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The Portability of New Immigrants' Human Capital: Language, Education and Occupational Matching

Gustave Goldmann
University of Ottawa

Arthur Sweetman
McMaster University

Casey Warman
Queen's University

Department of Economics
Queen's University
94 University Avenue
Kingston, Ontario, Canada
K7L 3N6

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**Gustave Goldmann
Statistics Canada**

**Arthur Sweetman
Department of Economics
McMaster University**

**Casey Warman
Department of Economics
Queen's University**

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Abstract:

The implications of human capital portability – including interactions between education, language skills and pre- and post-immigration occupational matching – for earnings are explored for new immigrants to Canada. Given the importance of occupation-specific skills, as a precursor we also investigate occupational mobility and observe convergence toward the occupational skill distribution of the domestic population, although four years after landing immigrants remain less likely have a high skilled job. Immigrants who are able to match their source and host country occupations obtain higher earnings. However, surprisingly, neither matching nor language skills have any impact on the return to pre-immigration work experience, which is observed to be statistically significantly negative. Crucially, English language skills are found to have an appreciable direct impact on earnings, and to mediate the return to pre-immigration education but not labour market experience.

Keywords: Immigration, human capital portability, occupation, language, education
JEL: J24, J61, J62

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1. Introduction

It is well-known that, although at times there have been small improvements, new immigrants to Canada, European countries and the United States have generally faced increasing and substantial deficits in labour market outcomes at entry relative to native-born comparators over the last few decades (e.g., Aydemir and Skuterud, 2005; Bevelander and Nielsen, 2001; Bloom, Grenier and Gunderson, 1995; Borjas, 1995; Borjas and Friedberg, 2009; Dustmann and Fabbri, 2005; Frenette and Morissette, 2005; Lemaitre and Liebig, 2007; Liebig, 2009; Lubotsky, 2007). Several correlates of this gap have been identified and one underlying theme is the portability of human capital (e.g., Chiswick and Miller, 2009, 2010a, 2010b; Duleep and Regets, 1999; Friedberg, 2000). Pre-immigration labour market experience, education, and domestic language skills have all been shown to be relevant to the decline, with the portability of these skills being of particular relevance for countries that pursue high skilled immigration policies, such as Canada's immigration points system (Aydemir, 2011). Using Canadian data that follow new immigrants after landing, we explore these factors with a focus on their interactions with source and host country occupational matching.

Empirical evidence regarding immigrants' foreign work experience by Aydemir and Skuterud (2005), and Green and Worswick (2010), show that for Canada not only has its economic return declined over time, but it is discounted to the point where it is seen to receive a zero or sometimes even negative rate of return. The decline is not as large in the US (Borjas, 1995; Borjas and Friedberg, 2009), but it is still appreciable.

While there appears not to have been a large decline in the returns to foreign education over time in Canada, Schaafsma and Sweetman (2001), and Ferrer and Riddell (2008), find that immigrants on average receive lower returns to pre-Canadian years of schooling than do those

whose schooling was obtained in Canada.¹ A closely related issue is the effect of language knowledge and literacy skills. These have a direct effect on labour market outcomes, but also may have an indirect effect by mediating the use of foreign human capital in the Canadian context. Ferrer, Green, and Riddell (2006) examine measured English or French literacy skills and find that immigrants receive returns similar to those of the Canadian born, but have lower literacy levels. Of particular relevance, they observe that the gap in the rate of return to education for immigrants and the Canadian born is closed once controls for literacy are introduced. However, they do not find any impact from controlling for literacy skills on the returns to general labour market experience.

A plausibly relevant issue in considering the economic return to pre-immigration human capital is the transferability of occupation-specific skills (e.g., Chiswick and Miller, 2008, 2009, 2010b; Simón, Ramos and Sanromá, 2011). Beyond the immigration literature there is a substantial body of research that explores the economic return to experience that is firm-specific (Topel, 1991; Altonji and Williams, 1998), industrial (Neal, 1995; Parent, 2000), and occupational (Kambourov and Manovskii, 2009). Related to this, skill bundles associated with jobs (Poletaev and Robinson, 2008), as well as the value of experience/seniority in, for example, union compared to non-union contexts (Kuhn and Sweetman, 1999), have been studied. At the risk of oversimplifying, aside from firm-specific human capital, the general conclusion is that while sample selection bias is appreciable the magnitude of the return to industry, and even more so occupational, seniority appears to be very substantial. Kambourov and Manovskii (2009) find that the return to occupational experience is much larger than that for industrial experience. Looking carefully at underlying factors, Poletaev and Robinson (2008) estimate the distance between the “skill portfolios” of different jobs and find that wage losses following involuntary

¹ Ferrer and Riddell (2008) find that once years of schooling are controlled for, immigrants receive higher returns for their educational credentials, although they receive lower returns to years of foreign schooling.

displacement are associated with switching portfolios. This implies new immigrants who find post-immigration jobs that are “close” to their pre-immigration ones may have much better labour market outcomes than those who do not, and may have greater success in transferring their human capital.

Of course, in the immigration context there are cross-country complexities regarding differences in the nature of occupations and industries, and, as mentioned, language proficiency issues that might mediate the effective use of skills in the host country labour market. Green (1999) examines immigrant occupational integration and addresses matching immigrants’ actual occupation and that declared as intended in the application process. While, the impacts of source country occupational tenure and matching source and host country occupations are not well understood, it seems likely that occupational human capital acquired prior to immigration will be of much lower value if an immigrant is unable to secure employment in the same or a related occupation in the host country.

Using the Longitudinal Survey of Immigrants to Canada (LSIC) we first examine immigrants’ success in obtaining employment in the occupation in which they last worked prior to immigrating, as well as their success in obtaining employment in their “intended” occupation as declared in the immigration process. We then explore the correlates of earnings with language, schooling, general labour market experience, matching occupations, and interactions of the same. Next we explore extensions focussing on professionals and those working in licensed/regulated occupations, and matching among those subject to Canada’s immigration points system, the Skilled Worker Principal Applicant stream. We add to both the literature on immigrant earning outcomes, as well as that on specific human capital by examining whether a mismatch between source and host country occupations can account for low returns to the human capital that immigrants bring with them.

2. Data

The LSIC contains a sample of immigrants who applied through a Canadian Mission abroad and immigrated between October 1st, 2000 and September 30th, 2001. They are then interviewed six months, two years and four years after landing. We employ Statistics Canada's (2007) weights and restrict our sample for analysis to those age 25 to 59 at the time of the first cycle. Further, those who had previously either worked in Canada as temporary foreign workers or had been former international students are removed in order to obtain a cleaner measure of foreign work experience and schooling. The natural logarithm of weekly earnings is the focus of much of our analysis, and it is converted into real terms using the Consumer Price Index (CPI).² Although not presented, we also undertook the entire analysis using the log of hourly wages as the dependent variable and found similar results. We prefer weekly earnings, which we interpret as a better measure of aggregate labour force outcomes since they are a function of both hourly wages and weekly hours. In general, we are interested in a broad sample and broad measures since the immigration policy questions of interest involve all immigrants admitted to the country and hence we include in each wave all those with any positive earnings.

The LSIC includes numerous questions to determine the English and French language ability of respondents, including their language use at work and school. We use the derived linguistic ability scores that amalgamate these self-reported language questions. The score is rescaled to fall within the interval from zero to one.

The LSIC contains rich information on occupations, and we use the 1991 Standard Occupational Classification (SOC) to construct various levels of two and three digit occupation

² Given the survey design, we use a moving average of the monthly CPI over the reference period for each immigrant to better control for differences in the price level. For example, for an immigrant interviewed at cycle 1, we take an average of the CPI over his/her six month reference period.

classification aggregations.³ Unlike other surveys used to analyse economic outcomes of immigrants, there is not only information on occupations in Canada, but also on both the last source country occupation and the intended post-immigration occupation.⁴ While occupational coding is often associated with measurement error, the possibility of matching errors should be reduced given that the questions about sending country occupation, and intended and initial host country occupations, are coded as part of the same survey. However, the source and host country occupational classifications are based on three questions, whereas the intended occupation is based on only one; therefore, the main intended occupation question is not as reliable. The variable could not be coded for about 11 percent of the males and 7 percent of the females. Another 17 percent of males, and 35 percent of females, did not declare an intended occupation because either they did not plan on working or did not have a particular target occupation. The data does not distinguish between these two options and we code this as an occupational group or drop these observations as appropriate. An additional measure of intended occupation, which derives from the administrative data, is only available for Skilled Worker Principal Applicants (the subset of the Economic Class immigration stream admitted via Canada's "points system").

The Labour Force Survey (LFS), which describes the occupational distribution of the general Canadian population, is used for comparison in table 1. It is a six month rotating panel and we restrict our estimations to the first month for each respondent.

3. Methodology

After exploring the data using simple descriptive statistics, a variety of ordinary least squares specifications similar to equation (1), but with varying regressors, are estimated.

³ Most of the results presented are for 25 occupational groupings, but we also looked at 10, 47 and 139 categories and found broadly similar results. We adjust the SOC to make it comparable to the NOC-S codes in the LFS.

⁴ We drop a small number of observations for people who had an occupation in the sending country that could not be coded, or for people who refused to answer the question on source country occupation.

$$\begin{aligned}
(1) \quad \ln y_i = & \beta_1 X_i + \delta_1 Match_i + \delta_2 EXP_i + \delta_3 EXP_i * Match_i \\
& + \delta_4 School_i + \delta_5 School_i * Match_i \\
& + \delta_6 Language_i + \delta_7 Language_i * Match_i \\
& + \delta_8 Exp_i * Language_i * Match_i + \delta_9 School_i * Language_i * Match_i + e_i
\end{aligned}$$

The dependent variable, $\ln y_i$, is the natural logarithm of earnings for individual i . The matrix X_i contains months since migration in all specifications, and sometimes includes pre-immigration occupation, region of origin, region of residence, marital status and number of children. The *Match* between foreign and Canadian occupation, pre-migration *School*, years of potential foreign work experience (*EXP*; calculated as age at immigration – years of school at immigration – 6), domestic (English and/or French) *Language* ability, and interactions of the same are central to the analysis. In particular, we are interested in the rate of return to pre-immigration experience since its decline is an important component of the declining labour market outcomes of new immigrants. Although potential work experience is commonly used as a proxy for actual work experience (e.g., Aydemir and Skuterud, 2005), it is likely that there is measurement error, especially for females. Given that regression coefficients on the interactions of continuous regressors can be difficult to interpret when zero falls outside the domain of the data, to facilitate interpretation each has a fixed amount subtracted from it so that all of the continuous variables are equal to zero for someone who is 30 years old with 15 years of education, and whose literacy score is 0.65 for English and 0.14 for French.⁵

Importantly, although from an econometric perspective we treat it as exogenous, occupational matching is likely non-random and is, for example, plausibly more common for workers with high valued unobserved characteristics. Therefore, the coefficient on *Match* is

⁵ This is similar to mean-deviating the data; however, we are not deviating from the mean but from round numbers near the means.

likely biased upwards relative to the expected value of a match for a random immigrant. As well, the coefficients on the interactions between *Match* and *EXP*, and *School*, are biased upwards if workers with work experience, or schooling, more suitable to Canada are more likely to obtain a match. Nevertheless, the results are informative, especially if they are low/zero since they provide an upper bound for a typical worker.

We estimate the regressions separately for each of the three cycles and restrict the sample to people who had worked prior to immigration. We do not employ panel data techniques since we want to allow for parameter flexibility across the waves of the survey. Also, a fixed effect parameter is perfectly collinear with the variables of interest and Hausman-type tests reject a random effects model. Given space constraints, we present the results four years after entry.

While we are not able to measure actual pre-immigration work experience, we have information on whether the immigrant had ever worked prior to landing, which can help provide some sense of how well our measure of experience captures true work experience. We expected that immigrants who report never having worked prior to immigrating would have much lower potential work experience. Surprisingly, we find that it is almost identical at 15.0 years for males who have, and 14.4 for those who never, worked prior to immigrating to Canada. Moreover, potential experience is actually higher at 20.3 years for females who have never worked, compared to 14.2 for those who have. While only three percent of males reported having never worked prior to immigration, 20 percent of females do so. Given our interest in occupational matching, we drop those who had never worked before immigrating from the regression analysis but provide selected descriptive statistics for them.

A further caveat that affects interpretation is that while we are able to identify a successful match, we do not know the duration of the job in the sending country. Possibly, failure to match source country and Canadian occupations is due to lack of experience in the

source country occupation. Additionally, we do not have any data regarding the similarity of occupational requirements in the source and host countries. For example, the use of information technology may differ across countries.⁶

4. Descriptive Statistics

The proportion of new immigrants and, for comparison, the Canadian population in high (versus low) skilled occupations, is presented in table 1 by sex. We restrict the domestic sample from the LFS to people aged 25 to 59 initially, and allow it to age at the same rate as the LSIC sample. Source and intended occupation are shown in the upper panel on the left for those who intend to work.⁷ Compared to the LFS, new immigrants in the LSIC report higher pre-immigration occupational skill levels. The results over time echo Green's (1999) findings; while there is a small increase in occupational skill level for the domestic population, that for new immigrants increases very dramatically post-immigration. Four years after immigrating, males' average skill level is very close to catching up with the national average, although it remains much below the pre-immigration level. Although not shown, we also find strong convergence using 10 occupational categories.

However, the upper half of table 1 does not control for differences in observable characteristics between new immigrants and the Canadian population. In the bottom half of table 1, therefore, using probit regressions we present predictions of being in a high-skilled occupation for a representative individual. Given that we are using different data sources for the new

⁶ We examined the role of the potential quality of the human capital by controlling for source country GDP. We found that for males, coming from a country with higher GDP per capita has a positive effect on earnings, regardless of successful matching. Conversely, for females, only workers with a match obtain a positive relationship between source country GDP and earnings, and only in cycles 1 and 2.

⁷ High-skilled jobs are defined as occupations in Skill Levels A, B or O, and less-skilled jobs as occupations in Skill Levels C and D, based on the national occupational classification. Approximately 13 percent of the sample could not be coded for intended occupation, and for these statistics only the sample is reduced. However, we estimate the LSIC results restricting the sample to people who had an intended occupation that could be coded and found that the skill distributions are very similar to those presented.

immigrant and Canadian samples, the predictions, based on equation (2) estimated independently for each sample, are for 40 year olds who are married/common law with one child, a Bachelor's degree, and live in Toronto.

$$(2) \hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 Age + \hat{\beta}_2 Age^2 + \hat{\beta}_3 Edu + \hat{\beta}_4 region + \hat{\beta}_5 marital + \hat{\beta}_6 children$$

The predicted gap is initially much greater implying that there are substantial differences in characteristics that need to be borne in mind. Once we take these characteristics into account, the new immigrants' outcomes appear far poorer initially, and the rate of integration towards the skill level of the Canadian population is much more rapid.

Looking a little deeper, the apparent stability of source country and intended occupation skill levels in table 1 masks numerous underlying transitions that are addressed in table 2. As far as we are aware, immigrants' intentions regarding occupational switching have received little or no attention in explaining immigrants' low or zero returns to foreign work experience. Green (1999), which is the most significant look by an economist at occupational integration of immigrants to Canada, has data that only includes intended, but not pre-immigration, occupation. Table 2 is very conservative (important given the innate measurement error in identifying occupations) in that it only addresses the proportion of people whose source country occupation does not match their intended occupation by high- and low-skill level groupings.

The first column of table 2 indicates that a sizeable proportion of immigrants, especially low skilled pre-immigration workers, planned to switch occupations post-immigration. A substantial number of low skilled workers planned on upgrading upon immigrating, and some high skilled workers planned on moving to a low skilled occupation. This suggests that intended occupation, which is historically captured in the immigration system's administrative data, is not a sufficient statistic. One reason why the value of pre-immigration work experience is low value

may be this intended occupational switching. One caveat regarding this evidence, and the reason why we aggregate into simple high/low skill categories, is that (as discussed earlier) intended occupation has numerous missing observations and is not as well measured as the other measures.

Table 3 summarizes employment status and occupational matching at the time of each interview, and also displays averages for selected variables at cycle one. Panels A and B represent all male and female immigrants respectively, and panel C is the subset of panel A comprising male Skilled Worker Principal Applicants.⁸ Overall, while employment growth is obvious, even after four years non-employment remains high.

Occupational matching also grows, but even after four years only slightly over 25% of the males, and under 20% of the females, match their pre- and post-immigration occupation. The small proportion of occupational matches, and the skill atrophy associated with gaps in employment, may represent a loss of human capital, although non-matching occurs regularly in the Canadian labour market and we have no information about how this rate differs from the norm, nor about the value of the lost skills. The mismatching and delays may occur because of imperfections in the Canadian labour market (including discrimination), they may reflect underlying issues regarding the relevance of pre-immigration human capital in the Canadian labour market, and/or there may be language barriers that prevent skill utilization. Of course, many individuals also intended to switch occupations as seen in panel C. The low match rate is likely relevant in understanding the low rates of return to general labour market experience observed for new immigrants.

⁸ Besides unemployment, those not employed at the time of the interview may be in school or language training. The results are for 25 occupation groupings; 10, 47, and 139 had similar results, although as the grouping becomes more precise there is a lower proportion of matches.

The particularly low fraction of occupational matches for females may derive from family commitments. Baker and Benjamin (1997) posit that a new immigrant family investment strategy may explain some of this difference. Sweetman and Warman (2010) show that the spouses of Skilled Worker Principal Applicants have very high levels of educational attainment and other observable characteristics associated with beneficial labour market outcomes, but they do not seem to perform as well as might be expected conditional on these characteristics.

There is a distinct question answered by Skilled Worker Principal Applicants regarding their intended occupation in the Federal Government's Ministry of Citizenship and Immigration Canada (CIC) administrative records that is available. Panel C, therefore, presents information for male Skilled Worker Principal Applicants, all of whom by definition have worked pre-immigration. Unfortunately, the female sample is too small to be presented. This analysis is beneficial in that it allows a key group that is selected specifically on economic criteria to be examined. We subdivide this group by intention to switch occupations on immigration.

A very large proportion, 38 percent, indicated they planned to switch occupations on immigrating to Canada. Moreover, given the wording of the question this may be an undercount. A very similar proportion of switchers and non-switchers are not employed at the time of the interview in each of the three cycles. Surprisingly, those intending to switch occupations were nevertheless more likely to find employment in their pre-immigration occupation than their intended one. Another intriguing result is that only a very small percentage who aspired to switch occupations did so. Overall, intended occupation at the time of immigration does not appear to provide much information.

The right-hand side of table 3 presents descriptive statistics for selected variables at cycle one. The key, and most outstanding, obvious difference between the employed and unemployed in panels A, B and C is English language fluency. Recall that this measure of language ability is

an index that ranges between zero and one. Better English language skills clearly have a strong positive relationship with employment and a positive, but more modest, relationship with obtaining an occupational match. On average, males have higher English skills than females, and Skilled Worker Principal Applicants have yet higher scores again.

5. Regression Analysis

5.1 Returns to Foreign Human Capital and Occupational Matching

The portability of human capital in terms of the (logarithm of) weekly earnings four years after arrival is explored in tables 4a and 4b for males and females respectively.⁹ Surprisingly for many observers, but in accord with previous research, equation (1) for both genders finds the rate of return to pre-immigration labour market experience is negative and statistically significant. While it is unusual to specify experience linearly, we attempted a quadratic and it was rejected by the data. Further, explorations using Robinson's (1988) semi-parametric double residual approach also supported employing a linear specification. Note that the coefficient's point estimates vary little across specifications. As pointed out by Schaafsma and Sweetman (2001), one interpretation of this involves age-at-immigration, which is the converse of labour market experience. Immigrant outcomes appear to decline with increasing age-at-immigration. Additionally, Green and Worswick (2010) emphasize that new immigrants, regardless of their age-at-arrival and with the possible exception of males from a small number of developed English-speaking countries, appear to have outcomes similar to new labour market entrants. In

⁹ All regressions included a linear months since migration variable and all, except column one, also include: nine region of origin, five region of residence, two major city, and two marital status indicators, and a variable measuring the number of children in the household less than age 18. Regressions similar to those in tables 4a and 4b, but controlling for 25 source country occupations, were also estimated. Including source country occupation serves to reduce the magnitude of the coefficient on years of schooling, and language variables slightly. For example, in the regression in column 3 for males, the coefficient on years of school is reduced from 0.013 (significant at the 1% level) to 0.008 (significant at the 10% level); while the coefficient on the English-language score drops from 0.322 to 0.280 (both significant at the 1% level). As the number of human capital interaction terms increases in higher numbered columns, the influence of pre-immigration occupation diminishes.

contrast, the returns to education for both sexes are positive and statistically significant, although smaller than those seen in studies of Canadian born workers.

When language ability are introduced in specification (2) the rate of return to education is reduced by half. Perhaps unexpectedly, while the rate of return to English is appreciable, that for French is effectively zero for males, and for females it is roughly half that for English.¹⁰

In column (3) of tables 4a and 4b we introduce an indicator for matching source and receiving country occupations. Clearly, this variable is endogenous (see, e.g., Chiswick and Miller, 1995) but it still has value as a descriptive statistic and an upper bound. It shows that individuals who manage to match their pre- and post-immigration occupations have substantially higher earnings than those who do not. In column (4) this match is interacted with experience, years of school and language. For both genders, very surprisingly, those who obtain employment post-immigration in the same occupation as that in which they have pre-immigration experience continued to receive zero economic return to that experience. Also, language skills do not appear to increase the value of the occupational match. In contrast, there is an economically and statistically significant positive interaction between language and education. However, for both genders the coefficient on the years of schooling variable is simultaneously driven to approximately zero. It appears that those who do not obtain an occupational match receive no benefit from pre-immigration education. Canadian language ability, and, even then, only English ability for the men, is the only form of human capital that is beneficial to both those who do, and do not, match their occupational experience.

In column (5) of tables 4a and 4b we explore interrelationships between our measures of human capital with particular attention to the hypothesis that language skills may mediate the

¹⁰ We explored at length differences between the rate of return to each language in Québec (predominantly French speaking) and the rest of Canada (predominantly English). Surprising, the basic patterns are broadly consistent with those presented with only a few exceptions.

portability of occupational and educational capital. The coefficients on the interactions with labour market experience all have point estimates close to zero and are not statistically significant. Also consistent with the evidence observed thus far, and with the findings of Ferrer, Green and Riddell (2006), higher levels of English ability is associated with increasing returns to education. For French the point estimate is slightly negative, but effectively zero from males, and while it is not statistically significant for females it is at least positive and roughly half of that for English. This provides additional evidence that English language skills mediate the rate of return to education, although they do not obviously affect the rate of return to labour market experience. Note that for both genders, the coefficient on the interaction term between language and the match is not appreciably affected by the introduction of these additional interactions.

In the final column of tables 4a and 4b we estimate an extremely rich and complicated model that is at, or perhaps beyond for the females, the limits of what samples of these sizes can support. We add to the regression a set of three-way interactions between matching occupations, language knowledge, and each of labour market experience and years of school. For females almost all of the coefficients, except for those on experience and language, are reduced to statistical insignificance. In contrast, for the males two of these three-way interactions are statistically significant, and these reinforce the importance of language mediating the value of education; however the interactions introduced in (5) are reduced to statistical insignificance.

In additional regressions not presented to save space, we separate the sample into those from "traditional" (i.e., Europe, United States, Australia, and the like), and "non-traditional" source countries. Although the sample sizes are smaller and the standard errors larger, the story is broadly consistent with that here.¹¹

¹¹ We looked at several sub-samples in simple regressions not including interactions: university educated, Skilled Worker Principal Applicants, high-skilled occupation in the source country, worked in all 3 cycles, living only in 3 major cities, matched source and intended occupation, business or management occupation in the sending country,

Overall, these findings suggest that matching occupations and English (and for females French) language skills are associated with higher earnings in the Canadian labour market for all new immigrants.¹² In contrast, the return to schooling is only positive for those who have language skills that allow for portability. One possible explanation for the lower returns to schooling found here compared to studies using census data is that they employ year of immigration to impute foreign schooling so those measures of foreign schooling contain some domestic schooling, whereas we have a direct measure for foreign schooling. Even those who do match occupations, despite the endogeneity making it likely that they obtain an above-average return, are not able to reap the benefit of their pre-immigration labour market experience.

5.2 Professional, Licensed and Regulated Occupations

Extensions to the basic results are presented in table 5. Three sets of regressions, by gender, explore alternative approaches to the data and each is closely related to equation (1) from tables 4a and 4b. We build on column (5), rather than the more comprehensive column (6), because the latter has too many interactions to support the extensions given the sample sizes. The first set of equations differentiates immigrants by three levels of educational attainment: those without postsecondary, those with a postsecondary professional degree, and postsecondary graduates without a professional degree.¹³ For males, the return to a match is very similar for professional and non-professional degree holders, and we cannot reject the equality of the returns using an F-test. For females, professional degree holders obtain a higher return to a successful

Western source countries, Asian source countries, aged 25 to 40 at the time of immigration, and strong English language ability. Only the sample of male immigrants from Western countries provides any (very modest) evidence of positive returns to potential foreign work experience; otherwise we find negative returns or no returns.

¹² We also look at 10, 47, and 139 occupation groupings and find that the coefficient on the match variable becomes slightly larger as the occupation grouping narrows. This coefficient may be biased downward in the later cycles if workers obtain a match in an earlier cycle and then progress to another occupation.

¹³ We specify a professional degree as those with an engineering degree or a degree in a health professions, science and technologies.

match than do workers with a non-professional degree and the equality of the coefficients is rejected. However, for both sexes, with the point estimate for males being extremely close to zero, the only benefit from a match accrues to those with university education.

Plausibly, immigrants who have their work experience in occupations that are regulated or licensed in Canada experience more difficulty transferring their foreign acquired human capital. We take two approaches to examining this issue. First, in columns (3) and (4) of table 5, we look at the return to a match for workers who indicated in the first interview that they have a professional or technical credential earned outside Canada for a job requiring licensing.¹⁴ Secondly, in columns (5) and (6) of table 5, we look at these workers' jobs in the source country to see if that occupation is regulated or licensed in Canada according to information from a Canadian list of regulated occupations. We classify occupations ourselves, and define an occupation as regulated if it is regulated in any province in Canada.

Surprisingly, for men there is little effect one way or another from having an education in a licensed discipline, even if they match occupations, except for those with high English language ability for whom having such education is very valuable. Language is again seen to be crucial. For females the story is more complicated, with a licensed degree being valuable, but the match for one not being so.

We next turn to regulated occupations in columns (5) and (6) of table 5. For males we separately identify workers in skilled trades such as carpenters, cooks, roofers and welders for which Canadian governments have established a set of criteria for employment access. For females, there are too few observations for these occupations, so we do not identify them separately from non-regulated occupations. In this case both males and females are affected by

¹⁴ Respondents are asked "Do you have any professional or technical credentials that you received from **outside** Canada, such as a license required to practice your occupation? Some examples of these types of credentials would be a license to be a mechanic, engineer, plumber, chartered accountant and so on."

having worked in a regulated profession pre-immigration. For males, having worked in a regulated profession has a negative coefficient on the main effect, indicating that if the person does not obtain a match there is a penalty for having worked in a regulated profession, but the interaction coefficient is positive and larger than the main effect so those who match have a net increment to earnings. For females the main effect is not statistically significant, but the interaction effect is much larger and they have a larger earnings increment associated with a match. As seen before, English, for males, and both languages for females, have positive and statistically significant coefficients both directly and when interacted with schooling. Oddly, our measures of language skills interacted with the regulated occupation indicators have negative coefficients that are sometimes statistically significant. These are common to those with, and without, a match and may indicate a negative effect for those not matching since that interaction is also included. Unfortunately, the sample size is not large enough to explore this issue in detail.

5.3 Source, Intended and Host Country Occupational Matches for Male Skilled

Worker Principal Applicants

To this point, our regression analysis examines matching for all immigrants. But, in this subsection we focus on Skilled Worker Principal Applicants who are subject to Canada's immigration points system and intended occupation. In equation (3) we define five exhaustive and mutually exclusive matches: source country and the main occupation in Canada, but with no match between the intended and either the source country or main occupation (*MatchSM*); source country and intended (*MatchSI*); intended and main (*MatchIM*); and, source country, intended and main occupations (*MatchSIM*). The omitted group intended to switch but did not match either their intended or source country occupations with their main occupation. Given the small number of female Skilled Worker Principal Applicants, we restrict the analysis to males.

$$(3) \quad Y_i = \beta_1 Exp_i + \beta_3 School_i + \beta_4 MatchSM_i + \beta_5 MatchSI_i + \\ \beta_6 MatchIM_i + \beta_7 MatchSIM_i + \varepsilon_i$$

In table 6, with column (1) not having, and (2) having, additional controls, any type of successful match with the main Canadian occupation yields a high return. Using an F-test, we cannot reject the equality of the *MatchSM* and *MatchIM* and *MatchSIM* coefficients. However, respondents who intended to work in their source country occupations but failed to match, have lower earnings. We do not pursue a larger analysis with this sample since its size is insufficient.

6. Conclusion

The limited portability and/or relevance of pre-immigration human capital are important contributing factors to the poor earning outcomes of recent immigrants in many developed nations. Using data that identifies immigrant source country occupation and education, as well as measures of language skills and post-immigration occupation, we expand on the previous literature by examining the joint implications of these factors for earnings.

Immigrants to Canada are very likely to work in high skilled occupations prior to immigration, but following immigration the percentage in high skilled occupations is much below the population average, although the skill level increases rapidly in the years that follow. Some of this follows from immigrants' intention to switch occupations post-migration, with substantial differences being observed between source country occupational experience, and intended occupation at landing. Substantial gaps are also observed between pre-immigration, intended, and post-migration occupation. Simple descriptive statistics identify English language ability as crucial to both obtaining employment and matching pre-and post-immigration occupations.

In a regression framework exploring rates of return to weekly earnings, increasing durations of potential work experience are seen to be associated with statistically significantly lower, not higher, earnings. This finding implies that earnings decline with increasing age at immigration. Increasing years of schooling and English language skills are both associated with higher earnings, however French language skills are only seen to affect earnings for females. Moreover, the return to education is modest and only observed to be statistically significant for those who match their pre- and post-immigration occupation and/or have high levels of English language ability. In general, language skills appear to be crucial in mediating the use of formal education in the Canadian labour market, and this may well be the case in many developed countries.

Immigrants who successfully match their pre-immigration occupation with the one they obtain post-migration receive a substantial earnings boost. Surprisingly however, even immigrants who match occupations receive an approximately zero rate of return to their pre-migration potential labour market experience. Matching occupations is clearly endogenous, and it seems entirely plausible that, on average, those who succeed in obtaining a match realize a larger benefit than would a randomly selected new immigrant. Therefore, the rate of return to both the match and experience for those who obtain a match can be viewed as an upper bound for the population. If this is interpreted in relation to the research on domestic returns to specific human capital, matching occupations appears to transfer a similar amount of human capital regardless of pre-immigration years of experience.

In extensions to the central analysis, we observe that there is no value to matching occupations for those without postsecondary education, and, although it is large and positive, there is no difference in the value of the match for those with professional compared to more general postsecondary education. When we focus on immigrants who report educational training

preparatory to an occupation that is licensed in Canada, we observe increased earnings, but for the men this earnings benefit is primarily for those with high levels of English language skills. Immigrants whose pre-immigration occupation was in an occupation that is regulated in Canada obtain a substantial benefit if they match pre-and post-immigration occupations.

All of the above results are for a sample of all immigrants, but when we focus on those admitted under the points system the importance of matching occupations is at least as important, although the sample is too small to undertake an exhaustive examination. Interestingly, we can observe that matching the source country, and/or intended, occupation is equally beneficial.

On dimensions where there are overlaps, our findings are consistent with the existing literature, but we undertake a more comprehensive analysis addressing several issues simultaneously for a sample of new immigrants in the initial stages of integrating into the post-migration labour market. Our findings emphasize the importance of language both in its own right, and for its role in mediating the value of education obtained prior to immigration. This paper also sets the stage for future work addressing the interaction of multiple immigrant characteristics on labour market integration. In particular, now that many of the relevant characteristics are starting to be captured in administrative data, large-scale studies would seem worthwhile since they would allow these issues to be addressed in the context of the administrative structure of formal immigration with samples large enough to study the effects of characteristic interactions within tightly defined administrative immigration classifications. Like some other recent research, this study emphasizes the potential importance of language training as part of the immigrant settlement process.

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Table 1: Proportion of Workers in High Skilled Occupation

Unadjusted Means	Source	Intended Occupation ⁱ	Occupation in Canada		
	Country		6 months	2 years	4 years
Males					
LSIC – Sample	86.9	87.0	41.2	50.8	60.5
LFS Sample	----	----	63.5	63.9	64.7
Females					
LSIC Sample	77.5	76.3	30.9	36.3	46.0
LFS Sample	----	----	53.8	54.1	55.3
Predicted Probabilities ⁱⁱ			Occupation in Canada		
			6 months	2 years	4 years
Males					
LSIC Sample			32.8	50.4	63.4
LFS Sample			82.8	82.7	81.7
Females					
LSIC Sample			23.6	35.6	49.4
LFS Sample			79.2	78.4	78.5

Notes: High Skill is defined as A, B or O level based on the national occupational classification matrix. LFS sample is from the incoming rotation. For the LFS unadjusted means, a monthly average was taken based on the reference period of the LSIC. i. Intended Occupation had around 13 percent of occupations that could not be coded. ii. Predicted probabilities calculated using probit regressions for people aged 40, living in Toronto, whose highest degree is a Bachelor, who are married or common law and have one child.

Table 2: Match between source country and intended occupation

Source Country Occupational Skill Level	Comparison to Intended Occupation			
	Males		Females	
	No Match	Switch to High Skill	No Match	Switch to High Skill
High Skill	29.7	75.2	32.9	61.0
Low Skill	55.3	73.2	50.1	63.6

Notes: Calculated for workers who had a codeable intended occupation.

Table 3: Employment, Occupation Matches and Other Descriptive Statistics

	Match with Source Country Occupation			Descriptive Statistics at Cycle 1				
	6 mth	2 yrs	4 yrs	Age	Educ	Exp	English	French
Panel A - Males								
Never worked pre-immigration (3% of the sample)								
Not Employed	51.9	27.8	22.7	37.3	14.7	16.6	0.51	0.07
Employed	48.1	72.2	77.2	31.6	13.6	12.0	0.64	0.12
Worked pre-immigration (97% of sample)								
Not Employed	39.8	26.4	17.0	37.7	15.7	16.0	0.55	0.17
Employed, no match	42.0	50.4	56.2	36.4	15.5	14.9	0.75	0.10
Employed, match	18.2	23.3	26.9	35.0	16.2	12.9	0.80	0.14
All Males	--	--	--	36.6	15.6	15.0	0.67	0.14
Panel B - Females								
Never worked pre-immigration (20% of the sample)								
Not Employed	80.2	72.4	62.2	38.9	11.8	21.1	0.38	0.05
Employed	19.8	27.6	37.8	35.5	12.3	17.2	0.46	0.04
Worked pre-immigration (80% of sample)								
Not Employed	58.7	43.6	32.4	35.7	14.9	14.7	0.52	0.13
Employed, no match	31.3	43.3	49.7	34.9	15.1	13.7	0.69	0.10
Employed, match	10.1	13.1	17.9	34.4	15.8	12.5	0.78	0.15
All Females	--	--	--	35.9	14.4	15.5	0.56	0.11
Panel C - Male skilled worker principal applicants								
Intended to Switch Occupations (37.5% of sample)								
Not Employed	38.5	25.0	17.4	36.7	16.9	13.8	0.60	0.27
Employed, different occ.	38.0	43.5	47.6	36.5	16.6	13.9	0.79	0.15
Employed, match intended	8.3	15.3	18.3	35.0	16.7	12.3	0.81	0.11
Employed, match source	14.6	16.2	16.7	36.3	17.0	13.3	0.82	0.21
All Intended Switchers	--	--	--	36.4	16.8	13.6	0.72	0.20
Intended to work in pre-immigration occ. (62.5% of sample)								
Not Employed	36.3	26.2	15.0	35.5	16.6	12.9	0.61	0.17
Employed, no match	37.8	41.4	45.5	35.1	16.4	12.7	0.79	0.09
Employed, match	25.9	32.5	39.5	33.6	16.6	10.9	0.82	0.14
All Intended Matchers	--	--	--	34.9	16.5	12.3	0.73	0.13

Note: Sample restricted to immigrants aged 25 to 59 at the time of the first interview (approximately 6 months after arrival).

Table 4a: Earnings Regressions with Interaction Terms, Males

	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Imm Experience	-0.011**	-0.011**	-0.010**	-0.011**	-0.012**	-0.011**
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Years of School	0.024**	0.012*	0.013**	0.005	0.004	0.005
	[0.005]	[0.005]	[0.004]	[0.005]	[0.006]	[0.006]
English Score		0.397**	0.322**	0.317**	0.347**	0.359**
		[0.062]	[0.062]	[0.067]	[0.071]	[0.073]
French Score		-0.041	-0.051	-0.059	-0.041	-0.046
		[0.079]	[0.076]	[0.080]	[0.082]	[0.083]
Occ Match			0.326**	0.299**	0.291**	0.298**
			[0.024]	[0.029]	[0.029]	[0.031]
Exp * Match				0.004	0.003	-0.000
				[0.004]	[0.004]	[0.004]
School * Match				0.026**	0.025**	0.017+
				[0.009]	[0.009]	[0.010]
English * Match				0.071	0.084	0.034
				[0.123]	[0.124]	[0.127]
French * Match				0.038	0.046	0.063
				[0.091]	[0.090]	[0.101]
Exp * School					-0.000	-0.000
					[0.000]	[0.000]
Exp * English					0.007	0.001
					[0.007]	[0.007]
Exp * French					0.003	-0.001
					[0.008]	[0.010]
School * English					0.047*	0.029
					[0.019]	[0.024]
School * French					-0.002	0.001
					[0.016]	[0.021]
English * Exp * Match						0.031*
						[0.015]
French * Exp * Match						0.016
						[0.014]
Eng * School * Match						0.073*
						[0.036]
Fr * School * Match						0.013
						[0.030]
N	2030	2030	2030	2030	2030	2030
R ²	0.07	0.18	0.25	0.25	0.26	0.26
Additional Controls	NO	YES	YES	YES	YES	YES

Note: Robust standard errors in brackets. + significant at 10%; * significant at 5%; ** significant at 1%. All regressions include controls for Months Since Migration. Additional Controls include: Region of Origin, Region of Residence, Months Since Migration, Marital Status, Number of Children. Occupation defined into 25 categories.

Table 4b: Earnings Regressions with Interaction Terms, Females

	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Imm Experience	-0.009** [0.003]	-0.008** [0.003]	-0.007** [0.002]	-0.009** [0.003]	-0.009** [0.003]	-0.009** [0.003]
Years of School	0.028** [0.008]	0.013 [0.008]	0.011 [0.008]	-0.002 [0.008]	0.001 [0.008]	-0.002 [0.008]
English Score		0.556** [0.090]	0.500** [0.087]	0.517** [0.090]	0.580** [0.096]	0.560** [0.097]
French Score		0.263* [0.114]	0.314** [0.109]	0.323** [0.112]	0.310** [0.110]	0.299** [0.112]
Occ Match			0.391** [0.042]	0.390** [0.046]	0.371** [0.046]	0.334** [0.051]
Exp * Match				0.006 [0.006]	0.005 [0.006]	0.005 [0.006]
School * Match				0.042* [0.017]	0.042* [0.016]	0.048** [0.016]
English * Match				-0.054 [0.187]	0.002 [0.188]	0.119 [0.212]
French * Match				-0.016 [0.151]	0.026 [0.154]	0.153 [0.158]
Exp * School					-0.000 [0.001]	-0.000 [0.001]
Exp * English					-0.002 [0.009]	0.005 [0.010]
Exp * French					0.000 [0.009]	0.001 [0.010]
School * English					0.040+ [0.024]	0.014 [0.027]
School * French					0.022 [0.025]	0.028 [0.030]
English * Exp * Match						-0.029 [0.020]
French * Exp * Match						-0.002 [0.019]
Eng * School * Match						0.050 [0.052]
Fr * School * Match						-0.047 [0.054]
N	1444	1444	1444	1444	1444	1444
R ²	0.04	0.11	0.17	0.18	0.18	0.19
Additional Controls	NO	YES	YES	YES	YES	YES

Note: Robust standard errors in brackets. + significant at 10%; * significant at 5%; ** significant at 1%. All regressions include controls for Months Since Migration. Additional Controls include: Region of Origin, Region of Residence, Months Since Migration, Marital Status, and Number of Children. Occupation defined into 25 categories.

Table 5: Extensions

	Professional Postsecondary		Licensed Pre-Imm Occupation		Regulated Pre-Imm Occupation	
	Males (1)	Females (2)	Males (3)	Females (4)	Males (5)	Females (6)
Pre-Immig Experience	-0.011**	-0.009**	-0.011**	-0.009**	-0.011**	-0.008**
	[0.002]	[0.003]	[0.002]	[0.003]	[0.002]	[0.003]
Years of School	0.000	-0.005	0.003	-0.002	0.004	0.000
	[0.007]	[0.010]	[0.006]	[0.008]	[0.006]	[0.008]
Prof/License/Regulated	0.035	0.091	0.006	0.188**	-0.082*	-0.003
	[0.055]	[0.081]	[0.036]	[0.044]	[0.034]	[0.043]
Not Prof/--/Reg Skilled	0.056	0.055	--	--	-0.004	--
	[0.050]	[0.061]			[0.049]	
Occ Match	0.041	0.123	0.310**	0.415**	0.245**	0.241**
	[0.087]	[0.121]	[0.029]	[0.044]	[0.035]	[0.058]
English Score	0.395**	0.610**	0.313**	0.590**	0.399**	0.617**
	[0.136]	[0.172]	[0.070]	[0.101]	[0.076]	[0.106]
French Score	-0.108	0.376*	-0.038	0.328**	0.011	0.406**
	[0.140]	[0.160]	[0.082]	[0.114]	[0.085]	[0.115]
Exp * Match	0.006	0.006	0.003	0.005	0.003	0.005
	[0.004]	[0.006]	[0.004]	[0.006]	[0.004]	[0.006]
School * Match	0.016	0.026	0.027**	0.044**	0.021*	0.034*
	[0.010]	[0.020]	[0.009]	[0.016]	[0.009]	[0.017]
Prof/License/Regulated * Match	0.296**	0.407**	-0.045	-0.207+	0.179**	0.312**
	[0.102]	[0.156]	[0.057]	[0.121]	[0.053]	[0.087]
Not Prof/--/Reg Skilled * Match	0.299**	0.229	--	--	-0.045	--
	[0.102]	[0.139]			[0.084]	
Exp * English	0.005	-0.001	0.006	-0.005	0.006	-0.003
	[0.006]	[0.008]	[0.006]	[0.008]	[0.006]	[0.008]
Exp * French	0.002	0.000	0.001	-0.002	0.003	0.002
	[0.008]	[0.009]	[0.008]	[0.009]	[0.009]	[0.009]
School * English	0.055*	0.055*	0.045*	0.044*	0.047*	0.050*
	[0.024]	[0.028]	[0.019]	[0.022]	[0.019]	[0.023]
School * French	0.001	0.036	-0.002	0.023	0.005	0.034
	[0.018]	[0.031]	[0.016]	[0.025]	[0.017]	[0.026]
Prof/License/Regulated * English	0.009	-0.172	0.262*	-0.074	-0.003	-0.065
	[0.185]	[0.257]	[0.121]	[0.160]	[0.128]	[0.151]
Prof/License/Regulated * French	0.077	-0.318	0.071	-0.081	-0.095	-0.306*
	[0.162]	[0.266]	[0.103]	[0.156]	[0.104]	[0.146]
Not Prof/--/Reg Skilled * English	-0.102	-0.003	--	--	-0.237+	--
	[0.166]	[0.181]			[0.136]	
Not Prof/--/Reg Skilled * French	0.067	-0.032	--	--	-0.038	--
	[0.158]	[0.167]			[0.102]	
N	2030	1444	2030	1444	2030	1444
R ²	0.26	0.19	0.26	0.19	0.26	0.20

Note: Robust standard errors in brackets. + significant at 10%; * significant at 5%; ** significant at 1%. Controls include: Region of Origin, Region of Residence, Months Since Migration, Marital Status, and Number of Children.

Table 6: Matching among Male Skilled Worker Principal Applicants

	(1)	(2)
Experience	-0.007**	-0.010***
	[0.003]	[0.003]
School	0.014**	0.005
	[0.007]	[0.007]
Occupational Match		
Match Source & Main	0.322***	0.268***
	[0.038]	[0.038]
Match Source & Intended	-0.089**	-0.168***
	[0.044]	[0.049]
Match Intended & Main	0.342***	0.318***
	[0.055]	[0.056]
Match Source, Intended & Main	0.363***	0.259***
	[0.042]	[0.048]
R ²	0.14	0.28
Additional Controls	NO	YES

Notes: Males who had worked prior to immigrating to Canada. Matches of source country, intended and main post-immigration occupation using 25 Occupation grouping. All regressions include controls for Months Since Migration. Additional Controls include: Region of Origin, Region of Residence, Months Since Migration, Marital Status, and Number of Children.