unity if Skilled Worker Principal Applicants, Skilled Worker Spouses and Dependants, Refugees and Others, with Family Class immigrants as the reference. These variables are time invariant and exogenous.
- 3) Region of birth: dichotomous variables equal to unity if born in Asia and Pacific, Central and South America, Europe other than UK and Western Europe, and Africa and Middle East, with North America, UK and Western Europe as the benchmark. These variables are time invariant and assumed to be exogenous.
- 4) Province of residence: dichotomous variables equal to unity if lived in Atlantic Provinces, Quebec, Prairies Provinces and British Columbia with Ontario as the reference category; five dichotomous variables equal to unity if lived in the top five CMAs – Toronto, Montreal, Vancouver, Ottawa and

⁸ Here, unobserved ability is rewarded with high pay and people with high innate ability tend to have higher levels of social capital and education.

⁹ For technical details on Baltagi's EC2SLS, see Baltagi (2005), Section 7.1 in Chapter 7.

¹⁰ The conversion considers Wave 1 to be in 2001, Wave 2 in 2003 and Wave 3 in 2005.

Calgary. Inclusion of these variables is to capture the local labour market disparity. These variables are time varying and exogenous.

- 5) Ethnic group: dichotomous variables equal to unity if Chinese, South Asian, Black, Filipino, Latin, West Asian and Arab, Other Asian (Southeast Asian, Korean and Japanese), and Other Visible Minority, with White as the benchmark.¹¹ Similar to region of birth variables, these variables are time constant and exogenous.
- 6) Education: dichotomous variables equal to unity if LR had a master's degree, college diploma or some university education, some post-secondary education, a high school diploma or less, with a bachelor's degree as the reference; a dichotomous variable equal to unity if in school at the time of interview. The education variables are time varying and assumed to be correlated with unobserved ability.
- 7) Languages: dichotomous variables equal to unity if has knowledge of English (speaking fairly well, well, very well and with English as the native language), or knowledge of French (speaking fairly well, well, very well and with French as the native language). Both variables are time varying and assumed exogenous.
- 8) Experience: length of time in Canada measured in weeks and a set of dichotomous variables equal to unity if had work experience before immigration, had visited Canada before, had worked in Canada on a work permit before, had studied in Canada on a study permit before, or had an arranged job in Canada when landing. Obviously the time spent in Canada is time varying while other variables indicating experience before or upon landing are time constant. All of these are assumed to be exogenous.
- 9) Occupation and skill level: Occupation major groups are defined using the Standard Occupational Classification (SOC) 1991 while skill levels are determined using the National Occupational Classification (NOC) 2001. Management occupations are considered as skill level A. For multiple-job holders, occupation group and skill level are determined by the current main job.¹² These variables change over time. Occupational variables are exogenous while the skill levels are assumed to be endogenous with individual ability as they are highly correlated with education level.
- 10) Number of current jobs and total hours worked per week are included in the control variables to account for comparability, as the weekly wages are the summation of weekly wages of all current jobs. Job tenure is measured as the number of weeks worked at the job and is included as a control variable. These variables are all time varying. Hours worked per week and job tenure are assumed to be endogenous.

Social capital indicators are built according to the LSIC data structure (Xue 2007). 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, indicators are built to measure the social capital stock: size, geographic closeness, diversity, frequency of contact.

Different from what are included in the empirical analysis for employment likelihood (Xue 2007), workplace network is added in friendship network to further investigate the effects of characteristics of workplace interpersonal network on wages outcome of immigrants. Specifically, while meeting new friends at workplaces was excluded from the number of sources of meeting new friends in Xue (2007) for analysis of employment likelihood, given the endogeneity of the two variables, it is counted as one source of meeting

¹¹ In the LSIC, there are questions on both ethnicity and visible minority group (population group). The question on population group was used to construct the ethnic group variables in the current paper.

¹² The current main job is identified by the following criteria: 1. If the LR only had one current job, it was the main job. 2. If the LR had more than one current job, the job with the most hours worked per week was the main job. 3. If more than one current job met the above criteria, the job with the earliest start date was selected. 4. If the above criteria did not help to identify one job among the current jobs, the first job reported was selected.

friends, i.e. size of friendship, in the current paper as the current sample only includes those who were employed. A new variable, ethnic diversity of workplace network, considering the relative number of supervisors and co-workers of the same ethnic group as an immigrant worker, is included in social capital indicators in the estimations for wages.

For group and organizational networks, due to the low participation in groups and organizations among all immigrants, only one dummy variable indicating whether LR participated in any kind of groups or organizations is included in the estimation models instead of size, diversity, density indexes for organizational networks.¹³

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

All the social capital variables are assumed endogenous with unobserved individual heterogeneity in the Hausman-Taylor models.

¹³ In the preliminary estimations, size, diversity and density indexes were used to capture the characteristics of group and organizational networks, which leads to insignificant coefficients for all organizational networks indicators. This could result from the large number of missing values for size, diversity and density indicators of organizational networks due to the low participation in organizations among all immigrants. However, the results including size, diversity and density indexes of organizational networks in the estimations are available upon request.

5. Descriptive Statistics of the Estimation sample

After the selection of the sample¹⁴, there were 3014 males and 2399 females left for the estimations. Table 1 presents the weighted survey means for the dependent and selected independent variables for both male and female immigrants included in the sample.¹⁵

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

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

At the time of landing, around 50% of immigrants had relatives already living nearby (49% of men and 55% of women). And also about half of the immigrants had friends living in the same province or city (51% and 48% for male and female newcomers, respectively). Participation in organizations was relatively low: only three in 10 immigrants took part in any kind of groups or organizations (30% and 29% for males and females respectively). As the ethnic diversity indexes are scaled to run from 0 to 1, the immigrants in the sample demonstrated relatively diverse networks (about 0.5 for friendship diversity and nearly 0.8 for workplace diversity).¹⁶

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

¹⁴ Please see section 3 for sample restrictions.

¹⁵ For survey means of complete variables, see survey means table in the Appendix.

¹⁶ Xue (2007) presents details on how these diversity indexes are defined.

Table 1. Survey means of selected variables in the estimations

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

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

6. Empirical Results

The estimation of the log of real weekly wages is undertaken in longitudinal models, including random effects, fixed effects, Hausman-Taylor models and instrumental variables (IV) model for panel data. Table 2 shows the estimation and relevant test results of the log of real weekly wages for male and female immigrants.¹⁷

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

6.1. Social capital effects

Looking at social capital variables included in Table 2, it is clear that there are significant relationships between social networks and weekly wages. The results are robust across different statistical models. The directions of the relationships between social capital indicators within various types of social networks and weekly wages are mixed. The channels through which a newcomer gets a job do not make much difference for male immigrants in terms of wages, which is reflected by the always non-significant coefficients of personal contacts as job-found channels. In contrast, jobs found through family ties provide higher wages for female newcomers than those found through other methods, varying from 4.5% (random effects model) to 15.1% (panel IV model), but the significance is not observed in the panel IV model. The size of kinship network always has a negative coefficient for both male and female newcomers, but only sometimes statistically significant (in fixed effects model and Hausman-Taylor model). The size of the friendship network has different impacts on wages of different genders. It has a non-significant positive effect on male immigrants' wages but has a significant negative impact on female newcomers' wages. While a more diverse workplace network is associated with higher employment earnings for both male and female newcomers, the magnitude of the effect differs across models.

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

The p-values of the Hausman tests are shown in the bottom row of Table 2. For male and female immigrants, the Hausman tests for (fixed effects – random effects) are $X^2(44) = 269.71$ with p-value of 0.0000 and $X^2(44) = 254.35$ with p-value of 0.0000, respectively. Thus we can reject the null hypothesis that assumption (3) holds and fixed effects model is favoured over random effects model for both men and women samples. In contrast, the Hausman tests for (Hausman-Taylor estimator – fixed effects) show that we cannot reject the null hypothesis of assumption (5) for both gender samples; therefore the set of instruments x_1 and z_1 chosen are legitimate and the Hausman-Taylor estimator is consistent and efficient.

The Hausman tests for (FE2SLS – EC2SLS) are $X^2(43) = 108.02$ with p-value of 0.0000 and $X^2(43) = 151.53$ with p-value of 0.0000 for male and female immigrants, respectively. This result shown in Table 4 rejects the null hypothesis that EC2SLS yields a consistent estimator. An additional Hausman test based on the difference between fixed effects 2SLS and ordinary fixed effects estimators fail to reject the null hypothesis that ordinary fixed effects estimators are consistent. In other words, there is no significant evidence that social capital variables are correlated with the disturbances term ε_{it} in the wages equation.

Recall that the Hausman-Taylor estimators are consistent and efficient compared with fixed effects. Thus the Hausman-Taylor (HT) estimators are favoured among all panel data models in the current research, and the rest of the paper will focus on the results from the HT estimators.

¹⁷ Table 2 only shows the coefficient estimates for social capital variables. For complete estimation results, see Appendix.

Table 2. Estimated effects of social capital variables on the log of real weekly wages

	Males				Females			
	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)
Social capital variables								
Channels through which the current main job was found								
Job found through family ties	-0.007	0.030	0.029	-0.068	0.045**	0.069**	0.071***	0.151
Job found through coethnic friends	-0.018	0.010	0.009	-0.219*	-0.017	0.005	0.004	-0.153
Job found through non-coethnic friends	0.005	0.037	0.040	-0.194	-0.040	-0.012	-0.015	-0.638**
Relatives								
Number of relatives in Canada	-0.004	-0.097**	-0.103***	-0.006	0.000	-0.115*	-0.119***	-0.013
Relatives living nearby upon landing	-0.017	-	-0.520*	-0.007	-0.004	-	-0.444	0.017
Relatives living far upon landing	0.055	-	1.515*	0.044	0.038	-	1.642	0.051
Frequency of contact with sponsors	0.040*	0.051	0.056**	0.026	0.020	0.033	0.031	0.010
Friends								
Number of sources meeting friends	0.003	0.003	0.003	0.010	-0.011**	-0.010*	-0.010***	-0.008
Friends living nearby upon landing	-0.008	-	-0.114	-0.007	0.028	-	0.046	0.024
Friends living far upon landing	0.050**	-	0.243	0.041	0.038	-	-1.359	0.036
Ethnic diversity of friends	0.021	0.028	0.025	-0.327*	0.012	0.034	0.029	-0.373*
Frequency of contact with friends	0.003	-0.021	-0.022	0.122*	0.013	0.031	0.034	0.175**
Ethnic diversity of workplace network	0.180***	0.130***	0.138***	0.600**	0.186***	0.142***	0.145***	0.957***
Group and organizational network								
Participation in organization	0.007	0.023*	0.023*	0.084	0.017	0.003	0.003	0.210
No. of observations	6235	6235	6235	6235	4448	4448	4448	4448
No. of individuals	3014	3014	3014	3014	2399	2399	2399	2399
Chi2	9088.070	5505.687	5863.969	5872.993	7446.827	4711.482	5370.115	5369.095
R²	0.510	-	-	-	0.543	-	-	-
rho	0.527	0.764	0.858	0.397	0.427	0.830	0.979	0.378
p-value of Hausman test	0.000	-	0.320	0.000	0.000	-	1.000	0.000

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

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

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

For male immigrants, the elements within social networks which play a role in determining employment wages are workplace ethnic diversity, kinship size and frequency of contact with family sponsors. An increase in workplace ethnic diversity from a total concentration in one ethnic group to a total diverse workplace network would increase the log of real weekly wage by 13.8%. The frequency of contact with sponsors shows a return of 5.6% in wages. The geographic closeness of relatives and participation in organizations also shows marginally significant (at 10% level) effects on real weekly wages, though the directions of the effects differ. Size of kinship has a significant negative return for male newcomers. One more relative¹⁸ in Canada is associated with a 10.3% wage discount.

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

¹⁸ As the number of relatives is measured by the number of types of relatives in Canada, this result should be interpreted with caution.

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

Allowing social network variables to be endogenous with unobserved heterogeneity has a large effect on the estimated returns to social capital. It can be seen that introducing the endogeneity of social capital indicators with individual effects reduces or increases the return to social capital by about 20 to 30 percent for both sexes. Comparing column 1 and column 3 in Table 2, the return to workplace diversity decreases from 18% using random effects model to 13.8% using the Hausman-Taylor estimator for male immigrants, a decrease of 23%. For females, the return to social capital estimated with random effects model is also very different from the return using the Hausman-Taylor estimator: the return to family ties as a job search channel increases to 7.1% from 4.5% while the return to workplace diversity drops from 18.6% to 14.5%, a drop of 22%. When taking into account the endogeneity of social capital variables with individual effects, the negative effects of kinship size also become bigger and statistically significant, for both male and female immigrants.

6.2. Differential social capital effects

To further explore the differential effects of social capital indicators, interaction terms of social network variables with education, language skills, ethnic group and immigration class are included separately in the Hausman Taylor models. The final specifications presented in Table 3 put all significant interaction terms together, excluding non-significant interactions for men and women immigrants respectively. In Table 3, the specifications of interaction models for male and female immigrants are presented based on the same assumption that social capital variables, education, skill level, job tenure and working hours are endogenous with individual specific effects. This closer look at the coefficients of interaction terms reveals that social capital affects wages of immigrants with varied characteristics quite differently.

For male immigrants, social capital, especially family networks, has stronger effects on less-educated immigrants' earnings. Specifically, when interacted with education attainment, the size of family ties plays different roles on weekly real wages for immigrants with varied education levels. Relative to those with university degrees, those less educated benefit more from the number of relatives – having much higher returns to the number of relatives in Canada: 20.9% higher for those who had some post-secondary education, 14.1% more for those with a college diploma and 2.2% more gain (though not significant) for those who had a high school diploma or less. Furthermore, the return to family ties as a channel for finding a job is also larger for those with less education: 21.1% more gain for those high school graduates, 18.5% more for those with some post-secondary schooling and 13% more for college graduates, relative to the jobs found through non family members or relatives. It is interesting that those with higher education are also more likely to benefit from family ties in terms of 16.1% higher return in the jobs found through relatives than jobs found through other ways, though the effect is only marginally significant at the 10% level.

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

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

However, workplace diversity seems to be most beneficial for those with a university degree, and not for the less educated, neither more educated. For example, workplace diversity has 35.5% weaker effects for those

with a high school diploma or less, 46% less returns for those with some post-secondary education, and 34.3% weaker for female immigrants with a master's degree or a PhD.

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

Table 3. Interaction effects of social capital on the log of real weekly wages

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

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

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

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

7. Discussions and Conclusions

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

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

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

For women, the social capital effects are quite universal, except for groups with different human capital stock in terms of education and language skills. Jobs found through family ties give much higher premiums over jobs found through other methods to those female immigrants without English speaking skills than those who could converse in English fluently. Francophone immigrants who found jobs through non-coethnic friends receive much less than those without knowledge of French obtaining jobs through the same way. However, it is interesting that the impact of ethnic diversity of workplace network is not enlarged for those women newcomers short of educational capital. Those female immigrants with lower education level are penalized more for a diverse workplace network.

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

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

Meanwhile, the results show that personal ties are most useful or important for those disadvantaged by human capital in the labour market. The return to social capital is generally much higher for these groups. These findings confirm the previous literature that social capital substitutes for human capital to some extent, and its effects are amplified for those lacking labour market skills as well.

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

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

8. References

- Aguilera, M.B. & Massey, D.S. (2003), "Social Capital and the Wages of Mexican Migrants: New Hypothesis and Tests", *Social Forces* 82 (2): 671-701.
- Amuedo-Dorantes, C. & Mundra, K. (2004), "Social Networks and Their Impact on the Employment and Earnings of Mexican Immigrants", Paper provided by EconWPA in its series *Labor and Demography* with number 0502001.
- Baltagi, B.H. (2005), *Econometric Analysis of Panel data*, Third Edition, John Wiley & Sons, Ltd.
- Baltagi, B.H. (1981), "Simultaneous Equations with Error Components", *Journal of Econometrics* 17: 189-200.
- Barros, C. P. (2006), "Earnings, Schooling and Social Capital of Cooperative Managers", *Annals of Public and Cooperative Economics* 77(1): 1-20.
- Bartus, T. (2001), "Social Capital and Earnings Inequalities", Dissertation thesis. Groningen University.
- Bayer, P., Ross, S. & Topa, G. (2005), "Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes", *Working Papers* 05-23, U.S. Census Bureau, Center for Economic Studies.
- Beaman, L. A. (2006), "Social Networks and the Dynamics of Labor Market Outcomes: Evidence from Refugees Resettled in the U.S.", Yale University, job market paper.
- Beine, M., Docquier, F. & Ozden, C. (2007), "On the Size and Skill Structure of a Diaspora", *Industry Canada Economic Seminar Series*, June 13, 2007.
- Bertrand, M., Luttmer, E. & Mullainathan, S. (2000), "Network Effects and Welfare Cultures", *The Quarterly Journal of Economics* 115: 1019-1055.
- Borghans, L., Weel, B. & Weinberg, B. A. (2006), "People People: Social Capital and the Labor-Market Outcomes of Underrepresented Groups", *NBER Working Paper Series*, w11985, National Bureau of Economic Research, Inc.
- Borjas, G.J. (1995), "Ethnicity, Neighbourhoods, and Human-Capital Externalities", *American Economic Review* 85: 365-390.
- Cahuc, P. & Fontaine, F. (2002), "On the Efficiency of Job Search with Social Networks", *CEPR Discussion Paper* No.3511.
- Calvo-Armengol, A. & Jackson, M. O. (2007), "Networks in Labor Markets: Wage and Employment Dynamics and Inequality", *Journal of Economic Theory* 132 (1): 27-46.
- Calvo-Armengol, A., & Jackson, M. O. (2004), "The Effects of Social Networks on Employment and Inequality", *American Economic Review* 93 (3): 426-454.
- Calvo-Armengol, A. & Jackson, M. O. (2003), "Networks in Labor Markets: Wage and Employment Dynamics and Inequality", *Mimeo*, Caltech and Univeristat Autonoma de Barcelona.
- Calvo-Armengol, A. & Zenou, Y. (2005), "Job Matching, Social Network and Word-of-Mouth Communication", *Journal of Urban Economics* 57: 500-522.
- Chiswick, B. R. & Miller, P. W. (1996), "Ethnic Networks and Language Proficiency among Immigrants", *Journal of Population Economics* 9 (1): 19-35.
- Datcher, L. (1983), "The Impact of Informal Networks on Quit Behaviour", *Review of Economics and Statistics* 65: 491-495.
- Durlauf, S.N. (2002), "On the Empirics of Social Capital", *Economic Journal* 112: 459-479.
- Elliott, J. (1999), "Social Isolation and Labor Market Isolation: Network and Neighborhood Effects on Less-Educated Urban Workers", *Sociological Quarterly* 40 (2): 199-216.
- Fontaine, F. (2003), "Do Workers Really Benefit from Their Social Networks?" *Maison des Sciences Economiques*, Université Paris Panthéon-Sorbonne, Cahiers de la MSE No v04085.
- Flap, H.D. & Boxman, E. (2001), "Getting Started: The Influence of Social Capital on the Start of the Occupational Career", *Social Capital: Theory and Research*, ed. Lin, N., Cook, KS, Burt, R., New York.
- Giorgas, D. (2000), "Community Formation and Social Capital in Australia", *paper presented at the 7th Australian Institute of Family Studies Conference*, Sydney, 24-26 July 2000.

- Granovetter, M. (1973), "The Strength of Weak Ties", *American Journal of Sociology* 78: 1360-80.
- Granovetter, M. (1995), *Getting a Job: A Study of Contacts and Careers*, 2nd Ed. University of Chicago Press, Chicago.
- Green, G. P., Tigges, L. M. & Diaz, D. (1999), "Racial and Ethnic Differences in Job-Search Strategies in Atlanta, Boston, and Los Angeles", *Social Science Quarterly* 80(2): 263-78.
- Greene, W.H. (2003), *Econometric Analysis*, Fifth edition, Pearson Education, Inc., Upper Saddle River, New Jersey.
- Hausman, J. A. & Taylor, W. E. (1981), "Panel Data and Unobservable Individual Effects," *Econometrica* 4 (6): 1377-98.
- Holzer, H.J. (1987), "Informal Job Search and Black Youth Unemployment", *American Economic Review* 77: 446-452.
- Hou, F. & Picot, G. (2003), "Visible Minority neighborhood Enclaves and Labor Market Outcomes of Immigrants", *Analytical Studies Branch research paper series*, Catalogue no. 11F0019MIE – No.204, Statistics Canada.
- Kunz, J. L. (2005), "Orienting Newcomers to Canadian Society: Social Capital and Settlement", *Thematic Policy Studies*, Policy Research Initiative.
- Lai, G., Lin, N. & Leung, S.Y. (1998), "Network Resources, Contact Resources, and Status Attainment", *Social Networks* 20: 159-78.
- Lin, N. (1999), "Social Networks and Status Attainment", *Annual Review of Sociology* 25: 467-487.
- Lin, N. (2001), *Social Capital, a Theory of Social Structure and Action*, New York, Cambridge University Press.
- Livingston, G. (2006), "Gender, Job Searching, and Employment Outcomes among Mexican Immigrants", *Population Research and Policy Review* 25: 43-66.
- Loury, L.D. (2006), "Some Contacts Are More Equal than Others: Informal Networks, Job Tenure, and Wages," *Journal of Labor Economics* 24: 299-318.
- Montgomery, J.D. (1991), "Social Networks and Labor Market Outcomes: Toward an Economic Analysis", *American Economic Review* 81: 1408-1418.
- Montgomery, J.D. (1992), "Job Search and Network Composition: Implications of the Strength-of-Weak-Ties Hypothesis," *American Sociological Review* 57: 586-96.
- Mouw, T. (2002), "Social Capital and Job Search: Do Contacts Matter?" *Mimeo*, University of North Carolina.
- Munshi, K. (2003), "Networks in the Modern Economy: Mexican Migrants in the US labor market", *Quarterly Journal of Economics* 118: 549-599
- Narayan, D. (1999), "Bonds and Bridges: Social Capital and Poverty", World Bank, Washington. D.C.
- Pellizzari, M. (2004), "Do Friends and Relatives Really Help in Getting a Good Job?" *CEP (Centre for Economic Performance) Discussion Paper No. 623*, London School of Economics and Political Science.
- Potocky-Tripodi, M. (2004), "The Role of Social Capital in Immigrant and Refugee Economic Adaptation", *Journal of Social Service Research* 31(1): 59-89.
- Sanders, J. M., Nee, V. & Sernau, S. (2002), "Asian Immigrants' Reliance on Social Ties in a Multiethnic Labor Market", *Social Forces* 81: 281-314.
- Simon, C.J. & Warner, J.T. (1992), "Matchmaker, Matchmaker: the Effect of Old Boy Networks on Job Match Quality, Earnings and Tenure", *Journal of Labor Economics* 10(3): 306-330.
- Smith, S.S. (2000), "Mobilizing Social Resources: Race, Ethnic, and Gender Differences in Social Capital and Persisting Wage Inequalities", *Sociological Quarterly* 41: 509-537.
- Staiger, D. (1990), "The Effect of Connections on the Wages and Mobility of Young Workers", Cambridge, MA, the MIT Press.
- Stone, W., Gray, M. & Hughes, J. (2003), "Social Capital at Work", Research Paper No.31, Australian Institute of Family Studies, Melbourne.
- Warman, C. R. (2005), "Ethnic Neighbourhoods and Male Immigrant Earnings Growth: 1981 through 1996", *Analytical Studies Branch Research Paper Series*, Statistics Canada, Catalogue no. 11F0019MIE - No. 241.

- Woolcock, M. (2000), "Social Capital and Its Meanings", *Canberra Bulletin of Public Administration* 98: 17-19.
- Wooldridge, J. M. (2002), *Econometric Analysis of Cross Section and Panel Data*, the MIT Press, Cambridge, Massachusetts.
- Xue, L. (2007), "Social Capital and Employment Entry of Recent Immigrants to Canada", paper prepared for Citizenship and Immigration Canada.
- Yakubovich, V. (2005), "Weak Ties, Information, and Influence: How Workers Find Jobs in a Local Russian Labor Market", *American Sociological Review* 70(3): 408-21.

9. Appendix

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

Dependent variable	
Log of real weekly wage	Weighted Mean
Independent variables	
Immigration category	
Family	1 if LR is in Family class, 0 otherwise. (Reference category)
Skilled Workers (PA)	1 if LR landed as a Skilled Worker principal applicant, 0 otherwise
Skilled Workers (S&D)	1 if LR landed as a Skilled Worker spouse and dependant, 0 otherwise
Refugees	1 if LR landed as a Refugee, 0 otherwise
Others	1 if LR landed in a immigration category other than Family Class, Skilled Workers (principal applicants and spouses and dependants) and Refugees, which mostly consists of business immigrants in
Demographic variables	
Age	Age in years
Age Square	Age square/100
Married	1 if LR is married or living with a common-law partner, 0 if LR is single, separated or divorced, or widowed
Province of residence	
Atlantic Provinces	1 if LR is living in Atlantic provinces: New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador, 0 otherwise.
Quebec	1 if LR is living in Quebec, 0 otherwise.
Ontario	1 if LR is living in Ontario, 0 otherwise. (Reference category)
Manitoba and Saskatchewan	1 if LR is living in Saskatchewan or Manitoba, 0 otherwise.
Alberta	1 if LR is living in Alberta, 0 otherwise.
BC	1 if LR is living in British Columbia, 0 otherwise.
Census metropolitan areas (CMAs)	
Toronto	1 if LR is living in Toronto, 0 otherwise.
Montreal	1 if LR is living in Montreal, 0 otherwise.
Vancouver	1 if LR is living in Vancouver, 0 otherwise.
Ottawa-Hull	1 if LR is living in Ottawa-Hull, 0 otherwise.
Calgary	1 if LR is living in Calgary, 0 otherwise.
Not in the Big 5 CMAs	1 if LR is living in an area other than the big 5 CMAs, 0 otherwise.
Region of birth	
Asia and Pacific	1 if region of birth is Asia and Pacific, 0 otherwise.
North America, UK and Western Europe	1 if region of birth is North America, UK and Western Europe, 0 otherwise. (Reference category)
Central and South America	1 if region of birth is Central America and South America, 0 otherwise.
Europe except UK and Western Europe	1 if region of birth is Europe except UK and Western Europe, 0 otherwise.
Africa and Middle-East	1 if region of birth is Africa and Middle-East, 0 otherwise.
Population group	
White	1 if LR is white, 0 otherwise. (Reference category)
Chinese	1 if LR is Chinese, 0 otherwise.
South Asian	1 if LR is South Asian, 0 otherwise.
Black	1 if LR is Black, 0 otherwise.
Filipino	1 if LR is Filipino, 0 otherwise.
Latin	1 if LR is Latin, 0 otherwise.
West Asian and Arab	1 if LR is West Asian and Arab, 0 otherwise.
Other Asian	1 if LR is other Asian---South East Asian, Korean, Japanese, 0 otherwise.
Other Visible Minority	1 if LR is other visible minority---Visible minority n.i.e., Multiple visible minorities, White and visible minority, 0 otherwise.

Languages

English	1 if LR has the knowledge of English (speaking fairly well or better), 0 otherwise (poorly or none).
French	1 if LR has the knowledge of French (speaking fairly well or better), 0 otherwise (poorly or none).

Education

High school diploma or less	1 if LR has a master's degree or above, 0 otherwise.
Some post-secondary education	1 if LR has a bachelor's degree, 0 otherwise. (Reference category)
College diploma or some university	1 if LR has a college diploma or some university education, 0 otherwise.
Bachelor's Degree	1 if LR has some post-secondary education, 0 otherwise.
Master's degree or above	1 if LR has less than high school education or a high school diploma, 0 otherwise.
Currently in school	1 if LR is in school at the time of the interview, 0 otherwise

Experience

Had work experience before landing	1 if LR had work experience before landing, 0 otherwise
Number of weeks in Canada after landing	Number of weeks in Canada
Number of weeks in Canada after landing ²	(Number of weeks in Canada) square/100
Had an arranged job upon landing	1 if LR had an arranged job when landing, 0 otherwise
Visited Canada before landing	1 if LR visited relatives or friends in Canada or visited Canada as a tourist before landing, 0 otherwise
Worked in Canada before landing	1 if LR worked in Canada before landing, 0 otherwise
Studied in Canada before landing	1 if LR studied in Canada before landing, 0 otherwise
Number of current jobs	Total number of current jobs
Hours worked per week	Hours currently worked per week
Weeks in employment	Number of weeks at work since landing
Skill level	Skill level of current main job: 1=O or A (i.e. management level is treated as skill level A), 2=B, 3=C, and 4=D.

Occupation group

Management	1 if the current main job is in the Management Occupations, 0 otherwise
Business and Finance	1 if the current main job is in the Business, Finance and Administrative Occupations
Natural and Applied Sciences	1 if the current main job is in the Natural and Applied Sciences and Related Occupations, 0 otherwise
Health	1 if the current main job is in the Health Occupations, 0 otherwise
Social Science	1 if the current main job is in the Occupations in Social Science, Education, Government Service and Religion, 0 otherwise
Art, Culture and Recreation	1 if the current main job is in the Occupations in Art, Culture, Recreation and Sport, 0 otherwise
Sales and Services	1 if the current main job is in the Sales and Service Occupations, 0 otherwise
Trades, Transport and Equipment Operators	1 if the current main job is in the Trades, Transport and Equipment Operators and Related Occupations, 0 otherwise
Primary Industry	1 if the current main job is in the Occupations Unique to Primary Industry, 0 otherwise
Processing Manufacturing and Utilities	1 if the current main job is in the Occupations Unique to Processing Manufacturing and Utilities, 0 otherwise

Social capital***Channels through which current main job was found***

Job found through family ties	1 if the current main job was found through family members or relatives, 0 otherwise.
Job found through coethnic friends	1 if the current main job was found through friends in the same ethnic group as the LR, 0 otherwise.
Job found through non-coethnic friends	1 if the current main job was found through friends in the ethnic group different than the LR, 0 otherwise.

Relatives

Number of relatives in Canada	Number of types of relatives (spouse, children, parents, grandparents, brothers or sisters, etc.) in Canada, ranging from 0 to 11.
Relatives living nearby upon landing	1 if most of the existing relatives upon landing were living in the same city or same province as LR, 0 otherwise.
Relatives living far upon landing	1 if most of the existing relatives upon landing were living in a place other than the city or province in which LR lived, 0 otherwise.
Frequency of contact with family sponsors	Frequency of contact with family sponsor (0~1) : 0--- No sponsor or having not seen or talked to sponsors since arriving; Between 0 and 1 --- Seeing or talking to sponsors in varied frequencies; the higher the index is, the more frequently LR contacts with sponsors. 1--- Seeing or talking to sponsors every day.

Friends

Friends living nearby upon landing	1 if most of the existing friends upon landing were living in the same city or same province as LR, 0 otherwise.
Friends living far upon landing	1 if most of the existing friends upon landing were living in a place other than the city or province in which LR lived, 0 otherwise.
Number of sources meeting friends	Number of sources meeting new friends, ranging from 0 to 14.
Ethnic diversity of friends	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.
Frequency of contact with friends	Frequency of contact with friends (0~1) : 0--- No friends or having not seen or talked to friends since arriving; Between 0 and 1 --- Seeing or talking to friends in varied frequencies; the higher the index is, the more frequently LR contacts with friends. 1--- Seeing or talking to friends every day.
Ethnic diversity of workplace network	Ethnic diversity of workplace network (0~1): 0--- All the people with whom LR worked belong to the same ethnic or cultural groups as LR; Between 0 and 1 --- Some people with whom LR worked belong to the same ethnic or cultural groups as LR; the higher the index is, the more ethnically diversified is the friend network. 1--- None of the people with whom LR worked belong to the same ethnic or cultural groups as LR.

Group and organizational network

Participation in organization	1 if LR participated in any organization or group, 0 otherwise.
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Time effect

Wave 2	1 if the observation is in Wave 2 and 0 otherwise.
Wave 3	1 if the observation is in Wave 3 and 0 otherwise.

Instrumental variable

Ethnic concentration ratio	The ethnic group concentration ratio in the CMA/CA where LR lived, derived from 2001 Census.
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¹ LR: Longitudinal Respondent.

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

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

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

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

Table A.3. Estimated effects of non-social capital and social capital variables on the log of real weekly wages

	Males				Females			
	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)	Random effects	Fixed effects	Hausman-Taylor	Panel IV (EC2SLS)
Immigration category								
Skilled Workers (PA)	0.100***		-0.204	0.063*	0.095***		-0.100	0.046
Skilled Workers (S&D)	0.020		-.324**	-0.005	0.010		-0.334	-0.042
Refugees	-.084**		-.534***	-.084**	-0.048		-0.342	-0.061
Others	-0.057		-.310***	-0.050	-0.061		-0.215	-0.063
Demographic variables								
Age	0.041***	0.069***	.082***	0.041***	0.037***	-0.030	0.020	0.043***
Age ²	-.051***	-.087***	-1.02***	-.050***	-.052***	-0.023	-.033**	-.060***
Married	0.027	0.011	-0.001	0.017	0.013	-0.017	-0.009	0.005
Province and CMA of residence								
Atlantic Provinces	-.137*	-0.166	-.230**	-.142*	-.201**	-.542***	-.533***	-.238**
Quebec	-.316***	-1.245***	-.593***	-.274***	-.113**	-.296*	-.281**	-.137*
Manitoba and Saskatchewan	-.167***	-0.108	-.173**	-.173***	-0.080	-.975***	-.701***	-.117*
Alberta	-0.027	0.061	-0.076	-0.044	-0.053	-.340**	-.262***	-0.057
BC	-0.061	-0.205	-.142*	-0.019	-0.039	-0.030	-0.043	-0.016
Toronto	0.008	0.019	0.020	-0.001	0.009	0.034	0.019	0.018
Montreal	0.061	0.021	0.061	0.034	0.020	0.002	0.002	0.050
Vancouver	0.184***	0.788***	0.419***	0.138**	0.067	0.311**	0.256***	0.082
Ottawa-Hull	0.046	-0.129	-0.049	0.065*	0.092**	0.445***	0.331***	0.082*
Calgary	-0.035	-0.039	0.021	-0.041	0.032	-0.189	-.176*	0.036
Region of birth								
Asia and Pacific	-.178***		-0.113	-.191***	0.006		-0.057	-0.017
Central and South America	-.122**		-0.177	-.144**	-0.034		-0.186	-0.041
Europe except UK and Western Europe	-.239***		-0.061	-.263***	-0.060		-0.066	-.120**
Africa and Middle-East	-.113**		-0.094	-.136**	-0.003		-0.039	-0.050
Ethnic group								
Chinese	-.181***		-.161*	-.189***	-.092*		0.009	-0.051
South Asian	-.071*		0.124	-.084*	-0.070		0.122	-0.091
Black	-.076*		0.062	-.109**	0.001		0.244	-0.103
Filipino	-.107**		0.140	-.139***	-0.037		0.151	-0.089
Latin	-0.104		0.096	-.127**	-0.010		0.142	-0.081
West Asian and Arab	-.170***		-0.065	-.160***	-.117**		-0.055	-.123**
Other Asian	-.154***		-.197*	-.158***	-.203***		-0.259	-.195***
Other Visible Minority	-.266***		-0.023	-.276***	0.013		0.250	-0.003
Education								
High school diploma or less	-.085***	0.189	0.116	-.075***	-.088***	0.093	0.026	-0.041
Some post-secondary education	-0.046	-0.006	-0.035	-0.037	-0.054	-0.031	-0.067	-0.039
College diploma or some university	-.071***	0.070	0.030	-.056**	-.063***	-0.042	-0.060	-0.039
Master's degree or above	0.016	-0.061	-0.076	0.008	0.031	-0.091	-0.091	0.015
Currently in school	-.088***	-.067***	-.069***	-.089***	-.075***	-.043*	-.047***	-.064***
Language ability								
English	0.027	0.063**	0.055**	0.005	-0.011	-0.014	-0.018	-0.028
French	-0.023	-0.024	-0.006	-0.037	0.005	-0.003	-0.003	-0.001

Experience

Had work experience before landing	0.052*		0.077	0.040	0.070***		0.255**	0.061**
Number of weeks in Canada after land	0.000	0.002***	0.002***	0.000	0.000	0.002***	0.001**	0.000
Number of weeks in Canada after land	0.000	-0.000***	-0.000***	0.000	0.000	-0.000**	-0.000*	0.000
Had an arranged job upon landing	0.167***		0.139**	0.172***	0.148***		0.230	0.119**
Visited Canada before landing	0.105***		0.218***	0.110***	0.072***		0.171	0.066**
Worked in Canada before landing	0.195***		0.178**	0.189***	-0.013		0.078	0.028
Studied in Canada before landing	-0.002		-0.108	-0.003	0.023		-0.029	0.020

Job characteristics

Number of current jobs	-0.130***	-0.063**	-0.064***	-0.141***	-0.046**	0.025	0.027	-0.037
Hours worked per week	0.022***	0.019***	0.019***	0.022***	0.028***	0.023***	0.023***	0.028***
Weeks in employment	0.001***	-0.001	0.000	0.001***	0.001***	0.001*	0.001***	0.001***
Skill level	-0.115***	-0.088***	-0.090***	-0.122***	-0.091***	-0.084***	-0.086***	-0.087***

Occupation group

Business and Finance	-0.047	0.019	0.019	-0.068*	0.109**	0.050	0.059	0.094*
Natural and Applied Sciences	0.197***	0.181***	0.216***	0.160***	0.352***	0.201***	0.212***	0.328***
Health	0.177***	0.391***	0.310***	0.112*	0.257***	0.242***	0.257***	0.251***
Social Science	-0.122***	-0.025	-0.047	-0.161***	0.024	0.037	0.037	0.038
Art, Culture and Recreation	-0.151**	0.093	0.019	-0.200***	-0.162**	-0.713***	-0.656***	-0.096
Sales and Services	-0.205***	-0.142***	-0.147***	-0.216***	-0.112**	-0.097	-0.092*	-0.090
Trades, Transport and Equipment	-0.046	-0.002	0.005	-0.053	-0.155**	-0.095	-0.088	-0.133
Primary Industry	-0.091*	0.035	0.007	-0.123**	-0.009	0.033	0.027	0.020
Processing Manufacturing and Utilities	0.037	0.117**	0.114***	0.010	0.021	0.080	0.088*	0.011

Channels through which current

Job found through family ties	-0.007	0.030	0.029	-0.068	0.045**	0.069**	0.071***	0.151
Job found through coethnic friends	-0.018	0.010	0.009	-0.219*	-0.017	0.005	0.004	-0.153
Job found through non-coethnic	0.005	0.037	0.040	-0.194	-0.040	-0.012	-0.015	-0.638**

Social capital indicators

Number of relatives in Canada	-0.004	-0.097**	-0.103***	-0.006	0.000	-0.115*	-0.119***	-0.013
Relatives living nearby upon landing	-0.017		-0.520*	-0.007	-0.004		-0.444	0.017
Relatives living far upon landing	0.055		1.515*	0.044	0.038		1.642	0.051
Frequency of contact with family spon:	0.040*	0.051	0.056**	0.026	0.020	0.033	0.031	0.010
Number of sources meeting friends	0.003	0.003	0.003	0.010	-0.011**	-0.010*	-0.010***	-0.008
Friends living nearby upon landing	-0.008		-0.114	-0.007	0.028		0.046	0.024
Friends living far upon landing	0.050**		0.243	0.041	0.038		-1.359	0.036
Ethnic diversity of friends	0.021	0.028	0.025	-0.327*	0.012	0.034	0.029	-0.373*
Frequency of contact with friends	0.003	-0.021	-0.022	0.122*	0.013	0.031	0.034	0.175**
Ethnic diversity of workplace network	0.180***	0.130***	0.138***	0.600**	0.186***	0.142***	0.146***	0.957***
Participation in organization	0.007	0.023*	0.023*	0.084	0.017	0.003	0.003	0.210

_cons	4.926***	4.270***	4.377***	4.820***	4.356***	6.359***	5.148***	3.753***
No. of observations	6235	6235	6235	6235	4448	4448	4448	4448
No. of individuals	3014	3014	3014	3014	2399	2399	2399	2399
chi2	9088.070	5505.687	5863.969	5872.993	7446.827	4711.482	5370.115	5369.095
r2	0.510				0.543			
rho	0.527	0.764	0.858	0.397	0.427	0.830	0.979	0.378

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

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

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

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

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

Social capital indicators

Number of relatives in Canada	-0.425***	0.127	-0.121***	0.043
Frequency of contact w with family sponsors	0.05*	0.026	0.025	0.030
Number of sources meeting friends	0.003	0.003	-0.01**	0.004
Ethnic diversity of friends	0.026	0.020	0.024	0.023
Frequency of contact w with friends	-0.012	0.024	0.043	0.027
Ethnic diversity of workplace network	0.126***	0.029	0.336***	0.052
Participation in organization	0.023**	0.011	-0.001	0.013

Interaction effects

High school diploma or less * Kinship size	0.022	0.076		
Some post-secondary education * Kinship size	0.209***	0.080		
College diploma or some university * Kinship size	0.141*	0.080		
Master's degree or above * Kinship size	0.008	0.054		
Skilled Workers (PA) * Kinship size	0.217**	0.091		
Skilled Workers (S&D) * Kinship size	0.469	0.294		
Refugees * Kinship size	-0.065	0.211		
Others * Kinship size	0.333	0.222		
Chinese * Kinship size	0.331***	0.127		
South Asian * Kinship size	0.093	0.100		
Black * Kinship size	0.362*	0.187		
Filipino * Kinship size	0.219*	0.130		
Latin * Kinship size	0.038	0.190		
West Asian and Arab * Kinship size	0.505**	0.251		
Other Asian * Kinship size	1.012	2.167		
Other Visible Minority * Kinship size	-0.413	2.133		
High school diploma or less * Job found through	0.211***	0.046		
Some post-secondary education * Job found through	0.185***	0.062		
College diploma or some university * Job found	0.13**	0.064		
Master's degree or above * Job found through family	0.161*	0.083		
English * Job found through family ties			-0.162***	0.043
French * Job found through family ties	0.25***	0.091		
French * Job found through co-ethnic friends	-0.097**	0.041		
French * Job found through non-coethnic friends			-0.206***	0.068
High school diploma or less * Workplace diversity			-0.355***	0.081
Some post-secondary education * Workplace			-0.46***	0.122
College diploma or some university * Workplace			-0.099	0.088
Master's degree or above * Workplace diversity			-0.343***	0.094

Tlexogenous *

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

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

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

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

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