Immigrant returns to education and experience: Analysis of skill discounting in Canada

Rapport de recherche pour l'obtention du grade de maîtrise presenté par:
Juan Carlos González Ibarguen

Sous la direction du professeur:
Brahim Boudarbat

Département de sciences économiques

Université de Montréal, Canada

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RÉSUMÉ/ABSTRACT

Cette recherche offre quelques explications au sujet des écarts de salaires entre les immigrants et les Canadiens à l'aide de donnés des recensements Canadiens. Nous étudions les sources de cet écart en mesurant les rendements à l'éducation en prenant en compte les effets de diplômes. Le texte présente évidence d'une valorisation différenciée des immigrants sur le marché du travail selon leur région d'origine. On trouve que le marché du travail pénalise spécialement les immigrants provenant des régions d'origine non traditionnelles comme l'Asie et l'Amérique Latine. En plus, le rendement à l'expérience du travail au Canada semble s'améliorer pour les immigrants récents mais les rendements à l'expérience du travail à l'étranger sont très bas. Nos résultats indiquent aussi que le rendement d'une année d'instruction au Canada est inférieur pour les immigrants que pour les Canadiens. Cependant, pour les immigrants le rendement d'une année d'instruction à l'étranger est similaire au rendement d'une année d'instruction au Canada. Finalement, on observe que les effets des diplômes universitaires sont plus importants pour les immigrants.

This research offers evidence about the wage differentials between immigrants and Canadians using the Canadians censuses. We investigate the sources of this wage differential by estimating returns to schooling, taking into account sheepskin effects. The paper presents evidence of a differentiated labor market valuation of immigrants according to their region of origin. We find that the Canadian labor market specially penalizes immigrants from non-traditional source regions like Asia and Latin America. Additionally, we observe improvements in the returns to Canadian working experience for recent cohorts of immigration. However, the immigrants' returns to foreign experience are remarkably small. Furthermore, our results indicate that the return to one more year of Canadian schooling is smaller for immigrants than for native-born. In addition, immigrants' returns to foreign schooling seem to be similar to immigrants' return to Canadian schooling. Finally we observe that sheepskin effects have larger returns for immigrants than for native-born the higher the diplomas.

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1. INTRODUCTION

Immigration is an important issue for Canada. The government has several reasons to promote it. On the one hand, the ageing of working population is augmenting. On the other hand, the fertility rates are small. Dolin and Young (2004) report a 36 percent increase of the population between 45 and 64 years of age from 1991 to 2001 and a fertility rate of 1.51 children per family in 2001. Under these conditions they point out deaths will surpass births in 20 years. Hence, Canada is in a position where it needs to increase immigration to keep its labor market working. As a result of this challenge they say the economic component of Canada's immigration program looks for immigrants in different ways, among which the skilled worker class is an important group, to fulfill the needs of Canadian labor market. According to Grant and Sweetman (2004) the 2001 Census reports 5.4 million foreign-born persons, that represent about 18.4 percent of the total population. However, despite these facts, Grant and Sweetman (2004) argue that there are at least three characteristics of recent immigration that concerns policy makers and researchers. Firstly, they point out its urban nature contrary to the rural nature of earlier decades; Secondly, the changes in demographic characteristics due to modifications of the immigration policy which has resulted in an increase of immigrants coming from non-traditional source countries but also in an increase of human capital endowments; Finally, they say that immigrants have suffered a deterioration in their labor market assimilation compared to earlier cohorts. Moreover, Reitz (2005) calls attention to the fact that since Canada has moved towards a knowledge-based economy there is especial interest in the "[...] effective use of immigrants' skills in the changing labor market [...]" (Reitz, 2005, p.2). In order to meet this objective, in the case of skilled worker class, there exists a point accumulation method to assess the qualifications of the applicants with a maximum score of 100 points and a current pass mark of 67[1]. Within this assessment, education, language proficiency and work experience have an important share of all the points[2]. The reason is to attract individuals who can meet the labor market requirements and have a successful integration to Canada. Thus, the system is supposed

[1] http://www.cic.gc.ca/english/skilled/assess/index.html
[2] *Ibidem.*

to attract immigrants with outstanding skills that will allow them to pass the mark. Nonetheless, there are other components of the immigration program that do not have the same goal but humanitarian purposes and might not attract skilled immigrants. For instance, in the case of refugees Riddell and Ferrer (2004) mention that selection bias could be in the worst case negative if conditions in source countries do not allow an efficient human capital accumulation. Even with these different components of the immigration system Green and Worswick (2004) present evidence of similar assimilation patterns from different visa group immigrants. Furthermore, Baker and Benjamin (1994) and Bloom, Grenier and Gunderson (1995) show evidence concerning the worsening in the assimilation of the most recent cohorts of immigrants. More recently, Reitz (2005) and Alboim, Finnie and Meng (2005) among others, call attention to the fact that immigrants coming with foreign education earn less than Canadians with the same credentials. Additionally, Reitz (2005) indicates that despite the fact that recent cohorts of immigrants have, in average, higher credentials relative to native-born Canadians, a downward earnings trend persists, especially for non traditional source countries. Furthermore, Aydemir and Skuterud (2005) shows that additionally to the deterioration in immigrants' earnings due to the shifts in region of origin, the declines in returns to foreign experience explain notably this deterioration. These results are perturbing, especially since there is an important amount of immigrants coming as skilled workers and the new Immigration and Refugee Protection Act emphasizes on human capital Tolley (2003).

Looking at all these facts, the question concerning the causes of male immigrant wage deterioration relative to male native-born Canadians seems important to us. Therefore, this research will attempt to provide evidence regarding to what extent, education and experience of immigrants are valued relative to native-born in the Canadian labor market. Particularly, we will focus on the role of schooling and diplomas. The study will also examine the role of the region of origin in the remuneration of immigrants. Finally, we will inspect the return to Canadian experience for both groups (immigrants and native-born). We believe that if there are information asymmetries in labor market and employers are not familiar with or do not recognize experience, schooling and diplomas of the immigrants, there will be immigrants receiving smaller

wages than their Canadian counterparts. The failure in the recognition of foreign education and experience by the labor market can complicate the job search in the new country as it will be harder for immigrants to prove their skills to potential employers. In some cases this can lead immigrants to accept jobs for which they are overqualified or to accept jobs different from their area of expertise due to legal restrictions in certain areas. Additionally, if years of education have a different value for the labor market than diplomas and there are asymmetries in the labor market, it is reasonable to suppose different rewards for immigrants' educational attainment and credentials. Finally, we try to see if immigrants that come from countries not sharing similar background with Canada will find it more difficult to integrate into the labor market. It is reasonable to consider that immigrants coming from countries with dissimilar political and economic institutions and economic development will find it harder to adapt to the Canadian society and to enter into the labor market successfully.

In order to carry out this research, we use a regression analysis using a variation of the Mincer log-wage equation to estimate returns to education and experience. The sample for the study is composed by fulltime-working permanent residents and native-born males from pooled data of the 1991, 1996 and 2001 Public User Micro Files of the Canadian censuses. We find that returns to Canadian experience are lower for male immigrants than for male native-born. Additionally, we observe foreign experience has a trivial value relative to Canadian experience. What is more, our results let us see that while immigrants' returns to Canadian schooling are lower relative to native-born, sheepskin effects are larger for immigrants. Regarding immigrants' returns to foreign schooling, we come across evidence that supports these are similar to the immigrants' returns to Canadian schooling. Moreover, our outcome shows us cohort deterioration with some recovery for the most recent cohort (1995-2000). Finally, our results also indicate that shifts in region of origin plays an important role in the deterioration of immigrants' wages.

Understanding of how the labor market rewards immigrants' characteristics relative to Canadian is essential for understanding the problems that immigrants have to face in order to integrate to Canadian society. In this sense, this paper adheres to the effort of the current Canadian immigration literature for increasing the knowledge about

immigrant returns to schooling and experience. Nevertheless, our study has limitations. On the one hand, a difficulty arises in evaluating the returns to schooling and experience by class of immigrant since the Canadian census lacks variables with detailed information regarding immigrant class. For this reason, the analysis focuses only on male permanent residents and native-born Canadians. A second limitation comes from the fact of using public user data files, which confines to some extent our sample and the detail of the variables. Nonetheless, we consider that the results presented here are relevant and provide useful information for further studies on this matter. The following paper is divided as follows: Section 2 revises previous articles; Section 3 summarizes the theory behind returns to education; Section 4 clarifies the estimation approach; Section 5 gives a basic descriptive analysis of the data; Section 6 explains the results of the econometric analysis and finally, Section 7 presents the conclusions.

2. PREVIOUS LITERATURE

There is numerous literature concerning immigrants' earnings profile and assimilation to host country, especially addressing the United States. Among this vast literature, the seminal paper of Chiswick (1978) regarding the earnings of foreign-born men in the US labor market is an important point of reference regarding immigrants' returns to schooling and experience. Chiswick's cross-section analysis studies the effects of foreign birth and the length of time in the host country on the earnings of immigrants based on the human capital earning function developed by Mincer (1974). Chiswick (1978) finds that immigrants' earnings growth is fairly high and estimates an overtaking time period between 10 and 15 years for immigrants to catch up native earnings. In his research Chiswick establishes the common model based on Mincer's theory that later on is used and modified at some extent by Borjas (1985, 1995), which questions the empirical soundness of using only one cross-section analysis. In turn, Borjas develops a well known cohort analysis using data from different censuses and a modified version of Chiswick's specification. Results from Borjas show that cross-section approach overestimates the earnings growth and do not take into account the immigrant quality deterioration between cohorts.

Regarding Canada, there is growing empirical literature to unveil the causes of wage disparity between immigrants and Canadians. Covering the period from the postwar to the beginning of the seventies Abbott and Beach (1993) examine the evolution of immigrant earnings differentials. They use the 1973 Job Mobility Survey, which due to the direct measure of experience, allows them to use age of individuals to measure birth-year effects. This permits measuring the differences of earnings-experience and earnings-years-since-migration between birth cohorts as well as analyzing the role of a direct measure of experience in the earnings for both male native-born Canadians and immigrants. Their results indicate that earnings differentials between immigrants and native-born Canadians started to amplify in the middle of the 1960's due to a lower assimilation-earnings profile and a decreasing earnings-experience profile together with an increase in native-born Canadians earnings profile.

For their part, Baker and Benjamin (1994) examine the assimilation of immigrants during the 1970's and 1980's using the 1971, 1981 and 1986 Canadian censuses. The analysis they perform to calculate the differences across and within cohorts use estimates of cross-section regressions, which permits parameters to be different for each year, contrasting with pooled regressions. Furthermore, the use of three censuses allows them to obtain two pairs of assimilation estimates and examine the stability of the assimilation profile throughout the 1970-1985 period. They find small immigrant assimilation all over the three censuses. What is more, they find that many arrival cohorts do not present earnings growth. In the case of earlier cohorts the low assimilation rate is explained by the small earnings gap. However, unlike the earlier cohorts which had smaller entry earnings differences relative to native-born, the recent cohorts enter with lower entry earnings but do not present higher assimilation rates. Alternatively, with a different model specification, Bloom, Gernier and Gunderson (1995) use pooled data from same censuses and arrive to similar results to Baker and Benjamin (1994). Nonetheless, the analysis of Bloom, Gernier and Gunderson (1995) shows more clearly the effects of source country composition changes in the entry and assimilation profiles. These authors observe the entry effects being substantially more negative for non-traditional source countries than for traditional ones even though for both groups of countries there is a decreasing assimilation pattern for recent cohorts. However, they also calculate that

immigrants of post-1970 cohorts from non-traditional sources will never catch up with native-born wages in a reasonable amount of time compared to the pre-1970 cohorts that completed assimilation within fifteen years. Results from their estimates of the 1971 cohort are similar to those obtained by Abbott and Beach (1993) for 1973, as well as the worsening position tendency of recent immigrants found by Baker and Benjamin (1994).

In a different manner, Schaafsma and Sweetman (2001) use a two step procedure for several cross-section analysis of the 1986, 1991 and 1996 censuses to investigate if earnings differences between immigrants and native-born Canadians of the same age (and other similar characteristics) are a function immigrants' age at immigration. Concerning education, they detect that immigrants arriving at younger ages have similar returns to schooling than native-born while for older immigrants the returns diminish. However, if immigrants' schooling is measured as Canadian and foreign, they notice that although there are similar returns for both (Canadian and foreign schooling), these are vaguely smaller than the returns to schooling for native-born Canadians. Moreover, they notice that the age of immigration has an important impact on the acculturation of visible minorities with a mother language different to English. For instance, they observe immigrants that arrived at around the age of 15 and 18 have a smaller amount of schooling years than immigrants that arrived at younger or older ages. Finally, regarding work experience, they observe returns to foreign experience are insignificant for immigrants.

Alternatively, Green and Worswick (2003, 2004) carry out two analyses using the Immigrant Database (IMDB) and a series of surveys of Consumer Finance (SCF) from the years 1981, 1982, 1984-1997. To undergo the analysis the authors create and organize cohorts to reflect the conditions of the economy and immigration policy. In the case of the immigrants' sample, they can define cohorts by education level since the IMDB is a panel that links education at arrival and earnings. However, the SCF does not permit to do this. Therefore, they restrict the analysis to males between 25 and 64 years of age, who are considered to have completed their education and entered the labor market. In their first analysis Green and Worswick (2003) try to measure the importance of cohort and macroeconomic effects in the presence of human capital investment. Since human capital theory predicts lower entry wages and higher earnings growth, they try to measure

net present values for different cohorts using the "overtaking" tool from Mincer (1974). While they find important decreases in entry earnings from the 1980's and a faster decrease during the 1990's, macroeconomic conditions do not help to explain this decrease completely. When comparing with native-born Canadians cohorts of new labor market entrants, they find that macroeconomic conditions explain about 50 percent of the cross cohort decrease. Additionally, the use of net present values shows that immigrants in the nineties are not a lot worse than immigrants from the eighties. However, they identify like Bloom, Gernier and Gunderson (1995) and Baker and Benjamin (1994) that changes in composition of source countries have an important role in the earnings decrease, thus in the net present values. In their second analysis, using the same sample, Green and Worswick (2004) investigate the sources of the fall in entry earnings for Canadians and immigrants. They consider that by estimating the earnings differential for immigrants and Canadians that entered to the labor market at the same time, they will be able to remove the effects of Canadian economy affecting both groups. The purpose of doing this is to corroborate the wage differences among native-born Canadians and immigrants once changes in Canadian economy are taken into account. One advantage of the data they use over the census data is that it contains an immigrant visa group variable. So, the authors break down the data by visa group and country of origin. Differentiating by type of visa, they test if the point system criterion has any effect in the wage differential. Since the point system criterion has the objective of selecting individuals by their skills and adaptability to Canada, it should make it easier to the immigrants accepted through this method to transfer their human capital. They find that the general trend is similar to the other class of immigrants. Like in their previous study they discover that an important decrease in wages is related to the country of origin. Green and Worswick (2004) conclude that eighty percent of the fall in entry earnings can be explained by the effect of new entrants (36 percent), changes in the composition of source countries (30 percent) and a decrease in the returns to foreign experience (15 percent).

Further, Frenette and Morissette (2003) use censuses from 1981, 1986, 1991, 1996 and 2001 and the same methods of Baker and Benjamin (1994) and Grant (1999) to examine what would be necessary for recent immigrants' cohort to achieve wage convergence with native-born. Their data show increasing earnings deterioration during

the 1980's that stopped between 1990 and 1995. They show also a restarting of the decrease and in 1995 where immigrants show 45 percent lower earnings. Nevertheless, they detect that between 1996 and 2000 the relative entry earnings improved and by 2000 they moved back to the mid-1980's value. Contrasting Bloom, Gernier and Gunderson (1995), Frenette and Morissette (2003) find that immigrants' wages from the 1975-1979 cohort converge almost to the native-born Canadians' wages after fifteen years after the arrival year while for immigrants from the eighties there still is a large wage difference after 15 years. What is more, they explain that unless immigrants' cohorts from the nineties experience a high wage growth rate it will take longer time to converge with their native-born counterparts. Alternatively, Warman and Worswick (2004) using the same censuses as Frenette and Morissette (2003), study the earnings performance of immigrants in urban areas from a completely different approach. They use mostly graphics and wage mean values to carry out their study. Like previous studies, they find that immigrants' relative earnings of more recent cohorts decline for all the cities they study. Moreover, they observe that when comparing with native-born Canadians, economic integration of immigrants in urban areas is lower. Nevertheless, they find a turnaround for men from the 1996-2000 cohort, which present higher earnings than the 1991-195 cohort in the first five years after arrival.

From a different stance, Ferrer and Riddell (2004) explore how the Canadian labor market rewards the education and skills of immigrants. They include both, the contribution of diplomas and education attainment in the wage analysis, conversely to other studies that use just one of these variables. With this approach, they seek to separate the effect of program completion from the effect of years of schooling. Furthermore, they use age at immigration to distinguish between Canadian and foreign education. Ferrer and Riddell (2004) use a sample of full time male workers by pooling the 1981, 1986, 1991 and 1996 censuses. Their study shows that immigrants' schooling years and experience are rewarded less than those of native-born Canadians. Surprisingly, they discover that immigrant credentials are equally valued and sometimes more valued than Canadian credentials. Regarding the effects of region of origin they show that the returns to education and to credentials change according to the region. For example, for individuals coming form England/United States and Africa the returns are similar to

native born Canadians but for immigrants from Europe, South America and Asia they find that education is largely discounted whereas degrees are not.

From the same perspective of Ferrer and Riddell (2004), Alboim, Finnie and Meng (2005) use the Literacy Skills Used in Daily Activities database for 1989 to uncover the effects of foreign and Canadian education on immigrants' wages. The main advantage of this database compared to the census data used by Ferrer and Riddell (2004) is that it has direct measures of foreign and Canadian schooling as well as individual reading tests in English and French. Furthermore, the database allows them to separate foreign from Canadian working experience. They find that after controlling for explicit measures of foreign and Canadian education and experience the entry wage gap between native-born Canadians and immigrants practically disappears. Moreover, they notice that foreign experience and foreign education are highly discounted, especially for non-white minorities. Nonetheless, they observe that when using a sheepskin effects approach; immigrants with a foreign degree that obtain a Canadian degree receive similar returns compared to their native-born counterparts. According to them, this particular finding seems to show that a Canadian diploma serves to make a foreign credential more meaningful. Then again, Sweetman (2004) carries out another effort to disclose the way Canadian labor market rewards the immigrants' skills from a slightly different angle. Sweetman (2004) uses the censuses of 1986, 1991 and 1996. Moreover, he takes into account the sheepskin approach used by Ferrer and Riddell (2004). However, he includes a variable referring to the quality of immigrants' education in their source countries. In order to do that he uses an average score from Hanushek and Kimko (2000). This average score is derived from the data of international standardized tests that are used to measure quality of education. By using this variable, he finds that immigrants coming from countries with poorer quality of education receive lower returns to education and experience than immigrants coming form countries with better quality of education. Additionally, he observes that education at the source country does not affect the returns of immigrants entering to Canada at a young age and who completed their education in Canada. More recently, Aydemir and Skuterud (2005) carry out a cohort study for estimating the deterioration of entry earnings of immigrants. In their study they pool data from the 1981, 1986, 1991, 1996, and 2001 Canadian censuses. One of the remarkable

parts of this study lies in the specifications to be estimated. Aydemir and Skuterud (2005) start estimating earnings equations comparable to those of Bloom, Gernier and Gunderson (1995). However, with the aim to disentangle the interpretation of years since migration variable, they split the variables regarding immigrants' years of schooling and years of experience into their Canadian and foreign components. Thus, creating four variables they have the flexibility to isolate each effect. Furthermore, they use provincial unemployment rates interacted with immigration dummy instead of common fixed year effects to capture for current period effects. Their results are in line with those of Alboim, Finnie and Meng (2005), Ferrer and Riddell (2004), and Sweetman (2004) among others, which suggest that declines in return to foreign experience (between one quarter and one half) and shifts in the country of origin (one third) explain an important part of the deterioration in immigrant entry earnings.

3. THEORETICAL FRAMEWORK

In this section we will give a synopsis of the common knowledge among economists regarding returns to schooling. With that purpose in mind we will follow and summarize Ehrenberg (2004), Pons (2004), Card (2000) and Willis (1986) who have a complete review of the underlying theory and some econometric issues behind our research.

3.1. Returns to schooling

Ehrenberg (2004) says investments in education and training are known as human capital. This human capital has, like physical capital, a value in the market. Ehrenberg (2004) explain Labor economics analyzes why people under the same circumstances invest different quantities in human capital and how the market rewards this investment. On the one hand, human capital investments involve two major costs for a person: direct costs and opportunity costs. The first represents the financial investment dedicated to studies, like tuition fees, money spent on books and tools; the second represents the money a person stops receiving for the hours he spends studying. On the other hand, a person that

invests in human capital expects a benefit through a higher stream of future earnings, thus expecting higher returns for their investment relative to someone that has lower human capital. But for these higher earnings to happen, Willis (1986) says that more schooled persons should be significantly more productive and that on a long-run equilibrium the schooling-earnings link would imply that anyone will have incentive to change his schooling level. However, Willis (1986) states that among human capital literature it is difficult to stick to full theoretical considerations since these can sometimes represent difficulties for applied analysis under limited data and econometric methodologies. Bearing this in mind, we follow Pons (2004) to derive the human capital investment model developed by Becker (1964). For simplification purposes Pons (2004) considers that investment is done in a unique period and that benefits are collected in a stream period of time.

According to Pons (2004), a person that chooses at a certain age an activity X which needs certain amount of schooling will have, after subtracting the tuition costs of the first period, a net earning stream of $x_1, x_2, x_3 ... x_n$. The present value of this stream is:

$$V(X) = \sum_{n=0}^{N} \frac{x_n}{(1+i)^{n+1}}$$

with i being a fix discount rate. If there is another activity Z, which does not require any investment in education, and has a $z_1, z_2, z_3, ... z_n$ net earnings stream with a net present value of:

$$V(Z) = \sum_{n=0}^{N} \frac{z_n}{(1+i)^{n+1}}$$

Then the net present value benefits from choosing X instead of Z can be written as:

$$d = V(X) - V(Z) = \sum_{n=0}^{N} \frac{x_n - z_n}{(1+i)^{n+1}}$$

Recalling that X has costs only for the first period, Pons (2004) says that the cost from choosing X instead of Z can be expressed as the difference from the net earnings from the first period $C = x_0 - z_0$ while the benefits R can be expressed as the net present value of the differences in net earnings for the following periods $k_n = x_n - z_n$ (with n=1, 2,...N). Hence, we can write the benefit from choosing X as:

$$d = \sum_{n=1}^{N} \frac{k_n}{(1+i)^{n+1}} - C = R - C$$

Like any other investment decision, a person will compare the net present value of benefits with the costs. So, a person that is thinking about an additional year of schooling will compare the present value of his net future benefits with the costs of such investment. He will only invest if the present value of the benefits is larger than the costs, consequently a persons' investment decision will be based on the sign of *d.* If *d* is positive (*d>0*) he will invest in education whereas if *d* is negative (*d<0*) he will not.

Pons (2004) points out that another method to assess if investing in education is profitable is to write the equation with equality and look for the internal rate of return:

$$C = \sum_{n=1}^{N} \frac{k_n}{(1+i)^{n+1}}$$

Since $C = x_0 - z_0$ and $k_n = x_n - z_n$, this expression can be re-formulated as:

$$d = \sum_{n=0}^{N} \frac{x_n}{(1+r)^{n+1}} - \sum_{n=0}^{N} \frac{z_n}{(1+r)^{n+1}} = 0$$

Lastly, since $x_n = z_n + k(n = 1,2,...N)$, she arrives to the following expression:

$$C = \frac{K}{r}\left[1 - (1+r)^{-N}\right]$$

which uses $(1+r)^{-N}$ as a way to correct for the fact that life has a limited amount of years. In this case Pons (2004) explains that the investment decision depends on the internal rate of return and the discount rate. If the internal rate of return is higher than the discount rate, then the person will choose to X whereas if the internal rate of return is lower he will choose Z.

Later, with the aim of making empirically measurable the return to schooling, Mincer (1974) develops a human capital earnings function of the form:

$$\log y = \alpha + bS_i + cX_i + dX_i^2$$

where *y* is a measure of earnings, *S* is schooling years and *X* is years of potential experience which for data limitations is usually calculated as *X*=age-*S*-6. Willis(1986) calls attention to the fact that Mincer's earnings function offers an estimate of the schooling internal rate of return "[…]only if it is assumed[…]that a given increment in

schooling has the same proportional effect on earnings at all levels of experience[…]" Willis (1986). However, Willis (1986) indicates that if this is not the case, Mincer (1974) proposes a technique to avoid numerical methods which uses the concept of "overtaking experience". What is more, this overtaking experience is less than or equal to the reciprocal of the internal rate of return to schooling according to Mincer (1974). Yet, from this human capital earnings model Card (2000) argues that maximizing earnings net present value to reach an optimal schooling decision by matching costs and benefits is appropriate if people face a fix interest rate and are indifferent between working and going to school. But in a more general way, Card (2000) says, variations arise in the optimal schooling decision between individuals since they most likely have different talent and preferences towards school and working. Therefore, Card (2000) presents, from a theoretical and empirical perspective, a model that takes into account some of the problems Griliches (1977) identifies in the empirical literature, like ability bias, measurement errors and interpretation of coefficients, which we will explain in the following paragraphs. For this purpose we summarize a simplified version of Card's model from Oreopoulos (2004) and later extend the explanations using Card (2000).

Oreopoulos (2004) assumes individuals have an infinite planning horizon starting at $t = 0$ and a lifecycle utility function:

$$V(S, c(t)) = \int_0^{\infty} u(c(t))e^{-\rho t} dt$$

where utility depends on consumption *c(t)* at period *t*, $U(\bullet)$ being a concave increasing function, assuming that individuals use a subjective discount rate ρ and that they take a unique decision regarding when to stop studying. This utility function is subject to a budget constraint:

$$\int_0^{\infty} c(t)e^{-Rt} dt = \int_s^{\infty} y(S)e^{-Rt} dt = y(S)\frac{e^{-RS}}{R}$$

where $y(S)$ is the earnings function of an individual with *S* years of schooling. In order to simplify, he assumes that schooling is additively separable in age so he can ignore earnings growth from post-schooling investments. Additionally, he assumes the individual faces a fix interest rate *R*. Given that the model only considers that the

individual will choose a level of education to maximize his income, the first order conditions can be written as:

$$-Ry(S)\frac{e^{-RS}}{R}+y'(S)\frac{e^{-RS}}{R}=0$$

This expression can be reduced to:

$$\frac{y'(S)}{y(S)}=R$$

Here $y'(S)/y(S)$ is the marginal internal rate of return to schooling and R represents the marginal cost of the investment. Then, Oreopoulos (2004) postulates that first order conditions reveal that individuals will invest in education until marginal return from this investment is equal to the interest rate. He defines as well the human capital production function Mincer (1974) proposes $y(S)=e^{a_i+b_iS}$ where, according to Willis (1986), a_i represents a parameter of basic earnings capacity for individual i, and b_i represents parameter of learning skills that allows individual i to increase his productivity during school. Thus, after taking logarithms and using the first order conditions Oreopoulos obtains:

$$\log y(S)=\alpha_i+b_iS=a_i+RS$$

$$\frac{y'(S)}{y(S)}=b_i=R$$

The problem with this function, as Willis (1986) says referring to Rosen (1977), is that individuals with a constant marginal internal rate of return and a fix interest rate will be indifferent to the level of schooling when $b_i=R$, choose zero schooling when $b_i<R$ or choose an endless quantity of schooling when $b_i>R$. This problem, comments Oreopoulos (2004), can be solved once a curvature is added in the marginal costs or the marginal benefits of schooling. Hence, he introduces the following earnings function:

$$y(S)=e^{\alpha_i+b_iS-\frac{1}{2}k_1S^2}$$

which allows the marginal benefits to be heterogeneous and to decrease with additional schooling. Then, using the first order conditions again, he arrives to:

$$\frac{y'(S)}{y(S)}=b_i-k_1S=R$$

where b_i is a random variable, with mean $\bar{b}$ and variance σ_b^2, and k_1 is a non-negative constant. Subsequently, he shows an optimal schooling solution that allows for different levels of optimal schooling:

$$S = \frac{b_i - R}{k_1}$$

Furthermore Oreopoulos (2004) allows heterogeneity of a_i to affect the optimal schooling to show the two possible sources of ability bias with a functional form like:

$$y(S) = e^{b_i S - \frac{1}{2}k_1 S^2} + A_i$$

that together with the first order conditions gives us:

$$\frac{y'(S)}{y(S)} = (b_1 - k_1 S)\frac{e^{b_i S - \frac{1}{2}k_1 S^2}}{e^{b_i S - \frac{1}{2}k_1 S^2} + A_i} = R$$

In this case he shows the optimal choice of schooling is affected by presence of heterogeneity in the initial earnings level, thus making schooling attainment lower when these initial earnings levels are higher. Hence, from this result he observes the existence of two kind of ability bias. On the one hand, there is a bias due to differences in endowments of ability, i.e. differences in the levels of ability of each person, which has a propensity to lower the amount of optimal schooling. On the other hand, there is a bias due to differences in the interactions between ability and schooling i.e. differences in the slopes, which is the one that Oreopoulos (2004) continues to elucidate following Card (2000) analysis since this source of bias is the one that "supply side" empirical literature worries more about.

In the presence of heterogeneity of costs, where R_i can be considered as an alternative to measure liquidity constraints and a lifecycle function where utility out of school is $u(c(t))$, and utility whilst in school is $u(c(t)) - \phi(t)$ in which $\phi(t)$ is a convex function that reflects a dislike of school, Oreopoulos (2004) formulates the lifecycle utility from Card (2000):

$$V(S, c(t)) = \int_0^S (u(c(t)) - \phi(t))e^{-\rho t}dt + \int_S^\infty (u(c(t)) - \phi(t))e^{-\rho t}dt$$

Letting be $u(c(t)) = \log c(t)$ he shows that the first order conditions yield:

$$\frac{y'(S)}{y(S)} = R_i + \rho e^{-\rho S}\phi(S) \equiv d(s) \qquad [1]$$

which is a simplified version of Card's model.

So, when inspecting this equation Card (2000) exhibits the two possible sources of heterogeneity affecting schooling choice and that he specifies in a simple way as:

$$\frac{y'(S)}{y(S)} = b_i - k_1 S \qquad [2]$$

$$d(S) = r_i + k_2 S \qquad [3]$$

where b_i and r_i are random variables and k_1 and k_2 are non-negative constants. Beginning with the first expression [2], Card (2000) observes heterogeneity from the benefits of schooling that is represented by different marginal returns to schooling. As of the second expression [3], Card (2000) observes that heterogeneity arises from differences in the marginal costs of schooling. Thus, from these two expressions the optimal schooling choice is:

$$S_i = (b_i - r_i)/k \qquad [4]$$

with $k = k_1 + k_2$. In this expression Card (2000) shows optimal schooling like a linear function of the heterogeneity terms of each individual. With this equilibrium in schooling choice, he points out that the marginal return to schooling is:

$$\beta_i \equiv b_i - k_1 S_i = b_i(1 - k_1/k) + r_i k_1/k$$

Concerning this framework, which allows heterogeneity in the costs and benefits, it is possible to see two particular cases for the distribution of returns to education. In the first case, Card (2000) supposes $k_2 = 0$ and $r_i = \bar{r}$ for all individuals, which permits to see that individuals have equality of opportunities and differences in the return to schooling arise due to heterogeneity in abilities. The second case occur when Card (2000) allows $k_1 = 0$ and $b_i = \bar{b}$, a situation where all individuals have equality of abilities and differences in the return to schooling arise due to heterogeneity in the marginal costs. Taking expectations $\bar{\beta} = E(\beta_i) = E(b_i - k_1 S_i) = \bar{b} - k_1 \bar{S}$ is the average marginal return from one more year of education for a random sample of population. Although this

average return might not be completely relevant for specific sub-populations, Card uses it as a point of reference to compare the coefficients of different estimation methods.

Taking this model as a basis, Card (2000) deducts an empirical form, where for simplicity he excludes experience in order to see the implications in the estimation of $\bar{\beta}$. Thus the equation he begins with is:

$$\log y(S) = \alpha_i + b_i S_i - \tfrac{1}{2} k_1 S_i^2$$

Card (2000) remarks that in this equation the individual heterogeneity can affect the intercept and the slope and re-writes it as

$$\log y(S) = a_0 + \bar{b} S_i - \tfrac{1}{2} k_1 S_i^2 + a_i + (b_i - \bar{b}) S_i \qquad [5]$$

where $a_i \equiv \alpha_i - a_0$ has mean 0. In this case Card says, equations [4] and [5] depict a two equation system in terms of $a_i, b_i \quad and \quad r_i$

where $a_i = \lambda_0 (S_i - \bar{S}) + u_i$ and $b_i - \bar{b} = \psi_0 (S_i - \bar{S}) + v_i$ are the linear projections of $a_i \quad and \quad (b_i - \bar{b})$ on observed schooling. When he substitutes these projections in [5] he arrives to:

$$\log y(S) = const + (\bar{b} + \lambda_0 + \psi_0 \bar{S}) S_i + (\psi_0 - \tfrac{1}{2} k_1) S_i^2 + u_i + v_i S_i$$

Further Card (2000) mentions that if the third central moments of a joint distribution for b_i and r_i are zero there will not be a correlation between $v_i S_i$ and S_i. In this case he explains that $E\left[(S_i - \bar{S})^3 \right] = 0$ and the projection of S_i^2 on S_i has a slope $2\bar{S}$. Then, when calculating the probability limit of the ordinary least squares regression regarding the coefficient for returns to education, he arrives to:

$$p\lim b_{ols} = \bar{b} + \lambda_0 - \psi_0 \bar{S} + 2\bar{S} \times (\psi_0 - 1/2k_1) \qquad [6]$$

$$p\lim b_{ols} = \bar{b} - k_1 \bar{S} + \lambda_0 + \psi_0 \bar{S}$$

$$p\lim b_{ols} = \bar{b} + \lambda_0 + \psi_0 \bar{S}$$

In this equation Card (2000) presents the ability bias problem that arises between schooling and earnings, where λ_0 is the traditional ability bias and ψ_0 is the comparative advantage bias. Card (2000) points out that in the case all individuals had the same marginal benefits from schooling the bias would be $p\lim b_{ols} - \bar{b} = \lambda_0$. Thus, λ_0 is equivalent to the omitted variable bias that arises from the correlation between the ability a_i and the marginal cost of schooling r_i and would be positive if $\text{cov}(a_i, r_i) < 0$ which means marginal costs are lower for persons that would earn more at any level of education. In the case that individuals have different marginal benefits together with different intercepts, Card (2000) asserts a more complicated problem because individuals with higher returns to education have incentives to have higher levels of education. Therefore, this endogen source of bias, according to him, will give a biased estimator even if there is no variation in the intercepts. This endogeneity bias is $\psi_0 \overline{S}$, where $\psi_0 = \text{cov}(b_i, S_i) / \text{var}(S_i) = k * f$ .Here f is the fraction of the variance of schooling that we can attribute to the differences in the slope of the earnings-schooling relation and it can be expressed as:

$$f = \frac{\text{var}(b_i) - \text{cov}(b_i, r_i)}{\text{var}(b_i) + \text{var}(r_i) - 2\,\text{cov}(b_i, r_i)}.$$

Moreover, if it is assumed that marginal benefits are no higher for persons that face higher marginal costs, i.e. $\text{cov}(b_i, r_i) < 0$, the ordinary least squares estimator will be upward biased. Additionally, if there is an additive measurement error in the schooling variable of the form $S_i^o = S_i + \varepsilon_i$, where S_i^o is observed schooling, S_i is true schooling and ε_i has $E(\varepsilon_i) = 0$ and variance σ_ε^2, Card (2000) shows that the probability limit of ordinary least squares estimator will be:

$$p\lim(b_{ols}) = R_0 \left\{ \bar{\beta} + \lambda_0 + \psi_0 \bar{S} \right\}$$

where $R_0 = \text{cov}(S_i^0, S_i) / \text{var}(S_i^0) = \text{var}(S_i) / \left[\text{var}(S_i) + \sigma_\varepsilon^2\right] < 1$ when $\varepsilon_i \perp S_i$. In this case the ordinary least squares estimator will be downward biased.

Further on Card (2000) analyses different instrumental variables (IV) estimators within this framework and concludes that IV estimators yield higher estimates than OLS

due to three important reasons. Firstly, he says that if assuming ability biases are small in the OLS estimates of the return to schooling, then the differences between IV and OLS will reflect the downward bias of OLS caused by measurements errors. Secondly, he states that IV estimates could be even more upward biased that OLS due to unobserved differences between the characteristics of the treatment and comparison groups. Thirdly, Card (2000) says that since researchers tend to favor estimates with higher t-statistics, this could produce a specification search bias. Fourthly, Card (2000) comments that under heterogeneity IV estimates that take into account changes in the supply side recuperate the returns to schooling of individuals with high returns to schooling. Finally, he argues that even with ideal instruments the results of IV estimators are weighted averages of the returns to education for the sub-population whose schooling decision was affected by the instrument and that OLS estimates, even if upward biased, are a somewhat conservative estimate of the causal effects for groups affected by supply side changes.

To summarize, the fact that the Mincer earnings function does not take into account all these possible sources of bias mentioned above through a complete supply and demand framework suggests, according to Pons (2004), an incompatibility with the optimizing behavior of individuals. In that sense Card (2000) concludes that using a supply and demand framework is more interesting since it results in more complete econometric models. However, both Pons (2004) and Card (2000) say that estimates from OLS and IV are interesting tools for estimating returns to education once we take into account the possible bias and are careful to interpret the results.

3.2. Job market signaling: Introduction to sheepskin effects

Pons (2004) explains that signaling hypothesis embraces several theories that consider education has more purposes than increasing productivity. On the one hand, Pons (2004) tells that signaling hypothesis leads to models of signaling, filter and selection which keep economic rationality and which on average anticipate that individuals with higher education levels are more productive and consequently receive higher earnings. She says that these theories consider the employers use education attainment, particularly the

diplomas, to obtain information and choose the most potentially productive workers. She remarks the models of Spence (1973) and Stiglitz (1975) about signaling, Arrow's (1973) models about filters mechanisms in function of the individuals' abilities and Rotschild and Stiglitz' (1976) selection models with educative requirement of the firms for the development of this hypothesis. In general, Pons (2004) explains that these models assume there is asymmetric information where workers usually have information about their level of productivity whereas the firms do not. In this context, individuals with different levels of productivity are self-selected to different levels of education and different solutions are conceived using education as a source of information. On the other hand, she exposes that there is a credentials approach studied by Berg (1970) and Dore (1976) where education serves as a way to access certain jobs in such a way that employers offer better wages and positions to persons with higher diplomas whether they are more productive or not. The possible reasons behind this, according to her, are snobbism, misperception about the value of education and entry barriers. Nevertheless, Pons clarifies that this approach in its extreme form does not work since it does not explain why employers would want to pay higher wages due to the possession of a diploma relative to the productivity of an employee. What is more, she argues that if certain employers acted in this pure form in a competitive market with other employers that did not proceed like this, the employers acting in a pure credentialist way would be in disadvantage. On the other hand, she says the theory behind signalization puts emphasis on the value of the information education gives about productivity than in the end will produce different earnings streams for individuals with different levels of productivity. Nevertheless, as she mentions, presently the signaling hypothesis is not in opposition to the human capital theory since the first considers that education serves to raise productivity and to inform about innate abilities. Conversely, the empirical implications of the signaling hypothesis makes it very attractive since it gets through the omitted ability problem in the earnings function because firms use education as a signal to get information about abilities. Furthermore, she argues that from this approach since firms have difficulty to observe ability and use education as a signal, the coefficient of an ability variable should not be unavoidably significant.

Finally and as a conclusion of this section, Ferrer and Riddell (2001) state that since the nature of returns to human capital is more complex than the implications of both theories, these two should be reliable to some extent. However, a problem arises when trying to use both theories for the study of human capital since the data for carrying out these studies usually shows only one of the two measures. Therefore, they presume that another possible source of bias in the returns to education might arise from the omission of credentials' effects. Furthermore, they judge it reasonable to assume that the importance of schooling years and credentials differ by level of schooling attainment, diploma and country. Thus, they conclude evaluating both measures is important for Canadian immigration policy since knowing the sheepskin effects might contribute to enhance admission criteria and facilitate integration of foreign human capital.

4. ESTIMATION APPROACH

For our econometric analysis we use a variation of the standard log-wage equation developed by Mincer (1974). Particularly, we will base our estimations on the equation Aydemir and Skuterud (2005) develop, making some changes for taking into account the sheepskin effects approach of Ferrer and Riddell (2004). Thus, like Aydemir and Skuterud (2005) we divide experience and schooling in their Canadian and foreign components. Moreover, to take into account the sheepskin effects we add a series of dummy variables with the highest earned degree achieved by the person[3]. Hence, the first equation is similar to the one used by Aydemir and Skuterud with the exclusion of interactions between cohorts and Canadian years of experience:

[3]These dummies reflect the census variable of highest earned diploma and are written in a non-cumulative way:

α_1 =1 if no diploma α_1=0 otherwise	α_4=1 if collegial diploma α_4=0 otherwise	α_7=1 if masters diploma α_7=0 otherwise
α_2=1 if secondary diploma α_2=0 otherwise	α_5=1 if university certificate α_5=0 otherwise	α_8=1 if PhD diploma α_8=0 otherwise
α_3=1 if school of trades certificate α_3=0 otherwise	α_6=1 if bachelor diploma α_6=0 otherwise	

The dummy of bachelor diploma includes persons with bachelor diploma, MD diploma and superior to bachelor diploma.

$$\log W = \beta_0 + \beta_1 EXP_c + \beta_2 EXP_c^2 + \beta_3 S_c + I\left(\begin{array}{l}\delta_1 + \sum_{j=2}^{k} \delta_j C_j + \theta_{11c} EXP_c + \theta_{1f} EXP_f + \theta_{2c} EXP_c^2 + \\ \theta_{2f} EXP_f^2 + \theta_{cf}(EXP_c * EXP_f) + \theta_{3c} S_c + \theta_{3f} S_f\end{array}\right) + u \quad [1]$$

The second equation adds the interactions between immigration cohorts and Canadian years of experience:

$$\log W = \beta_0 + \beta_1 EXP_c + \beta_2 EXP_c^2 + \beta_3 S_c + I\left(\begin{array}{l}\delta_1 + \sum_{j=2}^{k} \delta_j C_j + \theta_{11c} EXP_c + \sum_{j=2}^{k} \theta_{1jc}(C_j * EXP_c) + \theta_{1f} EXP_f + \theta_{2c} EXP_c^2 + \\ \theta_{2f} EXP_f^2 + \theta_{cf}(EXP_c * EXP_f) + \theta_{3c} S_c + \theta_{3f} S_f\end{array}\right) + u \quad [2]$$

The third equation adds common sheepskin effects:

$$\log W = \beta_0 + \beta_1 EXP_c + \beta_2 EXP_c^2 + \beta_3 S_c + \sum_{i=2}^{h} \alpha_i DEGREE_i + I\left(\begin{array}{l}\delta_1 + \sum_{j=2}^{k} \delta_j C_j + \theta_{1c} EXP_c + \sum_{j=2}^{k} \theta_{1jc}(C_j * EXP_c) + \theta_{1f} EXP_f + \theta_{2c} EXP_c^2 + \\ \theta_{2f} EXP_f^2 + \theta_{cf}(EXP_c * EXP_f) + \theta_{3c} S_c + \theta_{3f} S_f\end{array}\right) + u \quad [3]$$

Finally, the fourth equation allows for different sheepskin effects:

$$\log W = \beta_0 + \beta_1 EXP_c + \beta_2 EXP_c^2 + \beta_3 S_c + \sum_{i=2}^{h} \alpha_i DEGREE_i + I\left(\begin{array}{l}\delta_1 + \sum_{j=2}^{k} \delta_j C_j + \theta_{1c} EXP_c + \sum_{j=2}^{k} \theta_{1jc}(C_j * EXP_c) + \theta_{1f} EXP_f + \theta_{2c} EXP_c^2 + \\ \theta_{2f} EXP_f^2 + \theta_{cf}(EXP_c * EXP_f) + \theta_{3c} S_c + \theta_{3f} S_f + \sum_{i=2}^{h} \gamma_i DEGREE_i\end{array}\right) + u \quad [4]$$

In all equations, potential years of experience are divided in two variables that show Canadian years of experience (EXP_c) and foreign years experience (EXP_f) where EXP = EXP_c + EXP_f. Furthermore, all equations include an interaction of foreign and Canadian

years of experience (EXP_c*EXP_f) and the square of Canadian and foreign years of experience (EXP_c^2 and EXP_f^2 respectively) to reflect the decreasing pattern of these variables. In the case of schooling years we divide similarly to obtain Canadian schooling years (S_c) and foreign schooling years (S_f) where $S = S_c + S_f$.[4] In addition to the schooling years, equations [3] and [4] include a series of dummies representing the highest degree of the individual. This was made to test for sheepskin effects. The variable *I* is a dummy that takes value one for the immigrants and zero otherwise. The series of cohort dummies C_j reflect the earning differences among immigrants that entered at different periods of time. Other control dummies we use exclusively for immigrants refer to the region of birth. We also use supplementary common control dummies in all specifications for both, Canadians and immigrants that indicate knowledge of official languages, province of residence, married status and living in a metropolitan area.

Contrasting to Aydemir and Skuterud (2005), we use different macroeconomic labor market related variables to control for period effects. We decided to do this with the aim of testing the robustness of the results once we control with different variables that reflect information regarding the business cycle. Thus, after estimating the four equations with unemployment rate, which is interacted with immigrant dummy, we re-estimated equation [4] using unemployment rate, employment rate and labor activity rate[5]. The unemployment rate, defined as the percentage of the labor force that actively seeks for a

[4] Since we only have access to the Public User Micro Data File we have to derive some variables. Firstly, we calculate "years since migration" using the immigration year variable and the year when census was performed. In the cases where data is grouped, we used the mean of the group. Once this is done we derive "age at immigration" simply subtracting "years since migration" from the current age. Secondly, we estimate the total schooling years using the methodology suggested by Li (1997) that is explained in the next section. Thirdly, we calculate total potential years of experience using the Mincer (1974) age-S-6 formula. Once these variables are obtained and assuming all immigrants achieved their schooling in a continuous period of time and entered the labor market right after school we are able to observe the "age of entry to the labor market" for each immigrant after adding six years to "total schooling years". Then we compare the "age of entry to the labor market" with the "age at immigration". Only if "age of entry to the labor market">"age at immigration" we observe some Canadian schooling that we can calculate subtracting these variables. In the case of equality we do not observe Canadian schooling nor foreign experience and if "age of entry to the labor market"<"age at immigration" we do not observe Canadian schooling but foreign experience. We are aware of the problems that could arise from the continuous schooling assumption and measurement errors in education and experience. However, looking at the results of Card and Lemieux (2000) regarding school-leaving behavior where they find that just one quarter of those who leave school return in the future and from those, more than half just complete one semester or even less, we find very plausible this assumption.

[5] We estimated these rates using the Census Metropolitan Area (CMA) census classification for the years 1990, 1995 and 2000. For the persons living in rural areas we estimated the same rates within each province for the same years.

job but has not been able to find it, lets us know the difficulty individuals in the labor force have to find a job. Nonetheless, it is useful to remember that the unemployment rate does not take into account discouraged job seekers that leave the labor force when they perceive it is too difficult to find a job. For example, a relatively small unemployment rate might be hiding the fact that there are discouraged work seekers leaving the labor market, thus making the rate small. For this reason we also use the employment rate, which represents the percentage of working-age-people that has job, and the labor force activity rate, which is the percentage of working-age-people who work or are actively looking for one. In addition and with the purpose of staying away from the problem that Moulton (1990) reports from using macro data in micro data analysis, we use cluster-robust errors by province for all our estimations. A development of this robust cluster variance estimator is given by Williams (2000), which "[...] presents a general proof that the modified-sandwich estimator is unbiased for cluster-correlated data regardless of the setting [...]" (Williams, 2000, p.645).

5. DATA

In line of the current literature we use pooled data from the public use micro data files (PUMF) of three different Canadian censuses -1991, 1996 and 2001- to build our sample. The 1991 and 1996 PUMF contain both data based on a 2.8 percent sample of the population listed in the census. The 2001 PUMF contains data based on a 2.7 percent sample of the population listed in the census. Following Ferrer and Riddell (2004) our sample is restricted to fulltime male wage earners that reported working periods of 52 weeks per year and working hours of at least 30 hours per week. It is also limited to persons between 20 and 65 years old[6] living in Quebec, Ontario and the western provinces since we did not find enough immigrants for Atlantic Provinces. Our dependent variable is the log of weekly wages and salaries at constant prices (using the Consumer Price Index, CPI) of 2000. Like in other studies, the use of fulltime male workers in connection with weekly wages is a simple way to leave out labor supply

[6] We consider that schooling/labor decisions for persons under 20 might vary their labor market participation across censuses as well as retirement decisions might affect persons over 65 years old.

issues. Furthermore, we consider that females deserve their own study. So, our sample contains 244 047 individuals, from which 80.05 percent are native born Canadians and 19.95 percent are permanent resident immigrants. Table 1 shows the mean values of the variables for each group. In order to have consistent variables across censuses for the region of origin indicators we put them into 6 groups[7]. In order to calculate schooling years we used the methodology suggested by Li (1997). On the one hand, we recode some variables presented in intervals. On the other hand, we construct the variable from others available in the censuses. Individuals reporting less than grade 5 are coded as having 2.5 years of schooling. Individuals reporting between grade 5 and 8 are coded as having 6.5 years of schooling. Furthermore, schooling years for persons that reported secondary are equal to the highest grade achieved, with grade 13 recoded as year 12. Finally, schooling years for those with post-secondary education result from the sum of 12 years (of elementary and secondary schooling years) and years spent in university or non-university education, whichever is larger in number of years. A nuisance of our research arises from the data format of the census public files used in this study. Some variables are top coded while others are presented in intervals. In order to divide schooling years and experience in its Canadian and foreign components, like Ferrer and Riddell (2004), who face the same difficulty, we derive some variables such as immigration year, immigration age, entry year to labor market and age of entry to the labor market. In the case of year of immigration, we recoded it for the observations that were presented in intervals. The variable of age at immigration was almost completely derived from immigration year, present age and census year. These variables together with the schooling years helped us to approximate years since migration, labor force entry age and finally break up schooling years and experience years in its Canadian and foreign components[8]. In the remaining part of this section we make an effort to describe some general patterns among native-born male Canadians and male immigrants in an interesting but simple manner.

[7] Since data from the 1991 census used a different classification of countries than the other two and grouped some western and eastern European countries together we decided to put them into one group with exception of the England, which along with the United States of America are consistently measured. Thus, we use these two countries as reference region of origin. We sub-divided Asia in three groups but in preliminary analysis we found the coefficients were not statistically different, thus we decided to see Asia as a single group.

[8] *vid.supra* footnote 4

In Table 2 we can observe the male schooling attainment composition by census year and immigrant status. This table shows that within the groups a larger percentage of immigrants have university and post-university education in comparison to native-born Canadians for the three censuses. Moreover, the cumulative percentage of individuals with university and post-university education is increasing for both native-born Canadians and immigrants in the sample. Additionally, it is also interesting to revise the percentages of native-born Canadians and immigrants with college education. We notice that among native-born Canadians the percentage with college education increase for each census while for immigrants there is a decrease between the 1991 and 1996 censuses and a small increase between the 1996 and 2001 censuses. In contrast, for the secondary, primary and no schooling classifications we can see a continuous decrease throughout the three censuses for both groups.

Regarding credentials, Table 3 shows the male distribution of highest obtained diplomas of native-born Canadians and immigrants in the sample. The table allows us to revise the composition of the credentials that the two groups have. This is important for our analysis since we believe that the credentials of individuals have a different effect than the schooling years, thus being rewarded differently than the latter. In general, Table 3 also shows that between the two groups, immigrants have a larger percentage of individuals holding higher diplomas than native-born Canadians. For instance, while for the 1991 Census 17.38 percent of immigrants and the 11.76 percent of native-born have a Bachelor, Master or PhD degree, for the 2001 Census 23.70 percent of immigrants and 13.79 percent of native-born Canadians have a Bachelor, Master or PhD degree.

Language distribution knowledge by male native-born Canadians and male immigrants is presented in Table 4. This shows a small increasing trend among native-born Canadians in the knowledge of English or both (English and French), and a decrease in merely the knowledge of French. Interestingly, there is an increase in the percentage of immigrants knowing neither French nor English from the 1991 to the 1996 census. In contrast, when comparing the 1996 and 2001 censuses, we can see a very small increase in the knowledge of English and both (English and French) and a decrease for only French. The importance of this variable relies in the fact that the familiarity with at least one official language can facilitate the integration of immigrants since it can help them to

continue studying, obtain a job, acquire local experience, specific values, and develop other abilities that are valued in the Canadian labor market.

Table 5 shows the birth region composition among male immigrants for the three censuses. We can see that the proportion of immigrants coming from United States, England and European countries is decreasing, while the proportion of immigrants from Asia and Africa is increasing. In the case of male immigrants from Latin America, we can see that while their proportion increases between the 1991 and 1996 censuses, it shows a small decrease between the 1996 and 2001 censuses. Several studies of immigrants' returns to education argue that changes in the composition of source countries might explain the decrease of wages immigrants perceive. This decrease would be caused by the difficulties to transfer human capital from source countries that have very different societies and practices. In order to illustrate how these characteristics presented above interact with wages, we introduce another set of tables that describe the distribution of weekly wages.

Table 6 shows the average weekly wage by immigration status and schooling attainment for each census year for our sample. We observe that for the 1991 census, the average weekly wages for fulltime-working male immigrants seem similar or larger at all schooling levels than for native-born Canadians with the exception of secondary and college education. Conversely, for the subsequent censuses this seems to be reversed for all levels of education with exception to primary education for the 2001 Census.

Table 7 breaks down average weekly wages by immigrant status and highest obtained diplomas for each census. We see that in almost all categories, native-born Canadians seem to receive a higher average weekly wage than immigrants for the three censuses. The only categories in which immigrants seem to have a higher mean wage are school of trade's diploma collegial diploma and PhD diploma for the 1991 Census and school trades diploma for the 2001 Census.

Finally, table 8 shows the average weekly wages by region of origin and Census for our sample. We can see in this table that there are some differences in the wages of immigrants from different regions. Immigrants coming from the United States and England seem to earn more than native-born Canadians and immigrants from other regions. Moreover, immigrants from Europe and Africa seem to have similar

remuneration than Canadians. However, immigrants coming from Asia and Latin-America on average seem to earn lower weekly wages than native-born Canadians and the other groups. We must recall that Table 6, which describes the proportion of immigrants from different regions for each census, shows a noteworthy increase of immigration form Asia and Latin-America. Thus, it looks like that the variable "region of origin" is a key factor to explain the decrease in wages for immigrants. The next section discusses these issues in more detail using results from econometric estimations.

6. EMPIRICAL RESULTS

In this section we present the results from our estimations. We begin analyzing the results from estimating specifications [1], [2], [3] and [4] from Section 4 using unemployment rate interacted with immigrant dummy to control for period effects. The complete estimates from these regressions are shown in Table 9. However, for expositional purposes, we present some selected estimates in tables throughout the explanation and only occasionally ask the reader to see Table 9. Further, we examine some results from estimating specification [4] with different variables to control for period effects, specifically employment rate and activity rate. The complete results of these estimations are in Table 10 but we introduce some selected coefficients during the section to facilitate explanations and only occasionally ask the reader to see Table 10.

6.1. Results of specifications 1 to 4 using unemployment rate

6.1.1. Returns to experience

From Table 11 we can observe that the return to Canadian years of working experience for native-born Canadians is quite similar across the different specifications. Conversely, in the case of immigrants although showing negative coefficients for all specifications, only for specification [1] the coefficient is statistically significant at 10 percent level of confidence. However, when verifying immigrants' returns to Canadian experience for different cohorts relative to the immigrants arriving before 1970 in specifications [2] to [4], we remark that in general immigrants' returns to Canadian experience for later

cohorts are inferior to those from immigrants arriving before 1970. In the case of the 1970-1974 cohort we see an important reduction in the returns to Canadian experience followed by small improvement for the next cohort and again reductions for the 1980-1984 and 1985-1989 cohorts[9]. Only for the two most recent cohorts the coefficients are positive though not statistically significant. When comparing our results with those from Aydemir and Skuterud (2005), despite the differences in the coefficient values estimates, we coincide that there is a recovery of the last two arrival cohorts. Nevertheless, we also report a small recovery for the 1975-1979 cohort that Aydemir and Skuterud (2005) results do not capture.

With regards to evolution of returns to Canadian years of experience, for specifications [1] and [2], we see that for native-born Canadians the variation on wages with increases in years of Canadian experience goes from 4.17 percent with one year of Canadian experience to 3.02 percent with ten years of Canadian experience. In contrast, immigrants' variation on wages with increases in years of Canadian experience in specification [1] goes from 3.34 percent with one year of Canadian experience to 2.30 percent with ten years of Canadian experience respectively. Furthermore, for specifications [3] and [4], that control for common sheepskin effects and different sheepskin effects respectively, native-born variation on wages with increases in years of Canadian experience goes from 4.27 with one year of Canadian experience to 3.04 with ten years of Canadian experience. In the case of immigrants we can observe in Table 12 the different numbers for each cohort for specifications [2], [3] and [4] that allow for different assimilation patterns. In general for all the specification and cohorts, the immigrants' variation on wages with increases in years of Canadian experience is inferior with the exception of the most recent cohort.

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[9] After performing a Wald test on specification [2], [3] and [4] we fail to reject the null hypothesis of equality for the following premise:
Test canadian_exp* c1975_1979*imm= canadian_exp* c1980_1984*imm
(2) F(1,5) = 0.19 Prob > F = 0.6818
(3) F(1,5) = 0.05 Prob > F = 0.8358
(4) F(1,5) = 0.02 Prob > F = 0.8959
Conversely, we reject the null hypothesis of another series of Wald tests on specifications [2],[3] and [4] to test for equality of the following premise:
test canadian_exp* c1970_1974*imm= canadian_exp* c1975_1979*imm= canadian_exp* c1980_1984*imm
(2) F(2,5) = 17.95 Prob > F = 0.0052
(3) F(2,5) = 21.54 Prob > F = 0.0035
(4) F(2,5) = 18.36 Prob > F = 0.0050

Table 11

Returns to Canadian and Foreign Experience				
	Eq.1	Eq.2	Eq.3	Eq.4
Canadian experience	0.0431 (0.0014)***	0.0431 (0.0014)***	0.0441 (0.0014)***	0.0441 (0.0014)***
Canadian experienceXimmigrant	-0.0082 (0.0033)*	-0.0038 (0.0031)	-0.0050 (0.0033)	-0.0050 (0.0034)
Canadian experienceX1970-1974Ximmigrant		-0.0050 (0.0006)***	-0.0050 (0.0005)***	-0.0051 (0.0005)***
Canadian experienceX1975-1979Ximmigrant		-0.0020 (0.0004)***	-0.0020 (0.0004)***	-0.0020 (0.0004)***
Canadian experienceX1980-1984Ximmigrant		-0.0026 (0.0010)**	-0.0023 (0.0012)	-0.0023 (0.0013)
Canadian experienceX1985-1989Ximmigrant		-0.0075 (0.0012)***	-0.0067 (0.0016)***	-0.0065 (0.0017)**
Canadian experienceX1990-1994Ximmigrant		0.0056 (0.0037)	0.0075 (0.0037)*	0.0081 (0.0038)*
Canadian experienceX1995-2000Ximmigrant		0.0007 (0.0096)	0.0039 (0.0090)	0.0051 (0.0089)
Canadian experience^2	-0.0006 (0.0000)***	-0.0006 (0.0000)***	-0.0007 (0.0000)***	-0.0007 (0.0000)***
Canadian experience^{2}Ximmigrant	0.0001 (0.0001)	0.0000 (0.00001)	0.0000 (0.0001)	0.0000 (0.00001)
ForeignXCanadian experienceXimmigrant	-0.0003 (0.0000)***	-0.0003 (0.0000)***	-0.0005 (0.0000)***	-0.0005 (0.0000)***
Foreign experienceXimmigrant	0.0111 (0.0009)***	0.0111 (0.0009)***	0.0120 (0.0008)***	0.0121 (0.0007)***
Foreign experience^{2}Ximmigrant	-0.0003 (0.0001)***	-0.0003 (0.00001)***	-0.0003 (0.0000)***	-0.0003 (0.0000)***

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

When looking to the foreign experience coefficients in Table 11, we observe these being statistically significant in all specifications. Moreover, we can notice the returns to foreign experience are in all cases unsurprisingly small; indicating the transferability of foreign experience is low. The evidence collected by Schaafsma and Sweetman (2001) and Aydemir and Skuterud (2005) together with our evidence points out that returns to foreign experience are tiny. When comparing the returns to Canadian experience with the

returns to foreign experience we can see that the latter correspond to a little fragment in the region of 25.00 percent of the returns to Canadian experience.[10]

Table 12

Evolution of Immigrants Returns to Canadian experience (%)			
	Specification 2	Specification 3	Specification 4
Cohort 1970-1974			
Canadian experience =1yr	3.2707	3.2348	3.2225
Canadian experience =10yrs	2.1088	2.0639	2.0457
Cohort 1975-1979			
Canadian experience =1yr	3.5678	3.5440	3.5245
Canadian experience =10yrs	2.4059	2.3731	2.3476
Cohort 1980-1984			
Canadian experience =1yr	3.5106	3.5100	3.5018
Canadian experience =10yrs	2.3487	2.3391	2.3250
Cohort 1985-1989			
Canadian experience =1yr	3.0162	3.0737	3.0782
Canadian experience =10yrs	1.8543	1.9028	1.9014
Cohort 1990-1994			
Canadian experience =1yr	4.3293	4.4944	4.5383
Canadian experience =10yrs	3.1674	3.3235	3.3614
Cohort 1995-2000			
Canadian experience =1yr	3.8359	4.1262	4.2404
Canadian experience =10yrs	2.6740	2.9553	3.0635

(foreign experience=1yr)

The fact that immigrants' return to foreign experience is just a very small fraction of the returns to Canadian experience shows that Canadian labor market gives a low value to this human capital immigrants bring with them. This is seen more clearly in Table 13, revising the evolution of immigrants' returns to foreign working experience in presence of different amounts of Canadian years of experience. For example, when looking the left column for specification [1], Table 13 shows the variation on wage with increase in years of foreign experience going from 1.03 with one year to 0.57 with ten

[10] We reject the null hypothesis of a Wald test in all specifications for the following test:
test canadian_exp+canadian_exp*imm1=foreign_exp
(1) F(1,5) = 89.83 Prob> F = 0.0002
(2) F(1,5) = 165.89 Prob> F = 0.0001
(3) F(1,5) = 127.98 Prob> F = 0.0001
(4) F(1,5) = 113.49 Prob> F = 0.0001

years of foreign experience. Nevertheless, when looking the right column for the same specification (when immigrants have ten years of Canadian experience instead of one) the variation on wage with increase in years of foreign experience shrinks, starting now from 0.74 with one year of foreign experience and ending in 0.28 with ten years respectively. With reference to specifications [2], [3] and [4], we can see in Table 13 that the numbers undergo very small changes. However, despite these changes, results show foreign experience has a lower impact on wages for immigrants than Canadian experience and with increasing years of Canadian experience, the contribution of foreign experience is even poorer.

Table 13

Evolution of Immigrants Returns to Foreign experience (%)		
	Canadian experience =1yr	Canadian experience =10yrs
eq.1		
Foreign experience=1yr	1.0300	0.7428
Foreign experience=10yrs	0.5728	0.2856
eq.2		
Foreign experience=1yr	1.0249	0.7443
Foreign experience=10yrs	0.5666	0.2860
eq.3		
Foreign experience=1yr	1.0959	0.6877
Foreign experience=10yrs	0.5876	0.1794
eq.4		
Foreign experience=1yr	1.1036	0.6512
Foreign experience=10yrs	0.5807	0.1283

6.1.2. Birth region effects and knowledge of official languages effects

In Table 14 we observe the effects of region of birth. Overall, we see that the effects throughout all specifications are negative, quite similar and statistically significant. We also observe that as we pass from specification [1] to specification [4], which has sheepskin controls, the negative effects vaguely increase for Europe, Asia and Africa and dimly decrease for Latin America and other regions. On the whole, coming from regions different to the United States and England has negative effects on wages. Nevertheless, if we revise the effects of each region, we detect that there are important differences among them. For example, equation 4 shows that coming from Europe decreases the wage 10.07

percent compared to immigrants from United States and England, whereas coming from Asia decreases it about 26.93 percent compared to immigrants from United States and England. Similarly, in the same equation, coming from Latin America negatively affects the wage up to 23.77 percent while coming from Africa decreases the wage by 19.82 percent[11]. The magnitude, sign and significance of these coefficients support the idea that declines in immigrants' wages are related to the shifts in region of birth.

Table 14

Birth region effects for different specifications				
	Eq.1	Eq.2	Eq.3	Eq.4
Europe	-0.0934 (0.0148)***	-0.0939 (0.0144)***	-0.0976 (0.0175)***	-0.1007 (0.0175)***
Asia	-0.2507 (0.0063)***	-0.2509 (0.0062)***	-0.2665 (0.0092)***	-0.2693 (0.0110)***
Africa	-0.1847 (0.0203)***	-0.1850 (0.0200)***	-0.1955 (0.0233)***	-0.1982 (0.0245)***
Latin_America	-0.2543 (0.0257)***	-0.2537 (0.0255)***	-0.2419 (0.0235)***	-0.2377 (0.0229)***
Others	-0.0550 (0.0456)	-0.0535 (0.0457)	-0.0457 (0.0388)	-0.0417 (0.0366)

Robust standard errors in parentheses,
* significant at 10%; ** significant at 5%; *** significant at 1%
Region of Reference: United States and England

The evidence presented here concerning wage decrease for immigrants from non-traditional regions supports the results of Bloom, Gernier and Gunderson (1995) Green and Worswick (2003, 2004), Ferrer and Riddell (2004), Sweetman (2004) and Aydemir and Skuterud (2005) which conclude that an important part of the decrease in immigrants wages is due to the changes in the composition of source countries.

Turning to the effects of knowledge of French, both English and French and, neither English or French relative to the knowledge of English, we can see in Table 9 that all coefficients are statistically significant and show the importance of knowing English or both (English and French) relative to knowing only French or neither official language.

[11] After testing for the null hypothesis for equal region of origin coefficients among immigrants from Asia and Latin America, we fail to reject the null hypothesis for all equations. The test and results are:
Test Asia – Latin America = 0
(1) F(1,5) = 0.03 Prob > F = 0.8722
(2) F(1,5) = 1.02 Prob > F = 0.9020
(3) F(1,5) = 1.93 Prob > F = 0.2230
(4) F(1,5) = 3.86 Prob > F = 0.1067

Moreover, we can see that in the case of only knowing French, the coefficients for the first two specifications have a less negative impact than for the last two that control for sheepskin effects. Conversely, when looking the effects of knowing both languages relative to knowing only English, we can see that the positive effect diminishes when controlling for sheepskin effects in the last two specifications. Finally, for immigrants, the lack of knowledge of both official languages has further negative effects for specifications [3] and [4] than for specifications [1] and [2].

6.1.3. Sheepskin effects and Returns to schooling

Regarding sheepskin effects and return to Canadian and foreign schooling years for specifications [3] and [4], we can see in Table 15 that in most cases all coefficients are positive and statistically significant. Specification [3] shows that no matter the degree, there is an increase in the wage relative to the persons not having any degree whatsoever. This specification, which considers common sheepskin effects, shows a solid increase of the effect the higher the degree. For instance, having a Secondary diploma increases wage by 6.74 percent compared to not having any diploma whereas having a School of Trades diploma increases wage by 11.83 percent and having a College diploma increases it by 17.23 percent. In the case of University Certificate diploma, wage is increased by 19.49 percent whilst a Bachelor diploma gives a big leap of a 32.89 percent compared to someone without any diploma. Regarding graduate diplomas, having a Master diploma increases wages by 37.03 percent while having a PhD diploma increases wage by 44.12 percent compared to someone without any diplomas[12]. However, when checking the same results for specification [4], which allows for different sheepskin effects for native-born and immigrants, we see some differences between the groups. On the one hand, the coefficients interacting with immigrant dummy for Secondary diploma and University Certificate are not statistically significant, thus having a similar return relative to Canadians with equivalent diplomas. On the other hand, the coefficients for School of Trades and University diplomas are positive and statistically significant. Therefore, indicating that while for lower diplomas the sheepskin effects are not statistically

[12]When testing for equality of coefficients for specification [3] we reject the following null hypothesis: Master degree = PhD degree
(3) F(1, 5) = 28.78 Prob > F= 0.0030

different, for higher diplomas there are some differences in the returns for immigrants and native-born Canadians.

Table 15

sheepskin effects		
	Eq.3	Eq.4
Secondary diploma	0.0674 (0.0045)***	0.0686 (0.0040)***
School of trades diploma	0.1183 (0.0098)***	0.1108 (0.0104)***
Collegial diploma	0.1723 (0.0187)***	0.1588 (0.0246)***
University certificate	0.1949 (0.0283)***	0.1892 (0.0294)***
Bachelor diploma	0.3289 (0.0226)***	0.3041 (0.0251)***
Master diploma	0.3703 (0.0274)***	0.3295 (0.0319)***
PhD diploma	0.4412 (0.0258)***	0.3334 (0.0478)***
Secondary diplomaXimmigrant		-0.0190 (0.0200)
School of trades diplomaXimmigrant		0.0360 (0.0127)**
Collegial diplomaXimmigrant		0.0558 (0.0255)*
University certificateXimmigrant		0.0267 (0.0240)
Bachelor diplomaXimmigrant		0.0987 (0.0228)***
Master diplomaXimmigrant		0.14513 (0.0230)***
PhD diplomaXimmigrant		0.2616 (0.0396)***

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Moreover, for native-born Canadians we fail to reject the null hypothesis of equal coefficients for having a Master diploma and a PhD diploma whereas for immigrants we do reject the null hypothesis of equal sheepskin effects of these two diplomas. So, according to these results, there are higher sheepskin effects for immigrants the higher the

diploma.[13] For instance, holding a Bachelor diploma increases the wage by 9.87 percent more for an immigrant than for a native-born Canadian. In the case of holding a Master diploma the increase in wage for an immigrant is 14.51 percent higher than for a native-born Canadian. Finally, for an immigrant in possession of a PhD diploma the wage increases by 26.16 percent more compared to a native-born Canadian holding the same diploma.

Our results using the sheepskin approach adopted by Ferrer and Riddell (2004) and Alboim, Finnie and Meng (2005) show interesting results regarding the different effects of these variables in wages. Like them, we find that by introducing sheepskin effects we observe that credentials affect the wage in a different way than schooling does. Similarly to Ferrer and Riddell (2004), we find that especially for higher degrees the sheepskin effects are more important for immigrants than for native-born.

On the subject of the returns to Canadian and foreign schooling years, Table 16 shows these returns are higher for specifications [1] and [2] than for specifications [3] and [4], which control for sheepskin effects. However, despite the specification, the return to one more year of Canadian schooling is less valued for an immigrant than for a native-born Canadian. The coefficients in Table 16 allow seeing that immigrants' returns to Canadian schooling is lower than native-born' returns with a 5 and 1 percent level of confidence for all specifications. Surprisingly, when we allow for different sheepskin effects (specification [4]), the return to one more year of Canadian schooling decreases for immigrants while increasing for native-born Canadians. This change indicates to us, together with the differences in sheepskin effects, that there is a different perception and valuation of education for native-born Canadians and immigrants. Furthermore, we fail to reject the null hypothesis that immigrants' return to one more year of foreign schooling is equal to the immigrants' return to one more year of Canadian schooling for all

[13] Testing for native-born in specification [4] we fail to reject the following null hypothesis:
Master degree = PhD degree
(4) F(1, 5) = 0.03 Prob > F= 0.8797
However, when testing the same coefficients for immigrants we reject the following null hypotheses:
a) Master degree*imm1= PhD degree *imm1
(4) F(1, 5) =32.72 Prob > F = 0.0023
b) Master degree + Master degree*imm1= PhD degree + PhD degree*imm1
(4) F(1, 5) =113.88 Prob > F =0.0001

equations[14]. The fact that the return to foreign schooling seems to have an equal value to the returns immigrants receive for Canadian schooling provides evidence that this precise form of human capital that is acquired in another country is valued as much as the human capital immigrants acquire in Canada.

Table 16

Return to Canadian and foreign school years			
Specification	Return to one more year of Canadian schooling		Return to one more year of foreign schooling
	Canadians	Immigrant differential	Immigrants
Eq.1	0.0750 (0.0034)***	-0.0142 (0.0040)**	0.0618 (0.0034)***
Eq.2	0.0750 (0.0034)***	-0.0141 (0.0041)**	0.0620 (0.0034)***
Eq.3	0.0390 (0.0015)***	-0.0118 (0.0029)***	0.0297 (0.0020)***
Eq.4	0.0427 (0.0019)***	-0.0250 (0.0045)***	0.0204 (0.0027)***

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Separating schooling in its foreign and Canadian components permits us to observe and provide further evidence in the same direction of Schaafsma and Sweetman (2001) and Aydemir and Skuterud (2005). Like them, we find differences in the returns to Canadian schooling among native-born and immigrants, being lower for the latter. In addition, we also find that returns to foreign schooling are not different to the immigrants' returns to Canadian schooling. Nonetheless, sheepskin effects show their importance, being the coefficients larger for immigrants the higher the diploma. The fact that the results of schooling years are consistently smaller when controlling for sheepskin effect for the last two specifications illustrates that assuming constant returns to schooling and not controlling for sheepskin effects hides a non-linearity and merges different information. Additionally, separating schooling effects from sheepskin effects shows that schooling effects are lower for immigrants than for native-born whereas the sheepskin

[14] test shclyrs_can+ shclyrs_can*imm1= shclyrs_foreign
(1) F(1, 5) = 0.64 Prob > F = 0.4601
(2) F(1, 5) = 0.67 Prob > F = 0.4502
(3) F(1, 5) = 3.37 Prob > F = 0.1258
(4) F(1, 5) = 3.13 Prob > F = 0.1371

effects are higher for immigrants, which again is in line with the results from Alboim, Finnie and Meng (2005) and Ferrer and Riddell (2004).

6.2. Results from estimating specification 4 with different labor market related variables

All estimations given until now use unemployment rate interacting with the immigrant dummy to control for period effects. But, since we believe there are other variables that might be more informative regarding the labor market and could provide better results to control for these period effects, thus changing some estimates, for the remaining of the section we use specification [4] together with different labor market related variables to check for this possibility. Table 10 presents the results of the three estimations we carried out, which use unemployment rate, employment rate and activity rate, respectively, to control for period effects for each census. We present selected estimates in tables throughout the explanation and ask only occasionally the reader to see Table 10.

6.2.1. Cohort effects

Concerning the arrival cohort effects, Table 17 illustrates that using employment rate and activity rate instead of unemployment rate changes the statistical significance, values and sign of these coefficients[15]. More specifically in Table 17, we observe that for specification [4.1], which uses unemployment rate, only the 1970-1974 and 1975-1979 cohorts have a positive sign and the rest have a negative sign. Alternatively, for specification [4.2], which uses employment rate, only the 1990-1994 and 1995-2000 cohorts have negative sign. Conversely, for specification [4.3], which uses activity rate, we observe that only the 1990-1994 cohort shows a negative sign. Furthermore, when examining the coefficients for each cohort across specifications [4.1] to [4.3], we see that for the 1970-1974 cohort there are not large variations. However, when we revise the 1975-1979 cohort we see that even though all coefficients show a decrease, the values of

[15]Although not all coefficients are individually statistically significant when testing for joint statistical significance we reject the null hypothesis of the following test:
test c1975-1979 = 0 c1980-1984 = 0 c1985-1989 =0 c1990-1994 =0 c1995-2000 = 0
(4,1) F(5,5) = 187.12 Prob > F = 0.0000
(4,2) F(5,5) = 190.49 Prob > F = 0.0000
(4,3) F(5,5) = 32.88 Prob > F = 0.0008

the coefficients from specification [4.2] and [4.3] more than double the value of coefficient of specification [4.1]. In the case of the 1980-1984 cohort we notice that while for specification [4.1] the coefficient turns out to be negative, specifications [4.2] and [4.3], although decreasing, remain positive. Moreover, for the 1985-1989 cohort the three coefficients report a recovery but still, the result from specification [4.1] stays negative while coefficients from specifications [4.2] and [4.3] remain positive. Conversely, for the 1990-1994 cohort we distinguish that for all specifications the coefficients show an important decrease and are negative. Nevertheless, the estimate from specification [4.1] shows the lowest entry effect relative to immigrants coming before 1970. Lastly, the 1995-2000 cohort shows a recovery for all specifications but still a negative value for specifications [4.1] and [4.2].

Table 17

Cohort Effects			
	Eq. 4.1	Eq. 4.2	Eq. 4.3
1970-1974	0.0864 (0.0140)***	0.0945 (0.0131)***	0.0907 (0.0129)***
1975-1979	0.0154 (0.0160)	0.0384 (0.0162)*	0.0434 (0.0148)**
1980-1984	-0.0141 (0.0235)	0.0187 (0.0212)	0.0302 (0.0195)
1985-1989	-0.0069 (0.0265)	0.0415 (0.0235)	0.0656 (0.0179)**
1990-1994	-0.1880 (0.0211)***	-0.1061 (0.0282)**	-0.0698 (0.0317)*
1995-2000	-0.1107 (0.0462)*	-0.0338 (0.0396)	0.0274 (0.0407)
Labor market control variable			
unemployment rate employment rate Activity rate	YES NO NO	NO YES NO	NO NO YES

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The use of different controls for period effects affect the sign, magnitude and significance of the entry effects. Nonetheless, despite the labor market control variable, all the specifications show the same downturns and upturns. Hence, as regards to cohort effects, when using unemployment rate to control for period effects, like Aydemir and Skuterud (2005), we find that there has been a deterioration of entry earnings which is in

line with the finding of most researchers. However, our results report positive coefficients for the 1970-1974 and 1975-1979 cohorts and smaller negative effects for subsequent cohorts than the results from Aydemir and Skuterud (2005), which report more important and increasing negative effects. Nevertheless, our results, like theirs, show a strong deterioration for the 1990-1994 cohort and a recovery for the 1995-2000 cohort. When using other market labor related variables, however, we find negative entry effects to be not as large and significant as when using unemployment rate.[16]

6.2.2. Returns to experience

In table 18 we can see the estimates relative to Canadian and foreign years of working experience. Regarding the return to Canadian years of experience for native-born Canadians, we observe that it does not present important changes when using different labor market related variables to control for period effects. Table 18 shows that the returns to Canadian experience for native-born for all estimations is on average 4.44 percent. Once more, we can see that for immigrants there is no statistically significant difference in the returns to Canadian experience relative to native-born. Nevertheless, when looking at the returns to Canadian experience of different arrival cohorts relative to the immigrants arriving before 1970, we can observe some similarities and differences across specifications. Firstly, we remark for specifications [4.1] to [4.3] that in general the returns to Canadian experience for immigrant cohorts between 1970 and 1989 seem to be inferior to the returns for immigrants arriving before 1970. Secondly, we see that the three specifications follow the same downturns and upturns. Nevertheless, when looking at the magnitudes of the coefficients, the specification [4.1] shows larger negative values than specifications [4.2] and [4.3].[17]

[16] Differences from our results and others can be explained for many reasons. For instance, we only used 3 censuses from the 1990's while Aydemir and Skuterud (2005) also use censuses from the 1980's. Moreover, for our research, we use the Public users micro files, which have only a sample of the population and have variables that are top coded or grouped whereas Aydemir and Skuterud (2005) have access to the complete census files and less coding restrictions which could provoke miss-measurement biases in our results. Others source of differences are that we limit the scope of our research to investigate sheepskin effects and the sensibility of the results due to changes in the labor market related variable while Aydemir and Skuterud (2005) follow Green and Worswick (2003) in order to control for entry effects for native-born Canadians.

[17] After performing a Wald test of joint significance for the three specifications we reject the null hypothesis at 1 percent for specifications 4,1 and 4,2 and at 10 percent for 4,3 of the following test: test can_exp*c1975-1979*imm1 = 0 can_exp*c1980-1984*imm1 = 0 can_exp*c1985-1989*imm1 = 0 can_exp*c1990-1994*imm1 = 0 can_exp*c1995-2000*imm1 = 0

Table 18

Returns to Canadian and Foreign Experience			
	Eq.4.1	Eq.4.2	Eq.4.3
Canadian experience	0.0441 (0.0014)***	0.0444 (0.0015)***	0.0448 (0.0014)***
Canadian experienceXimmigrant	-0.0050 (0.0034)	-0.0029 (0.0033)	-0.0025 (0.0036)
Canadian experienceX1970-1974Ximmigrant	-0.0051 (0.0005)***	-0.0046 (0.0004)***	-0.0036 (0.0005)***
Canadian experienceX1975-1979Ximmigrant	-0.0020 (0.0004)***	-0.0017 (0.0004)***	-0.0006 (0.0003)
Canadian experienceX1980-1984Ximmigrant	-0.0023 (0.0013)	-0.0018 (0.0015)	-0.0002 (0.0014)
Canadian experienceX1985_1989Ximmigrant	-0.0065 (0.0017)**	-0.0063 (0.0020)**	-0.0044 (0.0018)*
Canadian experienceX1990-1994Ximmigrant	0.0081 (0.0038)*	0.0050 (0.0041)	0.0073 (0.0038)
Canadian experienceX1995_2000Ximmigrant	0.0051 (0.0089)	0.0020 (0.0095)	0.0023 (0.0095)
Canadian experience^2	-0.0007 (0.0000)***	-0.0007 (0.0000)***	-0.0007 (0.0000)***
Canadian experience^{2}Ximmigrant	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)
ForeignXCanadian experienceXimmigrant	-0.0005 (0.0000)***	-0.0005 (0.0000)***	-0.0005 (0.0000)***
Foreign experienceXimmigrant	0.0121 (0.0007)***	0.0118 (0.0007)***	0.0114 (0.0007)***
Foreign experience^{2}Ximmigrant	-0.0003 (0.0000)***	-0.0003 (0.0000)***	-0.0003 (0.0000)***
Labor market control variable Unemployment rate employment rate activity rate	 YES NO NO	 NO YES NO	 NO NO YES

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

In this sense, the use of different labor market related variables to control for period effects is affecting the magnitude of the coefficients and the statistical significance but not the patterns of deterioration (and recovery).

With regards to the foreign experience coefficients in Table 18, we observe these being statistically significant in all specifications and although the specifications [4.2]

(4,1) F(5,5) = 190.58 Prob > F = 0.0000
(4,2) F(5,5) = 454.39 Prob > F = 0.0000
(4,3) F(5,5) = 4.34 Prob > F = 0.0666

and [4.3] show slightly lower returns than specification [4.1], the differences are very tiny. In general we detect that returns to foreign experience are in all cases small compared to immigrants' returns to Canadian experience[18]. So, despite the changes in labor market control variables, we still observe foreign experience has a lower impact in wages than Canadian experience for immigrants.

6.2.3. Returns to schooling

As to the coefficients of returns to schooling for specifications [4.1], [4.2] and [4.3], Table 20 summarizes the results. We observe that the return to one more year of Canadian schooling for native-born when using unemployment rate (specification [4.1]) or employment rate (specification [4.2]) is around 4.26 percent while for the estimation using activity rate (specification [4.3]) the return is slightly higher. Conversely, for immigrants the returns for Canadian schooling in specification [4.1] are about 1.77 percent whereas for specification 4.2 they are 1.98 percent and finally for specification [4.3] they are 2.18 percent. Thus, when changing the labor market control variable we observe immigrants' returns to Canadian schooling increase. For instance, while for specification [4.1] immigrants' returns to Canadian schooling represent about 41.41 percent of the returns to a native-born, for specification [4.2] these represent 46.48 percent and for [4.3] these represent 50.20 percent. Finally, when we revise the return of one more year of foreign schooling, we notice that these returns only present tinny increases when changing the labor market control variable from unemployment rate to employment rate or activity rate. Finally, although it seems that foreign returns are higher than Canadian returns for immigrants, when testing for this possibility we fail to reject the null hypothesis of equality[19].

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[18] After performing a Wald test we reject the null hypothesis for all specifications of the following premise:
Test canadian_exp+canadian_exp*imm1=foreign_exp
(4,1) F(1,5) = 113.49 Prob > F = 0.0001
(4,2) F(1,5) = 187.65 Prob > F = 0.0000
(4,3) F(1,5) = 150.65 Prob > F = 0.0001

[19] When testing equal immigrants' returns to Canadian schooling and foreign schooling, we fail to reject the null hypothesis: test shclyrs_can+ shclyrs_can*imm1= shclyrs_foreign
(4.1) F(1,5) = 3.13 Prob > F = 0.1371
(4.2) F(1,5) = 0.33 Prob > F = 0.5899
(4.3) F(1,5) = 0.96 Prob > F = 0.3727

Table 19

Return to Canadian and foreign school years				
	Return to one more year of Canadian schooling		return to one more year of foreign schooling	Labor market control variable
	Canadians	Immigrant differential	Immigrants	
Eq.4.1	0.0427 (0.0019)***	-0.0250 (0.0045)***	0.0204 (0.0027)***	Unemployment rate
Eq.4.2	0.0426 (0.0018)***	-0.0228 (0.0042)***	0.0205 (0.0028)***	Employment rate
Eq.4.3	0.0433 (0.0018)***	-0.0216 (0.0047)***	0.0207 (0.0029)***	Activity rate

Robust standard errors in parentesis
* significant at 10%; ** significant at 5%; *** significant at 1%

In general all these results indeed show some evidence about the importance of the labor market related variable used to control period effects. As we have seen, using different variables changes the magnitude of some coefficients while for others it changes not only the magnitude but also the sign and the significance. However, despite the results presented here support the evidence of different informative characteristic from the unemployment, employment and activity rates, we are not able to distinguish to what extent employment and activity rates are better controls than unemployment rate. Nevertheless, the information that the employment rate and the activity rate give about the availability of jobs, the adequacy amongst the skills supplied by native-born and immigrants and the accessible jobs, should be considered in further studies that attempt to control for period effects.

7. CONCLUSION

In this study we explore the returns to schooling, sheepskin effects and experience of immigrants applying a variation to specification used by Aydemir and Skuterud (2005) that allows separating the variables of education and experience in their Canadian and foreign components. Our research takes a different path and introduces the sheepskin approach from Ferrer and Riddell (2004) and Alboim, Naomi, Ross Finnie, and Ronald Meng (2005) as well as different labor market related variables to control for period effects. Additionally, we limit our study to the 1991, 1996 and 2001 censuses while

Ferrer and Riddell (2004) and Aydemir and Skuterud (2005) among others also use the 1980's censuses. Nonetheless these differences and our data limitation to the 1990's censuses, our results are consistent with the literature. They show that regarding experience, the return of one more year of Canadian experience is not lower for immigrants than for native-born Canadians. Nonetheless, when we allow different assimilation patterns for Canadian experience and include sheepskin effects, we observe deterioration in the returns to Canadian experience relative to the returns for immigrants arriving before 1970. We also observe a recovery in these returns for the two most recent cohorts (1990-1994 and 1995-2000), where the return to one more year of Canadian experience approaches the return of Canadian experience for immigrants arriving before 1970. On the other hand, the return to foreign experience for immigrants is small compared to the returns to Canadian experience. Thus, our evidence plus the results collected in the researches of Schaafsma and Sweetman (2001) and Aydemir and Skuterud (2005) point out that returns to foreign experience are tiny, thus indicating a low transferability of this kind of human capital. Furthermore, the estimates concerning region of origin support the conclusions of Bloom, Gernier and Gunderson (1995) Green and Worswick (2003, 2004), Ferrer and Riddell (2004), Sweetman (2004) and Aydemir and Skuterud (2005) among others regarding the negative effects on wages from the shift of traditional source countries to non-traditional source countries, particularly from Asia and Latin America. Additionally, separating schooling effects from sheepskin effects shows that returns to Canadian schooling are lower for immigrants than for native-born whereas the sheepskin effects are higher for immigrants, which again is in line with the results from Alboim, Finnie and Meng (2005) and Ferrer and Riddell (2004). Furthermore, the fact of separating schooling in its foreign and Canadian components permits us to observe and provide further evidence in the direction of Schaafsma and Sweetman (2001) and Aydemir and Skuterud (2005). Like them, we find differences in the returns to Canadian schooling among native-born and immigrants, being lower for the latter. In addition, we also notice that returns to foreign schooling are not different to immigrants' returns to Canadian schooling across all specifications.

On the subject of sheepskin effects, we detect that diplomas have an important effect on wages of natives and immigrants. Moreover, when allowing interactions of

sheepskin effects with the immigration dummy, we observe that for immigrants the sheepskin effects are remarkably large for university diplomas. Although for native-born we find no significant difference between the sheepskin effect of a master diploma and a PhD, for immigrants we do find statistically different sheepskin effects at these levels.

As regards to cohort effects, when using unemployment rate to control for period effects like Aydemir and Skuterud (2005), we find that there has been a deterioration of entry earnings which is in line with the finding of most researches. Specifically, we find results showing a strong deterioration for the 1990-1994 cohort and a recovery for the most recent 1995-2000 cohort. However, when using other market labor related variables we find negative entry effects to be not as large and significant as when using unemployment rate. Additionally, we observe that when using unemployment, employment and activity rates to control for period effects, results change notably regarding estimates for province, cohorts and experience. Our results are an attempt to encourage their use. Thus, we believe these variables should be employed in further research. Nevertheless, since this study only uses the Public User Micro-data Files from the last three Canadian censuses to construct a pooled sample, additional studies using more censuses and more precision in some socio-economic and demographic variables are needed.

8. TABLES

Table 1

	Sample Means by immigrant status	
Variable	Canadians	Immigrants
Earnings		
log (weekly wage)(*)	6.6912	6.6640
	(0.6604)	(0.7128)
Potential experience years		
years of Canadian experience	20.4897	17.0644
	(10.7796)	(10.3876)
years of foreign experience		6.9807
		(8.0500)
Canadian experience^2	536.0264	399.0938
	(504.0554)	(407.4315)
Foreign experience^2		113.5310
		(221.7315)
Foreign experience*Canadian experience		95.4346
		(124.7745)
Schooling years		
Canadian schooling years	13.0709	2.9719
	(2.7090)	(5.0917)
foreign schooling years		10.4093
		(5.5590)
Highest degree or diploma		
No diploma	0.2113	0.2118
	(0.4082)	(0.4086)
secondary diploma	0.2380	0.1742
	(0.4259)	(0.3793)
school of trades diploma	0.1628	0.1556
	(0.3692)	(0.3625)
collegial diploma	0.1688	0.1541
	(0.3746)	(0.3610)
University certificate	0.0214	0.0311
	(0.1449)	(0.1736)
bachelor degree	0.1538	0.1793
	(0.3607)	(0.3836)
Master degree	0.0369	0.0654
	(0.1884)	(0.2472)
PhD degree	0.0070	0.0286
	(0.0835)	(0.1666)

(Table 1 continues…)

	Sample Means by immigrant status	
Variable	Canadians	Immigrants
Province of residence		
Ontario	0.3974	0.5987
	(0.4894)	(0.4902)
Quebec	0.2905	0.1168
	(0.4540)	(0.3212)
Manitoba	0.0464	0.0312
	(0.2103)	(0.1737)
Saskatchewan	0.0375	0.0097
	(0.1900)	(0.0978)
Alberta	0.1133	0.0910
	(0.3169)	(0.2876)
British Columbia	0.1150	0.1527
	(0.3190)	(0.3597)
Other characteristics		
Age	39.5606	43.4263
	(10.1069)	(10.3946)
Metropolitan area	0.6469	0.8793
	(0.4779)	(0.3258)
Married	0.6275	0.7685
	(0.4835)	(0.4218)
Knowledge of official languages		
Knowledge of English	0.6394	0.8242
	(0.4802)	(0.3807)
Knowledge of French	0.1252	0.0208
	(0.3309)	(0.1429)
Knowledge of both	0.2354	0.1353
	(0.4243)	(0.3421)
Knowledge of neither	0.0000	0.0197
	(0.0000)	(0.1389)

(Table 1 continues…)

	Sample Means by immigrant status	
Variable	Canadians	Immigrants
Region of birth		
US-England		0.2050
		(0.4037)
Europe		0.3438
		(0.4750)
Asia		0.2779
		(0.4480)
Africa		0.0492
		(0.2162)
Latin-America		0.1138
		(0.3176)
other regions		0.0103
		(0.1011)
Immigration cohort		
Before 1970		0.3067
		(0.4611)
1970 - 1974		0.1398
		(0.3468)
1975 - 1979		0.1935
		(0.3951)
1980 - 1984		0.0900
		(0.2861)
1985 - 1989		0.1264
		(0.3323)
1990 - 1994		0.0954
		(0.2938)
1995 - 2000		0.0482
		(0.2142)
Observations	195,348	48,699

(*) based on wages at constant prices (index, 2000=100)
Standard Errors in parenthesis

Table 2

Schooling by immigrant status and Census year (%) (Males)						
	Census 1991		Census 1996		Census 2001	
Schooling	Canadian	immigrant	Canadian	immigrant	Canadian	immigrant
No schooling	2.27	4.64	1.95	4.41	1.58	3.84
Primary	11.86	13.3	10	11.12	8.14	8.93
Secondary	27.61	16.36	26.24	15.96	23.62	13.96
College	28.64	25.21	29.14	24.97	30.82	25.39
University	22.93	28.72	25.29	30.77	26.94	31.81
Pos-university	6.69	11.76	7.38	12.77	8.9	16.07
Total	100	100	100	100	100	100

Source: Estimated by the author with data from the
1991, 1996 & 2001 Canadian Censuses

Table 3

Highest degree by immigrant status and Census year (%) (Males)						
	Census 1991		Census 1996		Census 2001	
Highest diploma	Canadian	Immigrant	Canadian	Immigrant	Canadian	Immigrant
No diploma	40.93	36.41	37.76	33.15	34.65	29.77
Secondary	22.09	18.12	22.22	18.04	22.75	18.66
School of trades	14.23	15.74	13.86	14.01	14.46	12.87
Collegial	9.56	10.05	11.64	12.19	12.64	11.79
University certif.	1.45	2.29	1.65	2.95	1.72	3.21
Bachelor	9.44	12.06	10.22	13.57	10.93	16.18
Master	1.95	3.85	2.20	4.31	2.41	5.44
PhD	0.37	1.47	0.44	1.79	0.45	2.08
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Estimated by the author with data from the
1991, 1996 & 2001 Canadian Censuses

Table 4

Knowledge of official languages by immigrant status and Census year (%) (Males)						
	Census 1991		Census 1996		Census 2001	
languages	Canadian	Immigrant	Canadian	Immigrant	Canadian	Immigrant
English	65.57	79.48	65.61	78.83	66.09	79.21
French	16.47	3.46	15.69	3.44	14.7	3.13
Both	17.6	12.52	18.27	12.42	18.89	12.89
Neither	0.36	4.54	0.43	5.31	0.32	4.77
Total	100	100	100	100	100	100

Source: Estimated by the author with data from the
1991, 1996 & 2001 Canadian Censuses

Table 5

Immigrants by birth region and Census year (%)(Males)			
Birth region	Census 1991	Census 1996	Census 2001
US-England	20.88	17.20	14.14
Europe	39.48	34.92	31.78
Asia	24.68	31.56	37.21
Africa	4.30	4,92	5,64
Latin-America	9.85	10,53	10,33
Others	0.81	0.87	0.89
Total	100.00	100.00	100.00

Source: Estimated by the author with data from the
1991, 1996 & 2001 Canadian Censuses

Table 6

Sample average weekly wages by schooling, immigrant status and census year						
	1991		1996		2001	
Schooling	Canadian	immigrant	Canadian	immigrant	Canadian	immigrant
no_schooling	599.90	690.21	629.55	611.57	609.63	595.85
Primary	722.53	738.52	712.57	693.71	696.55	716.87
Secondary	798.91	744.14	770.70	723.91	771.00	735.94
College	861.28	855.91	843.89	792.80	840.78	796.37
University	1025.97	1027.98	1022.25	981.03	1070.47	1007.49
Pos-university	1251.01	1261.54	1236.34	1216.94	1279.36	1210.06

Source: Estimated by the author with sample data from the
1991, 1996 & 2001 Canadian Censuses at constant prices (base year 2000)

Table 7

Sample average weekly wages by highest degree, immigrant status and census year						
Highest	1991		1996		2001	
Diploma	Canadian	immigrant	Canadian	immigrant	Canadian	immigrant
No diploma	631.63	606.98	689.67	635.52	756.23	702.92
Secondary	708.42	677.00	765.03	696.82	836.68	773.46
School of trades	734.69	765.59	822.69	819.42	903.79	913.69
Collegial	782.41	831.66	870.64	864.07	988.53	969.41
University certif.	896.67	839.94	973.14	868.29	1119.03	920.43
Bachelor	989.40	965.85	1091.70	1029.60	1287.80	1149.39
Master	1145.63	1064.62	1273.34	1187.63	1482.45	1283.70
PhD_d	1226.71	1290.56	1351.12	1341.04	1508.80	1492.30

Source: Estimated by the author with sample data from the
1991, 1996 & 2001 Canadian Censuses at constant prices (base year 2000)

Table 8

Sample average weekly wages by region of origin and census year			
Region of origin	1991	1996	2001
Canada	934.36	934.77	967.34
US-England	1147.84	1152.79	1194.98
Europe	959.81	951.69	991.74
Asia	822.14	778.49	842.12
Africa	957.38	919.64	962.63
Latin-America	790.27	767.34	800.10
Others	976.04	882.61	998.44

Source: Estimated by the author with sample data from the
1991, 1996 & 2001 Canadian Censuses at constant prices (base year 2000)

Table 9

	Eq.1	Eq.2	Eq.3	Eq.4
	log(weekly wage)	log(weekly wage)	log(weekly wage)	log(weekly wage)
Immigration status				
Immigrant	0.475486	0.4096334	0.3789304	0.5290844
	(0.1050490)***	(0.1034589)**	(0.0957303)**	(0.1040340)***
Potential Experience				
Canadian experience	0.0430807	0.0430809	0.044148	0.0441039
	(0.0013929)***	(0.0013935)***	(0.0013783)***	(0.0013870)***
Canadian experienceXimmigrant	-0.0081983	-0.0037758	-0.004998	-0.0050084
	(0.0032680)*	(0.0030631)	(0.0032807)	(0.0034019)
Foreign experienceXimmigrant	0.0111269	0.0110702	0.0119775	0.0121192
	(0.0009180)***	(0.0009440)***	(0.0007928)***	(0.0006937)***
Canadian experience^2	-0.0006428	-0.0006428	-0.0006884	-0.0006834
	(0.0000412)***	(0.0000412)***	(0.0000388)***	(0.0000383)***
Canadian experience^{2}Ximmigrant	0.0000658	-0.0000027	0.0000379	0.0000296
	(0.0000723)	(0.0000704)	(0.0000708)	(0.0000726)
Foreign experience^{2}Ximmigrant	-0.000254	-0.0002546	-0.0002824	-0.0002905
	(0.0000497)***	(0.0000501)***	(0.0000447)***	(0.0000419)***
ForeignXCanadian experienceXimmigrant	-0.0003191	-0.0003118	-0.0004536	-0.0005026
	(0.0000405)***	(0.0000442)***	(0.0000317)***	(0.0000314)***
Schooling years				
Canadian school years	0.0750454	0.0750465	0.0390367	0.0427388
	(0.0034173)***	(0.0034164)***	(0.0014916)***	(0.0018676)***
Canadian school yearscXimmigrant	-0.0142219	-0.0140764	-0.0117967	-0.025038
	(0.0040118)**	(0.0040674)**	(0.0029146)***	(0.0044998)***
Foreign shool yearsXimmigrant	0.0618308	0.0619596	0.0297361	0.0203628
	(0.0033871)***	(0.0033828)***	(0.0020402)***	(0.0027159)***
Province of residence				
Quebec	-0.1169045	-0.1167184	-0.1135841	-0.1133766
	(0.0137022)***	(0.0137354)***	(0.0155910)***	(0.0154205)***
Manitoba	-0.1654308	-0.1653739	-0.1639273	-0.1641436
	(0.0035170)***	(0.0035238)***	(0.0033940)***	(0.0033829)***
Saskatchewan	-0.154914	-0.154891	-0.1539968	-0.1544714
	(0.0074184)***	(0.0073893)***	(0.0072303)***	(0.0072380)***
Alberta	-0.0359719	-0.0359903	-0.029257	-0.0299089
	(0.0041088)***	(0.0041303)***	(0.0041948)***	(0.0042570)***
British columbia	-0.0147425	-0.0146507	-0.0064007	-0.0063804
	(0.0070880)*	(0.0071491)*	(0.0076128)	(0.0075564)
Living in urban area and marital status				
Metropolitan area	0.0859579	0.0859056	0.0798378	0.0802741
	(0.0187863)***	(0.0187826)***	(0.0190464)***	(0.0191795)***
Married	0.1874859	0.1874611	0.1802386	0.1800489
	(0.0104823)***	(0.0104718)***	(0.0097750)***	(0.0098848)***
Knowledge of official languages				
French	-0.0660959	-0.0661397	-0.0809824	-0.0807558
	(0.0157173)***	(0.0156368)***	(0.0144780)***	(0.0139952)***

(Table 9 continues…)

Both	0.0383226	0.0382932	0.0175788	0.0176356
	(0.0074129)***	(0.0073923)***	(0.0073717)*	(0.0067800)**
Neither	-0.0721125	-0.0712956	-0.0907016	-0.0999973
	(0.0175432)***	(0.0171659)***	(0.0200750)***	(0.0204764)***
Region of origin				
Europe	-0.093373	-0.0939296	-0.0976189	-0.1006846
	(0.0148293)***	(0.0143931)***	(0.0174872)***	(0.0174577)***
Asia	-0.2507057	-0.2509272	-0.2665361	-0.269297
	(0.0062918)***	(0.0061720)***	(0.0092448)***	(0.0110316)***
Africa	-0.1846593	-0.1849718	-0.1954825	-0.198162
	(0.0202648)***	(0.0200442)***	(0.0232830)***	(0.0244712)***
Latin-America	-0.2542993	-0.2536614	-0.2419178	-0.23766
	(0.0257443)***	(0.0255406)***	(0.0235320)***	(0.0229122)***
Other region	-0.054994	-0.0534913	-0.0456871	-0.0416918
	(0.0455520)	(0.0457251)	(0.0387751)	(0.0365584)
Arrival cohorts and interactions				
1970-1974Ximmigrant	-0.015613	0.0921053	0.0878406	0.0863636
	(0.0133785)	(0.0186922)***	(0.0147259)***	(0.0140230)***
1975-1979Ximmigrant	-0.0313334	0.0151721	0.0134045	0.015376
	(0.0177945)	(0.0190349)	(0.0164212)	(0.0159823)
1980-1984Xmmigrant	-0.0586445	-0.0038274	-0.0127919	-0.0140845
	(0.0238712)*	(0.0238874)	(0.0219967)	(0.0234758)
1985-1989Ximmigrant	-0.0768182	0.0177774	-0.002821	-0.0068527
	(0.0334978)*	(0.0286862)	(0.0256851)	(0.0264720)
1990-1994Ximmigrant	-0.1639367	-0.1509315	-0.1808524	-0.187973
	(0.0245238)***	(0.0248640)***	(0.0205285)***	(0.0210633)***
1995-2000Ximmigrant	-0.0966042	-0.0437321	-0.0949985	-0.1106869
	(0.0304659)**	(0.0412847)	(0.0423511)*	(0.0461700)*
Canadian experienceX1970-1974Ximmigrant		-0.0049958	-0.0050478	-0.0050602
		(0.0006276)***	(0.0005268)***	(0.0005444)***
Canadian experienceX1975-1979Ximmigrant		-0.0020247	-0.0019558	-0.0020407
		(0.0003859)***	(0.0003980)***	(0.0004187)***
Canadian experienceX1980-1984Ximmigrant		-0.0025961	-0.0022951	-0.002267
		(0.0009941)**	(0.0012023)	(0.0013073)
Canadian experienceX1985-1989Ximmigrant		-0.0075399	-0.0066583	-0.0065029
		(0.0012075)***	(0.0015707)***	(0.0017019)**
Canadian experienceX1990-1994Ximmigrant		0.0055907	0.0075483	0.0080974
		(0.0036654)	(0.0037143)*	(0.0037805)*
Canadian experienceX1995_2000Ximmigrant		0.0006571	0.0038665	0.0051184
		(0.0095665)	(0.0089687)	(0.0088601)
Diplomas and interactions				
Secondary			0.0673904	0.068551
			(0.0044641)***	(0.0040447)***
School of trades			0.1182988	0.1107573
			(0.0097518)***	(0.0103901)***

(Table 9 continues…)

College			0.1722678	0.1588403
			(0.0186716)***	(0.0246099)***
University certificate			0.1948963	0.1892208
			(0.0282901)***	(0.0294069)***
Bachelor			0.3289443	0.3040937
			(0.0226160)***	(0.0250915)***
Master			0.3703099	0.3294834
			(0.0274464)***	(0.0318596)***
PhD			0.4411679	0.3334241
			(0.0258213)***	(0.0477652)***
Secondary diplomaXimmigrant				-0.0189688
				(0.0199591)
School of tradesXimmigrant				0.0360156
				(0.0126680)**
CollegeXimmigrant				0.0558435
				(0.0255129)*
University certificateXimmigrant				0.0267437
				(0.0240355)
BachelorXimmigrant				0.0986741
				(0.0228219)***
Master degreeXimmigrant				0.1451256
				(0.0230383)***
PhDXimmigrant				0.2615553
				(0.0396449)***
Labor market related variable				
Unemployment rate	0.0072992	0.0072771	0.0065102	0.0066396
	(0.0039498)	(0.0039562)	(0.0041029)	(0.0040547)
Unemployment rateXimmigrant	-0.0097693	-0.0099428	-0.0104171	-0.0112163
	(0.0023084)***	(0.0023343)***	(0.0026139)**	(0.0029077)**
Constant	4.9881189	4.9882889	5.3447747	5.3027084
	(0.0647721)***	(0.0646643)***	(0.0515744)***	(0.0534921)***
Observations	244047	244047	244047	244047
R-squared	0.2	0.2	0.21	0.21
Robust standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

The excluded categories for all regressions are: province: Ontario; Cohort: before 1970; Highest Degree: no diploma; Knowledge of Official Language: English; Civil status: Not married. The dependent variable is log weekly wage at constant prices of 2000. Sample is limited to fulltime male workers persons between 20-65 years old with positive wage that have worked at least 30 hours per week and 52 weeks per year in the reference year. Only permanent residents living in Quebec, Ontario and the western provinces were included in the group.

Table 10

	Eq.4.1	Eq.4.2	4 3
	log(weekly wage)	log(weekly wage)	log(weekly wage)
Immigration status			
Immigrant	0.5290844	0.2424131	0.3680987
	(0.1040340)***	(0.2256192)	(0.2170860)
Potential Experience			
Canadian expericne	0.0441039	0.0443624	0.0447727
	(0.0013870)***	(0.0015459)***	(0.0014287)***
Canadian experienceXimmigrant	-0.0050084	-0.0029051	-0.0025117
	(0.0034019)	(0.0032753)	(0.0035854)
Foreign experienceXimmigrant	0.0121192	0.0118004	0.0114128
	(0.0006937)***	(0.0007275)***	(0.0007283)***
Canadian experience^2	-0.0006834	-0.0006874	-0.0006924
	(0.0000383)***	(0.0000405)***	(0.0000391)***
Canadian experience^{2}Ximmigrant	0.0000296	0.0000164	0.0000302
	(0.0000726)	(0.0000749)	(0.0000751)
Foreign_experience^{2}Ximmigrant	-0.0002905	-0.0002867	-0.0002798
	(0.0000419)***	(0.0000421)***	(0.0000419)***
ForeignXCanadian experienceXimmigrant	-0.0005026	-0.0004874	-0.0004726
	(0.0000314)***	(0.0000331)***	(0.0000349)***
Schooling years			
Canadian school years	0.0427388	0.0426343	0.0433364
	(0.0018676)***	(0.0018484)***	(0.0018232)***
Canadian school yearsXimmigrant	-0.025038	-0.0228178	-0.0215785
	(0.0044998)***	(0.0042256)***	(0.0046899)***
Foreign school yearsXimmigrant	0.0203628	0.020493	0.0206569
	(0.0027159)***	(0.0027895)***	(0.0028795)***
Province of residence			
Quebec	-0.1133766	-0.0623368	-0.0729128
	(0.0154205)***	(0.0137262)***	(0.0093696)***
Manitoba	-0.1641436	-0.1615411	-0.1616728
	(0.0033829)***	(0.0032312)***	(0.0027929)***
Saskatchewan	-0.1544714	-0.181426	-0.1823214
	(0.0072380)***	(0.0081927)***	(0.0091847)***
Alberta	-0.0299089	-0.0939951	-0.1110107
	(0.0042570)***	(0.0078137)***	(0.0113468)***
British Columbia	-0.0063804	0.0254703	0.0184055
	-0.0075564	(0.0039371)***	(0.0006965)***
Living in urban area and marital status			
Metropolitan area	0.0802741	0.0458835	0.0429745
	(0.0191795)***	(0.0260958)	(0.0259690)
Married	0.1800489	0.1802503	0.1768015
	(0.0098848)***	(0.0094097)***	(0.0105797)***
Knowledge of official languages			
French	-0.0807558	-0.0707281	-0.0705499
	(0.0139952)***	(0.0129927)***	(0.0122330)***

(Table 10 continues…)

Both	0.0176356	0.0168025	0.016365
	(0.0067800)**	(0.0078268)*	(0.0080613)*
Neither	-0.0999973	-0.0986953	-0.0981423
	(0.0204764)***	(0.0206642)***	(0.0211473)***
Region of origin			
Europe	-0.1006846	-0.1027562	-0.1042223
	(0.0174577)***	(0.0179295)***	(0.0173063)***
Asia	-0.269297	-0.2702423	-0.2694235
	(0.0110316)***	(0.0112581)***	(0.0111418)***
Africa	-0.198162	-0.2012857	-0.2014301
	(0.0244712)***	(0.0256926)***	(0.0258228)***
Latin-America	-0.23766	-0.2397863	-0.2402122
	(0.0229122)***	(0.0241652)***	(0.0247181)***
Other region	-0.0416918	-0.0442073	-0.0423675
	(0.0365584)	(0.0364101)	(0.0368429)
Arrival cohorts and interactions			
1970_1974Ximmigrant	0.0863636	0.0945155	0.0907491
	(0.0140230)***	(0.0130785)***	(0.0128513)***
1975_1979 Ximmigrant	0.015376	0.0383587	0.0434067
	(0.0159823)	(0.0161787)*	(0.0147556)**
1980_1984 Ximmigrant	-0.0140845	0.018673	0.0301602
	(0.0234758)	(0.0212337)	(0.0194936)
1985_1989 Ximmigrant	-0.0068527	0.0414598	0.0656014
	(0.0264720)	(0.0234575)	(0.0179253)**
1990_1994 Ximmigrant	-0.187973	-0.1061264	-0.0697731
	(0.0210633)***	(0.0282167)**	(0.0317397)*
1995_2000 Ximmigrant	-0.1106869	-0.0337887	0.0273635
	(0.0461700)*	-0.039561	(0.0407145)
Canadian experienceX1970-1974Ximmigrant	-0.0050602	-0.004576	-0.003596
	(0.0005444)***	(0.0004108)***	(0.0005074)***
Canadian experienceX1975-1979Ximmigrant	-0.0020407	-0.0017465	-0.0005653
	(0.0004187)***	(0.0004292)***	(0.0003121)
Canadian experienceX1980-1984Ximmigrant	-0.002267	-0.0018466	-0.0002072
	(0.0013073)	(0.0015120)	(0.0014319)
Canadian experienceX1985-1989Ximmigrant	-0.0065029	-0.0062733	-0.0043501
	(0.0017019)**	(0.0019721)**	(0.0018029)*
Canadian experienceX1990-1994Ximmigrant	0.0080974	0.0049811	0.007314
	(0.0037805)*	(0.0040628)	(0.0037574)
Canadian experienceX1995-2000Ximmigrant	0.0051184	0.0019561	0.0022623
	(0.0088601)	(0.0094615)	(0.0094713)
Diplomas and interactions			
Secondary	0.068551	0.0695341	0.0704239
	(0.0040447)***	(0.0044778)***	(0.0048575)***
School of trades	0.1107573	0.1119178	0.1124221
	(0.0103901)***	(0.0102812)***	(0.0106425)***

(Table 10 continues…)

College	0.1588403	0.1603996	0.161677
	(0.0246099)***	(0.0249662)***	(0.0257093)***
University certificate	0.1892208	0.1909038	0.1904822
	(0.0294069)***	(0.0302242)***	(0.0302220)***
Bachelor	0.3040937	0.3048077	0.3038583
	(0.0250915)***	(0.0263622)***	(0.0268187)***
Master	0.3294834	0.3288616	0.3263288
	(0.0318596)***	(0.0336315)***	(0.0337808)***
PhD	0.3334241	0.3347435	0.3321884
	(0.0477652)***	(0.0500817)***	(0.0510151)***
SecondaryXimmigrant	-0.0189688	-0.020667	-0.0212943
	(0.0199591)	(0.0202538)	(0.0207462)
school of tradesXimmigrant	0.0360156	0.035241	0.0351044
	(0.0126680)**	(0.0124425)**	(0.0126213)**
collegeXimmigrant	0.0558435	0.055408	0.0546252
	(0.0255129)*	(0.0258086)*	(0.0265020)*
University certificateXimmigrant	0.0267437	0.0230288	0.0231784
	(0.0240355)	(0.0249122)	(0.0256109)
Bachelor degreeXimmigrant	0.0986741	0.0967897	0.09711
	(0.0228219)***	(0.0238726)***	(0.0250295)**
Master degreeXimmigrant	0.1451256	0.1433786	0.1449861
	(0.0230383)***	(0.0244039)***	(0.0251879)***
PhD degreeXimmigrant	0.2615553	0.2592459	0.2613543
	(0.0396449)***	(0.0424119)***	(0.0438370)***
Labor market related variable			
Unemployment rate	0.0066396		
	(0.0040547)		
Unemployment rateXimmigrant	-0.0112163		
	(0.0029077)**		
Employment rate		0.0093276	
		(0.0015465)***	
Employment rateXimmigrant		0.0018982	
		(0.0027136)	
Activity rate			0.0132154
			(0.0015807)***
Activity rateXimmigrant			-0.0003398
			(0.0020771)
Constant	5.3027084	4.7342625	4.3799704
	(0.0534921)***	(0.1213941)***	(0.0671326)***
Observations	244047	244047	244047
R-squared	0.21	0.21	0.21
Robust standard errors in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			

The excluded categories for all regressions are: province: Ontario; Cohort: before 1970; Highest Degree: no diploma; Knowledge of Official Language: English; Civil status: Not married. The dependent variable is log weekly wage at constant prices of 2000. Sample is limited to fulltime male workers persons between 20-65 years old with positive wage that have worked at least 30 hours per week and 52 weeks per year in the reference year. Only permanent residents living in Quebec, Ontario and the western provinces were included in the group.

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