Entry Earnings of Canada's Immigrants over the Past Quarter Century: the Roles of Changing Characteristics and Returns to Skills

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Abstract

We examine whether the factors associated with the rise in the Canadian born - immigrant entry earnings gap played different roles in the 1980s, the 1990s, and the early 2000s. We find that for recent immigrant men, shifts in population characteristics had the most important effect in the 1980s when their earnings gap expanded the most, but this "compositional" effect diminished in the 1990s and early 2000s. The effect of changes in returns to Canadian experience and education was small for men, but stronger for women in all three periods. During the early 2000s the IT bust, combined with a heavy concentration of immigrants in IT-related occupations, was the primary explanation of the increase in their earnings gap. Furthermore, returns to foreign experience declined in the 1980s and 1990s, but recovered moderately in the early 2000s. In contrast, the relative return to immigrant education declined in the early 2000s.

Keywords: Immigrants, entry earnings, decomposition, Canada

1. Introduction

Many studies have documented the deteriorating labor market performance of recent immigrants in Canada through the 1980s and 1990s (Aydemir and Skuterud 2005; Bloom, Grenier and Gunderson, 1995; Frenette and Morissette 2005; Picot and Hou 2003; Reitz 2007a, 2007b). This deterioration has continued despite the improved macro-economic condition in the late 1990s and early 2000s, and rising educational attainment of immigrants (Picot, Hou, and Coulombe 2008).

A number of papers have documented the causes of the decline in entry earnings among immigrants. Probably the most representative and well-known Canadian studies on this topic are Aydemir and Skuterud (2005), Green and Worswick (2004a), and Reitz (2001). There is no consensus in these papers. Reitz finds that about half of the decline in entry earnings of immigrant men between the late 1970s and mid-1990s was attributable to rising levels of education of the Canadian born, the increased importance of education in Canadian labor markets, and the increased difficulty of immigrants in gaining market recognition of their educational qualification. While Reitz emphasizes the importance of education-related factors, Aydemir and Skuterud (2005) and Green and Worswick (2004a) find that there has not been an increased devaluation of foreign education. Rather, they suggest that changing immigrant composition, a new labor market entrant effect and falling returns to foreign experience together explain all or most of the decline in entry earnings. However, these two latter studies differ regarding the role played by declining returns to foreign work experience. Green and Worswick (2004a) show that declining returns to foreign experience accounted for about 15% of the declining entry earnings among immigrants arrived between the early 1980s and the mid-1990s. In comparison, Aydemir and Skuterud (2005) indicate

that the same factor was responsible for about one-third of the decline in entry earnings from the late 1960s to the late 1990s.

There are at least three possible reasons why these studies reached somewhat different conclusions. First, various explanatory factors might have played a different role during different periods. This possibility was not carefully explored in previous studies. Second, the data sources used in the studies differed; some used census data, others the Immigration Data Base which links immigrant landing records with taxation records. Third, methodological differences might contribute to the variation in the results. Notably, the inconsistent use of decomposition techniques could accentuate the role of some factors over others.

This paper is intended to contribute to the literature in three ways. First, it updates the research on the causes of the decline in entry earnings by using more recent data. Secondly, we examine the varying impact of compositional shifts and changing returns to skills (education and experience) on the entry earnings gap for recent immigrants *separately* for three distinct periods, the 1980s, 1990s, and early 2000s. We find that the determinants of the gap shift considerably over the decades. The results help us anticipate the trends of immigrant entry earnings in the near future. The third contribution is methodological. We use a flexible model specification that can simultaneously capture the effect of a host of potential variables, reflecting both compositional shifts and changes in returns to various characteristics, on changes in the entry earnings gap. We also use a decomposition technique that takes into account possible overlapping effects of various explanatory factors. This differs from earlier research, which tended to enter one factor at a time. The order in which different explanatory variables are entered may affect the results.

2. Explaining the declining entry earnings of immigrants

2.1 Potential explanatory factors and their changing roles

Previous studies have identified three major potential factors underlying the deteriorating labor market outcomes of immigrants (Picot and Sweetman 2005; Reitz 2007a; Reitz 2007b). The first is the shift in source countries of immigration from Europe and the United States to other regions, and the associated changes in the proficiency of Canada's official languages (Aydemir and Skuterud 2005; Picot and Hou 2003). Immigrants from countries other than the United States and Europe may have lower earnings because potential difficulties related to language, education quality, networks, and possibly discrimination may reduce the transferability of their skills and credentials (Bloom, Grenier, and Gunderson 1995; Sweetman 2004).

The shift from traditional source regions to non-Western countries occurred primarily in the 1970s and 1980s, and since then further changes were small. The share of immigrants from Western countries with largely developed economies declined from 42% in 1980 to 26% in 1990, and then declined to 21% by 2000 (Picot and Hou 2003). Green and Worswick (2004a) show that immigrant country composition explained about half of the rising earnings gap between recent immigrant men and their Canadian born counterparts in the 1980s, but less than 20% of the rising gap from the end of 1980s to the mid-1990s. It is possible that the small shift in immigrant source regions in the later 1990s and early 2000s had minimum impact on immigrant entry earnings trends.

The second factor that may influence immigrant entry earnings gap is some long-term changes in labor market conditions that could affect both the Canadian born and immigrants. Based on an earlier observation that real wages fell 20% among Canadian new labor market entrants form 1981 to 1993 (Beaudry and Green 2000), Green and Worswick (2004b) concluded that the best benchmark against which to compare immigrant earnings was not the total adult working population, but rather the Canadian-born new labor market entrant cohorts. This was an ingenious effort to allow the wage structure for new labour market entrants (including immigrants) to change over a period as long as two decades, rather than assuming it remained fixed. Green and Worswick (2004a) find that the broader deterioration in earnings for new entrants accounted for over one-third of the total decline in immigrant entry earnings from the early 1980s to the mid-1990s. The effect seems to be larger in the 1980s than in the first half of the 1990s. It is unlikely that this factor remains relevant in more recent periods. The outcomes for young labor market entrants—particularly males, where the decline was largely observed—had stopped deteriorating during the late 1990s and early 2000s (Morissette 2008).

The third set of factors emphasized in the literature relates to changes in the earnings return to immigrant-specific characteristics. While Aydemir and Skuterud (2005) and Green and Worswick (2004a) focus on the declining return to foreign work experience, Reitz (2001) stresses changes in returns to foreign education. It is not clear whether changes in return to foreign work experience and immigrant education were consistent over the 1980s, 1990s and early 2000s. More importantly, as we will discuss later, it is difficult to disaggregate the individual contribution of such changes to the decline in immigrants' entry earnings.

2.2 Analytical approach of the present study

In the present study, we focus on the cross-cohort differences in immigrants' *entry* earnings relative to the Canadian born. Examining immigrant entry earnings is important for several reasons. Immigrant entry earnings and other initial labor market outcomes are often used as a criterion to evaluate the effectiveness of immigration selection programs and to make policy adjustments (Green and Worswick 2004a). Economic outcomes during early years after arrival may affect immigrants' decision on whether to remain in Canada, move to other countries or return to their source country. Information on initial outcomes is likely transmitted to would-be immigrants in the source countries, potentially affecting their choice of destination countries.

By focusing only on cohort difference in entry earnings, we do not need to estimate an assimilation effect (earnings growth with years since immigration), and thus avoid the problem of sample attrition that is typically associated with following synthetic cohorts over a long period of time. When a synthetic cohort is "followed" over a long time using repeated cross-sections of census data, its size and composition may change because of sample attrition. Many immigrants leave Canada during the first few years following arrival (Aydemir and Robinson 2008). As a result, both the cohort effect and assimilation effect are likely to be estimated with bias (Lubotsky 2007). We also avoid the problem of extrapolating assimilation rates for more recent cohorts with very few points of observation (Li 2003).

Focusing only on entry earnings also allow us to use a very flexible model that includes changes in the return to both Canadian work experience and education as

explanatory factors. Changes in the return to work experience capture both the new labor market entrant effect introduced by Green and Worswick (2004a) and the improved earnings position of experienced workforce as a whole.[1] We are also able to ask whether changes in the return to education (i.e. for the population in the general) affect recent immigrants' earning gaps.

We conduct the analysis separately for three time periods, 1980-1990, 1990-2000, and 2000-2005. The starting and end points in these periods were in similar positions in the business cycle. Thus we can by and large remove the impact of business cycle on immigrants' entry earnings gap. Examining the three periods separately allows us to test the possibility that the determinants of the increasing entry earnings gap changed over time.

3. Data and methods

3.1 Data and variables

The present study uses the 20% sample micro data files from the 1981, 1991, 2001 and 2006 censuses of Canada. The study population contains individuals who were age 25 to 59 and had positive annual employment income, and worked at least one week in the calendar year before the census. We include only the Canadian born and recent immigrants and exclude

[1] The new labor market entrant effect only partially captures the skill-biased labor market changes, i.e., because of changes in earnings returns to certain skills (e.g., work experience and education) the earnings of population groups with different skill sets will be affected differently. Skill-biased changes in the Canadian labor market may negatively affect new labor market entrants, but may also positively affect the experienced workforce. If returns to work experience increased in the 1980s and 1990s, the earnings gap between workers with many years of experience and new entrants would widen. In other words, while the earnings of more recent cohorts of Canadian-born new labor market entrants fell relative to earlier cohorts, the earnings of experienced workers might rise relative to their counterparts in earlier years. This would also increase the earnings gap between recent immigrants and the Canadian born (which include both Canadian-born new entrants and experienced workers). Furthermore, in addition to changing returns to experience, changing returns to education might also affect the earnings gap for recent immigrants.

more-established immigrants, since our focus is on changes in immigrant entry earnings gap. Recent immigrants are defined as those who had stayed in Canada five full years or less at the time of the census, e.g., those arrived from 1975 to 1979 in the 1981 census and those arrived from 2000 to 2004 in the 2006 census. Those who arrived in the year prior to the census are not included as most of them had not stayed a full year in Canada.

We further restrict the recent immigrant sample to those whose age at immigration was 25 to 59. Immigrants who arrived at a younger age are often the dependents of working age immigrants or international students. They are likely to receive at least some of their education in Canada and have earnings profiles similar to the Canadian born (Schaafsma and Sweetman 2001).

The outcome variable is log weekly earnings (annual earnings divided by weeks worked). Explanatory variables include education, potential years of Canadian and foreign work experience (separately), marital status, full-time/part-time status, racial minority status, location of residence, and immigrant composition in language and source regions. Education is grouped into five categories: no high school certificate, high school certificate or diploma, non-university certificate or diploma, bachelor's degree, and graduate degree. With the exception of the 2006 census, it is not possible to identify whether immigrants received their highest levels of education in Canada or abroad. Instead of trying to separate Canadian education from foreign education, we allow recent immigrants and the Canadian born to have different returns to education in all our models.

Given the emphasis placed by previous studies on declining returns to foreign experience, in this study we distinguish potential Canadian work experience from foreign work experience for recent immigrants. For the Canadian born, all their potential years of

experience are assumed to have been acquired in Canada, and are estimated as "age minus years of schooling and 6".[2] For recent immigrants, foreign experience is derived as "age at immigration minus years of schooling and minus 6" if the value is positive or 0. Their Canadian work experience is simply the difference between their total potential years of experience and estimated foreign experience. In the models we also allow recent immigrants and the Canadian born to have different returns to Canadian experience.

Marital status is coded as a dummy variable: married vs. others. Racial minority status is coded as racial minorities (1) vs. non racial minorities (0). Place of residence is grouped into 14 categories: Montréal, Toronto, Vancouver, and ten provinces (excluding the three largest metropolitan areas in their respective province) and territories.

Immigrant language is coded as 6 categories based on the combination of mother tongue and self-reported official language: mother tongue is English, mother tongue is French, mother is non- English/French but speak English, mother is non- English/French but speak French, mother is non- English/French but speak both English and French, mother tongue is non-English/French and do not speak English or French. The country of birth is coded into 43 groups to separate the major immigrant source regions.[3]

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[2] Since years of schooling are not collected in the 2006 census, we imputed years of schooling for the 2006 census. This is based on estimated median years of schooling by highest levels of certificate, diploma or degree for individuals aged 25 to 59 (the age range used in the present study) from the 2001 census. These estimated median years of schooling are assigned to corresponding certificate/degree levels in the 2006 census (Hou and Coulombe 2010). To ensure comparability, in the analysis of the change from 2001 to 2006, we use the imputed years of schooling to compute potential year of work experience for the 2001 census as well.

[3] They are USA, Haiti, Jamaica, Trinidad, Other Caribbean, Central America, Guyana, other South America, UK, Netherlands, France, Germany, Italy, Portugal, other Northern/Western/Southern Europe, Former Yugoslavia, Poland, Former USSR, other Eastern Europe, Israel, Lebanon, Iran, Egypt, other West Asia/Middle East, China, Hong Kong, Taiwan, Korea, other Eastern Asia, Philippines, Vietnam, other Southeast Asia, India, Pakistan/Bangladesh, Other South Asia, Northern Africa, Western/Central Africa, Southern Africa ,Eastern Africa, Kenya, Australia, New Zealand, and other countries.

3.2. Methods: inter-temporal decomposition of changes in earnings gaps

To evaluate the relative contributions of various factors to the change in the earnings gap for recent immigrants, the conventional approach is to pool the data for non-immigrants and immigrants from different time periods. A baseline regression model is constructed to include a dummy variable for immigrant status, a series of dummies for immigrant arriving cohorts, years since immigration, the interaction terms between cohorts and year since immigration. Subsequent models are then constructed to add explanatory variables, which are typically added one at a time to assess their affects on the entry earnings gap. The reduction in the coefficients on immigrant cohort dummies between the baseline model and subsequent models is interpreted as the "explained" portion of the changes in entry earnings gaps accounted for by the explanatory variables (e.g., Aydemir and Skuterud 2005).

One potential problem with this approach is that the order of entry into the model of the potential explanatory variables matters. If there are overlapping effects among these explanatory variables, the relative importance of a variable depends on whether it enters the model before or after other variables.

To overcome this problem, we use an inter-temporal decomposition approach that takes into account overlapping effects among explanatory variables. We include all explanatory variables *simultaneously* in the model and then calculate the relative contribution of each variable. This is equivalent to estimating a complex Oaxaca decomposition. Below we outline our approach.

We construct models separately for three periods: 1980-1990, 1990-2000, and 2000-2005. For each period, data on recent immigrants and the Canadian born from two censuses are pooled to estimate the following models:

Base Model: $Y = a^{\dagger} + ß_1^{\dagger} * T + ß_2^{\dagger} * IM + ß_3^{\dagger} * IM * T$

Where: Y is log weekly earnings, T is a dummy for census income year (the later year = 1), and IM is a dummy for immigrant status (recent immigrant =1, the Canadian born =0).

This model simply replicates the average earnings gap between recent immigrants and the Canadian born observed in the raw data. In this specification, $a^{\dagger}$ is the average log weekly earnings of the Canadian born in the first year of the period (year 1), $ß_1^{\dagger}$ is the change in earnings among the Canadian born between year 1 and the final year of the period (year 2). $ß_2^{\dagger}$ is the earnings gap between recent immigrants and the Canadian born in year 1, while $ß_2^{\dagger} + ß_3^{\dagger}$ is the earnings gap between recent immigrants and the Canadian born in year 2. Thus, $ß_3^{\dagger}$ is the change over the period in earnings gap between recent immigrants and the Canadian born.

Model 1 adds a number of control variables to the base model.

Model 1:

$$Y = a + ß_1 * T + ß_2 * IM + ß_3 * IM * T + ß_4 * Edu + ß_5 * Edu * IM + ß_6 * Edu * T + ß_7 * Exp + ß_8 * Exp * IM + ß_9 * Exp * T + ß_{10} * Married + ß_{11} * Visim + ß_{12} * Location + ß_{13} * Fulltime + ß_{14} * Fexp * IM + ß_{15} * Lang * IM + ß_{16} * POB * IM$$

Where: *Edu* refers to 4 dummy variables with high school certificate as the common reference group. *Exp* refers to potential Canadian experience. *Location* refers to 13 dummy variables with Toronto as the reference group. *Married* refers to marital status. *Visim* refers to racial minority status. *Lang* refers to 5 immigrant language dummy variables with English mother tongue as the reference. *POB* refers to 42 dummy variables for countries of birth

with mainland China as the reference group. And *Fulltime* refers to whether the worker worked mostly full time.

The term *Edu*IM* allows recent immigrants and the Canadian born to have different returns to education. Similarly, the term *Exp*IM* allows recent immigrants and the Canadian born to have different returns to Canadian experience. The terms *Edu*T* and *Exp*T* are used to capture changes in returns to education and Canadian experience for the general population (i.e. immigrants and the Canadian born combined). Since T=0 in the initial year, and 1 in the final year, β_6 and β_9 represent the *change* in return to education and Canadian experience over the study period of interest.

In Model 1, $ß_2$ is the earnings gap between recent immigrants and the Canadian born in year 1 *controlling for other variables in the model*, while $ß_2 + ß_3$ is the earnings gap between recent immigrants and the Canadian born in year 2 *with controls*. Thus, $ß_3$ is the change in earnings gap between recent immigrants and the Canadian born *with controls*.

As illustrated at the bottom of Appendix Table 1, the difference between $ß_3^{\dagger}$ in the base model and $ß_3$ in Model 1 is the portion of the change in the earnings gap that is accounted for (the "explained" component in the conventional Oaxaca decomposition) by the included control variables. The "explained" changes in the earnings gap can be further decomposed using the following equation. The derivation of this decomposition can be found at the bottom of Appendix table 1. This approach in essence ascribes the change in the earnings gap that is accounted for by the controls (i.e. the "explained" component, as measured by $ß_3^{\dagger} - ß_3$) to both changes in the relative composition of the explanatory variables, plus changes in the returns to Canadian experience and education (for immigrants and the Canadian born combined)

Decomposition Equation 1:

$$ß_3^{\dagger} - ß_3 = \beta_4^*(\Delta Edu_{t2}-\Delta Edu_{t1}) + \beta_5^*(Edu_{IM.t2}-Edu_{IM.t1}) + \beta_6^*\Delta Edu_{t2} + \beta_7^*(\Delta Exp_{t2}-\Delta Exp_{t1}) + \beta_8^*(Exp_{IM.t2}-Exp_{IM.t1}) + \beta_9^*\Delta Exp_{t2} + \beta_{10}^*(\Delta Mar_{t2}-\Delta Mar_{t1}) + \beta_{11}^*(\Delta Vis_{t2}-\Delta Vis_{t1}) + \beta_{12}^*(\Delta Loc_{t2}-\Delta Loc_{t1}) + \beta_{13}^*(\Delta Full_{t2}-\Delta Full_{t1}) + \beta_{14}^*(Fexp_{IM.t2}-Fexp_{IM.t1}) + \beta_{15}^*(Lang_{IM.t2}-Lang_{IM.t1}) + \beta_{16}^*(POB_{IM.t2}-POB_{IM.t1})$$

where: ΔEdu_{t2} and ΔEdu_{t1} are differences in education levels between recent immigrants and the Canadian born in year 1 and year 2;

$Edu_{IM.t2}$ and $Edu_{IM.t1}$ are immigrant education levels in year 1 and year 2;

ΔExp_{t2} and ΔExp_{t1} are differences in Canadian experience between recent immigrants and the Canadian born in year 1 and year 2;

$Exp_{IM.t2}$ and $Exp_{IM.t1}$ are Canadian experience among immigrants in year 1 and year 2,

ΔMar_{t2} and ΔMar_{t1}, ΔVis_{t2} and ΔVis_{t1}, and ΔLoc_{t2} and ΔLoc_{t1} are differences between recent immigrants and the Canadian born in marriage rate, racial minority status, and geographic distribution respectively in year 2 and year 1. $Fexp_{IM.t2}$ and $Fexp_{IM.t1}$, $Lang_{IM.t2}$ and $Lang_{IM.t1}$, and $POB_{IM.t2}$ and $POB_{IM.t1}$ are mean values of foreign experience, language and source region composition among recent immigrants in year 2 and year 1.

From this equation, it is straightforward to compute the contribution of each control variable to the "explained" component. For instance, the contribution due to changes in source countries can be calculated as $\beta_{15}^*(POB_{IM.t2}-POB_{IM.t2})/ (ß_3^{\dagger} - ß_3)$. To simplify the presentation, we combine various terms into the following contributing factors: (A) changing returns to skills (education and Canadian experience), and (B) changing population characteristics (composition effects).

The first factor (A) consists of the following two terms: (1) changes in the return to Canadian experience, $\beta_9*\Delta Exp_{t2}$,[4] and (2) changes in the return to education, $\beta_6*\Delta Edu_{t2}$. Note that changes in returns to foreign experience are not captured in this model because of methodological difficulties in constructing the decomposition when such a term is included. This issue is discussed later regarding Model 2.

The second factor (B) – the effect of changes in population characteristics– includes: (1) changes in educational attainment among both recent immigrants and the Canadian born, $\beta_4*(\Delta Edu_{t2}-\Delta Edu_{t1}) + \beta_5*(Edu_{IM.t2} -Edu_{IM.t1})$; (2) changes in Canadian experience among recent immigrants and the Canadian born, $\beta_7*(\Delta Exp_{t2}-\Delta Exp_{t1}) + \beta_8*(Exp_{IM.t2}-Exp_{IM.t1})$; (3) general demographic variables including marital status, racial minority status, and location, $\beta_{10}*(\Delta Mar_{t2}-\Delta Mar_{t1}) + \beta_{11}*(\Delta Vis_{t2}-\Delta Vis_{t1}) + \beta_{12}*(\Delta Loc_{t2}-\Delta Loc_{t1})$; (4) full-time status, $\beta_{13}*(\Delta Full_{t2}-\Delta Full_{t1})$; (5) changes in years of foreign experience among recent immigrants, $\beta_{14}*(Fexp_{IM.t2}-Fexp_{IM.t1})$; and (6) changes in immigrant language and source regions, $\beta_{15}*(Lang_{IM.t2}-Lang_{IM.t1}) + \beta_{16}*(POB_{IM.t2}-POB_{IM.t1})$.

Building on Model 1, in a subsequent Model 2 we can add three-way interaction terms (i.e., among IM, T, and an immigrant-specific variable) to include changes in the return to foreign experience and immigrant education.

Model 2:

$$Y = a' + ß'_1*T + ß'_2*IM + ß'_3*IM*T + ß'_4*Edu + ß'_5*Edu*IM + ß'_6*Edu*T + ß'_7*Exp + ß'_8*Exp*IM + ß'_9*Exp*T + ß'_{10}*Married + ß'_{11}*Visim + ß'_{12}*Location + ß'_{13}*Fulltime + ß'_{14}*Fexp*IM + ß'_{15}*Lang*IM + ß'_{16}*POB*IM + ß'_{17}*IM*T*Fexp + ß'_{18}*IM*T*EDU$$

[4] Note that this term reflects the change in returns to Canadian experience because it was interacted with a time dummy, T, in model 2. The same is true for the term involving β_6 – the change in return to education.

Model 2 allows us to determine the changes in returns to these two variables among recent immigrants over time.

Ideally we would develop a decomposition based on Model 2 that would allow us to determine the extent to which changes (if any) in the returns to foreign experience and immigrant education influence the entry earnings gap, much as decomposition 1 did for the variables included in model 1. However, as noted by Oaxaca and Ransom (1999), this cannot be reliably done. Changing returns to immigrant-specific factors such as foreign experience are part of the "unexplained" portion of the change in earnings gap, i.e. the effect on the earnings gap of the βs that are specific to one group as opposed to the Xs.[5] It is problematic to quantify the individual contribution of change in βs that are specific to immigrants to the "unexplained" portion.[6]

Earlier studies have attempted to assess the role of changing return to foreign experience on changes in immigrant earnings. Green and Worswick (2004a) used a unique

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[5]. Note that our inter-temporal decomposition can capture the effect on earnings gap of changes in βs that apply to both immigrants and the Canadian born, e.g., returns to Canadian experience and returns to education for the population as a whole. Both are two-way interaction terms (e.g., EXP*T). Changes in returns to foreign experience, which is a three-way interaction term (IM*Fexp*T), however, apply only to immigrants.

[6]. Some researchers do disaggregate the "unexplained gap" (i.e., the effect of changes in the βs) into the separate contributions of the constituent variables. However, disaggregating the "unexplained gap" is not invariant to the choice of the reference group for categorical variables and to certain transformations of continuous variables. A 'normalized' regression approach has been used to deal with categorical variables (Yun 2008). This approach is equivalent to taking the simple average of the decomposition results from a series of decompositions in which the categories are used one after another as the reference. But the issues with continuous variables remain unsolved. Locational transformations (e.g., age versus age-18) and adding higher orders (quadratic or cubic terms) of a continuous variable would dramatically change the intercept term and the contribution of this variable to the "unexplained gap" (Oaxaca and Ransom 1999). For this reason, we did not disaggregate the "unexplained gap" in our study. That means, for example, that we do not attempt to measure the share of the change in the earnings gap that is directly attributable to changes in the βs on the foreign experience variable, as opposed to changes in other βs.

form of regression decomposition to estimate the effect of changing returns to foreign experience. The approach we adopt in this paper is similar to theirs. Another study estimated whether there were significant changes in the returns to foreign experience by entering the three-way interaction just as we do in Model 2 (Aydemir and Skuterud 2005). But they went further and measured the share of the decline in entry earnings attributable to changing returns. They conclude that changing returns to foreign experience play a large role to immigrant earnings gap based on the observation that the three-way interaction is significant and $ß'_3$ in Model 2 is substantially smaller than β_3 in Model 1. But when the change in the return to foreign experience (i.e. the three-way interaction IM*T*Fexp) is included in the model, $ß'_3$, the coefficient for IM*T, has to be interpreted in conjunction with $ß'_{17}$*IM*T*Fexp because the three-way interaction also contains the two-way interaction IM*T. Thus, the change in earnings gap as a result of allowing the change in returns to foreign experience is not the difference between $ß_3$ and $ß'_3$, but rather the difference between $ß_3$ and $ß'_3 + ß'_{17}$*Fexp [7]. This difference can only be evaluated at some given value of Fexp, preferably at the mean value of Fexp. This is the approach we use, and we evaluate further

[7]. We illustrate this point with a simplified model $Y = \alpha + ß_1*T + ß_2*IM + ß_3*IM*T + ß_{14}*Fexp*IM$. When the three-way interaction is not included, $ß_3$ is the change in immigrant earnings gap when Fexp is controlled, as we demonstrate in Appendix Table 1. Including a three interaction, the model become $Y = \alpha' + ß'_1*T + ß'_2*IM + ß'_3*IM*T + ß'_4*Fexp*IM + ß'_5*IM*T*Fexp$. From this equation, the predicted earnings at time 1 is α' for the Canadian born and $\alpha + ß'_1 + ß'_4*Fexp$ for immigrants. Thus, the immigrant earnings gap at time 1 equals $ß'_1 + ß'_4*Fexp$. At time 2, the predicated earnings for the Canadian born is $\alpha' + ß'_2$, and for immigrants is $\alpha' + ß'_1 + ß'_2 + ß'_3 + ß'_4*Fexp + ß'_5*Fexp$, thus the gap at time 2 is their difference which equals $ß'_1 + ß'_3 + ß'_4*Fexp + ß'_5*Fexp$. The change in the earnings gap is the difference in gaps between time 2 and time 1 $(ß'_1 + ß'_3 + ß'_4*Fexp + ß'_5*Fexp) - (ß'_1 + ß'_4*Fexp) = ß'_3 + ß'_5*Fexp$. With the inclusion of the three-way interaction, $ß'_3$ now is the change in immigrants' earnings gap only when Fexp=0. Since only a small fraction of adult immigrants had no foreign experience, the change (or lack of) in their entry earnings gap does not tell us much about the experience of average immigrants. When Fexp $\neq$0, the immigrant earnings gap can only be estimated at a given value of Fexp.

changes in the entry earnings gap as a result of allowing returns to foreign experience and immigrant education change over time.[8]

4. Results

4.1 Compositional changes among recent immigrants and the Canadian born

Changes in demographic composition among both recent immigrants and the Canadian born are a potential determinant of the trend in their earnings gaps. Table 1 presents changes in selected socio-demographic variables over the past quarter century for male earners included in our study. The same information for female earners is not presented but available upon request.

As shown in Table 1, recent immigrants had much higher educational levels than the Canadian born, particularly in terms of acquiring degrees above the Bachelor's level. In 2005, about 31.4% recent immigrant male earners had a Bachelor's degree and another

[8] Allowing returns to foreign experience and immigrant education to change over time can affect the total change in earnings gap in two ways. First it is part of the "unexplained" component in conventional Oaxaca decomposition $\Sigma\Delta ß^*X$ (i.e. the effect of the change in the βs on the earnings gap). For a given value of $\Sigma\Delta ß^*X$, it is difficult to decompose the contribution of changing returns to foreign education and immigration education to the "unexplained" component of the change in entry earnings, as explained in footnote 6. Hence, we cannot evaluate the effect of changes in returns to foreign experience and immigrant education on the earnings gap in this way. In the second way, allowing returns to foreign experience and immigrant education to change over time can alter the "explained" components in the conventional Oaxaca decomposition, $\Sigma ß^*\Delta X$ (i.e. the effect of changes in the Xs on the earnings gap), by changing the set of βs used to evaluating the effect of the change in the Xs on the earnings gap. Without the three way interaction, the ß vector in $\Sigma ß^*\Delta X$ includes returns to foreign experience and immigrant education based on the average of the beginning and end years of the study period. With the three-way interaction, ß in $\Sigma ß^*\Delta X$ is returns to foreign experience and immigrant education at the beginning year. Simply put, we can only estimate the effect of changes in returns to foreign experience and immigrant education by assessing their effect on the "explained" component in the decomposition, but not their individual contribution to the "unexplained" components.

29.9% had a graduate degree. The corresponding levels were 13.6% and 6.5% among the Canadian born.

The relative educational advantage of recent immigrants (over the Canadian born) narrowed slightly in the 1980s, but expanded substantially since. Twenty seven percent of male recent immigrants had a Bachelor's or graduate degree in 1980, twice that of the Canadian born (13.6%). This ratio was reduced to about 1.8 (28.8% vs. 15.9%) in 1990. This is consistent with Reitz' observation that increases in education among recent immigrants did not keep pace with the increase among the Canadian born in this period (Reitz 2001). However, the educational level among new immigrants increased rapidly following the early1990s, when Canada altered its immigrant selection criteria. By 2005, the percentage of recent immigrant men with a Bachelor's or graduate degree (61.3%) was three times as high as that among the Canadian born (20.1%). Similar trends are observed among female earners.

The shift in both source regions and in official language ability occurred primarily in the 1980s. In the 1990s and early 2000s, compositional changes occurred mostly among non-traditional source countries. Recent immigrants are much more likely to be racial minorities than are the Canadian born. While the share of the Canadian born who are racial minorities rose continuously, it remained trivial compared to that among recent immigrants.

4.2 Trends in weekly earnings among recent immigrants and the Canadian born

Among male earners, the gap in weekly earnings between the Canadian born and recent immigrants expanded the most during the 1980s (Table 2). Between 1980 and 1990 log

weekly earnings decreased 0.07 among the Canadian born, or an approximately 7 percentage point decrease,[9] but approximately 25 percentage points among male recent immigrants. Hence, the Canadian born-immigrant entry earnings gap widened 18 percentage points.

In the 1990s, the earnings gap changed little as the Canadian born and recent immigrant men experienced similar small declines.[10] In the early 2000s, the earnings gap expanded again as earnings grew among the Canadian born but declined among entering recent immigrants. By 2005, the earnings gap between recent immigrant and Canadian born men grew to 33%.

The earnings gap between female recent immigrants and the Canadian born expanded throughout the past quarter century, although more so in the 1990s. Unlike male recent immigrants, whose earnings declined in absolute values, women experienced little long-term changes in earnings. However, the earnings of Canadian born women improved steadily and hence the Canadian-immigrant entry earnings gap increased, reaching 30% by 2005.

4.3 The impact of compositional shifts and changing returns to skills

[9] The difference in log earnings (when times 100) can be interpreted as approximate percentage differences in actual earnings. Large log differences (especially those in absolute value than larger 0.10) often overestimate the percentage difference.

[10] Other research suggests that this stability over the decade actually consisted of an increase in the gap during the early 1990s, followed by an offsetting decline during the late 1990s, likely related to the recession in the early 1990s and economic expansion in the later 1990s particularly the boom in the information technology sector (Picot and Hou, 2007; Frenette and Morrisette, 2005).

To examine the extent that the changing earnings gaps for recent immigrants are associated with compositional shifts and changes in returns to skills, we construct regression models as specified in the Base Model and Model 1, and perform decomposition as outlined in Decomposition Equation 1 in the Data and Methods section. The compositional shifts include changes in the difference between the Canadian-born and recent immigrants in education, Canadian experience, the proportion married, the proportion racial minority and the geographic distribution, as well as compositional shifts among recent immigrants in education, foreign experience, language and source region. The change in returns to skills include changing earnings returns to Canadian experience and education (pooled estimates based on the combined recent immigrant and Canadian born populations).We allow Canadian born and immigrants have different return to education and Canadian experience, but do not include *changes* in returns to foreign experience and immigrant education, which will be included in Model 2. The results are summarized in Table 3.

Among men compositional shifts account for most of the rising earnings gaps for recent immigrant men in 1980s. Of the total "explained" change in the earnings gap (-.171), close to 82% was attributable to changes in the characteristics of immigrants and the Canadian born. Shifts in immigrant language and source regions alone account for 41% of the "explained" component (-.070). The other important compositional changes are a slower growth in education and a larger decrease in years of Canadian experiences among recent immigrants relative to the Canadian born, contributing to 33% (-.057) of the "explained" component. Changes in the return to Canadian experience and education contribute about 18% of the "explained" change in earnings gap (or 17% of the total expansion in the earnings gap).

In the 1990s, changes in population characteristics contribute little to the trend in the earnings gap for recent immigrant men. While shifts in recent immigrant language and source region tended to increase the earnings gap, their rapidly rising education tended to reduce the gap. These two effects offset each other. Changes in the returns to skills tended to reduce the earnings gap for recent immigrant men because of rising return to education and a faster rise in education among recent immigrants than among the Canadian born.

In the early 2000s, the combined effects of changing returns to skills and compositional shifts accounted for little of the rise in the earning gap for recent immigrant men. While changes in population characteristics tended to reduce the gap slightly, this effect was mostly offset by that of changing returns to skills.

Overall, the "unexplained" portion of the change in weekly earnings gaps, after accounting for the effects of the explanatory variables in Model 1, are small among men in the 1980s and 1990s (-.010 and -.015 respectively), but grew to -.056 in the early 2000s (Table 3).

Among women, changes in returns to skills and compositional shifts accounted for all expansion in the earnings gap in the three time periods. While the effect of change in population characteristics decreased over time, the effect of changes in returns to skills was rather consistent over the three periods. Hence, during the 1980s compositional changes accounted for the majority of the increase in immigrant women's earnings gap, and by the early 2000s the effect of compositional changes and changes in returns to skills were roughly equal.

4.4 The impact of the IT boom and bust in the early 2000s

The expansion of earnings gaps for male recent immigrants in the early 2000s was not accounted for by compositional shifts and changes in returns to skills. Other changes in the labor market, particularly the demand/supply shifts, could have played a role. Picot and Hou (2009) found that the downturn in the information technology (IT) sector after 2000 negatively affected the entry earnings of recent immigrants. Employment in the IT sector in Canada declined 6% from 2001 to 2005. However, the number of skilled economic immigrants who intended to work as IT or engineering professionals increased from about 2,000 in 1990 to the peak of 25,000 in 2001 and then gradually reduced to about 19,000 by 2005 (Picot and Hou 2009). At a time when IT employment was contracting, the supply of IT workers via immigration was at historical highs. Based on data complied from immigrant landing records and tax files, Picot and Hou (2009) showed the decline in immigrant entry earnings was almost entirely concentrated among immigrant IT professionals and engineers. However, Picot and Hou (2009) could not examine changes in earnings gaps between recent immigrants and the Canadian born since their data contain no information on education and occupation for the Canadian born.

Here we complement the study by Picot and Hou (2009) by examining the impact of IT employment fluctuations on earnings gaps between recent immigrants and the Canadian born with census data. The census allows us to make conditional comparisons (conditional on education in particular), and contains information on the actual occupations, rather than intended occupation as used in Picot and Hou, for both immigrants and the Canadian born.

The results in Table 4 show that the IT downturn had a large impact on changes in male earnings gaps both in the 1990s and early 2000s. In the 1990s, the entry earnings gaps remained stable without controls and expanded by 1.5 percentage points with controls for

compositional shifts and changes in returns to skills. Excluding IT workers, however, the entry earnings gaps expanded 5.9 percentage points without controls, and 4.8 percentage points with controls. Among non-IT workers there was an increase in the entry earnings gap during the 1990s. Demand for IT workers was large during the late 1990s in particular, likely putting upward pressure on their wages.

In contrast, in the early 2000s, among all workers the entry earnings gaps expanded 5.1 percentage points without controls and 5.6 percentage points with controls. This expansion was concentrated among IT male workers whose earnings gap increased 14.9% without controls, and 9.9% with controls. Among non-IT workers there was relatively little increase in the gap. Similarly, recent female immigrant IT workers experienced a large expansion in their earnings gaps with the Canadian born.

Hence, the aggregate earnings gap did not increase during the 1990s largely because of a significant rise in earnings among recent immigrant workers in the IT-related occupations, likely related to the rising labour demand. The earnings gap increased significantly among non-IT workers. During the early 2000s the opposite occurred. The earnings gap increase significantly among recent immigrant IT workers, likely related to the decrease in wages driven by falling labour demand. And because they had become a significant share of all recent immigrants, this increased the aggregate earnings gap. Among the non-IT workers, the gap changed little.

4.5 Changing returns to foreign experience and immigrant education

In this section we examine changes in earnings returns to foreign experience and immigrant education over three different time periods based on Model 2. We present results only for

men since compositional shifts and changes in returns to skills based on Model 1 fully accounted for the changing earnings gaps for immigrant women.

Table 5 presents the regression coefficients for two-way and three-way interaction terms involving foreign experience and immigrant education in Model 2.

The earnings return to foreign experience was approximately zero in 1980 (.001 in table 5), and negative in all later years studied. As the three-way interaction term indicates (3rd row in the table), the return to foreign experience declined during both the 1980s and 1990s (-.003 and -.005 respectively). This is consistent with what was observed in previous studies. However, in the early 2000s, the return to foreign experience increased rather than declined. One extra year of foreign experience is associated with 0.2% less penalty in weekly earnings in 2005 than in 2000.

The three way interaction terms on educational levels are also shown in Table 5. The inclusion of these variables allows us to separate the change in returns to education for immigrants from the changes in returns to education for the Canadian born. Since the immigrants in our sample are over age 25 at entry, and are newly arrived immigrants, most of their education would have been received in their home country. Hence we are virtually measuring the change in returns to foreign education. The Canadian born, on the other hand, would have been largely educated in Canada, and hence changes in returns to education for this population refer primarily to Canadian education. The reference group is the high school educated, and hence the returns are those relative to the high school educated.

We will focus on the "undergrad degree" group. The first panel under "main effect of education" indicates that the relative returns to an undergraduate degree among adult Canadian born males at the beginning of the 1980-90 period (i.e. in 1980) was 27.8%; these

Canadian-born males earned 27.8% more than a high school educated Canadian-born male. The panel under "changing return to education among Canadian born" indicates that this relative return increased by 4.4 percentage points over the period. Among immigrants, the returns were 7.5 percentage points lower than among the Canadian born in 1980 (in the panel under "Different return to immigrant education"), and they changed little over the 1980s (4.4%-4.9% = -.005, see bottom panel under "Changing return to immigrant education").

The second column displays comparable results for the 1990s. Returns rose significantly among the Canadian born (8.4%), and marginally more among immigrants, by 9.9 % (8.4 plus 1.5). Thus, the *change* in returns to education among the Canadian born and immigrants were not that dissimilar over the 1980s and 1990s. The relative returns increased more among the Canadian born than immigrants during the 1980s, but during the 1990s the opposite occurred. These observations are consistent with earlier research. Hence, these small differences between immigrants and the Canadian born in the *changes* in returns to education likely had little to do with the changing immigrant entry earnings gap over this period.

The early 2000s were different. During the 2000 to 2005 period, relative earnings among the university educated Canadian born males *fell* by 4.3 percentage points, and among entering immigrants, it fell much more, by 11.0 percentage points (4.3 for T*Undergrad degree plus 6.7 for T*IM*Undergrad degree). Among immigrant males this decline is very likely related to the IT bust discussed earlier. Virtually all entering immigrants intending to work in IT occupations -very large number by the early 2000s- held a university degree. They were hard hit by the IT employment downturn, but the high school

educated were not. In fact, during this period employment in the natural resources sector, with a relatively large share of less educated workers, was expanding. Hence, it is not surprising that relative returns to university education among entering immigrants declined significantly. The reasons for the much smaller decline among the Canadian born may be similar, but much attenuated because the concentration of the university educated in the IT sector is not nearly as great.

The general pattern in the change in relative returns to education over the three periods is the same for graduate degrees as for undergraduate degrees (Table 5). Over the 1980 to 2000 period, relative returns to a graduate degree (relative to the high school educated) increased by 11.8% among the Canadian born and by 8.2% among male recent immigrants. But between 2000 and 2005, these returns declined by 7.6% among the Canadian born and a larger 14.5% among "recent" male immigrants, wiping out a lot of the gains made during the earlier period.

As explained in footnote 8 (also footnotes 5, 6, and 7), although we cannot decompose the individual contribution of changing returns to foreign experience and immigrant education to the "unexplained" component of the change in entry earnings (i.e., the change in the earnings gap associated with changes in the βs that are specific to immigrants), we can evaluate whether these changing returns affect the "explained" component (i.e. the effect of changes in the Xs on the earnings gap). We do so by entering three groups of variables to our Base Model sequentially, and re-estimate the entry earnings gap at each step. The three groups of variables are: (1) population characteristics as defined in Table 3, (2) changing returns to Canadian experience and education as defined in Table 3, and (3) changes in returns for foreign experience and immigrant education. We are

particularly interested in the effect of entering the last group of variables. We enter these sets of variables in two different orders, and find that it changes the results little (Table 6).

During the 1980 to 1990 period, most of the large increase in the gap was accounted for by the compositional changes outlined in Table 3, as noted earlier. When the three way interaction terms representing changing returns to foreign experience and immigrant education are added, now allowing *changing* returns to education among immigrants and the Canadian born to differ, the unaccounted for change in the gap over the 1980s rises marginally from 1.0% to 1.2 % (top panel, table 6). This suggests that the changes in returns to these two variables had little effect on the "explained" component of the decomposition (i.e., the effect of the changes in the Xs and βs that are common to immigrants and the Canadian born). The changing returns to immigrant characteristics might have affected the "explained" component by significantly altering the βs at which the changes in the Xs are evaluated (see footnote 8).

Similar results regarding the effect of changes in returns to foreign experience and immigrant education are observed during the 1990s and early 2000s. During both periods the addition of these variables resulted in little change in the share of the gap accounted for by the "explained" component. For reasons noted in footnotes 6, 7, and 8, we did not attempt to assess the direct effect of the changes in returns to foreign experience and immigrant education on the gap. Such an effect is part of the "unexplained" component of the decomposition, and this component is very small during the 1980s and 1990s (around 1.0 percentage points and 1.5 percentage points respectively). Thus, these two variables together likely had little effect on the earnings gap during these periods. During the early 2000s the "unexplained" portion of the gap increased to around 6 percentage points. This

may well have been associated with the fact that the returns to education fell more dramatically among immigrants than the Canadian-born.

5. Summary and Discussion

In this paper we extend the research on the factors associated with the rise in the Canadian born - immigrant entry earnings gap and examine whether their roles changed over the 1980s, the 1990s, and the early 2000s. This longer perspective leads us to conclusions that differ from the earlier work in some important aspects.

First, changes in population characteristics were the dominant factor affecting immigrant entry earnings gap during the 1980s. Of the three decades, this one witnessed the largest increase in the unadjusted earnings gap, at least for men, driven largely by a significant shift in immigrant source regions. Among male immigrants, the effect of such "compositional" shifts became trivial in the 1990s as rapidly rising education and continuing shift in immigrant source regions offset each other. In the early 2000s, the effect of compositional shifts on the gap was reversed; they tended to reduce the gap. For women, like males, the effect of compositional shifts was greatest during the 1980s, and then fell continuously through the 1990s and early 2000s.

A significant part of the effect of changing compositions is related to education. A slower growth in educational attainment among recent immigrants relative to the Canadian born was an important factor in explaining the rising earnings gaps for recent immigrants in the 1980s. This is consistent with Reitz's (2001) conclusion. However, this conclusion applies only to the 1980s; there was a reversal of this effect in later periods. The rapid

increase in recent immigrants' educational levels in the 1990s and early 2000s tended to reduce, rather than increase, the earnings gap for recent immigrants.

Second, the effect of changing returns to Canadian experience and education on immigrant entry earnings gap was generally small for immigrant men, particularly in the 1990s and early 2000s, but was stronger for immigrant women in all three periods. Rapidly rising returns to education, which were observed among both entering immigrants and the Canadian born over the 1990s, was actually in favor of immigrants. This is because the educational attainment of entering immigrants was rising much faster than that of the Canadian born, and as a result recent immigrants benefited more from the rising relative returns. For female immigrants, the effect of changing return to education on their entry earnings gap was generally small.

Rising returns to Canadian experience accounted for about one fifth of the expansion in the recent immigrant men' earnings gap in the 1980s, but the effect became trivial in the 1990s and tended to reduce immigrant men's earning gaps in the early 2000s. For recent immigrant women, the large rise in the return to Canadian experience was among the most important factors contributing to their widening earnings gap throughout the whole study period. This large increase in returns to Canadian experience of course benefited the Canadian born more than entering immigrants, since they have much more Canadian experience.

Third, we show that although it is difficult to directly estimate the effect of changing returns to foreign experience and immigrant education on the immigrant entry earnings gap, such effects were likely small during the 1980s and 1990s. Like several earlier studies, we find that there was a decline in returns to foreign experience in the 1980s and 1990s.

However, since changing composition and changes in returns to Canadian experience and education accounted for the vast majority of the increase in the gap for immigrant men, and all the changes for immigrant women over the 1980s and 1990s, it seems unlikely that changing returns to foreign experience played a large role. During the early 2000s, a period not covered in the earlier research, returns to foreign experience recovered marginally. However, returns to immigrant education fell significantly during this period. Therefore, changing returns to immigrant education rather than changing returns to foreign experience seems a more likely explanation of the rise in the "unexplained" gap during the 2000s. In any case, the effect of declining returns to immigrant education was likely offset to some extent by the moderate recovery of returns to foreign experience.

Fourth, in the early 2000s the IT bust, combined with a large concentration of male immigrants in this industry, was the major explanation for the rise in their earnings gap. The IT downturn was also likely the primary reason for the large decline in the relative return to higher education among recent immigrants in this period.

By focusing the research on three distinct time periods, and observing the changing effects of major explanatory factors, the research paints a less pessimistic picture about the labor market performance of Canada's recent immigrants in the recent past. The largest increase in the gap was observed during the 1980s, driven largely by compositional shifts, most of which abated during the 1990s, and certainly by the 2000s. The shifts in immigrant source regions and language ability have stabilized and may not negatively affect trends in immigrants' earnings gap in the near future, barring some possible significant change in immigration patterns (e.g., it may become less easy to attract highly-educated immigrants from fast growing Asian economies). Changes in returns to Canadian experience and

education played a moderate role in the 1980s, but it effect has become small, at least for the earnings gap of recent immigrant men. The reason for the expanding earnings gap in the early 2000s is unique. The downturn of a single industrial sector (IT) affected a substantial share of recent immigrants. A similar event may not be repeated, although it remains to be seen what effect the recent recession of 2008-09 had on immigrants' relative earnings. The relative earnings of immigrants do tend to fall in recessions.

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Table 1. Compositional changes among the Canadian born and recent immigrant male earners

	Canadian born				Recent immigrants			
	1980	1990	2000	2005	1980	1990	2000	2005
% with Bachelor's degree	8.7%	10.5%	12.7%	13.6%	13.6%	14.4%	24.3%	31.4%
% with graduate degree	4.9%	5.4%	6.1%	6.5%	13.6%	14.1%	25.4%	29.9%
Years of Canadian experience	20.7	19.7	21.0(21.3)	21.9	3.3	2.5	3.0(3.0)	3.1
Years of foreign experience	…	…	…	…	13.9	14.7	14.6(14.7)	13.8
% visible minorities	0.6%	1.2%	1.7%	2.5%	50.4%	66.8%	70.3%	73.8%
% English/French mother tongue	…	…	…	…	47.6%	25.0%	19.8%	18.6%
Source country/region								
USA	…	…	…	…	6.5%	2.8%	1.6%	1.7%
Haiti	…	…	…	…	1.9%	0.9%	0.6%	0.8%
Jamaica	…	…	…	…	3.0%	2.0%	1.2%	0.9%
Trinidad	…	…	…	…	1.3%	1.4%	0.8%	0.4%
Other Caribbean	…	…	…	…	1.4%	0.8%	0.9%	0.9%
Central America	…	…	…	…	0.7%	4.2%	1.7%	1.8%
South America	…	…	…	…	6.5%	5.5%	3.2%	4.7%
UK	…	…	…	…	17.4%	4.7%	2.8%	2.7%
France	…	…	…	…	1.5%	0.9%	1.9%	2.2%
Germany	…	…	…	…	1.3%	0.9%	0.7%	0.6%
Former Yugoslavia	…	…	…	…	1.7%	1.0%	4.7%	1.3%
Poland	…	…	…	…	2.3%	10.2%	3.9%	3.8%
Former USSR	…	…	…	…	1.3%	0.8%	5.8%	4.6%
Italy	…	…	…	…	1.8%	0.8%	0.4%	0.3%
Portugal	…	…	…	…	3.9%	3.6%	0.4%	0.3%
Other Europe	…	…	…	…	6.1%	4.3%	2.8%	3.0%
Israel	…	…	…	…	0.5%	0.5%	0.3%	0.4%
Lebanon	…	…	…	…	1.6%	2.3%	0.9%	1.0%
Iran	…	…	…	…	0.4%	2.6%	3.3%	2.2%
Egypt	…	…	…	…	1.1%	1.0%	1.1%	0.7%
Other West Asia/Middle East	…	…	…	…	1.2%	2.2%	3.2%	3.0%
China	…	…	…	…	2.3%	5.3%	12.9%	16.3%
Hong Kong	…	…	…	…	2.9%	8.8%	4.7%	0.6%
Taiwan	…	…	…	…	2.6%	0.6%	1.9%	0.6%
Other Eastern Asia	…	…	…	…	2.1%	1.3%	2.0%	2.5%
Philippines	…	…	…	…	5.2%	4.5%	6.7%	6.6%
Vietnam	…	…	…	…	3.8%	4.0%	1.0%	0.5%
Other Southeast Asia	…	…	…	…	2.1%	3.4%	0.8%	0.8%
India	…	…	…	…	5.7%	6.2%	10.3%	13.6%
Pakistan/Bangladesh	…	…	…	…	1.2%	1.3%	6.0%	6.9%
Other South Asia	…	…	…	…	0.4%	2.9%	3.1%	2.5%
Northern Africa	…	…	…	…	1.0%	1.2%	2.4%	4.4%
Western/Central Africa	…	…	…	…	0.8%	1.8%	2.5%	3.3%
Southern Africa	…	…	…	…	1.5%	1.0%	1.0%	0.7%
Eastern Africa	…	…	…	…	3.0%	3.5%	1.9%	2.5%
Oceania and other countries	…	…	…	…	2.1%	0.8%	0.7%	0.9%

Note: numbers in brackets are based on imputed years of schooling for 2001 census
Source: the 1981, 1991, 2001 and 2006 Canadian census 20% sample

Table 2. Average log weekly earnings of the Canadian-born and recent immigrant earners aged 25 to 59, 1980-2005

	1980	1990	2000	2005
Men				
Canadian born	6.80	6.73	6.71	6.74
Recent immigrants	6.69	6.44	6.43	6.41
Gap	-0.11	-0.29	-0.28	-0.33
Women				
Canadian born	6.18	6.22	6.29	6.36
Recent immigrants	6.06	6.06	6.04	6.05
Gap	-0.11	-0.16	-0.25	-0.30

Source: the 1981, 1991, 2001 and 2006 Canadian census 20% sample

Table 3. The contribution of skill-biased labour market changes and compositional shifts to the changes in the earnings gap between recent immigrants and Canadian-born workers aged 25 to 59

	Men			Women		
	1980-1990	1990-2000	2000-2005	1980-1990	1990-2000	2000-2005
Change in gaps	-0.182	0.008	-0.051	-0.044	-0.092	-0.054
"Unexplained" component	-0.010	-0.015	-0.056	0.065	0.010	0.016
"Explained" component	-0.171	0.023	0.005	-0.109	-0.102	-0.071
Due to changes in returns to skills	-0.031	0.023	-0.011	-0.037	-0.050	-0.032
Changes in return to Canadian experience	-0.037	-0.001	0.016	-0.041	-0.061	-0.031
Changes in return to education	0.006	0.024	-0.027	0.004	0.010	-0.001
Due to changes in characteristics	-0.141	0.000	0.016	-0.072	-0.051	-0.039
Immigrant-Canadian born difference in education	-0.024	0.042	0.017	-0.028	0.003	0.002
Immigrant-Canadian born difference in Canadian experience	-0.033	-0.002	0.000	-0.033	0.008	-0.005
Working full time	-0.011	-0.015	0.004	-0.007	-0.040	-0.023
Location + Marital status + racial minority status	-0.002	0.013	-0.007	0.015	0.004	-0.008
Foreign experience	-0.001	0.001	0.005	0.001	0.004	0.005
Immigrant language + Place of birth	-0.070	-0.040	-0.004	-0.020	-0.030	-0.011

Source: authors' model estimates based on the 1981, 1991, 2001 and 2006 Canadian census 20% sample

Table 4. The impact of IT boom and downturn on earnings gaps for recent immigrants

	Change in gaps with the Canadian born			
	1990-2000		2000-2005	
	Observed	With Controls	Observed	With Controls
Men				
All recent immigrants	0.008	-0.015	-0.051	-0.056
Non IT workers	-0.059	-0.048	-0.017	-0.025
IT workers	0.096	0.058	-0.149	-0.099
Women				
All recent immigrants	-0.092	0.010	-0.054	0.016
Non IT workers	-0.127	-0.004	-0.030	0.039
IT workers	0.022	0.134	-0.176	-0.073

Source: authors' model estimates based on the 1991, 2001 and 2006 census 20% sample files

Table 5. Regression coefficients showing changing return to foreign experience and immigrant education in models for log weekly earnings, male earners

	1980-1990	1990-2000	2000-2005
T*IM	-0.012	-0.016	-0.064 ***
IM*Fexp (Foreign experience)	0.001	-0.003 ***	-0.007 ***
T*IM*Fexp	-0.003 **	-0.005 ***	0.002 *
Main effect of education			
No diploma/certificate	-0.154 ***	-0.173 ***	-0.173 ***
Non university diploma/certificate	0.095 ***	0.121 ***	0.166 ***
University degree	0.278 ***	0.317 ***	0.413 ***
Graduate degree	0.406 ***	0.436 ***	0.530 ***
Different return to immigrant education			
IM*No diploma/certificate	0.016	0.091 ***	0.064 ***
IM*Non university diploma/certificate	-0.001	-0.050 **	-0.077 ***
IM*University degree	-0.075 ***	-0.117 ***	-0.100 ***
IM*Graduate degree	-0.072 ***	-0.060 ***	-0.091 ***
Changing return to education for the Canadian born			
T*No diploma/certificate	-0.022 ***	0.002	-0.003
T*Non university diploma/certificate	0.029 ***	0.031 ***	-0.015 ***
T*University degree	0.044 ***	0.084 ***	-0.043 ***
T*Graduate degree	0.037 ***	0.081 ***	-0.076 ***
Changing return to immigrant education			
T*IM*No diploma/certificate	0.089 ***	-0.025	0.100 **
T*IM*Non university diploma/certificate	-0.053 *	-0.017	0.019
T*IM*University degree	-0.049 *	0.015	-0.067 ***
T*IM*Graduate degree	0.004	-0.040	-0.069 ***

Note 1: the model also include all variables in Model 1.
* significant at p <.05; ** p<.01; *** p<.001.
Source: 1981,1991, 2001, and 2006 Canadian censuses

Table 6. Accounting for changes in immigrant men's entry earnings gap by adding explanatory factors in sequential orders

	1980-1990	1990-2000	2000-2005
Total change in gaps	-0.182	0.008	-0.051
(1) Controlling for compositional shift	-0.039	0.000	-0.065
(2) Adding changing return to Canadian experience and education	-0.010	-0.015	-0.056
(3) Adding changing return to foreign experience and immigrant education	-0.012	-0.016	-0.064
Based on different sequence of entering variables			
Total change in gaps	-0.182	0.008	-0.051
(1) Controlling for compositional shift	-0.039	0.000	-0.065
(2) Adding changing return to foreign experience and immigrant education	-0.041	0.010	-0.075
(3) Adding changing return to Canadian experience and education	-0.012	-0.016	-0.064

Source: authors' model estimates based on the 1981, 1991, 2001 and 2006 Canadian census 20% sample

Appendix Table 1: Decomposition of changes in earnings gaps between recent immigrants and Canadian-born

		Predicted mean log weekly earnings						
		Year 1		*Year 2*		Year 1 gap	Year 2 gap	Change in gap
		$Y_{CB.t1}$	$Y_{IM.t1}$	$Y_{CB.t2}$	$Y_{IM.t2}$	Δ_{t1}	Δ_{t2}	
Coefficient	Variables	Canadian-born	Recent immigrants	Canadian-born	Recent immigrants	$Y_{CB.t1}$-$Y_{IM.t1}$	$Y_{CB.t2}$-$Y_{IM.t2}$	Δ_{t1}-Δ_{t2}
Base model								
$\alpha^{\dagger}$	Constant	$\alpha^{\dagger}$	$\alpha^{\dagger}$	$\alpha^{\dagger}$	$\alpha^{\dagger}$	0	0	0
$\beta_1^{\dagger}$	T	0	0	$\beta_1^{\dagger}$	$\beta_1^{\dagger}$	0	0	0
$\beta_2^{\dagger}$	Im	0	$\beta_2^{\dagger}$	0	$\beta_2^{\dagger}$	$\beta_2^{\dagger}$	$\beta_2^{\dagger}$	0
$\beta_3^{\dagger}$	Im*T	0	0	0	$\beta_3^{\dagger}$	0	$\beta_3^{\dagger}$	$\beta_3^{\dagger}$
Model 1								
α	Constant	α	α	α	α	0	0	0
β_1	T	0	0	β_1	β_1	0	0	0
β_2	IM	0	β_2	0	β_2	β_2	β_2	0
β_3	Im*T	0	0	0	β_3	0	β_3	β_3
β_4	Edu	β_4*$Edu_{CB.t1}$	β_4*$Edu_{IM.t1}$	β_4*$Edu_{CB.t2}$	β_4*$Edu_{IM.t2}$	β_4*ΔEdu_{t1}	β_4*ΔEdu_{t2}	β_4*(ΔEdu_{t2}-ΔEdu_{t1})
β_5	Edu*Im	0	β_5*$Edu_{IM.t1}$	0	β_5*$Edu_{IM.t2}$	β_5*$Edu_{IM.t1}$	β_5*$Edu_{IM.t2}$	β_5*($Edu_{IM.t2}$-$Edu_{IM.t1}$)
β_6	Edu*T	0	0	β_6*$Edu_{CB.t2}$	β_6*$Edu_{IM.t2}$	0	β_6*ΔEdu_{t2}	β_6*ΔEdu_{t2}
β_7	Exp	β_7*$Exp_{CB.t1}$	β_7*$Exp_{IM.t1}$	β_7*$Exp_{CB.t2}$	β_7*$Exp_{IM.t2}$	β_7*ΔExp_{t1}	β_7*ΔExp_{t2}	β_7*(ΔExp_{t2}-ΔExp_{t1})
β_8	Exp*Im	0	β_8*$Exp_{IM.t1}$	0	β_8*$Exp_{IM.t2}$	β_8*$Exp_{IM.t1}$	β_8*$Exp_{IM.t2}$	β_8*($Exp_{IM.t2}$-$Exp_{IM.t1}$)
β_9	Exp*T	0	0	β_9*$Exp_{CB.t2}$	β_9*$Exp_{IM.t2}$	0	β_9*ΔExp_{t2}	β_9*ΔExp_{t2}
β_{10}	Married	β_{10}*$Mar_{CB.t1}$	β_{10}*$Mar_{IM.t1}$	β_{10}*$Mar_{CB.t2}$	β_{10}*$Mar_{IM.t2}$	β_{10}*ΔMar_{t1}	β_{10}*ΔMar_{t2}	β_{10}*(ΔMar_{t2}-ΔMar_{t1})
β_{11}	Visim	β_{11}*$Vis_{CB.t1}$	β_{11}*$Vis_{IM.t1}$	β_{11}*$Vis_{CB.t2}$	β_{11}*$Vis_{IM.t2}$	β_{11}*ΔVis_{t1}	β_{11}*ΔVis_{t2}	β_{11}*(ΔVis_{t2}-ΔVis_{t1})
β_{12}	Location	β_{12}*$Loc_{CB.t1}$	β_{12}*$Loc_{IM.t1}$	β_{12}*$Loc_{CB.t2}$	β_{12}*$Loc_{IM.t2}$	β_{12}*ΔLoc_{t1}	β_{12}*ΔLoc_{t2}	β_{12}*(ΔLoc_{t2}-ΔLoc_{t1})
β_{13}	Fulltime	β_{13}*$Ful_{CB.t1}$	β_{13}*$Ful_{IM.t1}$	β_{13}*$Ful_{CB.t2}$	β_{13}*$Ful_{IM.t2}$	β_{13}*ΔFul_{t1}	β_{13}*ΔFul_{t2}	β_{13}*(ΔFul_{t2}-ΔFul_{t1})
β_{14}	Fexp*Im	0	β_{14}*$Fexp_{IM.t1}$	0	β_{14}*$Fexp_{IM.t2}$	β_{14}*$Fexp_{IM.t1}$	β_{14}*$Fexp_{IM.t2}$	β_{14}*($Fexp_{IM.t2}$-$Fexp_{IM.t1}$)
β_{15}	Lang*Im	0	β_{15}*$Lang_{IM.t1}$	0	β_{15}*$Lang_{IM.t2}$	β_{15}*$Lang_{IM.t1}$	β_{15}*$Lang_{IM.t2}$	β_{15}*($Lang_{IM.t2}$-$Lang_{IM.t1}$)
β_{16}	POB*Im	0	β_{16}*$POB_{IM.t1}$	0	β_{16}*$POB_{IM.t2}$	β_{16}*$POB_{IM.t1}$	β_{16}*$POB_{IM.t2}$	β_{16}*($POB_{IM.t2}$-$POB_{IM.t2}$)
Model 2								
same variables as in specification 2, but change βs to β's								
β'_{17}	IM*T*Fexp	0	0	0	β'_{17}*$Fexp_{IM.t2}$	0	β'_{17}*$Fexp_{IM.t2}$	β'_{17}*$Fexp_{IM.t2}$

How to decompose changes in group difference with pooled cross sectional data?

1. From Base model, the predicted changes in earnings gaps Δ_{t1}-Δ_{t2} = ($Y_{CB.t2}$-$Y_{IM.t2}$) - ($Y_{CB.t1}$-$Y_{IM.t1}$) = $\beta_3^{\dagger}$

2. From Model 1, the predicted changes in earnings gaps Δ_{t1}-Δ_{t2} = ($Y_{CB.t2}$-$Y_{IM.t2}$) - ($Y_{CB.t1}$-$Y_{IM.t1}$) = β_3 + β_4*(ΔEdu_{t2}-ΔEdu_{t1}) + β_5*($Edu_{IM.t2}$ -$Edu_{IM.t1}$) + β_6*ΔEdu_{t2} + β_7*(ΔExp_{t2}-ΔExp_{t1}) + β_8*($Exp_{IM.t2}$-$Exp_{IM.t1}$) + β_9*ΔExp_{t2} + β_{10}*(ΔMar_{t2}-ΔMar_{t1}) + β_{11}*(ΔVis_{t2}-ΔVis_{t1}) + β_{12}*(ΔLoc_{t2}-ΔLoc_{t1}) + β_{13}*(ΔFul_{t2}-ΔFul_{t1})+ β_{14}*($Fexp_{IM.t2}$-$Fexp_{IM.t1}$) + β_{15}*($Lang_{IM.t2}$-$Lang_{IM.t1}$) + β_{16}*($POB_{IM.t2}$-$POB_{IM.t2}$)

3. Since Δt_1-Δt_2 remains the same from specification 1 and 2, $\beta_3^{\dagger}$ = β_3 + β_4*(ΔEdu_{t2}-ΔEdu_{t1}) + β_5*($Edu_{IM.t2}$ -$Edu_{IM.t1}$) + β_6*ΔEdu_{t2} + β_7*(ΔExp_{t2}-ΔExp_{t1}) + β_8*($Exp_{IM.t2}$-$Exp_{IM.t1}$) + β_9*ΔExp_{t2} + β_{10}*(ΔMar_{t2}-ΔMar_{t1}) + β_{11}*(ΔVis_{t2}-ΔVis_{t1}) + β_{12}*(ΔLoc_{t2}-ΔLoc_{t1}) + β_{13}*(ΔFul_{t2}-ΔFul_{t1}) + β_{14}*($Fexp_{IM.t2}$-$Fexp_{IM.t1}$) + β_{15}*($Lang_{IM.t2}$-$Lang_{IM.t1}$) + β_{16}*($POB_{IM.t2}$-$POB_{IM.t1}$)

4. Put differently, $\beta_3^{\dagger}$ - β_3 = β_4*(ΔEdu_{t2}-ΔEdu_{t1}) + β_5*($Edu_{IM.t2}$ -$Edu_{IM.t1}$) + β_6*ΔEdu_{t2} + β_7*(ΔExp_{t2}-ΔExp_{t1}) + β_8*($Exp_{IM.t2}$-$Exp_{IM.t1}$) + β_9*ΔExp_{t2} + β_{10}*(ΔMar_{t2}-ΔMar_{t1}) + β_{11}*(ΔVis_{t2}-ΔVis_{t1}) + β_{12}*(ΔLoc_{t2}-ΔLoc_{t1}) + β_{13}*(ΔFul_{t2}-ΔFul_{t1})+ β_{14}*($Fexp_{IM.t2}$-$Fexp_{IM.t1}$) + β_{14}*($Lang_{IM.t2}$-$Lang_{IM.t1}$) + β_{16}*($POB_{IM.t2}$-$POB_{IM.t2}$)