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Immigrant Networks, Occupational Choice, and Match Quality

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I Introduction

British Columbia is home to the second largest concentration of immigrants in Canada, with immigrants accounting for 27.5% of the Province's residents, according to the 2006 Canadian Census. It is therefore critical that the Province ensure immigrants effectively integrate into the labour market and utilize their labour market skills to their fullest potential, benefiting the immigrants, their families, and the provincial economy as a whole. In this study, we will explore the role that immigrant networks in British Columbia and other Canadian provinces have in influencing the labour market success of newly arriving immigrants. Specifically, we will examine to what extent newly arriving immigrants choose the same occupations as their compatriots, and whether this choice leads to an underutilization of the skills immigrants bring with them to the Province. In doing so, we will identify likely policy tools that may alter the influence of immigrant networks to improve the occupational choice and skill match of newly arriving immigrants to the Province. In the following sections we will describe the contemporary literature documenting recent declines in immigrant outcomes and the role of social contact, such as immigrant networks, in the job search process. We will then discuss how immigrant networks may adversely influence the occupational choice of new arrivals and why such influence is consistent with the recently observed declines in immigrant outcomes. Finally, we will discuss the data and empirical strategy we expect to employ during the course of this study.

II Literature Review

Immigration to Canada

Canada has experienced a dramatic shift in both the source country of new immigrants and their relative labour market success over the preceding decades. In particular, immigrant labour market outcomes have deteriorated in successive cohorts since the 1970s (Baker and Benjamin, 1994) and have continued to decline well into the 1990s relative to both the native

born and earlier immigrant cohorts (Frenette and Morrisette, 2005; Picot and Sweetman, 2005). These recent arrivals are less likely than previous cohorts to enter into professional occupations consummate with their education (Green, 1999) and rarely settle into the intended occupation declared to immigration officials at time of arrival (Goldmann, Warman, and Sweetman, 2012). These declines appear persistent over time and are only partly explained by the changing composition of immigrants experienced recently (Aydemir and Skuterud, 2005).

Given the important economic consequences of these well-documented declines, both for immigrants themselves and Canada as a whole, an extensive literature has emerged seeking to explain these observed declines. One important factor may be the changes in language and literacy skills among immigrants in recent cohorts. Immigrants who do not speak either English or French in the home typically receive 10–12% lower earnings relative to those who do speak at least one of the official languages (Miller and Chiswick, 2003). In addition, those who do not speak either language in the home receive lower returns to years of schooling, with these returns declining to zero for those who report no ability to speak either official language (Miller and Chiswick, 2003). Changes in the languages spoken by recent arrivals capture about one-third of the recently observed declines in entry earnings (Aydemir and Skuterud, 2005). Other factors include the declining returns to foreign experience (Aydemir and Skuterud, 2005; Green and Worswick, 2009) as well as barriers in the recognition of foreign credentials in regulated occupations (Boyd and Schellenberg, 2008). These studies are important in identifying compositional changes and other factors that have contributed to the persistent declines in labour market outcomes among immigrants to Canada, however, they do not identify the mechanisms through which these factors affect outcomes.

Social Networks In Job Search

One possible mechanism that is consistent with the declines in immigrant outcomes is the influence of immigrant networks on the job search of new arrivals. An immigrant network

is comprised of those established immigrants who are from the same source country or are the same ethnicity as the new arrival. Using US data, Patel and Vella (forthcoming) demonstrate that the occupational choices of the members of the immigrant network appear to influence the occupational choices of new arrivals. Specifically, this study shows that new arrivals to the US are choosing to settle into occupations that are dominant within the immigrant network, as it is likely that new arrivals obtain information about available job vacancies through the immigrant network.

Indeed, the use of informal job search methods, such as the immigrant networks documented in Patel and Vella (forthcoming), is well-documented in the economics literature. Heterogeneity exists in the use of formal and informal job search channels between various demographic groups. For example, those with less years of schooling are more likely to seek jobs through social contacts than those with more years of schooling (Ioannides and Loury, 2004), while women are less likely to use social contacts in the job search process than men (Ports, 1993; Smith, 2000). Using US data, Ports (1993) finds that while African-American job seekers are slightly more likely to rely on social contacts during the job search process than their white counterparts, Hispanic job seekers are far more likely than either group to make use of social contacts when searching for jobs. While these studies do not focus on the direct relationship between the use of informal networks in the job search process and resulting labour market outcome, they do suggest that it is likely that the use of social networks differs between demographic groups, such as immigrants and their native born counterparts, and even immigrants from different ethnic groups.

The literature examining the labour market outcomes arising from the use of informal social networks is unclear (Ioannides and Loury, 2004). While some studies find positive wage returns to jobs obtained through personal contacts (Rosenbaum, DeLuca, Miller, and Roy, 1999; Marmaros and Sacerdote, 2002), others find that any positive wage effect declines over time (Simon and Warner, 1992), while still others find a negative wage effect for those who rely on social networks in the job search process (Green, Tigges, and Diaz, 1999). Within the context of immigration, Patel and Vella (forthcoming) find a significant, positive wage

premium paid to those immigrants who choose the dominant occupation of the immigrant network (12% for males and 7% for females). Goel and Lang (2009) develop a theoretical model and use data from Canada to investigate the role of family and friend networks, rather than dominant network occupations, on immigrant outcomes. The authors use data on whether newly arriving immigrants report having found their job through a family member or friend while observing the strength of the network, defined as the presence of family or friends in the local area, as well as the size of the network, defined as the proportion of individuals from the same source country living in the same area as the new arrival. The authors find that immigrants who have strong networks receive lower wages when entering into jobs found through family or friends relative to taking jobs found in formal channels, though this result is statistically insignificant.

As with the literature on earnings outcomes, the literature on how the use of social networks in job search affects job match quality is equally mixed. While studies suggests that individuals who secure a job through social contacts have longer tenures (Simon and Warner, 1992; Loury 2006), whether these longer tenures are due to better job match quality or a lack of alternatives available through formal job search channels has been debated (Loury, 2006). Informal social contacts and referrals may provide better information to both job seekers and employers, resolving some of the information friction that exist in formal job search channels. In this case, job seekers are able to better match their skills with prospective employers, resulting in better match quality and therefore longer tenures. Conversely, other job seekers may use social contacts as a last resort if the job seeker has only limited choices available in the formal job search channels. Under this hypothesis, the longer tenures observed for those who secure employment through social contact would be a consequence of the limited availability of jobs in the formal job search channel, and *not* due to better job match quality or labour market outcomes. It is likely that such a scenario would result in worse job match quality, given the more limited choice available to these workers. Loury (2006) finds support for both hypotheses depending on the nature of the social contact.

Distinguishing between these two competing hypotheses is critical to evaluating the role

of immigrant networks, and in turn, policy tools to ensure good job match quality among new arrivals. This study will not only examine whether new arrivals to the Province and Canada are drawn into the dominant occupation of the existing immigrant network, as in Patel and Vella (forthcoming), but more importantly examine whether choosing the dominant occupation of the immigrant network results in better or worse match quality. Reliance on the immigrant network during the job search process has the potential to result in either better or worse job match quality. As described above, search within the network may improve job match quality if the network resolves information frictions between new arrivals and employers within the Province. Conversely, newly arriving immigrants may be more dependent on the immigrant network during the initial job search process than other groups, as has been documented in the case of Mexican migrant workers in the United States (Munshi, 2003). New arrivals may face language barriers when searching through formal channels and thus increase search within the network. It may also be less costly for new arrivals to search within the network. In these cases, it is likely that use of the immigrant network decreases match quality, relative to what could be attained from a broader job search including formal channels.

III   Motivation

Network Effects in Explaining Recent Canadian Trends

As noted, the literature on the role of social networks on job search, job match quality, and labour market outcomes remains mixed, and therefore the possibility exists that such network effects can result in inferior matching between immigrants and occupations in Canada. Such effects may help explain some of the recent deterioration in immigrant outcomes. The predictions of a model in which networks adversely affect occupational choice through search behaviour can be shown to be consistent with many of the stylized facts pertaining to observed immigrant outcomes in Canada. First, contemporary studies, such as those described above, have shown that recent arrivals to Canada have performed worse relative to similarly skilled

native born workers. These declines have been persistent in Canada since the 1990s. If immigrants are more likely to search within their networks than the native born, poor match quality may result, leading to worse labour market outcomes for the immigrants relative to similarly skilled native born workers. If immigrants become locked into these occupations this relative difference in outcomes will persist over time. This outcome is consistent with the 'limited choice' hypothesis noted above, which results in poor job match quality and occupational lock in the form of longer tenures when job seekers rely on the network due to limited access to formal job search channels.

Second, deteriorating labour market outcomes have also been linked to poorer literacy and language skills among recent immigrants, along with declines in the returns to foreign education and experience. While some of the deterioration in literacy skills stems from compositional changes in the source country of recent arrivals to Canada, source country composition has been relatively stable since the 1990s while declines in immigrant outcomes have continued. Immigrant network effects are consistent with both the continued declines in immigrant outcomes and the decrease in returns to foreign experience and education. The size of immigrant networks in Canada has continued to grow with each successive cohort since the 1990s. As networks increase in size, the cost of searching within the network decreases relative to the cost of searching outside of the network. Less costly search within the network increases the number of job matches facilitated by the network, and may lead to poorer match quality if the distribution of skills needed in the dominant occupations of the networks differ from that of the new arrival. Poor match quality may make foreign experience and education less useful in the occupation chosen in the host country, thus decreasing the returns to both[1].

This study will therefore empirically test the hypothesis that immigrant networks influence the occupational choice of new arrivals by drawing them into the dominant occupation of the network, and that this influence results in poor match quality. This study will contribute to contemporary literature in two important ways. First, we will document whether immigrant

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[1]Goldmann, Warman, and Sweetman (2012) find evidence for higher returns to education for immigrants who match Canadian and source country occupation, but not higher returns to experience.

networks are indeed one of the underlying mechanisms driving the recent declines in immigrant outcomes in Canada. Second, the results of this study will provide additional evidence for the ongoing debate on the role of networks in affecting job match quality and labour market outcomes. We will identify policy tools that alter the influence of immigrant networks and improve job match quality. We acknowledge that it is possible that immigrant networks may improve job match quality and labour market outcomes by alleviating information frictions in the job search process. This result would be equally important to document and also has clear implications for policy aimed at improving immigrant outcomes.

In addition, we will also examine factors that affect the relative cost between searching within and outside of the network and change the likelihood that new arrivals take jobs made available through the network. As mentioned, poor language skills make the cost of search through formal channels more expensive relative to search within the network. Higher levels of wealth also increase the likelihood that an immigrant will be willing to search outside of the network. Family structure and the presence of children in the home also have the potential to influence the choice between search within and outside of the network. Our empirical strategy will allow us to examine whether these or other factors play a role in the occupational outcomes of newly arriving immigrants. While identification of the impacts of networks on immigrant outcomes requires that we utilize data across jurisdictions in Canada, we will tailor our estimation strategy and results to provide information that is unique to British Columbia. It is likely that match quality outcomes and the effects of factors such as language, wealth and family composition on job search within cities will differ due to differences in the size and nature of the ethnic networks. This may imply differences in the effectiveness of the various policy tools used to ensure the best possible outcomes for immigrants to BC. Thus, we will identify the impacts of these factors on immigrants arriving in BC's cities, provide information on outcomes, including the quality of job matches across search types, among immigrants to BC, and recommended policy implications that are specific to BC.

IV   Data

Data Sets

In conducting this study, we will use data on recent immigrants from the Longitudinal Survey of Immigrants to Canada (LSIC) combined with data drawn from the confidential Canadian Census files. The LSIC data set tracks new immigrants who arrived in Canada between 2000 and 2001, following them six months, two years, and four years after arrival, and will form the basis of this study. The confidential Canadian Census files will supplement the data contained in the LSIC data set and will additionally provide data on both the native born and on established immigrants who comprise the immigrant networks. The large sample size of the Census files is also advantageous as immigrant networks will be defined by country of origin and city.

The LSIC's panel aspect will allow us to identify the extent of the influence of the network on occupational choice at different points in the assimilation process. The empirical approach used will partially draw upon that of Patel and Vella (forthcoming); however, the proposed study extends upon their work by examining the role of networks in occupational skill match by utilizing unique measures of skill which are available in the LSIC. The LSIC data set includes information on each new arrival's occupation in his or her source country prior to arrival in Canada, as well as his or her intended occupation. These measures of skill are important for overcoming the likely endogeneity between the occupational choices of recent and previous arrivals. For example, it is possible that the occupations of previous arrivals will match those of newcomers from the same country, if immigrants from the same country have the same skills or are drawn to particular locations because of demand for those particular skills. Unlike Patel and Vella, we can not only account for this type of endogeneity but additionally observe the resulting job match quality.

Variables

Occupational data is critical to this analysis and will provide a means of assessing job match quality. Source country occupation of new arrivals will be used as an indicator of the new arrival's skill level and type of foreign experience. The quality of match between the skills used in the new arrival's source country occupation and the skills needed to perform the occupation chosen by the immigrant in Canada will then be assessed by creating an occupational skill index, which will be discussed in later in this document. Occupations will be identified using the 4-digit occupational codes drawn from the LSIC data set and confidential Census files. Additionally, we intend to use many of the variables on new arrivals available in the LSIC data set including, but not limited to, source country, intended and actual occupation in Canada, CMA of residence, wage, immigration class, and many of the usual socio-economic control variables such as age, education, age at arrival, gender, and visible minority status. Language ability, family structure in terms of marital status and the age and number of children, and wealth at arrival are also important factors in the choice of whether to use immigrant networks in the job search process that we will investigate.

The confidential Census files will provide information on established immigrants and native born workers. In order to identify established immigrants that comprise a new arrival's network, data on country of origin, immigrant status, year of arrival, and CMA of residence will be used. After identifying the members of a particular immigrant network, the 4-digit occupational codes will identify the predominant occupations of the network. With this information, it will be possible to measure the size of the immigrant network itself as well as the degree to which the members of the network choose to cluster into the predominant occupations of the network. Additionally, information in the confidential Census file will also be used to provide occupational information on the native born workers in the same labour markets, and to control for differences in the occupational distribution of workers in the various geographic labour markets in Canada.

V   Empirical Framework

Skill Index

Development of an index to compare the relative skill level of any two occupations presents a difficult empirical challenge. Studies focusing purely on occupational match often rely on the comparison of occupational codes, such as the National Occupation Classification (NOC) code developed jointly by Human Resources and Skills Development Canada (HRSDC) and Statistics Canada. The NOC encodes occupations using four digits. The first digit represents the broad industry or sector category called 'skill types', while the second digit indicates the skill level as measured by educational requirements. Together, the first two digits are termed the 'major group'. Within a particular major group, the third digit differentiate 'minor groups', with the final digit differentiating specific occupations (called 'unit groups') within a minor group. For example, the NOC unit group 4162 represents economists and economic policy analysts. The first digit, 4, indicates indicates that the occupation is in skill type 4, defined as occupations in social science, education, government, and religion. The second digit, 1, indicates the occupation is in skill level A, which encompasses occupations that require a university degree. The third digit indicates that the occupation is in minor group 6 of major group 41, which includes policy researchers and consultants in other disciplines. The last digit, 2, designates the specific occupation within the minor group.

While occupational codes like the NOC are useful in identifying occupations and comparing whether two occupations that have differing job titles match, it is ill-suited for skill comparison. The NOC code only coarsely classifies occupations based on skill, as indicated by the major group. Two occupations within the same major group are said to have the same skill type and skill level, but may vary widely. For instance, specialist physicians (3111) and registered nurses (3152) are both in the same major group (31), indicating they have the same skill type and skill level, despite the substantial differences in educational requirements and necessary skills. Comparison across major groups is even more difficult. Computer network administrators (2281) and cabinetmakers (7272) both fall into skill level B, as indicated by

the second digit, but require substantially different skills.

It is therefore necessary to map occupational codes to a more direct indication of skill. In this study, we will index skills using the approach developed by Peri and Sparber (2008) and later applied to Canadian data by Torres (2010). Peri and Sparber draw occupation-level skill data from the US Department of Labor's O*Net database. O*Net replaces the Dictionary of Occupational Titles (DOT) and provides numeric values for the importance of fifty-two skills ranging from physical stamina and strength to deductive and inductive reasoning, for each occupation in its database. Peri and Sparber separate these scores into two broad categories they term manual skills and communication skills. To create an index, the authors average the scores of the skills that fall into each category for each occupation. These averages are then rescaled into relative percentile rankings for the occupations that appear in the their data set. For instance, the communication index created by the authors assign the occupation 'Financial Managers' a value of 0.83, indicating that 83% of the occupations in their data set used the battery of communication skills to a lesser degree than Financial Managers (Peri and Sparber, 2008, p 147). The authors construct a similar index for measuring manual skills.

While the O*Net database was developed for and based on data from the US labour market, there is little reason to expect that identical occupations in the United States and Canada would require different skills. Torres (2010) adopts the approach used by Peri and Sparber (2008) to create similar skill indices using Canadian data. Torres begins by mapping Canadian NOC codes to US occupational codes in order to use the O*Net database. Once Canadian and US occupations are mapped, Torres follows the approach of Peri and Sparber to create each skill index. Torres reports good results and the loss of only a few occupations that appear in Canadian data but have no equivalent in the O*Net database, demonstrating that adopting the approach of Peri and Sparber to Canadian data is indeed feasible.

Careful consideration will be given to which skills to use in the creation of the index. Peri and Sparber (2008) create two separate skill indices, one measuring physical abilities that they term 'manual skills', while the other measures verbal, written, cognitive and analytic

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ability, which they term collectively as 'communication skills'. Torres (2010) instead creates four separate indices. Like Peri and Sparber, Torres creates a manual skill index, but divides Peri and Sparber's communication index into three separate indices: one to measure cognitive skills, one to measure verbal and written skills, and a final index that indicates the importance of English in the occupation. As the Canadian immigration system focuses primarily on skilled economic immigrants, we will construct a skill index similar to the communication index developed by Peri and Sparber, noting again that the communication index includes not only verbal and written ability, but cognitive, analytical, and numeracy skills.

Estimation Strategy

Due to the potential endogeneity between skill match and the choice of the network's dominant occupation, the proposed empirical specification will employ instrumental variables. In the first stage regression, the potentially endogenous choice of the dominant occupation of the network will be regressed on characteristics of the network and other exogenous covariates. These network characteristics only influence skill match through choice of the network's dominant occupation, and are therefore ideal instruments. The first stage regression is expected to be:

$$\text{Prob}(I_{ijmot} = 1) = \alpha + \gamma_1 Y^e_{jmot} + \gamma_2 Y^n_{mot} + \gamma_3 S^a_{mot} + \gamma_4 S^e_{jmt} + \delta_1 \text{CMA} + \delta_2 \text{SC} + X_{it}\beta + \epsilon_{ijmot} \quad (1)$$

where I_{ijmot} is a variable that takes the value 1 if immigrant i from source country j in labour market m chooses dominant occupation o in time period t. Y^e_{jmot} is the proportion of the established immigrants from j who work in m that choose dominant occupation o in t. Similarly, Y^n_{mot} is the proportion of native born workers in m who choose o in t. S^a_{mot} is proportion of all workers in m who work in occupation o in period t, while S^e_{jmt} is the proportion of all workers from source country j working in m in period t. CMA and SC are dummy variables indicating city or region and source country respectively. X_{it} is a vector of observable characteristics about i in period t.

Given the rich data available in the LSIC data set, X_{it} will contain many critical control variables, such as language ability, wealth, and family structure, which may change the search behaviour of new arrivals, and in turn, whether new arrivals are more or less likely to choose the network's dominant occupation. For instance, if language barriers exist in formal search channels, new arrivals with poor language ability may increase search within the network, increasing the likelihood of choosing the network's dominant occupation. The wealth of new arrivals may also alter access to formal job search channels, while both wealth and family structure may change the new arrival's preference between the lower match quality job offers that arrive quickly through the network and the higher match quality job offers that arrive more slowly through formal job search channels.

With the probability of choosing the dominant occupation estimated in the first stage, the second stage regression will estimate the degree of skill match between new arrival's actual occupation in Canada and his or her occupation in the source country prior to arrival. The specification for the second stage is expected to be:

$$SM_{imct} = \alpha + \gamma_1 \widehat{DomOcc}_{it} + \gamma_2 SD_{mt} + \delta_1 \text{CMA} + \delta_2 \text{SC} + X_{it}\beta + \mu_{imct} \tag{2}$$

where SM_{imct} is the difference in the skill index score between i's chosen occupation in Canada, c, in period t and i's source country occupation. The primary variable of interest is $\widehat{DomOcc}_{it}$, which is the probability of choosing the dominant occupation of the network, as estimated in the first stage regression. SD_{mt} is a measure of the skill distribution of the jobs available in labour market m in time t, relative to i's source country occupation. The remaining variables, CMA, SC, and X_{it}, are identical to those described in the first stage regression. Using Equation 2, this study will measure whether new arrivals who choose the network's dominant occupation perform work that require more intensive use of the skills measured by the skill index discussed previously. The size of the network effect can then be compared to other factors of interest, namely family structure, language ability, and wealth, which appear in X_{it}.

Given the nature of the skill index, it may be difficult to interpret the numerical value of the coefficient estimates. We will, however, be able to determine the sign and significance of the network effect and other determinants of job match quality, as well as compare the relative magnitudes of the different variables of interest. These results will allow us to identify which policy tools may be effective in addressing relative skill mismatch among recent arrivals to the Province.

VI   Conclusion

Given the large and growing population of immigrants in British Columbia and Canada as a whole, ensuring immigrants are utilizing their skills to their fullest potential is important for the immigrants themselves, their families, and the provincial economy. A vast literature exists documenting the ongoing declines in immigrant outcomes that began in the 1970s and has continued since. While these studies have identified a number of possible factors that have contributed to these declines in labour market outcomes, few provide evidence for an underlying mechanism behind the observed declines.

One potential mechanism is the use of social networks in the job search process. New entrants to a labour market, such as immigrants, may be more inclined to use social networks to locate employment than other groups. The use of social networks in the job search process may result in better or worse job match quality, as documented by job search literature. Social contacts, such as immigrant networks, may improve job match quality if they resolve information frictions between employers and job seekers. Use of these networks could also decrease job match quality if search within the network is driven by lack of access to formal job search channels. This seems likely in the case of newly arriving immigrants, who may face higher costs to searching within formal job search channels, due to language barriers or lack of familiarity with the local labour market.

A model in which social networks adversely influence job match quality would be consistent with the declines in labour market outcomes experienced by recent immigrants to

Canada. We will, therefore, test the hypothesis that the choice of the dominant occupation of the immigrant network results in poorer job match quality for newly arriving immigrants. In doing so, it will be necessarily to develop a skill index, which will be modelled after Peri and Sparber (2008). Instrumental variables will be used to account for the possible endogeneity of selection into the dominant occupation of the immigrant network. Results from this analysis will determine whether immigrant networks draw newly arriving immigrants into occupations that are of higher or lower skill than the occupations held prior to arrival. The magnitude of this effect will be compared to other factors, such as family structure, language ability, and wealth. While our identification strategy and data draws on observations throughout Canada, we will be able to tailor our results and policy implications specific to the Province. For instance, the size and structure of immigrant networks in British Columbia will likely differ from those in other jurisdiction, as will the role of family structure, wealth, and language ability. Identifying how these factors influence the occupational choice of new immigrants to British Columbia will allow us to identify the factors that are most important for immigrants to the Province and recommend policy tools that are best suited to address immigrant job match quality within BC.

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