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# Human Capital Quality and the Immigrant Wage Gap*

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***Abstract***

*We propose a new methodology for analyzing determinants of the wage gap between immigrants and natives. A Mincerian regression framework is extended to include GDP per capita in an immigrant's country of birth as a proxy for the quality of education and work experience acquired in that country. In this regard, a central finding is that Canadian immigrants' returns to schooling and work experience significantly increase with the GDP per capita of their country of birth. The contribution of quality of schooling and work experience to the immigrant wage gap is also examined. It is shown that lower human capital quality completely negates the endowment advantage that immigrants have in the areas of schooling and work experience, so that this factor is key to understanding why they earn less than Canadian natives. Since data on GDP per capita are available for most countries in the world over long periods of time, the proposed methodology can be applied to analyze immigrant wage gaps for a large set of countries for which common statistics on natives and immigrants are available.*
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**Key words:** *Wage differentials, immigrants vs. Canadian natives, human capital quality, immigration policies, work experience, education.*
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**JEL Classification**: J20, J24, J15, J61.

***Résumé***

Qualité du capital humain et écart salarial entre immigrants et natifs. *Nous proposons une nouvelle méthodologie pour analyser les déterminants de l'écart salarial entre les immigrants et les natifs. On ajoute à une régression salariale mincérienne le PIB par habitant du pays de naissance d'un immigrant en tant qu'approximation de la qualité de l'éducation et de l'expérience de travail reçues dans ce pays. À cet égard, un résultat important est que les rendements à l'éducation et à l'expérience des immigrants canadiens augmentent de façon significative avec le PIB par habitant dans leurs pays de naissance. On examine aussi la contribution de la qualité de l'éducation et de l'expérience de travail à l'écart salarial entre immigrants et natifs au Canada. On montre que la faible qualité du capital humain élimine complètement l'avantage des immigrants dans les niveaux d'éducation et d'expérience, ce qui fait que ce facteur est fondamental dans notre compréhension de l'écart salarial. Comme des données sur le PIB par habitant sont disponibles pour la plupart des pays durant de longues périodes, la méthodologie proposée peut être appliquée dans plusieurs pays pour lesquels il existe des statistiques salariales sur les natifs et les immigrants.*

**Mots clés:** *Écart salarial, immigrants et natifs canadiens, qualité du capital humain, immigration.*

**Classification JEL**: J20, J24, J15, J61.

## 1. Introduction

The wage gap between immigrants and natives is a key measure of how well immigrants integrate into an economy, and by extension, of the effectiveness of a country's immigration and labour market policies. The gap can be decomposed into an explained component and an unexplained component. The explained component is the part of the gap that can be attributed to differences in observed skills (mainly education and work experience) between immigrants and natives. In the U.S., for example, immigrants have on average fewer years of schooling than natives, which explains to a large extent their lower wages (Card, 2005; Smith 2006).

The unexplained component of the wage gap reflects the extent to which the observed skills of immigrants are not valued as much as those of natives in the host country's labour market. Canada is a good example of how significant the unexplained component can be. Unlike their U.S. counterparts, immigrants in Canada have better observed skills than natives (mainly because of Canada's immigration policy which is based on a point system), but still earn substantially less than them.

To paraphrase Abramovitz (1956) on the Solow residual, the unexplained component can be viewed as a measure of our ignorance. It can be attributed to a variety of factors that cannot be easily measured such as discrimination (Oreopoulos, 2009), institutional rigidities, market failures, or the inability of employers to recognize foreign credentials (Reitz, 2005). The purpose of this paper is to improve our understanding of the determinants of immigrant wages. By doing so, we explain a larger part of the wage gap and thus reduce our ignorance in that regard.

Our approach is based on the hypothesis that the education and work experience acquired by immigrants in their country of birth may be of different *quality* than those acquired by the natives of the host country. Bloom, Grenier and Gunderson (1995), Schaafsma and Sweetman (2001), and Bonikowska, Green and Riddell (2008) all use the difference in quality argument in their analyses of immigrant wages in Canada, and Bratsberg and Terrel (2002) does the same for the U.S.. However, our analysis of the immigrant wage gap is novel in that it provides a general methodology that can directly account for the quality of education and work experience in immigrant wage regressions.

Differences in human capital quality across immigrants from different countries have been typically measured using the results of cognitive tests (see, for example, Bonikowska, Green and Riddell, 2008; Coulombe and Tremblay, 2009). There are two major problems with this approach. One is data availability. Test scores from the International Adult Literacy and Skills Survey (IALS) are available for only 27 countries and for very few years (in Canada, the last one was conducted in 2003 and the previous one in 1994). The other problem is more fundamental. While it may be suitable to use the results of cognitive tests as measures of schooling quality, it is inappropriate to use them as measures of work experience quality because they are not designed to assess the value of work experience. Indeed, while, for example, a lawyer with 25 years of experience is certainly much more productive for a firm than a recruit who just recently graduated, one can easily envision the former being outperformed by the latter in a cognitive test such as *IALS.*

The objective of this paper is to propose a methodology that can be applied to analyze immigrant wage gaps for a large set of countries for which common statistics on natives and immigrants are available. This methodology is applied to the case of Canada. Building on the work of Coulombe, Grenier and Nadeau (2011), in a first step, we show how GDP per capita can be used as a cross-country proxy for the quality of schooling and work experience in Mincerian immigrant wage regressions. Essentially, the ratio between the GDP per capita of an immigrant's country of birth and that of Canada, measured at the time of graduation or at the time of immigration, is used as an indicator of schooling quality and of work experience quality and is interacted with the years of schooling and work experience variables. The approach is appealing for a number of reasons. First, we should expect GDP per capita to be a good indicator of human capital quality because richer countries generally allocate more resources to education. Furthermore, on-the-job learning opportunities greatly benefit from the high levels of technology and capital/labour ratios in developed countries. Second, data on GDP are available for most

countries in the world and for long periods of time.[1] Finally, unlike in cross-country growth studies, GDP per capita is a strictly exogenous variable in an empirical analysis of immigrant earnings.

In a second step, we estimate our wage regression equations using 2006 Canadian census data on male and female immigrants and natives. Results reveal that the returns to schooling and work experience significantly increase with the GDP per capita of an immigrant's country of birth, even when incorporating a country of birth fixed effect. In particular, we find that schooling and work experience acquired in a country whose GDP per capita is similar to that of Canada have annual rates of return that are respectively 1.6 and 0.7 percentage point higher than schooling and work experience acquired in a country whose GDP per capita is one-tenth that of Canada (schooling and work experience acquired in India for example).

In a third step, we use a variant of the Blinder-Oaxaca method to decompose the immigrant wage gap into an *explained* component, an *unexplained* component and an *immigrant specific* component that includes *human capital quality* effects. We find that lower human capital quality completely negates the endowment advantage that immigrants have in the areas of schooling and work experience and is by far the major reason why they earn less than Canadian natives. We also find that after controlling for human capital quality, the unexplained component of the wage gap (which is sometimes associated with labour market discrimination) is reduced by almost 65 percent for male immigrants and virtually eliminated for female immigrants.

The empirical methodology used in this paper is similar to the one used in our earlier work (Coulombe, Grenier, and Nadeau, 2011). The two papers, however, differ in a substantial way. The purpose of our (2011) paper is to assess the role of differences in human capital quality in explaining differences in living standards across countries. Consequently, the main contribution of that paper is in the economic development area. Furthermore, we have extended the sample size of the immigrant population in this paper from 57,000 to 136,000 by including the immigrants who acquired part of their schooling in

[1] For example, data on GDP adjusted for purchasing power parity (PPP) are available for as many as 188 countries and 55 years in Heston, Summers, and Aten (2009).

their home country and part in Canada. We also include female immigrants in this paper. Overall, we find that the main conclusions regarding the role of GDP per capita as a proxy for human capital quality are extremely robust across the various samples.

The results of the analysis in this paper have important policy implications. Among other things, they suggest that if a country wants to adopt an immigrant selection policy based on a point system such as that of Canada, then for the same number of years of schooling and of work experience, the number of points should vary depending on the assessed quality of those years of schooling and work experience. In particular, more points should be allocated if schooling (especially the highest diploma) and work experience have been acquired in Canada–or in a highly developed country–than if they have been acquired in a less developed country. Another (and possibly more efficient) immigrant selection approach, would be to rely less on the number of years of schooling and of work experience in selecting immigrants, and more on cognitive and professional accreditation tests.

This paper is organized as follows. Section 2 discusses the issue of controlling for human capital quality in studies of the labour market integration of immigrants and justifies the use of GDP per capita as an indicator of human capital quality. Section 3 presents the statistical framework. Section 4 discusses the data used along with summary statistics. Section 5 presents the empirical results and Section 6 concludes.

## 2. Controlling for Immigrant Human Capital Quality

When immigrants move to another country, one thing they bring with them is their human capital. Most people would agree in a casual conversation that one year of schooling or of work experience in a very poor country is generally not worth as much as one year of schooling or of work experience in a very rich country. Yet, much of the research on the labour market integration of immigrants ignore this issue; it assumes that one year of schooling or of work experience is worth the same irrespective of where it has

been acquired.[2] Beyond casual conversation though, the modern growth literature actually provides ample evidence that an immigrant's schooling and work experience quality may be as important as his or her schooling and work experience quantity in explaining labour market performance in the host country. For example, Coulombe, Tremblay, and Marchand (2004) and Hanushek and Woessman (2008) conclude that cognitive skills (which are related to both the quantity and the quality of schooling) are a much better predictor of economic growth than mere school attainment.

Another aspect of immigrant human capital quality is self-selection. Common wisdom is that since immigrants are a self-selected group, they may be "more able and more highly motivated" Chiswick (1978, p. 900) than natives. However, self-selection may work the other way around too; for example, Borjas (1987) argues that under certain conditions (e.g., higher income inequality in the source country than in the U.S.), immigrants "need not be drawn from the most able and most ambitious in the country of origin" (Borjas, 1987, p. 551). One way or the other though, self-selection is an issue that must be kept in mind when comparing the returns to skills of immigrants with those of natives.

Beside expediency, one possible reason why so few studies in the labour market integration of immigrants' literature ignore differentials in human capital quality is the lack of widely available human capital quality indices that apply to both education and work experience. As already pointed out, the approach of using cognitive tests suffers from two major drawbacks. First, highly developed and comparable cognitive tests, such as those in *IALS,* are expensive to do and are available in only a few surveys and for a very limited number of countries. For example, the *IALS* is done in only 27 countries, and for many countries, too few immigrants are included in the sample. An option is to extrapolate the

[2] There are some exceptions to this though. For example, Bratsberg and Terrell (2002) examine the impact of birth country school quality on the returns to education of U.S. immigrants and find that differences in the attributes of educational systems account for most of the variation in rates of return to education earned by immigrants. There are also a number of studies of the labour market integration of Canadian immigrants that recognize that schooling and work experience acquired outside Canada may be of lower quality than that acquired in Canada and may yield lower returns (see, for example, Schaafsma and Sweetman, 2001 and Bonikowska, Green and Riddell, 2008). However, the ways to empirically measure the impact of differences in human capital quality on the immigrant wage gap have typically been over-simplistic. Indeed, a common approach has been to assume that the returns to human capital (be it to schooling or to work experience) acquired outside Canada differ from that acquired in Canada, but is the same irrespective of the country where it has been acquired (see, for example, Frenette and Morissette, 2003, Aydemir and Skuterud, 2005 and Nadeau and Seckin, 2010).

available test scores to other countries (as in Hanushek and Kimko, 2000), but, as discussed in Sweetman (2004), this can result in measurement errors.

Second, the use of cognitive test scores in assessing the quality of human capital is really only appropriate for the education component.[3] Surveys such as the *IALS* are designed to evaluate the quality of the education provided by the formal education system or informally by the family network; they are not designed to evaluate the other major component of human capital which is work experience. This point is of particular importance since, as emphasized in our earlier work (Coulombe, Grenier, and Nadeau 2011), there are good reasons to believe that the quality of work experience is highly correlated with the development level of a country. Furthermore, in Canadian studies, it is recognized that the work experience acquired in an immigrant's country of birth has a different return than that acquired in the Canadian labour market (Schaafsma and Sweetman, 2001).

Borrowing from Coulombe, Grenier and Nadeau (2011), we propose to use GDP per capita as an indicator of human capital quality.[4] A great practical advantage of using GDP per capita instead of other possible quality indicators (such as results of cognitive tests) is that data on GDP per capita across countries and available for most countries in the world over long periods of time. However, there are also several other (more) conceptual reasons for using GDP per capita as an indicator of human capital quality.

Regarding the education component, more and better resources are generally allocated to the education system in countries with higher GDP per capita. For example, although the combined population of Africa and South America is about 35 times that of Canada, only seven universities in Africa and South America are among the top 400 universities in the world, compared with 18 in Canada (according to Times Higher Education, 2012), Similarly, from the work of Arrow (1962) and Romer (1986) on *learning-by-doing*, we should expect work experience to be of higher quality if it has been acquired in a rich country than if it has been acquired in a poor country, as the former typically has a

[3] For example, Cawley, Heckman and Vytlacil (2001) find that measured cognitive ability is almost perfectly correlated with years of schooling.

[4] Another paper that uses GDP per capita as a measure of human capital quality is Akbari (1996). Unlike his paper. however, our paper distinguishes between quality of schooling and quality of work experience.

higher capital/labour ratio and technology level than the latter. Furthermore, as argued by Bloom and Van Reenen (2007, 2010), differences in customs, in labour organization and in managerial styles across countries may promote (or discourage) innovative thinking. Empirical evidence from the growth literature indicates that GDP per capita is strongly (positively) correlated with the results of cognitive tests (see, for example, Coulombe et al. 2004, Coulombe and Tremblay, 2009, Hanushek and Kimko, 2000 and Hanushek and Woessmann, 2008).

Finally, it should be noted that GDP per capita in an immigrant's country of birth is a strictly exogenous variable in an empirical analysis of immigrant wages. Of course GDP per capita is determined by a number of factors beside human capital, such as the quality of institutions, level of technology and capital/labour ratio. However, what immigrants bring with them when moving to another country is their human capital—the other factors that determine GDP are left behind.

## 3. The Statistical Framework

The statistical framework used in this paper is based on the well-known Blinder-Oaxaca decomposition method (see Blinder 1973, Oaxaca 1973). As in Nadeau and Seckin (2010), we allow for the possibility of the wage determination process to be different between immigrant and natives. Let the subscripts $N$ and $I$ respectively denote Native and Immigrant; $S$ denote the number of years of schooling; $X$ denote the number of years of work experience; $y$ denote a vector of other control variables, including a constant term, common to Canadian born individuals and immigrants (*e.g.*, language skill, region of residence, marital status); $z$ denote a vector of country of birth fixed effects; and the overscript ~ denote variables measured in efficiency units (to be explained later). Then the mean log wages of Canadian born workers and immigrant workers can be respectively expressed as

$$w_N = \alpha_N \tilde{S}_N + \beta_{N1} \tilde{X}_N + \beta_{N2} \tilde{X}_N^2 + y_N \phi_N \tag{1}$$

and

$$w_I = \alpha_I \tilde{S}_I + \beta_{I1} \tilde{X}_I + \beta_{I2} \tilde{X}_I^2 + y_I \phi_I + z\gamma \tag{2}$$

where all the right-hand side variables are sample means, and the $\alpha$, $\beta$, $\phi$ and $\gamma$ are OLS estimated coefficient vectors.

To allow for the quality of education to vary across countries, let $s_h$ and $s_f$ respectively denote the number of years of schooling spent in the host country and in the birth country ($S = s_h + s_f$); $f_{dip}$ denote a dichotomous variable that takes on the value of one if an individual's highest diploma was not obtained in the host country and zero otherwise; $q_s$ denote an education quality index constructed in such a way that $q_s = 0$ if the quality of education acquired in an immigrant's birth country is comparable to that acquired in the host country, $q_s < 0$ if it is lower than that acquired in the host country and $q_s > 0$ if it is greater than that acquired in the host country. Further, assume that immigrants acquire their years of schooling and their highest diploma either in their birth country or in their host country and that the quality of schooling varies not only with the country where it was acquired but also with the country where the last diploma was obtained. Thus we specify years of schooling measured in efficiency units as

$$\tilde{S} = s_h + s_f(\delta_1 + \delta_2 q_s + \delta_3 f_{dip} + \delta_4 f_{dip} q_s) \tag{3}$$

where $\delta$ is a vector of coefficients.

We model work experience in efficiency units in a similar way. Let $x_h$ and $x_f$ respectively denote the number of years of experience spent in the host country and in the birth country ($X = x_h + x_f$); $q_x$ denote a work experience quality index constructed in such a way that $q_x = 0$ if the quality of experience acquired in an immigrant's birth country is comparable to that acquired in the host country, $q_x < 0$ if it is lower than that acquired in the host country and $q_x > 0$ if it is greater than that acquired in the host country. Thus we model years of work experience measured in efficiency units as

$$\tilde{X} = x_h + x_f(\delta_5 + \delta_6 q_x). \tag{4}$$

We would expect all the $\delta$ coefficients to be positive except $\delta_3$ which we would expect to be negative, so that the same number of years of schooling and of work experience would be worth less (in terms of

efficiency units) if acquired in a country that has lower human capital quality than Canada and that a diploma obtained outside Canada would add less to human capital than a diploma obtained in Canada.

Finally, following the discussion in the previous section and that in Coulombe, Grenier and Nadeau (2011), we specify the human-capital quality index at a given point in time as:

$$q_t = \ln\left(\frac{GDPc_{ft}}{GDPc_{ht}}\right) \tag{5}$$

where $GDPc_{ft}$ and $GDPc_{ht}$ respectively denote GDP per capita in an immigrant's birth country and GDP per capita in the host country at time *t*. The difference between $q_s$ in equation (3) and $q_x$ in (4) is that $q_s$ is $q_t$ measured at the time of graduation, while $q_x$ is $q_t$ measured at the time of immigration to the host country.

Thus, given equations (3) and (4), if we assume that all natives completed their studies and acquired their work experience in the host country and if we allow the country of birth's GDP to have a direct effect (that is, an effect that is independent of the level of schooling and the level of experience, and that is evaluated at the time of entry of the immigrant), then $\tilde{S}_N = S_N$ and $\tilde{X}_N = X_N$, and with some algebra, equations (1) and (2) can be rewritten in reduced form as

$$w_N = \alpha_{N1} S_N + \beta_{N1} X_N + \beta_{N2} X_N^2 + y_N \phi_N \tag{6}$$

and

$$\begin{aligned} w_I = {} & \alpha_{I1} S_I + \theta_1 q_x + \theta_2 s_{If} + \theta_3 s_{If} q_s + \theta_4 s_{If} f_{dip} + \theta_5 s_{If} f_{dip} q_s \\ & + \beta_{I1} X_I + \beta_{I2} X_I^2 + \theta_6 x_{If} + \theta_7 X_I x_{If} + \theta_8 x_{If}^2 + \theta_9 x_{If} q_x + \theta_{10} X_{If} x_{If} q_x + \theta_{11} x_{If}^2 q_x + \theta_{12} x_{If}^2 q_x^2 \\ & + y_I \phi_I + z\gamma \end{aligned} \tag{7}$$

where the $\theta$'s are OLS estimated coefficients and all the right-hand side variables are sample means. Note that $\theta_I$ may pick up a self-selection effect (*à la* Borjas, 1987).

The framework above allows to perform a number of tests on the impact of quality of education and of work experience on immigrant wages and, by extension, on the immigrant wage gap. In particular,

building on Blinder (1973) and Oaxaca (1973), given (6) and (7) the immigrant wage gap can be decomposed as the sum of six components:

$$
\begin{aligned}
(w_I - w_N) = & \left\{\alpha_{N1}(S_I - S_N) + \beta_{N1}(X_I - X_N) + \beta_{N2}(X_I^2 - X_N^2) + (y_I - y_N)\phi_N\right\} \\
& + \left\{S_I(\alpha_{I1} - \alpha_{N1}) + X_I(\beta_{I1} - \beta_{N1}) + X_I^2(\beta_{I2} - \beta_{N2}) + y_I(\phi_I - \phi_N)\right\} \\
& + \theta_1 q_x + s_{If}\left\{\theta_2 + \theta_3 q_s + \theta_4 f_{dip} + \theta_5 f_{dip} q_s\right\} \\
& + \left\{x_{If}(\theta_6 + \theta_9 q_x) + X_I x_{If}(\theta_7 + \theta_{10} q_x) + x_{If}^2(\theta_8 + \theta_{11} q_x + \theta_{12} q_x^2)\right\} + z\gamma \qquad (8)
\end{aligned}
$$

The first term in the decomposition (8) is the *explained* component of the wage gap. This component measures the portion of the wage gap due to differences between the observed attributes of immigrants and those of Canadian born workers, evaluated with the coefficients of the latter. The second term is the *unexplained* component of the wage gap. The other four terms are the *immigrant specific* components of the wage gap. The third term is the country of birth's GDP direct effect. The fourth and fifth terms respectively reflect the impact of immigrant quality of education and quality of work experience. The last term reflects the impact of immigrant country of birth fixed effects.

## 4. Data and Descriptive Statistics

We use data from the Statistics Canada *2006 Census Microdata Masterfile* for our analysis. Canada has a relatively large immigrant population, with 20% of the people being born abroad, and with more than 250,000 new immigrants arriving every year. Through a *Point System* which emphasizes factors such as education, age, work experience and language ability, Canada's immigration policy clearly gives the priority to skilled immigrants. As a result, the recent cohorts of immigrants have especially high levels of schooling—in fact, higher than the native-born.

The census data provide a very large sample of immigrants, with specific information on their countries of birth. The sample is restricted to men and women aged 18 to 64, who worked full-time full-year in 2005, who were not self-employed and who obtained their highest certificate, degree or diploma either in their country of birth or in Canada. Full-time is defined as 30 hours or more a week and Full-

year is defined as 49 weeks or more. The total number of years of schooling is not directly available from the census data and it is imputed based on the highest certificate, degree or diploma (see Table A1 in appendix). Canadian-born workers are assumed to have completed all their education in Canada. For immigrants, the variable Years of schooling in birth country is calculated from the year of birth, the total number of years of schooling, the year when landed immigrant status was first obtained in Canada, and whether the highest certificate, degree or diploma was obtained in Canada.

*Potential work experience* is defined the usual way, as Age minus *Years of schooling* minus 6. Canadian born individuals are assumed to have acquired all their work experience in Canada. Immigrants may have obtained their work experience in Canada or in their birth country. *Years of work experience in birth country* is calculated from the year of birth, *Potential work experience* and the year when landed status was first obtained.

Data on GDP per capita are adjusted for purchasing power parity and come from Heston, Summers, and Aten (2009). More details on the variables of our analysis are given in Appendix A .

Table 1 displays summary statistics on Canadian born and immigrant workers in our sample. It is interesting to note that despite being endowed with more years of schooling and work experience, male immigrants earn on average about 4.1 percent less than natives, while the equivalent figure for female immigrants is 3.3 percent. In this paper, we argue that a major reason for the existence of this gap is that the human capital of immigrants in Canada is lower than that of Canadian born.

(Table 1 approximately here)

## 5. Empirical results

In this section, we report estimates of the Canadian born earnings equation (6) and nested versions of the immigrant earnings equation (7), from the most restricted to the least restricted. This allows for the examination of changes in coefficient estimates following the removal of restrictions. The estimated

returns to years of schooling and work experience are reported in Table 2 for males and Table 3 for females. The other estimated coefficients are reported in Table B1 in Appendix B.

(Table 2 approximately here)

(Table 3 approximately here)

### *5.1 Base case: No control for human capital quality*

The most restricted case of (7) is when it is assumed that the wage determination process of immigrants is exactly the same as that of Canadian born individuals; that is, when it is assumed that from a human capital point of view, the quality of one year of schooling or work experience acquired in an immigrant's country of birth is the same as that acquired in Canada and that an immigrant's country of birth does not have any influence on the wage determination process. This corresponds to equation (7) with all the $\theta$'s and the $\gamma$ vector set equal to zero. The results in the column labelled *Model 1* in Table 2 and Table 3 show that if such an assumption was correct then the returns to human capital would significantly be lower for immigrants than for Canadian born individuals. For example, for males, the returns to years of schooling and years of work experience (evaluated at zero years of work experience) would respectively be 6.6 percent and 3.5 percent per year for male immigrants compared with 8.0 percent and 4.9 percent per year for their Canadian born counterparts. The results are similar for females.

### *5.2 Human capital acquired in Canada vs. Human capital acquired in birth country*

*Model 2* in Table 2 and Table 3 is a first step towards distinguishing between the quality of schooling and work experience acquired in Canada and that acquired in an immigrant's country of birth. The difference between this model and *Model* 1 is that, the returns to schooling and to work experience are now allowed to differ by a fixed quantity depending on whether schooling and work experience have been acquired in

Canada or outside Canada. This model also allows for a country of birth fixed effect. In other words, compared to *Model 1*, *Model 2* relaxes the assumption $(\theta_2 = \theta_4 = \theta_7 = \theta_8 = \gamma = 0)$.

*Model 2*'s estimation results strongly support the notion that the quality of schooling and of work experience is perceived by Canadian employers to be lower if these qualifications have been acquired outside Canada. Looking at schooling first, we find from column (3) of Table 2 that all other things equal, a male immigrant earns 0.5 percent less per year of schooling if his schooling (including his highest diploma) has been acquired in his country of birth than if his schooling has been acquired in Canada (the equivalent figure for a female immigrant is 0.9 percent). What seems to be driving this result though is not so much whether schooling is acquired outside Canada, but whether the highest diploma is obtained in Canada. Indeed, this differential is reduced to only 0.1 percent if a male immigrant obtains his highest diploma in Canada instead of in his country of birth (the equivalent figure for a female immigrant is 0.3 percent).

The difference between the marginal return of one year of work experience acquired in Canada and that of one year of work experience acquired in an immigrant's country of birth is even more pronounced: for males and females, the return to one year of work experience acquired in an immigrant's country of birth is about 2.0 percent less than the return to one year of work experience acquired in Canada (or about three-quarter smaller in relative terms).[5]

### *5.3 Relative GDP as a human capital quality indicator*

*Model 2* is a rather crude way of modeling the effect of quality of schooling and work experience on earnings as it pre-supposes that it is the same for all countries of birth, which is clearly untenable, especially since results in international standardized literacy tests vary across countries and is therefore not useful for estimating the impact of human capital quality on the immigrant wage gap along the lines discussed in Section 2. *Model 3* and *Model 4* correct for that by introducing *Relative GDP per capita* as a

[5] Since the model is non-linear with respect to work experience, those marginal returns are calculated from the coefficients of *Model 2* at the mean years of work experience of natives.

human capital quality indicator.[6] *Model 3* allows for human capital quality to affect earnings only directly (*à la* Borjas, 1987; Akbari, 1996 and Hanushek and Kimko, 2000) while *Model 4* allows for human capital quality to affect earnings both directly and indirectly through the returns to years of schooling and years of work experience. Specifically, *Model 3* corresponds to equation (7) but with the restriction $(\theta_3 = \theta_5 = \theta_9 = \theta_{10} = \theta_{11} = \theta_{12} = 0)$ while *Model 4* corresponds to equation (7) without restriction.

Looking at the coefficient estimates of *Model 3* in Table 2 and Table 3, we find that the direct impact of *Relative GDP per capita* on immigrant wages is rather small (although statistically significant). Specifically, we find that an immigrant's wage elasticity with respect to this variable is 0.043 for males (0.020 for females), which is actually smaller than the value of 0.116 found in Borjas (1987). This suggests, for example, that a male immigrant from a country whose *GDP* per capita level is 10 percent that of Canada (*e.g.*,, India) earns about 9.9 percent less than another immigrant who comes from a country whose per-capita GDP is comparable to that of Canada, but who is similar in all other respects. The equivalent figure for female immigrants is 4.6 percent.

While the results of *Model 3* show that *Relative GDP per capita* has a positive direct impact on immigrants' wages, we are concerned that *Relative GDP per capita* may be capturing more than a human capital quality effect. Indeed it could be capturing the effects of a host of other factors beside quality of schooling and of work experience, such as, for example, an *immigrant self-selection* effect (Borjas, 1987).

The coefficient estimates of *Model 4* in Table 2 and Table 3 provide a more convincing argument that *Relative GDP per capita* is an appropriate indicator of human capital quality. Indeed, we find that the effects of *Relative GDP per capita* on immigrants' earnings seem to be mostly operating through the *Years of schooling* and *Years of work experience* variables: the interaction effects of *Relative GDP per capita* are all highly statistically significant and of the expected signs (that is, they are positive). However, the direct impact of *Relative GDP per capita* is much smaller than in *Model 3* and is actually

[6] Note that *Relative GDP per capita* is not perfectly collinear with country of birth fixed effects in our regression since *Relative GDP per capita* is measured at the time of immigration, which means that it not only varies across countries of birth but also across immigrants.

statistically insignificant, which suggest that there may not be a self-selection effect of the type discussed in Borgas (1987).

Overall, *Model 4* estimates that human capital acquired in a rich country is valued significantly more than human capital acquired in a poor country. For male immigrants, schooling acquired in a country whose GDP per capita is similar to that of Canada has a rate of return that is 1.6 percent per year higher than that acquired in a country whose GDP per capita is one-tenth that of Canada.[7] The equivalent figure for work experience is 0.7 percent.[8] The results for female immigrants are similar.

A puzzling result though concerns the returns to human capital acquired in Canada. While the return to work experience for immigrants (whether male or female) is roughly the same as that for Canadian born individuals if the work experience has been acquired in Canada, which is what we should expect, the return to schooling acquired in Canada is 1.0 percent per year lower for male and 2.0 percent per year lower for female immigrants than for their native counterparts. This may reflect Schaafsma and Sweetman's (2001) contention that the outcome of education acquired by immigrants in Canada may be lower because of "acculturation." In our case, the impact of acculturation would appear to be not only in terms of levels of attainment but also in terms of returns. More research is needed in that regard.

Another interesting observation comes from comparing, for immigrants, the return to human capital acquired in Canada with that acquired in birth countries with GDP per capita similar to that of Canada. If the estimated returns to schooling and to work experience truly reflect the value of these skills (and are not reflective of other factors such as labour market discrimination), and if GDP per capita is a complete measure of human capital quality, then we should expect the rates of return on schooling and work experience acquired in Canada to be the same as those on schooling and work experience acquired in countries whose GDP per capita are similar to that of Canada. The results are mixed on that front: the

[7] This figure is calculated as the difference between the derivative of equation (7) with respect to $s_f$ evaluated at the coefficients of *Model 4,* $f_{dip}$=1 and $q = 0$ and that evaluated at the coefficients of *Model 4,* $f_{dip}= 1$ and $q = ln(0.1)$.

[8] This figure is calculated as the difference between the value of an additional year of work experience when $q = 0$ and that when $q = ln(0.1)$. The value of an additional year of experience is calculated as the difference between Equation (7) evaluated at the coefficients of *Model 4* and the mean value of work experience of the natives and that of Equation (7) evaluated at the coefficients of *Model 4* and the mean value of work experience of the natives plus one, holding all other variables constant. Note that for this calculation $X$ is set equal to $x_f$.

return to schooling acquired in a country whose GDP per capita is similar to that of Canada[9] is about the same as that acquired in Canada, but the return to work experience is about 1.1 percent per year lower (1.4 percent compared with 2.5 percent for males and 1.0 percent compared with 2.1 percent for females).[10] This suggests that GDP per capita may be a more accurate measure of schooling quality than of work experience quality.

Finally, we would be remiss if we did not mention that controlling for human capital quality significantly reduces the magnitude of the language skill coefficients in the wage regressions. For example, compared to only knowing English, the penalty for not knowing any official language for male immigrants goes from -35.7 percent in *Model 1* to -13.8 percent in *Model 4* (see Table B1 in Appendix B). The equivalent figures are respectively -24.2 percent and -8.8 percent for females. This suggests that the role of language skills in explaining the immigrant wage gap may not be as large as what has been estimated in previous studies—much of it may just have been reflecting lower schooling and work experience quality.

### *5.4 Results from the Blinder-Oaxaca decomposition*

In this section, we look at the contribution of differences in human capital quality to the immigrant wage gap using the decomposition (8). Table 4 reports selected elements of that decomposition estimated using *Model 1* (which does not accounts for human capital quality) and *Model 4* (our preferred specification, which accounts for human capital quality).[11] As has been noted elsewhere (see, for example, Nadeau and Seckin 2010), a key reason why Canadian immigrants earn less on average than natives is not because they have fewer years of schooling or fewer years of work experience than natives, but because their returns to schooling and work experience are much lower than those enjoyed by natives. Indeed, based on

[9] This figure is calculated as the derivative of equation (7) with respect to $s_f$ evaluated at the coefficients of *Model 5,* $f_{dip}$=1 and $q = 0$. Note that for this calculation $S$ is set equal to $s_f$.

[10] This figure is calculated as the difference between the value of an additional year of work experience when $x = 0$ and that when $q = 0$. The calculation of the value of an additional year of experience is explained in footnote 7.

[11] As shown in Oaxaca and Ransom (1999), the detailed decomposition of the unexplained component in (8) is not invariant to the choice of reference groups when dichotomous variables are used in the regression equations. To solve this problem, we follow Gardeazabal and Ugidos (2004) and Yun (2005) and restrict the sum of the estimated coefficients of each set of dichotomous variables to zero in performing the decomposition (8).

observed characteristics alone, Canadian male immigrants should earn 15.6 percent more than natives, but, mostly because of lower returns to schooling and work experience, in the end, they earn 4.1 percent less than natives (the equivalent figures are respectively 11.5 percent and 3.3 percent for female immigrants). It is also interesting to note that between the differential return to schooling and the differential return to work experience, it is the differential return to schooling that accounts for a larger share of the immigrant wage gap. In fact, the contribution of the differential return to schooling to the immigrant wage gap is about 35 percent larger than that of work experience for males, and about 150 percent larger for females.

(Table 4 approximately here)

A number of explanations have been proposed to account for the lower returns to schooling and work experience earned by immigrants compared to natives, including lower quality of skills and labour market discrimination. A key objective of this paper is to put a figure on the impact of the former. According to the *Model 4* estimates in Table 4, lower human capital quality is by far the major reason why immigrants earn less than natives. In fact, we find that after controlling for quality, the share of the immigrant wage gap explained by the differential return to schooling drops by almost 25 percent for both males and females (from -0.184 to -0.139 for males and from -0.376 to -0.262 for females). The drop in the share of the immigrant wage gap explained by the differential return to work experience is even more dramatic: it is of about 56 percent for males (from -0.147 to -0.064) for males and of almost 77 percent for females (from -0.149 to -0.035).

Overall, we find that the lower quality of schooling and of work experience more than negates the endowment advantage that immigrants have in these areas. Indeed, based on observed years of schooling and observed years of work experience alone, male immigrants should earn 9.1 percent more than natives, but lower quality of schooling and work experience subtracts 15.4 percent from that (the equivalent figures are respectively 6.0 percent and 17.0 percent for female immigrants). Of the total human capital quality effect, 75 percent is accounted for by differences in GDP per capita for males and almost 50 percent for females.

It is also noteworthy that unlike other studies (see, for example, Aydemir and Skuterud 2005; Nadeau and Seckin 2010), we find that the role of language skills in explaining the immigrant wage gap is rather small. As a point of comparison, we find that the share of the immigrant wage gap explained by differences in human capital quality is more than 20 times that explained by language skills (both in terms of endowments and returns) for males and more than eight times for females.

Finally, we observe that after controlling for human capital quality, the unexplained component of the wage gap (which is sometimes associated with labour market discrimination) is reduced by about 64 percent for male immigrants and virtually eliminated for female immigrants. This reinforces the point made in Bonikowska, Green and Riddell (2008) that what is sometimes blamed on labour market discrimination may just reflect lower human capita quality. [12]

## 6. Conclusion

This paper addresses the issue of measuring the human capital quality of immigrants. First, borrowing from the economic growth literature, we propose a methodology that uses *GDP per capita* in an immigrant's country of birth (in an otherwise Mincerian regression framework) to measure the quality of schooling and work experience acquired in that country. A great practical advantage of using GDP per capita instead of other human capital quality indicators (such as results of cognitive tests) is that data on *GDP per capita* are generally comparable across countries and available for most countries in the world over long periods of time. Next, we use this methodology to measure the contribution of differences in human capital quality to the immigrant-native wage gap in Canada.

Results reveal that *GDP per capita* is a good indicator of human capital quality. For one, we find that the returns to schooling and work experience significantly increase with the *GDP per capita* of an

[12] Besides the unexplained component of the wage gap, another variable in our model that could pick up the effects of discrimination is the *Country of birth fixed effect*. However, the contribution of this variable to the immigrant wage gap is positive (see Table 4), which is inconsistent with discrimination. The fact that this variable is positive also raises doubt about the extent of the lack of recognition of foreign credentials as an explanation for the immigrant wage gap (we would expect this variable to be negative if the lack of recognition of foreign credentials was systematic and significant in explaining the immigrant wage gap).

immigrant's country of birth, even when incorporating a country of birth fixed effect. In particular, we find that schooling and work experience acquired in a country whose GDP per capita is similar to that of Canada have rates of return that are respectively 1.6 percent and 0.7 percent per year higher than schooling and work experience acquired in a country whose GDP per capita is one-tenth that of Canada (schooling and work experience acquired in India for example).

With regards to measuring the contribution of human capital quality to the immigrant wage gap in Canada, we find that lower human capital quality completely negates the endowment advantage that immigrants have in the areas of schooling and work experience and is by far the major reason why they earn less than Canadian natives. In particular, we estimate that the share of the immigrant wage gap explained by differences in human capital quality is more than 20 times that explained by language skills (both in terms of endowments and returns) for males and more than eight times for females. Finally, we observe that after controlling for human capital quality, the unexplained component of the wage gap (which is sometimes associated with labour market discrimination) is reduced by almost 64 percent for male immigrants and virtually eliminated for female immigrants.

This study has important implications. From an analytical point of view, it suggests that the worsening of the immigrant wage gap in Canada over the last couple of decades may not be due so much to a geographic shift in immigrant source countries (from the U.S., England and other countries in Western Europe to countries in Asia and North Africa), but rather to an economic shift in immigrant source countries from the relatively rich to the relatively poor countries. From a policy point of view, this study suggests that if a country wants to adopt an immigrant selection policy based on a point system such as that of Canada, then for the same number of years of schooling and of work experience, the number of points should vary depending on the assessed quality of those years of schooling and work experience. In particular, more points should be allocated if schooling (especially the highest diploma) and work experience have been acquired in Canada than if they have been acquired in another country. Another and possibly more efficient approach, would be to rely less on the number of years of schooling and of work experience in selecting immigrants, and more on cognitive and professional accreditation tests.

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# APPENDIX A

# DATA DESCRIPTION

## Dependent variable

Our dependent variable is the natural logarithm of weekly earning. Weekly earning is calculated as wages and salaries reported for 2005 divided by the number of weeks worked in 2005.

Some restrictions were applied to eliminate very small and very large values of earnings. Observations with annual wages less than $1000 and less than $2 per hour in the reference week were removed. The sample was also restricted to individuals who had obtained their (post-secondary) highest certificate, diploma or degree in their country of birth or in Canada according to the *Location of study* variable in the 2006 census. In the census, the variable location of study is reported only for individuals who have completed a postsecondary certificate, diploma or degree. For individuals without post-secondary certificate, diploma or degree, we assumed that they had acquired their education in their country of birth except if they had immigrated to Canada before they turned 18, in which case we assumed they had completed their education in Canada.

## Independent variables

We allow earnings to vary by a fixed effect across Canada. We control for six regions: the Atlantic Provinces, Quebec, Ontario (the reference category), the Prairies, Alberta and British Columbia.

The 2006 census does not provide a value for *Years of schooling*. To compute this value we use the information provided on the highest certificate, degree or diploma obtained in the way described in Table A1.

*Potential experience* is defined as *Age* minus *Years of schooling* minus 6. *Foreign experience* is measured as potential experience minus *Years since migration,* where *Years since migration* is calculated

as 2005 minus the year the individual's year of immigration (that is, the year landed immigrant status was first granted). Domestic experience is defined as potential experience minus *foreign experience*.

For language skill, we use the variable *Knowledge of the official languages* (as evaluated by the respondents). The categories are (1) English only (the reference), (2) French only, (3) Both English and French, and (4) None of English and French.

**Table A1: Construction of Number of Years of Schooling Variable**

| Highest certificate, degree or diploma obtained | Estimated years of schooling |
|---|---|
| No certificate | 8 |
| High school certificate | 12 |
| Trade, apprenticeship, college or CEGEP certificates or diploma from a program of three months to less than one year | 13 |
| Trade, apprenticeship, college or CEGEP certificates or diploma from a program of one year to two years | 14 |
| University certificate or diploma below bachelor level | 15 |
| University bachelor level | 16 |
| University certificate or diploma above bachelor level | 17 |
| Masters | 18 |
| Doctorate (including medicine, dentistry and similar programs) | 22 |

*Relative GDP* is measured as the ratio of a ten-year moving average of an immigrant's country of birth real GDP per capita and that of Canada. Data on real GDP per capita come from Heston, Summers, and Aten (2009) and is available for 188 countries (including Canada) and up to 55 years for some countries. Immigrants whose country of birth is not one of these countries are excluded from the regressions. In instances where data on real GDP per capita are not going far enough back in time, *Relative GDP* is set equal to that of the earliest year available.

In some regressions, we used countries of birth as separate fixed effects. In those instances, we classified the countries as in Grenier and Nadeau (2011) where 48 countries or groups of countries are selected according to their importance as sources of immigration.

**Table 1: Key Common Average Characteristics of Immigrant and Canadian Born Individuals (2006) †**

| | Males | | Females | |
|---|---|---|---|---|
| | **Canadian Born** | **Immigrants** | **Canadian Born** | **Immigrants** |
| *% of Population* | 44.0 | 10.2 | 37.3 | 8.5 |
| *Weekly earnings ($)* | 1183.7 | 1152.6 | 840.0 | 816.9 |
| *Ln weekly earnings* | 6.871 | 6.829 | 6.582 | 6.549 |
| *Total years of schooling* | 13.3 | 14.0 | 13.6 | 13.9 |
| *In Canada* | 13.3 | 3.2 | 13.6 | 3.3 |
| *In birth country* | 13.3 | 10.8 | 13.6 | 10.6 |
| *Total potential experience (years)* | 21.8 | 24.0 | 21.7 | 23.9 |
| *In Canada* | 21.8 | 17.0 | 21.7 | 17.4 |
| *In birth country* | 21.8 | 7.0 | 21.7 | 6.5 |
| *Real GDP per capita ratio* | | | | |
| *At time of graduation ($q_s$)* | 1.0 | 0.65 | 1.0 | 0.65 |
| *At time of immigration ($q_x$)* | 1.0 | 0.44 | 1.0 | 0.43 |
| *Sample size* | 588,045 | 136,545 | 499,055 | 113,445 |

†Full-time, full-year working individuals between 18 and 64. Immigrants and Canadian born individuals are restricted to those having obtained their highest diploma in their country of birth. Canadian born individuals are assumed to have acquired all their work experience in Canada. Immigrants are assumed to have acquired their work experience either in their birth country or in Canada.

*Source*: Calculations from Statistics Canada 2006 census data.

## Table 2: Estimated returns to years of schooling and years of work experience—Males[†]

| **Variables** | *Canadian born (1)* | **Model 1** (no difference in quality) | | **Model 2** (Model 1 + country of birth schooling + country of birth work experience + country of birth fixed effects) | | **Model 3** (Model 2 + direct effect of $q$) | | **Model 4** (Model 3 + interaction effects of $q$) | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Immigrants (2)* | *(2) - (1)* | *Immigrants (3)* | *(3) - (1)* | *Immigrants (4)* | *(4) - (1)* | *Immigrants (5)* | *(5) - (1)* |
| $\alpha_1$ *(S)* | 0.080 (258) | 0.066 (108) | -0.013 (19.) | 0.068 (96.) | -0.012 (15.) | 0.068 (96.) | -0.012 (16.) | 0.070 (99.) | -0.010 (13.) |
| $\theta_1$ $(q_1)$ | | | | | | 0.043 (9.8) | | -0.004 (0.8) | |
| $\theta_2$ $(s_f)$ | | | | -0.001 (1.1) | | -0.001 (1.3) | | -0.001 (1.6) | |
| $\theta_3$ $(s_f q_s)$ | | | | | | | | 0.002 (8.2) | |
| $\theta_4$ $(s_f f_{dip})$ | | | | -0.004 (12.) | | -0.004 (12.) | | 0.003 (4.8) | |
| $\theta_5$ $(s_f f_{dip} q_s)$ | | | | | | | | 0.004 (15.) | |
| $\beta_1$ *(X)* | 0.049 (184) | 0.035 (52) | -0.015 (21.) | 0.044 (61.) | -0.006 (7.2) | 0.044 (61.) | -0.005 (6.8) | 0.045 (63.) | -0.004 (6.3) |
| $\beta_2$ $(X^2)$ | -0.078 (131) | -0.048 (36.) | 0.030 (21.) | -0.072 (44.) | 0.006 (3.5) | -0.073 (45.) | 0.005 (3.1) | -0.073 (45.) | 0.005 (2.8) |
| $\theta_6$ $(x_f)$ | | | | -0.025 (28.) | | -0.026 (28.) | | -0.014 (8.3) | |
| $\theta_7$ $(Xx_f)$ | | | | 0.075 (22.) | | 0.076 (22.) | | 0.046 (8.7) | |
| $\theta_8$ $(x_f^2)$ | | | | -0.044 (15.) | | -0.045 (15.) | | -0.036 (6.4) | |
| $\theta_9$ $(x_f q_x)$ | | | | | | | | 0.005 (6.7) | |
| $\theta_{10}$ $(Xx_f q_x)$ | | | | | | | | -0.010 (4.2) | |
| $\theta_{11}$ $(x_f^2 q_x)$ | | | | | | | | 0.011 (3.0) | |
| $\theta_{12}$ $(x_f^2 q_x^2)$ | | | | | | | | 0.004 (5.1) | |
| *N* | 588,045 | 136,545 | | 136,545 | | 136,545 | | 136,545 | |
| $R^2$ | 0.30 | 0.19 | | | | | | 0.28 | |

[†]Absolute t-ratio in parentheses. The dependent variable is ln(*weekly earnings*). Also included in regressions are five regions of residence indicators and, for models two to four, 47 immigrant country of birth dummy variables. The estimated returns to the variables in $X^2$,$x_f^2$ and $Xx_f$ have been multiplied by 100.
*Source:* Calculations from statistics Canada 2006 census data.

**Table 3: Estimated returns to years of schooling and years of work experience—Females**[†]

| **Variables** | *Canadian born (1)* | **Model 1** (no difference in quality) | | **Model 2** (Model 1 + country of birth schooling + country of birth work experience + country of birth fixed effects) | | **Model 3** (Model 2 + direct effect of $q$) | | **Model 4** (Model 3 + interaction effects of $q$) | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Immigrants (2)* | *(2) - (1)* | *Immigrants (3)* | *(3) - (1)* | *Immigrants (4)* | *(4) - (1)* | *Immigrants (5)* | *(5) - (1)* |
| $\alpha_1$ *(S)* | 0.105 (320) | 0.079 (118) | -0.026 (35.) | 0.083 (112) | -0.022 (27.) | 0.083 (112) | -0.022 (28.) | 0.086 (114) | -0.020 (24.) |
| $\theta_1$ $(q_1)$ | | | | | | 0.020 (4.4) | | -0.006 (1.2) | |
| $\theta_2$ $(s_f)$ | | | | -0.003 (7.4) | | -0.003 (7.5) | | -0.002 (4.3) | |
| $\theta_3$ $(s_f q_s)$ | | | | | | | | 0.002 (7.6) | |
| $\theta_4$ $(s_f f_{dip})$ | | | | -0.006 (21.) | | -0.006 (21.) | | -0.001 (1.8) | |
| $\theta_5$ $(s_f f_{dip} q_s)$ | | | | | | | | 0.004 (12.) | |
| $\beta_1$ *(X)* | 0.042 (164) | 0.028 (44.) | -0.015 (22.) | 0.039 (57.) | -0.003 (4.7) | 0.039 (57.) | -0.002 (3.0) | 0.040 (57.) | -0.003 (3.7) |
| $\beta_2$ $(X^2)$ | -0.066 (112) | -0.037 (28.) | 0.029 (21.) | -0.061 (39.) | 0.005 (2.9) | -0.061 (40.) | 0.003 (1.5) | -0.061 (39.) | 0.004 (2.7) |
| $\theta_6$ $(x_f)$ | | | | -0.026 (26.) | | -0.026 (26.) | | -0.017 (9.9) | |
| $\theta_7$ $(Xx_f)$ | | | | 0.080 (23.) | | 0.081 (23.) | | 0.043 (7.7) | |
| $\theta_8$ $(x_f^2)$ | | | | -0.044 (15.) | | -0.045 (15.) | | -0.023 (4.1) | |
| $\theta_9$ $(x_f q_x)$ | | | | | | | | 0.004 (4.3) | |
| $\theta_{10}$ $(Xx_f q_x)$ | | | | | | | | -0.018 (7.1) | |
| $\theta_{11}$ $(x_f^2 q_x)$ | | | | | | | | 0.023 (6.2) | |
| $\theta_{12}$ $(x_f^2 q_x^2)$ | | | | | | | | 0.005 (5.7) | |
| *n* | 499,055 | 113,445 | | 113,445 | | 113,445 | | 113,445 | |
| $R^2$ | 0.31 | 0.20 | | | | | | 0.28 | |

[†]Absolute t-ratio in parentheses. The dependent variable is ln(*weekly earnings*). Also included in regressions are five regions of residence indicators and, for models two to four, 47 immigrant country of birth dummy variables. The estimated returns to the variables in $X^2$,$x_f^2$ and $Xx_f$ have been multiplied by 100.
*Source:* Calculations from statistics Canada 2006 census data.

## Table 4: Decomposition of Immigrant Wage Gaps

| | *Males* | | | | *Females* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 4** | | **Model 1** | | **Model 4** | |
| | **Wage Gap** | **\|t\|** | **Wage Gap** | **\|t\|** | **Wage Gap** | \|t\| | **Wage Gap** | \|t\| |
| **Observed gap**[a] | **-0.041** | **20.0** | **-0.041** | **20.0** | **-0.033** | **16.4** | **-0.033** | **16.4** |
| **Explained gap** | **0.156** | **3.66** | **0.156** | **3.66** | **0.115** | **2.63** | **0.115** | **2.63** |
| Schooling | 0.059 | 8.51 | 0.059 | 8.51 | 0.027 | 2.74 | 0.027 | 2.74 |
| Work experience | 0.032 | 7.92 | 0.032 | 7.92 | 0.033 | 8.62 | 0.033 | 8.62 |
| Language | 0.004 | 3.35 | 0.004 | 3.35 | -0.001 | 0.72 | -0.001 | 0.72 |
| Others[b] | 0.061 | 1.93 | 0.061 | 1.93 | 0.056 | 1.86 | 0.056 | 1.86 |
| **Unexplained gap** | **-0.197** | **80.0** | **-0.071** | **8.60** | **-0.148** | **60.7** | **0.000** | **0.00** |
| Schooling | -0.184 | 19.0 | -0.139 | 12.9 | -0.363 | 34.1 | -0.273 | 23.8 |
| Work experience | -0.147 | 19.0 | -0.064 | 7.92 | -0.149 | 20.1 | -0.035 | 4.51 |
| Language | 0.025 | 2.18 | -0.011 | 0.97 | 0.006 | 0.48 | -0.018 | 1.48 |
| Others[c] | 0.109 | 6.20 | 0.144 | 7.45 | 0.357 | 19.5 | 0.325 | 16.2 |
| **Immigrant specific effects** | | | **-0.126** | **15.7** | | | **-0.148** | **18.1** |
| Country of birth fixed effect | | | 0.023 | 12.2 | | | 0.015 | 7.14 |
| *Human-capital quality (total)* | | | *-0.149* | *19.9* | | | *-0.162* | *21.5* |
| Country of birth's GDP direct effect | | | 0.005 | 0.80 | | | 0.008 | 1.22 |
| Schooling quality (total) | | | -0.077 | 16.5 | | | -0.105 | 23.4 |
| Years of foreign schooling | | | -0.010 | 1.59 | | | -0.025 | 4.27 |
| Foreign diploma fixed effect | | | 0.018 | 4.75 | | | -0.006 | 1.77 |
| Country of birth's GDP education effect | | | -0.085 | 19.7 | | | -0.074 | 17.1 |
| Work experience quality (total) | | | -0.077 | 29.2 | | | -0.065 | 26.3 |
| Years of foreign work experience | | | -0.045 | 10.8 | | | -0.058 | 14.6 |
| Country of birth's GDP work experience effect | | | -0.032 | 8.71 | | | -0.007 | 2.09 |

[a]Difference between the *log of weekly earnings* of immigrants and that of Canadian born workers.

[b]The category *Others* include the *Region of residence*, *Urban area, Married* and the *Constant term* variables.

[c]The large contribution of the *Others* set of variables to the female immigrant wage gap is mostly due to the large difference between the estimated constant term coefficient in the immigrant female regression and that in the Canadian born female regression (see Table B1 in Appendix B).

## APPENDIX B
## TABLE B1 Regression Coefficients—Control Variables

| Variables | Native Males | | Immigrant Males | | | | Native Females | | Immigrant Females | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 1 | | Model 4 | | Model 1 | | Model 1 | | Model 4 | |
| | Coeff. | \|t\| | Coeff. | \|t\| | Coeff. | \|t\| | Coeff. | \|t\| | Coeff. | \|t\| | Coeff. | \|t\| |
| Constant term | 5.100 | 1007. | 5.478 | 404.1 | 5.362 | 314.9 | 4.617 | 828.9 | 5.144 | 348.5 | 5.006 | 284.5 |
| Atlantic | -0.253 | 87.9 | -0.142 | 9.4 | -0.219 | 14.7 | -0.242 | 87.9 | -0.180 | 12.0 | -0.227 | 15.8 |
| Quebec | -0.145 | 47.1 | -0.273 | 35.2 | -0.226 | 30.3 | -0.154 | 52.3 | -0.252 | 34.5 | -0.218 | 30.7 |
| Prairies | -0.164 | 56.9 | -0.201 | 24.1 | -0.198 | 25.3 | -0.135 | 47.3 | -0.162 | 19.3 | -0.164 | 20.5 |
| Alberta | 0.077 | 27.9 | 0.037 | 6.2 | 0.023 | 4.0 | -0.012 | 4.3 | -0.078 | 9.5 | -0.062 | 10.6 |
| B.C. | -0.042 | 16.1 | -0.077 | 15.7 | -0.099 | 20.4 | -0.054 | 20.6 | -0.072 | 15.5 | -0.085 | 18.4 |
| Urban | 0.029 | 15.6 | -0.134 | 17.0 | -0.002 | 0.2 | 0.071 | 37.0 | -0.053 | 6.4 | 0.039 | 4.8 |
| Married | 0.214 | 127.4 | 0.121 | 28.5 | 0.172 | 40.7 | 0.036 | 23.3 | -0.021 | 5.9 | 0.018 | 5.0 |
| *Knowledge of official languages (Reference category: English only)* | | | | | | | | | | | | |
| French only | -0.087 | 24.7 | -0.089 | 7.4 | -0.102 | 8.4 | -0.073 | 21.7 | -0.038 | 3.2 | -0.045 | 3.8 |
| English & French | 0.019 | 7.2 | 0.126 | 18.3 | 0.030 | 4.3 | 0.064 | 26.6 | 0.166 | 26.2 | 0.082 | 12.6 |
| None | -0.196 | 4.2 | -0.357 | 27.7 | -0.138 | 10.9 | -0.129 | 2.6 | -0.242 | 21.7 | -0.088 | 7.8 |
| *Countries of birth (Reference category: United States)* | | | | | | | | | | | | |
| Central America | | | | | -0.105 | 7.1 | | | | | -0.110 | 7.1 |
| Haiti | | | | | -0.107 | 4.9 | | | | | -0.028 | 1.4 |
| Jamaica | | | | | -0.079 | 5.2 | | | | | -0.015 | 1.0 |
| Trinidad | | | | | -0.106 | 6.4 | | | | | -0.012 | 0.9 |
| Other Caribbean | | | | | -0.135 | 7.7 | | | | | -0.062 | 3.8 |
| Guyana | | | | | -0.024 | 1.4 | | | | | 0.020 | 1.2 |
| Other S. America | | | | | -0.060 | 4.1 | | | | | -0.062 | 4.4 |
| France | | | | | 0.033 | 2.0 | | | | | 0.028 | 1.8 |
| Germany | | | | | 0.005 | 0.4 | | | | | -0.026 | 1.9 |
| Other W. Europe | | | | | 0.016 | 1.1 | | | | | -0.041 | 3.0 |
| Romania | | | | | 0.067 | 4.0 | | | | | 0.070 | 4.3 |
| Poland | | | | | -0.009 | 0.6 | | | | | -0.058 | 4.4 |
| Ukraine | | | | | -0.099 | 4.2 | | | | | -0.101 | 4.6 |
| Russia | | | | | -0.091 | 4.3 | | | | | -0.118 | 5.3 |
| Hungary | | | | | -0.043 | 1.7 | | | | | -0.057 | 2.4 |
| Other E. Europe | | | | | -0.064 | 3.2 | | | | | -0.049 | 2.7 |
| U.K. | | | | | 0.080 | 7.6 | | | | | 0.031 | 3.2 |
| Other N. Europe | | | | | 0.068 | 3.3 | | | | | 0.044 | 2.5 |
| Greece | | | | | -0.159 | 7.4 | | | | | -0.072 | 3.5 |
| Italy | | | | | 0.038 | 2.9 | | | | | -0.016 | 1.3 |
| Portugal | | | | | 0.062 | 4.5 | | | | | -0.004 | 0.3 |
| Other S. Europe | | | | | 0.047 | 2.9 | | | | | 0.014 | 0.9 |
| West Africa | | | | | 0.018 | 0.8 | | | | | 0.037 | 1.5 |
| East Africa | | | | | -0.004 | 0.2 | | | | | 0.032 | 1.7 |
| Algeria | | | | | -0.074 | 2.8 | | | | | 0.031 | 0.9 |
| Egypt | | | | | 0.082 | 3.2 | | | | | 0.048 | 1.8 |
| Morocco | | | | | 0.043 | 1.7 | | | | | 0.051 | 1.8 |
| Other N. Africa | | | | | -0.052 | 1.9 | | | | | -0.010 | 0.3 |
| Southern Africa | | | | | 0.280 | 11.5 | | | | | 0.167 | 7.6 |
| Lebanon | | | | | -0.084 | 4.0 | | | | | -0.059 | 2.6 |
| Afghanistan | | | | | -0.260 | 7.8 | | | | | -0.130 | 3.4 |
| Iran | | | | | -0.131 | 6.3 | | | | | -0.079 | 3.8 |
| Iraq | | | | | -0.092 | 2.9 | | | | | -0.095 | 3.1 |
| Other W.C. Asia | | | | | 0.011 | 0.6 | | | | | -0.017 | 0.9 |
| China | | | | | -0.030 | 1.7 | | | | | 0.043 | 2.5 |
| Hong Kong | | | | | -0.119 | 9.3 | | | | | 0.027 | 2.4 |
| South Korea | | | | | -0.235 | 9.6 | | | | | -0.056 | 2.3 |
| Taiwan | | | | | -0.151 | 5.5 | | | | | -0.026 | 1.0 |
| Other E. Asia | | | | | -0.074 | 2.2 | | | | | -0.071 | 2.6 |
| Philippines | | | | | -0.134 | 9.3 | | | | | -0.034 | 2.4 |
| Vietnam | | | | | -0.014 | 0.8 | | | | | 0.018 | 1.0 |
| Other S.E. Asia | | | | | 0.004 | 0.2 | | | | | 0.057 | 3.3 |
| India | | | | | 0.043 | 2.6 | | | | | -0.021 | 1.3 |
| Sri Lanka | | | | | -0.094 | 5.5 | | | | | -0.100 | 5.4 |
| Pakistan | | | | | -0.087 | 4.4 | | | | | -0.092 | 3.9 |
| Bangladesh | | | | | -0.253 | 9.0 | | | | | -0.266 | 8.0 |
| Others | | | | | -0.016 | 0.9 | | | | | 0.070 | 0.4 |