

Language Skills in the New Economy and the Deteriorating Labour Market Performance of Canada's Immigrant Workers

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EXECUTIVE SUMMARY

Between the late 1960s and early 1990s, Canada experienced a dramatic shift in the source countries of its immigrants away from Europe towards Asia and to a lesser extent Africa. This shift had a large impact on the English and French language abilities of new immigrant workers entering Canada's labour markets and in turn their earnings capacity when compared to similarly aged and educated Canadian-born workers. The labour market disparities of Canada's most recent immigrant cohorts and the important role of language in driving these disparities are now well documented and widely acknowledged by policymakers.

Since the early 1990s, however, the source country distribution of Canada's new immigrants has remained relatively stable. The percentage of immigrants with English or French as a mother tongue has consequently also changed little over past two decades. If deteriorating language skills were solely responsible for the rising earnings disparities of Canada's immigrants, these disparities should have stabilized in the early 1990s; but they did not. Analyses of Census data up to the first half of the 2000s suggest a continued deterioration in earnings, particularly among immigrant women. Moreover, deteriorating earnings prior to the 1990s should not be evident when we compare cohorts of immigrants arriving from the same country with similar English/French language abilities; but they are. What accounts for these robust and persistent gaps? This paper posits that not only has there been a long-term decline in the average English/French language abilities of Canada's immigrants, but as a result of broad economic structural changes or perhaps even changes in the way work is organized within sectors, the labour market value of English/French language skills has increased over time. Not only did this contribute to the earnings shortfalls of immigrants prior to the early 1990s, but even as the average language abilities of Canada's immigrants have stabilized, and perhaps even improved, their relative earnings have not.

Using test score data assessing literacy, numeracy and problem-solving skills of Canada's adult population, I find evidence of large gaps in immigrant language skills, which appear not only strongly related to labour market earnings, but substantially larger for immigrants with a foreign mother tongue and who use a foreign language at home. Given this evidence, I exploit consistently-defined information on the mother tongue and home language of recent immigrant spanning four decades of Census data, to proxy the language abilities and explore the possibility of increasing returns to language skills in Canadian labour markets. The results of this analysis are remarkably supportive of the paper's main

hypothesis. Specifically, I find that the deterioration in new immigrants' earnings, relative to similarly aged and educated Canadian-born workers, has clearly been most pronounced among immigrants with a foreign mother tongue and home language. This appears particularly evident in the results for women and is evident even after the 1990s when the percentage of recent immigrants with a foreign mother tongue and home language began to decline. It also continues to be true after controlling for the region of an immigrant's birth, suggesting further that it reflects a change in the return to language skills, rather than a change in language skills themselves.

Determining the precise nature of these changing returns is difficult in the absence of a richer source of historical data on the language abilities of new Canadian immigrants. Nonetheless, sectoral analyses suggest two key structural economic developments likely contributed. First, data from three different sources providing information on the language skills of immigrants or the language requirements of their jobs, consistently point to relatively large returns to language skills in new high-technology industries, most notably the information and communications technology industry, and relatively low returns in unskilled manufacturing jobs. Moreover, beginning in the early to mid-1990s there is clear evidence of a structural shift in the employment of recent immigrant workers away from unskilled manufacturing towards high-technology industries. For immigrant women, in particular, this shift towards employment where language skills are valued relatively highly appears to have contributed to the persistence of the labour market shortfalls of Canada's most recent immigrant workers.

The results of this analysis suggest a larger role for language in explaining the well-documented labour market challenges of Canada's recent immigrants. Nonetheless, more research is needed. In particular, the language variables contained in the Census data provide little more than proxies for actual language skills. An important area of future research may be to explore the relationship between changing returns to language skills explored here and the large literature on skill-biased technological change (SBTC) of which most recent Canadian evidence is more supportive. It may be that the strongest Canadian evidence of the SBTC hypothesis is to be found in the recent relative labour performance of immigrant workers.

1. Introduction

The deteriorating labour market performance of new immigrants to Canada that began in the 1970s and continued up until at least the late 1990s, and perhaps even through the 2000s, is now well recognized both in the economics research literature and among Canadian policymakers. Over the past decade or so, a substantial literature has arisen seeking to understand the underlying causes of this deterioration (see Picot and Sweetman (2005) for a review). A key finding of this literature points to the shift in the source countries of Canada's newest immigrants away from the U.K., U.S., and Europe towards Asia and to a lesser extent Africa. In their analysis of Census data, Aydemir and Skuterud (2005) attribute one-third of the overall deterioration in the labour market earnings of recent immigrant men to this shift. But of course this finding tells us nothing about why immigrants from non-traditional immigrant source regions have greater difficulties integrating into Canada's labour markets. Since discriminating between immigrants on the basis of country of origin is politically infeasible, one needs to dig deeper to inform the optimal design of immigrant selection policy.

What we do know is that non-traditional source country immigrants are not only less likely to be proficient in one of Canada's official languages on arrival, but also have more difficulty learning English or French (see Chiswick 2005). There is also a well-established connection between the language skills of immigrants and their subsequent post-migration labour market earnings going back to, at least, the work of McManus, Gould and Welch (1983). More recent evidence from Ferrer, Green and Riddell (2006) examining Canadian data on adult literacy skills points to the importance of written language skills in explaining the challenges facing Canada's immigrant workers. And in ongoing work, Clarke and Skuterud (2010) find that much of the performance advantage of Australian immigrants, where the relative earnings of recent immigrants have not tended to fall across arrival cohorts as in Canada, can in large part be attributed to a much more modest shift in Australia away from English-speaking immigrant source countries. Even beyond the Canadian literature, language has over the past decade begun to dominate the economics literature concerned with explaining disparities in immigrant labour market performance. As examples of this work, see the extensive research by Christian Dustmann and coauthors, as well as by Barry Chiswick and Paul Miller.

Notwithstanding these findings, the Canadian evidence also suggests that shifts in the source country distribution of new immigrants, cannot account for all of the deterioration in the relative labour market earnings of new immigrants. Aydemir and Skuterud (2005), for example, find that declining

immigrant earnings in the year following entry to Canada is observed even when we condition on the source country of new immigrants. That is, evidence of deteriorating earnings at entry are still found even when one compares immigrants arriving from the same country, say China, in the 1970s and 1990s. What explains the remaining deterioration? We do know that at least an additional third, and perhaps more, of the remaining deterioration is related to changes over time in the return to foreign work experience in Canadian labour markets. That is, there is clear evidence of a concomitant deterioration in the value of foreign work experience to Canadian employers, which becomes particularly acute when we restrict attention to immigrants from non-traditional source countries (Green and Worswick 2010). This phenomenon is, however, not well understood. In fact, a review of the current literature offers scant evidence, or even speculation, on the nature of this deterioration.

In this paper we posit that the observed decline in the value of foreign work experience in Canadian labour markets may also be related to language of Canada's most recent immigrants. To date the Canadian literature that has directly accounted for the role of language has assumed that the return to language capital has been constant over time. But it may be that the value of language skills has been increasing over time. Why might this be the case? There are at least three reasons. First, the period over which the deterioration in immigrant earnings is observed – the early-1970s up to at least the late 1990s – is also the period over which Canada (and most other OECD countries) experienced a significant structural employment shift, driven primarily by increasing international trade flows, away from goods-producing industries towards service-producing industries. To the extent that language skills play a larger role in the production of services than goods, we would expect this sectoral shift to have increased the average labour market return to language capital in the Canadian labour markets. As a particularly salient example of such a structural employment shift, it may be that highly-paid unionized jobs in the manufacturing sector, which were readily accessible to a relatively unskilled immigrant with little or no English or French language skills arriving in Canada during the 1970s, have been replaced with service-sector jobs, such as telemarketing and other sales occupations, in which language skills are imperative.

Furthermore, there is good evidence that language capital and other forms of human capital, such as technical skills, tend to be complementary in production. Examining the 1991 Canadian Census, Chiswick and Miller (2003) find that greater proficiency in English or French increases the immigrant return to foreign labour market experience, suggesting that the human capital obtained through foreign work experience is language-specific. As an example, the skills obtained from working as a math teacher

in China may only be useful in Canada to the extent that an immigrant has sufficient English- or French-language abilities to translate those skills. It may be that the structural economic shifts that have occurred in Canada over the past three to four decades may have shifted employment towards exactly those sectors, such as sales, where this language specificity of foreign work experience is most acute.

The problem with attributing these changes to employment shifts from the goods- to service-producing sector is that one can always think of counter-examples of jobs of the "old economy" in which language skills were critical, such as managers or product engineers in the manufacturing sector, and jobs of the "new economy" in which language skills may be relatively unimportant, such as technical jobs in the information technology industry. It is, therefore, not obvious that these structural shifts have served to increase the return to language capital. An alternative possibility is that changes *within* industries, as opposed to shifts in employment across industries, have increased the value of English and French language skills. The skill-biased technological change (SBTC) hypothesis argues that there has been an increase in the relative demand for skilled labour within industries. Although early Canadian research on the SBTC hypothesis found little change over time in the relative wages of university-educated men (Burbidge, Magee and Robb 2002), the recent analysis by Boudarbat, Lemieux and Riddell (2010) finds substantial increases in returns to education among men (but not women) over the period from 1980 to 2005.¹ In addition, there is evidence for Canada that the skill intensity of Canadian industries is correlated with technological innovation (Gera, Gu and Lin 2001). Once again, to the extent that language skills and these other skills are complementary in production, as evidence suggests they are, we would expect SBTC to have similarly served to increase the importance of language skills in production, thereby introducing an additional labour market challenge for immigrants arriving in Canada with weak English and French language proficiency.

Even ignoring these economic structural shifts and SBTC considerations, it may still be that the importance of language skills has increased over time. There is evidence that the organization of production, most notably within the manufacturing sector, has changed over time from processes based on Taylorist principles, in which jobs are rationalized down to their narrowest components, to principles of total quality management (TQM), in which production occurs in teams of workers, thereby increasing the involvement of workers in the entire production process. One might expect that work organized in teams requires greater communication and language skills on the part of workers, thereby putting

¹ The authors attribute the different results to their use of the Census data, in contrast to the Survey of Consumer of Finances (SCF), as well as the fact that they control for years of work experience.

recent immigrant workers at a disadvantage. Or perhaps quality management and safety regulations, such as those of the International Organization for Standardization (ISO), increasingly call for a basic level of English or French literacy skills even within the most unskilled occupations. Consequently, it might not only be the case that there are fewer factory-floor manufacturing jobs for immigrant workers today than there were for their counterparts of the 1970s, but a third possibility is that the language demands of these jobs themselves may have changed, making immigrant workers with inferior language skills a poorer fit for these jobs.

There are essentially two key ideas or hypotheses underlying this paper. First, immigrants are, on average, less proficient in English or French. It may also be that their English/French language abilities have deteriorated over time, even among immigrants from a common source country, but that is only of secondary interest. Second, and more contentiously, it is hypothesized that the average wage or earnings return to English/French language skills, that is the influence that language skills have in production, has over the past three to four decades increased. It does not matter for our analysis why this has happened, but simply that it has. Together these two premises imply not only disparities in the wage rates of immigrant workers, but also that these wage gaps have been increasing over time. Note that the hypothesis here is quite different from the usual compositional "shift-share analysis" stories, which point to shifts from relatively high-paying to low-paying jobs and argues that immigrants have experienced this shift differently. Instead, the hypothesis here is that structural employment shifts may have been equivalent for immigrants and native-born workers, but by increasing the average return to language skills in the economy, the effect of these shifts has had a larger impact on the earnings of immigrants, whose language skills in English or French are on average weaker.²

The remainder of this paper is organized as follows. In the following section, I describe the three main data sources that will be employed in the analysis. Section 3 then describes in detail the empirical methodologies that will be employed. The fourth section discusses the results of the analysis in detail. Lastly, I conclude by summarizing the main findings and what I see as the important directions for future research in this area.

² A caveat to the main hypothesis of this paper is that if returns to language skills are, in fact, increasing as a result of structural economic changes, more recent immigrants might mitigate the effect of these changes by shifting to sectors of the economy in which returns to language skills remain low. In other words, if increasing language returns are resulting from, for example, shifts in employment away from goods- to service-producing industries, immigrants can mitigate the effect on their average earnings by increasingly (across cohorts) opting for employment in the goods-producing industries. An important part of the empirical analysis will therefore need to relate the sectoral distribution of immigrant employment and the sectoral returns to language skills.

2. Literature Review

Economics research examining the role of immigrant language abilities on post-migration labour market performance has a long history, going back to at least the work of McManus, Gould and Welch (1983), who examined the relative earnings of Hispanic men in U.S. labour markets. A key complication of this research is determining to what extent the observed language effects identified in the literature reflect true causal impacts of language skills. Theoretically, two sources of bias may be at play. First, language ability is likely positively correlated with unobservable productivity characteristics of workers. As a result, simple least squares regressions are likely to overstate the importance of language skills. But, on other hand, language measures in the data are also likely to contain measurement error, due to reporting errors for example, suggesting that the estimated language effects in the literature may, in fact, be underestimated.

Dustmann and Van Soest (2002) and Berman, Lang and Siniver (2003) both attempt to sort out the relative importance of these biases using different strategies. Both find that, if anything, the estimated effects in the naive literature are likely too small, suggesting that effects of immigrant language abilities on labour market outcomes may be even more important than previously thought. Similarly, using plausibly exogenous variation in language abilities resulting from a discontinuity in the ability of individuals to learn new languages as they age, Bleakley and Chin (2004) find large returns to language abilities. Taken as a whole, there is clearly a movement in the literature towards putting a greater emphasis on the role of language abilities in driving immigrant labour market disparities. In the Canadian setting, this emphasis is most evident in the recent work of Ferrer, Green and Riddell (2006) comparing the literacy test scores and labour market earnings of Canadian immigrants to their native-born counterparts.

None of these studies, however, consider variation in the returns to language abilities over time. In fact, a review of the extant literature identifies a single study examining changes in the returns to language skills over time. Focusing on changes over time in the relative earnings of self-employed immigrants in U.S. Census data, Dávila and Mora (2004) find evidence of increasing returns to English proficiency between 1980 and 1990. Differences in the return to language skills across different occupations (Berman, Lang and Siniver 2003) and across the earnings distribution (Boyd and Cao 2009) have also been examined. In this paper, we consider whether the changes identified by Dávila and Mora have been more widespread and to what extent can this change account for the deteriorating labour

market performance of Canada's more recent immigrants. Given the potential implications for the labour market integration of Canada's most recent immigrants, who are increasingly arriving from countries where neither English nor French are an official language, an examination of this possibility appears long overdue.

3. Data

To this point, the paper has been referring loosely to language skills and language capital, as well as the labour market return to these skills. But what exactly are language skills? At the most basic level, they encompass the abilities to communicate and comprehend, both orally and in writing. But the type of communication and comprehension skills required in workplaces varies tremendously across occupations and jobs. A computer software designer requires relatively formal and technical language abilities, compared to a salesperson, where colloquialism, dialects, slang, jargon, humour, and other non-cognitive communication skills are more important. Of course, no single measure of language can possibly capture all these dimensions of language skills. Instead this project employs three very different sources of cross-sectional data, providing three very different measures of language skills. In what follows, I describe these data sources.

3.1 2003 International Adult Literacy and Life Skills Survey (IALLS)

A key premise of the paper's main hypothesis is that the proficiency of Canada's immigrant workers in one of Canada's official languages – English or French – are inferior to those of their native-born counterparts. This is not contentious. Nonetheless, to better inform the subsequent analysis, the paper begins by providing some evidence of this differential in language skills. Since this only requires a single recent cross-section of data, one can exploit a data source providing a relatively rich and high-quality set of measures of language abilities. To compare the relative language skills of immigrants I, therefore, examine the Canadian extract of the 2003 International Adult Literacy and Life Skills Survey (IALLS). Not only do these data identify the country of birth of all respondents, and for those born abroad, their year of arrival in Canada, but they also provide objective measures of prose literacy, document literacy, numeracy, and problem-solving skills.³ Although these measures clearly do not capture all dimensions of

³ For each of these 4 measures, 5 plausible values are provided, rather than a single point estimate (see von Davier, Gonzalez and Mislevy, "What are plausible values and why are they useful," IERI Monograph Series: Issues and Methodologies in Large-Scale Assessments, Volume 2, pp. 9-36). All of the analysis in this paper is based on the unweighted mean of these five scores.

English-French language skills that might influence workplace productivity, in particular they ignore verbal communication skills, which we might expect to be relatively important in unskilled service-sector jobs, evidence from Ferrer, Green and Riddell (2006) indicate that they are strongly related to wage outcomes.

An additional useful feature of the IALLS data, besides providing evidence on the relative literacy skills of immigrants, is that it identifies the sector (industry) of all employed respondents, as well as their annual individual income quintile.⁴ As we have argued above, the key hypothesis underlying our theory is that the return to language skills has increased over time. One way that this could happen is if employment has shifted from, for example, the goods- to service-producing sector, or more generally from industries with relatively low returns to industries with high returns. By restricting the analysis to full-year workers, in order to limit the amount of non-labour income, one can use the IALSS data to estimate and compare returns to literacy skills across sectors of the economy to identify in which sectors literacy skills are valued most. And having identified these sectors, one can then turn to an alternative data source to consider whether these are also the sectors which have experienced increasing employment shares as a result of economic restructuring. The analysis of the IALSS data will inform whether, for example, language returns in the service-producing sector of the economy tends to exceed the return in the goods-producing sector. This information can then be combined with the next layer of our analysis, which examines long-term sectoral employment shifts using the Census data spanning the period 1971 to 2006. By relating the estimated returns to language skills identified in the IALSS data to these employment shifts we obtain some indirect evidence of changes over time in these returns.

A complication of this analysis is that the industry code available in the IALSS data is different from that in the Census. In particular, the IALSS data reports a knowledge-based classification distinguishing 11 manufacturing and service groups (which we further categorize into 8 groups), whereas the Census data uses either the Standard Industrial Classification (1970 and 1980) or the North American Industrial Classification System (NAICS). As a result, the interpretation of the results will to some extent be rather subjective identifying broad differences between manufacturing; construction and utilities; trade; transportation; services; and public administration.

⁴ This project employs the public-use version of the 2003 IALLS microdata. The master file data provide 2-digit level International Standard Classification codes for industry (ISIC) and 4-digit level International Standard Classification codes for occupation (ISCO), as well as a continuous measure of labour market earnings.

3.2 Matched Career Handbook – Labour Force Survey (CH-LFS)

The key limitation of the IALSS data is that it is a single cross-section providing an overall sample size of only 11,202 employed individuals, of which 2,311 are immigrants. This makes it impractical to try and relate the observed sectoral distribution of immigrant employment to the estimated sectoral returns to language skills. In addition, although the IALSS data allow us to separately identify recent immigrants (those arriving after 1990), the sample size is insufficient to exploit this information.

An alternative strategy is to link data from the Canadian Labour Force Survey (LFS) to data on the language attributes of jobs available in Human Resources and Skills Development Canada's (HRSDC) Career Handbook (CH). The CH is the counselling component of the National Occupational Classification System (NOC-S). As such, it provides detailed information on occupational characteristics, including ratings indicating the relative importance of various aptitudes most relevant in the performance of the work in each of the 520 4-digit occupations of the NOC-S. Most importantly for the theoretical considerations of this paper, the CH data rate, using a 5-point scale, the relevance of verbal abilities; numerical abilities; and general abilities in each NOC-S occupation (5 being the least relevant). By relating this highly detailed source of variation in "language returns" to the occupational distribution of the immigrant population, one can much more accurately identify the extent to which immigrants are concentrated in sectors where language skills are deemed relatively unimportant (and perhaps where numeracy skills are relatively important). In this regard, the CH data provide are clearly preferred to the IALSS test score data. The disadvantage of the CH data, however, is that the ratings they provide are not estimated returns, but simply reflect rankings of occupations on the various attributes (combined with a distributional assumption).⁵ Since these unambiguous rankings require that the attributes can be measured on a single dimension (or that there is some ad-hoc way to combine the dimensions into a single index), the ratings are inevitably unable to capture the complexity of the language skills required in the workplace. As an example, verbal abilities are rated 4 for "Food and Beverage Servers" (only 2 occupations among 520 are rated lower), whereas "Dentists" are given the highest rating. In terms of casual conversation skills, one could easily imagine that language is more important in production, in terms of attracting repeat customers for example, in the former than the latter.

⁵ More specifically, all skills are assumed to be normally distributed in the Canadian labour force and occupations are ranked on separately for each skill. A score of 1 applies to the top decile (10%) of the skill distribution; a score of 5 applies to the bottom decile; and the remaining 80% of the population is divided into upper, middle and lowest thirds and assigned scores of 2, 3 and 4, respectively.

Nonetheless, to obtain richer evidence of how immigrants might be mitigating changing returns to language skills by concentrating in sectors where language skills are relatively unimportant, I exploit the CH data by linking it to immigrant employment shares estimated using the Canadian Labour Force Survey (LFS). Beginning in January 2006, the regular monthly LFS began to identify the birthplace of all respondents, and for those born abroad with permanent residence status in Canada, their year of immigration to Canada. To estimate immigrant employment shares within 4-digit NOC-S occupations, I pool the January 2006 to December 2009 LFS files, which provides an overall sample of 3,389,034 observations on occupations (roughly 70,000 per month).⁶ Since the shares likely vary in important ways between men and women, all the analysis is done separately by gender. Despite the large overall sample, the majority of the 520 occupations contain insufficient samples to satisfy Statistics Canada's disclosure requirements – since we are estimating immigrant employment shares we need at least 5 immigrants, not just 5 workers, per month or 240 immigrants in the pooled data. This disclosure requirement becomes particularly stringent when the shares are estimated separately for men and women, due to the strong gender segregation of workers across occupations. For men we obtain estimates of immigrant employment shares in 210 occupations (41% of the total possible) and for women in 157 occupations (30% of the total). For the remaining occupations we can, however, distinguish between those occupations in which the data are missing because the overall numbers of immigrants are low, from those occupations where the overall number of workers (immigrants and native-born) are low. For example, the data contain 5,100 observations on male Firefighters (NOC-S code 6262), which easily surpasses the disclosure threshold. However, within this occupation there are fewer than 240 immigrant men observed, so that the male immigrant employment share for this occupation does not satisfy the disclosure threshold. Nonetheless, since we know: (i) the total number of male Firefighters; and (ii) that fewer than 240 of these are immigrant men, we can estimate an upper bound of the male immigrant employment share in this occupation, which can be used in a censored regression model. Using this strategy the number of observed immigrant employment shares increases from 210 to 475 for men (91% of the total possible) and from 157 to 360 for women (69%).

3.3 Census

The only nationally representative data source to provide language measures of Canada's immigrant population consistently spanning the period over which the deterioration in immigrant labour market

⁶ NOC-S codes are identified for all respondents in the data who have worked in the previous year. Therefore, the employment shares used include unemployed workers. This is important in the current analysis, which focuses on immigrant shares, since we know that immigrants are more likely to be unemployed.

performance is observed – 1970s to 2000s – is the Canadian Census. Unfortunately, the measures available in the Census are far cruder than what is provided in the IALLS and CH data, and are more accurately described as proxies for English/French language abilities than actual measures of these abilities. Nonetheless, they have been used elsewhere to provide useful insights. Chiswick and Miller (1998) provide a detailed description and discussion of the language questions available in the Canadian (and U.S.) Censuses. Specifically, the 1971, 1981, 1986, 1991, 1996, 2001, and 2006 Census public-use microdata files (PUMFs) that are employed in this paper provide reasonably consistent measures of three aspects of language ability: (i) knowledge of an official language (English only; French only; English and French; neither English nor French); (ii) mother tongue (English, French or other); and (iii) language most often spoken at home (English single response; French single response; English and French and no foreign language; or foreign language, either as a single response or not).

Fortunately, in addition to its objective test score data, the IALLS data also contains these same language proxy variables. By relating the objective test scores in the IALLS data to these Census variables, we can obtain some sense of the extent to which the Census variables proxy for the language skills that more directly influence workplace productivity. In other words, does the incidence of speaking a language other than English or French at home, for example, appear to capture differences in literacy skills that are directly relevant in the workplace? Since the Census proxy variables will be relied upon to measure changes over time in both the language abilities of recent immigrants and in the labour market return to these abilities, this joint analysis using the literacy score data in the IALLS will be critical for gauging the meaningfulness of the Census estimates.

Although the public-use Census files provide much larger samples than are available in the IALLS data, the samples are still limited relative to the Master files of the Census, which in the most recent years provides observations on 20% of the entire Canadian population. This restricts the degree of disaggregation possible, most importantly in consistently identifying immigrants from particular source countries over time. The problem with using the master files of the Census, however, is that all the files before 1991 are not accessible. Since we know that much of the structural changes underlying our conjectures took place through the 1980s, it is critical that I be able to examine these earlier years.

Pooling the 1971 through 2006 public-use Census files, I obtain total sample sizes of 1,340,213 permanent-resident men and 1,366,431 women age 15 to 64, living in private households outside the

Maritimes and the Territories.⁷ Among men, 272,994 (20.4%) are immigrants, while for women 282,520 (20.7%) are immigrants. A small complication in pooling these files is that there is some variation across years in their sampling rates, as they have tended to increase over time, going from 1% of the population in 1971 to 2.7% in 2006. Since these are essentially simple random samples (SRS) of the population, we address this inconsistency by constructing a constant sample weight separately for each year equal to the inverse of the constant probability of being sampled.⁸ All the estimates reported employ this weight to, in effect, address the under-sampling of the earlier Census year. An additional complication is that there are some inconsistencies in how variables are defined across years. In the case of the schooling variable, for example, I am forced to aggregate up to three categories indicating the highest level of schooling attained: high school or less; post-secondary diploma or certificate; or university degree. More significantly for the present analysis, the classification of both industry and occupation has changed across Censuses. Using Concordance tables, I can however create a relatively high-level categorization that is broadly consistent over the full period from 1971 to 2006. Appendix 1, as well as the notes to the tables, contain detailed descriptions of how all the variables used in the analysis are defined.

4. Methodology

The first objective of the paper is to examine the relative language abilities of Canada's immigrant workers. I begin this analysis using the objective test scores provided in the IALLS data. Since these scores are continuous variables, rather than simply compare average test scores between immigrant and native-born workers, quantile regressions are estimated to identify differentials across the full distribution of test scores. The obvious advantage of the IALLS test score data are that they provide objective evaluations of adult cognitive skills. Their limitation, however, is that they do not necessarily tell us much about communication skills, which in some occupations may be equally or more important. As noted above, fortunately the IALLS data also provide self-reported indicators of fluency in English or French, mother tongue and home language, all of which are more directly related to communication skills. Using these data, we can compare how any observed disparities in immigrant test score vary

⁷ Many of the immigrant variables, such as country of birth, are coded at a higher level of aggregation in the public-use Census for individuals living in the Maritimes or the Territories. In order to produce a consistent set of categories for these variables, we therefore restrict the analysis to residents of Quebec, Ontario and the Western Provinces.

⁸ It turns out this weight is already defined in the 2006 file.

between individuals with a foreign (not English or French) mother tongue or who predominantly speak a foreign language at home, providing us with some sense of the meaningfulness of these language proxy variables provided in the Census data.

Having obtained some sense of the information content of these Census language proxies, I then explore changes over time in the language abilities of recent immigrants to Canada. This is done by estimating the proportion of recent immigrants (5 years or less since immigration), separately across arrival cohorts, who are fluent in English or French, as well as the proportions with English or French as a mother tongue or home language. Using the 1971 through 2006 Censuses, this allows us to directly measure changes in the language abilities of new arrivals over three-and-a-half decades. Of course, much of the observed deterioration will simply reflect the broad shift over this period in the countries immigrants are coming from. We, therefore, also estimate these proportions separately for immigrants from three broad regions, who have accounted for growing shares of recent immigrants – Asia, Africa and Eastern Europe.

Of course, the key hypothesis does not depend on the relative language abilities of immigrants deteriorating over time. It only requires that their language abilities were inferior 30 years ago and continue to be, but that this limitation of immigrants has become a greater liability over time due to the increasing importance of language abilities in the labour market. The second main objective of the empirical analysis is, therefore, to examine to what extent the sectoral distribution of immigrants is related to the variation in the importance of, or returns to, language abilities across sectors, and also how this relationship may have changed over time as immigrants try to mitigate the effects of changing returns to language skills within sectors. This analysis will consist of two parts. The first will estimate returns to literacy skills directly using the IALLS data. Using the income quintile data in the IALSS, and restricting the sample to respondents employed throughout the year, I estimate, by maximum likelihood, the ordered probit model given by:

$$\Pr(qu_i = j) = \Phi[\gamma_j + \alpha^n(nat_i * sec_i) + \alpha^m(imm_i * sec_i) + \phi(sec_i * score_i) + x_i\beta + \varepsilon_i] - \Phi[\gamma_{j-1} + \alpha^n(nat_i * sec_i) + \alpha^m(imm_i * sec_i) + \phi(sec_i * score_i) + x_i\beta + \varepsilon_i] \quad (1.1)$$

where $\Phi(\cdot)$ is the distribution function of the standard normal distribution; qu_i is the annual personal income quintile ($j = 1, \dots, 5$) of individual i in the population; sec_i is a vector of mutually-exclusive dummy variables indicating the sector of employment (see discussion in Section 3.1); $score_i$ is one of

the five test scores provided in the IALLS data; nat_i and imm_i are native-born and immigrant indicators, respectively; and x_i is a vector of wage-determining control variables, including age, education, usual weekly hours of work (quadratic). It would be preferable to estimate not only separate sector-specific intercepts for immigrants and native-born workers (α^n and α^m), but also separate sector-specific returns to test scores. However, consistent with the evidence presented in Ferrer, Green and Riddell (2006), I find no evidence of a difference in the score return between immigrants and the native-born when estimating an average return across all industries. However, conditional on test scores, there do appear to be some substantial differences in how immigrants and native-born workers are paid *within* sectors (consistent with the possibility of labour market discrimination).

As noted earlier, an important limitation of the IALLS data is the level of sectoral disaggregation possible given its limited sample size. The IALLS analysis is, therefore, supplemented using the CH-LFS data described above. The methodology in this case is relatively straightforward. The basic approach is to estimate, by censored linear regression (given the missing data discussed in Section 3.2 above), a series of functions of the form:

$$mshare_j = \lambda attribute_j + \mu_j \quad (1.2)$$

where $mshare_j$ is the immigrant share in occupation j and $attribute_j$ is the vector of job attribute ratings (verbal, numerical and general). The question is to what extent immigrant employment is concentrated in occupations with relatively low verbal ability requirements, conditional on the numerical and general ability requirements of the occupations. Using the country of birth data available in the LFS, it is also possible to distinguish immigrants born in countries where English or French is an official language to those where it is not. I therefore also examine whether the verbal attribute measures in the CH data are more strongly related to the share of occupations that are immigrants from countries without English or French as an official language.

Having obtained evidence on how language skills are valued differently across sectors of the economy, I then turn to the Census data to identify long-term shifts in sectoral employment. In this analysis I am interested in two questions. First, is there any evidence that overall employment has tended to shift towards sectors where language skills appear to be valued more, implying an increase in the average return to language skills in the Canadian labour market? Second, is there any evidence that immigrants may have mitigated broader labour market trends, by maintaining relatively high employment shares in sectors where language skills are valued relatively less? To identify these trends, I

will create a consistent set of industry and occupation codes in the 1971 through 2006 Census files and simply compare the relative distribution of immigrants over time.

Lastly, and most importantly, the paper exploits the proxy language variables in the Census to examine whether there is any direct evidence of an increase in the returns to language capital in Canadian labour markets. The basic approach to doing this will be to estimate the following immigrant earnings assimilation model using the pooled sample of native-born workers and recent immigrants (5 years or less since immigration) age 15 to 64 in the Census files from 1971 through 2006:

$$\log(\text{wearn}_{it}) = y_t + f_a(\text{age}_{it}) + f_s(s_{it}) + \gamma_n(\text{nat}_i * \text{lang}_{it}) + \text{imm}_i \cdot [\delta_m(\text{cohort}_i) + \gamma_m(\text{lang}_{it} \cdot y_t) + z_{it}\theta] + e_{it} \quad (1.3)$$

where wearn_{it} is the real weekly earnings of individual i in year t ; y_t is a vector of year dummies; age_{it} is age (the age function f_a is quartic); s_{it} is highest level of schooling (defined in Section 3.3); cohort_i is a vector of dummies indicating the period of immigration (defined in 5-year intervals); lang_{it} is a vector of the language variables contained in the Census (described in Section 3.3 above); and z_{it} is a vector of immigrant-specific control, most notably country/region of birth. The key parameter of interest is, of course, γ_m , which provides evidence on whether the returns to the language skills of immigrants have been changing over time. In addition to restricting the immigrant sample to recent arrivals, we also limit the samples to individuals employed full-year (49-52 weeks), full-time (usual weekly hours of work of 30 or more) in the earnings reference year.

5. Results

In this Section, I discuss the key findings from the analysis described above. Figure 1 plots the estimated coefficient on an immigrant dummy variable in the test score regressions estimated separately for employed men and women and each skill in the IALSS data (prose literacy, document literacy, numeracy and problem solving) and at every percentile between 5 and 95. For all four skills, immigrant disparities are evident across the distribution for both men and women. However, in all cases they are substantially smaller at the top end of the distribution, and in the case of document literacy and numeracy, the gaps become negligible beyond the 85th percentile. Although information on immigrant class is unavailable in the data, it seems likely that this primarily reflects the scores of migrants selected under Canada's skilled worker programs, as well long-term foreign-born residents of Canada.

In Table 1, mean immigrant skill gaps conditional on age and education are reported separately for men and women. Given the high collinearity of the four test scores, I follow Ferrer, Green and Riddell (2006) and aggregate them into a single “average skill” measure by taking the unweighted individual average test score for each individual in the data. As with the unconditional gaps in Figure 1, the results consistently point immigrant disparities in cognitive English-French language skills, although the gaps vary tremendously between different language groups (shown in columns). The standard deviation of all the test scores in the population is slightly greater than 50. Consequently, with the exception of the numeracy scores, the gaps for immigrants with a foreign mother tongue always exceed one-half of the population standard deviation and are substantially larger for immigrants whose home language is also foreign. However, for immigrants whose mother tongue *and* home language is English or French, the gaps are consistently less than half the size, and in the case of immigrant men, on average statistically insignificant. Overall the results in Table 1 suggest that these proxy language variables also provided by the Census data are highly correlated with actual immigrant language skills and do not appear to simply reflect unobservable differences between immigrants unrelated to language abilities.

Given this evidence, Tables 2, 3 and 4 examine long-term changes in the Census language proxy variables across immigrant arrival cohorts. In Table 2, the estimated proportions of recent immigrants with English/French fluency, mother tongue and home language are reported. The proportion whose mother tongue or home language is English or French has clearly declined over the past 35 years. Among both immigrant men and women, the percentage of recent immigrants with English or French as a mother tongue decreases from nearly one-half in 1971 to less than one-in-five by 1991, and thereafter remains quite stable. Similarly, the percentage speaking English or French at home decreases from roughly 55% in 1971 to about 25% by 1996, but thereafter tends to reverse the previous trend. Interestingly, unlike mother tongue and home language, self-reported fluency in English or French does not appear to have declined over time. Given the subjective nature of this variable and resulting difficulty of interpretation, I instead limit the earnings analysis the information on mother tongue and home language.⁹

What explains this apparent deterioration in immigrant language ability? Table 3 compares the country of origin distribution of recent immigrant arrival cohorts. The results indicate that 19.5% of recent immigrants observed in the 1971 Census were born in the U.K., while another 8.3% were U.S.

⁹ Comments on an earlier draft of this paper by HRSDC pointed out that self-reported fluency data has been found to be problematic in other data sources. For example, the Longitudinal Survey of Immigrants to Canada (LSIC) finds that self-reported knowledge of an official language among immigrants tends to decline with time spent in Canada.

born. By 2006, these shares had dropped to 2.0% and 2.1% respectively. In sharp contrast, over the same period the percentage of recent immigrants in the data from Asia increased from a low of 13.9% in 1971 to 40.9% in 1981, and 59.1% in 1996. However, since 1996 this share has been relatively stable. Also, noteworthy, but much less dramatic, is the continuing increase in the share of recent immigrants from Africa, which was only 3.3% in 1971, compared to 10.5% by 2006. Although we know some proportion of Asian and African immigrants are native English or French speakers, this dramatic shift away from U.K. and U.S. immigration, towards Asian and African immigration, undoubtedly accounts for an important part of the disparities in average immigrant literacy skills in English and French identified in Table 1. It is also worth noting that the stability of the language variables in Table 2 in the early- to mid-1990s coincides with the leveling off of the earlier growth in the Asian immigration shares in Table 3. The question is, of course, to what extent the labour market performance of recent immigrants, shows a similar improvement after the mid-1990s. To the extent that the documented deterioration in immigration labour market outcomes is driven by deteriorating language abilities, we would expect, given these patterns, to see a similar levelling off of the deterioration from the mid-1990s. However, as hypothesized here, it may be that the deterioration in entry returns reflects changing returns to these language abilities, in which case the deterioration in entry earnings may have persisted beyond the mid-1990s.

Lastly, Table 4 examines changes in the Census language-proxy variables across cohorts of immigrants arriving from Asia, Africa and Eastern Europe. Once again, both the mother tongue and home language variables suggest a strong deterioration in English/French language abilities, even within these regions, up to the mid-1990s and a levelling off, or even slight improvement, thereafter. In fact, in the case of African immigrants, the percentage of recent arrivals speaking English or French at home appears to have rebounded very substantially since the early-1990s. This is particularly evident among those African immigrants with a foreign mother tongue.

Before examining the earnings data in the LFS and Census, we regress the income quintile available in the IALSS data on both the IALSS “average skill” scores and the mother tongue and home language indicators. Specification (1) of Table 5 reports the coefficient on an immigrant dummy from this ordered probit regression when no language variables, but only controls for age, education and usual weekly hours of work controls are included. Consistent with the large literature on immigrant earnings disparities, the estimated shortfalls in immigrant income are substantial among both men and

women.¹⁰ Adding the language controls in Specification (2) reveals that the magnitude of these income shortfalls varies tremendously between immigrants whose mother tongue and home language is foreign as opposed to English or French. In fact, among both men and women, the earnings gap is insignificant for all immigrants with an English or French home language (whether or not the mother tongue is English or French). The question is how much of this difference reflects differences in English/French language skills? The third and fourth Specifications of Table 5 add the average skill variable as an additional control. In the third specification, this return is restricted to be the same between immigrants and native-born workers, while in the fourth this restriction is relaxed. However, consistent with the evidence of Ferrer, Green and Riddell (2006), the estimates here suggest the restriction is valid – that is, there is no evidence of a differential return to average skill between immigrants and native-born workers. For both men and women, and immigrants and natives, the return to average skill appears highly significant in raising labour market earnings. Moreover, the average skill shortfall of immigrants who speak a foreign language at home appears to account for roughly half of their earnings gap (the estimated gaps in the “Both” drop by about half between the second and third specifications). This provides us with some assurance of the validity of using the information on home language in the Census data to identify long-term changes in the returns to immigrant language abilities.

Before turning to the LFS and Census data, in Table 6 I exploit the information on sector of employment in the IALSS data to try and obtain some evidence on how returns to language skills may vary across labour markets. Given the limited sample size of the IALSS data and the heavy sectoral concentration of male and female employment, estimating separate intercepts and returns (conditional on age, education and usual work hours) separately for men and women is not feasible. Equation (1.1) is, therefore, estimated pooling the male and female samples. To the extent that women experience lower wages for reasons independent of their measured skills, the estimated intercepts will tend to be downward biased in those sectors where women are concentrated (for example, Community, social and personal services). However, assuming women are not paid differently for their skills than men, as the estimates in Table 5 suggest, this should not bias the estimated skill returns.

The point estimates in Table 6 point to relatively high returns the IALSS average skill test scores in high-technology manufacturing; knowledge intensive market services; public administration, defense and health; and other community, social and personal services. Cognitive skills appear to be valued least

¹⁰ Note that the reported point estimates are the unadjusted estimates from an ordered probit and therefore provide no straightforward interpretation with respect to earnings levels or percentage differences between groups.

in primary industries, followed by utilities and construction, with the remaining industries falling somewhere in between. Although, the degree of precision of these estimated differences is less than ideal (all but two of the differences, relative to high-technology manufacturing, are statistically insignificant), these differences seem entirely plausible; that is, the estimated returns do appear higher in the relatively knowledge and skill-intensive industries. The question is then, is there any evidence that immigrants are mitigating the effects of high language returns by disproportionately opting for employment where language skills are valued relatively less? The following six columns of Table 6 report employment shares, estimated using the IALSS data, separately by education groups. Comparing the estimated skill returns to employment shares, the evidence is mixed. On the one hand, immigrants at all education levels do have relatively low employment shares in the single industry where skill returns appear to be the highest – public administration, defence and health. However, they appear similarly underrepresented in industries where skills appear valued least – utilities and construction and primary industries. In fact, the industry in which immigrants appear most concentrated is high-technology manufacturing, where skill returns are relatively high. Overall, these results provide assurance that if the value of language skills has been increasing over time, this change should have contributed to the well-documented deterioration in relative immigrant earnings.

The main limitation of the IALSS data is the sample size it offers. In Tables 7 through 10, I present the results from the analysis of the merged CH-LFS data, which allow me examine sectoral variation at a much finer level of detail. I begin, in Table 7, by ranking the 10 largest and smallest occupations (in terms of overall employment shares in the population) with the highest verbal ability attributes in the CH data (recall that a higher rating indicates a lower level of ability required in that occupation). The question of interest is whether there is any evidence that immigrants are relatively concentrated in those occupations where verbal abilities are valued least. For men, the answer appears to be no. Most notably, immigrant men are concentrated (employment shares exceed one-third, relative to a labour force share of about one-in-five) in 5 of the 6 largest occupations where verbal abilities are most crucial, according to the CH data. From largest to smallest, they are: university professors; civil engineers; general practitioners and family physicians; specialists in clinical medicine; and agricultural and bio-resource engineers. In contrast, they are only concentrated in 2 of the 10 occupations where verbal ability is relatively unimportant – labourers in food, beverage and tobacco processing and in rubber and plastic products manufacturing. The results for women are somewhat different. Among the 6 largest occupations with the highest verbal ability attributes, immigrant women are underrepresented in 5 (university professors is the exception). Moreover, among the 10 largest occupations with the

lowest verbal ability attributes, they are overrepresented in 7. And where they are underrepresented, such as cashiers and food and beverage servers, it may be, as discussed in Section 3.2 above, that the CH data understates the importance of language abilities. This may be particularly true when one thinks about the role of language as a criterion in the recruiting decisions of employers.

An alternative approach to examining the relationship between the verbal abilities of jobs and the jobs in which immigrants are employed is to rank the occupations where immigrants are most and least concentrated. Using only the sample of occupations with uncensored immigrant shares, in Table 8 I identify the ten occupations with the lowest and highest immigrant shares separately for men and women. Once again, the results for men run counter to what we would expect. In particular, for men verbal abilities appear slightly more important in the 10 occupations where immigrants are most concentrated than in the 10 occupations where they are least concentrated (3.0 compared to 3.6). This result is driven by two outlying occupations which require strong verbal abilities and in which immigrants comprise a highly disproportionate share of employment – software engineers and chemists. Immigrant women, on the other hand, once again do appear to be concentrated in occupations where verbal skills are less important, despite the fact that immigrants also account for more than half of all female software engineers in the population. The fact that immigrant women are so much less likely than native-born women to work as lawyers (11.1% immigrant share) or managers in health care (11.3% immigrant share), plays an important part in driving this result.

A complication in interpreting the CH job-attribute data is that occupations which require above-average verbal abilities are likely the same occupations that require above-average numerical abilities. The fact that immigrant men are concentrated in occupations requiring relatively high verbal abilities may therefore reflect that they sort themselves into occupations requiring high numerical abilities. Consistent with this idea, Table 8 also indicates that the average numerical abilities (and general abilities) in the occupations where immigrant men are most concentrated exceeds the average where they are least concentrated, with once again software engineers, chemists, and now also mechanical engineers being particularly important. This pattern, however, is not evident among women, where there appears to be essentially no difference in the numerical ability requirements of the occupations where immigrants are most and least concentrated. However, it is worth noting that the variance of the numerical ability requirements are much higher in the occupations where immigrant women are most concentrated. Most notably, women are much more likely than native-born women to work as electrical or software engineers – both of which require exceptionally high numerical skills – *and*

as labourers in rubber and plastics manufacturing and in ironing, pressing and finishing occupations – both of which require the lowest level of numerical abilities.

The key question of interest is to what extent immigrants sort themselves into occupations with lower verbal ability requirements, *conditional on* other required abilities of jobs. Table 9 reports mean immigrant shares within occupations with a common verbal and numerical ability rating. In parentheses I indicate the number of NOC-S occupations. The strong correlation between verbal and numerical requirements of jobs is indicated in the small, and in most cases, empty off-diagonal elements of this table. This feature of the data makes it difficult to separately identify the influence of verbal and numerical requirements on immigrant sorting. Nonetheless, there is some independent variation. For example, holding numerical requirements at 3 and increasing the verbal requirements (moving upwards along a column), the mean immigrant share clearly tends to decrease for both men and women, becoming particularly small in occupations with the highest level of verbal ability required. This pattern is evident more often than not in all the columns of Table 9, providing some evidence of the hypothesized sorting of immigrants into jobs with weaker language requirements (recall that the immigrant shares also include unemployed workers, so it makes more sense to interpret the occupational distributions as reflecting the choices of workers than employers).

Lastly, in Table 10 I exploit all the observations in the data, including those in which I only observe an upper-bound estimate of the immigrant share, and regress immigrant shares on the ability attribute ratings (equation (1.2)) using a censored regression model. In Specification (1), I include only the verbal ability rating; in Specification (2) I add the numerical ability rating; and in Specification (3), I add the general ability ranking. It turns out that a strong outlier in these regressions is the occupation of Translators, terminologists and interpreters (NOC-S code 5125), which has an exceptionally high immigrant share (40.7% for men and 34.6% for women) and, not surprisingly, the highest rating for required verbal abilities. Of course, in this case the required verbal abilities will typically be in English or French *and* a foreign language, so that the CH rating is capturing something more than the English/French verbal skills we are interested in. Consistent with the descriptive findings, the unconditional results in Table 10 point to quite different patterns for men and women – immigrant women tend to be concentrated in occupations with relatively low language requirements (the coefficient on the verbal ability measure in Specifications (1) and (3) are positive and significant), whereas the opposite is true for immigrant men. However, the male coefficients change sign, becoming positive but insignificant, when we condition on numerical abilities. The female coefficients similarly

become more positive. Conditioning on general ability as well, provides even stronger evidence of immigrants sorting into occupations with lower verbal requirements, with the male coefficient becoming marginally significant. In summary, the CH-LFS are more supportive of the hypothesis of sorting of immigrants on the language requirements of jobs and suggest that this sorting is more important among women. One explanation for this difference is that the immigrant disparity in language abilities is larger for immigrant women as suggested by the literacy test scores results in Table 1.

Before discussing the Census earnings regressions, in Tables 11 and 12 I explore whether the relative sectoral distribution of immigrant workers has changed over time using the Census. Given the much larger Census sample size, we now restrict the immigrant sample to recent immigrants (5 years or less since immigration). Consistent with the evidence from the IALSS data, immigrant men in the most recent data are considerably more likely to be employed in manufacturing and in natural and applied sciences. Immigrant women similarly are relatively concentrated in manufacturing, but in terms of occupations are more likely to be in both natural and applied sciences and the residual unskilled category. However, this sectoral concentration of Canada's immigrant workers, does not appear to be something new; it is also evident in the 1971 data. Nonetheless, the decline in manufacturing employment that is evident for all groups since the mid-1980s, has clearly been disproportionately experienced by immigrant women. Between 1971 and 1986, roughly one-quarter of all recent immigrant women were employed in manufacturing. However, in the most recent Census, this proportion dropped to one-in-ten. Moreover, the occupation data indicate that much of this employment was unskilled in nature, as the proportion in unskilled occupations dropped in almost an identical fashion between the mid-1980s and the most recent Census. To the extent that these are the types of unskilled labourer jobs with minimal verbal ability attributes identified in the CH data, this decline should have had contributed to the deterioration in their relative earnings over this period.

The only clearly evident unequal sectoral shift among recent immigrant men is their relative increase in transportation, communication and utilities that occurred between 1996 and 2006. Specifically, between 1971 and 1996, roughly 5% of recent immigrant men were employed in this industry, but over the last decade this proportion doubled. A comparable increase among native-born men is not evident. Looking at the occupational distributions (Table 14), a similar unequal shift between 1996 and 2006 is evident in natural and applied sciences. Although, we are unable to further disaggregate these groups, we know from elsewhere that much of this increase reflects growth in the information and communications technology industry. But the CH data suggests that, unlike unskilled

manufacturing, this is a sector where language skills are relatively important. Once again, therefore, to the extent that the language skills of recent immigrant men are limited, this shift should have contributed to the deterioration in their relative earnings.

In Table 13, I estimate equation (1.3) by censored regression (given the top-coding of the Census earnings data) focusing on the relative earnings of recent immigrants across arrival cohorts. In the first two columns, I condition on age (quartic) and education (both with no immigrant interactions). In the following two columns, I also add controls for source country/region. The results in the first two columns reveal the well-documented deterioration in immigrant earnings across arrival cohorts. For men, the gap gradually increases from about 6 log points for the 1966-1970 cohort to 51 log points for the 1991-1995 cohort. It subsequently drops to 39 log points in the late 1990s, but then appears to have bounced back to more than 50 log points for the most recent cohort in the data. For women, the deterioration appears more monotonic, going from an insignificant difference for the earliest cohort (1966-1970) to 50 log points for the most recent cohort (2001-2005).

How much of this earnings deterioration can be accounted for by the shift in source countries/regions? For both men and women the gaps drop substantially when we add country/region dummies in the second specification. For men the declines are somewhat larger, reflecting the bigger source country/region effects for them (the negative Asia and Africa effects are both at least three times as large for immigrant men). Nonetheless, the deterioration persists even when we condition on source country/region, suggesting deteriorating language skills of new immigrants is not solely responsible for the increasing earnings disparities of new immigrants. The final specification of Table 13 adds the Census language controls. As in the IALSS data, the estimates point to significantly lower earnings for individuals with a foreign home language, whether or not their mother tongue is foreign. For recent immigrant women, using English or French as the primary home language is also associated with significantly lower earnings (roughly 14 log points lower) when the mother tongue is foreign. More importantly, however, the estimated cohort effects, which remain essentially unchanged between the second and third specifications of Table 13, suggest that these language proxies can only account for differences in earnings between source countries/regions and not deteriorating earnings within source regions/countries. But, it may still be that language skills have become more important over time, in which case language could also account for deteriorating earnings within countries/regions.

In Table 14, I interact all three Census language proxy variables with the full set of immigrant cohort dummies, while continuing to include all the other controls included in the previous Table 13.

Consistent with this paper's main hypothesis, the results for immigrants with a foreign mother tongue and home language clearly suggest rising returns to language skills. More specifically, the earnings gaps of foreign-language immigrants and immigrants with an English or French as a mother tongue and home language have clearly been diverging over time. This pattern is stronger for women, particularly over the period from the mid-1990s to 2006, when the gap associated with a foreign mother tongue and home language increased by roughly 10 log points (the interaction term increases from -0.125 log points for the 1991-1995 cohort to -0.207 log points for the 2001-2005 cohort).

Using the Census information on sector of employment, we can begin to gauge how much of this apparent increase in the importance of language skills is related to the sectoral employment shifts identified in Tables 11 and 12. Tables 15 and 16 add interactions of the foreign mother tongue and home language indicator with industry and occupations indicators, respectively. To insure that the estimates are not confounded by sectoral differences in earnings unrelated to language, I also add a full set of separate industry and occupation dummies, allowing these intercept differences to vary between immigrants and native-born workers. Overall, the industry interactions do little to change the results. For men there is evidence of high language returns (relative to manufacturing) in finance, insurance and real estate and in transportation, communications and utilities, while for women only the returns in primary industries and retail and wholesale trade are lower than they are in manufacturing. Given the sectoral shifts discussed above, these relative returns should have contributed to deteriorating earnings. The magnitude of the cohort effects when we include industry interactions are (Table 15), however, not very different from those when we do not (Table 14).

The results using occupation classification are more informative. For both men and women, the earnings penalty associated with having a foreign mother tongue and home language appear lowest in primary industries for both men and women, followed by construction and natural and applied sciences for men and by other unskilled occupations and sales and service for women. This implies a sharp contrast between immigrant men and women. Whereas, recent immigrant employment among men has over time shifted towards employment where the penalty associated with a foreign home language is low – the information and technology sector in particular – the employment of recent immigrant women has moved away from jobs with low language returns – unskilled manufacturing sector. As a result, when we allow for these differential language returns across occupations, the decline in language-cohort interactions are considerably less stark, particularly for women, implying that

differential language returns across sectors, combined with sectoral employment shifts, is in part responsible for the deteriorating earnings of more recent immigrants to Canada.

Lastly, in Table 17 I explore to what extent declining labour market returns to foreign work experience, documented in the current literature, may be related to the evidence here of increasing returns to language skills. To do this I introduce interactions of the age and education variables with immigrant status. Moreover, I allow the linear age terms to vary across arrival cohorts and then compare these age-cohort interactions between immigrants with and without a foreign mother tongue and/or home language. Since the sample is restricted to recent immigrants, these age-immigrant interactions can be interpreted as the earnings penalty, relative to a similarly aged native-born worker, of arriving in Canada at an older age. To the extent that foreign work experience is valued less than Canadian-work experience, we would expect the immigrant-age interaction terms to be negative. But the question is whether there is any evidence that they are more negative for immigrants with a foreign mother tongue and home language and whether this penalty has increased over time. The estimates in Table 17 clearly point to larger significantly larger penalties associated with arriving in Canada at an older age among immigrants with a foreign mother tongue and home language. Moreover, among for both immigrant men and women there is some evidence that this penalty has increased since the mid-1980s when the sectoral shifts identified in Tables 11 and 12 are most evident. This provides further evidence of increasing returns to English/French language skills in the Canadian labour market.

6. Summary

A review of the economics immigration literature over the past decade, both within and beyond Canada, reveals a growing emphasis on the importance of language in driving the labour market challenges of foreign-born workers. Recognition of the role of language is also evident in the federal government's 2002 Immigration and Refugee Protection Act (IRPA), which put greater emphasis on language skills in its federal skilled worker program selection grid, as well as the 2010 Ministerial instructions introducing mandatory third-party language testing for all applicants to the Federal Skilled Worker Program, the Canadian Experience Class and those who claim language proficiency in the Business Immigration Programs.

This paper posits that language may be playing an even larger role than previously thought in driving the labour market earnings shortfalls of Canada's recent immigrants. In particular, I examine

whether there is any evidence that the declining relative earnings of more recent immigrant cohorts to Canada, which is evident in the data even when we restrict attention to immigrants coming from a common source region, reflects an increase in the value of English/French language skills in Canada's labour markets. The increase in the return to language capital is posited to be the result of sectoral shifts in employment away from industries and occupations in which language skills are valued more to sectors where they are valued less. But, as I have argued, it is also possible that increasing returns to language capital stem from within-sector changes in the role of language in the production process. The key conjecture, however, is that the deterioration in immigrant labour market performance is not only driven by changes over time in the language abilities of immigrants, but also in changing returns to these abilities

The findings from analyses of three different nationally representative data sources providing information on the language skills of foreign-born workers and the language requirements of their jobs provides remarkably strong support for the paper's main hypothesis. Analysis of test scores of literacy, numeracy and problem-solving from the International Adult Literacy and Life Skills Survey (IALLS) suggests a strong disparity in the average language skills of Canada's immigrant workers, as well as a strong association between these skills and labour market earnings. One would therefore expect that immigrants would be concentrated in occupations in which language abilities are valued less. The data does provide little evidence of this sorting. In fact, immigrant men, even those arriving from countries where English or French are not official languages, very clearly tend to be concentrated in occupations where verbal abilities are more important. The reason is that the different skill requirements of jobs are highly collinear; jobs that require strong numeracy skills also tend to require strong verbal abilities. As a result, skilled immigrants employed in high-technology sectors are likely to be more limited by language deficiencies in English or French, than relatively unskilled immigrants employed in unskilled jobs.

Pooling Census data between 1971 and 2006 and relating an indicator of whether the most common language spoken at home is neither English nor French, I find quite clear evidence of an increasing return to language skills across immigrant cohorts. This increase is particularly notable among immigrant women. Nonetheless, the explanatory power of this increase in the return to language skills, in terms of the overall deterioration in earnings of recent immigrants, is quite limited. This, however, could be due to the crudeness of the language measure employed. With a richer measure of language skills, particularly communication skills, it may be that more of the deterioration occurring within these broad language groups could be accounted for. Further analyses of long-term structural and

technological changes and their effects on the role of language skills in the workplace and the relative performance of immigrant workers, would appear to be a fruitful area of future research.

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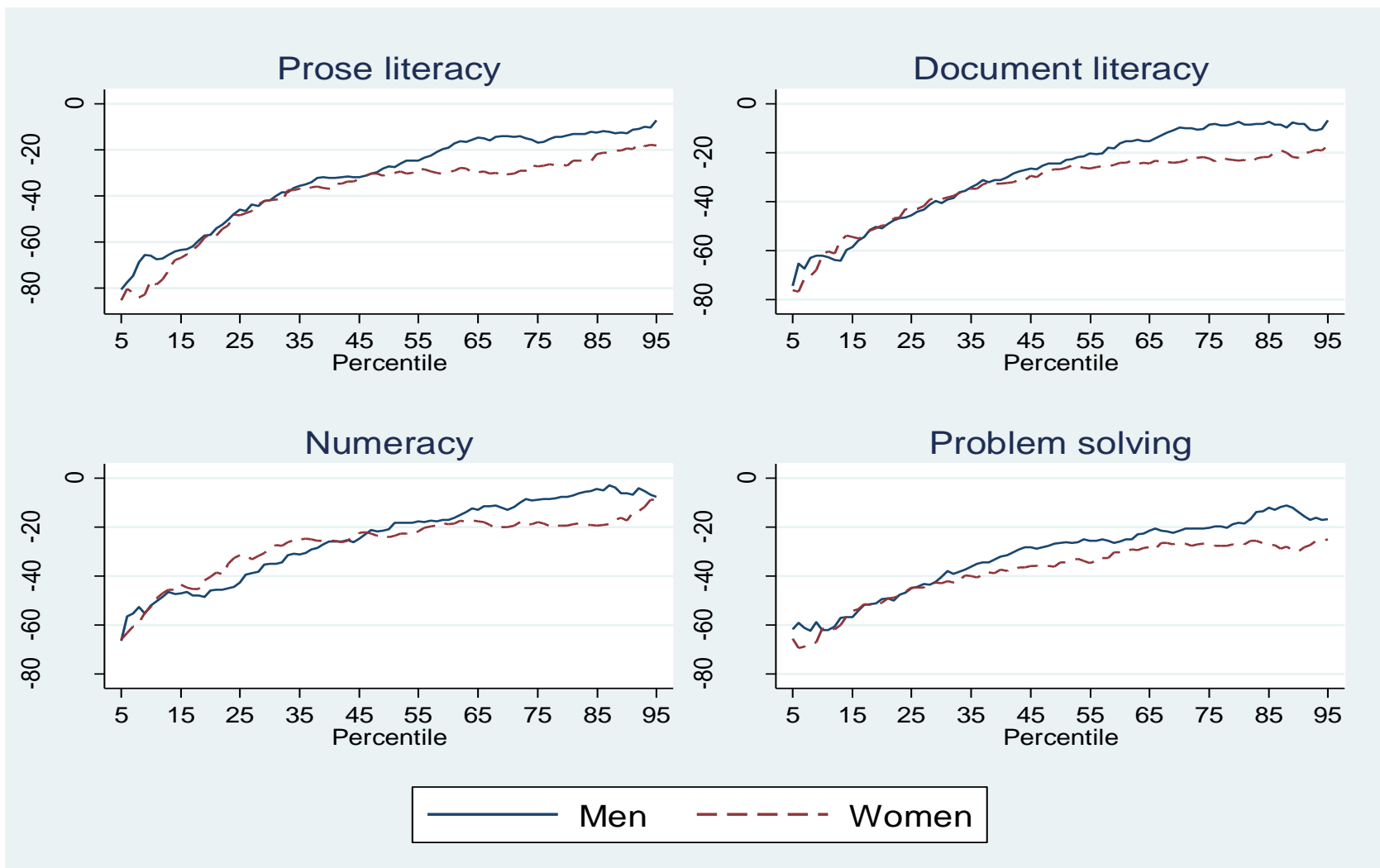
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Figure 1: Quantile regression estimates of relative immigrant test scores.



Note: Estimates represent the coefficient on an immigrant dummy in quantile regressions, which include no control variables, estimated at each percentile between 5 and 95.

Table 1: Mean immigrant skill gap (relative to native-born) by mother tongue and home language, Canada.

	Men				Women			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Prose literacy	-58.092*	-27.717*	-38.523	-8.914*	-62.877*	-33.260*	-44.194*	-19.555*
	(3.808)	(5.639)	(22.025)	(4.307)	(4.018)	(4.668)	(8.518)	(6.190)
Document literacy	-53.103*	-25.051*	-27.455	-5.848	-55.872*	-29.918*	-43.580*	-15.941*
	(3.826)	(5.687)	(21.438)	(4.643)	(3.983)	(4.209)	(12.480)	(6.581)
Numeracy	-48.567*	-22.487*	-42.519*	-6.599	-45.859*	-22.305*	-52.028*	-16.541*
	(3.691)	(4.891)	(18.407)	(4.631)	(3.979)	(3.786)	(13.196)	(6.849)
Problem solving	-55.781*	-26.883*	-29.680	-11.411*	-56.883*	-34.427*	-50.136*	-23.275*
	(3.397)	(4.742)	(21.453)	(4.960)	(3.635)	(3.683)	(9.774)	(6.614)
Average skill	-53.885*	-25.534*	-34.545	-8.193	-55.373*	-29.978*	-47.485*	-18.828*
	(3.536)	(5.113)	(20.422)	(4.469)	(3.745)	(3.920)	(10.698)	(6.432)
<i>Sample restriction:</i>								
Foreign mother tongue	Yes	Yes	No	No	Yes	Yes	No	No
Foreign home language	Yes	No	Yes	No	Yes	No	Yes	No
Immigrant observations	251	222	8	489	374	198	7	247
Native observations	3,832	3,832	3,832	3,832	4,165	4,165	4,165	4,165

Notes: Estimates are from OLS regressions of standardized skill scores (unweighted average of 5 levels) on an immigrant dummy and controls for age (5 categories) and education (postsecondary credential and university degree). Average skill is the unweighted average of the 4 skill type scores. Samples are restricted to individuals who are either currently employed or self-employed, and who worked for 12 months and normally every week of every month in the previous year. Robust standard errors are in parentheses. * indicates statistical significance at the 5% level.

Source: 2003 International Adult Literacy and Life Skills Survey (IALLS)

Table 2: Proportion of recent immigrants with English or French knowledge, mother tongue, and home language, 1971-2006 Censuses.

Period of arrival	Knowledge of English or French ¹		Mother tongue English or French ²		Home language English or French ³	
	Men	Women	Men	Women	Men	Women
1965-1970	0.894	0.820	0.455	0.482	0.546	0.562
1976-1980	0.904	0.849	0.403	0.430	0.495	0.491
1981-1985	0.900	0.848	0.281	0.315	0.338	0.358
1986-1990	0.913	0.867	0.201	0.231	0.305	0.328
1991-1995	0.914	0.870	0.161	0.169	0.258	0.265
1996-2000	0.936	0.900	0.161	0.152	0.282	0.280
2001-2005	0.933	0.898	0.179	0.169	0.284	0.285

¹ Identifies fluency, defined as the ability to conduct a conversation in either official language. In 1971, fluency was assumed for individuals who reported either their mother tongue as English or French or the main language spoken at home as English or French. In 1981, only the home language variable was sufficient to automatically classify individuals as fluent.

² In 1981, the wording of the question was changed from “language first spoken and still understood,” to “language first learned and still understood.”

³ Refers to the language spoken at home by the individual. If more than one language was spoken, the language spoken most often by the individual was to be reported.

Notes: A recent immigrant is defined as 5 years or fewer since immigration.

Table 3: Country of origin of recent immigrants, 1971-2006 Censuses.

Period of arrival	U.S.	U.K.	Germany	Italy	Poland	Eastern Europe ¹	Other Europe	Asia	Africa	Other America	Other
1965-1970	0.083	0.195	0.028	0.125	0.012	0.005	0.251	0.139	0.033	0.098	0.032
1971-1975	--	--	--	--	--	--	--	--	--	--	--
1976-1980	0.066	0.128	0.013	0.017	0.012	0.014	0.126	0.409	0.053	0.146	0.017
1981-1985	0.057	0.076	0.019	0.009	0.060	0.005	0.100	0.453	0.051	0.160	0.011
1986-1990	0.028	0.036	0.007	0.005	0.068	0.010	0.090	0.515	0.073	0.158	0.010
1991-1995	0.018	0.023	0.006	0.003	0.036	0.021	0.093	0.591	0.073	0.126	0.010
1996-2000	0.020	0.018	0.007	0.002	0.009	0.048	0.103	0.614	0.086	0.087	0.006
2001-2005	0.021	0.020	0.004	0.002	0.006	0.084	0.041	0.602	0.105	0.108	0.008
Total	0.036	0.058	0.011	0.019	0.027	0.032	0.107	0.504	0.073	0.122	0.012

¹ Between 1971 and 1991, defined consistently as USSR. Between 1996 and 2006, defined using a consistent set of Eastern European nations, including former USSR.

Notes: Sample includes men and women. A recent immigrant is defined as 5 years or fewer since immigration.

Table 4: Proportion of Asian, African, and Eastern European recent immigrants with English or French mother tongue or home language, 1971-2006 Censuses.

Period of arrival	Mother Tongue			Home Language			Home Language Not Mother Tongue		
	<u>Asia</u>	<u>Africa</u>	<u>Eastern Europe¹</u>	<u>Asia</u>	<u>Africa</u>	<u>Eastern Europe¹</u>	<u>Asia</u>	<u>Africa</u>	<u>Eastern Europe¹</u>
1965-1970	0.183	0.519	0.048	0.350	0.718	0.333	0.243	0.480	0.300
1976-1980	0.152	0.542	0.010	0.222	0.626	0.155	0.156	0.356	0.157
1981-1985	0.090	0.387	0.057	0.119	0.482	0.114	0.088	0.254	0.121
1986-1990	0.067	0.305	0.012	0.162	0.480	0.035	0.127	0.306	0.036
1991-1995	0.048	0.213	0.020	0.125	0.418	0.124	0.102	0.285	0.122
1996-2000	0.061	0.271	0.029	0.162	0.538	0.123	0.130	0.405	0.121
2001-2005	0.080	0.281	0.037	0.162	0.522	0.132	0.134	0.410	0.127

¹ Between 1971 and 1991, defined consistently as USSR. Between 1996 and 2006, defined using a consistent set of Eastern European nations, including the former USSR.

Notes: A recent immigrant is defined as 5 years or fewer since immigration.

Table 5: Estimated coefficients from ordered probit earnings regression

	Men				Women			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Immigrant	-0.4149*	-0.1056	-0.0434	0.0886	-0.2542*	-0.0014	0.1557	0.1465
	(0.0746)	(0.1298)	(0.1246)	(0.4135)	(0.0658)	(0.1419)	(0.1144)	(0.4948)
<i>Foreign language:</i>								
Both	--	-0.6057*	-0.3365*	-0.3478*	--	-0.5184*	-0.2146	-0.2139
		(0.1468)	(0.1476)	(0.1561)		(0.1553)	(0.1396)	(0.1561)
Mother tongue	--	0.0793	0.1939	0.1895	--	-0.1388	-0.0356	-0.0355
		(0.1611)	(0.1569)	(0.1583)		(0.1713)	(0.1488)	(0.1519)
Home language	--	-0.3894	-0.1405	-0.1475	--	-0.9714	-0.7813	-0.7811
		(0.2483)	(0.2553)	(0.2556)		(0.9237)	(0.8639)	(0.8643)
(Neither)	--	--	--	--	--	--	--	--
<i>Test scores:</i>								
Average skill	--	--	0.0063*	0.0064*	--	--	0.0088*	0.0087*
			(0.0007)	(0.0010)			(0.0008)	(0.0009)
Average skill * immigrant	--	--	--	-0.0005	--	--	--	0.0000
				(0.0014)				(0.0016)
Number of observations	4,802	4,802	4,802	4,802	4,991	4,991	4,991	4,991

Notes: Dependent variable is annual income quintile. Sample restricted to individuals who are either currently employed or self-employed, and who worked for 12 months and normally every week of every month in the previous year. Regressions include controls for age (5 categories); education (postsecondary credential and university degree); usual weekly hours of work (quadratic); and separate indicators of foreign mother tongue and/or home language for native-born workers. Robust standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Source: 2003 International Adult Literacy and Life Skills Survey (IALLS)

Table 6: Return to average skill and employment shares across industries by education groups.

	Regression coefficients			Employment shares					
	Intercept		Return	No postsecondary		College		University degree	
	<u>Natives</u>	<u>Immig.</u>		<u>Natives</u>	<u>Immig.</u>	<u>Natives</u>	<u>Immig.</u>	<u>Natives</u>	<u>Immig.</u>
(High-technology manufacturing)	--	-0.1335 (0.1700)	0.0073*** (0.0014)	0.063	0.114	0.058	0.130	0.024	0.102
Low-technology manufacturing	-0.1978 (0.5313)	-0.4890 (0.5073)	-0.0002 (0.0019)	0.075	0.140	0.050	0.085	0.035	0.049
Knowledge intensive services	-0.3498 (0.6226)	-0.3510 (0.6207)	0.0001 (0.0022)	0.123	0.158	0.149	0.185	0.206	0.297
Public administration, health	-1.0912** (0.4898)	-1.0825** (0.4741)	0.0030* (0.0017)	0.219	0.122	0.363	0.230	0.546	0.308
Other social/personal services	-0.7103 (0.6373)	-0.5176 (0.6309)	0.0002 (0.0023)	0.052	0.036	0.060	0.072	0.054	0.046
Utilities and construction	0.9417 (0.6489)	0.9700 (0.6060)	-0.0032 (0.0024)	0.068	0.045	0.069	0.026	0.025	0.025
Trade, retail, hotels, restaurants	-0.5457 (0.4907)	-0.5933 (0.4834)	-0.0005 (0.0017)	0.303	0.318	0.173	0.221	0.080	0.140
Transport and storage	0.2376 (0.8220)	-0.0644 (0.8259)	-0.0012 (0.0029)	0.051	0.045	0.042	0.045	0.015	0.028
Primary industries	0.8745 (0.7293)	0.0845 (0.6352)	-0.0044* (0.0025)	0.046	0.024	0.035	0.006	0.016	0.005
Number of observations		9,783		4,094	673	2,416	470	1,481	649

Notes: Dependent variable is annual income quintile. Sample restricted to individuals who are either currently employed or self-employed, and who worked for 12 months and normally every week of every month in the previous year. Regressions include controls for age (5 categories); education (postsecondary credential and university degree); and usual weekly hours of work (quadratic). Robust standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Source: 2003 International Adult Literacy and Life Skills Survey (IALLS)

Table 7: Occupations (NOC-S) with highest and lowest verbal ability attribute in Career Handbook

NOC-S code	Description	Occupation ability attributes			Immigrant share ¹	Employment share ²
		Verbal	Numerical	General		
<i>1. Highest verbal ability attribute – men</i>						
4112	Lawyers and Quebec Notaries	1	3	1	0.121	0.005
4121	University Professors	1	2	1	0.386	0.004
2131	Civil Engineers	1	1	1	0.346	0.004
3112	General Practitioners and Family Physicians	1	2	1	0.358	0.003
3111	Specialists in Clinical Medicine	1	2	1	0.350	0.002
2148	Agricultural and Bio-resource Engineers	1	1	1	0.375	0.002
5124	Occupations in Public Relations and Communications	1	3	2	0.138	0.002
3113	Dentists	1	2	1	0.242	0.001
5121	Creative Writers	1	4	2	0.213	0.001
112	Human Resources Managers	1	2	1	<0.176	0.001
	AVERAGE	1	2.2	1.2		
<i>2. Lowest verbal ability attribute – men</i>						
9617	Labourers in Food, Beverage and Tobacco Processing	5	5	4	0.277	0.003
9615	Labourers in Rubber and Plastic Products Manufacturing	5	5	4	<0.308	0.001
7411	Long-Haul Truck Drivers	4	4	3	0.177	0.032
7452	Material Handlers (Manual)	4	4	4	0.183	0.020
6663	Janitors, Caretakers and Building Superintendents	5	4	4	0.214	0.016
7611	Construction Trades Helpers and Labourers	4	4	4	0.139	0.015
6641	Food Service Counter Attendants and Food Preparers	4	5	4	0.202	0.015
6622	Grocery Clerks and Store Shelf Stockers	4	4	4	0.117	0.015
7265	Welders	4	4	3	0.191	0.011
7421	Heavy Equipment Operators (Except Crane)	4	4	3	0.057	0.010
	AVERAGE	4.3	4.3	3.7		
<i>3. Highest verbal ability attribute – women</i>						
5124	Occupations in Public Relations and Communications	1	3	2	0.141	0.004
4112	Lawyers and Quebec Notaries	1	3	1	0.111	0.003
4121	University Professors	1	2	1	0.241	0.003

311	Managers in Health Care	1	2	1	0.113	0.002
314	Managers in Social, Community and Correctional Services	1	2	2	0.166	0.002
112	Human Resources Managers	1	2	1	0.127	0.002
3112	General Practitioners and Family Physicians	1	2	1	0.277	0.002
5121	Creative Writers	1	4	2	0.153	0.002
3111	Specialists in Clinical Medicine	1	2	1	0.278	0.002
5125	Translators	1	4	2	0.346	0.002
	AVERAGE	1	2.6	1.4		

4. Lowest verbal ability attribute – women

9617	Labourers in Food, Beverage and Tobacco Processing	5	5	4	0.486	0.003
9615	Labourers in Rubber and Plastic Products Manufacturing	5	5	4	0.647	0.001
6611	Cashiers	4	3	4	0.162	0.040
6641	Food Service Counter Attendants and Food Preparers	4	5	4	0.196	0.028
3413	Nurse Aides, Orderlies and Patient Service Associates	4	4	3	0.262	0.022
6453	Food and Beverage Servers	4	4	4	0.118	0.021
6661	Light Duty Cleaners	4	5	4	0.307	0.019
6622	Grocery Clerks and Store Shelf Stockers	4	4	4	0.202	0.008
6471	Visiting Homemakers	4	4	3	0.252	0.008
6663	Janitors, Caretakers and Building Superintendents	4	4	4	0.265	0.007
	AVERAGE	4.2	4.3	3.8		

¹ Proportion of individuals in the occupation who are foreign-born.

² Occupation share of total employment.

Notes: Occupations with an equal verbal ability attribute are sorted from highest to lowest total employment share. Sample includes both currently employed and unemployed who worked sometime in the previous year.

Source: Occupation attribute data from HRSDC's *Career Handbook*. Employment share data from 2006-2009 Labour Force Survey (LFS).

Table 8: Occupations (NOC-S) with highest and lowest immigrant shares and their Career Handbook ability attributes

NOC-S code	Description	Occupation ability attributes			Immigrant share ¹	Employment share ²
		Verbal	Numerical	General		
<i>1. Highest immigrant shares – men</i>						
7413	Taxi and Limousine Drivers	4	4	4	0.583	0.004
9483	Electronics Assemblers	4	4	3	0.550	0.001
2173	Software Engineers	2	1	1	0.463	0.003
6271	Hairstylists	3	4	3	0.459	0.002
9492	Furniture and Fixture Assemblers	4	4	4	0.459	0.002
9422	Mixing Machine Operators – Plastics Processing	4	4	3	0.440	0.002
2112	Chemists	1	1	1	0.434	0.001
2132	Mechanical Engineers	2	1	1	0.426	0.003
631	Restaurant and Food Service Managers	3	3	3	0.423	0.007
9511	Machining Tool Operators	3	3	3	0.420	0.001
	AVERAGE	3.0	2.9	2.6		
<i>2. Lowest immigrant shares –men</i>						
8232	Oil and Gas Well Drillers and Well Servicers	3	4	3	0.044	0.003
7421	Heavy Equipment Operators (Except Crane)	4	4	3	0.057	0.010
6261	Police Officers (Except Commissioned)	3	3	3	0.064	0.006
6462	Correctional Service Officers	4	4	3	0.068	0.001
8251	Farmers and Farm Managers	3	3	3	0.078	0.015
6671	Amusement Attraction Operators	4	4	4	0.078	0.003
7252	Steamfitters and Pipefitters	3	3	3	0.079	0.003
8612	Landscaping and Grounds Maintenance Labourers	4	5	4	0.081	0.009
7312	Heavy-Duty Equipment Mechanics	4	3	3	0.087	0.006
8431	General Farm Workers	4	4	4	0.094	0.006
	AVERAGE	3.6	3.7	3.3		
<i>3. Highest immigrant shares – women</i>						
9451	Sewing Machine Operators	4	4	4	0.682	0.004
9615	Labourers in Rubber and Plastic Products Manufacturing	5	5	4	0.647	0.001
6682	Ironing, Pressing and Finishing Occupations	4	5	4	0.629	0.001

2133	Electrical and Electronics Engineers	2	1	1	0.629	0.001
9483	Electronics Assemblers	4	4	3	0.567	0.002
2173	Software Engineers	2	1	1	0.557	0.001
9422	Mixing Machine Operators – Plastics Processing	4	4	3	0.542	0.001
9619	Other Labourers in Processing, Manufacturing and Utilities	4	4	4	0.522	0.004
9495	Plastic Products Assemblers and Finishers	4	4	4	0.512	0.001
8611	Harvesting Labourers	4	4	4	0.511	0.001
	AVERAGE	3.7	3.6	3.2		

4. Lowest immigrant shares – women

5254	Program Leaders and Instructors in Recreation and Sport	3	4	3	0.066	0.009
3222	Dental Hygienists	3	3	3	0.099	0.002
4142	Elementary School and Kindergarten Teachers	2	3	2	0.105	0.019
4112	Lawyers and Quebec Notaries	1	3	1	0.111	0.003
311	Managers in Health Care	1	2	1	0.113	0.002
4153	Family, Marriage and Other Related Counsellors	2	3	2	0.115	0.003
4164	Social Policy Researchers	2	3	2	0.117	0.002
6453	Food and Beverage Servers	4	4	4	0.118	0.021
4167	Kinesiologists	2	3	3	0.119	0.002
8251	Farmers and Farm Managers	3	3	3	0.121	0.005
	AVERAGE	2.3	3.1	2.4		

¹ Proportion of individuals in the occupation who are foreign-born.

² Occupation share of total employment.

Note: Sample includes both currently employed and unemployed who worked sometime in the previous year.

Source: Occupation attribute data from HRSDC's *Career Handbook*. Employment share data from 2006-2009 Labour Force Survey (LFS).

Table 9: Mean immigrant shares by Career Handbook verbal and numerical ability attributes of occupations

Verbal ability	Numerical ability					
<i>1. Men</i>						
	1	2	3	4	5	Total
1	0.323 (5)	0.334 (4)	0.130 (2)	0.310 ¹ (2)	- (0)	0.295 (13)
2	0.314 (16)	0.238 (18)	0.205 (15)	- (0)	- (0)	0.253 (49)
3	- (0)	0.273 (3)	0.221 (67)	0.242 (11)	- (0)	0.226 (81)
4	- (0)	- (0)	0.204 (13)	0.247 (44)	0.180 (8)	0.230 (65)
5	- (0)	- (0)	- (0)	- (0)	0.277 ² (1)	0.277 (1)
Total	0.316 (21)	0.257 (25)	0.214 (97)	0.248 (57)	0.191 (9)	0.238 (209)
<i>2. Women</i>						
	1	2	3	4	5	Total
1	0.261 (2)	0.194 (7)	0.126 (2)	0.250 ¹ (2)	- (0)	0.202 (13)
2	0.371 (8)	0.224 (13)	0.172 (21)	- (0)	- (0)	0.226 (42)
3	- (0)	0.220 (4)	0.208 (45)	0.211 (17)	- (0)	0.210 (66)
4	- (0)	- (0)	0.162 (1)	0.342 (26)	0.306 (6)	0.330 (33)
5	- (0)	- (0)	- (0)	- (0)	0.567 ² (2)	0.567 (2)
Total	0.349 (10)	0.215 (24)	0.194 (69)	0.289 (45)	0.371 (8)	0.244 (156)

¹Includes Translators (NOC-S code 5125), where the immigrant share for men (women) is 40.7% (34.6%).

²Includes Labourers in Food, Beverage and Tobacco Processing (NOC-S code 9617) for men and women, as well as Labourers in Rubber and Plastic Products Manufacturing (NOC-S code 9615) for women.

Source: Occupation attribute data from HRSDC's *Career Handbook*. Employment share data from 2006-2009 Labour Force Survey (LFS).

Table 10: Censored regressions of immigrant shares on Career Handbook job attributes.

	Foreign-language immigrant share			Overall immigrant share		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>1. Men</i>						
Verbal ability	-0.003 (0.006)	0.023* (0.009)	0.026* (0.012)	-0.017* (0.007)	0.018 (0.010)	0.021 (0.013)
Numerical ability	--	-0.029*** (0.008)	-0.026** (0.009)	--	-0.041*** (0.009)	-0.038*** (0.010)
General ability	--	--	-0.006 (0.012)	--	--	-0.007 (0.015)
Constant	0.121*** (0.018)	0.132*** (0.018)	0.132*** (0.018)	0.251*** (0.022)	0.277*** (0.022)	0.277*** (0.022)
Wald chi-squared	0.26	11.86	12.01	5.38	26.91	27.13
Uncensored observations	129	129	129	209	209	209
Total observations	474	474	474	474	474	474
<i>2. Women</i>						
Verbal ability	0.038*** (0.010)	0.047*** (0.013)	0.064*** (0.019)	0.039** (0.012)	0.065*** (0.015)	0.090*** (0.022)
Numerical ability	--	-0.012 (0.012)	-0.005 (0.012)	--	-0.034* (0.016)	-0.022 (0.015)
General ability	--	--	-0.026 (0.020)	--	--	-0.040 (0.024)
Constant	-0.006 (0.028)	0.005 (0.031)	0.008 (0.031)	0.094** (0.032)	0.125** (0.039)	0.127*** (0.038)
Wald chi-squared	15.43	16.78	19.29	10.74	20.28	23.22
Uncensored observations	99	99	99	156	156	156
Total observations	359	359	359	359	359	359

Notes: Foreign language immigrant share is the proportion of all individuals in the occupation who were born in a country without English or French as an official language. All regressions exclude NOC-S code 5125 (Translators, Terminologists and Interpreters). Standard errors are in parentheses. *, **, *** indicate significance at the 5%, 1%, and 0.1% levels respectively.

Source: Occupation attribute data from HRSDC's *Career Handbook*. Employment share data from 2006-2009 Labour Force Survey (LFS).

Table 11: Industrial distribution of recent immigrant and native-born employment, 1971-2006 Censuses.

	Recent immigrants							Native-born						
	<u>1971</u>	<u>1981</u>	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2001</u>	<u>2006</u>	<u>1971</u>	<u>1981</u>	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2001</u>	<u>2006</u>
<i>1. Men</i>														
Manufacturing	0.315	0.326	0.302	0.244	0.255	0.249	0.201	0.242	0.225	0.206	0.181	0.180	0.181	0.156
Construction	0.114	0.072	0.066	0.095	0.054	0.047	0.071	0.086	0.097	0.091	0.105	0.096	0.103	0.112
Transp., comm. and utilities	0.050	0.056	0.046	0.056	0.058	0.068	0.091	0.114	0.107	0.107	0.104	0.103	0.100	0.104
Retail and wholesale trade	0.141	0.152	0.159	0.179	0.194	0.162	0.164	0.160	0.166	0.172	0.172	0.181	0.182	0.156
Finance, insurance, real estate	0.031	0.038	0.034	0.049	0.037	0.044	0.053	0.032	0.034	0.036	0.039	0.037	0.037	0.043
Comm., bus., personal services	0.279	0.282	0.332	0.328	0.358	0.393	0.391	0.157	0.189	0.209	0.230	0.257	0.270	0.298
Public administration	0.031	0.023	0.020	0.021	0.015	0.015	0.012	0.090	0.083	0.081	0.085	0.069	0.059	0.065
Primary industries	0.039	0.052	0.042	0.027	0.030	0.022	0.018	0.120	0.101	0.098	0.084	0.078	0.069	0.065
<i>2. Women</i>														
Manufacturing	0.253	0.246	0.274	0.189	0.180	0.168	0.114	0.139	0.115	0.102	0.085	0.078	0.078	0.064
Construction	0.006	0.008	0.010	0.007	0.007	0.008	0.010	0.010	0.015	0.015	0.017	0.016	0.015	0.018
Transp., comm. and utilities	0.029	0.024	0.015	0.027	0.022	0.027	0.039	0.047	0.050	0.048	0.049	0.044	0.042	0.055
Retail and wholesale trade	0.142	0.149	0.137	0.163	0.171	0.168	0.183	0.177	0.188	0.182	0.176	0.177	0.176	0.168
Finance, insurance, real estate	0.073	0.085	0.054	0.082	0.050	0.063	0.062	0.070	0.081	0.078	0.078	0.072	0.067	0.069
Comm., bus., personal services	0.444	0.432	0.450	0.480	0.530	0.526	0.562	0.429	0.440	0.463	0.481	0.520	0.532	0.542
Public administration	0.031	0.027	0.016	0.025	0.014	0.017	0.015	0.064	0.074	0.073	0.077	0.061	0.059	0.062
Primary industries	0.022	0.030	0.044	0.027	0.026	0.023	0.016	0.065	0.038	0.039	0.036	0.034	0.031	0.023

Notes: In 1971, 1981, 1986 and 1991, based on the 1970 Standard Industrial Classification (SIC). In 1996 and 2001, based on the 1980 SIC. In 2006, based on 2002 NAICS. Note that the NAICS group "Information and cultural industries" is included in "Transportation, communications and other utilities."

Table 12: Occupational distribution of recent immigrant and native-born employment, 1971-2006 Censuses.

	Recent immigrants							Native-born						
	1971	1981	1986	1991	1996	2001	2006	1971	1981	1986	1991	1996	2001	2006
<i>1. Men</i>														
Management and administrative	0.037	0.056	0.057	0.065	0.118	0.132	0.125	0.060	0.088	0.097	0.105	0.149	0.164	0.159
Teaching	0.067	0.018	0.022	0.023	0.024	0.028	0.029	0.026	0.028	0.027	0.029	0.030	0.027	0.028
Health	0.034	0.021	0.022	0.021	0.019	0.018	0.019	0.016	0.016	0.016	0.018	0.018	0.019	0.020
Natural and applied sciences	0.084	0.089	0.077	0.073	0.102	0.219	0.176	0.037	0.046	0.050	0.057	0.075	0.092	0.094
Social sciences	0.012	0.005	0.010	0.008	0.016	0.017	0.019	0.014	0.014	0.016	0.017	0.023	0.024	0.026
Art, culture, recreation	0.017	0.022	0.015	0.012	0.019	0.021	0.020	0.011	0.016	0.018	0.019	0.026	0.028	0.030
Clerical	0.061	0.070	0.063	0.098	0.075	0.062	0.075	0.091	0.077	0.073	0.074	0.071	0.058	0.064
Sales and service	0.190	0.224	0.262	0.265	0.293	0.213	0.242	0.200	0.196	0.205	0.210	0.224	0.210	0.213
Primary	0.032	0.044	0.041	0.027	0.032	0.020	0.018	0.113	0.089	0.088	0.075	0.075	0.068	0.063
Transport equipment operators	0.023	0.023	0.028	0.034	0.040	0.038	0.048	0.073	0.067	0.065	0.063	0.076	0.075	0.074
Construction trades	0.122	0.069	0.063	0.089	0.034	0.028	0.044	0.096	0.106	0.099	0.106	0.041	0.042	0.047
Other unskilled	0.321	0.359	0.339	0.285	0.229	0.204	0.184	0.265	0.259	0.247	0.227	0.192	0.195	0.184
<i>2. Women</i>														
Management and administrative	0.010	0.019	0.026	0.047	0.103	0.142	0.120	0.021	0.042	0.060	0.082	0.180	0.200	0.191
Teaching	0.078	0.035	0.036	0.036	0.032	0.034	0.044	0.079	0.063	0.063	0.066	0.055	0.055	0.058
Health	0.104	0.072	0.068	0.069	0.055	0.054	0.075	0.087	0.084	0.086	0.090	0.083	0.086	0.093
Natural and applied sciences	0.015	0.013	0.019	0.024	0.031	0.085	0.054	0.005	0.012	0.016	0.018	0.018	0.026	0.027
Social sciences	0.011	0.012	0.010	0.015	0.016	0.045	0.055	0.013	0.021	0.027	0.032	0.035	0.061	0.070
Art, culture, recreation	0.012	0.015	0.013	0.015	0.025	0.027	0.027	0.009	0.015	0.017	0.018	0.033	0.035	0.038
Clerical	0.281	0.285	0.213	0.266	0.131	0.123	0.134	0.368	0.376	0.349	0.327	0.185	0.157	0.159
Sales and service	0.236	0.292	0.312	0.314	0.418	0.320	0.364	0.257	0.266	0.271	0.271	0.335	0.303	0.298
Primary	0.018	0.022	0.037	0.022	0.023	0.019	0.011	0.058	0.027	0.029	0.025	0.023	0.022	0.017
Transport equipment operators	0.001	0.002	0.001	0.002	0.001	0.002	0.002	0.003	0.008	0.008	0.008	0.007	0.008	0.008
Construction trades	0.003	0.004	0.005	0.003	0.005	0.007	0.009	0.002	0.003	0.004	0.004	0.004	0.005	0.005
Other unskilled	0.232	0.231	0.261	0.188	0.159	0.144	0.107	0.098	0.083	0.072	0.061	0.042	0.043	0.036

Notes: In 1971, 1981, 1986 and 1991, based on the 1971 Standard Occupational Classification (SOC). In 1996, based on the 1991 SOC. In 2001 and 2006, based on the 2001 National Occupational Classification – Statistics (NOC-S). In 1996, 2001, and 2006, the groups “Contractors and supervisors in trades and transportation” (H0) and “Trades, helpers, construction, and transportation labourers and related occupations” (H8) are not assigned an industry code, since there is no clear concordance to the 1971 SOC classification.

Table 13: Relative log weekly earnings of recent immigrants by period of arrival conditional on country/region of birth.

	Men			Women		
	(1)	(2)	(3)	(1)	(2)	(3)
Age	1.083* (0.008)	1.084* (0.008)	1.084* (0.008)	1.097* (0.010)	1.097* (0.010)	1.097* (0.010)
Age ²	-0.379* (0.004)	-0.379* (0.004)	-0.379* (0.004)	-0.403* (0.004)	-0.403* (0.004)	-0.403* (0.004)
Age ³	0.059* (0.001)	0.059* (0.001)	0.059* (0.001)	0.065* (0.001)	0.065* (0.001)	0.065* (0.001)
Age ⁴	-0.003* (0.000)	-0.003* (0.000)	-0.003* (0.000)	-0.004* (0.000)	-0.004* (0.000)	-0.004* (0.000)
College	0.152* (0.002)	0.151* (0.002)	0.150* (0.002)	0.224* (0.003)	0.224* (0.003)	0.224* (0.003)
University	0.369* (0.003)	0.369* (0.003)	0.369* (0.003)	0.569* (0.003)	0.569* (0.003)	0.569* (0.003)
<i>Period of arrival:</i>						
1966-1970	-0.058* (0.013)	-0.020 (0.030)	-0.022 (0.030)	0.015 (0.018)	0.040 (0.034)	0.036 (0.034)
1976-1980	-0.234* (0.017)	-0.087* (0.033)	-0.090* (0.033)	-0.184* (0.020)	-0.115* (0.035)	-0.117* (0.035)
1981-1985	-0.392* (0.019)	-0.211* (0.034)	-0.205* (0.034)	-0.222* (0.021)	-0.141* (0.036)	-0.131* (0.036)
1986-1990	-0.374* (0.014)	-0.158* (0.032)	-0.152* (0.032)	-0.211* (0.016)	-0.119* (0.034)	-0.108* (0.034)
1991-1995	-0.507* (0.013)	-0.281* (0.032)	-0.273* (0.032)	-0.356* (0.015)	-0.260* (0.033)	-0.246* (0.033)
1996-2000	-0.395* (0.013)	-0.158* (0.032)	-0.153* (0.032)	-0.345* (0.015)	-0.243* (0.034)	-0.230* (0.034)
2001-2005	-0.535* (0.013)	-0.288* (0.032)	-0.282* (0.032)	-0.502* (0.015)	-0.390* (0.033)	-0.376* (0.034)
<i>Region of birth:</i>						
(U.S.)	--	--	--	--	--	--
U.K.	--	0.183* (0.034)	0.184* (0.034)	--	0.026 (0.038)	0.030 (0.038)
Germany	--	0.095 (0.059)	0.159* (0.061)	--	-0.083 (0.063)	0.061 (0.065)
Italy	--	0.056 (0.043)	0.149* (0.046)	--	0.110* (0.056)	0.288* (0.059)
Poland	--	-0.162* (0.043)	-0.076 (0.046)	--	-0.148* (0.045)	0.019 (0.049)
Eastern Europe	--	-0.208* (0.042)	-0.120* (0.045)	--	-0.266* (0.046)	-0.104* (0.049)
Other Europe	--	-0.044 (0.032)	0.024 (0.035)	--	-0.053 (0.035)	0.077* (0.038)
Asia	--	-0.306* (0.030)	-0.224* (0.034)	--	-0.113* (0.031)	0.041 (0.036)
Africa	--	-0.273* (0.035)	-0.225* (0.037)	--	-0.068 (0.039)	0.032 (0.041)
Other America	--	-0.226* (0.033)	-0.188* (0.034)	--	-0.097* (0.034)	-0.033 (0.035)
Other	--	-0.021 (0.053)	0.011 (0.053)	--	0.099 (0.060)	0.168* (0.060)
<i>Foreign language:</i>						
Both	--	--	-0.100* (0.018)	--	--	-0.185* (0.020)
Mother tongue	--	--	-0.031 (0.021)	--	--	-0.137* (0.024)

Home language	--	--	-0.098* (0.036)	--	--	-0.126* (0.043)
(Neither)	--	--	--	--	--	--
No. of obs.	857,570	857,570	857,570	749,790	749,790	749,790

Notes: Samples restricted to full-year (49-52 weeks), full-time (usual weekly hours 30 or more) workers and to recent immigrants (5 years or less since migration). Estimates are from a linear censored regression model, which also includes a full set of fixed year effects, as well as a separate set of language indicators for native-born workers. Standard errors are in parentheses. * indicates statistical significance at the 5% level.

Source: 1971, 1981, 1986, 1991, 1996, 2001, and 2006 public-use Census (individual) files.

Table 14: Earnings regression with interactions of language and arrival cohort, 1971-2006 Censuses.

	Men		Women	
<i>Period of arrival:</i>				
1966-1970	-0.065**	(0.032)	-0.007	(0.038)
1976-1980	-0.136***	(0.038)	-0.227***	(0.041)
1981-1985	-0.184***	(0.045)	-0.099**	(0.046)
1986-1990	-0.121***	(0.041)	-0.131***	(0.042)
1991-1995	-0.192***	(0.042)	-0.219***	(0.044)
1996-2000	-0.081*	(0.043)	-0.140***	(0.046)
2001-2005	-0.216***	(0.042)	-0.243***	(0.045)
<i>Foreign language:</i>				
Both	0.008	(0.034)	-0.058	(0.043)
Mother Tongue	0.129***	(0.047)	-0.137**	(0.059)
Home language	0.011	(0.099)	0.432***	(0.140)
(Neither)	--		--	
<i>Language-cohort interactions:</i>				
Both*1976-1980	-0.019	(0.048)	0.064	(0.059)
Both*1981-1985	-0.084	(0.053)	-0.167***	(0.062)
Both*1986-1990	-0.120**	(0.047)	-0.075	(0.055)
Both*1991-1995	-0.184***	(0.047)	-0.150***	(0.056)
Both*1996-2000	-0.168***	(0.048)	-0.218***	(0.058)
Both*2001-2005	-0.167***	(0.048)	-0.290***	(0.058)
Mother tongue*1976-1980	-0.039	(0.069)	0.242***	(0.089)
Mother tongue*1981-1985	-0.308***	(0.082)	-0.107	(0.100)
Mother tongue*1986-1990	-0.176***	(0.066)	0.024	(0.078)
Mother tongue*1991-1995	-0.207***	(0.066)	0.023	(0.077)
Mother tongue*1996-2000	-0.223***	(0.065)	-0.093	(0.076)
Mother tongue*2001-2005	-0.235***	(0.064)	-0.121	(0.076)
Home language*1976-1980	0.085	(0.133)	-0.344**	(0.174)
Home language*1981-1985	-0.168	(0.142)	-0.384**	(0.184)
Home language*1986-1990	-0.238*	(0.142)	-0.730***	(0.182)
Home language*1991-1995	-0.325**	(0.146)	-0.882***	(0.184)
Home language*1996-2000	-0.240*	(0.137)	-0.906***	(0.181)
Home language*2001-2005	-0.071	(0.122)	-0.624***	(0.163)
No. of observations	857,570		749,790	

Notes: Samples restricted to full-year (49-52 week), full-time (usual weekly hours 30 or more) workers and to recent immigrants (5 years or less since migration). Estimates are from a linear censored regression model, which also includes a full set of fixed year effects; age controls; education controls; region of birth controls; and a separate set of language indicators for native-born workers. Robust standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Table 15: Earnings regression with language-industry interactions, 1971-2006 Censuses.

	Men	Women
<i>Period of arrival:</i>		
1966-1970	-0.030 (0.038)	-0.090* (0.050)
1976-1980	-0.123*** (0.043)	-0.297*** (0.051)
1981-1985	-0.151*** (0.049)	-0.190*** (0.055)
1986-1990	-0.088* (0.046)	-0.198*** (0.054)
1991-1995	-0.162*** (0.047)	-0.275*** (0.055)
1996-2000	-0.064 (0.048)	-0.212*** (0.056)
2001-2005	-0.206*** (0.047)	-0.311*** (0.056)
<i>Immigrant industry:</i>		
(Manufacturing)	--	--
Construction	-0.145*** (0.048)	0.420*** (0.136)
Transp., comm. and utilities	-0.045 (0.046)	0.100 (0.071)
Retail and wholesale trade	-0.220*** (0.034)	-0.283*** (0.045)
Finance, insurance, real estate	-0.070 (0.049)	0.134*** (0.050)
Comm., bus., personal services	-0.252*** (0.028)	-0.138*** (0.037)
Public administration	-0.078 (0.062)	0.119 (0.073)
Primary industries	0.022 (0.065)	-0.278*** (0.097)
<i>Foreign language:</i>		
Both	-0.059 (0.039)	-0.009 (0.054)
Mother Tongue	0.058 (0.055)	-0.087 (0.078)
Home language	0.064 (0.121)	0.376** (0.152)
(Neither)	--	--
<i>Language-cohort interactions:</i>		
Both*1976-1980	0.012 (0.048)	0.056 (0.058)
Both*1981-1985	-0.075 (0.053)	-0.138** (0.062)
Both*1986-1990	-0.116** (0.047)	-0.088 (0.055)
Both*1991-1995	-0.177*** (0.047)	-0.129** (0.056)
Both*1996-2000	-0.169*** (0.048)	-0.213*** (0.057)
Both*2001-2005	-0.163*** (0.048)	-0.272*** (0.057)
<i>Language-industry interactions:</i>		
Both*Construction	0.157*** (0.055)	-0.457*** (0.168)
Both*Transp., comm. and utilities	-0.034 (0.055)	-0.114 (0.088)
Both*Retail and wholesale trade	0.074* (0.040)	0.140*** (0.051)
Both*Finance, insurance, real estate	-0.032 (0.062)	-0.076 (0.063)
Both*Comm., bus., personal services	0.083** (0.033)	-0.101** (0.042)
Both*Public administration	0.030 (0.086)	-0.277*** (0.100)
Both*Primary industries	0.006 (0.078)	0.309*** (0.109)
Number of observations	841,051	734,182

Notes: Samples restricted to full-year (49-52 week), full-time (usual weekly hours 30 or more) workers and to recent immigrants (5 years or less since migration). Estimates are from a linear censored regression model, which also includes a full set of fixed year effects; age controls; education controls;

region of birth controls; a separate set of language indicators for native-born workers; and the interactions of cohort and industry fixed effects with the foreign mother tongue and home language indicators. Robust standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Table 16: Earnings regression with language-occupation interactions, 1971-2006 Censuses.

	Men		Women	
<i>Period of arrival:</i>				
1966-1970	0.072	(0.044)	-0.056	(0.056)
1976-1980	-0.014	(0.048)	-0.252***	(0.057)
1981-1985	-0.050	(0.053)	-0.131**	(0.060)
1986-1990	0.017	(0.050)	-0.169***	(0.057)
1991-1995	-0.061	(0.050)	-0.210***	(0.056)
1996-2000	0.024	(0.050)	-0.164***	(0.055)
2001-2005	-0.104**	(0.049)	-0.244***	(0.056)
<i>Immigrant occupation:</i>				
(Management and administrative)	--		--	
Teaching	-0.420***	(0.055)	-0.236***	(0.061)
Health	-0.379***	(0.072)	-0.022	(0.057)
Natural and applied sciences	-0.166***	(0.043)	0.144*	(0.084)
Social sciences	-0.558***	(0.085)	-0.203***	(0.079)
Art, culture, recreation	-0.441***	(0.076)	-0.255***	(0.086)
Clerical	-0.595***	(0.049)	-0.175***	(0.048)
Sales and service	-0.615***	(0.040)	-0.594***	(0.047)
Primary	-0.609***	(0.080)	-0.872***	(0.134)
Transport equipment operators	-0.314***	(0.075)	-0.148	(0.260)
Construction trades	-0.403***	(0.055)	0.056	(0.185)
Other unskilled	-0.375***	(0.039)	-0.331***	(0.058)
<i>Foreign language:</i>				
Both	-0.255***	(0.054)	-0.147**	(0.069)
Mother Tongue	-0.161**	(0.075)	-0.047	(0.090)
Home language	-0.207	(0.169)	-0.338	(0.226)
(Neither)	--		--	
<i>Language-cohort interactions:</i>				
Both*1976-1980	0.006	(0.048)	0.057	(0.058)
Both*1981-1985	-0.058	(0.053)	-0.150**	(0.061)
Both*1986-1990	-0.107**	(0.047)	-0.063	(0.055)
Both*1991-1995	-0.147***	(0.048)	-0.132**	(0.056)
Both*1996-2000	-0.134***	(0.049)	-0.197***	(0.058)
Both*2001-2005	-0.117**	(0.049)	-0.241***	(0.058)
<i>Language-occupation interactions:</i>				
Both*Teaching	0.054	(0.078)	-0.208**	(0.083)
Both*Health	0.269***	(0.094)	0.009	(0.072)
Both*Natural and applied sciences	0.313***	(0.054)	0.066	(0.096)
Both*Socia sciences	0.263**	(0.111)	-0.269***	(0.099)
Both*Art, culture, recreation	0.114	(0.103)	-0.165	(0.111)
Both*Clerical	0.307***	(0.061)	0.045	(0.060)
Both*Sales and service	0.299***	(0.049)	0.226***	(0.057)

Both*Primary	0.452***	(0.094)	0.805***	(0.147)
Both*Transport equipment operators	0.007	(0.087)	-0.063	(0.336)
Both*Construction trades	0.325***	(0.066)	-0.005	(0.210)
Both*Other unskilled	0.241***	(0.049)	0.205***	(0.067)
Number of observations	816,191		732,732	

Notes: Samples restricted to full-year (49-52 week), full-time (usual weekly hours 30 or more) workers and to recent immigrants (5 years or less since migration). Estimates are from a linear censored regression model, which also includes a full set of fixed year effects; age controls; education controls; region of birth controls; a separate set of language indicators for native-born workers; and the interactions of cohort and industry fixed effects with the foreign mother tongue and home language indicators. Robust standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Table 17: Earnings regression with age and education interactions, 1971-2006 Censuses.

	Men						Women					
	<i>Foreign language:</i>						<u>Foreign language:</u>					
	Mother tongue & home language		Mother tongue		Neither		Mother tongue & home language		Mother tongue		Neither	
Age	1.074*	(0.008)	1.077*	(0.008)	1.080*	(0.008)	1.089*	(0.010)	1.093*	(0.010)	1.096*	(0.010)
Age ²	-0.375*	(0.004)	-0.376*	(0.004)	-0.377*	(0.004)	-0.399*	(0.004)	-0.401*	(0.004)	-0.402*	(0.004)
Age ³	0.058*	(0.001)	0.058*	(0.001)	0.059*	(0.001)	0.064*	(0.001)	0.064*	(0.001)	0.064*	(0.001)
Age ⁴	-0.003*	(0.000)	-0.003*	(0.000)	-0.003*	(0.000)	-0.004*	(0.000)	-0.004*	(0.000)	-0.004*	(0.000)
College	0.152*	(0.002)	0.152*	(0.002)	0.152*	(0.002)	0.227*	(0.003)	0.227*	(0.003)	0.227*	(0.003)
University	0.375*	(0.003)	0.375*	(0.003)	0.375*	(0.003)	0.583*	(0.004)	0.583*	(0.004)	0.583*	(0.004)
<i>Period of arrival:</i>												
1966-1970	0.963*	(0.091)	1.167*	(0.221)	-0.753*	(0.127)	0.901*	(0.115)	0.535*	(0.253)	0.147	(0.147)
1976-1980	0.886*	(0.104)	1.100*	(0.225)	-0.166	(0.140)	0.716*	(0.121)	1.296*	(0.280)	0.070	(0.157)
1981-1985	0.774*	(0.106)	0.463	(0.287)	-0.470*	(0.167)	0.415*	(0.122)	1.051*	(0.311)	0.229	(0.173)
1986-1990	0.494*	(0.090)	1.081*	(0.228)	-0.280	(0.150)	0.435*	(0.105)	0.993*	(0.250)	-0.065	(0.162)
1991-1995	0.619*	(0.088)	0.763*	(0.233)	-0.520*	(0.157)	0.305*	(0.101)	0.842*	(0.241)	-0.331	(0.171)
1996-2000	0.828*	(0.088)	1.032*	(0.207)	-0.399*	(0.154)	0.529*	(0.102)	0.597*	(0.231)	-0.068	(0.169)
2001-2005	0.762*	(0.085)	0.739*	(0.204)	-0.975*	(0.151)	0.428*	(0.097)	0.597*	(0.225)	-0.413*	(0.169)
Age	-0.050*	(0.004)	-0.064*	(0.011)	0.032*	(0.007)	-0.037*	(0.005)	-0.039*	(0.013)	0.003	(0.008)
Age*1976-1980	-0.005	(0.003)	-0.004	(0.008)	-0.022*	(0.004)	0.000	(0.004)	-0.025*	(0.010)	-0.005	(0.004)
Age*1981-1985	-0.004	(0.003)	0.007	(0.008)	-0.014*	(0.004)	0.008	(0.004)	-0.023*	(0.010)	-0.006	(0.005)
Age*1986-1990	0.005*	(0.003)	-0.007	(0.007)	-0.020*	(0.004)	0.010*	(0.003)	-0.017*	(0.008)	0.003	(0.004)
Age*1991-1995	-0.002	(0.003)	0.000	(0.007)	-0.015*	(0.004)	0.009*	(0.003)	-0.015	(0.008)	0.009	(0.005)
Age*1996-2000	-0.004	(0.003)	-0.005	(0.006)	-0.016*	(0.004)	0.004	(0.003)	-0.008	(0.008)	0.004	(0.005)
Age*2001-2005	-0.006*	(0.003)	-0.001	(0.006)	-0.002	(0.004)	0.003	(0.003)	-0.012	(0.007)	0.012*	(0.004)
Age ²	0.005*	(0.001)	0.008*	(0.001)	-0.003*	(0.001)	0.003*	(0.001)	0.006*	(0.002)	-0.002	(0.001)
College	0.000	(0.019)	-0.034	(0.039)	0.042	(0.026)	-0.130*	(0.021)	-0.061	(0.043)	-0.039	(0.028)
University	-0.082*	(0.018)	-0.069	(0.039)	0.052	(0.029)	-0.341*	(0.022)	-0.209*	(0.044)	-0.159*	(0.034)

Notes: Samples restricted to full-year (49-52 week), full-time (usual weekly hours 30 or more) workers and to recent immigrants (5 years or less since migration). Estimates are from a linear censored regression model, which also includes a full set of fixed year effects. Standard errors are in parentheses. * indicates statistical significance at the 5% level.

Source: 1971, 1981, 1986, 1991, 1996, 2001, and 2006 public-use Census (individual) files.

Appendix

1971 to 2006 Public-Use Census Analysis, Variable Definitions

Sample restrictions:

- (i) Private households
- (ii) Permanent residents
- (iii) Age 15 to 64
- (iv) Exclude Maritimes and Territories (immigration information limited for these groups)

Variable	Variable name	Coding	Exceptions
Type of work in reference week	worktype	1 = employee 2 = self-employed 3 = unemployed 4 = nonparticipant	In 1971 the “unemployed” include only those who looked for work in the past week, as opposed to the past 4 weeks as in all the other Census years.
Full-year (49-52 weeks employment in income reference year)	fullyear	1= yes 0 = no	
Full-time (worked mostly full-time in income reference year)	fulltime	1= yes 0 = no	
Log real weekly earnings (lower and upper bounds) in income reference year	logrwearn_a logrwearn_b	continuous variables	
Sex	sex	1= male 2=female	
Age	age	continuous	
Education	educ	1 = high school or below 2 = diploma or certification 3 = university degree	
Married	married	1 = yes 0=no	
Province	prov	24=Quebec 35=Ontario 46=Manitoba	

		47=Saskatchewan 48=Alberta 59=British Columbia	
Year of immigration	yrimm	1= before 1956 2=1956-1960 3=1961-1965 4=1966-1970 5=1971-1975 6=1976-1980 7=1981-1985 8=1986-1990 9=1991-1995 10=1996-2000 11=2001-2005	
Country of birth	pob	1=Canada 2=United States 3=United Kingdom 4=Germany 5=Italy 6=Poland 7=USSR 8=Other Europe 9=Asia 10=Africa 11=Caribbean and Latin America 12=Other	Notes: USSR is all Eastern Europe excluding Poland in 2006.
Born in China	china	1=Yes 0=No	Only defined for 1971, 1991, 1996, 2001, and 2006. For 1981 and 1986 use ethnicity variable together with region of birth to identify Chinese.
Born in India or Pakistan	indpak	1=Yes 0=No	Includes India and Pakistan in 1971 and 2006. Includes all South Asia in 1986, 1991, 1996, and 2001.
Mother tongue	mohtong	1=English	Note: In 1971 and 1981 having both

		2=French 3=English and French 4=Other	English and French as mother tongue is not possible.
Fluency in official language	fluent	1=English only 2=French only 3=English and French 4=Neither English nor French	In 1971 and 1981, English <i>and</i> French is not possible.
Language spoken at home	homelang	1=English 2=French 3=English and French 3=Other	
Industry	ind8	1=Manufacturing 2=Construction 3=Transportation, communications, and other utilities 4=Trade 5=Finance, Insurance, Real estate 6=Community, Business, Personal Services 7=Public Administration 8=Primary Industries	In 1971, 1981, 1986, 1991 based on 1970 SIC. In 1996 and 2001 based on 1980 SIC. In 2006, based on 2002 NAICS. Note that the NAICS group "Information and cultural industries" is included in "Transportation, communications and other utilities."
Occupation	occ12	1=Management and administrative 2=Teaching 3=Health 4=Natural and applied sciences 5=Social sciences 6=Art, culture, recreation 7=Clerical 8=Sales and service 9=Primary 10=Transport equipment operators 11=Construction trades 12=Other unskilled	In 1971, 1981, 1986 and 1991 use 1971 SOC. In 1996 use 1991 SOC. In 2001 and 2006 use 2001 NOC-S.

Sampling weight	weight	1971 = 100	
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