ESSAYS ON LABOUR MIGRATION IN CANADA

By

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For my little brother Waleed
You bring me so much joy

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My recompense is thanks, that's all,
Yet my good will is great, though the gift small.
-William Shakespeare, Pericles, Prince of Tyre, 3:4

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September 2018

Statement of Originality

I hereby certify that all of the work described within this thesis is the original work of the author. Any published (or unpublished) ideas and/or techniques from the work of others are fully acknowledged in accordance with the standard referencing practices.

This work has not been accepted for any previous degree.

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Abstract

The immigration literature generally concludes that the assimilation of immigrants mainly depends on individual characteristics of the person. Following Hatton and Leigh (2011), we study whether immigrants assimilate as communities, not only as individuals. Using the 1981, 1991, 2001 and 2006 Canadian Census data, the relationship between the assimilation of immigrants and the past stock of given ethnic origin groups are studied. Alongside the past stock, other group-level variables are used. The results suggest that a large number of immigrants from a given origin group depress the relative hours worked whilst a history of past immigration raises the relative hourly wages. Thus, the history of the individual's ethnic group in the host country matters in the assimilation process. In addition, the years since migration of a given origin group raises both the relative annual earnings and hourly wages.

In chapter two, using data from the Canadian censuses of 2001 and 2006, the role of the migrant's community in their time choices compared to native Canadians is studied. A Tobit regression in which the dependent variables are, the number of hours per week spent on childcare, housework and looking after the elderly, is estimated. The results show that immigrants spend less time on these three activities compared to natives and there is evidence to suggest that the migrant's community positively aids in the assimilation process of non-market activities.

The province of Quebec in Canada has two official languages, English and French, with French being the majority-spoken language. Similarly, the Montreal metropolitan area in Quebec has a majority of native French speakers but also a significant proportion of native English speakers and allophone immigrants. Using the 1971, 1981, 1991, 2001 and 2011 Canadian Census data, the paper *Payoff to official language knowledge in Quebec* studies the wage premium associated to having knowledge of an official language(s) that is different from one's mother tongue and whether it pays for one to learn a second official language given that communication can already take place with a different mother tongue language group (network externality). The results suggest that for the English mother tongue group, there is a positive payoff associated to having knowledge of French in Quebec and Montreal, while having knowledge of the English language for Francophone individuals only pays in Quebec but not in Montreal. For the allophone immigrants, there is a positive payoff to having knowledge of French only, higher than having knowledge of English only. However, having knowledge of both official languages pays more than knowing just one. Finally, evidence is found in Francophone individuals to support the network externality hypothesis.

Abbreviations

BC	British Columbia
CMA	Census metropolitan area
GDP	Gross Domestic Product
HCT	Human Capital Theory
HOUSEWORK	Time spent per week on housework
NOCS	National Occupation Classification Statistics
Obs	Observations
OLS	Ordinary least squares
PhD	Doctor of Philosophy
PUMF	Public Use Microdata File
ROC	Rest of Canada
SENIOR	Time spent per week caring for seniors
UK	United Kingdom
U.S.	United States
USSR	Union of Soviet Socialist Republics

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Introduction

1.1 Background on Canada

Immigrants have always accounted for a sizable fraction of the Canadian population. In 1871, around 16.1% of the Canadian population was foreign-born. This figure continued to rise reaching around 22.2% in 1931. Despite the influx of the foreign-born population in Canada declined significantly in 1941 due to the Great Depression, the Second World War and high emigration levels, by 1951 the foreign-born population began steadily increasing again. For example, Statistics Canada estimates that in 2006, immigrants made up 20% of Canada's population, a figure that is expected to reach at least 25% by 2031. Thus, for a very long time, immigrants played a fundamental role in the development of the Canadian nation. Statistics Canada published a report emphasizing that Canada's economic growth is increasingly dependent on immigrants as aging native workers drop out of the labour force and the birth rate of native Canadians declines.[1]

The large influx and number of immigrants in Canada naturally raises the issue of the assimilation of immigrants into Canadian society and labour market. It has been documented in the assimilation literature that the immigrant's themselves-mostly economic migrants-eventually become like natives in terms of earnings.[2]

Whilst many definitions of assimilation exist depending on the framework that it is used, Milton Gordon provided an attractive systematic dissection of the concept in his Assimilation in American Life (1964). He stressed that acculturation took place first. Acculturation is when the minority group adopts the cultural patterns of the host society. This is then followed by 'structural' assimilation, which Gordon defined as entrance of the

[1] See Duncan (2012) for the full report.

[2] Conventional wisdom about the assimilation process states that at some point usually around 10-15 years after immigration, the earnings of immigrants equal and exceeds those of the native population. For studies on Canada, see Meng (1987), Tandon (1978), Bloom and Gunderson (1989).

minority group into the social cliques, clubs, and institutions of the core society at the primary group level (Gordon, 1964). Identification assimilation then follows. This is the development of a sense of peoplehood based exclusively on the host society. Here, an immigrant's ethnic identity would be extinguished in favor of exclusivity to the identity of the host society.

Not surprisingly, Canada's immigration policy -after the Second World War- to a large extent has always been pro assimilation (Rawlyk, 1962). Evidence of this can be found in the history of Canadian immigration policy. For example, in 1947, Prime Minister MacKenzie King stated that potential immigrants to Canada would be accepted depending on each applicant's ability to assimilate. Until the mid-twentieth century, the Canadian government gave preferential treatment[3] to British subjects based on the assumption that British immigrants were more easily assimilated to Canadian life than immigrants from other nations. The absence of a serious language barrier, kinship connections with the mother country, and the political link through the Commonwealth fuelled this assumption (Richmond, 1967). This was also reflected in a speech given by the then Minister of Immigration, Walter Edward Harris:

"in the United Kingdom for example, we do our utmost to make Canada appear as attractive as possible so that as many people as we can attract will approach us to come to Canada"

Canada, Parliament, House of Commons, 1955

In addition, under the Immigration Act of 1953, Mr. Harris had the power to refuse the entry of immigrants based on the probable inability of the immigrant to become readily assimilated or to assume the duties and responsibilities of Canadian citizenship within a reasonable time after their admission.[4]

[3] Preferential treatment came in the form of fewer formalities, faster procedures for obtaining visas, a larger number of immigration offices and officials in Britain etc.

[4] Canada Year Book, 1957-1958, p172.

Furthermore, in 1967 Canada introduced the 'point system' with the aim of selecting immigrants with desirable skills allowing them to adapt and integrate easily into mainstream society. For example, immigrants were more likely to be accepted into the country if they were fluent in French and English (the official languages of Canada) and had an education. These skills aid immigrants into assimilating into society.

Assimilation of immigrants is fundamental because those that do not assimilate into mainstream society may be viewed by natives as being distinctively different from them and as a result, a threat to their nation. This may lead to social problems and an anti-immigration backlash. Historically, there are numerous documented cases of this. For example, in 1907, racial tension and frustration spread throughout British Columbia (BC), Canada, over the influx of male Japanese immigrants to the province. These immigrants were seen different from immigrants that came from 'traditional sources'[5] and so their ability to integrate into Canadian society was highly doubted (Lieberson 1981).

Other reasons for Canada's immigration policy favoring assimilation include the need for Canada to meet its population target[6] and the fact that native Canadians did not wish, as a result of mass immigration, to make a fundamental alteration in the character of its population. This was reflected in a speech given by the then Prime Minister MacKenzie King in 1947 stating:

"Canada is perfectly within her rights in selecting the persons whom we regard as desirable future citizens. It is not a fundamental human right of any alien to enter Canada…It is a matter of domestic policy"

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[5] Traditional sources of immigrants or the 'most-favoured' immigrant groups include those from British Commonwealth countries, the United States, France and North and Western Europe.

[6] The then Prime Minster MacKenzie King declared in 1947 that Canada would encourage immigration to meet its need for population (Bloom and Gunderson 1989). Statistics Canada estimates that net international immigration contributed about two thirds of Canada's population growth between 2001 and 2006 and that by 2030; immigration could become the only source of population growth.

1.2 General Motivation

We chose to use Canada as our case study on immigration for several reasons. Firstly, Canada has always attracted vast numbers of immigrants[7], making the nature of the question on assimilation highly relevant. Secondly, Canada has received little research attention on immigrant assimilation compared to countries like the United States (U.S.). Finally, Quebec province in Canada has a unique linguistic character. Whilst Quebec is predominately French speaking, there exist a significant proportion of English speakers in the Montreal metropolitan area in Quebec. This distinction makes studying Canada and in particular, Quebec very interesting.

The first paper titled *The Group Assimilation of Immigrants in Canada* was motivated by the need to test whether the theory proposed by Hatton and Leigh (2011)[8] for the U.S also worked for Canada, another important country for immigration. This motivation was fuelled by Borjas (1992), in which he showed that there exists a fundamental difference between the U.S. and Canadian immigration experience. In other words, it is naïve to take the results found for the U.S. and apply them or expect them to be the case for Canada. In addition, our study is more detailed than Hatton and Leigh (2011) as we employ a larger data set, a stricter definition of place of birth and our measure of past history stretches further back.

As for the paper titled *The Assimilation of Canadian immigrants: Evidence from non-market activities*, different dimensions in studying assimilation are explored. While there are many papers in the literature studying assimilation in terms of labour market outcomes[9] (and

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[7] The foreign-born fraction of the Canadian population has not fallen below 15 percent from 1901 till present (Immigration Statistics, 1983).

[8] Hatton and Leigh (2011) proposed that the more established is the tradition of immigration from a particular source, the more integrated that ethnic community will be, and the more easily new immigrants from that source will assimilate into the host labour market.

[9] For Canada, see for example, Baker and Benjamin (1994), Grant (1999) and Hum and Simpson (1999) all studied the annual earnings growth. Other labour market outcomes studied include the risk of unemployment by Thomas and Rappak (1998) and occupational distribution by Green (1999).

particularly so, for earnings), we deviate from this norm by focusing on non-market activities, which is understudied.[10] Specifically, we look at how immigrants fare to comparable Canadian natives in spending time on childcare, housework and caring for seniors. Also, in the literature, the term 'household production' is used to mean a combination of non-market activities. We believe it is fundamental to distinguish between different unpaid household productions as not all unpaid household production can be viewed in the same fashion. For example, one may assign different importance to doing the laundry and helping their child with homework. One advantage of the Canadian census is it distinguishes between household production tasks. This detailed classification allows us to gain a better understanding of how parents childcare time choices compares to their choices regarding housework and caring for the elderly. In addition, 'providing care or assistance to the elderly or senior family members' is a task that has to the best of our knowledge never been studied before. Finally, similar to the paper *The Group Assimilation of Immigrants in Canada*, we study the impact of the presence of the migrant's community on the assimilation process of immigrants. This is motivated by the strong belief that there is a cultural component to groups or communities that impacts the behavior of non-market more than market activities.

Finally, the paper *Payoff to official language knowledge in Quebec*, is motivated by the need to study the wage premium of possessing knowledge of a second official language in the Montreal area/Quebec province dichotomy, something that has received little attention. This has been fuelled by the political instability witnessed in the history of Quebec and increasing bilingualism. In addition, the paper also tests empirically the network hypothesis theory put forward by Church and King (1993).

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[10] While there is some work on the time parents spend in paid work and in housework, there has been no study on parental time investments on childcare using Canadian census data.

In summary, chapter two studies the assimilation of Canadian immigrants from an ethnic group or community perspective whilst chapter three examines the assimilation of immigrants from a non-market perspective and finally, chapter four estimates the impact of knowing a second official language on the earnings of francophone and Anglophone speakers and allophone immigrants residing in the province of Quebec. Chapter four also provides an insight into whether languages are used purely for communication purposes.

1.3 Specific Research Questions

The three research questions used in this thesis are listed below:

A. Do immigrants in Canada assimilate as groups?

B. What role do the immigrant communities in Canada play in the non-market assimilation of Canadian immigrants?

C. What is the payoff and use of the official languages in Quebec?

A brief review of the three research questions is presented below.

1.3.1 First Research Question: Do immigrants in Canada assimilate as groups?

The traditional choice in Economics in explaining interpersonal earning differentials between immigrants and comparable natives is studying individual level characteristics, and in particular educational attainment and labour market experience. Stemming from the work of Gordon (1964), many sociologists argue that the migrants' community or ethnic group plays a fundamental role in the assimilation process of immigrants. To the best of our knowledge there is only one paper by Hatton and Leigh (2011) that attempts to study this using economic data.

The paper *The Group Assimilation of immigrants in Canada* attempts to fill the gap in the existing literature by using data from the Canadian censuses of 1981, 1991, 2001 and

2006 to observe annual earnings, hours worked and hourly wages between comparable immigrant and native Canadians. Immigrants and natives are grouped into pseudo-persons of similar age, education and place of birth. In addition, the past and current immigrant stock of an ethnic group and the ethnic group's years since migration are employed in the analysis. That way, labour outcomes reflect the typical ethnic group properties and not the individual's own characteristics.

The paper finds that the migrants' community may play an even greater role in the assimilation process of immigrants and their labour market success than individual characteristics such as how long the immigrant has been in the host country. The results also suggest that the past immigration history of an ethnic origin group matters in the economic assimilation process of immigrants and that it is specifically the mid to distant past stock that matters with recent history having no impact. This could be because immigration history is not well developed or ingrained in the host society to have any significant impact.

1.3.2 Second Research Question: What role does the migrants' community in Canada play in the non-market assimilation of Canadian immigrants?

The paper *The Assimilation of Canadian immigrants: Evidence from non-market activities* explores a fairly untouched region in the assimilation literature. It looks at how immigrants devote time to non-market activities (childcare, housework and caring for seniors) compared to natives and what factors are associated with changes in the amount of non-market activities they perform. In addition, the role played by the migrant's community on the non-market assimilation of immigrants is studied. Data is taken from the Canadian censuses of 2001 and 2006.

The paper finds several important results. First, immigrant parents spend less time on market and non-market activities compared to native Canadian parents. Immigrants tend to dedicate the majority of their time gaining work experience in the form of unpaid work, volunteering and charity work. Secondly, the migrants' community impacts the assimilation process of immigrants and finally, it is vital to distinguish between non-market activities when studying assimilation.

1.3.3 Third Research Question: What is the payoff and use of the official languages in Quebec?

The paper *Payoff to official language knowledge in Quebec*, uses census observations spanning 40 years to estimate the impact of knowing a second official language on the earnings of francophone and Anglophone speakers and allophone immigrants residing in the whole of Quebec, Quebec excluding the Montreal area, and Montreal. In addition, using two census years, we test whether a higher prevalence of bilingualism among Francophone individuals lowers the pay-off associated to speaking French for the Anglophones and (symmetrically) whether more bilingualism among Anglophones lowers the returns from knowing English for them. Similarly, we check if the extent of bilingualism among the official language groups alters the payoffs of knowing English or French for the allophone immigrants. Also, we test that notion that languages are used primarily for communication as expressed by Church and King (1993), Grin (1992) and many others in their theoretical models.

The results indicate that bilingualism pays. Knowing a second official language is associated with a higher wage compared to knowing one official language. In addition, the paper finds network externalities to exist for Francophone individuals but not for Anglophones or allophone immigrants.

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2

The Group Assimilation of Immigrants in Canada

2.1 INTRODUCTION

Between 1981 and 2006, a staggering 3.5 million immigrants entered Canada. At the time of the 2006 census, 6.2 million immigrants still resided in Canada. That amounted to around 20% of the total population. Since the Second World War, the foreign-born population in Canada has continued to rise (see figure 2.1 in appendix 2), with future projections indicating a similar trend.[1] The importance of immigration to the growth and stability of Canada's economy has led policymakers, scholars and native Canadians to increasingly direct their attention towards the hot topic of, the economic assimilation of immigrants. Precisely, how immigrant earnings fare to that of comparable natives.

The human capital theory (HCT) has been the traditional choice in the economics literature in explaining interpersonal earning differentials. Emphasis is placed upon individual-level characteristics such as the length of schooling, training and language skills, in explaining labour income variations amongst workers (Becker 1967; Mincer 1974). Therefore, an immigrant can choose to increase their productivity and consequently their earnings by developing or acquiring these characteristics. We choose to develop this meritocratic theory by considering other new avenues to explain earning differentials between natives and immigrants.

Sociologists have long recognized the importance of immigrant communities or group interactions in the assimilation process. This view can be found to date back to the pioneering work of Gordon (1964).[2] It stems from the notion that one integrates from a position of strength, not from a position of weakness (Flitzpatrick 1966). Sociologists believe that an

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[1] Statistics Canada (2017) estimates that by 2036, the foreign born would be between 25.0% and 30.0% of Canada's population.

[2] Other influential studies in the sociological literature include Weinberg (1961); Litwak (1960); Kluckohn and Strodtbeck (1961).

immigrant's strength is his community. The community can offer psychological satisfaction and security to the immigrants, allowing them to integrate and assimilate with confidence into the host society.

There are papers in the economics literature that look to ethnicity when studying wage differentials between immigrants and natives.[3] However, to the best of our knowledge, there is only one study that examines the role played by the migrant's community on the economic assimilation of immigrants (Hatton and Leigh 2011). They showed that labour market outcomes of migrants depend on the interactions between immigrant communities as a whole and the host society. In addition to the standard individual level characteristics that affect the assimilation process, one's ethnic community also plays a vital role.

Empirically, we complement the HCT, by looking to community or group level influences. Doing so will improve our understanding of the immigrant assimilation process. Precisely, we argue that the background of a person is vital in the assimilation process. Thus, our hypothesis is that community level influences exist in the assimilation process of immigrants in Canada.[4]

Canada is our chosen case study for several reasons. Firstly, and as mentioned earlier, immigration has always played a fundamental role in Canada, making the nature of the question on the economic assimilation of immigrants a highly relevant one. Secondly, the data we have on place of birth is rich, in the sense that immigrants are described as originating from individual countries rather than specific continents or 'region of origin'- the norm in many studies on immigrant assimilation.[5] Consequently, our analysis is conducted at a more detailed level, providing more accurate results. In addition, our data is from over two

[3] For example Borjas (1995); Damm 2009; Edin et al. 2003; Glitz 2012.

[4] Since we follow Hatton and Leigh (2011)'s methodology, our hypothesis is the same as theirs.

[5] See for example, Borjas 1988; Bloom and Gunderson 1989; Wright and Maxim 1991; Bloom, Grenier and Gunderson 1994; Hatton and Leigh 2011.

complete decades of repeated cross-sections. Finally, examination of Canadian data has received little research in the immigration literature, compared to other countries such as the United States (U.S.). We cannot use the results obtained from studies on the U.S. in our understanding on Canada. Borjas (1992) has shown that there exist fundamental differences between the U.S. and Canadian immigration experiences due to different immigration policies, highlighting the need to conduct work on Canada.

Our study differs from Hatton and Leigh (2011)'s by exploiting more total observations on immigrants. This is because we use more census years in our study. Also, we explore the consequences of focusing primarily on males, the gender of interest in the literature and question whether some important features of the assimilation process are missed through this selection criterion, by including female observations. Finally and as mentioned earlier, we apply a stricter definition of place of birth, relying on individual countries rather than regions.

The hypothesis is tested by using data from the Public Use Microdata files (PUMF) of the 1981, 1991, 2001 and 2006 Canadian censuses. The idea is to observe measures of assimilation between comparable foreign and native-born Canadians, whilst incorporating community level influences. Taking our sample, we group into pseudo-persons foreign-born people of similar age, education and place of birth. Native Canadians are understandably grouped based only on their age and education levels.[6] Several independent variables are employed including the past and current immigrant stock of an ethnic origin group and the group's years since migration. These variables act as a proxy of an immigrant's community network. That way, labour outcomes reflect the typical ethnic group properties and not the individual's own characteristics.

[6] Native Canadians are not categorized in terms of their place of birth as they all originate from the same country, Canada.

Our results reveal firstly, that standard variables such as the years since migration play a significant role in the assimilation process of immigrants at the group level. Secondly, introducing community or group level variables changes the standard result significantly. The group level variables become significant as opposed to the standard variables. Precisely, a history of past immigration increases relative hourly wages, whilst greater number of years since migration of one's ethnic group raises both the relative annual earnings and hourly wages. This may indicate that community based factors such as the years since migration of one's ethnic group play a greater significant role in the assimilation process. These results support our stated hypothesis. Thirdly, we find consistent evidence to indicate that network effects may be specific to highly educated immigrants.

As an extension we alter the migrant stock to capture immigration history at different points in time. We find the mid to distant past stock matters in the assimilation process and that specifically it is the intermediate past stock that matters more. The recent past stock of 30 years ago has no impact. We attribute this result to the immigration history being not well developed or ingrained into the host society yet. However, with regards to the highly educated immigrants, recent immigration history serves them better.

When we extend the analysis by including females, interestingly, we find that group-level variables have a significant impact on relative annual earnings, whereas before the same variables are none relevant when females are excluded. This result demonstrates the fundamental role communities and ethnic niches play in the female labour supply. Excluding immigrants from the U.S also reveals group or community influences in the assimilation process.

We begin by presenting the data and some descriptive statistics in section 2.2, leading on to the empirical model, which is set out in section 2.3. Section 2.4 presents the results and finally, section 2.5 concludes with a summary of the work.

2.2 DATA AND VARIABLES

We use the PUMF of the Canadian Censuses of 1981, 1991, 2001 and 2006 to study the relationship between the assimilation of immigrants and the past stock for a given ethnic origin group. The 2001 and 2006 censuses for immigrants and natives residing in Canada are a 2.7% random sample of the Canadian population. The 1991 and 1981 files are a 3.0% and 2.0% random sample, respectively, of the Canadian population. The Census is conducted in May or June and contains information on demographics, place of residence, education and labour force activity including earnings, corresponding to the year preceding the census.

Our main measure of assimilation is immigrant annual earnings relative to comparable Canadian-born individuals. Comparable is taken to mean in terms of observed human capital, precisely education level and age group. The census provides information on annual earnings received by immigrants and natives.[7] Annual earnings are the product of wages and salaries, net income from self-employment, and other employment income (tips, gratuities, etc.).[8] As common in the literature (see Hatton and Leigh, 2011; Frenette and Morissette, 2005; Abbott and Beach, 1993) only those individuals who reported positive annual earnings are considered in this study. As alternative measures of assimilation, we consider the hourly wage and the annual hours worked. Since the census does not contain information on the annual hours worked of individuals, we compute this variable by multiplying the number of weeks worked in the reference year by the number of hours worked in the last week prior to Census day. It is worth mentioning that the number of annual hours worked is in no way a

[7] Annual earnings include wages and salaries, military pay and allowances, tips, commissions and cash bonuses, benefits from wage-loss replacement plans or income-maintenance insurance plans, supplementary unemployment benefits from an employer or union as well as all types of casual earnings during calendar year.

[8] Other employment income cannot be separated from wages and salaries in the Census.

true representation of the ‘usual’ hours worked per week because it may just be that during this particular week, one was unemployed or absent from their job. Thus, we only include individuals that reported both positive hours worked and number of weeks worked in the year.[9] Finally, the hourly wage is computed by dividing the annual earnings by annual hours worked.

We use the three different labour market outcome measures (annual earnings, hourly wage and the annual hours worked) for several reasons. Firstly, this study was motivated by the need to test whether the theory proposed by Hatton and Leigh (2011) for the U.S. also applied for Canada, another important country for immigration. In order to provide some comparison of the results of this study with that of Hatton and Leigh's, it is useful to compare assimilation for the same three measures studied in Hatton and Leigh (2011).

Moreover, different reasons push individuals to leave their country of origin. One reason is economic forming the term 'economic migrants'. The Canadian census does not include information on the reason of migration. However, it has been well documented in the assimilation literature that Canadian immigrants are mostly economic migrants. That is, immigration occurs when individuals experience a favorable wage draw in Canada relative to the wage available in the country of origin. To study how immigrants in Canada have economically progressed relative to natives, we need to observe some measure of earnings.

The most commonly used measure in the economics literature on immigrant assimilation is the hourly wage, possibly due to the theoretical foundation in human capital theory. For policy purposes, however, annual earnings- expressed as the product of wages and salaries, net income from self-employment, and other employment income- is also an interesting

[9] The high values of the variables annual earnings and number of hours worked are top coded. This could lead to a discrepancy between the reported and actual values. Unfortunately, we do not know of an alternative data set that corrects this problem, which we could use as a substitute.

outcome. Thus, we use both measures. However, labour market disparates between natives and immigrants are also marked in terms of working conditions and finding work. The total annual hours worked proxies for these. This variable gives an idea on exploitation, long working hours or lack of working opportunities etc. The log of annual earnings is our preferred measure because the number of annual hours worked is in no way a true representation of the typical hours worked per week. This is because it may be that during the reference week, one was unemployed or absent from theri job. As for the hourly wage, it typically ignores issues of involuntary unemployment, which is a paramount factor that is likely to impact immigrants and natives differently. Furthermore, the hourly wage is computed using the annual hours worked making it problematic.

Using the raw census data on individuals, pseudo-persons are defined and created by the following characteristics: age, education level and place of birth. Both the immigrant and native samples are restricted to males aged 25 and 64. This age range is preferred to avoid problems of endogeneity of labour force participation decisions (schooling, childcare or retirement decisions). In total there are eight age groups (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60-64).We use this many age groups likewise Hatton and Leigh (2011).

As for the education level, we use five groups namely (1) no certificate, diploma or degree (2) high school graduation certificate or equivalency certificate (3) some college or other non-university certificate or diploma (4) college or other non-university certificate or diploma, and (5) bachelor degree or more. The education level is determined by the person's most advanced certificate, diploma or degree (DGREEP variable). This information is obtained from the educational qualifications question in the census, which asked for all certificates, diplomas and degrees to be reported.

The place of birth of a person is established by asking the following question: "Where was this person born?" If the person is born in Canada, they are asked to indicate the specific province or territory. If the person is born outside Canada, he/she is asked to specify the country/region (2006 census). The place of birth is used to define a person's ethnic origin group. Social scientists employ numerous factors as a proxy of ethnic identity. One way of identifying ethnic identity is in terms of immigrants' origin (Hatton and Leigh 2011; Laroche et al. 2005).

We focus on the ethnic origin groups that have been reported in at least two censuses[11](see table 2.1). There are a total of 14 reoccurring country of origin groups in the data: U.S., United Kingdom (UK), Germany, Poland, Italy, Portugal, Netherlands, France, Greece, China, People's Republic of; Hong Kong, Special Administrative Region; Philippines, India and the Union of Soviet Socialist Republics (USSR). Although changes in the structure of the PUMF data sets between the four censuses and historical political border changes over time does not allow for a more detailed breakdown of the place of birth, the analysis is conducted at a more detailed level than that in Hatton and Leigh (2011). Hatton and Leigh (2011) employ a coarser specification for ethnic origin in their study. They use some individual countries but mostly the focus is on region of origin. Also, it is common in the literature on immigrant earnings relative to comparable Canadian-born individuals to exploit region of origin when referring to where immigrants originate (see for example, Borjas 1988; Bloom and Gunderson 1991; Bloom, Grenier and Gunderson 1994) Immigrants are usually described as coming from continents (for example, Asia, Europe or Africa). We, on the other hand, are specific with our definition of place of birth because we use individual countries. Thus, our results are richer in the sense that they will be derived from a more detailed understanding of place of birth. In addition, the construction of pseudo-persons is essentially the bundling together of individuals with similar traits. The more precise we can define these traits such as place of birth, the more accurately we are able to capture the role

[11] The terms ethnic origin, community and group, place of birth and country of origin are used interchangeably throughout to mean the same. Immigrants reported other countries as place of birth-Pakistan, Jamaica, Viet Nam, Yugoslavia, Belgium and Luxembourg, Austria, Hungary, Czechoslovakia and Ireland. However, we do not include them in the study because they do not satisfy the threshold criteria set of having to be reported in at least two census years.

played by immigrant's communities in the assimilation process of immigrants. Furthermore, it may be the case that some factors-such as culture or language- are all very similar in nature across a region or that a certain partnership exists binding a region together, however, it is naïve to assume that all countries in a particular region are the same. Wide geographical spread inevitably leads to some differences between countries in a region.

Our paper also addresses the conceptual problems that are associated with the many studies involving intra-ethnic comparisons such as Hatton and Leigh (2011). The most obvious problem is the aggregation misinterpretation introduced by pooling immigrants from different countries into one ethnic group. Since immigrant communities differ substantially on many fronts, it is highly unlikely that the ethnic group will resemble the average person in any of the national origin groups making up the ethnic category. Moreover, there are sizeable changes in the national origin mix of the immigrant flow over very short time periods even with particular ethnic groups. This will affect our interpretation on the effect of the past stock on the assimilation measure because it might be that the past stock for a certain ethnic group actually represents the major country that supplies the immigrants to Canada. Thus, we do not know how to interpret our measures of assimilation among the different ethnic groups unless we deal directly with a more primitive definition of ethnicity (place of birth).[12] This problem was mentioned in Borjas (1994) and we attempt to deal with it.

[12] Ethnicity is measured by country of origin following Borjas (1992, 1995, 1998), Damm (2009) and Hatton and Leigh (2011).

Table 2.1 A breakdown of the reported place of birth of respondents for the 2006, 2001, 1991 and 1981 Canadian census

2006	2001	1991	1981
United States of America	United States of America	United States of America	United States of America
United Kingdom	United Kingdom	United Kingdom	United Kingdom
Federal Republic of Germany	Federal Republic of Germany	Federal Republic of Germany	Western Federal Republic of Germany
Republic of Poland	Republic of Poland	Republic of Poland	Poland, People's Republic of
Italian Republic	Italian Republic	Italian Republic	Italian Republic
Portuguese Republic	Portuguese Republic	Portuguese Republic	Portuguese Republic
China, People's Republic of	China, People's Republic of	China, People's Republic of	--
Hong Kong, Special Administrative Region	Hong Kong, Special Administrative Region	Hong Kong	--
Republic of the Philippines	Republic of the Philippines	Republic of the Philippines	--
Republic of India	Republic of India	--	--
--	Netherlands	--	Netherlands
--	France	--	France
--	Greece	--	Greece
--	USSR	USSR	USSR

Notes: This table reports the breakdown of respondent's place of birth for the four censuses and the countries used in this study. *Source*: PUMF 2006, 2001, 1991 and 1981. - - indicates country not reported for in Census year.

For each census year, we use a simple immigrant status variable to separate individuals into two groups 'immigrants' and 'non-immigrants'.[13] Non-immigrants refer to natives.[14] For the immigrants, we group a set of individuals that are similar in age, education level and place of birth. For example, when looking at the 2006 census, all individuals between the ages of 25-29, have no certificate, diploma or degree and are from the U.S. are grouped together to form a 'pseudo-person'. For each pseudo-person we calculate the average annual earnings of these individuals. We do the same for non-immigrants, grouping similar individuals together based on education level and age, forming cohorts.[15] The average annual earnings for each cohort of natives are calculated. Figure 2.2 explains how this is done in a simplified illustration.

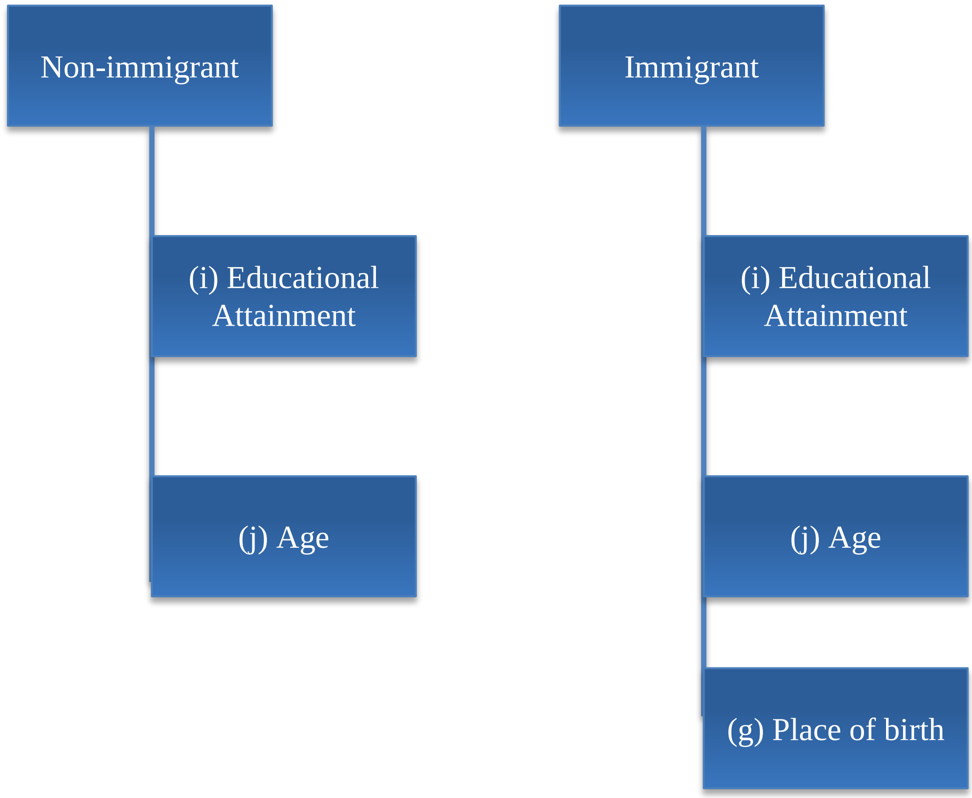
The construction of pseudo-persons in this manner, essentially, allows us to compare the earnings of foreign-born individuals working in Canada with native-born comparable Canadians. The construction of pseudo-persons is carried out for each of the four census years. Thus, we pool earnings data from four cross-sections, forming a pseudo-longitudinal data set or a single regression.

[13] An immigrant is someone who reports being a 'landed immigrant'. They have been granted the right to live in Canada permanently by immigration authorities. It is worth noting that the Canadian Censuses include non-permanent residents since 1991. These residents are persons from another country who, at the time of the census, held a work or study permit, or who were refugee claimants, as well as family members living with them in Canada. Non-permanent residents are included in the immigrant counts when possible.

[14] Non-immigrants are persons who are Canadian citizens by birth.

[15] Hatton and Leigh (2011) and Aydemir and Borjas (2006) use the same methodology approach choosing to group individuals in pseudo-cells or skill cells.

Figure 2.2 Pseudo-person construction



This study uses the 'pseudo-person' or the 'skill-cell' approach introduced by Borjas (2003), rather than individual level data for two reasons. Firstly, our methodology follows that of Hatton and Leigh (2011)'s and so, using a different methodological approach may render the comparison less clear.

Secondly, our dependent variable is the log of the wage of immigrants from a given origin country relative to the wage of native Canadians with the same education and age, for a given census year. In order for this comparison to happen, immigrants need to be compared to a reference point or benchmark of natives. The reference point can be achieved by taking the average wage of natives of a certain group. It then seems natural to construct a similar average for the immigrants. This essentially is the pseudo-person approach.

An alternative would be to look at the wage of each individual immigrant relative to the reference point of comparable natives. This specification would then need to include dummy variables identifying the pseudo group that each individual belongs to, making it a less parsimonious and less compact specification than the pseudo-person approach.

As the determinant of group-level assimilation, the main independent variable is the *past stock of immigrants from the same country of origin*. This variable indicates how embedded a particular ethnic group in Canada is because it measures the size of an ethnic group relative to the total Canadian population. In other words, it is our measure of the familiarity of the Canadian society with each ethnic group. For each ethnic group, the stock is computed at different points in time up to 100 years before the census year. For each census year, the origin region immigrant stock is expressed as a percentage of the total Canadian population (see tables 2.2 and 2.3 in Appendix section 2).[16] The past stock variable is the average of these percentages in the 100 years before the date of the observation, excluding any census years for which data is missing. Precisely, when looking at immigrant outcomes in the 2006 census, the past stock is calculated using all the available censuses in the period 1906-2001. Similarly, when looking at immigrant outcomes in the 2001 census, the period 1901-1996 is used. For the 1991 and 1981 censuses, the following periods are used: 1891-1986 and 1881-1976, respectively.

The computation of the past stock up to 100 years prior the census importantly allows us to study the impact of the recent and distant past on the earnings assimilation of first-generation immigrants. Capturing the migrant stock at different times in the past does this. We take recent past to mean 30 years ago, mid past to mean 70 years ago, and distant past as 100 years ago. Thus, we use alternative measures of the stock at 30, 70 and 100 years ago. Table 2.4 in Appendix 2 shows the different past stock values for each ethnic group at different time periods.

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[16] The immigrant stock figure is computed using both men and women of all work statuses and all ages. This is because realistically each person's human capital and activity, regardless of his or her own labour market activity can participate in the ethnic economy and network in an enclave, affecting a resident's labour force activity.

Another independent variable that is used is the y*ears since migration*. This variable is commonly used in the literature regarding earnings of foreign-born persons (see for example, Meng 1987, Hatton and Leigh 2011 and Bloom, Grenier and Gunderson 1994). In our case, given that this variable is constructed at the pseudo-person level, this variable will be the average years since migration for the individual in each pseudo-person group. The second independent variable used is the *group years since migration*. This measures the average years since migration for all the other individuals from the same ethnic group excluding those belonging to the same age-education cell. It will allow us to test whether the duration of other individuals from the same ethnic origin community has any impact on the economic assimilation of immigrants from the same community. A description of all the variables used in the regressions is provided in the Appendix section 2.

After applying the sample restrictions mentioned earlier and removing all individuals with missing values in relevant variables, we get a final sample of around 51000 individuals[17], including both natives and immigrants. We exploit this information to construct 1160 pseudo-persons, which have on average 44 observations. We do not construct pseudo-persons with less than 10 observations.

Table 2.5 in appendix 2 presents the mean log earnings of native workers and immigrants by country of origin. The first noticeable point is that in year 2001, immigrant and native earnings were roughly equivalent. Therefore, it would not be too farfetched to assume that Canadian immigrants were well assimilated in the labour market around 2001. However, a different picture is painted prior to 2001. Between 1971-1991, the average immigrant had higher earnings than the typical native worker. The difference in the earnings represents a marked change. In both 1971 and 1991, immigrant earnings were about 7 percent higher than those of Canadian natives. In 1981, that differential was 11 percent. The reverse

[17] The exact number of individuals in the study is 51420.

took place in 2001 with higher earnings belonging to natives. Also, a downward trend in the earnings of immigrants relative to natives is evident. The average immigrant in 2001 earned, on average, about as much as the typical native worker. By 2006, however, immigrant earnings were about 21 percent below the native wage.

This difference could reflect a variety of factors including human capital and demographic composition. However, there is no doubt that the decline in the relative wage, is partly due to the fact that a larger share of immigrants after 2001 originated from Asia, African and Latin American countries. It is a well-known fact non-European immigrants tend to not perform well in the Canadian labour market.

A closer look at table 2.5 indicates that certain countries are responsible for fuelling the relative decline in the immigrant wage. For example, the average wage of immigrants from Hong Kong in 2001 was 11 percent below that of natives. By 2006, that gap had widened to 18 percent. Similarly, immigrants from the Philippines in 2001 had an average wage that was 23 percent below that of natives. Half a decade later, that figure had increased to a whopping 32 percent. Other countries that contributed to the fall in immigrant's relative wage include India and China.

Also, table 2.5 documents that the average European immigrant had higher earnings than natives throughout the 35-year period of 1971-2006. We know that certain European countries contributed to this phenomenon. On average immigrants from the UK and Germany have always reported high earnings. In fact, throughout the 35-year period, immigrants from the UK on average reported higher earnings than both other immigrant groups and natives. Similarly, this is the case for immigrants from the U.S. A reasonable explanation may be that on average, immigrants from the U.S., UK and Germany had more years of schooling or higher educational attainment than immigrants from other countries and Canadians.

To avoid such discrepancies, table 2.6 is produced, in which age and education level of both immigrants and natives is held constant. Table 2.6 summarizes the trends in the wage of immigrants in particular cohorts and age/education groups relative to similar natives in the same age/education group, so that for example, German immigrants aged 25-29 with high school qualifications are compared with Canadian natives aged 25-29 also with high school qualification. For data processing reasons, we only exploit information from the most recent census (2006) and include only four countries selected at random.

Theoretically, since we hold age and education level constant, we expect given time, the earnings of immigrants to adjust to be in line with those of Canadian natives (as suggested by the literature: Borjas 1995; Chiswick 1978; Kalmijm 1996). However, generally speaking, we find that the average immigrant in 2006 earned, on average, less than comparable native workers. There are a few cases in which immigrants earned more than natives. An example is the cohort that is defined by an educational level of 'bachelor degree or more' and an age of 50-54. Here, immigrant earnings were about 13 percent higher than the native wage. Other similar cases are also evident; however, those who attained a college certificate or diploma and were between the ages of 60-64 witness the greatest differential of 68 percent.

Despite the general consensus of immigrant earnings being below that of natives, it is evident from table 2.6 that from the selected countries, immigrants from the U.S. and U.K tend to earn more than comparable Canadians. One explanation may be that immigrants from these two countries are expected to speak and be fluent in English, one of the official languages in Canada- the other language being French. However, immigrants from Poland and China may struggle in this aspect.

Based on the results in table 2.6, one can argue that the extent to which immigrants assimilate into the Canadian labour market in the sense that their earnings patterns come to match the earnings patterns of otherwise comparable Canadian-born individuals is influenced by the place of birth of immigrants. What we are interested in is whether the assimilation of immigrants can be explained in terms of the community to which one belongs. We study this next.

Before we turn to the methodology section, the issue of illegal immigration and the educational attainment is worth mentioning. First, we appreciate the fact that illegal immigration is not taken into account in most censuses is a clear limitation. For us, this limitation is not relevant simply by the fact that Canada tries to account for illegal immigration in their censuses. Also, we use data on immigration stocks rather than flows and even if illegal migrants represent a large fraction of total flows they generally remain a small fraction of the immigrant stock. This is because most illegal migrants eventually become legalized or return back to their home country.

Finally, even though we do control for the education level, the labour economics literature documents very well the impact of obtaining an education in different countries on labour market outcomes. Since we do not consider the country in which one obtained his education from, we open the educational attainment category to heterogeneity in terms of human capital. However, this issue is addressed by controlling most of the variation in the cross section by including country-specific variables.

Table 2.6 Mean log annual earnings of immigrant and Canadian-born workers, taking into consideration age and education level, for selected countries- for the 2006 census

Education	Age	Natives	All immigrants	US	UK	Poland	China
No certificate, diploma or degree	25-29	10.253	10.222	10.443	10.071	9.013	10.116
	30-34	10.388	10.594	10.664	10.745	10.280	9.552
	35-39	10.473	10.479	10.085	10.679	--	9.750
	40-44	10.946	10.608	10.571	10.466	--	9.892
	45-49	12.262	10.659	10.212	11.248	11.045	10.094
	50-54	10.623	10.599	10.703	10.994	6.907	10.029
	55-59	10.333	10.579	11.134	11.117	10.921	10.065
	60-64	10.344	10.490	--	10.628	10.736	10.135
High School graduation certificate	25-29	10.338	10.181	10.181	10.485	10.234	9.689
	30-34	10.611	10.385	10.277	10.646	10.152	10.038
	35-39	10.589	10.592	10.700	10.904	10.849	9.861
	40-44	10.627	10.729	11.444	11.027	10.491	9.828
	45-49	10.263	10.719	10.540	11.008	10.703	10.089
	50-54	10.915	10.715	11.001	10.999	10.614	9.936
	55-59	12.831	10.768	10.533	11.128	10.763	10.289
	60-64	10.606	10.610	10.284	10.804	10.915	10.333
Some college certificate or diploma	25-29	10.470	10.321	10.985	10.414	--	9.282
	30-34	10.674	10.473	6.907	10.653	10.997	10.194
	35-39	10.206	10.646	10.624	10.881	10.778	10.113
	40-44	10.808	10.806	10.723	10.861	10.988	9.852
	45-49	10.856	11.026	10.645	11.094	10.819	10.236
	50-54	10.891	10.790	10.790	10.982	10.766	9.732
	55-59	10.821	10.882	10.837	10.958	11.018	10.853
	60-64	10.647	11.071	10.308	10.885	11.107	10.584
College certificate or diploma	25-29	10.496	10.279	10.099	10.346	10.509	9.420
	30-34	10.787	10.687	10.774	10.666	10.801	10.362
	35-39	11.288	10.738	10.464	10.858	11.046	10.380
	40-44	10.799	10.973	11.014	11.289	10.990	10.124
	45-49	11.446	10.893	10.852	11.212	10.996	10.520
	50-54	11.132	11.066	11.047	11.258	11.059	10.232
	55-59	10.950	11.062	11.763	11.081	10.687	10.838
	60-64	10.379	11.061	10.899	11.265	10.861	10.826
Bachelor degree or more	25-29	10.342	10.470	10.716	10.860	10.290	10.205
	30-34	11.066	10.694	10.833	10.901	11.123	10.341
	35-39	10.933	10.955	11.453	11.279	11.179	10.701
	40-44	11.461	11.052	11.723	11.382	11.255	10.708
	45-49	11.586	11.345	11.927	11.909	10.939	10.838
	50-54	11.221	11.355	12.198	11.649	11.608	10.789
	55-59	11.423	11.373	11.320	11.755	11.312	11.500
	60-64	11.324	11.317	11.418	11.457	10.868	11.059

Notes: All immigrants include the following countries: United States, United Kingdom, Germany, Poland, Italy, Portugal, China, Hong Kong, Philippines and India. For each cohort, the mean log of annual earnings is taken. Earnings are expressed in Canadian dollars.

2.3 METHODOLOGY

2.3.1 Ethnic Labour

We follow Hatton and Leigh (2011)'s econometric specification which is based on defining the supply and demand of ethnic labour for a given ethnic origin group. There is no clear and complete definition in the literature on what constitutes ethnic labour. Bonacich (1972) comes close in providing a definition. She understands the term 'ethnicity' as referring to groups defined socially as sharing a common ancestry in which membership is therefore inherited or ascribed, whether or not members are currently physically or culturally distinctive. Bonacich (1972) argues that labour markets include ethnic lines or groups and those differences exist not only across ethnic groups but also within groups. Individuals within a group vary markedly in skills, and these differences may lead to overall differences in average skills across different groups or the labour market. However, theoretically, we expect 'like' inputs or ethnic groups to be more suitable substitutes than 'unlike' ethnic groups. For example, white Western European immigrants are similar to Canadians/or share more similarities to native Canadians than black and Hispanic immigrants.

My work is partly related to this literature on ethnic labour but not completely. Workers are classified in different ethnic groups not because they play a different role in production but because their wage depends on natives' attitudes towards different origin groups.

We assume that ethnic origin is related to country of origin but it is not the same. People born in the same country might have different ethnic backgrounds. For example, from the 2006 PUMF of the Canadian census, from the immigrant sample, 5% were born in China. Immigrants from China reported ethnic origins other than Chinese (such as Canadian, English and German, amongst others).

In our study when we refer to 'ethnic group' what we truly mean is 'country of birth'. Precisely, the terms 'ethnic group', 'ethnic origin' or 'ethnic community' and 'place of birth' are used interchangeably throughout this study to mean country of birth. Pseudo-person groups are defined in terms of country of birth rather than ethnicity due to the stable and fixed definition of the place of birth of respondent variable in the census.

The Canadian census has collected information on the ethnicity of persons since 1861.However, this variable is not stable over time. The question wording and format, instructions and data processing on ethnic origin has changed over the years. For example in the 2006 census, respondents were asked: "What were the ethnic or cultural origins of this person's ancestors?" and in 2001, 1996 and 1991, the question was different: "To which ethnic or cultural group(s) did this person's ancestors belong?" However, in 1996, the format of the ethnic origin question was changed. The 1991 census question included 15 mark-in categories and two write-in spaces. The 2001 and 1996 questions did not include any mark-in categories. Respondents were required to write in their ethnic origin(s) in four write-in spaces. In 1996, the ethnic origin question gave 24 examples of ethnic origins whereas in 2001, there were 25 examples. Thus, historical comparisons of ethnic origins across censuses have limitations and should be made with caution. However, the place of birth of respondent variable has been relatively stable over the censuses. Furthermore, ethnicity is a self-perceived matter and respondents' knowledge of the ethnic and cultural history of their ancestors can influence the type of response given at the time of the census. New knowledge may be acquired and changed over time meaning that the same respondent may change their ethnic origin from one census to another. This means that two respondents with the same ethnic ancestry could report different ethnic origins. For example, a respondent may identify as 'East Indian' as an ethnic origin while another respondent with a similar ancestral background may report 'Punjabi' or 'South Asian'. Also, the social environment in which questions on ethnicity have been asked can influence the type of response one gives. The place of birth of respondent variable does not suffer from this, as it is objective and fixed.

Another issue is related to persons reporting more than one ethnic origin. Marriages, common-law unions between people from different cultural and ethnic groups and knowledge of family history may prompt individuals to identify with more than once ethnicity. From the 2006 PUMF immigrant sample, around 17% reported multiple ethnicities. Also, the census categories multiple responses in bundles. It does not identify the exact ethnic origins one picks in multiple response cases. All these issues make the construction of pseudo-person groups problematic. For example, if a Polish immigrant in Canada identifies as being of 'Canadian' and 'Polish' ethnicity, which pseudo-person group does this individual fit in?

One way of dealing with this is to remove individuals with multiple ethnic origin responses from the study. However, this means we lose observations and may bias the results. Using the place of birth variable, we do not have to deal with the issue of multiple responses as a person can only be born in one country.

For all the reasons mentioned above, we chose to look at place of birth of respondents as opposed to ethnic origin. Of course, it would be interesting to incorporate ethnicity into studies on immigrant assimilation, especially when looking at second-generation immigrants-something we do not do here.

2.3.2 Development of Ethnic labour markets

Several explanations have been proposed on the development of ethnic labour markets. Wood (1982) believes that ethnic labour markets are the natural outcome of market forces. Employers attempting to maximize their production and profits will demand specific workers based solely on their skills. Consequently, ethnic concentrations or groups in certain job sectors form with each group possessing a comparative advantage in terms of skills or knowledge in satisfying the demands of the jobs in that sector. As for the supply side, given demand, naturally, workers will select the job opportunities that pay the highest (Becker, 1975).

Opposing this view, segmentation theorists argue that, rather than the existence of a single labour market; there are multiple markets as a result of social structures and institutional mediation (Wang, 2004). These markets are home to different sectors conditioned by their power to provide returns and opportunities to labourers. Ethnic minorities, women and new immigrants tend to be found in the less powerful, low wage and unstable sectors. Being disadvantaged in the labour market simply because of their position implies they have a greater tendency to concentrate in lower levels of the job market, forming ethnic niches.

The social capital approach provides another explanation. Social capital suggests that networks are essentially carved out of several factors such as race and nativity, which individuals can exploit to aid their socio-economic status (Loury, 1977). By studying immigrants' place of birth and consequently their origin community, we are convinced that we can successfully represent their ethnic networks. This compared to other similar studies, in our opinion, is a well-defined and well-established social unit. Other studies have typically used administrative or census boundaries to define social units.[11] In addition, Massey et al. (1987) carried out a study on network relationships among migrants, and found that most relationships are based on belonging to a common origin-community. Thus, we are confident in using ethnic origin groups as a proxy for networks.

Finally, ethnic labour markets may develop due to economic restructuring. For example, as natives move out of certain employment sectors, immigrants may be called upon to fill the newly created vacancies.[12] This process of 'ethnic succession' allows immigrants to enter the labour market. Immigrants from the same origin group tend to have the same characteristics and experiences.

[11] Examples of these studies include (Case and Katz 1991; Glaeser, Sacerdote, and Scheinkman 1996; Borjas 1996; Borjas 1994; Bertrand, Luttmer, and Mullainathan 2000; Topa 2001).

[12] This process has been confirmed to take place by Waldinger (1996) and Wright and Ellis (1996).

2.3.3 The Model

As argued in the previous section, the demand and supply of ethnic labour is a natural occurring phenomenon in the labour market. These are the relative price of goods and services of a given quality supplied by the ethnic group to the native community (P_g), the share of labour force of the ethnic origin group (M_g), and a group-specific component (μ_g). The labour market is said to be 'split' if at least two ethnic groups exist in it. This is because no two ethnic groups can have the same price of labour. Nevertheless, Bonacich (1972) points out that if ethnic groups approximately equal in resources and/or goals enter the same economic system, a split labour market will not develop.

The supply for ethnic labour is a function of P_g, M_g and μ_g. As for the demand for ethnic labour, it is a function of P_g, the average years since migration of the ethnic origin group (Y_g), a demand shifter for the ethnic labour of the ethnic group (Z_g), and a group-specific component (ν_g). The prevailing view of demand for ethnic labour is its not really present or relatively on a small scale basis. In other words, there does not really exist a specific demand for ethnic labour, except for certain things such as ethnic food. It is mostly a supply side phenomenon. The exact equations for the supply of ethnic goods and the demand for the good or services of a given ethnic origin group can be found in appendix 1 alongside explanations. The equilibrium price of ethnic goods is:

$$\boldsymbol{P_g = -\frac{1}{\alpha+\beta_1}M_g + \frac{\beta_2}{\alpha+\beta_1}Y_g + \frac{\beta_3}{\alpha+\beta_1}Z_g + \frac{\nu_g-\mu_g}{\alpha+\beta_1}} \quad \textbf{\textit{(1)}}$$

where M_g is the share of labour force represented by group g. It is the total number of foreign-born from the origin region at time *t* as a proportion of the total Canadian population.

Substituting equation (1) into the common analytical framework used in the literature (equation 2), where W_{ig} is the log wage of the individual immigrant of education type *i* from ethnic group g, X_{ig} is the individual's education, Y_{ig} measures how long the immigrant group has been in Canada and ε_{ig} is a random component. Using equation (2), Hatton and Leigh (2011) are able to define separate earnings functions for both immigrants and natives (see equations 4 and 5 in Hatton and Leigh (2011)).

$$\boldsymbol{W_{ig} = \gamma_0 + \gamma_{11} X_{ig} + \gamma_2 Y_{ig} + \gamma_3 P_g + \varepsilon_{ig}} \qquad \textbf{(2)}$$

Thus, the wage of immigrants from a given country of origin (*g*) relative to natives (*n*) with the same education (*i*) and age (*j*) at each census (*t*) is given by the final estimating equation:

$$\boldsymbol{Ln\left(\frac{W_{ijgt}}{W_{ijnt}}\right) = a_0 + a_1 Y_{ijgt} + a_2 {Y^2}_{ijgt} + a_3 Y_{gt} + a_4 M_{gt} + a_5 Z_{gt} + a_6 ZHE_{gti} + a_7 U_{gt} + d_t + d_i + d_j + e_{ijgt}} \qquad \textbf{(3)}$$

There is a maximum of fourteen countries of origin (*g*=U.S., UK, Germany, Poland, Italy, Portugal, China, Hong Kong, India, Russia, Netherlands, France, Greece and Philippines) and eight age groups (*j*=25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60-64). As for education groups, there are five groups (*i*=no certificate, diploma or degree, high school graduation certificate, some college, certificate or diploma, college certificate or diploma and bachelor degree or more). Finally, we have four census years (*t*= 2006, 2001, 1991 and 1981).[13]

[13] Since we are taking into account both the age and education level of individuals and if we accept Mincer (1974) formulation of total labour market experience as (age minus year of schooling minus six), then putting it

The pseudo-person's years since migrating to Canada is given by Y_{ijgt} and Y_{gt} is the average years since migration for other individuals in the same ethnic origin group g, excluding those in the same age-education cell. M_{gt} is the total number of foreign-born from the origin region at time t, as a proportion of the total Canadian population (see table 2.3 in appendix 2). The variable Z_{gt} measures the historical presence of an origin group g up to 100 years ago at different time intervals (see table 2.4 in appendix 2).

According to the cross-section literature on immigrant wage assimilation, the coefficient a_1 should be positive (Tandon 1978). The economic interpretation of Borjas (1985) is that immigrants invest heavily in themselves by acquiring Canadian-specific human capital (for example, learning the language spoken or attaining or furthering qualifications of the host country). Essentially, the aim of immigrants is to 'canadianize' their skills. Consequently, the longer one has been in Canada, the more investment one has made in themselves, which implies they will progressively catch up with natives' wages. In other words, the duration of residence in Canada can be viewed as an indicator of Canadian-specific human capital. Despite keeping labour market experience constant in our study, the pseudo-person's years since migration to Canada variable may still reflect the same idea expressed by Borjas (1985). Thus, we expect a_1 to be positive because it is still highly unlikely that the educational attainment level alone is a sufficient proxy for total Canadian-specific human capital. This is because firstly, we are not sure if the immigrant in question acquired his college or university degree in his origin country or in Canada, and secondly, there are other factors apart from educational attainment that can influence the earnings of immigrants such as language skills. It is worth mentioning that we also include the squared

in another way we are studying whether assimilation occurs at the group level defined by place of birth, keeping total labour market experience of immigrant and native community constant.

years since migration term to capture a possible non-linear relationship between earning assimilation and the years since migration.

Less common in the literature is the group's average years since migration variable, which we use. This measures the duration of the ethnic community in Canada, where the ethnic community is composed of individuals different in both age and education level from the pseudo-persons in question. Thus, the crucial question becomes whether the duration of other immigrants from the same ethnic origin but different in characteristics in Canada, affect your ability to assimilate. This is a good way of checking whether the ethnic origin group one belongs to matters in the assimilation process. The answer to this question is surely not an easy one as it depends on several factors and may vary for different immigrant groups. One key factor is the degree to which individuals choose to identify with their ethnic group or wish to present themselves as being different. According to Hechter (1978), the greater the size of the ethnic group, the more one would want to identify with their ethnic group. We test this theory by the data we have collected of M_{gt} for each ethnic group. The extent to which immigrants choose to identify with their ethnic group is important because according to Grand and Szulkin (2002), employers will often exploit information on the average productivity of certain groups of employees as a proxy for the productivity of an individual belonging to the group in question. Employees may be grouped in numerous forms including ethnic origin of foreign-born workers. If we accept Grand and Szulkin 's (2002) idea, then ethnic group identification becomes less relevant, specifically as certain characteristics such as accent or skin colour may give away one's ethnic origin.

The second key factor is how specific immigrant groups choose to interact with the host society. An ethnic group can adopt numerous positions in society. These positions range from encouraging integration to distinguishing themselves in the host society. Since human interaction is rarely a one way street, the extent to which an immigrant groups interacts with the host society will be reflected in how the society views or perceives these immigrant groups.

In principle, the longer an immigrant community has been in Canada, the more integrated it should be in society. However, based on the reasons mentioned above, this may not be the case. The general consensus in the literature is that as the immigrant spends increasing number of years in the receiving society, ties are formed outside his ethnic community (Breton 1964). Thus, we expect the coefficient a_3 from equation 3 to be positive based on the familiarity of the native population with that particular ethnic group.

On the other hand, we expect the wage gap between immigrants and comparable natives to be a negative function of the total number of immigrants from the ethnic origin group ($a_4 < 0$). This is due to the 'crowding out' effect. There are two types of crowd out effects. The first is related to the notion that as the immigrant community increases in size in the host country they take up job opportunities of natives.[14] Suppose, for instance, that many of the immigrants from a particular ethnic group (the Filipinos), choose to work in a particular sector (nursing). One would expect wages in nursing occupations to fall and these kind of jobs to become relatively less attractive to natives. Filipino immigrants, however, may still accept these low-paying jobs because- compared to the even lower wage that they would have received in their origin country-it seems attractive. However, natives may have more career choices. Also, it may be the case that immigrants view their career decisions or job prospects as an entry ticket into Canada, and this alone may encourage them to accept the low-paying job (Borjas 2004). The second crowd out effect is based on the idea that if we assume each ethnic group is unique in the goods and services it supplies to the native community then as the ethnic group increases in size, supply has also increased of similarly

[14] For Germany, Glitz (2012), finds that an increase in immigrants has a negative effect on the employment/labour force rate of the resident population. Precisely, for every 10-immigrant workers finding employment, around 3.1 resident workers lose their jobs.

skilled workers. Given that demand remains constant, the price of the goods and services supplied by an ethnic group is driven down. This leads to a fall in the earnings of the immigrants (see, for example, Borjas 1987). There are both group-specific and individual-specific error terms. As for our primary variable of interest, Z_{gt} we expect the wage gap between immigrants and natives to be a positive function of the familiarity of the native

population with that particular ethnic group. Origin groups with longer histories in the host country receive the highest acceptance or approval from native Canadians. In other words, the coefficient a_5 from equation (3) should be positive. Looking at the results from the benchmark specifications we do find some evidence that this is the case but it is worth stressing that this result may be driven by changes in the composition of place of birth and therefore i do not have conclusive evidence. In other words, i have not identified the effect of the past and present stock.

Borjas (1987, 1991, 1999a) develops a well-known argument that highly educated individuals are viewed as more skilled and talented and are therefore able to transcend ethnic barriers more easily, better adapting to a new occupational environment. Therefore, when it comes to who benefits most from networks or the past stock, it is individuals who are more likely to be unemployed, the less educated migrants. Centring on this argument, we include an interaction term (past stock* high education) ZHE_{gti} of the immigrant past stock with a dummy for the high education group. We expect the sign of this interaction term to be negative, as immigrants in the high education group are less likely to require the assistance of their ethnic community in finding employment (Greenwood and McDowell 2009). We also employ country specific variables U_{gt} in the regression. These variables portray the economic conditions, as well as some characteristics of the immigrant populations of the countries in our analysis. Consequently, these variables influence the selection and performance of immigrants in Canada. The first variable included is the ratio of average years of total schooling in the origin country relative to Canada lagged 10 years. Statistics on the average number of schooling years in the total population (over age 15) is taken from Barro and

Lee’s (2001) data set.[15] This variable aims to capture differences in human capital between the two countries, not individuals. Because we control for education attainment of both natives and immigrants in our study combined with the restrictions imposed by Barro and Lee (2001) in their study[16], we interpret a higher number of years of schooling in the migrants' home country relative to Canada, to mean requiring more years of schooling to arrive at the same educational level as native Canadians. The repercussion of this interpretation is to assume that the average worker from these countries is of lower quality and thus, of lower productivity. This leads us to expect a negative sign on the education year’s ratio.

This ratio alone is not sufficient in capturing fully the skills and technology of the immigrant flows from the different sources. Thus, the second variable we include is the ratio of gross domestic product (GDP) per capita in the origin region relative to Canada lagged 10 years (in 1990 Int. GK$). We expect a positive sign for this variable because the higher the GDP per capita in the country of origin, the greater the skills of the immigrant flow. This is translated as higher quality immigrants.

Borjas (1987, 1991) analyses the selection process of immigrants from a given origin using the Roy model (Roy, 1950). He finds that the greater the return to skill in the source country relative to the destination country, the more immigrants will be negatively selected. As our third variable, we proxy the relative return to skill by the ratio of source to destination (Canada) country income inequality, lagged 10 years. To represent income inequality we use the Gini coefficient of household income. This is because the coefficient is commonly used in the migration literature and it has wide appeal since it is more easily understood and

[15] This panel only contains data at five-year intervals. In the period I cover, the years covered are 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995 and 2000. I require data for the following years: 1961, 1971, 1981, 1991 and 1996. I take the data from the closest year available.

[16] Barro and Lee (2001) take into account the official duration of individual levels of education in each country and they also exclude the years spent repeating individual grades.

calculated.[17] Data on Gini coefficients of Canada and origin countries, used to construct the origin country's relative inequality variable, comes from Deininger and Squire (1996) data set. Only high-quality observations are used. We expect the sign to be negative as Borjas (1987, 1991) finds that immigrants from countries with more income inequality are of lower quality. This result is also consistent with the theoretical implications of the Roy model (Roy, 1950).

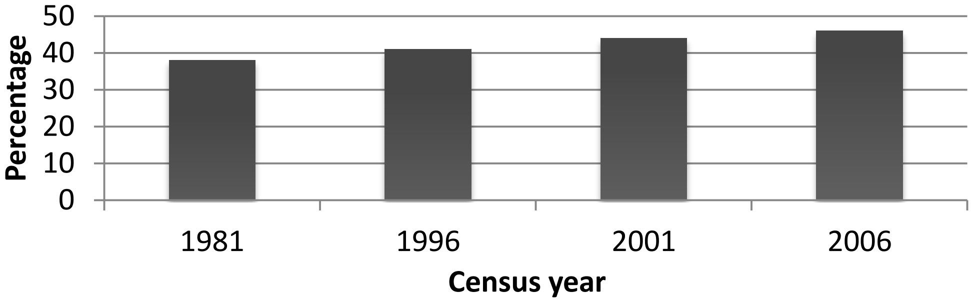
The 10-year lag aims to capture the conditions in the migrant's home country at the time he/she migrated to Canada. Table 2.7 in appendix section 2 gives more information on the computation of these three variables.

The cost of migration can be determined by numerous factors and amongst these, distance is one. Chiswick (1999) and others[18] argue that high migration costs are an indication of high determined, high-skilled, high educated and well-connected immigrants. Thus, immigrants are more likely to be positively selected if migration costs are high. Nevertheless, the influence of distance on the cost of migration is somewhat ambiguous. We capture the cost of migrating by the log of the distance in Kilometres between the capital city of the source country and Toronto, Canada. We enter the distance in logarithmic form so that marginal migration costs decline with distance. Toronto is our chosen city because it has always been a hub for immigrants from all major countries. Figure 2.3 illustrates this. In 1981, around 38% of Toronto's population were immigrants. Over the years, this figure continued increasing, reaching to around 46% in 2006.

[17] These include Borjas (1987), Leibig and Sousa-Poza (2004), Mayda (2009), Clark *et al*. (2007), Brucker and Defoort (2009), Hatton and Leigh (2011), and Hoover and Yahya (2011).

[18] Others include Mattoo, Neagu, Ozden (2008), Brucker and Defoort (2009)

Figure 2.3 Percentage of the foreign-born population in Toronto, Canada, 1981-2006



Source: Statisics Canada, censuses of population, 1981-2006

Table 2.8 reports the log of the distance for the fourteen origin countries. The distances range between 6.33 (U.S.) and 9.49 (the Philippines). We also distinguish between close and far countries by taking the mean of the log distance as the cut off point. For this calculation we exclude the U.S.[19] Thus the mean point becomes 8.97 . Any country with a log distance less than 8.97 is classified as a close country and if the log distance is greater than 9.07 then this is a far country. According to this specification, the U.S., the UK, Portugal, Netherlands, France, Germany, Poland, Italy, Russia and Greece are close countries and China, India, Hong Kong and the Philippines are far countries.

Dummy variables are also included d_i, d_j, d_t for education group, age group and census year, respectively. Also, we do not include origin fixed effects since most of the variation in the country-specific variables U_{gt} and Z_{gt} is in the cross section.[20]

It is worth noting that the way we have interpreted the coefficients requires us to assume there are no omitted variables that are correlated with the years since migration

[19] The United States is excluded from this calculation because it is viewed as an anomaly. However, the United States is considered a close country when undertaking empirical work.
[20] Hatton and Leigh (2011) do the same thing.

variable. This is hard to defend because essentially this variable also measures the date of entry into the new country (Canada) in a cross-sectional regression. If the omitted variables happen to be relevant to labour market success and vary systematically across waves of immigrants, the coefficient on the years since migration variable will measure both immigrant labour market progress and the effect of the average difference in unmeasured factors across successive entry waves. The easiest way to overcome this is to use data that follows cohorts over time. That is, data which gives you observations on each entry cohort at two or more points in time. Unfortunately, to our knowledge, such longitudinal data for Canada does not exist.

Table 2.8 Distance in km and log of the distance between Toronto, Canada and the capital city in the origin country

Country capitals	Distance from Toronto	Log distance
Washington, D.C. (US)	563	6.33
London (UK)	5718	8.65
Lisbon (Portugal)	5732	8.65
Amsterdam (Netherlands)	6024	8.70
Paris (France)	6007	8.70
Berlin (Germany)	6483	8.77
Warsaw (Poland)	6929	8.84
Rome (Italy)	7088	8.86
Moscow (Russia)	7492	8.92
Athens (Greece)	7901	8.97
Beijing (China)	10601	9.26
New Delhi (India)	11645	9.36
Hong Kong (Hong Kong)	12556	9.43
Manila (Philippines)	13229	9.49

Notes: Distance from Toronto to country capitals: Washington, D.C., London, Berlin, Warsaw, Rome, Lisbon, Beijing, New Delhi, Amsterdam, Paris, Athens, Moscow, Hong Kong and Manila. Distances in KM are obtained from: http://www.mapdevelopers.com/distance_from_to.php.

2.4 RESULTS

Tables 2.9, 2.10 and 2.11 report the results of regressing the independent variables discussed in section 2.2 against the log ratio of migrant to native annual earnings, hourly wages and number of hours worked, respectively, for 1981, 1991, 2001 and 2006 census observations.

From table 2.9 consider initially the results of the standard model using only the traditional variables.[21] This is represented by column 1. The years since migration is both positive and significant. This result is in line with evidence in the literature, which suggests that immigrant earnings rise with time spent in the host country.[22] As for the immigrant stock it lacks significance, indicating that the current stock of a given ethnic group does not affect the relative annual earnings of immigrants in Canada belonging to that ethnic group.[23] Note further that the introduction of the past stock per 100 population variable[24] and the past stock*high education interaction term in columns 2 and 3, respectively, has little impact on the standard model results.

Interestingly, column 4 shows that when the group's year since migration variable is introduced into the model, the years since migration variable loses its significance completely (although the coefficient remains positive). This is surprising because the years since migration variable had been strongly significant at the 1% level prior to introducing the high

[21] The standard model is used to compare earnings profiles of immigrants and natives and it is a simple extension of the standard human capital earnings function. The model is proposed by Chiswick (1978).

[22] See for example, Lubotsky 2000.

[23] Based on the assumption that ethnic labour exists, we expected a negative and significant coefficient for the immigrant stock to demonstrate the crowding out effect. However, our result is in line with a recent study on Germany (Glitz 2012).

[24] This is essentially the average stock of immigrants from the origin region over the previous 100 years. For example, for an observation from the 2006 census, the variable measures the average share of the immigrant group in the population at census years from 1906 to 2001, excluding any years in which data is missing. For a 2001 observation, the variable measures the average stock over the census years 1901 to 1996, again excluding any years in which data is not available.

education term (but still significant). It is true that the high education interaction term weakened the significance of this variable but we attribute its now lack of significance to the group years since migration variable. This allows us to conclude that the group years since migration may play an even greater role in the assimilation process of immigrants and their labour market success than the individual years since migration.

It is interesting to note that the high education interaction term remained positive and strongly significantly correlated to the annual earnings, regardless of the introduction of the group years since migration variable, the origin region characteristics and the log of the distance in the model. In addition, the size of the coefficient has remained the same. This result seems puzzling because following the argument that past history might matter less for the most highly educated immigrants, we expected persons in the high-educated group to benefit less from the past stock of immigrants from the same source country. Our result suggests that the opposite is true- that past history matters even more for the highly educated immigrants.[25] This conflicts the view expressed in Hatton and Leigh (2011) - that for the highly educated immigrants, past immigration history matters far less as they are seen to be able to transcend ethnic barriers easily. Different results may be due to differences in identifying the highly educated immigrants.[26]

Clearly Hatton and Leigh (2011)'s hypothesis does not agree with us. Highly educated immigrants cannot transcend barriers more easily, as originally thought and therefore, still require assistance when searching for employment. Banerjee and Verma (2011) agree. They

[25] High-educated individuals are individuals who have earned at least a bachelor's degree. That is, they are individuals that have a bachelor's degree, university certificate or diploma above bachelor level, degree in medicine, dentistry, veterinary medicine or optometry, master's degree or an earned doctorate degree.

[26] I alter the definition of the high education group to match that of Hatton and Leigh (2011)'s. They take the high education group to be those with four or more years in college. Using this new definition, I re-estimate the regression and find the results to be very similar to our original regression output. This reinforces our finding of past history mattering even more for the highly educated immigrants.

claim that highly educated immigrants in Canada are unable to find work in fields related to their education.

Table 2.9 Estimates for annual earnings with different independent variables for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	Annual earnings					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Years since migration/100 (i,j,g,t)	4.49** [1.7]	3.99** [1.84]	3.43* [1.88]	2.66 [1.83]	2.29 [1.86]	3.15 [1.8]
Years since migration squared/100 (i,,j,g,t)	-0.04 [0.03]	-0.04 [0.03]	-0.03 [0.03]	-0.03 [0.03]	-0.03 [0.03]	-0.04 [.03]
Immigrant stock per 100 population (g,t)	-0.07 [0.19]	-0.16 [0.14]	-0.17 [0.14]	-0.15 [0.15]	-0.09 [0.15]	-0.13 [.15]
Immigrant stock per 100 popn. Squared (g,t)	0.04 [0.05]	0.03 [0.05]	0.04 [0.05]	0.04 [0.05]	0.04 [0.04]	0.03 [.05]
Past stock per 100 population (g,t)	--	0.04 [0.02]	0.02 [0.02]	0.01 [0.02]	-0.006 [0.02]	0.03 [.02]
Past stock * high education (g,t)	--	--	0.06*** [0.01]	0.06*** [0.01]	0.06*** [0.01]	--
Group years since migration/10 (g,t)	--	--	--	0.11* [0.05]	0.07 [0.05]	0.11* [.05]
GDP ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.14* [0.08]	--
Education years ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.0004** [0.0001]	--
Gini coefficient ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.09 [0.08]	--
Log distance (g)	--	--	--	--	-0.05* [0.02]	--
R^2	0.57	0.57	0.58	0.58	0.59	0.57
No. of observations	1149					

Note: The dependent variable is the log of the ratio of annual migrant earnings to annual native earnings. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. - - indicates variable not included in regression. ***p=0.01, **p=0.05 and *p=0.10

This is because their education is 'discounted' in the Canadian labour market. This discounting may occur because Canadian employers are unable to assess the quality or relevance of foreign qualifications (Reitz 2007). Nevertheless, if Reitz (2007)'s point is valid, then the past stock variable would have also been significant as the discounted theory would hold for all education levels not just for higher education. Thus, the network effects might be specific to the highly educated immigrants and so it is paramount that the exact reasoning is tied specifically to these immigrants.

Banerjee and Vermon (2011) point out that highly educated persons tend to possess specific personality skills that set them apart from others. They are more motivated and determined, making them more likely to want to work after arriving in the host country and if they find they are unable to secure employment, they may be more motivated to seek help from their network or community than other less educated immigrants.

Also it could be that the network effect is not strong enough to compensate for low ability persons' limitations or that the network might be more active in occupations that requires candidates to be better educated on average, simply because there is greater demand for these kind of jobs. Greater demand for highly educated immigrants was acted upon via the 1967-and later amended in 1974- skill selective 'point system'. The aim of this policy was to provide a large supply of skilled immigrants to the Canadian economy- to match the increase in demand. It did this by awarding potential immigrants points for possessing high education, amongst other specifications. Therefore, we expect immigrants that arrived after 1967 to be more educated than those that arrived prior to 1967.[27]

[27] Borjas (1991) confirms this expectation. Comparing immigration policy between Canada and the United States, he states that the point system attracted a more educated immigrant flow into Canada. He goes on to state that prior to the enactment of the point system in Canada, the average immigrant entering Canada had fewer years of schooling than the average immigrant entering Canada post the introduction of the point system.

This is relevant to our results since the raw data we use spans over a century and encompasses the time period when the point system was enacted. It may be that, it is not the highly educated immigrants that are in need of the past stock but that the past stock was actively looking and selecting highly educated immigrants (via the points system) to meet the increase in demand. This could also explain why the past stock is never significant in the regression. It may be that the past stock of immigrants or the immigrants in Canada were only interested in the highly educated new immigrants. Pinpointing the exact direction of causation is near impossible with the data available. However, since certain policies were set out to achieve particular agendas and there is evidence suggesting this was the case, one has a starting point to the direction of causality.

Before proceeding to the origin-region characteristics, one may question whether it is the high education interaction term or the group years since migration variable that bears the greater weight in influencing the significance of the years since migration variable in table 2.9. To answer this, I re-run the model including both the traditional variables and the group years since migration variable. However, I exclude the interaction term.[28] Column 6 in table 2.9 presents the results. Evidently, only the group years since migration variable is significant. Thus, the group years since migration variable seems to bear the weight alone in making the traditional years since migration variable lose significance. This reinforces the assumption made earlier- the significance of the group years since migration in the assimilation process of immigrants.

Turning to the origin-region characteristics, as expected the coefficient on the foreign to Canada GDP ratio is positive and significant for annual earnings. This suggests that origin region GDP per capita matters in the assimilation process of immigrants because migrants

[28] I also ran the regression with just the traditional variables and the origin region characteristics including the log of the distance. I found that the years since migration variable was still positive and significant. This implies that significance is only lost when the group years since migration variable is introduced.

originating from countries with higher GDP per capita are of more 'quality'. By quality, we mean productivity. The higher the quality of the worker, the higher the expected productivity of that worker. Thus, immigrants that originate from countries with high GDP per capita are most likely to have high productivity levels. This is usually the by-product of being exposed to social and economic factors in these high GDP per capita countries. This result is consistent to that found in Hatton and Leigh (2011).[29]

The coefficient on the foreign to Canada education ratio is also positive and significant. Since educational attainment is controlled for, this result implies that immigrants originating from source regions in which the average years of schooling is greater than that of Canada can expect to have higher earnings. Therefore, it seems that immigrants are not penalised for this, as originally thought. Since we do not control for the country in which the education is attained we must interpret this result with diligence. One explanation could be that education is sought after, and consequently, more of it is valued greater than less of it. This ideology could stem from differences in the quality of education across countries. More years of education needed in the migrant's home country could be viewed as essential to reinforce the same education quality as comparable natives.

The effect of the ratio of the average Gini coefficient in the origin region relative to that of Canada turns out to be unimportant in the annual earnings regression, suggesting that income inequality levels do not affect the economic assimilation of immigrants in Canada. Thus, we cannot assess the predictions made by the Roy model (Roy, 1950).

Finally, the distance between Canada and the origin country appears to be of considerable importance. Its effect is negative and significant on relative annual earnings. This finding challenges the notion that immigrants are more likely to be positively selected if

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29 In their study on the U.S., they found the GDP ratio to be significant and positively correlated with annual earnings.

migration costs are high. According to the results in table 2.9, the opposite is true.[30] One explanation as to why distance may negatively affect the assimilation of immigrants is that it is more costly to obtain information ex-ante about far-away countries, in our case, Canada (Greenwood 1997, Lucas 2001, and Greenwood and McDowell 1991). Information asymmetry is likely to lead to mismatch in demand and supply of labour.

From table 2.10 a number of findings are immediately apparent. Both the number of years since migration and the immigrant stock variables are significant and positively correlated with the hourly wage. However, the introduction of the past stock variable alters the standard results dramatically. No longer are these two independent variables significant. Instead the past stock is positive and significantly correlated to the hourly wage at the 1% level.[31] This is evidence that the past immigration history of an ethnic origin group matters in the economic assimilation process of immigrants.

According to the last column in table 2.10, a 0.01 percent rise in the past stock of a given origin group in Canada increases the hourly wage of immigrants from that origin group by an average of $0.0016.[32]

[30] There are some empirical studies in the international migration literature that find the effect of distance to be negative. See Greenwood and McDowell (1991), and Clark, Hatton and Williamson (2007), Mayda (2009).

[31] This relationship between the two variables remains despite introducing other variables into the model.

[32] The average hourly wage in the sample of the census years 2006, 2001, 1991 and 1981 is $16.2.

Table 2.10 Estimates for the hourly wage with different independent variables for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	Hourly wage				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Years since migration/100 (i,j,g,t)	1.29* [0.65]	0.94 [0.61]	0.92 [0.63]	0.68 [0.60]	0.39 [0.65]
Years since migration squared/100 (i,,j,g,t)	0.0002 [0.01]	0.003 [0.01]	0.003 [0.01]	0.003 [0.01]	0.006 [0.01]
Immigrant stock per 100 population (g,t)	0.11** [0.04]	0.05 [0.04]	0.05 [0.04]	0.06 [0.04]	0.06 [0.04]
Immigrant stock per 100 popn. Squared (g,t)	-0.01 [0.01]	-0.02** [0.008]	-0.02** [0.008]	-0.02** [0.008]	-0.018** [0.008]
Past stock per 100 population (g,t)	--	0.02*** [0.009]	0.02*** [0.009]	0.02*** [0.008]	0.01** [0.007]
Past stock * high education (g,t)	--	--	0.002 [0.005]	0.001 [0.005]	0.002 [0.005]
Group years since migration/10 (g,t)	--	--	--	0.03 [0.01]	0.033* [0.016]
GDP ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.05 [0.04]
Education years ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.00003 [0.00007]
Gini coefficient ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.03 [0.05]
Log distance (g)	--	--	--	--	-0.006 [0.008]
R^2	0.23	0.24	0.24	0.25	0.25
No. of observations	1149				

Note: The dependent variable is the log of the ratio of migrant hourly wage to native hourly wage. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. -- Indicates result not required.

****p*=0.01, ***p*=0.05 and **p*=0.10

One possible explanation is based on the idea of receptivity. We assume that a relationship exists between the size of the past stock of a given ethnic origin group and the familiarity of natives towards immigrants from that ethnic group. An increased familiarity fosters greater receptivity towards the immigrants.[33]

A second explanation is that fundamentally, the past stock is a proxy for network effects. According to Munshi (2003), the individual migrant's network is measured by the proportion of sampled individuals in his community who are located at the destination country (Canada), at each point in time. This is similar to how we computed the immigrant stock and since the past stock is the average immigrant stock at different points in time up to 100 years, the past stock can be viewed as the vintage of the network. Established migrants are likely to make up the majority of these networks (assuming no to little return migration) and these migrants are not only able to find jobs for other members of the same network, but more importantly, they tend to channel them into higher paying occupations (Munshi 2003).

Established migrants are more likely to be employed and the firms that hired them will on average have employed their older immigrants longer. These workers will presumably have risen within the organizational hierarchy or accumulated a firm-specific reputation over time, making it difficult for them if they are to part from the firm. Therefore, established migrants only refer the ablest workers from their network (Munshi 2003). The result is an increase in the average hourly wage of immigrants in Canada. This reinforces the positive relationship found between the past stock and the hourly wage as it can be argued that these 'ablest workers' deserve a high hourly wage.

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[33] One must bear in mind that this is just an assumption as realistically it is not that simplistic. The notion of acceptance between ethnic outsiders and natives follows a single direction fueled by the size of the past stock is just too naive to assume. There are numerous mechanisms involved in this complex process with a whole literature dedicated to understanding this phenomenon.

As for the coefficient on the group years since migration it is positive and significant for the hourly wage.[34] Hatton and Leigh (2011) fail to arrive at a similar conclusion. They find that this independent variable has no impact on the hourly wage. Two ways in which the group years since migration variable can translate into having a positive impact on the hourly wage are discussed.

Firstly, we assume the longer an ethnic group has been in Canada, the more receptive the host society is towards the group. Therefore, dependent on an immigrant identifying himself with an ethnic group and that this is apparent to the employer, combined with the employer being able to access information on this ethnic group, we can conclude that other members of the same ethnic group one belongs to does affect your ability as an immigrant to assimilate economically. Precisely, for every additional year one's ethnic community has been present in Canada, you can expect your hourly wage to increase by an average of 0.033%. With the average hourly wage in the sample being \$16.2, immigrants can expect their hourly wage to increase by \$0.005.

The second explanation is offered by the ethnic capital model and is dependent on being exposed to an ethnic community. Borjas (1992) sums it up beautifully stating that the longer one has been exposed to a migrant community, the stronger the ethnic capital or network effect gain. So what are the benefits of ethnic capital exactly and how is it relevant to understanding our results?

The labour economics and sociology literature documents the benefits of network effects or ethnic capital in the economic assimilation process of migrants.[35] Starting with the pioneering work of Lucas (1988), who documents that a key determinant of finding

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[34] Note that the group years since migration variable only becomes significant when the origin region characteristics are included in the regression.

[35] Other studies that document the importance of network on the human capital accumulation process include Light and Bonacich, 1988; Clark, Hatton and Williamson, 2007; Portes 1987; Lazear 1999.

employment, involves knowing similar people to us, whether in terms of ethnicity or skills. Coleman (1988) stresses the concept of 'social capital'. He believes that the culture in which the individual is raised, which can be thought of as a form of human capital common to all members of that group has the ability to alter the individual's opportunity set and has significant effects on labour market outcomes. Similarly, Wilson (1989) in his study of young blacks in poor neighbourhoods argues that whom we expose ourselves to has an impact on our economic mobility. Last, Borjas (1992, 1994) famously argues than an ethnic community can act as a viable source in offering economic opportunities to its people. In particular, people raised in advantageous ethnic environments will be exposed to social and economic factors that increase their productivity. The greater the exposure, the higher the resulting quality of the worker. Thus, assuming one exposes himself to his ethnic group community in the host country, then one can expect to have a more positive assimilation process, the longer the exposure. The greater the group years since migration, the longer on average one has had the chance to expose himself to his ethnic community.

As for the origin region characteristics, unlike table 2.9, none of the variables including the log of the distance is significant.[36] That is, they have no impact on the hourly wages. Turning to the final measure of assimilation, the log ratio of annual hours worked, it is evident from table 2.11 that the number of years since migration and its square give positive and negative coefficients, respectively. This indicates that the relationship between annual hours worked and years since migration is nonlinear and that a lower increment to the number of hours worked occurs with additional years of stay in Canada. The coefficient signs are expected because studies of individual level data (Chiswick 1978; Carliner 1980; Bloom and Gunderson 1991; Baker and Benjamin 1994) dictate that the longer one has been in the

[36] In table 2.9, the GDP and education ratio and the log distance are significant.

host society, the more human capital -specific to the host society- one has accumulated and thus, the more assimilated they are expected to be.

Precisely, for every additional year an immigrant has been in Canada, they can expect their working hours to increase by an average of 1.6%. With the average annual hours worked by immigrants in the sample being 2065 hours, immigrants can expect to work around 33 hours more. Note this does not imply that immigrants are financially better off, as the number of years since migration and its square is not significant for the measures that take into account monetary value- the annual earnings and the hourly wage.

The immigrant stock, as expected, has a negative impact on the relative number of hours worked, most likely due to the crowding out effect. As a particular ethnic group in the host society increases in size, the supply of similarly skilled workers also increases. One may question why the supply of workers is similarly skilled? In a recent empirical study, Alesina et al. (2013)-relying on immigration data from 195 countries-observed productive skills and people's birthplaces. The authors found a positive association between the two and that having an origin-mix of workers in the workplace actually leads to higher productivity, due to skill differences being complementary. Different birthplaces imply people are being exposed to different experiences, different school systems, and different cultures and thus have developed different perspectives that allow them to interpret and solve problems differently. Thus, we assume differences in skills exist across ethnic groups but these are limited within ethnic groups.

Table 2.11 Estimates for annual hours worked with different independent variables for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	Hours worked				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Years since migration/100 (i,j,g,t)	1.63*** [0.43]	1.53*** [0.46]	1.48*** [0.45]	1.47** [0.55]	1.63** [0.61]
Years since migration squared/100 (i,,j,g,t)	-0.02** [0.007]	-0.01** [0.007]	-0.01** [0.007]	-0.01** [0.007]	-0.02** [0.008]
Immigrant stock per 100 population (g,t)	-0.04 [0.02]	-0.06** [0.02]	-0.06** [0.02]	-0.06** [0.02]	-0.06** [-.02]
Immigrant stock per 100 popn. Squared (g,t)	0.01* [0.007]	0.01* [0.006]	0.01* [0.006]	0.01* [0.006]	0.01* [0.007]
Past stock per 100 population (g,t)	--	0.007 [0.005]	0.006 [0.005]	0.005 [0.004]	0.003 [0.004]
Past stock * high education (g,t)	--	--	0.006** [0.002]	0.006** [0.002]	0.006*** [0.002]
Group years since migration/10 (g,t)	--	--	--	0.001 [0.01]	-0.0007 [0.01]
GDP ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.02 [0.03]
Education years ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.00007** [0.00003]
Gini coefficient ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.01 [0.04]
Log distance (g)	--	--	--	--	-0.02** [0.008]
R^2	0.18	0.19	0.19	0.19	0.20
No. of observations			1149		

Note: The dependent variable is the log of the ratio of migrant annual hours worked to native annual hours worked. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. -- Indicates result not required. ****p*=0.01, ***p*=0.05 and **p*=0.10

As supply of similarly skilled workers increases, the number of hours given to each migrant worker is driven down. This is because generally, a larger network should improve employment outcomes, however, beyond a certain point in size, network effects have a diminishing effect. Finally, since the immigrant stock squared coefficient is significantly negative for the number of hours worked, we can conclude that the relationship between annual number of hours worked and immigrant stock is nonlinear.[37]

The high education interaction term claims its significance by entering the model. This is similar to the results obtained for relative annual earnings. In addition, the origin region characteristic strengthens its significance. Also, we find that ratio of average years of education in the origin region relative to Canada is significant at the 5% level with a negative coefficient. The sign on the coefficient is expected but the fact that it is different to that found for relative annual earnings[38], we conclude its effect on the assimilation process to be ambiguous. It may act as a double-edged sword.

Likewise the results for relative annual earnings, the effect between the distance and the outcome variable is negative and significant. Based on this revelation, we choose to re-estimate the three measures of assimilation based on a far and close countries specification. That is we split the regression into far and close countries. Details of this specification and how the distinction is obtained are outlined in the data section. Splitting the sample into far and close countries incidentally splits the sample into high paying (Western) and low paying (Asian) countries. The Western countries are the U.S., the UK, Portugal, the Netherlands, France, Germany, Poland, Italy, Russia and Greece. As for the Asian countries in the sample they are China, India, Hong Kong and the Philippines.

[37] This implies that the number of annual hours worked increases with the immigrant stock size but at a decreasing rate.

[38] The correlation between the education ratio and relative annual earnings is positive.

Tables 2.12 and 2.13 report the results. We find that the effect of distance turns out to be unimportant in all the three regressions for close countries but significantly negative for the outcome variable hourly wage, for the far countries. Thus, when separating the regression into far and close countries, the impact of distance on the economic assimilation of immigrants is less profound, when compared to our original results.

Far country specification

What is of interest is that many of the non-significant coefficients from the benchmark model are now significant in the far country specification. For example, the years since migration is now positive and significant with earnings. This result is in line with the literature, which suggests that immigrant earnings rise with time spent in the host country due to the immigrants acquiring more host-market skills (see for lubotsky 2000). Therefore, immigrants from low paying nations can expect their earnings to increase with the time spent in Canada. This is also the case for the group's years since migration.

The immigrant stock and its square give positive and negative coefficients, respectively. We find no evidence of the expected crowding out effect. Rather the current stock of immigrants has a positive impact on both annual earnings and hourly wage[39] For the original results, the reverse was true.

Also, from table 2.13 (far countries regression) we find that the ratio of the average Gini coefficient in the origin region relative to that of Canada takes a positive coefficient for both annual earnings and hourly wages.[40]

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[39] It may be that network-diminishing effects have not set in yet probably because the size of the immigrant stock is not large enough. Indeed, when observing the average of the immigrant stock for both far and close countries, we find that it is the far countries that have a lower average immigrant stock. The average of the Canadian immigrant stock for both the far and close countries are 0.745 and 0.86, respectively. It is evident that far countries have a smaller average immigrant stock. It may be that by increasing the average of the immigrant stock (size of network), will entice crowding out or diminishing effects.

[40] This result is consistent with the predictions of the Roy model. Thus, skilled immigrants from either China, India, Hong Kong or the Philippines will still find it more attractive to move to Canada-and will probably be positively selected- despite the higher returns to skills in their home country.

Also, the coefficient on the past stock variable reverses sign and gains significance, implying that past immigration history of an ethnic origin group matters in the economic assimilation process of immigrants. Specifically, the larger the size of the past stock of a given origin group, the higher the earnings of immigrants. This is possibly due to increased familiarity of natives towards immigrants from those origin groups.
Other changes include the coefficient on the foreign to Canada education ratio. This variable reverses sign and is now negative and significant on annual earnings. Since educational attainment is controlled for in the regression, this result implies that immigrants originating from source regions in which the average years of schooling is greater than that of Canada can expect to have lower earnings. This is because we interpret higher number of years of schooling in the migrants' home country relative to Canada, to mean requiring more years of schooling to arrive at the same educational level as native Canadians (Hatton and. Leigh 2011). In other words, the average worker is of lower quality and productivity, a typical characteristic of Asian or low paying nations.

Close country specification

Looking at the close country specification, it is apparent that there are fewer significant findings among the results compared to the far country (low paying nations) specification. It may be due to the close country (high paying nations) specification including immigrants (from Western Europe, the UK and the U.S.) that typically earn more in Canada than the natives and so there will be less positive and significant effects of the variables associated with assimilation such as the years since migration, the past and and present stock and the group's years since migration.

Table 2.12 Estimates for annual earnings, hourly wages and hours worked, for 1981, 1991, 2001 & 2006 Census observations (close countries)

Dependent variable	Annual earnings	Hourly wage	Hours worked
Years since migration/100 (i,j,g,t)	2.451 [2.362]	.801 [.750]	1.518* [.813]
Years since migration squared/100 (i,,j,g,t)	-.038 [.040]	-.008 [.015]	-.016* [.009]
Group years since migration/10 (g,t)	.229* [.115]	.020 [.015]	-.0004 [.033]
Immigrant stock per 100 population (g,t)	-.241 [.244]	.083 [.067]	-.097*** [.022]
Immigrant stock per 100 popn. squared (g,t)	.068 [.067]	-.018 [.017]	.026** [.009]
Past stock per 100 population (g,t)	.022 [.022]	.010 [.005]	.004 [.007]
Past stock * high education (g,t)	.038* [.017]	.004 [.003]	.003 [.002]
GDP ratio (foreign/Canada) (g,t-1)	.235 [.165]	.115 [.076]	-.099 [.089]
Education years ratio (foreign/Canada) (g,t-1)	.0005* [.0003]	8.34e-06 [.0001]	-.0001** [.00004]
Gini coefficient ratio (foreign/Canada) (g,t-1)	.186 [.321]	-.038 [.122]	.126 [.072]
Log distance (g)	-.022 [.051]	.003 [.013]	-.018 [.015]
R^2	0.568	0.125	0.136
No. of observations	833	833	833

Note: The dependent variables are the log of the migrant to native ratio (e.g. the log of the ratio of annual migrant earnings to annual native earnings). Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation.

****p*=0.01, ***p*=0.05 and **p*=0.10

Table 2.13 Estimates for annual earnings, hourly wages and hours worked, for 1981, 1991, 2001 and 2006 Census observations (far countries)

Dependent variable	Annual earnings	Hourly wage	Hours worked
Years since migration/100 (i,j,g,t)	3.716** [1.098]	.112 [1.355]	1.477* [.495]
Years since migration squared/100 (i,,j,g,t)	-.019 [.032]	.039 [.029]	-.0157 [.012]
Group years since migration/10 (g,t)	.382* [.151]	.224 [.224]	-.036 [.043]
Immigrant stock per 100 population (g,t)	3.417** [.888]	3.843* [1.351]	.173 [.667]
Immigrant stock per 100 popn. squared (g,t)	-1.205** [.299]	-1.480** [.456]	-.108 [.267]
Past stock per 100 population (g,t)	5.999** [2.247]	10.657* [3.404]	-1.432 [2.011]
Past stock * high education (g,t)	.191 [.489]	.264 [.199]	-.006 [.084]
GDP ratio (foreign/Canada) (g,t-1)	.082 [.056]	-.244* [.103]	.087 [.061]
Education years ratio (foreign/Canada) (g,t-1)	-2.600** [.772]	-4.26** [1.202]	.456 [.755]
Gini coefficient ratio (foreign/Canada) (g,t-1)	1.278* [.472]	2.539** [.751]	-.373 [.465]
Log distance (g)	-.657 [.481]	-2.943** [.775]	.587 [.690]
R^2	0.353	0.3	0.241
No. of observations	316	316	316

Note: The dependent variables are the log of the migrant to native ratio (e.g. the log of the ratio of annual migrant earnings to annual native earnings). Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation.

***p=0.01, **p=0.05 and *p=0.10

2.4.1 The recent past or the distant past

In order to assess whether it is immigration in the recent past or in the distant past that influences the earnings of first-generation immigrants, we capture the migrant stock at various times in the past. Specifically the migrant stock is captured at the recent past of 30 years ago, the mid-past at 70 years ago, and finally the distant past at 100 years ago. This investigation is fundamental because immigrant origin composition in any given host country is dynamic. It constantly changes over time reflecting political, economic and social events.

Table 2.14 reports the results. For comparison with table 2.10, these regressions do not include origin fixed effects. Before we proceed with the results, it is useful to mention that for tables 2.14, 2.15 and 2.16, the layout is as the following. Columns 1 and 2 show the results when the migrant stock is set at 30 and 70 years prior to the current census, respectively. The last column is a replication of our original/baseline result as a benchmark. In other words, it is when the past migrant stock is set at 100 years previous to the current census.

Looking to the benchmark model in column 3 of table 2.14, the past stock variable is highly significant impacting the hourly wages of immigrants in Canada positively. We also found that the high education interaction term to lack significance. The coefficients on the past stock and the interaction term follow a similar pattern to when the past stock is at 70 years ago in column 2- the past stock variable is highly significant for hourly wages and the interaction term has no effect. Column 1 represents the results when the migrant stock is set at 30 years prior to the current census. Neither the past stock nor the interaction term have any significant effect on the hourly wage of immigrants in Canada.

Several points can be concluded from these revelations. Firstly, the past stock of immigrants does positively impact the economic assimilation process (hourly wage) of immigrants in Canada, and fundamentally, altering the immigration history by altering the stock does change the result. It is unsurprising that the main effect increases in size as the past stock becomes closer to the present.[41] Surprisingly, we also find that if the past stock is too close to the present, at 30 years ago, then the coefficient becomes insignificant. In other words, the mid to distant past stock matters whereas the recent has no effect on the hourly wages of immigrants. This could be because recent immigration history is not well developed or ingrained in the host society to have any effect on the hourly wages of immigrants in Canada.

41 The mid-past seems to matter more than the distant past.

Table 2.14 Estimates for hourly wage with different past stocks for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	**Hourly wage**		
	(1) Recent past	(2) Mid-past	(3) Benchmark
Years since migration/100 (i,j,g,t)	.47 [.70]	.42 [.64]	.398 [.651]
Years since migration squared/100 (i,,j,g,t)	.005 [.01]	.006 [.01]	.006 [.013]
Group years since migration/10 (g,t)	.03* [.02]	.03* [.01]	.033* [016]
Immigrant stock per 100 population (g,t)	.10** [.04]	.07* [.04]	.069 [.043]
Immigrant stock per 100 popn. Squared (g,t)	-.01 [.01]	-.02** [.008]	-.018** [.008]
Stock from same group (%) 100 years ago (g,t)	--	--	.018** [.007]
Stock 100 years ago * high education (g,t)	--	--	.002 [005]
Stock from same group (%) 70 years ago (g,t)	--	.024** [.01]	--
Stock 70 years ago * high education (g,t)	--	.001 [.006]	--
Stock from same group (%) 30 years ago (g,t)	-.00001 [.0001]	--	--
Stock 30 years ago * high education (g,t)	.006 [.01]	--	--
GDP ratio (foreign/Canada) (g,t-1)	.06 [.04]	.060 [.045]	.056 [.043]
Education years ratio (foreign/Canada) (g,t-1)	.00003 [.00006]	.00004 [.00007]	.00003 [.00007]
Gini coefficient ratio (foreign/Canada) (g,t-1)	.03 [.07]	.03 [.05]	.033 [.053]
Log distance (g)	-.01 [.009]	-.004 [.009]	-.006 [.008]
R^2	0.25		
No. of observations	1149		

The dependent variable is the log of the ratio of migrant hourly wage to native hourly wage. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. -- Indicates result not required.

***p=0.01, **p=0.05 and *p=0.10

It is also interesting how the coefficient of current immigrant stock becomes bigger and increases in significance level as a closer definition of the past stock is chosen. Finally, we find that there is no effect between the high education interaction term and the hourly wage irrespective of changes in immigration history. This is probably due to the effect being confounded with that of the current immigrant stock measure.

Table 2.15 presents the results for the outcome variable annual earnings. We find that the immigrant past stock has no impact on relative annual earnings and that the high education interaction term is significantly positive (see column 1 of table 2.15). The past stock still has no effect on relative annual earnings despite changing the definition of immigration history (see columns 2 and 3). In addition, we find that recent immigration history benefits highly educated immigrant's more than distant immigration history. There is no impact when the past stock is taken to mean mid-past.

With regards to the relative annual hours worked, table 2.16 indicates that likewise annual earnings, the past stock variable is not significant and changes to the immigration history of ethnic origin groups does not alter this result. As for the interaction term, it is recent immigration history benefits the highly educated immigrants more than distant immigration history.

We can only speculate about why the effects are more powerful for the recent past as opposed to the distant past, for the highly educated immigrants. Hatton and Leigh (2011) offer a reasonable explanation. They state that it may simply be that individual and institutional memories fade over time. Or it may be the result of structural change; for example, the traditional established in rural communities have been pushed into the background by a century of urbanization. Alternatively, cultural perceptions may be influenced by the structure of migration itself: traditions created by more recent immigrant streams eventually suppress those that were established much earlier.

The positive and significant correlation between the past stock at 70 and 100 years ago with the hourly wage witnessed in the benchmark regression (see table 2.14) may have been caused by the lack of dummies for country of birth in the regression. Given that most of the variation in the origin-specific variables is in the cross section we felt no need to control for country of birth. The past stock represents the historical presence of an origin group up to 100 years ago. Looking at the past immigrant stock values from table 2.4 in appendix 2, the countries that supplied the greatest number of immigrants in Canada over 100 year period from the time of the census are the UK, U.S. and Italy.

Other country specific variables used in the regression include the ratio of average years of total schooling in the origin country relative to Canada, the ratio of GDP per capita in the origin region relative to Canada and the Gini coefficient of household income in the origin region relative to Canada. In addition, the pseudo-person groups created are defined by country of birth.

Nevertheless, not controlling for country of birth may lead to omitted variable bias and the immigrant stock effects may be capturing unobserved immigrant qualities that happen to be correlated with the timing and magnitude of past migrations but are not completely captured by origin-region variables like GDP per capita or education. As a result, it is likely that the past stock variable will proxy for country of birth and since the majority of immigrants composing the past stock are from developed countries, who typically earn on average more than native Canadians, it is likely to fuel the positive effect of the past stock on the hourly wage ratio, that we see.

In addition, this could also explain the smaller effect of the past stock 30-year sample compared to the 70 year sample. The past stock 70 years ago is greater than the stock 30 years ago in immigrants from the UK and U.S. This implies that origin groups with long histories have a higher hourly wage than those with short histories.

In the specification including place of birth dummies (see table 2.14a), the insignificant coefficients for the years since migration and its squared variable from the benchmark model is reproduced. The coefficient on the group years since migration loses significance across the three regressions when the place of birth dummies in included. The coefficient on the immigrant stock also becomes insignificant in the 30 and 70-year sample and reverses sign in the 30-year sample regression. Indeed it seems that the results of the past stock were caused by the lack of country of birth dummies. The past stock is strongly correlated to the country of birth. Including the country of birth dummies into the specification leads the past stock measure at 100 years ago and the past stock at 70 years ago to lose significance and reverse sign. Prior to the inclusion of the origin dummies, the coefficient on the past stock 70 and 100 years ago is positive. This is because the past stock measures at 70 and 100 years ago had a significant share of immigrants from Western Europe (particularly the UK) and the U.S. These immigrants typically earn more in Canada than comparable native Canadians, leading to the apparent positive effect of the past stock on the hourly wage ratio. Controlling for the origins of immigrants now eliminates this.

As for the past stock measure 30 year ago, it reverses sign and becomes significant. Several points can be concluded from this. Firstly, it is paramount to control for the origins of immigrants as the origin composition of immigrants in the sample may bias the results, particularly for the variables that concern the history of immigrant origin groups such as the past stock. In particular, we witness a bias upward for the coefficients on the past stock at 70 and 100 years ago.

Secondly, we find that the past stock of immigrants does impact the economic assimilation process (hourly wage) of immigrants in Canada and in particular, it is recent immigration history (30 years or less)-as opposed to the distant past- that has a positive impact on the hourly wage. One reason for this could be simply that individual and institutional memories fade over time and therefore one is more likely to be affected by the culture, traditions and ideas of recent immigrants than distant immigrants. Alternatively, cultural perceptions may be influenced by the structure of migration itself: traditions created by more recent immigrant streams eventually suppress those that were established much earlier. earlier.

Table 2.14a Estimates for hourly wage with different past stocks for 1981, 1991, 2001 and 2006 Census observation, with place of birth dummies

Dependent variable	Hourly wage		
	(1) Recent past	(2) Mid-past	(3) Benchmark
Years since migration/100 (i,j,g,t)	0.22 [0.72]	0.19 [0.77]	0.21 [0.77]
Years since migration squared/100 (i,,j,g,t)	0.009 [0.01	0.009 [0.02]	0.009 [0.01]
Group years since migration/10 (g,t)	0.01 [0.03]	0.01 [0.03]	0.007 [0.02]
Immigrant stock per 100 population (g,t)	-0.06 [0.11]	0.04 [0.14]	0.02 [0.13]
Immigrant stock per 100 popn. Squared (g,t)	0.004 [0.01]	-0.004 [0.02]	-0.003 [0.02]
Stock from same group (%) 100 years ago (g,t)	--	--	-0.04 [0.06]
Stock 100 years ago * high education (g,t)	--	--	0.0009 [0.005]
Stock from same group (%) 70 years ago (g,t)	--	-0.04 [0.03]	--
Stock 70 years ago * high education (g,t)	--	0.0004 [0.006]	--
Stock from same group (%) 30 years ago (g,t)	0.0003* [0.0002]	--	--
Stock 30 years ago * high education (g,t)	0.00004 [0.01]	--	--
GDP ratio (foreign/Canada) (g,t-1)	0.08 [0.16]	0.05 [0.17]	0.05 [0.17]
Education years ratio (foreign/Canada) (g,t-1)	0.06 [0.222]	-0.005 [0.19]	-0.05 [0.19]
Gini coefficient ratio (foreign/Canada) (g,t-1)	-0.02 [0.02]	-0.17* [0.08]	-0.16 [0.09]
Log distance (g)	-0.04 [0.06]	-0.06 [0.04]	-0.11 [0.08]
R^2	0.28		
No. of observations	1149		

The dependent variable is the log of the ratio of migrant hourly wage to native hourly wage. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups, three census years and fourteen place of birth dummies. The data are weighted according to the number of migrants underlying each observation. – Indicates result not required.

*** p=0.01, **p=0.05 and *p=0.10

Table 2.15 Estimates for Annual earnings with different past stocks for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	**Annual earnings**		
	(1) Recent past	(2) Mid-past	(3) Benchmark
Years since migration/100 (i,j,g,t)	2.11 [1.88]	2.18 [1.87]	2.29 [1.86]
Years since migration squared/100 (i,,j,g,t)	-.03 [.03]	-.03 [.03]	-.03 [.032]
Group years since migration/10 (g,t)	.07 [.06]	.07 [.04]	.07 [.05]
Immigrant stock per 100 population (g,t)	-.11 [.16]	-.10 [.13]	-.09 [.15]
Immigrant stock per 100 popn. Squared (g,t)	.03 [.04]	.03 [.05]	.04 [.04]
Stock from same group (%) 100 years ago (g,t)	--	--	-.00 [.02]
Stock 100 years ago * high education (g,t)	--	--	.06*** [.01]
Stock from same group (%) 70 years ago (g,t)	--	.03 [.05]	--
Stock 70 years ago * high education (g,t)	--	.0005 [.03]	--
Stock from same group (%) 30 years ago (g,t)	.00006 [.0003]	--	--
Stock 30 years ago * high education (g,t)	.16*** [.01]	--	--
GDP ratio (foreign/Canada) (g,t-1)	.15* [.08]	.15* [.08]	.14* [.08]
Education years ratio (foreign/Canada) (g,t-1)	.0004** [.0001]	.0004** [.0001]	.0004** [.0001]
Gini coefficient ratio (foreign/Canada) (g,t-1)	-.07 [.14]	-.10 [.08]	-.09 [.08]
Log distance (g)	-.04** [.01]	-.04 [.03]	-.05* [.02]
R^2	0.6	0.6	0.59
No. of observations	1149		

The dependent variable is the log of the ratio of migrant annual earnings to native annual earnings. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. -- Indicates result not required. ***p=0.01, **p=0.05 and *p=0.10

Table 2.16 Estimates for Annual hours worked with different past stocks for 1981, 1991, 2001 and 2006 Census observations

Dependent Variable	**Hours worked**		
	(1) Recent past	(2) Mid-past	(3) Benchmark
Years since migration/100 (i,j,g,t)	1.60** [.59]	1.63** [.61]	1.633** [.615]
Years since migration squared/100 (i,,j,g,t)	-.02** [.007]	-.02** [.008]	-.021** [.008]
Group years since migration/10 (g,t)	-.004 [.01]	-.001 [.01]	-.0007 [.014]
Immigrant stock per 100 population (g,t)	-.05* [.02]	-.06** [.02]	-.064** [.027]
Immigrant stock per 100 popn. Squared (g,t)	.01* [.007]	.01 [.007]	.014* [.007]
Stock from same group (%) 100 years ago (g,t)	--	--	.003 [.004]
Stock 100 years ago * high education (g,t)	--	--	.006*** [.002]
Stock from same group (%) 70 years ago (g,t)	--	.006 [.005]	--
Stock 70 years ago * high education (g,t)	--	.007*** [.002]	--
Stock from same group (%) 30 years ago (g,t)	-.00008 [.00005]	--	--
Stock 30 years ago * high education (g,t)	.01** [.004]	--	--
GDP ratio (foreign/Canada) (g,t-1)	-.01 [.03]	-.02 [.035]	-.029 [.035]
Education years ratio (foreign/Canada) (g,t-1)	-.00007** [.00002]	-.00007** [.00003]	-.00007** [.00003]
Gini coefficient ratio (foreign/Canada) (g,t-1)	-.033 [.051]	-.01 [.04]	-.013 [.041]
Log distance (g)	-.02** [.007]	-.01** [.009]	-.021** [.008]
R^2	0.20		
No. of observations	1149		

The dependent variable is the log of the ratio of migrant annual hours worked to native annual hours worked. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. -- Indicates result not required.

***p=0.01, **p=0.05 and *p=0.10

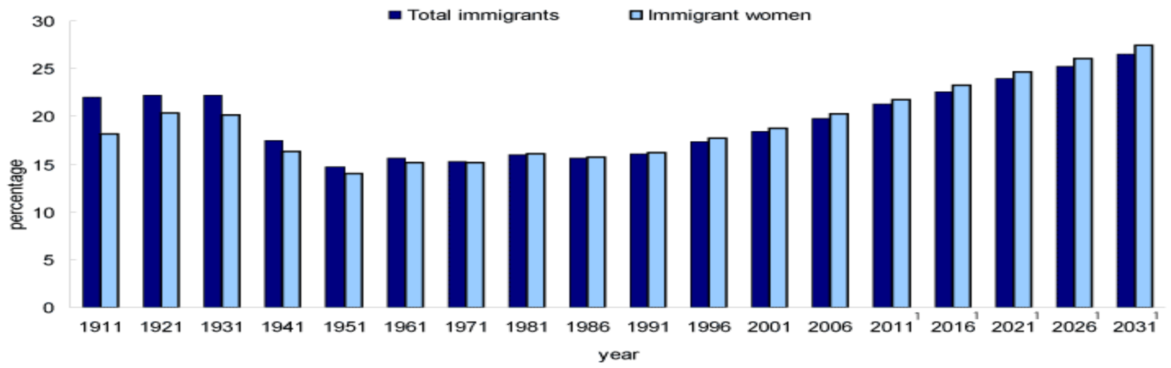
2.4.2 Alternative estimates

Taking our benchmark model,[42] we address a caveat regarding female workers. Following the common methodology approach in studies on interpersonal earning differentials, females were excluded from our study (see for example, Hatton and Leigh, 2011; Baker and Benjamin 1994; Tandon 1978; Wright and Maxim 1993; Grant 1999). This is due to the complexity of the labour supply of females and the problems associated with its accurate measurement. However, the exclusion of females is a serious limitation since they accounted for a significant share of the immigrant population during the 1911-2006 period. After 1981, the proportion of female immigrants continued to increase and evidently from figure 2.4 Canada's population of immigrant women is projected to continue increasing to over 25 percent by 2031.

Since female immigrants play a pivotal role in Canadian immigration and the fact that Canadian censuses contain sufficient information on the work history and human capital of females, we alter our benchmark model to include females. Doing so will increase our understanding on the economic assimilation of immigrants. Results are presented in table 2.17. Sample restrictions are kept the same as before.

[42] The benchmark sample is restricted to males, aged between 25 and 64, and who reported positive earnings, hourly wage and annual hours worked.

Figure 2.4 Immigrant women and total immigrants, Canada, 1911 to 2006 and 2011 to 2031 projections



1. Projection.

Sources: Statistics Canada, censuses of population, 1911 to 2006; and *Projections of the Diversity of the Canadian Population, 2006 to 2031*. Ottawa: Statistics Canada, 2010. The raw data used in this graph can be found at https://www150.statcan.gc.ca/n1/pub/89-503-x/2010001/article/11528/c-g/desc/c-g001-desc-eng.htm (Accessed 07.01.2019)

Catalogueno.91-551-x.

When females are included in the study (see column 2 of table 2.17), notably very little has changed to the traditional variables. Apart from the immigrant stock now being positive and significant at the 5% level, the years since migration variable and its squared remain not significant. The sign on the immigrant stock coefficient is surprising as we expected it to be negative due to the crowding out effect. Also, though it was not significant in the benchmark model, the coefficient was negative. It seems that the introduction of females seems to have reversed the sign from negative to positive. This could be because females have a small labour force participation overall.[43]

43 Edin et al (2003) obtain similar results. They find a significant and positive relationship between ethnic stock and annual earnings. Their study also includes females.

Secondly, whereas in the benchmark model, the group-level variables had no impact on relative annual earnings, the introduction of females seems to have enticed the significance of the group level variables. We find that both the group years since migration and the past stock to be significant. This is evidence to suggest that group level characteristics play a dominant role in the assimilation process of immigrants when females are included in the study.

The group years since migration variable has a positive and significant impact on annual earnings. This may be due to the notion that females seek support from their ethnic communities more than males. Wang (2004) refers to female workers as a disadvantaged group in the labour market. Many other scholars share the same opinion as Wang (see, Hanson and Pratt, 1988, 1995; Raijman and Semyonov, 1997). This opinion stems from the notion that females are restricted in their labour market choices due to their domestic responsibilities. As a result, women tend to take on different jobs from those occupied by men (Ellis and Wright, 1999; Wright and Ellis, 2000; Hudson, 2002), and fundamentally, are more likely to form ethnic niches.[44] The common reason given in the literature is that ethnic niches allow the disadvantaged person (in this case female workers) to compensate for their lack of skills and/or difficulty integrating into the labour market.[45] However, since we keep socioeconomic factors constant in our study, we feel that there must be other reasons, which compel females to join ethnic niches. Nevertheless, this is not necessarily a bad phenomenon as we have proven empirically that a positive relationship exists between one's ethnic group years since migration and relative annual earnings. Thus, we conclude that group the level characteristics do have an impact on female assimilation process as opposed to men.

[44] Wang (2004) found that female Filipino workers are 2.4 times more likely to work in Filipino niches than male workers.

[45] Ethnic niches provide information on job opportunities and act as an environment where the immigrant is less exposed to the discrimination encountered elsewhere in the labour market.

Table 2.17 Alternative estimates for annual earnings for 1981, 1991, 2001 and 2006 Census observations

Dependent variable	Annual earnings		
	(1) Benchmark	(2) Females Included	(3) U.S. excluded
Years since migration/100 (i,j,g,t)	2.297 [1.868]	0.0002 [0.007]	4.05*** [1.29]
Years since migration squared/100 (i,,j,g,t)	-.032 [.032]	-.03 [0.02]	-.058** [.02]
Group years since migration/10 (g,t)	.078 [.050]	0.61*** [0.09]	.065* [.03]
Immigrant stock per 100 population (g,t)	-.092 [.152]	0.64** [0.3]	-.169 [.136]
Immigrant stock per 100 popn. Squared (g,t)	.041 [.047]	-.05 [0.05]	.067 [.04]
Past stock per 100 population (g,t)	-.006 [.020]	-.105** [0.042]	-.01 [.02]
Past stock * high education (g,t)	.066*** [.011]	-.002 [0.018]	.066*** [.013]
GDP ratio (foreign/Canada) (g,t-1)	.147* [.082]	-0.95* [0.48]	.139 [.084]
Education years ratio (foreign/Canada) (g,t-1)	.0004** [.0001]	0.89** [0.326]	.0004** [.0001]
Gini coefficient ratio (foreign/Canada) (g,t-1)	-.096 [.085]	0.196 [0.217]	-.128 [.113]
Log distance (g)	-.051* [.027]	-.366 [0.219]	.03 [.12]
R^2	0.595	0.666	0.60
No. of observations	1149	1338	1027

Note: The dependent variable is the log of the ratio of annual migrant earnings to annual native earnings. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. The results of the other two measures of assimilation (hourly wages and number of hours worked) are available from the author upon request. Including females in the analysis means we constructed separate pseudo groups for males and females. Consequently, there are more pseudo person categories. Precisely, we gain 189 categories over four census years when females are included. In total, we have less pseudo categories for females than males because there is less female individual observations overall.

****p*=0.01, ***p*=0.05 and **p*=0.10

In addition, and to our surprise, we find the coefficient on the past stock variable to be negative and significant. We strongly believe that the negative sign arises due to the origin-region characteristics in the model because the past stock remained positive until the origin-region characteristics entered the model. As for the origin-region characteristics, the GDP ratio changes sign. The education year's ratio remains positive and significant, whilst the Gini coefficient still has no effect.

Another caveat we address concerns the immigrants from the U.S. The immigration literature assumes that generally immigrants come from countries with real per capita incomes lower than the host country they choose to migrate to.[46] From the fourteen countries considered in this study, there is one exception to this assumption, immigrants from the U.S. Also, in the current debate over immigrant's economic assimilation in Canada, it has not been the U.S. born immigrants that have been the issue. As pointed out by Hardwick (2010), whereas immigrants from other parts of the world are primarily viewed as 'economic migrants', American immigrants migrate to Canada for a variety of reasons such as affordable healthcare, more liberal political policies or for the trendy cultural scene. This may have an effect on their labour market outcomes and choices. Thus, as an alternative estimate, we decide to omit the U.S. from the benchmark sample and to concentrate on immigrants from the other thirteen origin countries only.

Several findings are apparent from column 3 in table 2.17. First, there is evidence that the traditional variables and some of the group-level variables impact the economic assimilation of immigrants. As expected, the years since migration and its square give a positive and negative significant coefficient, respectively. This is similar to the result

[46] Thus, is its expected that fluctuations in Canadian real income has little impact on shifting the supply curve of immigrants to Canada.

obtained by Tandon (1978).[47] In addition, the group year since migration variable is positive and significant. Combined with the lack of significance of the GDP ratio this seems to indicate that the assimilation process is quite successful for some groups of immigrants, but that other groups face obstacles. In other words, immigrants from the thirteen countries used in this study (excluding the United States), can rely on both the traditional and group-level variables in the integration process. However, immigrants from the U.S. in Canada lack this aid. This may be due to the fact that American immigrants in Canada are already seen as assimilated and integrated into Canadian society.

Furthermore, in our study, we considered M_{gt}, the size of an immigrant's ethnic enclave or community. Several theoretical models argue that when studying network effects or human capital externalities, it is not so much the size of the enclave that matters but rather the quality.[48] Likewise, it is reasonable to think that the quality of the enclave may be vital in models that emphasize network effects. For example, if one's ethnic community is comprised of highly skilled individuals and that other workers primarily interact with these members, then we expect their labour market outcomes to be positively influenced by this, specifically if the person in question is at a disadvantage or low skilled. In other words, the monetary return to interacting with one's ethnic community should increase with the quality of the community.

Observing the average skill level of all the individuals belonging to a particular ethnic group can capture the quality of the group. Precisely, we use three indicators[49]: (i) mean annual earnings of the ethnic group; (ii) the share of self-employment in the ethnic group; and

[47] Tandon (1978) finds the coefficient on the years since migration variable and its squared, to be positive and negative, respectively. This indicates that a lower increment to earnings occurs with additional years of stay in Canada.

[48] See Cutler and Glaeser 1997; Borjas 1998; Edin et al 2003.

[49] These indicators are commonly used in the literature on human capital externalities (see for example, Bertrand, Luttmer, and Mullainathan 2000; Cutler and Graeser 1997; Borjas 1998; Edin et al 2003).

(iii) the share of the ethnic group with at least a bachelor's degree. These variables will capture aspects of how different ethnic immigrants have fared in the Canadian labour market. We borrow Damm (2009) and Bertrand et al (2000) methodology of including an interaction term between the quality indicator and the immigrant stock in our original regression specification. Essentially this is the number of people the individual interacts with in combination with the average skill level of these people. We also include the log of the quality indicator as a separate variable. The results tables can be found in appendix section 2.

We find that when the quality indicator is mean annual earnings, it has no significant impact on the dependent variable 'annual earnings'. Neither does the log of this quality indicator. This implies that our results are robust to the introduction of the average human capital (earnings) of the ethnic group (see table 2.18). As for the hourly wage, we find that the past stock variable becomes insignificant and as expected the log of the quality indicator is positive and significant. This implies that the quality of one's ethnic group is vital in setting the hourly wage for workers. As for the number of hours worked, there are no changes to the original results and the quality indicator along with its log form is not significant.

Turning to the share of self-employment quality indicator (see table 2.19), there are no changes to all our original results and the log of the indicator itself is not significant. Thus, our results are robust to the introduction of this quality indicator.

As for the last quality indicator, 'the share of the ethnic group with at least a bachelor's degree' (see table 2.20 in Appendix 2), significant changes are seen for both the annual earnings and the hourly wage. The group years since migration variable becomes significant for annual earnings but loses significance for the hourly wage. However, the log of the quality indicator is not significant.

Furthermore, assimilation is generally understood as the immigrants- initially having worse outcome than natives- getting closer to the natives' outcomes, i.e. improving their outcomes, with the number of years spent in the host country. However, it is true that in some cases the outcomes of immigrants may be actually better than those of natives. For wages, this is the case in our sample for actually a large proportion of the pseudo persons, namely 33%. Most of the immigrants with wages higher to those of comparable natives come from Western countries. The table below provides the mean values of some variables used in our earning regression of the immigrants, depending on whether they belonged to a pseudo person group with a higher or lower wage than the natives.

Table 2.21 Mean values of selected variables for immigrants with a wage above and below natives for 1981, 1991, 2001 and 2006 Census observations

	Immigrants with a wage above natives	Immigrants with a wage below natives
Log of the ratio of annual migrant earnings to annual native earnings	0.58	-0.28
GDP ratio (foreign/Canada)(g,t-1)	0.83	0.55
Education years ratio (foreign/Canada)(g,t-1)	0.78	0.71
Gini Coefficient ratio (foreign/Canada) (g,t-1)	1.08	1.11
No. Of. Observation	389	760

The country specific variables: GDP ratio, the education year's ratio and the Gini coefficient ratio are lagged 10 years with the aim of capturing the conditions in the migrant's home country at the time he/she migrated to Canada. Table 2.7 in appendix section 2 gives more information on the computation of these three variables.

Immigrants with wages above natives come from countries that have higher GDP per capita, less household income inequality and on average more years of schooling, compared to immigrants that earned wages below that of comparable natives. The characteristics of the countries, whose immigrants earn more than natives, typically produce more skilled and productive workers. This is usually the by-product of being exposed to social and economic factors in these countries.

One way of dealing with this issue is to eliminate from the study pseudo-persons that have a positive log ratio of migrant to native annual earnings. In other words, we drop the immigrant groups that on average earn a wage above that of comparable natives. Table 2.21 reports the results of regressing the independent variables (discussed in section 2.2) against the log ratio of annual earnings, for immigrants reporting a wage lower than comparable natives at the pseudo person level.

Results from table 2.21 are compared with our benchmark results (see table 2.9 in results section). Firstly, the years since migration and its squared variable are significantly correlated with the relative annual earnings of immigrants. The coefficient on the years since migration variable is positive implying immigrants that initially earn less than comparable native Canadians can expect their earnings to rise with the time spent in Canada. This is in line with the results in the literature (see for example, Lubotsky 2000). The coefficient on the squared variable is negative implying a lower increment to earnings occurs with additional years of stay in Canada. In our benchmark model (see column 5 of table 2.9 in the results section), these two variables lacked significant.

Secondly, the group years since migration variable becomes positive and significantly correlated with annual earnings whereas in the benchmark regression, it lacked significance. This implies that the longer an immigrants' ethnic origin group has been in Canada, the higher the wage immigrants can expect to receive. This is what we had predicted.

Interestingly, the past stock is negative (although only significant in columns 4 and 6 of table 2.21) for the far country specification and positive and significant for the close country specification. This could be because the immigrants (from the UK and the US) in the close country specification are more similar to Canadians/or share more similarities to native Canadians than Asian immigrants.

Finally, the past stock*high education interaction term still has a positive coefficient but is no longer significant as it was in the benchmark regression (see table 2.9). This implies that for pseudo-person groups earning less than comparable Canadians, past immigration history has no impact on the assimilation process of highly educated immigrants. This may be due to the small number of observations available (760) in our sample.

Overall, it is apparent that when we eliminate pseudo persons with wages above natives and focus only on those with lower wages, we see stronger results of assimilation compared to our benchmark results and for the specification including immigrants reporting a wage higher than natives (see table 2.22).

Table 2.21 Estimates for annual earnings with different independent variables for immigrants reporting a wage lower than natives for 1991, 2001 and 2006 Census observations

Dependent variable	Annual earnings						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Years since migration/100 (i,j,g,t)	7.49*** [0.74]	7.86*** [0.69]	7.86*** [0.99]	6.49*** [0.79]	6.39*** [1.09]	6.43*** [0.93]	6.64*** [1.16]
Years since migration squared/100 (i,,j,g,t)	-0.16** [0.01]	-0.16** [0.01]	-0.16*** [0.02]	-0.15*** [0.01]	-0.14*** [0.02]	-0.15*** [0.01]	-0.15*** [0.03]
Immigrant stock per 100 population (g,t)	-0.11 [0.11]	-0.27* [0.09]	-0.27** [0.10]	-0.16 [0.10]	-0.11 [0.06]	-0.12** [0.06]	-0.38*** [0.08]
Immigrant stock per 100 popn. Squared (g,t)	0.02 [0.04]	0.09* [0.03]	0.09* [0.04]	0.07 [0.04]	0.07 [0.04]	0.07** [0.04]	0.13*** [0.03]
Past stock per 100 population (g,t)	--	-0.03 [0.02]	-0.03 [0.03]	-0.045* [0.01]	-0.06 [0.03]	-0.06** [0.03]	-0.04 [0.04]
Past stock * high education (g,t)	--	--	0.000001 [0.03]	0.005 [0.02]	0.004 [0.02]	--	-0.003 [0.03]
Group years since migration/10 (g,t)	--	--	--	0.11* [0.04]	0.15* [0.06]	0.15* [0.06]	--
GDP ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.15 [0.21]	-0.15 [0.21]	0.28* [0.15]
Education years ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.15 [0.19]	0.15 [0.20]	-0.04 [0.19]
Gini coefficient ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.04 [0.11]	0.04 [0.11]	0.02 [0.10]
Log distance (g)	--	--	--	--	-0.04 [0.07]	-0.04 [0.06]	0.15* [0.06]
R^2	0.80	0.86	0.86	0.87	0.87	0.87	0.87
No. of observations	760						

Note: The dependent variable is the log of the ratio of annual migrant earnings to annual native earnings. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. - - indicates variable not included in regression. ***p=0.01, **p=0.05 and *p=0.10

Table 2.22 Estimates for annual earnings with different independent variables for immigrants reporting a wage higher than natives for 1991, 2001 and 2006 Census observations

Dependent variable	Annual earnings				
	(1)	(2)	(3)	(4)	(5)
Years since migration/100 (i,j,g,t)	0.26 [0.34]	0.64 [0.42]	0.62 [0.42]	0.24 [0.54]	0.27 [0.65]
Years since migration squared/100 (i,,j,g,t)	0.003 [0.006]	-0.005 [0.007]	-0.005 [0.007]	-0.002 [0.007]	-0.0009 [0.01]
Immigrant stock per 100 population (g,t)	-0.007 [0.02]	-0.03 [0.02]	-0.04 [0.03]	-0.04 [0.02]	-0.04 [0.03]
Immigrant stock per 100 popn. Squared (g,t)	0.008 [0.009]	-0.003 [0.01]	-0.003 [0.01]	-0.00001 [0.009]	0.004 [0.009]
Past stock per 100 population (g,t)	--	0.016** [0.004]	0.01*** [0.004]	0.013*** [0.003]	0.01*** [0.002]
Past stock * high education (g,t)	--	--	0.004* [0.002]	0.004 [0.002]	0.004 [0.002]
Group years since migration/10 (g,t)	--	--	--	0.02* [0.01]	0.03*** [0.006]
GDP ratio (foreign/Canada) (g,t-1)	--	--	--	--	-0.07 [0.04]
Education years ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.02 [0.05]
Gini coefficient ratio (foreign/Canada) (g,t-1)	--	--	--	--	0.03 [0.06]
Log distance (g)	--	--	--	--	-0.04*** [0.01]
R^2	0.37				
No. of observations	550				

Note: The dependent variable is the log of the ratio of annual migrant earnings to annual native earnings. Robust standard errors in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underlying each observation. - - indicates variable not included in regression. ***p=0.01, **p=0.05 and *p=0.10

2.5 CONCLUSION

Canada is known as one of the leading immigrant-receiving countries. In 2011, it had a foreign-born population of over 6 million people. This represented 20.6% of the total population. With future projections intended to increase, it is no wonder that the ability of immigrants to assimilate successfully into mainstream Canadian society poses as a hot topic in the immigration literature. The literature has long viewed assimilation as an individual phenomenon, one that is purely down to the individual characteristics of a person. Whilst this theory is sufficient in explaining some aspects of assimilation, we choose to extend and develop this one-dimensional view of assimilation. We take Hatton and Leigh (2011)'s theory and test it on our data for three measures of economic assimilation: annual earnings, hours worked and hourly wage. Consequently, we argue that the notion of economic assimilation can only be explained by the traditional view is out-dated.

Using data from the 1981, 1991, 2001 and 2006 Canadian censuses, we obtain information on the measures of assimilation for both natives and immigrants. Comparing immigrants to natives of similar age and education level achieves this. The only difference is for the immigrants, we note down their county of birth. As for the explanatory variables for assimilation, and in response to the theory we test, we include the size of origin-specific immigrant communities in the present and in the past and the group years since migration.

Several findings are worth summarizing. First, we find evidence to confirm the main lesson of earlier studies: the traditional variables have an impact on the assimilation of immigrants. Secondly, we find that a large number of immigrants from a given origin tend to depress relative hours worked while a history of past immigration from that source raises relative hourly wages. We also find that the years since migration of an ethnic group raise both relative annual earnings and hourly wages. Thus, we conclude that immigrants do assimilate as communities.

Interestingly, we find the high education interaction term to be positive and significant for both relative annual earnings and hours worked. This suggests that past immigration history plays an essential role in the assimilation process of highly educated immigrants. Precisely, highly educated immigrants benefit more from the past stock of the relative origin group. The crucial question then becomes why is past immigration history fundamental to the assimilation process of highly educated immigrants in Canada? Is it down to government intervention in the form of immigration policies or are there are factors at play?

We also find that the closer the past stock*high education interaction term is to the present, the bigger the effect of the outcome variable, implying a greater assimilation effect. It remains a fascinating question how a shorter or recent immigration history can have a greater impact on the assimilation process of immigrants than distant immigration history. Researches could benefit in attempting to find out why this is the case. Are there different time frames in which immigration history is considered significant or not in the assimilation process? Could it be because long-term immigrants are identified as natives? Or is it down to people's memory stretch or are there factors involved?

Our results can provide valuable information to policymakers on the assimilation process of immigrants from a non-traditional viewpoint. Policymakers may evaluate the adaptation process of immigrant groups to aid them in adjusting visa and naturalization approvals, some of which are subject to country quotes. In addition, since we have provided evidence of assimilation, future work could focus on determining the speed of the assimilation process.

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APPENDIX 2

Definition of the variables

Census Variables

The following variables are taken from the 2%, 3%, 2.7% and 2.7% samples of the 1981, 1991, 2001 and 2006 Canadian Censuses, respectively. These are available upon request from the PUMF database.

Sample restriction

Men aged between 25 and 64, who reported positive annual earnings, hourly wages and annual hours worked.

Individual-level variables

Annual earnings (WAGES)
Annual hours worked: the number of weeks worked in the reference year (WKSWRK) × the number of hours worked in the last week prior to Census day (HRSWRK)
Hourly wages: annual earnings/ annual hours worked
Education groups: There are five education groups: (1) no certificate, diploma or degree, (2) high school graduation certificate, (3) some college certificate or diploma, (4) college certificate or diploma, and (5) bachelor degree or more.
Years since migration: from year of immigration information obtained from censuses
Group years since migration: This is the average years since migration of all immigrants from a given origin excluding the age/education group to which it is applied.

Migrant stock variables

The fourteen birthplaces used in this study are: United States, United Kingdom, Germany, Poland, Italy, Portugal, China, Hong Kong, India, Russia, Netherlands, France, Greece and the Philippines. The countries were selected on the basis that they had to be reported in at least three census years. For each census, the origin region immigrant stock is expressed as a percentage of the total Canadian population. Please see table 2.3 in Appendix 2.
The past stock variable is the average of the origin region immigrant stock in the 100 years prior to the date of observation, excluding any census years for which data were missing at the time this paper was drafted.
To be precise, when looking at immigrant outcomes in the 2006 census, the past stock is constructed from the 1906-2001 censuses. When looking at outcomes in the 2001 census, the past stock from the 1901-1996 censuses. For the outcomes in the 1991 census, the past stock is constructed from the 1891-1986 censuses; and when looking at immigrant outcomes from in the 1981 census, we use the past stock from the 1881-1976 censuses. Since Canadian

censuses are conducted every 5 years and taking into account missing data for some census years[50], we are averaging in each case across ten censuses conducted over a 100-year period. Alternative measures of the past immigrant stock are also explored, for the time periods of 30, 70 and 100 years ago.

Source country variables

GDP per capita: calculated from Maddison (2001), Appendix C, pp. 267-333. Origin region GDP per capita calculated form countries and regional residuals, weighted by population. It can be accessed from http://www.ggdc.net/maddison/maddison-project/data.htm
Education years: Average years of education for the population ages 15 years and over and over for 80 countries, weighted by country populations within each of the 16 regions. Data from Barro and Lee (2013), available from the website of the center for International Development at Harvard University: http://www.cid.harvard.edu/ (last accessed August 2015).
Inequality: Gini coefficient of household income for 80 countries, weighted by populatipn in each of the 16 origin regions.
Distance from Toronto: Distances in km are calculated using the following website: http://www.mapdevelopers.com/distance_from_to.php. Origin-region capitals are Washington D.C., London, Lisbon, Amsterdam, Paris, Berlin, Warsaw, Rome, Moscow, Athens, Beijing, New Delhi, Hong Kong and Manila. For more information, please refer to table 2.8 in the text.

50 It must be noted that we do not have information for the following census years: 1876, 1886, 1906, 1916, 1926, 1936, 1946, 1956, 1966 and 1976.

The demand for and supply of ethnic goods

We start with a strong assumption that the labour market is split. At least two ethnic origin groups exist in the labour market and each group has its own unique price of labour. Furthermore, each immigrant origin group differs in their demand and in their supply of goods and services. The prevailing view of demand for ethnic goods and services is its not really present or relatively on a small-scale basis. Goods and labour services are supplied to the economy at large and they can be anything that is provided by immigrants (for example, food and clothing items, religion, music or workers). Ethnic differences in consumption and labour supply also induce differences in patters of investment in general human capital, resulting in cases of occupational specialization within ethnic groups. For example, Chinese immigrants residing in Canada make up a high proportion of all Canadians employed in scientific and technical occupations. On the other hand, Filipino origin immigrants are more likely to supply labour services in the health and manufacturing industry (Statistics Canada, 2001). It is worth mentioning that this a strong hypothesis that could be a reasonable representation in some cases (staff at a Chinese oriental restaurant) but not in all cases (university lecturers).

The supply of a given ethnic good or service is group-specific and it depends on P_g the relative price of the goods and services (of a given quality), M_g the share of the labour force represented by the origin group g and μ_g some group specific component. This is essentially, the supply equation below:

$$S_g = \alpha P_g + M_g + \mu_g \qquad \text{A1}$$

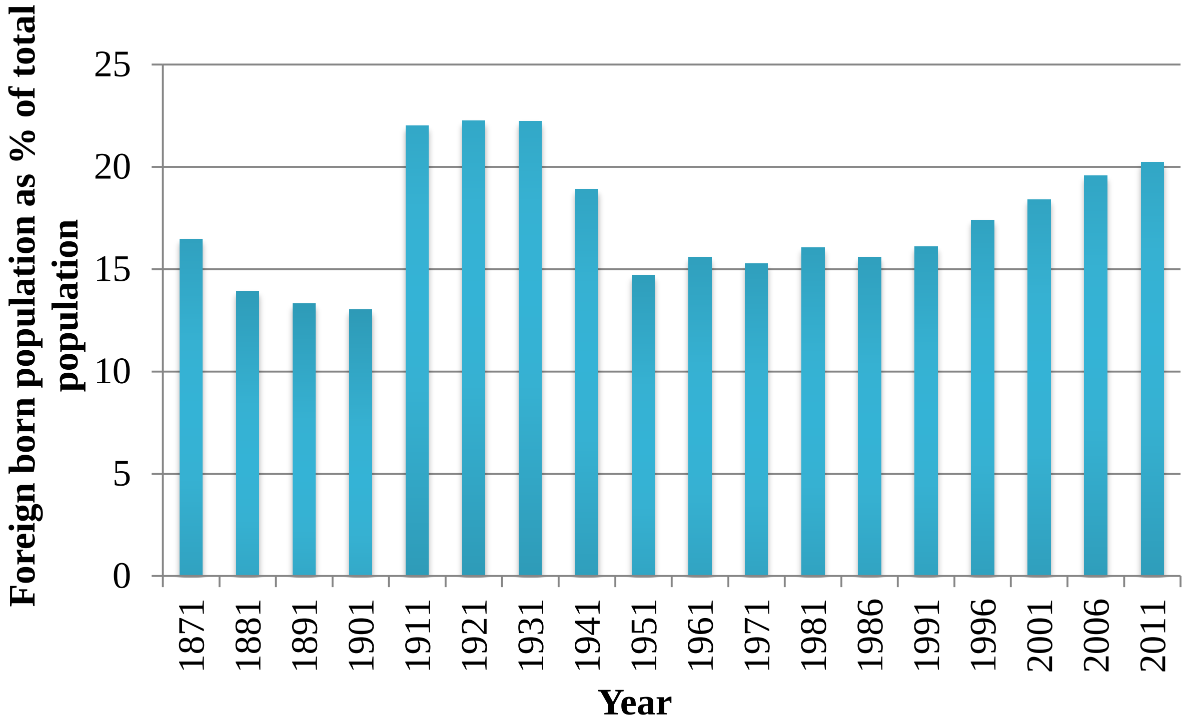
From equation A1, it is apparent that an increase in the size of a given ethnic origin group causes the supply to increase, which will drive down the price of ethnic goods. This is what we refer to as the ‘crowding out effect’. The downward pressure on the relative price of goods and services will impact the demand for these goods and services. The demand equation is given below:

$$D_g = -\beta_1 P_g + \beta_2 Y_g + \beta_3 Z_g + v_g \qquad \text{A2}$$

where Y_g is the average years since migration in the ethnic origin group, Z_g is a demand shifter for the goods and services of ethnic origin group g, and v_g is a group-specific component. The average number of years since migration for the ethnic origin group as a whole is a measure of ethnic capital, for example the acquired ability to market ethnic labour services. The variable Z_g captures the demand effect of the host society’s familiarity with and acceptance of the services offered by ethnic group g.

The final price of an ethnic good is when the demand of a given origin group is equal to the supply of that same group.

Figure 2.1 Proportion of foreign-born population, Canada, 1871-2011



Source: Statistics Canada, Census of population

Table 2.2 Number of individuals by place of birth, Canada, 2006 to 1851

Birthplace	Census Year								
	2006	2001	1996	1991	1986	1981	1971	1961	1951
Total Canada Population*	**31612897**	**30007094**	**28846761**	**27296859**	**25309331**	**24083500**	**21568311**	**18238247**	**14009429**
United States	278135	258420	244695	249075	282025	301525	309640	283908	282010
United Kingdom	592355	614610	655535	717745	793080	878980	933045	969715	912482
Germany	176040	177676	181645	180525	189560	189375	211060	189131	42693
Poland	171910	181820	193370	184695	156805	148540	160035	171467	164474
Italy	299045	318095	332110	351620	366815	384780	385760	258071	57789
Portugal	151740	155770	158815	161180	139635	139180	71540	--	--
People's Republic of China	493770	345520	231050	157405	119190	52155	57150	36724	24166
Hong Kong, Special Administrative Region	218815	240045	241095	152455	77405	58710	--	--	--
Philippines	319560	239160	184545	123295	82235	66350	--	--	--
India	455260	322210	235930	173670	130060	109160	38875	--	--
Netherlands	113200	117690	124545	129615	134155	138410	133525	135033	41457
France	--	69465	62600	55160	53345	53765	19247	36103	15650
Greece	75770	79695	83675	85090	89365	78780	38017	8594	5871
Russia-USSR	--	133195	106445	99355	109445	128425	160120	188292	124402

Table 2.2 Number of individuals by place of birth, Canada, 2006 to 1851-Con.

Birthplace	Census Year									
	1941	1931	1921	1911	1901	1891	1881	1871	1861	1851
Total Canada Population	**11506655**	**10376786**	**8788483**	**7206643**	**5371315**	**4833239**	**4324810**	**3605010**	**3229633**	**2436297**
United States	312473	344574	374024	303680	127899	80915	77753	64613	--	--
United Kingdom	960125	1138942	1025121	804234	404848	477735	470906	496595	--	--
Germany	28479	39163	25266	39577	27300	27752	25328	24162	--	--
Poland	155400	171169	65304	31373	31231	695	6376	416	--	--
Italy	40432	42578	35531	34739	6854	2795	777	218	--	--
Portugal	--	--	--	--	270	--	--	--	--	--
People's Republic of China	29095	42037	36924	27083	17043	9129	--	--	--	--
Hong Kong, Special Administrative Region	--	--	--	--	--	--	--	--	--	--
Philippines	--	--	--	--	--	--	--	--	--	--
India	4376	4672	3848	4491	1076	--	--	--	--	--
Netherlands	9923	10736	5827	3808	385	--	--	--	--	--
France	13795	16756	19247	17619	7944	5381	4389	2908	--	--
Greece	5871	5579	3769	2640	213	--	--	--	--	--
USSR	124402	133869	112412	89984	31231	9222	6376	416	--	--

Notes: Numerical distribution of the total Canadian population and the immigrant population in Canada by birthplace for the period 2006-1851. * is the sum of the immigrant and non-immigrant (native) population in Canada. --Indicates missing values. *Source*: Census of Canada, 2006-1851

Table 2.3 Source composition of Canadian immigrant stock (percent of the total Canadian population), 2006-1871

	Census Year																
	2006	2001	1996	1991	1986	1981	1971	1961	1951	1941	1931	1921	1911	1901	1891	1881	1871
U.S.	0.879	0.861	0.848	0.912	1.114	1.251	1.435	1.556	2.013	2.715	3.320	4.255	4.213	2.381	1.674	1.797	1.792
UK	1.873	2.048	2.272	2.629	3.133	3.649	4.325	5.316	6.513	8.344	10.975	11.664	11.159	7.537	9.884	10.888	13.775
Germany	0.556	0.592	0.629	0.661	0.748	0.786	0.978	1.037	0.304	0.247	0.377	0.287	0.549	0.508	0.574	0.585	0.670
Poland	0.543	0.605	0.670	0.676	0.619	0.616	0.741	0.940	1.174	1.350	1.649	0.743	0.435	0.581	0.014	0.147	0.011
Italy	0.945	1.060	1.151	1.288	1.449	1.597	1.788	1.414	0.412	0.351	0.410	0.404	0.482	0.127	0.057	0.017	0.006
Portugal	0.479	0.519	0.550	0.590	0.551	0.577	0.331	--	--	--	--	--	--	0.005	--	--	--
China	1.561	1.151	0.800	0.576	0.470	0.216	0.264	0.201	0.172	0.252	0.405	0.420	0.375	0.317	0.188	--	--
Hong Kong	0.692	0.799	0.835	0.558	0.305	0.243	--	--	--	--	--	--	--	--	--	--	--
Philippines	1.010	0.797	0.639	0.451	0.324	0.275	--	--	--	--	--	--	--	--	--	--	--
India	1.440	1.073	0.817	0.636	0.513	0.453	0.180	--	--	0.038	0.045	0.043	0.062	0.020	--	--	--
Netherlands	--	0.392	0.431	0.474	0.530	0.574	0.619	0.740	0.295	0.086	0.103	0.066	0.052	0.007	--	--	--
France	--	0.231	0.217	0.202	0.210	0.223	0.089	0.197	0.111	0.119	0.161	0.219	0.244	0.147	0.111	0.101	0.080
Greece	--	0.252	0.276	0.306	0.336	0.371	0.365	0.208	0.061	0.051	0.053	0.042	0.036	0.003	--	--	--
USSR (European component)	--	--	--	0.363	0.432	0.533	0.742	1.023	1.344	1.081	1.290	1.279	1.248	0.581	0.190	0.147	0.011

Notes: Table 2.3 is computed from using the figures in table 2.2. For example, to work out the immigrant stock from the United States in 2006, (total immigrant population from the United States in 2006/total Canadian population in 2006)*100. Missing values are represented by --.

Table 2.4 The past immigrant stock as a percentage of the Canadian population for various ethnic origin groups for the time periods of 30, 70 and 100 years ago- for the 2006, 2001, 1991 and 1981 census

	2006			**2001**			**1991**			**1981**		
	30Y	**70Y**	**100Y**	**30Y**	**70Y**	**100Y**	**30Y**	**70Y**	**100Y**	**30Y**	**70Y**	**100Y**
U.S.	0.997	1.411	2.041	1.112	1.684	2.167	1.339	2.207	2.357	1.668	2.786	2.535
UK	2.746	4.247	6.002	3.201	5.239	6.459	4.105	6.739	7.499	5.384	8.328	8.660
Germany	0.683	0.664	0.599	0.760	0.640	0.592	0.887	0.595	0.581	0.773	0.539	0.544
Poland	0.637	0.821	0.851	0.664	0.937	0.849	0.729	0.979	0.805	0.951	1.004	0.777
Italy	1.309	1.167	0.983	1.454	1.095	0.906	1.562	0.978	0.771	1.204	0.751	0.546
Portugal	0.557	0.519	0.519	0.519	0.519	0.434	0.486	0.486	0.366	0.331	0.331	0.168
China	0.642	0.455	0.441	0.465	0.372	0.432	0.287	0.300	0.298	0.212	0.298	0.288
Hong Kong	0.548	0.548	0.548	0.485	0.485	0.485	0.274	0.274	0.274	--	--	0.246
Philippines	0.497	0.497	0.497	0.422	0.422	0.422	0.299	0.299	0.299	--	--	--
India	0.698	0.530	0.423	0.519	0.383	0.280	0.382	0.212	0.169	0.180	0.073	0.064
Netherlands	0.480	0.460	0.363	0.525	0.428	0.331	0.615	0.376	0.307	0.551	0.280	0.246
France	0.216	0.177	0.185	0.188	0.169	0.178	0.179	0.166	0.166	0.132	0.162	0.149
Greece	0.308	0.247	0.196	0.330	0.225	0.175	0.32	0.185	0.152	0.211	0.116	0.102
USSR (European component)	0.442	0.788	0.933	0.517	0.851	0.901	0.682	0.965	0.885	1.036	1.143	0.892

Table 2.5 Mean earnings of immigrant and Canadian-born workers, 1981, 1991, 2001 and 2006 Census

	1981		1991		2001		2006	
Country of Origin	**Ln(*W*)**	**N**	**Ln(*W*)**	**N**	**Ln(*W*)**	**N**	**Ln(*W*)**	**N**
US	9.78	1176	10.27	1563	10.49	1192	10.75	555
UK	9.91	4440	10.45	5624	10.62	3998	10.75	1667
Germany	9.84	1228	10.34	1590	10.50	958	10.65	308
Poland	9.71	709	9.91	1101	10.36	1018	10.65	368
Italy	9.59	2854	10.21	3525	10.41	1972	10.61	660
Spain & Portugal	--	--	--	--	--	--	--	--
Portugal	9.53	842	10.08	1587	10.40	1240	10.60	526
China	--	--	9.86	1162	9.91	1932	10.05	1133
India	--	--	--	--	10.15	2524	10.33	1440
India & Pakistan	--	--	--	--	--	--	--	--
Netherlands	9.83	955	--	--	10.49	726	--	--
France	9.78	354	--	--	10.36	531	--	--
Greece	9.38	597	--	--	10.11	489	--	--
USSR (European component)	9.75	533	10.18	346	10.15	517	--	--
Hong Kong	--	--	10.07	1134	10.24	1521	10.52	711
Phillipines	--	--	9.87	886	10.12	1570	10.38	848
All immigrants	9.76	13604	10.22	18512	10.33	20188	10.49	8216
Natives	9.65	76085	10.15	139914	10.35	133736	10.70	128292

Table 2.7 The ratio of GDP per capita and average years of education in origin country relative to Canada lagged 10 years, for 2006,2001,1991 and 1981 census.

	1981			1991			2001			2006		
Country of Origin	GDP	EDU	Gini	GDP	EDU	Gini	GDP	EDU	Gini	GDP	EDU	Gini
US	1.218	1.183	1.372	1.144	1.184	1.289	1.250	1.175	1.205	1.306	1.171	1.441
UK	0.871	0.799	0.814	0.773	0.763	0.825	0.884	0.782	1.076	0.933	0.782	1.108
Germany	0.881	0.549	1.182	0.858	0.493	0.899	0.911	0.774	0.778	0.901	0.849	0.978
Poland	0.374	0.782	0.851	0.326	0.792	0.681	0.259	0.817	0.791	0.308	0.848	1.072
Italy	0.755	0.617	1.270	0.790	0.662	1.023	0.906	0.742	0.943	0.898	0.767	1.089
Portugal	0.467	0.415	1.289	0.492	0.545	1.131	0.618	0.652	1.097	0.620	0.647	1.225
China	0.063	0.690	0.883	0.067	0.477	0.643	0.107	0.540	0.601	0.149	0.594	1.327
India	0.068	0.172	58.916	0.059	0.230	1.031	0.071	0.330	1.031	0.084	0.352	1.115
Netherlands	0.980	0.685	1.376	0.881	0.916	0.880	0.908	0.974	0.970	0.995	0.971	0.983
France	0.942	0.521	1.612	0.900	0.586	1.009	0.970	0.718	0.862	0.950	0.794	0.987
Greece	0.527	0.716	1.386	0.540	0.698	1.121	0.558	0.825	1.084	0.545	0.809	1.157
Russia	0.451	0.692	0.841	0.390	0.622	0.825	0.403	0.932	0.959	0.239	0.942	1.566
Hong Kong	0.475	0.690	1.352	0.680	0.652	1.442	1.003	0.899	1.386	1.084	0.868	1.769
Philippines	0.143	0.593	1.472	0.145	0.653	1.395	0.116	0.718	1.395	0.117	0.734	1.601

Notes: GDP per capital (GDP) is calculated from Maddison (2001), Appendix C pp.267-333. Origin country GDP per capita calculated from countries, weighted by population. The average years of education (EDU) is calculated from Barro and Lee (2013), weighted by country populations. The Gini coefficient is weighted by population and it is available at the website of the World Institute for Development Economics Research of the United Nations University (UNU-WIDER). The observations selected are (almost) exclusively those labelled as 'high-quality'. Census year observations are obtained from linear interpolation, where appropriate. – stands for not available.

Table 2.18 Estimates for annual earnings, hourly wages and hours worked, for 1981, 1991, 2001 and 2006 Census observations, including the mean annual earnings of the ethnic group.

Dependent variable	Annual earnings	Hourly wage	Hours worked
Years since migration/100 (i,j,g,t)	1.344 [1.76]	-0.122 [0.646]	1.54** [.65]
Years since migration squared/100 (i,,j,g,t)	-0.021 [0.032]	0.0127 [0.0132]	-0.02** [0.008]
Group years since migration/10 (g,t)	0.028 [0.059]	0.0059 [0.0155]	-0.006 [0.015]
Immigrant stock per 100 population (g,t)	-0.589 [0.55]	-0.152 [0.188]	-0.051 [0.097]
Immigrant stock per 100 popn. squared (g,t)	0.122 [0.09]	0.02 [0.023]	0.014 [0.013]
Past stock per 100 population (g,t)	-0.03 [0.03]	0.0042 [0.011]	-0.001 [0.006]
Past stock * high education (g,t)	0.066*** [0.011]	0.00259 [0.0058]	0.006*** [0.002]
GDP ratio (foreign/US) (g,t-1)	-0.11 [0.149]	-0.0887** [0.039]	-0.056* [0.029]
Education years ratio (foreign/US) (g,t-1)	0.0005*** [0.0001]	0.000076 [0.00006]	-0.00006* [0.00003]
Gini coefficient ratio (foreign/US) (g,t-1)	-0.01 [0.105]	0.081 [0.046]	-0.004 [0.038]
Log distance (g)	-0.06* [0.033]	-0.0174* [0.0096]	-0.02** [0.009]
Earnings quality interaction term	0.318 [0.312]	0.142 [0.123]	-0.0078 [0.061]
Log earnings	0.783 [0.633]	0.465** [0.189]	0.122 [0.127]
R^2	0.59	0.26	0.2
No.of obs	1149		

Note: The dependent variables are the log of the migrant to native ratio (e.g. the log of the ratio of annual migrant earnings to annual native earnings). Robust standard errors are in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underling each observation.

***p=0.01, **p=0.05, *p=0.10

Table 2.19 Estimates for annual earnings, hourly wages and hours worked, for 1981, 1991, 2001 and 2006 Census observations, including the share of self-employed of the ethnic group

Dependent variable	Annual earnings	Hourly wage	Hours worked
Years since migration/100 (i,j,g,t)	2.15 [1.95]	0.457 [0.672]	1.6** [0.639]
Years since migration squared/100 (i,,j,g,t)	-0.02 [0.033]	0.0045 [0.0143]	-0.019** [0.008]
Group years since migration/10 (g,t)	0.089 [0.05]	0.0323* [0.015]	0.0027 [0.015]
Immigrant stock per 100 population (g,t)	-0.788 [0.67]	-0.143 [0.212]	-0.145** [0.061]
Immigrant stock per 100 popn. squared (g,t)	0.13 [0.1]	0.0057 [0.026]	0.027*** [0.0085]
Past stock per 100 population (g,t)	0.016 [0.023]	0.0248*** [0.0081]	0.006 [0.003]
Past stock * high education (g,t)	0.064*** [0.011]	0.0011 [0.0056]	0.0069*** [0.0021]
GDP ratio (foreign/US) (g,t-1)	0.154 [0.131]	0.091 [0.0662]	-0.055** [0.02]
Education years ratio (foreign/US) (g,t-1)	0.0004** [0.00017]	0.0000038 [0.000056]	-0.00006** [0.00003]
Gini coefficient ratio (foreign/US) (g,t-1)	-0.073 [0.098]	0.00058 [0.061]	0.019 [0.024]
Log distance (g)	-0.03 [0.026]	0.00027 [0.011]	-0.019* [0.009]
Self-employment interaction term	0.43 [0.4]	0.137 [0.151]	0.045 [0.039]
Log Self-employment	-0.436 [0.379]	-0.187 [0.15]	-0.007 [0.036]
R^2	0.59	0.24	0.22
No.of obs	1116		

Note: The dependent variables are the log of the migrant to native ratio (e.g. the log of the ratio of annual migrant earnings to annual native earnings). Robust standard errors are in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underling each observation.

***p=0.01, **p=0.05, *p=0.10

Table 2.20 Estimates for annual earnings, hourly wages and hours worked, for 1981, 1991, 2001 and 2006 Census observations, including the share of the ethnic group with at least a bachelor's degree.

Dependent variable	Annual earnings	Hourly wage	Hours worked
Years since migration/100 (i,j,g,t)	2.54 [1.81]	0.23 [0.669]	1.543** [0.559]
Years since migration squared/100 (i,,j,g,t)	-0.034 [0.031]	0.0095 [0.0139]	-0.0199** [0.0074]
Group years since migration/10 (g,t)	0.11* [0.053]	0.02 [0.0122]	-0.009 [0.019]
Immigrant stock per 100 population (g,t)	-0.61 [0.62]	-0.252 [0.269]	-0.089 [0.082]
Immigrant stock per 100 popn. squared (g,t)	0.11 [0.098]	0.022 [0.0337]	0.017 [0.011]
Past stock per 100 population (g,t)	-0.001 [0.023]	0.032*** [0.0089]	0.0065 [0.005]
Past stock * high education (g,t)	0.068*** [0.011]	0.001 [0.0055]	0.0055** [0.0021]
GDP ratio (foreign/US) (g,t-1)	0.131 [0.096]	0.055 [0.051]	-0.027 [0.031]
Education years ratio (foreign/US) (g,t-1)	0.0006** [0.0002]	-0.000053 [0.00006]	-0.0012*** [0.00004]
Gini coefficient ratio (foreign/US) (g,t-1)	-0.083 [0.087]	0.034 [0.052]	-0.0146 [0.039]
Log distance (g)	-0.029 [0.028]	-0.003 [0.011]	-0.0237** [0.009]
Education quality interaction term	0.341 [0.356]	0.196 [0.190]	0.01 [0.04]
Log education	-0.281 [0.364]	-0.2244 [0.192]	-0.028 [0.047]
R^2	0.59	0.26	0.21
No.of obs	1142		

Note: The dependent variables are the log of the migrant to native ratio (e.g. the log of the ratio of annual migrant earnings to annual native earnings). Robust standard errors are in brackets, clustered at the ethnicity group level. Regressions include dummies (not reported) for eight age groups, five education groups and four census years. The data are weighted according to the number of migrants underling each observation.

***p=0.01, **p=0.05, *p=0.10

3

The assimilation of Canadian immigrants: Evidence from non-market activities

3.1 INTRODUCTION

Canada is commonly referred to as one of the three main immigrant-receiving nations in the world. Between 1986 and 2011, a staggering 2.9 million immigrants entered Canada, continuing the trend of steady growth of the foreign population experienced since the Second World War. The 2011 Census reported the foreign-born population at 6,775,700, representing 20.6% of the total Canadian population.

The majority of the research on the assimilation of immigrants in Canada focuses on labour market assimilation and how it is determined by the years since migration (see in particular, Baker and Benjamin 1994; Bloom and Gunderson 1989; Bloom et al. 1994; Grant 1999). In particular, the research focuses on how immigrants' years since migration impact the wages immigrants earn relative to comparable Canadians. A fairly untouched region in the assimilation literature is to study how immigrants devote time to non-market activities compared to native Canadians. Therefore, this paper attempts to fill this gap in the literature on assimilation.

Specifically, we examine the amount of time immigrants and natives spend on childcare and what factors are associated with changes in the amount of childcare they perform. The number of hours one spends on childcare per week is our main variable of interest. Additionally, we also consider two other time-use activities: housework and caring for the elderly or senior family members. For our empirical analysis, we use data from the Public Use Microdata Files (PUMF) of the Canadian Censuses of 2001 and 2006. In this study, immigrants come from a total of ten countries to account for the diversity of the Canadian population.

We also examine the role played by the migrant's community on the non-market time assimilation of immigrants, an issue so far neglected by the literature. In our paper, we identify the migrant's community as the people from the same country of birth as the migrant living in Canada both in the present, and in the past. Sociologists have long recognized the importance of immigrant communities or group interactions in the assimilation process. This view can be found to date back to the pioneering work of Gordon (1964). It stems from the idea that one integrates from a position of strength, not from a position of weakness (Flitzpatrick 1966) and sociologists believe that an immigrant's strength is his or her community. This is because the community offers psychological satisfaction and security to the immigrants, allowing them to integrate and assimilate with confidence into the host society.[1]

To the best of our knowledge, there are only two studies that examine the role played by the migrant's community on the economic assimilation of immigrants, Hatton and Leigh (2011) and Al-Sabah (2015).[2] Both studies show that labour market outcomes of migrants depend on the interactions between the immigrant communities as a whole and the host society. In addition to the standard individual level characteristics that affect the assimilation process, the immigrant's ethnic community also plays a role.

Our results reveal a few points. Firstly, immigrant parents spend less time on both market and non-market activities compared to Canadian parents. Secondly, the migrant's community positively aids in the assimilation process of immigrants and thirdly, the past history of the communities negatively impacts the assimilation process with recent history having a greater impact compared to distant. In addition, the quality of the Canadian census data set on ethnicity is tested as a proxy for cultural differences and we find that it is not a good indicator. Instead, place of birth is a better indicator.

This paper makes several contributions to the literature. Firstly, whilst most studies usually use home production or housework as an umbrella term to mean several non-market activities including childcare and looking after the elderly, we study immigrant assimilation in each component of home production separately. Indeed, individuals may value the time they

[1] Other influential studies that share the same view as Gordan (1964) include Weinburg 1961; Litwak 1960; Kluckohn and Strodtbeck 1961.

[2] AL-Sabah (2015) is chapter two of this thesis.

spent, for example bathing or reading to their children different to the time they spend cleaning or doing laundry. In addition, Kimmel and Connelly (2007), Coltrane (2000) and Hook (2010) all mention that other non-market activities excluding childcare are usually more flexible. For example, one may delay housework tasks but they cannot leave young children unsupervised. Therefore, we distinguish what is essentially known as 'home-production' in the literature into three separate different activities: childcare, housework and spending time with seniors. This will allow us to identify the factors relevant to each activity time choice and analyse how the assimilation of immigrants compared to Canadians varies between the three non-market activities. If we find that the different non-market activities studied respond differently to the socio-economic factors we study, then the estimated covariates will also differ. Thus, aggregating the three non-market activities into one may produce flawed empirical results, making the disaggregation of the activities paramount. Also, relatively little is actually known about children's time with parents. While there is a great amount of work on the time parents spend in paid work and in housework, there has been no study on Canada on parental time investments on childcare using Canadian census data.

Secondly and to the best of our knowledge, there is no study that has looked at the impact of the years since migration on childcare hours. The closest study is by Vargas (2016) who considers housework as opposed to childcare. However, as mentioned previously childcare and housework cannot be viewed in the same fashion.

Finally, most of the papers that look at childcare time use focus only on mothers. Fathers' involvement in raising children has received little attention. As a consequence, we choose to study both mothers and fathers separately.

To my knowledge, this study on the time allocations of Canadian immigrants and how it depends on gender, duration of stay in Canada and the community one belongs to, is something that has not been looked at before in the literature and helps elucidate how well immigrants balance their personal time on non-market activities, an important element that affects their quality of life.

The remaining of the paper is structured as follows. Section 3.2 goes over the existing literature. Section 3.3 describes the data. Section 3.4 presents the model. Section 3.5 is the results with extensions in section 3.6. Section 3.7 looks at a market activity and finally, a discussion is offered in section 3.8.

3.2 LITERATURE REVIEW

The literature on the allocation of non-market time and household production goes back to Becker (1965), Mincer (1962) and Reid (1934). Becker (1965) extends the standard labour supply model to include different uses of time. According to his model, one's time use in different activities is affected by their wage. As immigrants often have lower wages than natives, direct implications exist for ethnic minorities' uses of time.

The majority of the research on time use of non-market activities excludes the study of immigrants (see for example, Kalenkoski et al. 2005; Bloemen at al. 2010; Grossbard and Stancanelli 2010; Gorsuch 2014). Only a handful of studies exist that consider immigrants, as we propose to do in this paper. Starting with Nock and Kingston (1988) who briefly touch on the issue of race and time spent with children, they find that immigrants spend less time with children in play and education.

Sousa-Poza et al. (2001) use data from the 1997 Swiss Labour Force Survey to analyse the allocation of time to housework and childcare. They conclude that immigration status has no impact on time spent on childcare.

Joesch and Spiess (2006) look at how many hours per week mothers spend looking after children across nine European countries. Their data is from the 1996 wave of the European Community Household Panel. They find evidence suggesting that foreign mothers spend less time on childcare compared to natives.

Kimmel and Connelly (2007) use American Time Use Survey to analyse the impact of race on mothers' time allocation. They find that persons with Hispanic origin had different time use preferences than natives and that non-whites spend less time on childcare and housework than comparable whites.

The study by Zaiceva and Zimmermann (2007) analyses time use by ethnicity and they find it has no impact on the time spent on childcare. Rather, they conclude, that it is high fertility and the presence of children that drives childcare time.

Hamermesh and Trejo (2012) study the assimilation of immigrants in their time use comparable to natives. They use data from the United States (U.S.) and Australia. They find that immigrants spend more time on education, shopping and market work than natives. They put this down to these activities being ‘assimilating’.

Bloemen and Stancanelli (2014) use a rich time data set for France to study the effect of partners’ wages on partners’ allocation of time. They find that immigration status has no impact on the hours one spends on childcare.

Finally, Vargas (2016) uses the American Time Use Survey to look at how the time Mexican immigrants allocate to activities like household production, personal care and leisure activities compare to the time allocation of U.S. natives. The study finds that for married immigrant men there is a trade-off between market work and household work, whereas for single immigrant men the trade-off is between market work and leisure. They also find that Mexican immigrant women relinquish mostly passive leisure and sleep time to meet demands of family and market work.

3.3 DATA, VARIABLES AND DESCRIPTIVE STATISTICS

For the purpose of this study the Public Use Microdata Files (PUMF) of the Canadian Censuses of 2001 and 2006 are employed. Both Censuses of immigrants and natives residing in Canada are a 2.7% random sample of the Canadian population. The Census is conducted in May or June and provides information on the respondents' age, earnings, education and the total number of hours per week spent on childcare, housework and providing care or assistance to seniors. The time use data is provided per week because the time frame of the time use questions is the week prior to Census day. Therefore, respondents will be providing information on the weekly number of hours they spend on each of the three non-market activities studied.

The Census defines child care activities to include: bathing or playing with young children, driving children to sports activities or helping them with homework, talking with teens about their problems, etc. As for housework, it covers activities related to the yard and home (such as preparing meals, washing the car, doing laundry, cutting the grass, shopping and household planning). Finally, providing care or assistance to seniors is understood as providing personal care to a senior family member, visiting seniors, talking with them on the telephone and helping them with shopping, banking or taking medication.[3]

This time use data was collected for each respondent aged 15 and over who is not an institutional resident. It is important to mention that for confidentiality reasons, the Census is formatted in such a way making it impossible of knowing which respondents belong to the

[3] Any time spent on volunteer work for a non-profit organization, a religious organization, a charity or community group, or work without pay in the operation of a family farm, business or professional practice is not included in any of the three activities.

same household. Therefore, we cannot match couples or relatives together. Consequently, the socioeconomic and time use data we employ is for one member of the couple and thus, we do not include information on the individual characteristics of the respondent's significant other or family. The data set does, however, provide a sufficiently large sample of immigrants and enough information about them to enable us to draw conclusions about immigrant-native time use differences. The specific questions regarding time use are

Last week, how many hours did this person spend doing the following activities:

a) Doing unpaid housework, yard work or home maintenance for members of this household, or others?

b) Looking after one or more of this person's own children, or the children of others, without pay?

c) Providing unpaid care or assistance to one or more seniors?

The answers to these questions are recorded in categories. For both the questions on housework and child care, respondents had to indicate one category that represented a true indication of how many hours they spent on the respective activities during the Census week. They could choose from 'none', 'less than 5 hours', '5 to 14 hours', '15 to 29 hours', '30 to 59 hours' and '60 or more'. For providing care or assistance to seniors, respondents had the following options to choose from, 'none', 'less than 5 hours', '5 to 9 hours', '10 to 19 hours' and '20 hours or more'. Since the data on time use is coded in categories, we use the mid-point of each category to represent the actual number of hours an individual spends on a particular activity.

As we link time spent in non-market activities to the country of origin of immigrants, our analysis for immigrants is restricted to those belonging to one of the ten countries for which the country of origin is reported[4], namely the U.S., the United Kingdom (UK), Germany, Poland, Italy, Portugal, China, Hong Kong, the Philippines and finally, India. For each individual country of origin, we construct a present and past stock variable. The present stock is the number of immigrants from a given country over the total Canadian population for a given year expressed as a percentage. Therefore, each country of origin has two present stock values, one for the year 2006 and one for 2001. As for the past stock variable, it is the past stock of immigrants from the same country of origin over a period of 100 years prior to the census year. This variable indicates how embedded a particular ethnic group in Canada is because it measures the size or presence of an ethnic group relative to the total Canadian population over time. In addition, the past stock also might act as a proxy for the individual migrant's potential network.[5] Furthermore, in order to assess whether immigration in the recent past and/or in the distant past influences the time use of immigrants, we employ the past stock at various lags in time. Specifically, we measure the size of the immigrant's country group 30, 70 and 100 years before the census date.[6] For a detailed description on the construction of these variables see Al-Sabah (2015).[7]

We restrict our attention to adults with children[8] who are not self-employed or in full time education.[9] Studying only parents prevents us from mixing together the decision to have

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[4] For a detailed description on the conceptual problems associated with defining immigrants' place of birth in terms of continents or region of origin rather than individual countries see Al-Sabah (2015). Al-Sabah (2015) is the second chapter of this thesis.

[5] Since the computation of the past stock is similar to the computation of the immigrant present stock, the past stock of a given origin group can be viewed as the vintage of the network of that group. Individuals that make up the composition of the past stock are also likely to be included in the composition of the present stock, assuming no to little return migration.

[6] Figures for the past and present stocks for immigrants based on their country of origin can be found in appendix section 2 (see Tables 2.3 and 2.4) in Al-Sabah (2015).

[7] Al-Sabah (2015) is the second chapter of this thesis.

[8] An alternative could have been to include all adults living in a household with children, but the drawback from this would have been that the group of adults in a household with children which at the same time are not parents would have been quite heterogeneous, as it would have potentially included grand-parents, step-

a child (be a parent) with decisions regarding time allocation to childcare. From our descriptive statistics (see section 3.3.2), it is evident that Canadian immigrants enjoy higher fertility rates than native Canadians and mixing together parents and non-parents in our study may confound the results. We exclude the self-employed because income may reflect returns to capital and returns to labour. The characteristics of self-employed individuals differ from wage/salary workers. For example, the earnings of the self-employed are on average higher than salary/wage workers and since our exogenous variables include the log of the hourly wage and non-labour income, it is unwise to combine the two groups of individuals in the study. In turn, individuals currently in full time education are not considered because we control for the education level of the individual by considering the highest degree obtained. If they are still in education then maybe we underestimate the impact education has on the number of hours spent on childcare.[10] Also, we consider only respondents with at least one child below age 24 years or under. The age at which a person by law is no longer a child but an adult varies throughout Canada based on the province and territory. For example, in Ontario the age cut off point is 18 whereas in BC it is 19. One may argue that respondents with a child over the age of 18 or 19- depending on the province one resides in- should be excluded from the study. However, due to the Census reporting the age of children in intervals such as '15-24 years' this is not possible. Therefore we choose to include respondents that have at least one child aged 24 years or under. Also, respondents have to be under the age of 65- the average retirement age for workers in Canada- and a minimum age of 15 years. Finally, if the respondent is an immigrant, then

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parents etc. Instead, we choose to include the presence of other adults in the household excluding the parents as a control variable.

9 This is a common practice in the literature. See for example Kalenkoski et al. (2008), Bloemen et al. (2010) and Bloemen and Stancanelli (2013).

10 As it is not possible to differentiate between persons that are currently attending school full-time or part-time in the 2006 Canadian Census, we exclude all persons who are attending school regardless of their attendance status.

they must come from one of the ten countries mentioned previously.[11]

The education level is controlled by employing dummies for the highest education level obtained by the individual. In total, we use seven categories of education, namely (1) no certificate, diploma or degree, (2) high school graduation certificate or equivalent, (3) some college or other non-university certificate or diploma, (4) college or other non-university certificate or diploma, (5) a bachelor degree, (6) a master's degree and finally (7) an earned doctorate degree.

In conjunction to controlling for the education level, we control for the total number of children belonging to the respondent and the ages of these children. We control for the number of children because parents may spend greater time on childcare when there are more children in the family present. The total number of children variable is constructed by exploiting information on both the number of persons in the census family and the household living arrangements of the census family. We take the total number of persons in the census family and subtract 2 if the respondent is married or in a common law partnership. If the respondent lives in a lone-parent family, we subtract 1. This leaves us with the total number of children belonging to each parent. From the data the minimum and maximum number of children a parent has is 1 and 6, respectively.

The Census provides information on the ages of children aggregated in four categories (under 2 years, 2 to 5 years, 6 to 14 years and 15 to 24 years). Based on this information, we construct a dummy variable for each age category indicating whether children are from the corresponding age bracket in the household.

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[11] The ten countries are the U.S., UK, Germany, Poland, Italy, Portugal, China, Hong Kong, the Philippines and India.

We also include in the regression, a dummy for the presence of other adults in the household- which is constructed using information on the respondents' family status and household living arrangements. In addition, a primary maintainer variable, a dummy indicating the non-labour income received and finally the hourly wage of the respondent is included.

The Census provides information on whether the respondent is the primary maintainer in the household, defined as the 'first person in the household who pays the rent or mortgage or the taxes or the electricity bill and so on for the dwelling he or she resides in.'[12]

Bloemen and Stancanelli (2014) define non-labour income as the difference between total household incomes and total household earnings. For wives, this includes their husband's earnings and for husbands this includes their wife's earnings.[13] The Canadian census does not directly provide information on the non-labour income of the individual. However, information is provided on household income groups and the wages and salaries of the individual. Total household income was collected at the household level and in intervals. In order to use this data, we take the mid-point of each interval and equal to the lower bound on the interval for individuals in the top bracket. Then we allow non-labour income to mean the difference between total household income and total wages of the respondent.[14]

The Census does not provide direct information on the hourly wage of the individual but we can compute it using the information on annual wages, the number of hours worked for pay in a week and the total number of weeks worked per year, which are all available.

Clearly, the labour participation and non-market activity decisions should ideally both be understood as endogenous and probably simultaneous, so including the wage as an

[12] From Statistics Canada 2006 codebook.

[13] Kimmel and Connelly (2007) also make this assumption. In their model they assume that a proportion of non-labour income is the earnings of the individual's spouse, if the individual in question is married. They argue that this assumption is still accepted even in the 21st century.

[14] We express non-labour income in Canadian dollars.

explanatory variable for non-market activity may be problematic. We try to correct part of the potential issues associated to this modelling choice by trying to limit the extent of endogenous selection into work by constructing as in Bloemen and Stancanelli (2014) potential wages for those who report a zero wage.

It is worth mentioning that as well as selection issues, there is also the issue that the wage itself is endogenous to the time spent on non-market activities. In other words, the time people spent on housework may negatively affect their earnings. For example, Hersch and Stratton (1994) find a negative effect of housework time on wages after controlling for human-capital characteristics, number of children and marital status. Similarly, using data from the Danish Time Use Survey, Bonkie et al., 2005 find a negative effect of housework on women's wages. The common response in the literature to this endogeneity problem is to employ instrumental-variables estimates (Hersch and Stratton 1993). We acknowledge the endogeneity problem but do not solve it as it lies outside the scope of my work. This could be a project for future research.

3.3.1 Predicting the Potential Wage

In total 5% of parents in our sample report a zero wage rate. Information on wages may be missing for three main reasons. The first is related to being outside the labour force. From the 11701 individuals that reported a zero wage, around 9.2% are not in the labour force. For the remaining individuals in the labour force, two issues are at play. The first is related to unemployment. We observe that around 6.4% of those for which the wage is zero and are in the labour force are unemployed.[15] The second issue is related to employed individuals who have a zero wage.[16] We attribute the lack of wage information to nonresponse to this specific question.

[15] They do not work and therefore have no earnings to report.

[16] This is around 84%. Therefore, the majority of those who report a zero wage are employed and earn a wage but choose not to disclose.

[17] This is to also account for any possible selection bias in wages.

To treat these issues, we use a two-stage estimation procedure. The first stage involves jointly estimating gender-specific Probit models of whether individuals worked and of whether they provided usable earnings information. This is to also account for any possible selection bias in wages. For the second stage, gender-specific selectivity- adjusted log net wage regressions are estimated, following Tunali (1986) bivariate correction method. We also estimate the number of hours spent at work for individuals that report zero hours. Indeed, 4.74% of employed individuals from our general sample report zero hours of work despite them working a minimum of one week during the Census year. This is because the Census collected information of hours worked based on the reference period, which is only one week. It maybe that these individuals do work just not during the reference period. The remaining individuals do not work and therefore have no hours to report.

Identification in these models requires that we include some variables in the employment Probit regression that are not included in the wage Probit regression. Commonly used in the literature (see for example, Kalenkoski et al. (2008) and Bloemman and Stancanelli (2013) are characteristics of the respondent's partner such as his or her age, education, and potential experience and health status. As the Census data lacks information on the respondent's significant other, this is not possible in our case, but we can at least include household characteristics such as, the total number of children in the household and the non-labour income. Dummies are also used to identify if the person is married and if they live with other adults. The different ages of children are also included via dummies.

We expect that these variables will influence employment outcomes but not the reporting of the wage.[19] The remaining variables, which are included in both equations, include measures for the individual's own education level, age, skill level and finally the local unemployment rate.[20]

Regarding the skill level, we use job characteristics aggregated into two occupational group dummies 'medium' and 'high-skill' occupations to construct the potential wages. Low- skilled individuals are the reference category for the skill level dummies. We rely on the 2006 and 2001 'National Occupation Classification Statistics' (NOCS) to code the occupations into different skill level groups.[21] High skilled persons are managers, professionals, supervisors and technicians and associate professionals. Administrative and clerical personnel and service and sales workers are considered as medium skilled individuals. Finally, low skilled persons are those associated in agriculture, crafts and trades and manual labour.

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19 Following Bloemen and Stancanelli (2014), we include amongst other variables (total number of children and relationship status and the presence of other adults in the household), the presence of children of different ages, the non-labour income and immigration status in the employment equation.

20 Following Blanchflower and Oswald (1994), we use the local unemployment rate to identify wages. A common variable included in the regression is the total labour market experience of the individual. Mincer (1974) defines labour market experience as (age minus year of schooling minus six) and since the Census does not provide a direct measure of the year of schooling, we are forced to use the highest degree obtained as a proxy. As we already include in our regression the highest degree obtained by the individual, the two variables will be highly correlated, introducing the problem of multicollinearity.

21 The National Occupational Classification for Statistics codes occupations into various groups based on the education, training, or skill level required to enter the job, as well as the kind of work performed, as determined by the tasks, duties and responsibilities of the occupation.

Table 3.1 Results of the estimation of the employment and wage equations

Variable	Employment (number of hours worked per annum) equation		Wage equation	
	Male	Female	Male	Female
Intercept	-0.25* [0.12]	0.24** [0.10]	2.25*** [0.19]	3.17*** [0.17]
Total number of children	0.01* [0.006]	-0.007 [0.005]	--	--
Children age 0-1	-0.11*** [0.01]	-1.02*** [0.01]	--	--
Children age 2-5	-0.02 [0.01]	-0.06*** [0.01]	--	--
Children age 6-14	-0.05*** [0.01]	0.04*** [0.01]	--	--
Children age 15-24	-0.001 [0.01]	0.11*** [0.01]	--	--
Married	0.14*** [0.01]	0.02 [0.01]	--	--
Immigrant	-0.05*** [0.01]	-0.01 [0.01]	--	--
Age	0.08*** [0.003]	0.06*** [0.02]	0.03*** [0.005]	0.01** [0.005]
Age squared	-0.001*** [0.00004]	-0.0007*** [0.0001]	-0.0005*** [0.00005]	-0.0001** [0.00006]
Medium-skill individual	0.07 [0.07]	0.14** [0.01]	0.35*** [0.08]	0.26*** [0.08]
High-skill individual	0.19*** [0.07]	0.25*** [0.02]	0.25*** [0.08]	0.22*** [0.08]
Unemployment rate	-0.07*** [0.01]	-0.13*** [0.01]	-0.23*** [0.01]	-0.17*** [0.02]
High school qualification	0.20*** [0.01]	0.18*** [0.07]	0.21*** [0.02]	0.20*** [0.02]
Some college qualification	0.22*** [0.02]	0.19*** [0.01]	0.21*** [0.02]	-0.009 [0.02]
College qualification	0.26*** [0.15]	0.25*** [0.01]	0.33*** [0.02]	0.33*** [0.02]
Bachelor degree	0.33*** [0.01]	0.25*** [0.02]	0.32*** [0.02]	0.34** [0.02]
Master's degree	0.28*** [0.02]	0.27*** [0.02]	0.41*** [0.03]	0.32*** [0.03]
PhD degree	0.29*** [0.05]	0.41*** [0.07]	0.39*** [0.07]	0.02 [0.09]
Non-labour income	-0.0008*** [0.0001]	-0.0009*** [0.0001]	-	--
Other adults in household	0.17*** [0.02]	0.06*** [0.01]	--	--
Number of observations	119657	127898	119658	127901

Table 3.1 reports coefficients and standard errors (in parenthesis) using data from the 2001 and 2006 Canadian Public Use Microdata Files. – indicates result not required.

*** Significance at the 1% level, ** Significance at the 5% level and * Significance at the 10% level.

The coefficient estimates and standard errors (in parenthesis) are reported in table 3.1. Starting with the employment model, for men we find that the total number of children, age, high skill level, relationship status, education and the presence of other adults in the household all have a positive and significant effect on the number of hours spent at work. The presence of children between the ages of 0-1 and 6-14 years, immigration status, the unemployment rate and non-labour income all have a negative and significant impact on the hours worked. For females, a positive and significant relationship is found between the number of hours worked and the presence of children age 6-14 and 15-24, the age of the individual, medium and high skill level, education and the presence of other adults in the house. Children aged 0-1 and 2-5 years, the unemployment rate and non-labour income reduce the number of hours worked.

For the wage equation, all the variables incorporated in the regression are significant predictors of wage reporting behaviour for both men and women, with the exception of some college and PhD degree level for females. These two education levels are not significant. A positive relationship is found for all the variables apart from the unemployment rate as expected. The time-use equations will incorporate a measure of each individual's predicted log wage rate if the actual wage rate was reported as zero.[22]

3.3.2 Descriptive Statistics

We present some statistical information about our sample and our three time-use activities. Tables 3.2 and 3.3 displays amongst other explanatory variables, the average hours per week spent on childcare, housework and caring for the elderly, by immigration status and

[22] This is composed using the number of hours worked in a year. If the individual reports zero hours, then we estimate for him/her the predicted number of hours worked.

gender. Looking at both tables, we know that immigrants are slightly older than the Canadians in our sample with women on average being younger than men of the same ethnicity. Immigrants are also more likely to be married, live in household with other adults, and have higher education degrees. Estimates indicate that immigrants have a greater proportion of individuals in the sample reporting being married compared to natives. For example, 91% of Indian males in the sample were married compared to 74% of native males. Similarly, 84% of Polish females were married compared to 71% Canadian females. Also, 92% of immigrants in the sample reported sharing a house with other adults. For natives, this figure is less, around 81% for Canadian mothers and 67% for Canadian fathers.

When it comes to those with a bachelor degree or more (higher educated), statistics show that immigrants have a greater proportion of being higher educated than natives. For example, on average, 6% of immigrants reported having a master’s degree in comparison to just 3% of Canadians. Also, 20% of immigrants have a bachelor degree whereas only 15% of Canadian do.

Canadians earn a higher hourly wage rate compared to immigrants with the exception of those from the U.S., the UK and Germany. Immigrants from China and India earn the least per hour and overall, males earn more than women regardless of country of origin. The average hourly wage rate for immigrant men is 24.92 Canadian dollars (hereafter dollars) whereas for immigrant women it is 19.28 dollars. Similarly, Canadian men earn an average hourly wage of 27.58 dollars and for Canadian women the rate is 21.50 dollars. Finally, from the description of the statistics, it cannot go unnoticed that immigrants from the U.S. receive on average the highest wages. The immigration literature assumes that generally immigrants come from countries with real per capita incomes lower than the host country they choose to migrate to. Individuals from the U.S. would not fit this criterion. Furthermore, in the debate over immigrants' economic assimilation in Canada, it has not been the U.S. born immigrants that have been the issue. Hardwick (2010) mentions, whereas immigrants from other parts of the world are primarily viewed as 'economic migrants', American immigrants migrate to Canada for numerous reasons usually related to healthcare, politics or culture. This may have an effect on their labour market outcomes and choices, which would thus influence their time use. Indeed, Al-sabah (2015)[23] finds stronger results to suggest the economic assimilation of immigrants when immigrants from the U.S. were excluded from the study. Hence, as an alternative estimate, we decide to exclude the U.S. from the benchmark sample and to focus on immigrants from the remaining eight countries.

Overall immigrant men enjoy higher non-labour income compared to Canadian men. The difference between the two groups of men is around 2270 dollars per year. In particular, men from the Philippines receive the highest non-labour income whereas men from the U.S. receive the least. The results are different for mothers. Canadian mothers receive around 1250 dollars more in non-labour income than immigrant women. However, Italian women receive the highest of this type of income and women from China receive the least. Since non-labour income is essentially made up of the total income of all the people in one household excluding the respondent, we can assume that a father's non-labour income is made up of his wife's income if he is married or in a relationship and similarly for mothers, her non-labour income comprises her husband's salary if she is married or in a committed relationship. Based on this definition and the statistics mentioned earlier, it seems that immigrant wives contribute more to the household financially than Canadian wives and that there is not a great difference in the financial contribution of Immigrant and native husbands towards their household.

Compared to Canadian parents, parents from the UK, Germany, Poland, Hong Kong and China report having fewer children. On the other hand, those from the U.S.,

[23] Al-Sabah (2015) is the second chapter of this thesis.

Italy, the Philippines and India report a greater number of children. Specifically, Italian couples report the greatest number of children, 1.98 and Chinese couples report the least, 1.59. With regards to Portugal, immigrants report the same number of children as the Canadians, 1.88. It is also worth mentioning that based on our sample; natives have a greater proportion of having young children, below the age 5 whereas immigrants are more likely to have older children, between the ages of 6 and 24.

Interestingly, when we turn to the years since migration variable, we see that the Italian immigrants have been in Canada the longest. On the other hand the migration of Chinese immigrants to Canada is a recent phenomenon. Thus, we expect the Italian immigrants to be more assimilated towards Canadian culture and the Chinese to be the least. This is something we explore in section 3.5.1.

Estimates indicate that immigrant men spend on average less time on childcare related activities compared to Canadian fathers. Immigrant men from Italy devote the least time of 9.44 hours per week to children. For women, we see a similar trend. Native mothers dedicate more time per week to childcare than immigrant mothers. Likewise the fathers, Italian mothers spend the least time on childcare per week, around 13.92 hours. When comparing time devoted to childcare across genders, women spend more time than males. For example, mothers from Poland spend an average of 16.22 hours per week on childcare compared to an average of 11.19 hours that Polish fathers consume. Also, Canadian mothers spend on average 26.10 hours per week on childcare compared to the average number of hours of 16.84 per week that Canadian fathers spend.

Table 3.2 Descriptive statistics on fathers time use, immigrants and natives by country of origin, Canadian Census 2001 and 2006, mean and proportion

	FATHERS											
	Natives	USA	UK	Germany	Poland	Italy	Portugal	China	Hong Kong	Philippines	India	All immigrants
Age, *Mean*	40.08	43.41	45.49	45.39	44.13	49.28	43.59	43.33	45.35	41.84	41.96	43.31
Married, *Proportion*	0.74	0.87	0.90	0.88	0.92	0.95	0.91	0.96	0.93	0.92	0.97	0.91
High school, *Proportion*	0.25	0.15	0.18	0.16	0.20	0.20	0.20	0.15	0.21	0.23	0.19	0.19
Some College, *Proportion*	0.17	0.09	0.15	0.18	0.23	0.17	0.10	0.03	0.05	0.09	0.06	0.12
College, *Proportion*	0.21	0.15	0.28	0.28	0.23	0.17	0.12	0.12	0.21	0.24	0.16	0.20
Bachelor, *Proportion*	0.15	0.27	0.19	0.18	0.11	0.11	0.03	0.26	0.31	0.34	0.28	0.20
Master , *Proportion*	0.03	0.16	0.06	0.07	0.11	0.03	0.007	0.15	0.07	0.01	0.10	0.07
PhD, *Proportion*	0.00	0.07	0.03	0.02	0.01	0.00	0.00	0.08	0.00	0.00	0.02	0.02
Hourly Wage, dollar, *Mean*	27.58	34.41	33.08	31.80	23.91	27.12	23.12	23.34	24.00	24.54	23.01	24.92
Household non-labour income, yearly[1]**,** *Mean*	25.79	18.00	23.00	24.05	29.16	34.46	32.67	27.97	30.88	39.57	33.93	28.06
Living with other adults, *Proportion*	0.93	0.94	0.95	0.94	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.96
Number of children, *Mean*	1.88	1.97	1.85	1.82	1.71	2.02	1.88	1.61	1.79	2.01	1.97	1.93
Children age 0-1, *Proportion*	0.14	0.12	0.10	0.09	0.07	0.03	0.08	0.13	0.08	0.15	0.15	0.13
Children age 2-5, *Proportion*	0.27	0.29	0.23	0.21	0.19	0.09	0.21	0.26	0.21	0.33	0.33	0.28
Children age 6-14, *Proportion*	0.49	0.52	0.46	0.43	0.47	0.39	0.48	0.46	0.52	0.54	0.51	0.50
Children 15-24, *Proportion*	0.46	0.42	0.50	0.52	0.55	0.65	0.53	0.43	0.48	0.43	0.41	0.48
Childcare hours, weekly, *Mean*	16.84	17.42	14.35	12.22	11.19	9.44	11.68	9.85	12.29	14.71	12.58	12.63
Senior, weekly, *Mean*	0.83	0.65	0.76	0.84	0.65	1.23	0.99	1.21	1.74	0.96	1.75	1.15
Housework, weekly, *Mean*	12.79	11.91	12.61	12.03	13.03	12.11	12.53	11.00	11.5	14.5	11.56	12.25
Years since migration, Mean	NA	18.94	26.37	27.67	16.43	35.34	26.43	11.39	17.48	11.99	13.51	15.05
Paid work time, Weekly, Mean	40.70	42.63	42.54	43.36	42.22	41.68	41.34	38.46	40.23	37.61	40.49	40.68

Table 3.3 Descriptive statistics on mothers time use, immigrants and natives by country of origin, Canadian Census 2001 and 2006, mean and proportion

	MOTHERS											
	Natives	USA	UK	Germany	Poland	Italy	Portugal	China	Hong Kong	Philippines	India	All immigrants
Age, *Mean*	39.04	41.74	43.39	43.64	42.02	46.48	41.23	41.07	43.62	41.57	38.83	41.01
Married, *Proportion*	0.67	0.79	0.80	0.78	0.84	0.89	0.89	0.91	0.90	0.84	0.94	0.82
High school, *Proportion*	0.27	0.23	0.26	0.24	0.21	0.32	0.25	0.20	0.26	0.15	0.23	0.22
Some College, *Proportion*	0.09	0.07	0.08	0.11	0.13	0.09	0.07	0.03	0.05	0.07	0.04	0.09
College, *Proportion*	0.30	0.23	0.35	0.31	0.37	0.19	0.13	0.18	0.26	0.30	0.16	0.26
Bachelor, *Proportion*	0.16	0.25	0.17	0.16	0.09	0.10	0.05	0.24	0.20	0.40	0.26	0.20
Master , *Proportion*	0.03	0.10	0.03	0.06	0.11	0.02	0.00	0.08	0.03	0.01	0.10	0.05
PhD, *Proportion*	0.00	0.02	0.005	0.007	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Hourly Wage, dollar, *Mean*	21.5	26.25	23.81	22.20	17.74	20.28	16.91	16.89	20.5	21.07	17.37	19.28
Household non-labour income, yearly[1], *Mean*	45.58	50.07	51.19	46.07	45.16	55.78	49.81	39.66	47.88	45.71	51.95	44.33
Living with other adults, *Proportion*	0.81	0.83	0.81	0.80	0.85	0.88	0.91	0.91	0.90	0.86	0.94	0.84
Number of children, *Mean*	1.88	1.91	1.85	1.78	1.73	1.94	1.88	1.58	1.76	1.90	1.98	1.89
Children age 0-1, *Proportion*	0.12	0.10	0.07	0.07	0.07	0.03	0.08	0.12	0.07	0.13	0.14	0.11
Children age 2-5, *Proportion*	0.24	0.22	0.18	0.17	0.16	0.08	0.19	0.24	0.17	0.29	0.31	0.24
Children age 6-14, *Proportion*	0.49	0.49	0.47	0.43	0.45	0.38	0.49	0.48	0.48	0.52	0.51	0.50
Children 15-24, *Proportion*	0.45	0.49	0.52	0.56	0.56	0.67	0.52	0.43	0.50	0.41	0.43	0.47
Childcare hours, weekly, *Mean*	26.10	24.83	23.21	19.63	16.22	13.92	19.8	16.72	17.36	20.12	20.67	19.78
Senior, weekly, *Mean*	1.29	1.05	1.11	1.35	0.96	2.19	1.55	1.67	1.92	1.25	2.32	1.57
Housework, weekly, *Mean*	21.36	21.78	21.92	22.91	19.00	23.77	22.42	18.08	18.80	20.15	23.20	21.10
Years since migration, Mean	NA	19.77	26.63	23.47	14.77	34.75	25.03	10.33	17.14	12.80	12.94	14.20
Paid work time, Weekly, Mean	30.27	30.89	31.81	31.47	33.62	32.97	32.59	32.06	33.51	33.18	31.16	32.13

Even when we control for the total number of children in table 3.4, we find that immigrant mothers and fathers spent less time on childcare compared to Canadian parents. For example, given that a parent has 3 children, an immigrant mother would spend around 8 hours less per week on childcare than a Canadian mother and an immigrant father would spend around 5 hours less than a Canadian father.

Table 3.4 The average time spent on childcare per week for natives and immigrants controlling for the number of children

	Number of hours spent in childcare per week			
Number of children	**Native mothers**	**Immigrant mothers**	**Native fathers**	**Immigrant fathers**
1	23.8	19.01	15.3	12.1
2	26.4	20.19	17.3	12.9
3	29.2	21.63	18.3	13.4
4	32.7	23.7	20.0	13.9
5-6	37.5	25.1	13.8	10.2

Similarly when we breakdown children in terms of their ages (see table 3.5), immigrants preform less childcare duties than natives. For example, assuming that a parent has a child between the ages of 6 and 14 years, an immigrant mother would spend around 7 hours less per week on childcare than a Canadian mother. For fathers, the difference is around 5 hours.

Table 3.5 The average time spent on childcare per week for natives and immigrants controlling for the ages of children

	Number of hours spent in childcare per week			
Age of children	**Native mothers**	**Immigrant mothers**	**Native fathers**	**Immigrant fathers**
0-1 years	48.0	40.08	27.0	20.1
2-5 years	42.7	33.8	26.6	19.7
6-14 years	31.3	24.4	20.6	15.5
15-24 years	14.1	11.7	9.2	7.5

Turning to housework, we note mixed results. Male immigrants from the Philippines and Poland allocate on average more time per week to household chores than male natives. Males from the other remaining countries devote less time to housework than Canadian males. Men from China do the least housework, 11 hours per week. As for women, overall natives do slightly more housework than immigrants. Mothers from the US, UK, Germany, Italy, Portugal and India do more housework than Canadian mothers. Mothers from the remaining countries do less housework. Indian and Italian mothers do the most housework at around 23 hours per week. Mothers from China allot the least time to housework. In particular, women do more housework than men across the board.

Turning to the last activity studied, providing care/assistance to seniors, we see mixed results when looking at males. Immigrant males from Germany, Italy, Portugal, China, Hong Kong, the Philippines and India spend more time on this activity compared to Canadian men. However, men from the remaining countries dedicate less time than Canadian men. The differences are more pronounced when comparing Indian and Polish or American Immigrants. Indian men allocate on average 1.1 hours per week more to looking after seniors than Polish or American men. Regarding women Table 3.3 shows that immigrant mothers from the U.S., the UK, the Philippines and Poland allot less time per week to looking after the elderly than Canadian mothers. In particular, Polish mothers spend the least time on this activity around 0.96 hours per week. Specifically, immigrants from Germany, China, Italy, Portugal, Hong Kong and India allot more time to this activity than Canadian women. Once more, women dedicate more time to this activity per week than men.

To briefly summarize our findings on the three activities, we find that immigrant parents spend less time with their children than Canadian parents, with the exception of those from the U.S. It is the Italians that spend the least time.[24] Chinese parents spend the least time per week on housework and that Canadian mothers do more housework than immigrant mothers, with the exception of those from India. For males, it is dependent highly on their country of origin. Polish parents spend the least amount of time on providing care and assistance to seniors whereas Indian parents spend the most. In all of the three activities considered, women dedicate more time to these activities than men. For a given week, we conclude that fathers from the U.S., the UK, Germany, Hong Kong, the Philippines, India and Canada generally prioritize childcare over housework and housework over providing care or assistance to seniors. Fathers from the other remaining countries choose to dedicate more time towards housework, childcare and finally spending time with seniors- in that order. For mothers, it's those from the U.S., the UK and Canada that prioritize childcare over housework and housework over providing care or assistance to seniors. Mothers from the remaining other countries prioritize housework over childcare and childcare over spending time with the elderly.

[24] Figures 3.1 and 3.2 present visually the data in tables 3.2 and 3.3 for the time spent on childcare duties.

Figure 3.1: Total hours fathers spent on childcare per week, by country of origin

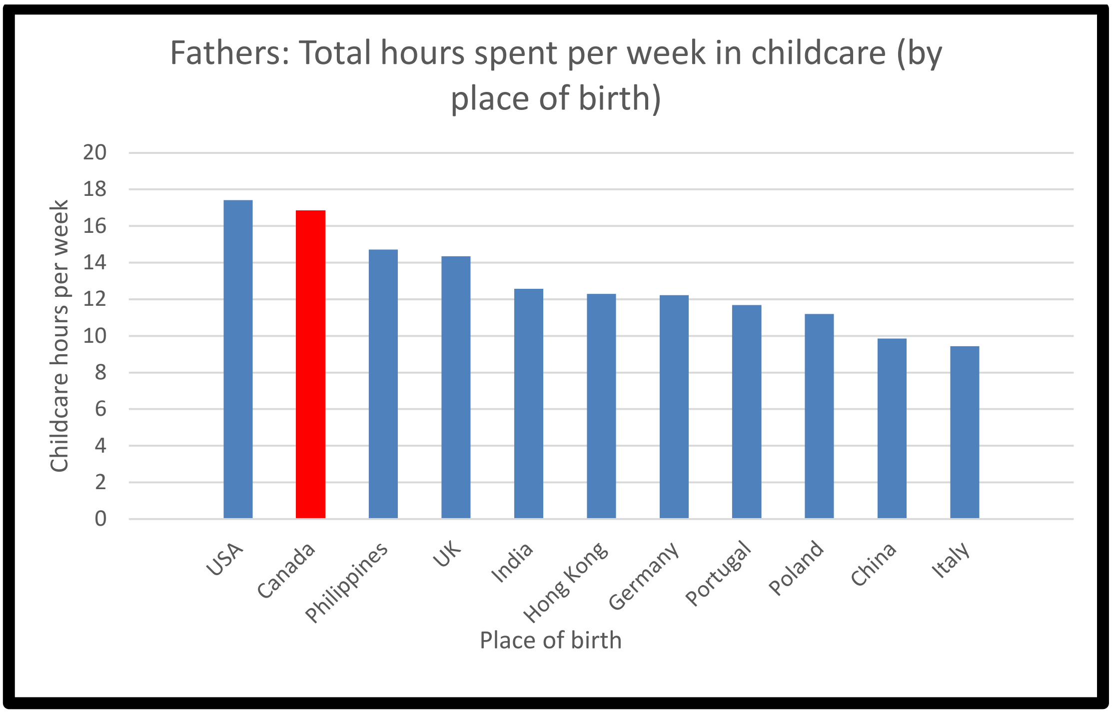
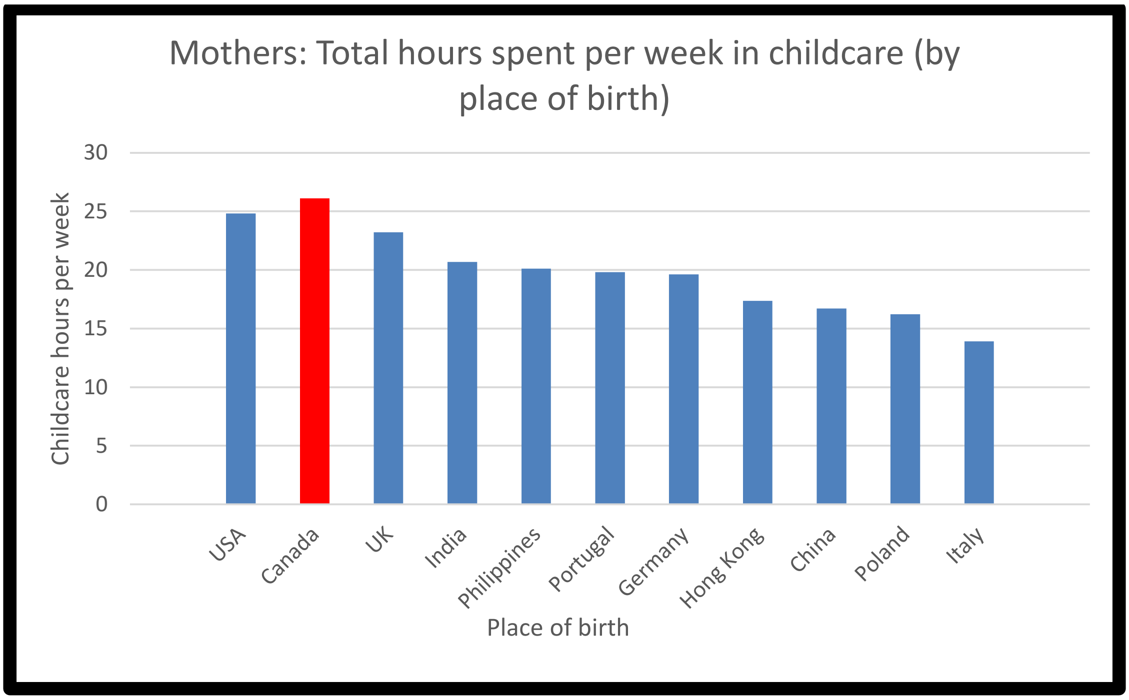


Figure 3.2: Total hours mothers spent on childcare per week, by country of origin



3.4 THE MODEL

To analyse the patterns of time use of both natives and immigrants in Canada, we regress the following independent variables (mentioned below) against the time spent per week on each non-market activity. As common in time use research, we run separate regressions for men and women.[25] In total, we distinguish between three non-market activities: childcare, housework and providing care or assistance to elderly family members.

We employ the following socioeconomic variables: age, age squared, the years since migration, the years since migration squared, dummies for the highest level of education obtained, an immigrant status dummy, the current size of the migrant's community and the historical presence of the migrant's community. Household variables are also included: a marital status dummy, a dummy for the presence of other adults in the household, the number of children in the respondent's household, four separate dummy variables representing the ages of the children (0-1, 2-5, 6-14 and 15-24 years), a primary maintainer dummy and the total non-labour income of the household. Finally, the log hourly wage rate of the individual is included in the model. The dependent variable is the total number of hours a parent spends on childcare, housework and looking after seniors per week.

Age is included because preferences towards spending time with children of older parents' may differ from that of younger ones due to differences in values and knowledge possibly influenced by different and additional life experiences. Also, greater experience (that usually comes with age) with raising and looking after children may influence the amount of time spent looking after children. Empirical evidence on a father's age and time with children is virtually non-existent as most studies regarding childcare choose to look at mothers only.

[25] See for example, Bittman and Wajcman (2000), Mattingly and Bianchi (2003) and Mattingly and Sayer (2006).

The education level of a parent may impact their time use through its impact on lifestyle preferences and attitudes and values. Parents with varying educational backgrounds may also have different aspirations to child rearing (Joesch and Spiess 2006). Leibowitz 1974; Hill and Stafford 1980; Sandberg and Hofferth 2001, have found more highly educated mothers to spend more time with their children. Thus, we expect education to have a positive impact on the time spent looking after one's children, at least for mothers. Regarding fathers, it is less clear what to expect, as there is less literature about this available. However, regarding the time spent on housework, the effect is generally found to be ambiguous because the more educated one is, the more likely they earn a higher income and thus may be more inclined to purchase household services such as a cleaner etc. from the market.[26] Ambiguity is also expected when looking at the time one spends providing care or assistance to seniors. This is because spending time with seniors maybe viewed in a similar fashion as spending time with children. On the other hand, the income effect may take precedence leading to higher educated individuals to hire a nurse/care worker or nanny to assist in looking after the elderly and children, respectively.[27]

The immigrant status variable allows us to separate individuals into two groups 'immigrants' and 'non-immigrants'. Previous studies have shown that immigrants are more likely to rely on relatives to help out with childcare than natives, leading us to predict that immigrant parents spend less time with their children compared to natives.[28]

Regarding the current stock of the migrant's community, we are apprehensive as to what to expect. The impact of the number of immigrants from a given origin on childcare hours may be positive or negative. Larger numbers of immigrants from a given origin may

[26] Bloemen et al. (2010) point out that higher educated individual are more productive in their everyday lives. Higher productivity in any given activity is associated with allocating more time to the given activity. This alongside the income effect theory is what fuels our ambiguity.

[27] This is based on the assumption that higher educated individuals earn higher income.

[28] See Capizzano et al.2000 and NCES 2004.

encourage ethnic enclaves to flourish, resulting in immigrants 'sticking' to their ways. This may lead to a negative association between the size of the migrants' community and how much childcare immigrants carry out. In addition, natives might view a growing immigrant population as a threat to their own customs and traditions. As a result, the native country will be hesitant in accepting the immigrant population. This may leave the distance in behaviour between the two groups unchanged (no impact) as there is limited interaction between the two groups or further apart (negative impact). On the other hand, larger immigrant communities make for more opportunities for natives and immigrants to interact and become familiar with each other, which should decrease the perceived differences between the two groups. Given that the population of the host society is much greater than any given immigrant origin group or the collective size of the immigrant groups, we expect the immigrants to be the ones who are influenced by natives, not the other way round. Therefore, the current stock of the migrant's community may have a positive impact on childcare hours-bridging the gap in the perceived differences between the two groups.

As for the past stock variables, two factors are at play. An increase in the historical presence of a given immigrant origin group may mean that natives have increased familiarity with the immigrants inducing a similar argument to the one mentioned above or it may be that natives feel suffocated with the continuous stream.

The assimilation profile with respect to the immigrant's own time in Canada is represented by the years since migration variable. This variable and its quadratic form are commonly used in the literature regarding the assimilation of immigrants.[29] Al-Sabah (2015) finds that the years since migration play a significant role in the assimilation process. We

[29] See for example (Baker and Benjamin 1994; Borjas 1995; Hatton and Leigh 2011; Al-Sabah 2015; Vargas 2016).

expect that greater number of years since migration should lead the time immigrants spend on childcare to resemble that of the Canadians.

Turning to the household characteristics, the marital status dummy variable takes the value 1 if the respondent is legally married and zero, otherwise. Individuals that are divorced, widowed or single receive the value zero. Economic theory does not provide us with clear predictions regarding the effect of marriage on an individual's time-use decision-making. The presence of a spouse may reduce one's childcare time as the spouse can participate and help in looking after the children. On the other hand, the demand for activities related to childcare may also increase in the presence of a marriage. Previous research produces mixed results. Kimmel and Connelly (2007) found that being married decreases childcare time whereas Gorsuch (2014) find married fathers to carry out greater childcare than non-married fathers. On the other hand, Bloemen and Stancanelli (2014) find marital status to have no significant impact on parental childcare time.

One of the variables included in the regression is the total number of children in the parents' household. This is the most basic measure of a household's need for childcare. We predict a positive sign on the coefficient of this variable because the greater number of children in a given household the more time will be consumed looking after and caring for the children by parents. This expected relationship has been established in previous empirical time use studies on childcare.[30]

In addition, we expect the ages of the children to impact differently on the demands on a parent's time. Younger children consume greater amount of time from their parents than older children. This is because they require more care usually in the form of supervision and physical care.

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[30] See for example Jenkins and O'Leary (1995), Miller and Mulvey (2000) and Sousa-Poza, Schmid and Widmer (2001).

The presence of other adults in the household is a commonly used variable in time-use studies. It is based on the notion that assuming household adult members behave as a cohesive unit, they will not only contribute financially to the household but some of their time. Time and money are well known factors impacting how a person chooses to spend his or her time. Thus, we expect the coefficient of this variable to have a negative sign. This is because a parent is more likely to receive assistance towards childcare, reducing the number of hours they end up spending on childcare- compared to a parent that lives only with children. It is true that not every adult is able to contribute to childcare for whatever reason but we expect this to have a small insignificant impact.[31]

The primary maintainer dummy variable may be interpreted as a proxy for bargaining power within the household.[32] Being the main breadwinner gains the individual greater bargaining power in the household. Empirical work has found evidence to suggest that bargaining power impacts the division of household labour and investment in children.[33] Specifically, the greater bargaining power one has, the less time they spend on childcare, housework and looking after the elderly. This is what we expect our results to show.

In the literature, non-labour income[34] is found to have an ambiguous effect on childcare hours. This is because childcare goods and childcare times are two distinct entities.

Given that childcare is viewed as a normal good, an increase in non-labor income may increase childcare. Responses to non-labor income changes will differ depending on the distinction made between childcare time, an invaluable input and childcare, a good.

An increase in non-labour income may increase the use of childcare services. That is, parents will purchase childcare from the market place. Connelly (1992) has shown that

[31] Reasons may include health problems; employment responsibilities or the parent may view the adult as not qualified to help with children, especially when children are young.

[32] This is based on the assumption that the primary maintainer is the main breadwinner of the household.

[33] See for example, Browning and Lusardi (1996), Rangel (2006) and Lundberg and Pollack (1993, 1994).

[34] See data section for a definition of non-labour income.

non-labour income increases the probability of a parent purchasing childcare services such as nursery and crèche care. Consequently, this will reduce the number of hours a parent spends looking after his/her child (ren). However, purchasing childcare off the market may not always be the case. A substitute to purchasing childcare is for the parent to look after the children themselves. If a parent views childcare as an input then an increase in non-labour income may free up the parent from work commitments allowing them to spend more time with their children. A similar view and one proposed by Kimmel and Connelly (2007) is that higher income families demand a higher level of active childcare time and thus, more time is needed to dedicate towards raising children. However, this ultimately depends on the weighting the individual places on work versus childcare time. Thus, we are apprehensive as to what the final impact between non-labour income and childcare will be.

As for the hourly wage, the impact it has on the individual time choices is ambiguous.[35] Previous research has produced mixed results. Kimmel and Connelly (2007) found increases in the wage rate to increase childcare time by more than an hour. In addition, Bloemen and Stancanelli (2010) find a positive and significant relationship between a husband's wage and the time he devotes to childcare and housework. On the other hand, Hallberg and Klevmarken (2003), Kooreman and Kapteyn (1987) and Van den Brink et al. (1997), found that one’s own wages does not affect childcare time.

Around 22.60% of people from our data set report zero hours of time spent on childcare activities in the week prior to Census day.[36] Since the reference period of the data is one week it maybe these people do spend time on childcare during the remaining year.[37] Also, the

[35] The wage rate is presented in its natural logarithm form and reported in Canadian dollars. We use the log of the hourly wage rate instead of hourly wage as the former produces a better fit to the data.

[36] For ‘housework’ and ‘senior’ the proportions are 4.10% and 77.61%, respectively.

[37] Or it may be that some parents do not spend any time with their children over the period of one year and therefore report zero hours, however, this reasoning is highly unlikely to be the case. Either way, the data on the number of hours parents spend on childcare is not representative of the population as there is a mismatch between the reference period and the actual one-year period of interest.

data on childcare is top-coded at 60 hours per week.[38] To treat these two issues we use a Tobit model for our analysis.[39]

However, we are not oblivious to the remarks made by Stewart (2009) on Tobit models. He finds that Tobit marginal effects significantly underestimate the true parameter values and the extent of the bias varies with the fraction of zero-value observations. This is possibly due to the Tobit model assuming that the process that determines whether an individual engages in the activity is the same that governs how much time is spent in that activity. On the other hand, he finds that ordinary least squares (OLS) estimation produces unbiased estimates.

Furthermore, Foster and Kalenkoski (2013), conduct a study in which they examine how the reference period length of the data affects OLS and Tobit results. They conclude that Tobit marginal effects are smaller than OLS, but the magnitude of the bias decreases as the reference period increases due to the reduction in the number of zero observations. With a reference period length of one week we must be cautious when interpreting Tobit marginal effects. In line with this debate and to test the robustness of our results to either specification, we decide to estimate our model, first using a Tobit specification and then using OLS.

In addition, given that the dependent variable is not continuous but rather categorical and ordered, we also re-estimate the model using a ordered Probit specification.

Finally, separate models for men and women are used. This is the conventional approach because factors often go in different directions for men and women. Combining female and male responses into one model may result in a biased estimation of the importance that our independent variables have for time spent on childcare, housework and looking after seniors.

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[38] For ‘housework’ and ‘senior’ the data is also top-coded at 60 and 20 hours per week, respectively.

[39] Sousa-Poza et al. (2001) argue that Tobit models are more appropriate for time use data.

3.5 RESULTS FOR TIME SPENT ON CHILDCARE

3.5.1 Tobit Estimation Results

The results from using the Tobit model of the time parents spend on childcare are reported in tables 3.6 and 3.7, for mothers and fathers, respectively.[40] Starting with the immigrant dummy, we see it is statistically significant and negative for childcare hours for both men and women. A non-Canadian parent irrespective of gender spends less time with their children compared to a Canadian parent.[41] This may be because immigrant parents are more focused towards employment, working greater number of hours outside the home and so have less time to spend with their children at home. Indeed, according to our descriptive statistics, immigrant mothers spend greater number of hours on paid work than Canadian mothers. However, for fathers, immigrants and natives spend roughly the same number of hours per week on paid work. Gutierrez-Domenech (2010) offers another reason. She states that immigrants unlike natives are less likely to have their family around to offer support in other tasks, so parents have less time to devote to childcare. It is worth pointing out that previous research on immigrants and childcare time devotion is limited and from what is

[40] Column 1 presents the results from the most standard specification in the literature explaining the outcome as a function of the father/mother individual characteristics. Columns 2 and 3 introduce the present stock and both the present and past stock, respectively, from the standard regression. Finally, regression 2 and 3 is repeated with place of birth dummies (the reference group being countries other than Canada). This is shown in columns 4 and 5. The model also includes observed controls for the number of children present in the household, the ages of the children, the presence of other adults, the receipt of non-labour income, the primary maintainer, the log hourly wage, the parent's education, age and immigration and marital status.

[41] From our raw data, we see that immigrant mothers and fathers spend less time with their children compared to Canadian parents. See tables 3.2 and 3.3 for a summary of the raw data. Referring to the descriptive statistics, the average number of hours Canadian and immigrant mothers spend per week on childcare is around 26 and 19 hours, respectively. For fathers, natives spend around 4 hours more per week than immigrants.

available, the results produce mixed results.[42] Nevertheless, a similar result to ours is found by Nock and Kingston (1988), Joesch and Spiess (1996) and Kimmel and Connelly (2007).[43]

Specifically, from the results (please see table 3.37 in appendix 3), if we remove the immigrant dummy variable from the model, we find that mothers from the U.K spend more time on childcare per week compared to Canadian mothers. However, mothers from the remaining countries report spending less time on childcare per week than their Canadian counterparts.[44] For fathers, those from Germany, Poland, Italy, Portugal, China, Hong Kong, the Philippines and India spend less time on childcare per week than Canadian fathers.[45] The remaining variables report similar results as before.

Moving on to age, the standard regression shows that older parents devote more time to their children than younger ones. This result is true for both genders. Since the age-squared coefficient is significantly negative for childcare hours, we conclude that the relationship between the number of hours spent on childcare by a parent and age is nonlinear.

[42] There is a lot of research on childcare time use but little that incorporates immigrants.

[43] All papers are for the United States, apart from Joesch and Spiess (1996), which is for a sample of European countries.

[44] Excluding the United States and Germany for which the place of birth dummies is positive but insignificant.

[45] The place of birth dummies for the U.S. and the U.K. are both positive but insignificant.

Table 3.6 Coefficient estimates from Tobit models of childcare time use

VARIABLES	Endogenous variable: Childcare hours spent by Females				
Age	3.04*** [0.08]	3.04*** [0.08]	3.02*** [0.08]	3.02*** [0.08]	3.03*** [0.08]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]
Immigrant dummy	-10.53*** [0.54]	-13.72*** [0.79]	-9.12*** [0.89]	-9.86*** [2.44]	-5.91* [2.58]
Number of children	1.78*** [0.11]	1.78*** [0.11]	1.77*** [0.11]	1.75*** [0.11]	1.76*** [0.11]
Child age 0-1	20.93*** [0.35]	20.94*** [0.35]	20.91*** [0.35]	20.94*** [0.35]	20.95*** [0.35]
Child age 2-5	21.68*** [0.23]	21.68*** [0.24]	21.68*** [0.23]	21.69*** [0.24]	21.71*** [0.23]
Child age 6-14	14.35*** [0.23]	14.35*** [0.23]	14.35*** [0.23]	14.35*** [0.23]	14.34*** [0.23]
Child age 15-24	-13.56*** [0.22]	-13.55*** [0.21]	-13.53*** [0,21]	-13.53*** [0.21]	-13.54*** [0.21]
Marriage dummy	4.31*** [0.22]	4.32*** [0.22]	4.35*** [0.22]	4.38*** [0.22]	4.39*** [0.22]
Primary maintainer dummy	3.41*** [0.21]	3.41*** [0.21]	3.35*** [0.21]	3.34*** [0.21]	3.33*** [0.21]
Other adults in household	-4.61** [0.29]	-4.61*** [0.29]	-4.54*** [0.29]	-4.52*** [0.29]	-4.55*** [0.29]
High school education	0.17 [0.22]	0.13 [0.28]	0.08 [0.28]	-0.02 [0.28]	-0.03 [0.28]
Some college education	1.75*** [0.36]	1.73*** [0.36]	1.61*** [0.36]	1.52*** [0.36]	1.51*** [0.36]
College education	1.50*** [0.28]	1.46*** [0.28]	1.38*** [0.28]	1.27*** [0.28]	1.25*** [0.28]
Bachelor degree education	-0.31 [0.32]	-0.35 [0.31]	-0.30 [0.32]	-0.46 [0.32]	-0.49 [0.32]
Masters degree education	-1.55*** [0.53]	-1.62*** [0.53]	-1.55*** [0.53]	-1.77*** [0.53]	-1.80*** [0.53]
PhD degree	-1.00 [1.39]	-1.04 [1.39]	-1.12 [1.39]	-1.55 [1.39]	-1.52 [1.39]
Log hourly wage (actual or predicted)	1.62*** [0.05]	1.62*** [0.05]	1.61*** [0.05]	1.61*** [0.05]	1.61*** [0.05]
Non labour income	-0.03*** [0.002]	-0.03*** [0.003]	-0.03*** [0.003]	-0.03*** [0.003]	-0.03*** [0.002]
Years since migration	0.14** [0.05]	0.17*** [0.05]	0.10* [0.05]	0.09 [0.06]	0.13** [0.06]
Years since migration squared	0.001 [0.001]	0.001 [0.001]	0.0003 [0.001]	0.0003 [0.001]	-0.0005 [0.001]
Present Stock	--	2.75*** [0.49]	-4.54*** [0.82]	5.87*** [1.68]	15.14*** [2.56]
Past stock at 30 years ago	--	--	5.21*** [0.46]	--	-11.67*** [2.42]
Place of birth dummies	No	No	No	Yes	Yes
Pseudo R^2	0.06				
No.Obs	118126				

Table 3.6 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes place of birth dummies not reported. - - Indicates result not required.*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.7 Coefficient estimates from Tobit models of childcare time use

	Endogenous variable: Childcare hours spent by Males				
VARIABLES					
Age	3.06*** [0.06]	3.06*** [0.06]	3.05*** [0.06]	3.06*** [0.06]	3.06*** [0.06]
Age squared	-0.03*** [0.0007]	-0.04*** [0.0008]	-0.03*** [0.0007]	-0.03*** [0.0007]	-0.04*** [0.0008]
Immigrant dummy	-6.67*** [0.44]	-7.78*** [0.65]	-5.19*** [0.74]	-7.61*** [1.98]	-5.04** [2.11]
Number of children	0.29*** [0.09]	0.29*** [0.09]	0.28*** [0.09]	0.26*** [0.09]	0.26*** [0.09]
Child age 0-1	10.63*** [0.23]	10.63*** [0.23]	10.63*** [0.23]	10.63*** [0.23]	10.64*** [0.23]
Child age 2-5	12.96*** [0.18]	12.97*** [0.18]	12.96*** [0.18]	12.94*** [0.18]	12.95*** [0.18]
Child age 6-14	10.80*** [0.18]	10.80*** [0.19]	10.81*** [0.18]	10.79*** [0.18]	10.79*** [0.18]
Child age 15-24	-11.01*** [0.17]	-11.00*** [0.17]	-11.00*** [0.17]	-10.98*** [0.17]	-10.98*** [0.17]
Marriage dummy	1.30*** [0.19]	1.30*** [0.19]	1.32*** [0.19]	1.35*** [0.19]	1.35*** [0.19]
Primary maintainer dummy	-0.69*** [0.17]	-0.69*** [0.17]	-0.66*** [0.17]	-0.63*** [0.17]	-0.63*** [0.17]
Other adults in household	-5.51*** [0.33]	-5.51*** [0.33]	-5.46*** [0.33]	-5.44*** [0.33]	-5.45*** [0.33]
High school education	0.55** [0.22]	0.53** [0.22]	0.53** [0.22]	0.41* [0.22]	0.39* [0.22]
Some college education	0.75*** [0.24]	0.73*** [0.25]	0.68*** [0.25]	0.56** [0.25]	0.55** [0.25]
College education	1.66*** [0.23]	1.64*** [0.23]	1.62*** [0.23]	1.46*** [0.23]	1.44*** [0.23]
Bachelor degree education	0.04 [0.25]	0.02 [0.25]	0.07 [0.25]	-0.13 [0.25]	-0.14 [0.25]
Masters degree education	-0.79** [0.37]	-0.83** [0.37]	-0.74** [0.37]	-0.91** [0.37]	-0.93** [0.37]
PhD degree	1.14 [0.72]	1.07 [0.72]	1.15 [0.72]	1.04 [0.72]	1.04 [0.72]
Log hourly wage (actual or predicted)	0.64*** [0.05]	0.64*** [0.05]	0.63*** [0.05]	0.62*** [0.05]	0.62*** [0.05]
Non labour income	-0.0006 [0.001]	-0.0006 [0.001]	-0.0002 [0.001]	-0.00009 [0.001]	-0.00002 [0.001]
Years since migration	-0.007 [0.04]	-0.0005 [0.04]	-0.04 [0.04]	-0.03 [0.04	-0.006 [0.04]
Years since migration squared	0.003*** [0.0009]	0.003*** [0.0009]	0.002*** [0.0009]	0.002*** [0.001]	0.003** [0.001]
Present Stock	--	0.94** [0.41]	-3.03*** [0.67]	3.71*** [1.34]	9.37*** [2.10]
Past stock at 30 years ago	--	--	2.72*** [0.37]	--	-6.63*** [1.89]
Place of birth dummies	No	No	No	Yes	Yes
Pseudo R^2	0.04				
No.Obs	115800				

Table 3.7 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. - - indicates result not required.*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

As expected, the number of children has a significant and positive effect on the number of hours per week a parent spends on childcare. Every additional child increases the time parents spend on childcare duties by around 1.77 hours and 15 minutes per week, for mothers and fathers, respectively. Our result is in line with the existing literature. Nock and Kingston (1988) find that for each additional child, childcare time increases by a little over an hour. Kimmel and Connelly (2007) find that mothers' childcare time increases with the number of children. Also, Kalenkoski et al. (2008) find that the number of children is also positively associated with British mothers child-care time. Finally, Zaiceva and Zimmermann (2007) find the number of children to have a strong positive effect on time spent on childcare.

Unsurprisingly, the ages of the children impacts significantly the childcare time allocation of both mothers and fathers. It is evident from table 3.6 that the hours allocated to childcare per week by the mother fall as the child increases in age, indicating that older children require less time from their parents.[46] This is because children are more 'time intensive' when they are young -as they are in need of constant and longer supervision- and as they become older they shift towards being 'material intensive'. Even so that when the child reaches 15 years of age, we see a change in sign on the coefficient 'dummy 15-24' from positive to negative. This result is consistent with the notion that older children require less parental care and can help out by taking care of the other children. Douthitt (1989) finds for Canada that the older the youngest child, the more time mothers spend on child care related activities. For France, Bloemen and Stancanelli (2014) find that older children require less childcare time from their parents. Finally, for the U.S., Kimmel and Connelly (2007) find mothers' childcare time to decrease with the age of the children. Other studies that find similar results to us include Kalenkoski et al.(2005),

[46] Children between the ages of 2 and 5 take the greatest amount of time from their parents.

Gutierrez-Domenech (2010) and Craig and Sawrikar (2009).

The results for men are similar. We do find that older children (between the ages of 15 and 24) consume less childcare time from their fathers than younger children. Children between the ages of 0-1 and 6-14 years consume roughly the same amount of hours per week. This is similar to the result obtained by Grossbard and Stancanelli (2010). They find that fathers' childcare time also increases when there are young children in the household. In addition, Gorsuch (2014) and Kalenkoski et al. (2005) find men with younger children to spend more time on childcare. Gustaffson and Kjulin (1994) use data from the 1984 Swedish Panel Study of Market and Non-market activities and find that time spent by parents on their children decreases with the age of the child.

Married parents perform significantly more childcare related activities than unmarried ones. The impact of marriage on childcare hours is larger for females than males.[47]

Interestingly, we see a positive and significant relationship between being the primary maintainer[48] and childcare hours for mothers. In other words, if a mother is the primary maintainer of the household she lives in, she will spend more time with her children compared to mothers that are not the primary maintainers. It might be that a mother who is the primary maintainer of the household is most likely to not be married compared to non-primary maintainer mothers'. Therefore, she is working to maintain the household and at the same time, the main person who looks after the children. The result for men is the opposite.

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47 Our result is similar to that found by Gorsuch (2014). This paper finds that married fathers ~~to~~ carry out more childcare than non-married fathers.

48 The definition of the primary maintainer is the first person in the household who pays the rent or mortgage or the taxes or the electricity bill and so on for the dwelling he or she resides in.

When the father is the primary maintainer he devotes less time to his children. One possibility maybe that the father works long hours outside the home and since childcare is usually thought as a female phenomenon, the father does less childcare.

As expected, both mothers and fathers report spending less time on childcare if there are other adults in the same household.[49] This is most likely due to the other adults helping out with the children. Our result agrees with Kalenkoski et al. (2005), Zaiceva and Zimmermann (2007) and Kalenkoski and Foster (2008) who also find a negative effect of other adults present on childcare time.

Next, we find a nonlinear relationship between education and childcare hours.[50] Firstly, there is some evidence to suggest that a positive relationship exists between the education level of a parent and the number of hours they spend on childcare per week. For mothers, the positive effect is found for those with a college education. A mother that has attended college spends greater time with her children than an uneducated mother. This result shares resemblance to that found by previous studies.[51] For example, Hill and Stanford (1985) for their study on the U.S. found that more educated women spend more time with their children than less educated mothers. Likewise, Guryan et al. (2008) using data on the U.S., found that mothers with a college degree spend around 4.5 hours more per week with their children than mothers with a high school degree or less. Sayer et al. (2004) also find that more educated mothers in Canada spend more time with their children.

For fathers, the positive effect is found with those holding a high school certificate or a college diploma or certificate. Fathers with these degrees spend greater time with their children compared to fathers with no degree, certificate or diploma. An explanation for this

[49] 'Other adults' does not include the partner of the parent in question.

[50] Individuals with no education (no certificate, diploma, or degree) are the reference category for the education level dummies. In total there are 6 dummies.

[51] Other studies include Bloemen et al. (2010), Craig (2006), Baxter and Hayes 2007, Bonke and Esping-Andersen (2011) and Kalenkoski et al. (2005).

finding may be that educated men are less traditionally oriented than men with no education and so do not mind helping out with childcare.

However, we do find evidence to suggest that a parent with a master's degree regardless of gender actually spend less time with their children compared to uneducated parents. We attribute this drop in childcare hours for higher educated parents as having to spend a greater amount of time working outside the home and thus have less time to devote to childcare.[52] This result contradicts that found by Kalenkoski et al. (2005). Using time-diary data from the 2000 United Kingdom Time Use study they found that mothers with a 'graduate degree' spend more time with their children than less educated mothers.[53] Finally, for both mothers and fathers, there is no impact of obtaining a bachelor or an earned doctorate degree on childcare hours.[54]

Moving on to the log of the hourly wage, we find that both a mother and father's own hourly wage rate has a positive impact on the number of hours spent on childcare. Thus, one's wage rate is relevant to childcare hours. It seems that a strong income effect on demand for high quality childcare exists. Mothers and fathers prefer to take care of their children themselves as opposed to purchasing childcare from the market. Bloemen et al. (2010) find a similar result for men. They find that a husband's wage rate has a positive and significant impact on childcare time. They go on to explain that persons receiving higher hourly wages are likely to be highly productive and this productivity is translated into the person spending more time on the given activity.[55]

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[52] We find this to be the case. From tables 3.35 and 3.36, persons with a master's degree spend greater hours at work than those with no degree.

[53] Kalenkoski et al. (2005) understand 'graduate degree' to be equivalent to an MSc degree.

[54] Despite this, the sign on the bachelor and PhD degree dummy is different for the genders. For females it is negative and fathers is positive but in both cases insignificant.

[55] This is based on the assumption that given a person is productive in the market place, they are more likely to be productive in other activities and according to Bloemen et al. (2010) this translates as allocating more time to it.

The non-labour income variable produces a negative and significant coefficient for females. Greater non-labour income increases a person's disposable income and they are more likely to purchase help with childcare from the market in the form of nannies or sending the children to day care nursery to be looked after. Consequently, the number of hours a parent spends per week with their children is less. The literature produces mixed results. Kimmel and Powell (2006) find that mothers with higher levels of non-labour income are significantly more likely to use baby center, sitter or relative care for their children. In addition, Casper (1996) finds that families with high levels of non-labour income were more likely to use paid arrangements such as organized child-care facilities. On the other hand, Kalenkoski et al. (2005), finds non-labour income to increase the time mothers spend on primary childcare.[56]

Our results, however, reveal no significant effect of non-labour income on childcare hours for men. Given that the non-labour income is composed of the partners' wages, we find that fathers' time use is less sensitive than mothers' to changes in wages. In other words, the wife's earnings are not a significant predictor of husband's participation in childcare. This finding is consistent with the time-use literature. [57]

As for the other measures of assimilation studied in the literature, we find that a longer stay in Canada as measured by the years since migration for mothers is associated with a behaviour more similar to that of natives, i.e. in this case a large number of hours of childcare. For fathers, the year since migration has no impact on childcare hours. The year since migration-squared coefficient is not significant for mothers but it is for fathers.

Column 2 in turn includes as an additional variable, the present stock. The introduction of this variable it to check whether there is some assimilation through origin groups. We find

[56] They breakdown childcare into primary and secondary. The positive effect is found only for primary childcare. Non-labour income has no impact on secondary childcare.

[57] Brayfield (1995) and Friedberg and Webb (2005) also find a similar result for fathers.

the present stock to be positive and significant for mothers. As the number of immigrants from a given origin group increase in size in Canada, immigrants from that group carry out more childcare duties and since we find immigrants to spend less time on childcare compared to natives in the first instance, an increase in their childcare hours would indicate assimilation.

One may argue that as the migrant's community increases in size in the host society, it will be more difficult for immigrants to assimilate since the community will 'shelter' the immigrants from mainstream host society and thus, reinforce their own cultural habits.

However, according to some scholars like Conzen (1991), Fukuyama (1993) and Garcia (1996), pre-migration cultural traits are not the same as homeland cultures because immigrants select carefully what behaviours, attitudes and ideas to bring with them to the host society. For example, some ethnic groups such as the Asians often select traits that will be suitable to the new environment they are heading to, such as strong work ethic, delayed gratification and thrift. In addition, homeland cultural norms and values may not be entirely inconsistent with those of the host society (Zhou 1997). Fukuyama (1993) argues that some immigrant cultural patterns may fit the 'new' requirements of life or may even be prerequisites for integrating into the host society. As for the other traits, according to Garcia (1996), they are modified, changed, adapted, transformed, reformed and negotiated throughout the immigrant adjustment period.

Thus, one question that begs itself is, how does the presence of a larger community aid in the assimilation process of immigrants? The sociological literature offers an explanation. Starting from the pioneering work of Gordon (1964), he emphasizes that 'one integrates from a position of strength, not from a position of weakness and that strength stems from having tightly knit social networks or community.[58] This is because immigrants face many disadvantages imposed by the host society and by establishing group solidarity; they can respond successfully (Jean et al. 2001). This is essentially, the segmented assimilation theory. This theory views ethnic networks as a form of social capital which influences individual's adaptation via support as well as control. Being part of a network and reaping the benefits of this network may offer a route to upward assimilation. In other words, ethnic communities provide the immigrants with a safety net allowing them to adapt react and assimilate into various parts of the host society. Another explanation offered by Jean et al. (2001) is that immigrant groups that make up a large part of the total population in the host country have higher rates of integration because they feel they are part of their own culture and also the larger society.

In addition, if immigrants depart from their traditional cultural framework too rapidly, and are thrown into an unfamiliar host society, there is a great chance of social disorganization, negatively impacting their ability to assimilate. Thus, they require their community to provide them with psychological satisfaction, security and knowledge- especially for newly arrived immigrants- in order to confidently interact and assimilate into the host society.

The basis of this idea is that immigrant communities and the host society should not be viewed as two separate distinct entities but rather as integral parts of the host society. Immigrant communities may retain some cultural behaviours, which aid in the assimilation process and for the rest, they may be adapted or altered etc. to fit into mainstream society. Also, it is possible that an individual has an integrated identity. That is, they still identify strongly with their ethnic identity whilst also identifying with the new host society.

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[58] Other studies that echo the same idea include Portes (1995), Portes and Schauffler (1994), Rumbaut (1996), Suarez-Orozco (1989) and Zhou and Bankston (1994).

Adding the past stock at 30 years ago produces interesting results. From column 3 in table 3.6, the present stock has now changed sign and is negative whilst the past stock is positive. Both variables are significant with childcare hours. The remaining results for the other variables reported have not changed. These results indicate that the community hinders the assimilation process of immigrants. As the number of immigrants from a given origin increase in size; immigrants carry out less childcare, pushing the behaviour of immigrants further away from the Canadians. This finding is the opposite of what we found before.

As for the past stock variable, increases in the history of an immigrant group in Canada 30 years ago causes female immigrants to assimilate towards female natives by increasing the number of hours per week they dedicate to childcare.

However, cultural differences may impact the results so we control for this with the introduction of country of birth dummies in columns 4 and 5 of table 3.6. In total there are 10 dummies[59] and the reference group is Canada. We strongly believe that culture has a significant role to play in the decision making process of non-market activities. How much time to spend on a given non-market activity is likely to be shaped by one's beliefs and opinions stemming from his/her culture or background.

As before, the present stock in column 4 is positive and significant and remains this way even with the introduction of the past stock. This suggests that what was leading the present stock to be negative in column 3 is certain immigrant countries that drove down assimilation because they actually do less childcare hours. We came to this conclusion because for many of the country of birth dummies, they were negative and significant (please see table 3.37 in appendix 3). Specifically, it is the parents from Poland, Portugal, China, Hong Kong, Philippines and India. Thus, controlling for culture is vital.

[59] The 10 countries of birth dummies are for the U.S., the UK, Germany, Poland, Italy, Portugal, China, Hong Kong, Philippines and finally, India. Each respondent gets a value of 0 if they are not from that particular country and a value of 1 if they are.

As for the past stock, it is negative and significant. One reason may be that as the presence of a given ethnic group becomes more prevalent in the host society over time[60] (represented by the past stock), you are constantly bombarding the host society with immigrants. This, according to Zhou (1997) acts as a major roadblock to assimilation.

It is worth noting that the past and present stocks work in opposite directions. For men, we see a similar pattern in the results to that of females regarding the present and past stock. The last column in tables 3.6 and 3.7 will be referred to as our benchmark result throughout this paper. In appendix section 3, i have included more of an explanation to the changes witnessed concerning past and present stock.

3.6 EXTENSIONS

3.6.1 Additional past lags

We now introduce the past stock at different years, specifically at 70 and 100 years before the Census date (please see table 3.8 and 3.9). This is so we test whether it is recent or distant past immigration history that impacts assimilation the greatest. Column 1 shows the benchmark results when the past stock is at 30 years ago. Columns 2 and 3 show the results when the past stock is at 70 and 100 years ago, respectively. Finally, the last column shows the results when all the different past stocks are all included. Table 3.8 presents the results for females and table 3.9 for males.

The first thing to note is that the introduction of the past stock at different points in time does not alter the original results, namely the present stock remains positive and significant and the past stock negative and significant. What is of interest is that the closer the past stock is to the present, the greater the impact on the assimilation process.

[60] For example, due to increased immigration flows.

This tells us a few things. Firstly, it is recent immigrants in Canada (those that have been in Canada for 30 years and less) that greatly impact the assimilation of current immigrants. In other words, the further we go back in time the less impact the past history of communities has on the assimilation process.

Table 3.8 Coefficient estimates from Tobit models of childcare time use for past stocks at 30, 70 and 100 years ago

VARIABLES	Endogenous variable: Childcare hours spent by Females			
Age	3.03*** [0.08]	3.03*** [0.08]	3.03*** [0.08]	3.03*** [0.08]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]
Immigrant dummy	-5.90** [2.58]	-7.71*** [2.48]	-7.95*** [2.63]	-9.54*** [2.94]
Number of children	1.76*** [0.11]	1.76*** [0.11]	1.75*** [0.11]	1.76*** [0.11]
Child age 0-1	20.94*** [0.35]	20.95*** [0.35]	20.94*** [0.35]	20.95*** [0.35]
Child age 2-5	21.71*** [0.23]	21.71*** [0.23]	21.70*** [0.23]	21.70*** [0.23]
Child age 6-14	14.35*** [0.23]	14.35*** [0.23]	14.35*** [0.23]	14.33*** [0.23]
Child age 15-24	-13.54*** [0.22]	-13.55*** [0.21]	-13.54*** [0.21]	-13.56*** [0.21]
Marriage dummy	4.39*** [0.22]	4.39*** [0.22]	4.38*** [0.22]	4.40*** [0.22]
Primary maintainer dummy	3.33*** [0.21]	3.33*** [0.21]	3.34*** [0.21]	3.33*** [0.21]
Other adults in household	-4.55*** [0.29]	-4.55*** [0.29]	-4.53*** [0.29]	-4.55*** [0.29]
High school education	-0.04 [0.28]	-0.04 [0.28]	-0.02 [0.28]	-0.05 [0.28]
Some college education	1.51*** [0.36]	1.52*** [0.36]	1.52*** [0.36]	1.51*** [0.36]
College education	1.25*** [0.28]	1.24*** [0.28]	1.26*** [0.28]	1.23*** [0.28]
Bachelor degree education	-0.49 [0.32]	-0.49 [0.32]	-0.47 [0.32]	-0.51 [0.31]
Masters degree education	-1.80*** [0.53]	-1.80*** [0.53]	-1.78*** [0.53]	-1.81*** [0.53]
PhD degree	-1.53 [1.39]	-1.53 [1.39]	-1.54 [1.39]	-1.53 [1.39]
Log hourly wage (actual or predicted)	1.61*** [0.05]	1.61*** [0.05]	1.61*** [0.05]	1.61*** [0.05]
Non labour income	-0.03*** [0.003]	-0.03*** [0.003]	-0.03*** [0.003]	-0.03*** [0.003]
Present Stock	15.14*** [2.56]	11.45*** [2.05]	8.08*** [2.03]	15.52*** [3.54]
Years since migration	0.13** [0.06]	0.14** [0.06]	0.11* [0.06]	0.15** [0.06]
Years since migration squared	-0.0005 [0.001]	-0.0005 [0.001]	0.00009 [0.001]	-0.0007 [0.001]
Past stock at 30 years ago	-11.67*** [2.42]	--	--	-15.97* [8.88]
Past stock at 70 years ago	--	-5.12*** [1.07]	--	-4.76 [3.83]
Past stock at 100 years ago	--	--	-2.21* [1.13]	8.22*** [2.10]
Pseudo R^2	0.06			
No.Obs	118126			

Table 3.8 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. - - indicates result not required.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.9 Coefficient estimates from Tobit models of childcare time use for past stocks at 30, 70 and 100 years ago

VARIABLES	Endogenous variable: Childcare hours spent by Males			
Age	3.06*** [0.06]	3.06*** [0.06]	3.06*** [0.06]	3.06*** [0.06]
Age squared	-0.03*** [0.0007]	-0.03*** [0.0007]	-0.03*** [0.0007]	-0.03*** [0.0007]
Immigrant dummy	-5.03** [2.11]	-6.42*** [2.01]	-6.32*** [2.13]	-5.07** [2.44]
Number of children	0.26*** [0.09]	0.26*** [0.09]	0.26*** [0.09]	0.26*** [0.09]
Child age 0-1	10.64*** [0.23]	10.64*** [0.23]	10.64*** [0.23]	10.64*** [0.23]
Child age 2-5	12.95*** [0.18]	12.95*** [0.18]	12.94*** [0.18]	12.95*** [0.18]
Child age 6-14	10.79*** [0.18]	10.79*** [0.18]	10.79*** [0.18]	10.79*** [0.18]
Child age 15-24	-10.98*** [0.17]	-10.98*** [0.17]	-10.98*** [0.17]	-10.98*** [0.17]
Marriage dummy	1.35*** [0.19]	1.35*** [0.19]	1.35*** [0.19]	1.36*** [0.19]
Primary maintainer dummy	-0.62*** [0.17]	-0.63*** [0.17]	-0.63*** [0.17]	-0.62*** [0.17]
Other adults in household	-5.45*** [0.33]	-5.45*** [0.33]	-5.44*** [0.33]	-5.46*** [0.33]
High school education	0.39* [0.22]	0.39* [0.22]	0.40* [0.22]	0.39* [0.22]
Some college education	0.55** [0.25]	0.56** [0.25]	0.56** [0.25]	0.56** [0.25]
College education	1.44*** [0.23]	1.45*** [0.23]	1.46*** [0.23]	1.44*** [0.23]
Bachelor degree education	-0.14 [0.25]	-0.15 [0.25]	-0.13 [0.25]	-0.14 [0.25]
Masters degree education	-0.93** [0.37]	-0.92** [0.37]	-0.91** [0.37]	-0.92** [0.37]
PhD degree	1.05 [0.72]	1.05 [0.72]	1.04 [0.72]	1.05 [0.72]
Log hourly wage (actual or predicted)	0.62*** [0.05]	0.62*** [0.05]	0.62*** [0.05]	0.62*** [0.05]
Non labour income	-0.00002 [0.001]	-0.0003 [0.001]	-0.00007 [0.001]	0.00002 [0.001]
Years since migration	-0.005 [0.04]	-0.009 [0.04]	-0.02 [0.04]	0.0001 [0.04]
Years since migration squared	0.002** [0.001]	0.002*** [0.001]	0.002*** [0.001]	0.002** [0.001]
Present Stock	9.37*** [2.10]	6.73*** [1.67]	5.28*** [1.65]	11.84*** [2.81]
Past stock at 30 years ago	-6.63*** [1.89]	--	--	-16.17** [6.59]
Past stock at 70 years ago	--	-2.50*** [0.83]	--	1.70 [2.92]
Past stock at 100 years ago	--	--	-1.35* [0.83]	3.08** [1.52]
Pseudo R^2	0.04			
No.Obs	115800			

Table 3.9 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. - - indicates result not required.*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

One possible explanation is that given the average age of immigrants in our sample is 43 years for men and 41 years for females, it is more likely that the present stock is composed of the same individuals representing the past stock at 30 years ago. Also, the characteristics of a given origin group may have been changing over time and consequently, it is unlikely that the size of the group 100 years ago has a fundamental effect. In addition, Hatton and Leigh (2011) argue that individual and institutional memories fade over time and therefore one is more likely to be affected by the culture, traditions and ideas of recent immigrants than distant immigrants. The same pattern in results is seen for fathers in table 3.9.

3.6.2 Ethnic Origin

Another extension is to control for ethnicity. This is because despite controlling for place of birth it may be that some native Canadians have different ethnicities. The intuition behind this is that some native Canadians may have behaviours depending on their ethnicity and their behaviour may potentially be similar to that of immigrants from the same ethnicity or background. Indeed, according to our raw data, 71.82% of native Canadians report a Canadian ethnicity. The remaining natives report other ethnicities. The three main other ethnicities reported are French, British and Italian. In total we employ 15 ethnicity dummies with Canadian being the reference group.[61] The results are presented in tables 3.10 and 3.11, with column 1 representing our benchmark results.

From the tables below, when we control only for ethnicity, excluding country of birth (see column 2), the results for the present and past stock are similar to those obtained when

[61] The ethnicities we consider excluding Canadian are: French, British, Caribbean, Latin America, Western Europe, Northern Europe, Eastern Europe, Southern Europe, Jewish, Arabic, West Asia, South Asia and finally, East and Southeast Asia.

we do not control for country of birth or ethnicity.[62] This implies that ethnicity is not a good indicator to use in order to control for culture and that our original results are robust to the inclusion of the ethnic dummies. [63]

When we control for both ethnicity and country of birth, we find mothers from the following ethnic backgrounds (British, French, Western and Northern Europe and West Asia) to dedicate significantly more time to childcare than mothers of Canadian ethnicity. On the other hand, mothers of East and Southeast Asian ethnicity spend less time on childcare. It may be that some non-white ethnicities spend less time on childcare because they rely more on relatives as caregivers. For fathers, the results are different. We find only British and Western European immigrants to spend more time on childcare than Canadian ethnic fathers. South European and Jewish fathers spend less time.[64]

[62] See table 3.6 at the start of the paper.

[63] See column 3 from tables 3.6 and 3.7 at the start of the paper. Country of birth is a better indicator.

[64] Only the ethnicities that are significant are mentioned.

Table 3.10 Coefficient estimates from Tobit models of childcare time use with controls for ethnicity

VARIABLES	Endogenous variable: Childcare hours spent by females		
Age	3.03*** [0.08]	3.09*** [0.08]	3.08*** [0.08]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]
Immigrant dummy	-5.91** [2.58]	-8.09*** [0.98]	-5.18** [2.71]
Number of children	1.76*** [0.11]	1.72*** [0.12]	1.72*** [0.12]
Child age 0-1	20.95*** [0.35]	20.91*** [0.35]	20.92*** [0.35]
Child age 2-5	21.71*** [0.23]	21.73*** [0.24]	21.74*** [0.23]
Child age 6-14	14.34*** [0.23]	14.30*** [0.23]	14.28*** [0.23]
Child age 15-24	-13.54*** [0.22]	-13.60*** [0.22]	-13.59*** [0.21]
Marriage dummy	4.39*** [0.22]	3.84*** [0.22]	3.88*** [0.22]
Primary maintainer dummy	3.33*** [0.21]	3.22*** [0.21]	3.21*** [0.21]
Other adults in household	-4.55*** [0.29]	-4.20*** [0.29]	-4.21*** [0.29]
High school education	-0.03 [0.28]	-0.16 [0.28]	-0.23 [0.28]
Some college education	1.51*** [0.36]	1.61*** [0.36]	1.56*** [0.36]
College education	1.25*** [0.28]	0.99*** [0.28]	0.92*** [0.28]
Bachelor degree education	-0.49 [0.32]	-0.75** [0.32]	-0.87** [0.32]
Masters degree education	-1.80*** [0.53]	-1.87*** [0.53]	-1.97*** [0.53]
PhD degree	-1.52 [1.39]	-1.84 [1.43]	-2.04 [1.43]
Log hourly wage (actual or predicted)	1.61*** [0.05]	1.61*** [0.05]	1.60*** [0.05]
Non labour income	-0.03*** [0.003]	-0.03*** [0.003]	-0.03*** [0.003]
Years since migration	0.13** [0.06]	0.15* [0.06]	0.17** [0.06]
Years since migration squared	-0.0005 [0.001]	-0.0008 [0.001]	-0.001 [0.001]
Present Stock	15.14*** [2.56]	-2.78*** [1.04]	14.54*** [2.61]
Past stock at 30 years ago	-11.67*** [2.42]	3.39*** [0.61]	-11.36*** [2.46]
Ethnicity dummies	No	Yes	Yes
Place of birth dummies	Yes	No	Yes
Pseudo R^2	0.06	0.07	0.07
No.Obs	118126	112418	112418

Table 3.10 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 countries of birth dummies and 15 ethnicity dummies not reported. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.11 Coefficient estimates from Tobit models of childcare time use with controls for ethnicity

VARIABLES	Endogenous variable: Childcare hours spent by males		
Age	3.06*** [0.06]	3.08*** [0.06]	3.08*** [0.06]
Age squared	-0.04*** [0.007]	-0.03*** [0.0008]	-0.03*** [0.0008]
Immigrant dummy	-5.03** [2.11]	-5.07** [0.82]	-5.05** [2.19]
Number of children	0.26*** [0.09]	0.30*** [0.10]	0.28*** [0.10]
Child age 0-1	10.64*** [0.23]	10.48*** [0.24]	10.48*** [0.23]
Child age 2-5	12.95*** [0.18]	13.10*** [0.18]	13.11*** [0.18]
Child age 6-14	10.79*** [0.18]	10.77*** [0.19]	10.77*** [0.19]
Child age 15-24	-10.98*** [0.17]	-10.92*** [0.18]	-10.92*** [0.18]
Marriage dummy	1.35*** [0.19]	1.35*** [0.21]	1.38*** [0.20]
Primary maintainer dummy	-0.63*** [0.17]	-0.67*** [0.18]	-0.65*** [0.18]
Other adults in household	-5.45*** [0.33]	-5.10*** [0.35]	-5.09*** [0.35]
High school education	0.39* [0.22]	0.43* [0.23]	0.35 [0.23]
Some college education	0.55** [0.25]	0.54** [0.25]	0.47* [0.25]
College education	1.44*** [0.23]	1.53*** [0.24]	1.43*** [0.24]
Bachelor degree education	-0.14 [0.25]	0.04 [0.25]	-0.07 [0.25]
Masters degree education	-0.93** [0.37]	-0.63 [0.38]	-0.72* [0.38]
PhD degree	1.04 [0.72]	0.96 [0.75]	1.00 [0.74]
Log hourly wage (actual or predicted)	0.62*** [0.05]	0.63*** [0.05]	0.63*** [0.06]
Non labour income	-0.00002 [0.002]	0.0003 [0.001]	0.0004 [0.001]
Years since migration	-0.006 [0.04]	0.03 [0.04]	0.06 [0.04]
Years since migration squared	0.003*** [0.001]	0.001* [0.001]	0.001 [0.001]
Present Stock	9.37*** [2.10]	-3.78*** [0.86]	9.04*** [2.14]
Past stock at 30 years ago	-6.63*** [1.89]	2.76*** [0.51]	-6.67*** [1.93]
Ethnicity dummies	No	Yes	Yes
Place of birth dummies	Yes	No	Yes
Pseudo R^2	0.04	0.04	0.04
No.Obs	115800	110336	110336

Table 3.11 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 countries of birth dummies and 15 ethnicity dummies not reported.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

3.6.3 Robustness Checks

We now present a series of robustness checks. First, we re-estimate the Tobit equation using only the individuals from our sample that report a positive wage. That is we do not estimate wages for those individuals with a zero wage and consequently they are excluded from the study. Table 3.12 presents the results with Columns 1 and 3 reporting the original benchmark results for females and males, respectively.

Results from the regression analysis using only those with wages are the same as the original results with a few changes. For females, the log hourly wage keeps its significance but changes sign to negative. Changes in the wage rate result indicate that it is paramount to control for the pseudo wage selection. Based on the suggestion that every individual has a certain income threshold to achieve, when one has a high hourly wage rate, they will need to work fewer hours and therefore have more time available to participate in childcare. This is what our original results showed. However, conditioned on those that work and have a wage, they actually spend less time on childcare. Those that chose to work are the high-income individuals. When lower wage individuals are not included in the sample, a higher wage is associated with lower childcare hours. Once the low wage-low childcare individuals that are not working are included in the sample, the correlation between the wage and childcare hours becomes positive.

For males, the log hourly wages becomes insignificant. This is most likely due to misspecification of the model by ignoring the endogeneity of wages as explained by Bloemen and Stancanelli (2008).[65]

[65] The importance of constructing pseudo wages for non-participating individuals is explained by Bloemen and Stancanelli (2008). They argue that earlier insignificant findings for the effects of wages might be due to misspecification of the model by ignoring the issue of endogeneity.

Table 3.12 Coefficient estimates from Tobit models of childcare time use using only individuals with a wage

VARIABLES	Endogenous variable: Childcare hours spent by both genders with a wage			
	Females		Males	
Age	3.03*** [0.08]	2.90*** [0.08]	3.06*** [0.06]	2.96*** [0.06]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.0008]	-0.04*** [0.0008]
Immigrant dummy	-5.91* [2.58]	-5.43** [2.66]	-5.04** [2.11]	-4.63** [2.12]
Number of children	1.76*** [0.11]	1.60*** [0.12]	0.26*** [0.09]	0.27*** [0.10]
Child age 0-1	20.95*** [0.35]	18.54*** [0.36]	10.64*** [0.23]	9.66*** [0.23]
Child age 2-5	21.71*** [0.23]	20.97*** [0.24]	12.95*** [0.18]	12.43*** [0.18]
Child age 6-14	14.34*** [0.23]	14.25*** [0.23]	10.79*** [0.18]	10.56*** [0.19]
Child age 15-24	-13.54*** [0.21]	-12.91*** [0.22]	-10.98*** [0.17]	-10.51*** [0.18]
Marriage dummy	4.39*** [0.22]	4.41*** [0.23]	1.35*** [0.19]	1.62*** [0.20]
Primary maintainer dummy	3.33*** [0.21]	3.34*** [0.22]	-0.63*** [0.17]	-0.72*** [0.18]
Other adults in household	-4.55*** [0.29]	-4.41*** [0.30]	-5.45*** [0.33]	-5.71*** [0.35]
High school education	-0.03 [0.28]	0.35 [0.29]	0.39* [0.22]	0.65*** [0.24]
Some college education	1.51*** [0.36]	1.78*** [0.37]	0.55** [0.25]	0.70*** [0.25]
College education	1.25*** [0.28]	1.99*** [0.29]	1.44*** [0.23]	1.85*** [0.24]
Bachelor degree education	-0.49 [0.32]	0.71** [0.33]	-0.14 [0.25]	0.44* [0.26]
Masters degree education	-1.80*** [0.53]	-0.46 [0.54]	-0.93** [0.37]	-0.29 [0.38]
PhD degree	-1.52 [1.39]	0.36 [1.40]	1.04 [0.72]	1.84** [0.73]
Actual Log hourly wage	1.61*** [0.05]	-0.22** [0.10]	0.62*** [0.05]	-0.04 [0.09]
Non labour income	-0.03*** [0.002]	-0.03*** [0.002]	-0.00002 [0.001]	-0.002 [0.002]
Years since migration	0.13* [0.06]	0.23*** [0.06]	-0.006 [0.05]	0.03 [0.04]
Years since migration squared	-0.0005 [0.001]	-0.002 [0.001]	0.002** [0.001]	0.002* [0.001]
Present Stock	15.14*** [2.56]	17.02*** [2.64]	9.37*** [2.11]	8.99*** [2.15]
Past stock at 30 years ago	-11.67*** [2.42]	-13.72*** [2.47]	-6.63*** [1.89]	-6.75*** [1.91]
Pseudo wages constructed	Yes	No	Yes	No
Pseudo R^2	0.06	0.07	0.04	0.05
No. Obs	118126	104400	225800	106417

Table 3.12 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for both females and males with wages. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes ten country of birth dummies not reported.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level

Table 3.13 shows the results for our second robustness check, that is dropping non-labour income from the model. This is due to some of the components of non-labour income depending on time allocation choices. The original results for both males and females are not affected.[66]

Also, table 3.14 checks the robustness of the results when we exclude immigrants from the U.S. We exclude American immigrants, as they are not usually viewed as a standard immigrant.[67] Once again, there is no change in the overall results.

The lack of change in the results after applying the robustness checks indicates that our original estimation results are robust to the exclusion of non-labour income and immigrants from the U.S., separately. The benchmark results with the past immigrant stock at 70 and 100 years are also robust to the exclusions.

Finally, following Bloemen and Stancanelli (2014) we included the total number of children in the household, non-labour income, relationship status, a dummy for the presence of other adults in the household, the presence of children of different ages and immigration status in the employment probit regression for when we estimated wages. Bloemen and Stancanelli (2014) argue that there is a direct and indirect relationship to human capital. The variables included in the employment but not the wage equations are thought to indirectly impact human capital and therefore the wage. For example, the presence of children in the household is likely considerably increase the amount of time one dedicates to activities such as shopping, cooking, washing up, cleaning the house (which are difficult to delegate to others). Time spent on housework and childcare duties and childcare or maternity-related breaks will indirectly depreciate the human capital of a person.

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66 Column 1 of table 3.13 shows the benchmark results.

67 From our sample, 7.45% or 2412 observations of the immigrants come from the U.S. Refer to section 3.3.2 on a complete discussion of why we exclude immigrants from the U.S.

On the other hand, a person's age, skill and education level and the unemployment rate will have a direct impact on the person's human capital, impacting their wage level directly.

However, following the examiners comment, I include the immigrant variable in both the employment and wage equations and find the coefficient of the immigration status variable to have a negative and significant correlation with wages (specifically, the coefficient on the immigrant status variable for females is -0.14 and -0.25 for males).
Re-estimating the Tobit specifications using the updates wages reveals that all the coefficients are unchanged both in terms of sign and in terms of significance. This is the case for all the three endogenous variables. This may be because the number of respondents in our sample that reported a zero wage is small.

Table 3.13 Coefficient estimates from Tobit models of childcare time use excluding non-labour income

VARIABLES	Endogenous variable: Childcare hours spent by both genders excluding non-labour income			
	Females		Males	
Age	3.03*** [0.08]	3.11*** [0.08]	3.06*** [0.06]	3.06*** [0.06]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.0008]	-0.03*** [0.0007]
Immigrant dummy	-5.91* [2.58]	-5.88** [2.58]	-5.04** [2.11]	-5.03** [2.11]
Number of children	1.76*** [0.11]	1.58*** [0.11]	0.26*** [0.09]	0.26*** [0.09]
Child age 0-1	20.95*** [0.35]	20.99*** [0.35]	10.64*** [0.23]	10.64*** [0.23]
Child age 2-5	21.71*** [0.23]	21.91*** [0.24]	12.95*** [0.18]	12.95*** [0.18]
Child age 6-14	14.34*** [0.23]	14.56*** [0.23]	10.79*** [0.18]	10.79*** [0.19]
Child age 15-24	-13.54*** [0.21]	-13.64*** [0.22]	-10.98*** [0.17]	-10.98*** [0.17]
Marriage dummy	4.39*** [0.22]	4.28*** [0.22]	1.35*** [0.19]	1.35*** [0.19]
Primary maintainer dummy	3.33*** [0.21]	3.72*** [0.21]	-0.63*** [0.17]	-0.62*** [0.17]
Other adults in household	-4.55*** [0.29]	-5.37*** [0.28]	-5.45*** [0.33]	-5.45*** [0.33]
High school education	-0.03 [0.28]	-0.13 [0.28]	0.39* [0.22]	0.39* [0.22]
Some college education	1.51*** [0.36]	1.49*** [0.36]	0.55** [0.25]	0.55** [0.25]
College education	1.25*** [0.28]	1.14*** [0.28]	1.44*** [0.23]	1.44*** [0.23]
Bachelor degree education	-0.49 [0.32]	-0.66 [0.32]	-0.14 [0.25]	-0.14 [0.25]
Masters degree education	-1.80*** [0.53]	-1.96*** [0.53]	-0.93** [0.37]	-0.93** [0.37]
PhD degree	-1.52 [1.39]	-1.62 [1.39]	1.04 [0.72]	1.04 [0.73]
Log hourly wage (actual or predicted)	1.61*** [0.05]	1.61*** [0.05]	0.62*** [0.05]	0.62*** [0.05]
Years since migration	0.13* [0.06]	0.12** [0.06]	-0.006 [0.05]	-0.006 [0.04]
Years since migration squared	-0.0005 [0.001]	-0.0002 [0.001]	0.002** [0.001]	0.003** [0.001]
Present Stock	15.14*** [2.56]	15.16*** [2.56]	9.37*** [2.11]	9.37*** [2.11]
Past stock at 30 years ago	-11.67*** [2.42]	-11.62*** [2.42]	-6.63*** [1.89]	-6.63*** [1.89]
Pseudo R^2	0.06	0.07	0.04	0.05
No.Obs	118126	118127	115800	115801

Table 3.13 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for both females and males excluding non-labour income. Estimated using data from the 2001 and 2006 Canadian Census. The hourly wage is measured in Canadian dollars. Regression also includes ten countries of birth dummies not reported.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.14 Coefficient estimates from Tobit models of childcare time use excluding immigrants from the United States

VARIABLES	Endogenous variable: Childcare hours spent by both genders excluding immigrants from the United States			
	Females		Males	
Age	3.03*** [0.08]	3.05*** [0.08]	3.06*** [0.06]	3.08*** [0.06]
Age squared	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.0008]	-0.03*** [0.0008]
Immigrant dummy	-5.91* [2.58]	-8.63*** [2.92]	-5.04** [2.11]	-6.68*** [2.43]
Number of children	1.76*** [0.11]	1.77*** [0.11]	0.26*** [0.09]	0.27*** [0.09]
Child age 0-1	20.95*** [0.35]	20.91*** [0.35]	10.64*** [0.23]	10.64*** [0.23]
Child age 2-5	21.71*** [0.23]	21.68*** [0.24]	12.95*** [0.18]	12.97*** [0.18]
Child age 6-14	14.34*** [0.23]	14.31*** [0.23]	10.79*** [0.18]	10.79*** [0.19]
Child age 15-24	-13.54*** [0.21]	-13.56*** [0.22]	-10.98*** [0.17]	-10.95*** [0.18]
Marriage dummy	4.39*** [0.22]	4.40*** [0.22]	1.35*** [0.19]	1.36*** [0.19]
Primary maintainer dummy	3.33*** [0.21]	3.31*** [0.22]	-0.63*** [0.17]	-0.64*** [0.17]
Other adults in household	-4.55*** [0.29]	-4.57*** [0.29]	-5.45*** [0.33]	-5.48*** [0.34]
High school education	-0.03 [0.28]	-0.05 [0.28]	0.39* [0.22]	0.41* [0.23]
Some college education	1.51*** [0.36]	1.50*** [0.36]	0.55** [0.25]	0.53** [0.25]
College education	1.25*** [0.28]	1.24*** [0.28]	1.44*** [0.23]	1.43*** [0.23]
Bachelor degree education	-0.49 [0.32]	-0.51 [0.32]	-0.14 [0.25]	-0.15 [0.25]
Masters degree education	-1.80*** [0.53]	-1.74*** [0.54]	-0.93** [0.37]	-0.95** [0.38]
PhD degree	-1.52 [1.39]	-1.59 [1.45]	1.04 [0.72]	0.81 [0.75]
Log hourly wage (actual or predicted)	1.61*** [0.05]	1.62*** [0.05]	0.62*** [0.05]	0.62*** [0.05]
Non labour income	-0.03*** [0.002]	-0.03*** [0.003]	-0.00002 [0.001]	-0.0002 [0.001]
Years since migration	0.13* [0.06]	0.15** [0.06]	-0.006 [0.05]	-0.003 [0.04]
Years since migration squared	-0.0005 [0.001]	-0.0005 [0.001]	0.002** [0.001]	0.003** [0.001]
Present Stock	15.14*** [2.56]	14.47*** [2.59]	9.37*** [2.11]	8.72*** [2.13]
Past stock at 30 years ago	-11.67*** [2.42]	-11.01*** [2.47]	-6.63*** [1.89]	-5.85*** [1.93]
Pseudo R^2	0.06	0.07	0.04	0.05
No.Obs	118126	116833	115800	114720

Table 3.14 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for both females and males excluding immigrants from the United States. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes ten countries of birth dummies not reported.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

3.6.4 Ordered Probit Specification

As an additional check, we re-estimate the model using an Ordered Probit for childcare hours. Coefficient estimates and standard errors from the Ordered Probit models of time use are reported in tables 3.15 and 3.16. This estimation technique is favored as a robustness check because our dependent variable is not continuous but categorical and ordered. Results are compared to those of the Tobit model reported in tables 3.8 and 3.9 for mothers and fathers, respectively.

With an ordered probit specification, most of the coefficients are unchanged both in terms of sign and in terms of their significance. For example, we still find immigrant parents to spend less time on childcare duties compared to Canadian parents and that with time mothers spend greater time on childcare duties. For fathers, the years since migration has no impact on childcare hours. The coefficient on the present stock is positive and significant to childcare hours for mothers and fathers. As the number of immigrants from a given origin group increase in size in Canada, immigrants from that group carry out more childcare duties and since we find immigrants to spend less time on childcare compared to natives in the first instance, an increase in their childcare hours would indicate assimilation. We also find the past stock to have a negative and significant impact with childcare hours and the closer of the past stock is to the present, the greater the impact on the assimilation process.

An exception is the coefficient on bachelor degree, which reverses sign and becomes significant. This implies a mother that has a bachelor degree spends greater time with her children than an uneducated mother. This result agrees with that in the literature (see for example, Bloemen et al. 2010, Craig 2006 and Baxter and Hayes 2007). The coefficient on the Master's degree dummy loses significance and the coefficient on high school and PhD degree dummies reverse sign but still remain insignificant.

For fathers, a few of the coefficients (non-labour income and the primary maintainer dummy) lose their significance in the ordered probit models, but none reverse sign. Also, the bachelor and PhD degree dummies gain significance suggesting a positive correlation exist between the education level of a parent and the number of hours spent on childcare per week. Finally, the coefficient on the years since migration reverses sign (but still remains insignificant).

The similarity of the results across the alternative specifications suggests that our results are robust and that the restrictions of the Tobit model are not unduly altering our findings.

Table 3.15 Coefficient estimates from Ordered Probit models of childcare time use

VARIABLES	Endogenous variable: Childcare hours spent by females			
Age	0.14*** [0.003]	0.14*** [0.003]	0.14*** [0.003]	0.14*** [0.003]
Age squared	-0.002*** [0.00004]	-0.002*** [0.00004]	-0.002*** [0.00004]	-0.002*** [0.00004]
Immigrant dummy	-0.21* [0.09]	-0.28*** [0.09]	-0.29*** [0.09]	-0.36*** [0.11]
Number of children	0.069*** [0.004]	0.07*** [0.004]	0.069*** [0.004]	0.07*** [0.004]
Child age 0-1	0.81*** [0.01]	0.81*** [0.01]	0.81*** [0.01]	0.81*** [0.01]
Child age 2-5	0.86*** [0.009]	0.86*** [0.009]	0.86*** [0.009]	0.86*** [0.009]
Child age 6-14	0.63*** [0.009]	0.63*** [0.008]	0.63*** [0.008]	0.63*** [0.008]
Child age 15-24	-0.56*** [0.008]	-0.56*** [0.008]	-0.56*** [0.008]	-0.56*** [0.008]
Marriage dummy	0.15*** [0.008]	0.15*** [0.008]	0.15*** [0.009]	0.15*** [0.008]
Primary maintainer dummy	0.12*** [0.008]	0.12*** [0.008]	0.12*** [0.008]	0.12*** [0.008]
Other adults in household	-0.14*** [0.01]	-0.14*** [0.01]	-0.14*** [0.01]	-0.14*** [0.01]
High school education	0.01 [0.01]	0.01 [0.01]	0.01 [0.01]	0.01 [0.01]
Some college education	0.08*** [0.01]	0.07*** [0.01]	0.08*** [0.01]	0.08*** [0.01]
College education	0.07*** [0.01]	0.07*** [0.01]	0.07*** [0.01]	0.07*** [0.01]
Bachelor degree education	0.03* [0.01]	0.03* [0.01]	0.03*** [0.01]	0.03* [0.01]
Masters degree education	-0.002 [0.02]	-0.002 [0.02]	-0.001 [0.02]	-0.002 [0.02]
PhD degree	0.02 [0.05]	0.01 [0.05]	0.016 [0.05]	0.01 [0.05]
Log hourly wage (actual or Predicted)	0.05*** [0.002]	0.05*** [0.002]	0.05*** [0.002]	0.05*** [0.002]
Non labour income	-0.001*** [0.0001]	-0.001*** [0.0001]	-0.001*** [0.0001]	-0.001*** [0.0001]
Years since migration	0.005** [0.002]	0.005** [0.002]	0.004 [0.002]	0.005* [0.002]
Years since migration Squared	0.0000063 [0.00005]	-0.0000007 [0.00005]	0.00002 [0.00005]	-0.00002 [0.00005]
Present Stock	0.62*** [0.09]	0.47*** [0.07]	0.22*** [0.07]	0.61*** [0.13]
Past stock at 30 years ago	-0.48*** [0.09]	--	--	-0.56* [0.33]
Past stock at 70 years ago	--	-0.21*** [0.04]	--	-0.21 [0.14]
Past stock at 100 years ago	--	--	-0.09* [0.04]	0.32*** [0.07]
Pseudo R-squared	0.14			
No. Obs	118126			

Table 3.15 reports the coefficient estimates and standard errors in parenthesis from Ordered Probit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * significant at the 10% level.

Table 3.16 Coefficient estimates from Ordered Probit models of childcare time use

VARIABLES	Endogenous variable: Childcare hours spent by Males			
Age	0.16*** [0.002]	0.16*** [0.002]	0.16*** [0.002]	0.16*** [0.002]
Age squared	-0.002*** [0.00004]	-0.002*** [0.00004]	-0.002*** [0.00004]	-0.002*** [0.00004]
Immigrant dummy	-0.24* [0.09]	-0.31*** [0.09]	-0.31*** [0.09]	-0.27** [0.11]
Number of children	0.01*** [0.004]	0.01*** [0.004]	0.01*** [0.004]	0.02*** [0.004]
Child age 0-1	0.56*** [0.01]	0.56*** [0.01]	0.56*** [0.01]	0.56*** [0.01]
Child age 2-5	0.66*** [0.008]	0.66*** [0.008]	0.66*** [0.008]	0.66*** [0.008]
Child age 6-14	0.58*** [0.008]	0.58*** [0.008]	0.58*** [0.008]	0.58*** [0.008]
Child age 15-24	-0.57*** [0.008]	-0.57*** [0.008]	-0.57*** [0.008]	-0.57*** [0.008]
Marriage dummy	0.05*** [0.008]	0.05*** [0.008]	0.06*** [0.008]	0.06*** [0.008]
Primary maintainer dummy	-0.005 [0.008]	-0.005 [0.008]	-0.005 [0.008]	-0.005 [0.008]
Other adults in household	-0.21*** [0.01]	-0.21*** [0.01]	-0.21*** [0.01]	-0.21*** [0.01]
High school education	0.03*** [0.01]	0.03*** [0.01]	0.03*** [0.01]	0.04*** [0.01]
Some college education	0.04*** [0.01]	0.05*** [0.01]	0.05*** [0.01]	0.05*** [0.01]
College education	0.11*** [0.01]	0.11*** [0.01]	0.11*** [0.01]	0.11*** [0.01]
Bachelor degree education	0.06*** [0.01]	0.06*** [0.01]	0.06*** [0.01]	0.06*** [0.01]
Masters degree education	0.04*** [0.01]	0.04*** [0.01]	0.05*** [0.01]	0.04*** [0.01]
PhD degree	0.13*** [0.03]	0.13*** [0.03]	0.13*** [0.03]	0.13*** [0.03]
Log hourly wage (actual or Predicted)	0.02*** [0.002]	0.01*** [0.002]	0.02*** [0.002]	0.01*** [0.002]
Non labour income	-0.0002*** [0.00007]	-0.0002*** [0.00007]	-0.0002*** [0.00007]	-0.0002*** [0.00007]
Years since migration	0.0002 [0.002]	0.00006 [0.002]	-0.0006 [0.002]	0.0005 [0.002]
Years since migration Squared	0.0001* [0.00005]	0.0001* [0.00004]	0.0001*** [0.00005]	0.0001* [0.00005]
Present Stock	0.51*** [0.09]	0.37*** [0.07]	0.29*** [0.07]	0.61*** [0.13]
Past stock at 30 years ago	-0.34*** [0.08]	--	--	-0.74* [0.29]
Past stock at 70 years ago	--	-0.14*** [0.03]	--	0.03 [0.13]
Past stock at 100 years ago	--	--	-0.07* [0.03]	0.17* [0.06]
Pseudo R-squared	0.12			
No. Obs	115800			

Table 3.16 reports the coefficient estimates and standard errors in parenthesis from Ordered Probit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * significant at the 10% level.

OLS Estimation Results

Because the Census collects the time use data over a reference period of one week[68] we also estimate a linear specification for childcare hours (see tables 3.40 and 3.41 in appendix 3). This implies to interpreting the zeros in the activity records as due to infrequency.

The original results are reported in tables 3.8 and 3.9 for mothers and fathers, respectively. For mothers, the results from the OLS regression are similar to the original results obtained via the Tobit model. The only significant change is that the bachelor degree dummy is now negative and significant.

For fathers, a few changes are witnessed. Firstly, the total number of children becomes negative and insignificant. Secondly, we witness changes in education. High school and college education lose significance. This is replaced by bachelor degree having a significant negative effect on the number of hours fathers dedicate per week towards childcare. Thus, it seems that fathers with higher education spend less time with their children. This is possibly because they spend greater amount of time at work and less time at home to spend with their children. Thirdly, non-labour income has a positive and significant effect on childcare hours.[69] Since non-labour income includes the earnings of the respondent's partner, it seems that increases in the earnings of the wife, lead to husbands increasing the number of hours they spend on childcare. This finding is similar to that obtained by Bloemen and Stancanelli (2014). This is perhaps due to the wife having greater bargaining power within the household (papers on bargaining power within the household include, Browning et al. 1994; Browning and Chiappori 1998). Finally the coefficient size of the variables is much smaller in the OLS model compared to the Tobit model for the two regressions.

[68] The reference period is the week prior to Census day.

[69] In the tobit model, non-labour income was negative but insignificant.

We also employ a more refined measurement of childcare hours-for the top-coded 60 hours- using the full/part time employment classification in the data set. We equate full and part time employment to mean working 40 and 20 hours per week, respectively.[70] We also assume that one sleeps a reasonable 56 hours per week and given that there are 168 hours in a week, we are able to compute a measure of the exact number of hours a parent spends on childcare for those individuals that report 60 plus hours. For full time workers it is 72 hours per week and for part time workers it is 92 hours. Overall, the results are the same as the OLS results when 60 hours is used instead.

3.6.5 Results for time spent on other non-market activities

We now turn to other types of non-market activities, housework and looking after the elderly, which as shown by Kimmel and Connelly (2007) may have determinants different from that of childcare. Thus, in this section we check whether the decrease in childcare time among immigrants is a result of the given activity or whether it is simply an immigrant phenomenon. We consider both housework and looking after the elderly.

As in the previous section a Tobit model is used followed by a linear specification model[71] but first we pursue the time-use literature on housework and looking after the elderly.

3.6.6 Time use literature on housework and looking after the elderly

The literature on the allocation of time use within a household production framework is rich[72] however; the literature on whether for these non-market activities immigrant behaviour

[70] This is due to Statistics Canada and the Ontario government defining full time employment as 30 or more hours per week.

[71] The results for the OLS regressions can be found in appendix section 3; see tables 3.21, 3.22, 3.23 and 3.24

is similar to the behaviour of natives is scarce and limited. Starting with Beckett and Smith (1981) who looked at gender differences in housework time accounting for ethnicity. They found that ethnic minorities do more housework than 'whites'. Similarly, using US data, Shelton and John (1993), found Hispanic husbands did more housework than white husbands.

More recently, Sousa-Poza et al. (2001), finds that foreign women spend more time on housework than native Swiss women. However, Kimmel and Connelly (2007) find immigrant women to dedicate less time on housework than female natives. They also find that an increase in the wage and non-labour income decreases overall housework time but the presence of young children increases housework time. Bloemen and Stancanelli (2014) exploited a time use data set for France and found immigration status to have no impact on the number of hours spent on housework.

Finally, Vargas (2016) finds Mexican husbands to spend more time on housework and care for household members than non-Hispanic whites.[73] He also finds that as their years of residence in the host country increase, immigrant husbands dedicate more time to housework and care for elderly members. This is due to immigrants being less labour intensive the longer they have been in the host country. For immigrant wives, the study finds that they devote more time to housework but less time to the care of elderly family members compared to native wives and as their years since migration increase, they increase their housework time and reduce the time they spend caring for elderly members. The literature on immigrant assimilation and providing care for seniors is very sparse. It is worth pointing out that the paper's mentioned main objective is not to compare behaviour by ethnicity but rather, ethnicity is one variable they include.

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[72] See for example Kooreman and Kapteyn (1987); Homan (1988); Kerkhofs (1994); Craig (2006).

[73] However, he finds that single immigrant men spend the same amount of time on housework and care for elderly members are native single men.

Our paper contributes to this literature by looking at the role one's ethnic community plays in the assimilation process of immigrants in the time spent on housework and caring for senior family members.

Due to space constraints, we present and comment only on the key analytical variables. The full set of coefficient estimates can be found in appendix section 3 (see tables 3.17, 3.18, 3.19 and 3.20).

3.6.7 Results for Housework

Table 3.25 shows immigration status to have no impact on mother's housework time per week. It is true that the immigrant dummy is negative but it is only significant in the second regression, which excludes the past stock and controls for country of birth dummies. Referring to the raw data in table 3.3, we see that the average number of hours spent on housework by both native and immigrant mothers is 21.36 and 21.10, respectively.[74] On the other hand, we find strong clear evidence that immigrant fathers spend less time on housework than comparable native fathers (see table 3.26). This finding goes in line with the main findings in the literature. Of particular interest, the immigrant dummy variable only becomes negative and significant once we control for country of birth. Prior to this, the variable is positive and only significant when we include the past stock. This implies that fathers from countries that did more housework than Canadian fathers are what were driving the immigrant dummy to be significant and positive.

Furthermore, removing the immigrant dummy from the model, we find that mothers from Germany do more housework compared to Canadian mothers. Mothers from the rest of the countries excluding-the U.S., the UK, Italy, Portugal and India (not significant) -

[74] When the years since migration and its squared variable are dropped from the model, we find the immigrant dummy to be negative and significant. This indicates that immigrant mothers do spend less time on housework duties compared to native mothers but over time these differences are ironed out.

report spending less time on housework than Canadian mothers. Interestingly, all immigrant fathers expect the ones from Poland, Portugal and the Philippines, for which the dummies lacked significance, spend less time on housework compared to Canadian fathers.[75]

The presence of children under the age of 15 increases housework hours for parents, with children between the ages of 0 and 1 increasing parent's housework time the greatest. Children between the ages of 15 and 24 reduce the amount of time parents spend on housework, possibly due to older children helping out with housework duties.

In addition, the presence of an additional child significantly increases the time one spends on housework, regardless of gender. Our result is consistent with that found by Nock and Kingston (1988). They find that mothers with larger families (greater number of children) are likely to spend more time on housework duties. This is due to the fact that they will consume more time on tasks like cooking, washing up dishes and cleaning the house, which are difficult to delegate to others. Other studies that find similar results include Homan (1988) and Kerkhofs (1994).

An increase in the log hourly wage increases the time parents spend on housework. One explanation is that the more income one has the larger their house and therefore, the more time spent on housework duties. Most of the literature suggests the opposite.[76] However, Bloemen et al. (2010), find a husband's wage to increase the time he devotes to housework on the weekend but to have no impact on the weekdays. For wives, her wage rate has no impact on the time she devotes to housework.

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[75] Please see table 3.38 in appendix section 3 for the results.

[76] Bloemen and Stancanelli (2014) find a negative and significant relationship to exist between one's wage and the time spent on housework. Similarily, Van der Lippe et at. (2017), find that the larger one's wages, the less hours of housework one undertakes. Finally, Craig (2006) actually finds wages to have no impact on the number of hours a day men and women spend on housework duties.

The non-labour income only impacts males.[77] Since non-labour income is composed of the wage of the individual's spouse, the wage rate of the wife can explain men's time allocation to housework. The higher her wage rate translated as higher non-labour income, the more housework fathers perform.[78] Our result agrees with that found by Bloemen and Stancanelli (2014). They find non-labour income to only impact positively housework time for males and not for females. One explanation is bargaining power. When females contribute more financially to the household, they are more likely to bargain their way out of housework and so the man is left to pick up her housework duties. Similarly, Bloemen et al. (2010) find that the wage of the wife to positively impact the husbands' housework time but not vice versa.

With regards to assimilation, a few points need to be mentioned. First, having already established that immigration status plays no role in housework hours for mothers, it is of no surprise that the years since migration and its squared variable are not significant.[79] For fathers, the years since migration is significantly negative to housework hours.[80] Given that immigrant fathers do less housework than comparable Canadian fathers, over time a process of negative assimilation takes place. Over time, immigrants' behaviour becomes even more different to that of natives. This finding goes against the main theory in the migration literature, in that immigrants become more similar to natives over time. This proves that not all non-market assimilation can be understood in the same manner as market assimilation.

[77] We find no impact of husbands' financial contribution on wives' housework hours.

[78] The relationship may also be the other way round. The more housework husbands undertake, the greater opportunity the wife has to earn a higher wage.

[79] The years since migration variable and its squared coefficient is significant but only when we do not control for culture. Controlling for culture renders the variables insignificant.

[80] Since the years since migration-squared coefficient is significantly positive for housework hours, we conclude that the relationship between the number of hours spent on housework by immigrant fathers and length of residence in Canada is nonlinear.

Secondly, a positive and significant relationship exists between the size of the migrant's community and the hours one spends on housework duties. For immigrant fathers, this implies positive assimilation.

Finally, the past stock is negative and insignificant for both mothers and fathers.[81] The historical history of immigrant origin groups has no impact on housework hours. Thus, when it comes to the factors of assimilation, what aids this process is the current stock as opposed to the historical presence of the immigrant group.

81 The past stock is positive and significant when countries of birth dummies are not included but this is not our benchmark regression.

Table 3.25 Selected coefficient estimates from Tobit models of housework time use

	Endogenous variable: Housework hours spent by Females					
VARIABLES						
Immigrant dummy	-0.41 [0.31]	-1.29*** [0.45]	-0.48 [0.51]	-2.11 [1.41]	-1.88 [1.47]	-2.59** [1.45]
Number of children	2.45*** [0.06]	2.45*** [0.06]	2.45*** [0.06]	2.42*** [0.06]	2.42*** [0.06]	2.41*** [0.06]
Child age 0-1	3.94*** [0.19]	3.94*** [0.19]	3.93*** [0.19]	3.96*** [0.19]	3.96*** [0.19]	3.97*** [0.19]
Child age 2-5	3.72*** [0.13]	3.72*** [0.14]	3.72*** [0.14]	3.73*** [0.13]	3.73*** [0.14]	3.73*** [0.14]
Child age 6-14	1.82*** [0.13]	1.81*** [0.13]	1.82*** [0.13]	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]
Child age 15-24	-1.41*** [0.12]	-1.41*** [0.12]	-1.40*** [0.13]	-1.41*** [0.13]	-1.41*** [0.13]	-1.40*** [0.13]
Log hourly wage (actual or predicted)	0.92*** [0.03]	0.91*** [0.03]	0.92*** [0.03]	0.92*** [0.03]	0.92*** [0.03]	0.91*** [0.03]
Non labour income	0.002 [0.001]	0.002 [0.001]	0.002 [0.001]	0.001 [0.001]	0.001 [0.001]	0.002 [0.001]
Years since migration	-0.06* [0.03]	-0.06* [0.03]	-0.06** [0.03]	-0.05 [0.03]	-0.05 [0.03]	--
Years since migration squared	0.001*** [0.0007]	0.001** [0.0007]	0.001** [0.0007]	0.0005 [0.0007]	0.0005 [0.0007]	--
Present Stock	--	0.77*** [0.28]	-0.52 [0.46]	2.69*** [0.96]	3.24** [1.46]	3.71* [1.45]
Past stock at 30 years ago	--	--	0.92*** [0.26]	--	-0.68 [1.37]	-1.15 1.36]
Place of birth dummies	No	No	No	Yes	Yes	Yes
Pseudo R^2	0.009					
No.Obs	118126					

Table 3.25 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.26 Selected coefficient estimates from Tobit models of housework time use

	Endogenous variable: Housework hours spent by males				
VARIABLES					
Immigrant dummy	0.10 [0.23]	0.004 [0.35]	0.67* [0.39]	-2.75* [1.07]	-2.37** [1.41]
Number of children	0.51*** [0.05]	0.51*** [0.05]	0.51*** [0.05]	0.49*** [0.05]	0.49*** [0.05]
Child age 0-1	2.21*** [0.12]	2.12*** [0.13]	2.21*** [0.13]	2.21*** [0.13]	2.21*** [0.13]
Child age 2-5	1.68*** [0.10]	1.68*** [0.10]	1.67*** [0.10]	1.68*** [0.10]	1.68*** [0.10]
Child age 6-14	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]
Child age 15-24	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]
Log hourly wage (actual or predicted)	0.63*** [0.03]	0.63*** [0.03]	0.63*** [0.03]	0.63*** [0.03]	0.63*** [0.03]
Non labour income	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]
Years since migration	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]
Years since migration squared	0.002*** [0.0005]	0.002*** [0.0005]	0.001*** [0.0005]	0.002*** [0.0005]	0.002*** [0.0005]
Present Stock		0.08 [0.22]	-0.94*** [0.36]	3.38*** [0.72]	4.22*** [1.12]
Past stock at 30 years ago			0.71*** [0.19]		-0.97 [1.01]
Place of birth dummies	No	No	No	Yes	Yes
Pseudo R^2	0.005				
No.Obs	115800	115800	115800	115800	115800

Table 3.26 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Turning to table 3.27 and 3.28, in which we introduce different year lags for the past stock, it is clear that the past has greater impact the closer to the present but it is still insignificant for parents.

Table 3.27 Selected coefficient estimates from Tobit models of housework time use for past stocks at 30,70 and 100 years ago

VARIABLES	Endogenous variable: Housework hours spent by females			
Immigrant dummy	-1.88 [1.47]	-1.91 [1.42]	-1.92 [1.51]	-2.85* [1.68]
Number of children	2.42*** [0.06]	2.42*** [0.06]	2.42*** [0.06]	2.44*** [0.06]
Child age 0-1	3.96*** [0.19]	3.96*** [0.19]	3.94*** [0.19]	3.96*** [0.19]
Child age 2-5	3.73*** [0.14]	3.73*** [0.13]	3.73*** [0.13]	3.73*** [0.13]
Child age 6-14	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]
Child age 15-24	-1.41*** [0.13]	-1.40*** [0.12]	-1.41*** [0.12]	-1.41*** [0.12]
Predicted Log hourly wage	0.92*** [0.03]	0.92*** [0.03]	0.92*** [0.03]	0.92*** [0.03]
Non labour income	0.001 [0.001]	0.002 [0.001]	0.002 [0.001]	0.002 [0.001]
Present Stock	3.24** [1.46]	3.25*** [1.17]	2.92** [1.16]	-1.70 [2.00]
Past stock at 30 years ago	-0.68 [1.37]	--	--	4.43 [4.97]
Past stock at 70 years ago	--	-0.50 [0.60]	--	-2.69 [2.15]
Past stock at 100 years ago	--	--	-0.22 [0.64]	0.41 [1.18]
Years since migration	-0.05 [0.03]	-0.05 [0.03]	-0.05 [0.03]	-0.05 [0.03]
Years since migration squared	0.0005 [0.0007]	0.0005 [0.0007]	0.0005 [0.0007]	0.0005 [0.0007]
Pseudo R^2	0.009			
No.Obs	118126	118126	118126	118126

Table 3.27 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.28 Selected coefficient estimates from Tobit models of housework time use for past stocks at 30,70,100 years ago

	Endogenous variable: Housework hours spent by males			
VARIABLES	**MALES**			
Immigrant dummy	-2.37** [1.41]	-2.54** [1.09]	-2.16* [1.15]	-2.12 [1.30]
Number of children	0.49*** [0.05]	0.49*** [0.05]	0.49*** [0.05]	0.49*** [0.05]
Child age 0-1	2.21*** [0.12]	2.21*** [0.12]	2.21*** [0.12]	2.21*** [0.13]
Child age 2-5	1.68*** [0.10]	1.68*** [0.10]	1.68*** [0.10]	1.68*** [0.10]
Child age 6-14	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]
Child age 15-24	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]
Predicted Log hourly wage	0.63*** [0.03]	0.62*** [0.03]	0.62*** [0.03]	0.63*** [0.03]
Non labour income	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]
Present Stock	4.22*** [1.12]	3.91*** [0.89]	4.11*** [0.88]	3.92*** [1.49]
Past stock at 30 years ago	-0.97 [1.01]	--	--	0.31 [3.47]
Past stock at 70 years ago	--	-0.42 [0.44]	--	0.15 [1.54]
Past stock at 100 years ago	--	--	-0.61 [0.44]	-0.85 [0.81]
Years since migration	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]
Years since migration squared	0.002*** [0.0005]	0.002*** [0.0005]	0.002*** [0.0005]	0.002*** [0.0005]
Pseudo R^2	0.005			
No.Obs	115800	115800	115800	115800

Table 3.28 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

3.6.8 Results for looking after seniors

Finally, we focus on our final non-market activity, providing care or assistance to seniors. From tables 3.29 and 3.30, we see that immigrant parents spend less time on this activity compared to Canadian parents. It may be that immigrants have less family members near them in the host country to care for.[82]

Surprisingly, families with greater number of kids spend more time looking after senior family members.

Parents with children age 5 and under spend less time looking after senior family members. This could be because families with younger children have grandparents that are likely to be younger too and so not at the stage of needing care yet.

The presence of older children has a positive and significant impact on time spent with seniors (from 6 to14 years for mothers and 6 to 24 years for fathers). Again, as the children increase in age so do their grandparents and their need for care. Thus, parents of these children will dedicate more time looking after older family members.

The log hourly wage is only significant for females and it is positive. Increases in mother's wage rate, increases the time she spends caring for elderly family members. The reasoning for this may be similar to that of childcare in that given one needs to achieve a certain income to cover their expenses, a higher hourly wage implies less hours spent at work and therefore, more time available to dedicate to non-market activities like childcare or looking after senior family members.

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[82] Specifically, we find that mothers from India spend more time looking after elderly family members compared to Canadian mothers and those from the United States, Germany, Poland and the Philippines spend less time. Place of birth dummy variables from the remaining countries are not significant. For fathers, it is those from India and Hong Kong that spend more time looking after elderly family members compared to Canadian fathers. Fathers from the United States, Germany, Poland, Portugal and the Philippines spend less. Fathers from the remaining countries have no impact. Please see table 3.39 in appendix section 3.

For fathers, the log hourly wage has no impact on the time he spends looking after senior family members.

The Non-labour income is positive and significant for both males and females. Increases in this type of income, increase the amount parents spend looking after senior family members. This is different to the result obtained for childcare.[83] Thus, it maybe that receipt of high non-labour income frees one from having to work long hours (this is what we find for paid work) and therefore they have more time available to dedicate towards sending time with senior family members.

As for the duration of residence of immigrants has no impact on the number of hours parents spend with older family members. This may mean that the decision in the time spent with senior family members is more culturally orientated.[84]

Finally, regarding the present stock, we find weak evidence to suggest that the community aids in the assimilation process of immigrant mothers. An increase in one's ethnic community size increases the time mothers spend looking after seniors, encouraging the assimilation process. For fathers, the presence of the community has no impact.

Similarly, with regards to the past stock, it has no impact for fathers and for mothers; it has a negative and significant impact. Thus, for mothers, it is not so much the historical presence of one's community that aids the assimilation process but rather having more family or community around.

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[83] For childcare hours, we found non-labour income to have a negative impact for mothers and no impact for fathers.

[84] When the years since migration squared is dropped from the model, the years since migration coefficient is positive and significant indicating assimilation.

Table 3.29 Selected coefficient estimates from Tobit models of Senior time use

VARIABLES	Endogenous variable: Senior hours spent by Females				
Immigrant dummy	-0.68*** [0.23]	-0.53 [0.33]	-3.03*** [0.38]	-3.05*** [1.03]	-2.23** [1.09]
Number of children	0.23*** [0.04]	0.23*** [0.04]	0.24*** [0.04]	0.23*** [0.04]	0.23*** [0.04]
Child age 0-1	-1.12*** [0.16]	-1.12*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]
Child age 2-5	-0.48*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]
Child age 6-14	0.27*** [0.09]	0.27*** [0.09]	0.27*** [0.09]	0.29*** [0.09]	0.28*** [0.09]
Child age 15-24	0.02 [0.09]	0.02 [0.09]	0.01 [0.09]	0.01 [0.09]	0.01 [0.09]
Log hourly wage (actual or predicted)	0.04* [0.02]	0.03* [0.02]	0.04* [0.02]	0.04* [0.02]	0.04* [0.02]
Non labour income	0.004*** [0.001]	0.004*** [0.001]	0.005*** [0.001]	0.004*** [0.001]	0.005*** [0.001]
Years since migration	0.02 [0.02]	0.02 [0.02]	0.05** [0.02]	0.03 [0.02]	0.04 [0.02]
Present Stock	--	-0.13 [0.21]	3.81*** [0.34]	0.06 [0.70]	1.86* [1.06]
Past stock at 30 years ago	--		-2.86*** [0.19]		-2.32** [1.02]
Place of birth dummies	No	No	No	Yes	Yes
Pseudo R^2	0.01				
No.Obs	118126	118126	118126	118126	118126

Table 3.29 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.30 Selected coefficient estimates from Tobit models of Senior time use

VARIABLES	Endogenous variable: Senior hours spent by males				
Immigrant dummy	0.10 [0.21]	0.52 [0.32]	-2.13*** [0.36]	-2.35** [0.98]	-1.98* [1.06]
Number of children	0.28*** [0.04]	0.27*** [0.05]	0.28*** [0.04]	0.28*** [0.04]	0.28*** [0.04]
Child age 0-1	-0.83*** [0.12]	-0.83*** [0.12]	-0.84*** [0.12]	-0.83*** [0.12]	-0.83*** [0.12]
Child age 2-5	-0.72*** [0.09]	-0.71*** [0.09]	-0.72*** [0.09]	-0.72*** [0.09]	-0.72*** [0.09]
Child age 6-14	0.36*** [0.09]	0.36*** [0.09]	0.35*** [0.09]	0.35*** [0.09]	0.35*** [0.09]
Child age 15-24	0.17** [0.08]	0.17* [0.08]	0.16* [0.08]	0.17** [0.08]	0.17** [0.08]
Log hourly wage (actual or predicted)	0.008 [0.02]	0.009 [0.02]	0.01 [0.02]	0.02 [0.02]	0.02 [0.02]
Non labour income	0.008*** [0.0008]	0.008*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]
Years since migration	0.03* [0.02]	0.03 [0.02]	0.07*** [0.02]	0.03 [0.02]	0.03 [0.02]
Years since migration squared	-0.0005 [0.0005]	-0.0005 [0.0005]	0.00002 [0.0004]	0.0007 [0.0004]	0.0007 [0.0004]
Present Stock	--	-0.35* [0.19]	3.66*** [0.32]	0.14 [0.63]	0.82 [0.97]
Past stock at 30 years ago	--	--	-2.88*** [0.18]		-0.84 [0.92]
Place of birth dummies	No	No	No	Yes	Yes
Pseudo R^2	0.01				
No.Obs	115800	115800	115800	115800	115800

Table 3.30 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes 10 place of birth dummies not reported. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Investigating whether it is the recent or distant past that impacts the assimilation process, we employ different past stocks. Results are presented in tables 3.31 and 3.32. From table 3.31, we find that the closer the past stock is to the present, the larger the impact it has on the assimilation process. However, the impact is not linear, as we have witnessed before. The past stock at 100 years ago has a greater impact on assimilation than the past stock at 70 years ago.

Table 3.31 Selected coefficient estimates from Tobit models of senior time use for past stocks at 30,70,100 years ago

	Endogenous variable: Seniors hours spent by females			
VARIABLES	**FEMALES**			
Immigrant dummy	-2.23** [1.09]	-2.70*** [1.05]	-2.09* [1.11]	-1.18 [1.21]
Number of children	0.23*** [0.04]	0.23*** [0.04]	0.23*** [0.04]	0.23*** [0.04]
Child age 0-1	-1.10*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]
Child age 2-5	-0.47*** [0.10]	-0.47*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]
Child age 6-14	0.28*** [0.09]	0.28*** [0.09]	0.29*** [0.09]	0.28*** [0.09]
Child age 15-24	0.01 [0.09]	0.01 [0.09]	0.01 [0.09]	0.01 [0.09]
Predicted Log hourly wage	0.04* [0.02]	0.04* [0.02]	0.04* [0.02]	0.04* [0.02]
Non labour income	0.004*** [0.001]	0.004*** [0.001]	0.004*** [0.001]	0.004*** [0.001]
Present Stock	1.86* [1.06]	0.85 [0.84]	1.10 [0.83]	3.18** [1.44]
Past stock at 30 years ago	-2.32** [1.02]	--	--	-6.51* [3.52]
Past stock at 70 years ago	--	-0.76* [0.45]	--	2.76* [1.55]
Past stock at 100 years ago	--	--	-1.06** [0.46]	-0.95 [0.87]
Years since migration	0.04 [0.02]	0.03 [0.02]	0.03 [0.02]	0.03 [0.02]
Years since migration squared	0.0005 [0.0005]	0.0005 [0.0005]	0.0005 [0.0005]	0.0006 [0.0005]
Pseudo R^2	0.01			
No.Obs	118126	118126	118126	118126

Table 3.31 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.32 Selected coefficient estimates from Tobit models of senior time use for past stocks at 30,70,100 years ago

	Endogenous variable: Seniors hours spent by males			
VARIABLES	MALES			
Immigrant dummy	-1.98* [1.06]	-2.13** [1.01]	-2.55** [1.07]	-2.83** [1.19]
Number of children	0.28*** [0.04]	0.28*** [0.04]	0.28*** [0.04]	0.28*** [0.04]
Child age 0-1	-0.84*** [0.13]	-0.83*** [0.13]	-0.83*** [0.13]	-0.84*** [0.13]
Child age 2-5	-0.72*** [0.09]	-0.72*** [0.09]	-0.71*** [0.09]	-0.71*** [0.09]
Child age 6-14	0.35*** [0.09]	0.36*** [0.09]	0.36*** [0.09]	0.35*** [0.09]
Child age 15-24	0.17* [0.08]	0.17* [0.08]	0.17* [0.08]	0.17** [0.08]
Predicted Log hourly wage	0.02 [0.03]	0.02 [0.02]	0.02 [0.02]	0.01 [0.02]
Non labour income	0.007*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]
Present Stock	0.82 [0.97]	0.54 [0.76]	-0.05 [0.75]	0.91 [1.27]
Past stock at 30 years ago	-0.84 [0.92]	--	--	-1.65 [2.96]
Past stock at 70 years ago	--	-0.37 [0.41]	--	-1.23 [1.36]
Past stock at 100 years ago	--	--	0.19 [0.41]	1.82* [0.77]
Years since migration	0.03 [0.02]	0.03 [0.02]	0.03 [0.02]	0.03* [0.02]
Years since migration squared	0.0006 [0.0004]	0.0007 [0.0004]	0.0007 [0.0004]	0.0006 [0.0004]
Pseudo R^2	0.01			
No.Obs	115800	115800	115800	115800

Table 3.32 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

OLS estimation results for both housework and seniors can be found in appendix section 3 (refer to tables 3.21, 3.22, 3.23, 3.24). For housework, overall the results are the same, with the exception of a few changes. For males, some college education level becomes insignificant and the past stock at 70 years ago becomes significant. For females, non-labour income gains significance.[85]

As for seniors, the majority of the changes are in the education level. For females, high school and college degree education all lose significance. This is replaced by masters and PhD degree gaining significance. Thus, it seems that with the OLS results, only higher education has an impact on the number of hours per week spent on elders. In addition, the immigrant dummy loses significance and the present stock is positive for all the different past stocks.

For males, having a child between the ages of 15 and 24 has no impact on senior hours and high school education is no longer significant. Obtaining bachelors or master’s degree and the presence of other adults in the household now has negative and significant impact on senior hours. Also and whereas before the log hourly wage and years since migration had no impact on senior hours, with the OLS regression they are significantly positive.

It seems that the greatest difference exists between the two regression methods for caring after the elderly.

[85] Whereas before it was positive but not significant.

3.7 MARKET ACTIVITY: PAID WORK

We also run regressions with total market time as the dependent variable.[86] This is because in order to get a complete picture of individuals time use, we must study market work hours alongside non-market hours. Table 3.33 and 3.34 does exactly this.

Table 3.33 Selected coefficient estimates from Tobit models of market work time use

VARIABLES	**Endogenous variable: Paid work hours spent by females**				
Immigrant dummy	-1.57*** [0.22]	-0.87*** [0.32]	-1.33*** [0.36]	-3.97*** [1.00]	-3.32*** [1.05]
Number of children	-0.47*** [0.04]	-0.48*** [0.04]	-0.47*** [0.04]	-0.48*** [0.04]	-0.48*** [0.04]
Child age 0-1	1.03*** [0.14]	1.03*** [0.14]	1.03*** [0.14]	1.03*** [0.14]	1.03*** [0.14]
Child age 2-5	-1.35*** [0.09]	-1.35*** [0.09]	-1.35*** [0.09]	-1.35*** [0.09]	-1.34*** [0.09]
Child age 6-14	-1.37*** [0.09]	-1.37*** [0.09]	-1.37*** [0.09]	-1.37*** [0.09]	-1.37*** [0.09]
Child age 15-24	0.60*** [0.09]	0.60*** [0.09]	0.60*** [0.09]	0.61*** [0.09]	0.60*** [0.09]
Log hourly wage (actual or predicted)	-6.01*** [0.02]	-6.02*** [0.02]	-6.02*** [0.02]	-6.02*** [0.02]	-6.02*** [0.02]
Non labour income	-0.04*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]	-0.05*** [0.001]	-0.04*** [0.001]
Years since migration	0.19*** [0.02]	0.18*** [0.02]	0.19*** [0.02]	0.17*** [0.02]	0.18*** [0.02]
Years since migration squared	-0.002*** [0.0005]	-0.002*** [0.0005]	-0.002*** [0.0005]	-0.002*** [0.0005]	-0.002*** [0.0005]
Present Stock	--	-0.61*** [0.20]	0.13 [0.33]	1.14* [0.68]	2.68*** [1.04]
Past stock at 30 years ago	--		-0.52*** [0.18]		-1.92** [0.98]
Place of birth dummies	No	No	No	Yes	Yes
No.Obs	118126	118126	118126	118126	118126

Table 3.33 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

65 Since hours of market work is viewed as a decision variable, it must be treated as an endogenous variable. Our dependent variable is the number of hours a parent spends on market work per week.

Table 3.34 Selected coefficient estimates from Tobit models of market work time use

VARIABLES	Endogenous variable: Paid work hours spent by males				
Immigrant dummy	-5.21*** [0.22]	-6.27*** [0.32]	-3.28*** [0.36]	-3.08*** [0.97]	-1.65 [1.03]
Number of children	0.66*** [0.05]	0.66*** [0.05]	0.65*** [0.04]	0.64*** [0.04]	0.65*** [0.04]
Child age 0-1	-0.11 [0.11]	-0.11 [0.11]	-0.11 [0.11]	-0.09 [0.11]	-0.09 [0.11]
Child age 2-5	0.08 [0.09]	0.09 [0.09]	0.08 [0.09]	0.08 [0.09]	0.09 [0.09]
Child age 6-14	-0.89*** [0.09]	-0.89*** [0.09]	-0.88*** [0.09]	-0.87*** [0.09]	-0.87*** [0.09]
Child age 15-24	-0.06 [0.08]	-0.06 [0.09]	-0.05 [0.08]	-0.05 [0.08]	-0.05 [0.08]
Log hourly wage (actual or predicted)	-8.06*** [0.03]	-8.06*** [0.03]	-8.07*** [0.02]	-8.07*** [0.02]	-8.07*** [0.02]
Non labour income	-0.06*** [0.0007]	-0.06*** [0.0007]	-0.06*** [0.0007]	-0.05*** [0.0007]	-0.06*** [0.0007]
Years since migration	0.21*** [0.02]	0.21*** [0.02]	0.16*** [0.02]	0.17*** [0.02]	0.19*** [0.02]
Years since migration squared	-0.001*** [0.0005]	-0.001*** [0.0005]	-0.002*** [0.0004]	-0.002*** [0.0004]	-0.002*** [0.0005]
Present Stock		0.90*** [0.19]	-3.67*** [0.32]	1.61** [0.65]	4.78*** [1.02]
Past stock at 30 years ago			3.15*** [0.18]		-3.69*** [0.92]
Place of birth dummies	No	No	No	Yes	Yes
No.Obs	115800	115800	115800	115800	115800

Table 3.34 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. The variables not reported for in this table are age, age squared, marriage dummy, primary maintainer dummy, other adults in household dummy and the education dummies.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

We find a significant and negative effect of being an immigrant. Even with the introduction of the place of birth dummies, the immigrant dummy remains negative and significant. For fathers, we find a similar result; however, the immigrant dummy loses significance once the past stock at 30 years is introduced into the regression with controls for country of birth. This tells us that immigrant mothers generally spend less time on both market and non-market activities compared to Canadian mothers.

One question that begs itself is, if immigrants spend less time compared to natives on both market and non-market activities, then what are they doing with their time? From the definitions provided by Statistics Canada of market and non-market activities, we conclude that immigrants spend a large proportion of their time volunteering or charity work, possibly to gain experience. They also spend their time on unpaid work which is usually found in paid work places[87], unpaid subsistence activities[88], personal care, and leisure and finally, sleep.

The number of children affects mother's paid market hours negatively, whilst positively affecting fathers hours. The more children a mother has, the less time she devotes to paid work and -from our previous results- more time on non-market activities, such as childcare and housework. As for fathers, greater number of children increases both his labour market hours and time spent on non-market activities. This could be because mothers are the ones that choose to stay at home with the children or reduce their labour market hours to allow them to stay at home. In response, fathers, will work more hours to compensate for the income loss.

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[87] Many immigrants looking to further their employment opportunities in their respective fields are usually required to have Canadian work experience in the form of unpaid work. This differs from volunteer work in terms of motivation, experience and sector.

[88] Subsistence activities are another type of unpaid work. It can include the cultivation of vegetables, fetching wood and water, and the care of livestock animals. This kind of activity usually takes place in rural communities in Canada.

The presence of children age 14 and under reduces women's market hours and children age 15 and over increase it. This is not surprising since younger children require more attention from their mothers than older children. Indeed, our previous results on childcare and housework show that the presence of children age 14 and under increases women's childcare and housework time. Given that time is limited, a mother would have to sacrifice her time at work. The reverse is true for mothers with children between the ages of 15 and 24.[89]

For fathers, it is only the presence of children between the ages of 6 and 14 that has an impact on their labour market hours. The impact is negative. From our previous results, we can infer that fathers with a child between the ages of 6 and 14 spend less time at work because they are spending more time on childcare and housework duties. Having children under the age of 6 and older than 14 does not impact market hours of fathers.

Regarding the hourly wage, we find that increases in the wage rate of parents, decreases the time they devote to paid work and increases the time on non-market activities. One explanation is given each family has a specified budget they must meet which covers all their living expenses, a higher hourly wage will allow them to meet their budget target quicker. Therefore, they will not need to work longer hours.

For non-labour income, increases in this type of income reduce parent's time on market work. Immigrant mothers increase the time they spend on market work with years since migration, while also increasing the amount of time they devote to childcare. This implies that immigrant mother's amount of discretionary time decreases with duration of residence in Canada.[90] This is the same result found by Vargas (2016) but for the United States. For

[89] The presence of children between the ages of 15 and 24 reduces mother's childcare and housework time, thereby increasing her market hours.

[90] For us, discretionary time is understood as time spent on charity work, unpaid work, sleep, personal grooming and commuting.

fathers, they do increase their market work with years since migration but since they decrease the time they spend on housework duties, the amount of discretionary time they have rises.[91]

Moving on to the present stock, once again controlling for place of birth, shifts the present stock from negative to positive. For both mothers and fathers, it is positive and significant, indicating that the immigrant's community has a positive impact on the migrants work hours. There is a large literature dedicated to explaining the benefits ethnic niches provide to the immigrants. One benefit via networking is job opportunities.[92] The past stock is significant and negative for parents and from tables 3.35 and 3.36, we find the past stock closer to the present to have the greatest impact on work hours, reinforcing our earlier argument that it is recent immigration history as opposed to distant that influences the assimilation process.

[91] Since the years since migration squared coefficient is negative and significant for both mothers and fathers, we can infer a non-linear relationship exists between market work hours and duration length.

[92] Refer to Al-Sabah (2015) for a detailed discussion on how immigrant communities aid immigrants in employment. Al-Sabah (2015) is the second chapter of this thesis.

Table 3.35 Coefficient estimates from Tobit models of paid work time use

VARIABLES	Endogenous variable: Paid work hours spent by females			
Age	1.32*** [0.03]	1.32*** [0.03]	1.32*** [0.03]	1.32*** [0.03]
Age squared	-0.01*** [0.0004]	-0.02*** [0.0004]	-0.01*** [0.0004]	-0.01*** [0.0004]
Immigrant dummy	-3.32*** [1.05]	-3.65*** [1.01]	-3.93*** [1.07]	-4.00*** [1.19]
Number of children	-0.48*** [0.04]	-0.48*** [0.04]	-0.48*** [0.04]	-0.47*** [0.04]
Child age 0-1	1.03*** [0.14]	1.03*** [0.14]	1.03*** [0.14]	1.03*** [0.14]
Child age 2-5	-1.35*** [0.09]	-1.34*** [0.09]	-1.35*** [0.09]	-1.35*** [0.09]
Child age 6-14	-1.37*** [0.09]	-1.37*** [0.09]	-1.37*** [0.09]	-1.37*** [0.09]
Child age 15-24	0.60*** [0.09]	0.60*** [0.09]	0.60*** [0.09]	0.60*** [0.09]
Marriage dummy	-0.18* [0.10]	-0.18** [0.10]	-0.18** [0.09]	-0.18** [0.09]
Primary maintainer dummy	1.58*** [0.09]	1.58*** [0.09]	1.58*** [0.08]	1.58*** [0.08]
Other adults in household	1.64*** [0.13]	1.64*** [0.13]	1.64*** [0.12]	1.63*** [0.12]
High school education	2.29*** [0.12]	2.29*** [0.12]	2.29*** [0.11]	2.29*** [0.11]
Some college education	1.49*** [0.16]	1.49*** [0.15]	1.49*** [0.14]	1.49*** [0.14]
College education	4.19*** [0.12]	4.19*** [0.11]	4.19*** [0.11]	4.18*** [0.11]
Bachelor degree education	7.43*** [0.14]	7.43*** [0.14]	7.44*** [0.13]	7.43*** [0.13]
Masters degree education	9.62*** [0.24]	9.62*** [0.22]	9.62*** [0.21]	9.62*** [0.21]
PhD degree	11.97*** [0.58]	11.97*** [0.58]	11.96*** [0.58]	11.97*** [0.58]
Predicted Log hourly wage	-6.02*** [0.03]	-6.02*** [0.02]	-6.02*** [0.02]	-6.02*** [0.02]
Non labour income	-0.05*** [0.001]	-0.05*** [0.001]	-0.04*** [0.001]	-0.04*** [0.001]
Present Stock	2.68*** [1.04]	1.99** [0.83]	1.18 [0.83]	3.52** [1.43]
Past stock at 30 years ago	-1.93** [0.98]	--	--	-5.63 [3.55]
Past stock at 70 years ago	--	-0.77* [0.43]	--	-0.21 [1.53]
Past stock at 100 years ago	--	--	-0.04 [0.46]	2.35*** [0.85]
Years since migration	0.18*** [0.02]	0.18*** [0.02]	0.17*** [0.02]	0.18*** [0.02]
Years since migration squared	-0.002*** [0.0006]	-0.002*** [0.0005]	-0.002*** [0.0005]	-0.002*** [0.0005]
No.Obs	118126	118126	118126	118126

Table 3.35 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.36 Coefficient estimates from Tobit models of paid work time use

VARIABLES	Endogenous variable: Paid work hours spent by males			
Age	1.38*** [0.02]	1.38*** [0.02]	1.38*** [0.02]	1.38*** [0.02]
Age squared	-0.01*** [0.0004]	-0.01*** [0.0003]	-0.01*** [0.0003]	-0.01*** [0.0004]
Immigrant dummy	-1.65 [1.03]	-2.41** [0.99]	-2.45** [1.05]	-1.92 [1.18]
Number of children	0.65*** [0.04]	0.64*** [0.04]	0.64*** [0.04]	0.65*** [0.04]
Child age 0-1	-0.09 [0.11]	-0.09 [0.11]	-0.09 [0.11]	-0.09 [0.11]
Child age 2-5	0.09 [0.09]	0.09 [0.09]	0.08 [0.09]	0.09 [0.09]
Child age 6-14	-0.87*** [0.09]	-0.87*** [0.09]	-0.87*** [0.09]	-0.88*** [0.09]
Child age 15-24	-0.05 [0.08]	-0.05 [0.09]	-0.05 [0.08]	-0.05 [0.08]
Marriage dummy	2.39*** [0.09]	2.39*** [0.09]	2.38*** [0.09]	2.39*** [0.09]
Primary maintainer dummy	1.34*** [0.08]	1.34*** [0.09]	1.34*** [0.08]	1.34*** [0.08]
Other adults in household	1.95*** [0.16]	1.95*** [0.16]	1.95*** [0.16]	1.95*** [0.16]
High school education	1.92*** [0.11]	1.92*** [0.11]	1.93*** [0.11]	1.92*** [0.11]
Some college education	2.49*** [0.12]	2.49*** [0.12]	2.49*** [0.12]	2.49*** [0.12]
College education	3.29*** [0.11]	3.29*** [0.11]	3.30*** [0.11]	3.28*** [0.11]
Bachelor degree education	5.21*** [0.12]	5.21*** [0.12]	5.21*** [0.12]	5.21*** [0.12]
Masters degree education	6.51*** [0.18]	6.51*** [0.18]	6.51*** [0.18]	6.51*** [0.18]
PhD degree	7.13*** [0.36]	7.13*** [0.36]	7.13*** [0.36]	7.14*** [0.36]
Predicted Log hourly wage	-8.07*** [0.02]	-8.07*** [0.02]	-8.07*** [0.02]	-8.07*** [0.02]
Non labour income	-0.05*** [0.0007]	-0.05*** [0.0007]	-0.05*** [0.02]	-0.05*** [0.0007]
Present Stock	4.78*** [1.02]	3.32*** [0.82]	2.39*** [0.81]	6.08*** [1.36]
Past stock at 30 years ago	-3.69*** [0.92]	--	--	-8.84*** [3.16]
Past stock at 70 years ago	--	-1.41*** [0.40]	--	0.56 [1.41]
Past stock at 100 years ago	--	--	-0.66* [0.40]	2.06*** [0.74]
Years since migration	0.19*** [0.02]	0.18*** [0.02]	0.18*** [0.02]	0.19*** [0.02]
Years since migration squared	-0.003*** [0.0005]	-0.003*** [0.0005]	-0.002*** [0.0005]	-0.002*** [0.0005]
No.Obs	115800	115800	115800	115800

Table 3.36 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

3.8 CONCLUSION

The topic of how immigrants fare or assimilate compared to natives has always centered around the labour market and in particular wages while ignoring non-market activities. In this paper, the PUMF of the Canadian Censuses of 2001 and 2006 are employed to examine from a gender and immigration perspective, how immigrant parents devote time per week to childcare, housework and looking after seniors, relative to native Canadians. To account for the diversity of the Canadian population, immigrants in our study come from a total of ten countries. Focusing on Canada, we make several contributions. Most prior relevant research has focused on household production as an umbrella term to mean several non-market activities, but our paper is more detailed in the sense that we distinguish household production into three separate activities (childcare, housework and caring for senior family members). In addition, we estimate the impact of duration of Canadian residence and immigrant community size on these time allocations. We do this not only mothers but also for fathers, which are usually excluded from studies on childcare.

Our original results show that immigrant mothers spend less time per week on childcare, market work and looking after senior family members than Canadian mothers. For immigrant fathers, they spend less time on childcare, housework, caring for seniors and market work, than Canadian fathers. Given this, it is safe to assume that immigrants spend more time on the other remaining time use (personal care, leisure and sleep), than native Canadians.

With regards to assimilation, we provide evidence that larger size community's aid in the assimilation process of immigrants by matching the behaviour of immigrants to that of natives over time, for childcare and housework. For example, for childcare, the greater the community size of the immigrant, the more childcare that takes place and given that immigrants do less childcare in the first place than natives, this bridges the gap between natives and immigrants. Our results echo what the sociologists believe, in that communities or networks can help immigrants to assimilate and integrate. Communities provide for the immigrants a safety net while they learn to adjust to the new host environment. If immigrants do not have this safety net, the too sudden exposure to a strange culture could be an upsetting shock. Thus, we conclude that the immigrant community is essential for immigrants in the assimilation process

For providing care or assistance to seniors, the present stock has no impact on the assimilation process of immigrants, for both genders. Thus, it is vital to distinguish between the three non-market activities as we have seen differences in the results and not to conjure them under one term.

According to the assimilation literature the longer an immigrant has been in the host society, the more assimilated they become, in terms of market variables. However, for our study of non-market activities, we find a mixture of results. For childcare, we find the years since migration to positively assist in the assimilation process (for example with mothers and childcare). In other cases such as the time fathers spend on housework, the years since migration variable negatively impacts assimilation. Also, we find certain cases in which the years since migration has no impact on immigrant's assimilation. Thus, it is not straightforward to assume that non-market activities will behave the same as market activities, with regards to the length of stay in host country.

Finally, when controlling for culture, we find that taking the place of birth of immigrants is a better indicator than ethnicity.

This paper is subject to a number of limitations. Firstly, the data we use provides us information on one spouse only. We cannot identify whom the respondent's spouse is and therefore we have no information on them. This means we cannot make affirmations regarding within-family behaviours. Also, we have no indicator on the intensity of childcare that is being delivered. Our main dependent variable measures the number of hours per week a parent spends on childcare. It measures the time consumed. It says nothing about the quality of interaction that is taking place or the exact activity that is taking place. Our data is not detailed enough to provide us with this information. Perhaps the most feasible description of these measures is that the dependent variable indicates the extent of parent-child contact in various types of activities- some of which may generally involve relatively intensive interaction, some much less so. For example, playing sport with children versus watching TV. Thus, studying this additional dimension can be beneficial for future studies.

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APPENDIX 3

Table 3.17 Coefficient estimates from Tobit models of housework time use

VARIABLES	Endogenous variable: Housework hours spent by females FEMALES				
Age	1.15*** [0.04]	1.15*** [0.04]	1.15*** [0.04]	1.15*** [0.04]	1.15*** [0.04]
Age squared	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0006]
Immigrant dummy	-1.88 [1.47]	-1.91 [1.42]	-1.92 [1.51]	-2.85* [1.68]	-2.59** [1.45]
Number of children	2.42*** [0.06]	2.42*** [0.06]	2.42*** [0.06]	2.42*** [0.06]	2.41*** [0.06]
Child age 0-1	3.96*** [0.19]	3.96*** [0.19]	3.96*** [0.19]	3.96*** [0.19]	3.97*** [0.19]
Child age 2-5	3.73*** [0.13]	3.73*** [0.13]	3.73*** [0.13]	3.73*** [0.13]	3.73*** [0.13]
Child age 6-14	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]	1.84*** [0.13]
Child age 15-24	-1.40*** [0.12]	-1.40*** [0.12]	-1.41*** [0.12]	-1.40*** [0.12]	-1.40*** [0.13]
Marriage dummy	3.32*** [0.13]	3.32*** [0.13]	3.32*** [0.13]	3.33*** [0.13]	3.32*** [0.14]
Primary maintainer dummy	0.79*** [0.12]	0.79*** [0.12]	0.79*** [0.12]	0.79*** [0.12]	0.79*** [0.12]
Other adults in household	-1.38*** [0.16]	-1.38*** [0.16]	-1.38*** [0.16]	-1.38*** [0.16]	-1.39*** [0.17]
High school education	-1.43*** [0.16]	-1.43*** [0.16]	-1.42*** [0.16]	-1.43*** [0.16]	-1.43*** [0.16]
Some college education	-0.94*** [0.20]	-0.93*** [0.21]	-0.93*** [0.21]	-0.94*** [0.21]	-0.94*** [0.21]
College education	-2.14*** [0.16]	-2.13*** [0.16]	-2.13*** [0.16]	-2.13*** [0.16]	-2.13*** [0.16]
Bachelor degree education	-4.94*** [0.18]	-4.94*** [0.18]	-4.94*** [0.18]	-4.94*** [0.18]	-4.93*** [0.18]
Masters degree education	-6.79*** [0.31]	-6.80*** [0.31]	-6.79*** [0.31]	-6.79*** [0.31]	-6.77*** [0.31]
PhD degree	-7.72*** [0.81]	-7.72*** [0.81]	-7.72*** [0.81]	-7.72*** [0.81]	-7.67*** [0.81]
Predicted Log hourly wage	0.92*** [0.03]	0.92*** [0.03]	0.92*** [0.03]	0.91*** [0.03]	0.91*** [0.03]
Non labour income	0.002 [0.001]	0.002 [0.001]	0.002 [0.001]	0.002 [0.001]	0.002 [0.002]
Present Stock	3.24* [1.46]	3.24*** [1.17]	2.92** [1.16]	1.70 [2.00]	3.71** [1.45]
Past stock at 30 years ago	-0.68 [1.37]	--	--	4.43 [4.97]	-1.15 [1.36]
Past stock at 70 years ago	--	-0.50 [0.61]	--	-2.69 [2.15]	--
Past stock at 100 years ago	--	--	-0.22 [0.64]	0.41 [1.18]	--
Years since migration	-0.05 [0.03]	-0.05 [0.03]	-0.05 [0.03]	-0.05 [0.03]	--
Years since migration squared	0.0004 [0.0007]	0.004 [0.0007]	0.0004 [0.0007]	0.0004 [0.0007]	--
No.Obs	118126	118126	118126	118126	118126

Table 3.17 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.18 Coefficient estimates from Tobit models of housework time use

	Endogenous variable: Housework hours spent by males			
VARIABLES	MALES			
Age	0.99*** [0.03]	0.99*** [0.03]	0.99*** [0.03]	0.99*** [0.03]
Age squared	-0.01*** [0.0003]	-0.01*** [0.0003]	-0.01*** [0.0003]	-0.01*** [0.0003]
Immigrant dummy	-2.37** [1.41]	-2.54** [1.09]	-2.16** [1.15]	-2.12 [1.31]
Number of children	0.49*** [0.05]	0.49*** [0.05]	0.49*** [0.05]	0.49*** [0.05]
Child age 0-1	2.21*** [0.12]	2.21*** [0.12]	2.21*** [0.13]	2.21*** [0.13]
Child age 2-5	1.68*** [0.10]	1.68*** [0.10]	1.68*** [0.10]	1.68*** [0.10]
Child age 6-14	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]	1.27*** [0.10]
Child age 15-24	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]	-0.92*** [0.09]
Marriage dummy	1.11*** [0.11]	1.11*** [0.11]	1.11*** [0.11]	1.11*** [0.10]
Primary maintainer dummy	0.02 [0.09]	0.02 [0.09]	0.02 [0.09]	0.02 [0.09]
Other adults in household	-2.01*** [0.17]	-2.01*** [0.17]	-2.01*** [0.17]	-2.01*** [0.17]
High school education	-0.46*** [0.12]	-0.46*** [0.12]	-0.46*** [0.12]	-0.46*** [0.12]
Some college education	0.25** [0.13]	0.25* [0.13]	0.25* [0.13]	0.25* [0.13]
College education	-0.26** [0.12]	-0.26** [0.12]	-0.25* [0.12]	-0.25** [0.12]
Bachelor degree education	-1.92*** [0.13]	-1.91*** [0.13]	-1.91*** [0.13]	-1.91*** [0.13]
Masters degree education	-2.43*** [0.20]	-2.43*** [0.20]	-2.43*** [0.20]	-2.43*** [0.20]
PhD degree	-2.58*** [0.39]	-2.58*** [0.39]	-2.59*** [0.39]	-2.59*** [0.39]
Predicted Log hourly wage	0.63*** [0.03]	0.63*** [0.03]	0.62*** [0.03]	0.63*** [0.03]
Non labour income	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]	0.01*** [0.0008]
Present Stock	4.22*** [1.12]	3.91*** [0.89]	4.11*** [0.88]	3.94*** [1.49]
Past stock at 30 years ago	-0.97 [1.01]			0.31 [3.47]
Past stock at 70 years ago		-0.43 [0.44]		0.15 [1.54]
Past stock at 100 years ago			-0.61 [0.44]	-0.85 [0.81]
Years since migration	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]
Years since migration squared	0.002*** [0.0005]	0.002*** [0.0005]	0.002*** [0.0005]	0.002*** [0.0005]
No.Obs	115800	115800	115800	115800

Table 3.18 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.19 Coefficient estimates from Tobit models of caring for seniors time use

	Endogenous variable: Seniors hours spent by females			
VARIABLES	**FEMALES**			
Age	0.50*** [0.03]	0.50*** [0.03]	0.50*** [0.03]	0.50*** [0.03]
Age squared	-0.004*** [0.0004]	-0.004*** [0.0004]	-0.004*** [0.0004]	-0.004*** [0.0004]
Immigrant dummy	-2.23** [1.09]	-2.70*** [1.05]	-2.09* [1.11]	-1.18 [1.21]
Number of children	0.24*** [0.04]	0.23*** [0.04]	0.23*** [0.04]	0.23*** [0.04]
Child age 0-1	-1.11*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]	-1.11*** [0.16]
Child age 2-5	-0.47*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]	-0.47*** [0.11]
Child age 6-14	0.27*** [0.09]	0.28*** [0.09]	0.29*** [0.09]	0.28*** [0.09]
Child age 15-24	0.01 [0.09]	0.01 [0.09]	0.01 [0.09]	0.01 [0.09]
Marriage dummy	0.62*** [0.09]	0.62*** [0.09]	0.62*** [0.09]	0.61*** [0.09]
Primary maintainer dummy	-0.42*** [0.09]	-0.43*** [0.09]	-0.42*** [0.09]	-0.42*** [0.09]
Other adults in household	-0.26** [0.12]	-0.26** [0.12]	-0.26** [0.13]	-0.26** [0.12]
High school education	0.35*** [0.12]	0.35*** [0.12]	0.35*** [0.12]	0.35*** [0.12]
Some college education	0.97*** [0.15]	0.97*** [0.15]	0.97*** [0.15]	0.91*** [0.15]
College education	0.86*** [0.12]	0.86*** [0.12]	0.86*** [0.12]	0.86*** [0.12]
Bachelor degree education	0.39*** [0.13]	0.40*** [0.13]	0.40*** [0.13]	0.40** [0.13]
Masters degree education	-0.25 [0.22]	-0.25 [0.22]	-0.25 [0.22]	-0.25 [0.22]
PhD degree	-0.76 [0.61]	-0.79 [0.61]	-0.77 [0.61]	-0.77 [0.61]
Predicted Log hourly wage	0.04* [0.02]	0.04* [0.02]	0.04* [0.02]	0.04* [0.02]
Non labour income	0.004*** [0.001]	0.004*** [0.001]	0.004*** [0.001]	0.004*** [0.001]
Present Stock	1.86* [1.06]	0.85 [0.84]	1.10 [0.83]	3.18** [1.44]
Past stock at 30 years ago	-2.32** [1.02]			-6.51* [3.52]
Past stock at 70 years ago		-0.76* [0.45]		2.76* [1.55]
Past stock at 100 years ago			-1.06** [0.46]	-0.95 [0.87]
Years since migration	0.04 [0.02]	0.04 [0.02]	0.03 [0.02]	0.03 [0.02]
Years since migration squared	0.0006 [0.0005]	0.0005 [0.0005]	0.0005 [0.0005]	0.0006 [0.0005]
No.Obs	118126	118126	118126	118126

Table 3.19 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.20 Coefficient estimates from Tobit models of caring for seniors time use

	Endogenous variable: Seniors hours spent by males			
VARIABLES	**MALES**			
Age	0.47*** [0.03]	0.47*** [0.03]	0.47*** [0.03]	0.47*** [0.03]
Age squared	-0.004*** [0.0004]	-0.004*** [0.0004]	-0.004*** [0.0004]	-0.004*** [0.0004]
Immigrant dummy	-1.98* [1.06]	-2.13** [1.01]	-2.55** [1.07]	-2.83** [1.19]
Number of children	0.28*** [0.04]	0.28*** [0.04]	0.28*** [0.04]	0.28*** [0.04]
Child age 0-1	-0.84*** [0.12]	-0.83*** [0.12]	-0.83*** [0.13]	-0.84*** [0.13]
Child age 2-5	-0.72*** [0.09]	-0.72*** [0.09]	-0.72*** [0.09]	-0.71*** [0.09]
Child age 6-14	0.35*** [0.09]	0.35*** [0.09]	0.36*** [0.09]	0.35*** [0.09]
Child age 15-24	0.17* [0.08]	0.17** [0.08]	0.17* [0.08]	0.17** [0.08]
Marriage dummy	0.59*** [0.10]	0.59*** [0.10]	0.59*** [0.10]	0.59*** [0.10]
Primary maintainer dummy	0.06 [0.09]	0.06 [0.09]	0.06 [0.09]	0.06 [0.09]
Other adults in household	-0.03 [0.17]	-0.03 [0.17]	-0.03 [0.17]	-0.03 [0.17]
High school education	0.57*** [0.11]	0.57*** [0.11]	0.57*** [0.11]	0.56*** [0.11]
Some college education	0.72*** [0.12]	0.72*** [0.12]	0.72*** [0.12]	0.72*** [0.12]
College education	0.91*** [0.11]	0.91*** [0.11]	0.92*** [0.11]	0.90*** [0.11]
Bachelor degree education	0.47*** [0.12]	0.47*** [0.12]	0.47*** [0.12]	0.47*** [0.12]
Masters degree education	0.21 [0.18]	0.22 [0.18]	0.22 [0.18]	0.21 [0.18]
PhD degree	-1.24*** [0.37]	-1.24*** [0.37]	-1.23*** [0.37]	-1.23*** [0.37]
Predicted Log hourly wage	0.02 [0.03]	0.02 [0.02]	0.02 [0.02]	0.01 [0.02]
Non labour income	0.007*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]	0.007*** [0.0008]
Present Stock	0.82 [0.97]	0.54 [0.76]	-0.05 [0.75]	0.91 [1.27]
Past stock at 30 years ago	-0.84 [0.92]			-1.65 [2.96]
Past stock at 70 years ago		-0.37 [0.41]		-1.23 [1.36]
Past stock at 100 years ago			0.19 [0.41]	1.82** [0.77]
Years since migration	0.03 [0.02]	0.03 [0.02]	0.03 [0.02]	0.03* [0.02]
Years since migration squared	0.0006 [0.0004]	0.0007 [0.0004]	0.0007 [0.0004]	0.0006 [0.0004]
No.Obs	115800	115800	115800	115800

Table 3.20 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.21 Coefficient estimates from OLS models of senior time use

	Endogenous variable: Senior hours spent by females			
VARIABLES	FEMALES			
Age	0.06*** [0.008]	0.06*** [0.008]	0.06*** [0.008]	0.06*** [0.008]
Age squared	-0.0003*** [0.0001]	-0.0003*** [0.0001]	-0.0003*** [0.0001]	-0.0003*** [0.0001]
Immigrant dummy	-0.31 [0.29]	-0.46* [0.28]	-0.21 [0.30]	-0.01 [0.33]
Number of children	0.04*** [0.01]	0.04*** [0.01]	0.04*** [0.01]	0.04*** [0.01]
Child age 0-1	-0.18*** [0.04]	-0.18*** [0.04]	-0.18*** [0.04]	-0.18*** [0.04]
Child age 2-5	-0.08*** [0.02]	-0.07*** [0.02]	-0.07*** [0.02]	-0.07*** [0.02]
Child age 6-14	0.05** [0.02]	0.05** [0.02]	0.05** [0.02]	0.05** [0.02]
Child age 15-24	-0.0008 [0.02]	-0.0007 [0.02]	-0.0001 [0.02]	-0.0000007 [0.02]
Marriage dummy	0.13*** [0.02]	0.13*** [0.02]	0.13*** [0.02]	0.13*** [0.02]
Primary maintainer dummy	-0.09*** [0.02]	-0.09*** [0.02]	-0.09*** [0.02]	-0.09*** [0.02]
Other adults in household	-0.12*** [0.03]	-0.12*** [0.03]	-0.12*** [0.03]	-0.12*** [0.03]
High school education	-0.01 [0.03]	-0.01 [0.03]	-0.01 [0.03]	-0.01 [0.03]
Some college education	0.12** [0.04]	0.12*** [0.04]	0.12*** [0.04]	0.11*** [0.04]
College education	0.04 [0.03]	0.04 [0.03]	0.04 [0.03]	0.04 [0.03]
Bachelor degree education	-0.12*** [0.03]	-0.12*** [0.03]	-0.11*** [0.03]	-0.11*** [0.03]
Masters degree education	-0.29*** [0.06]	-0.29*** [0.06]	-0.30*** [0.06]	-0.29*** [0.06]
PhD degree	-0.39** [0.16]	-0.39** [0.16]	-0.39** [0.16]	-0.39** [0.16]
Predicted Log hourly wage	0.02*** [0.006]	0.02*** [0.006]	0.02*** [0.006]	0.02*** [0.006]
Non labour income	0.001*** [0.0003]	0.001*** [0.0003]	0.001*** [0.0003]	0.001*** [0.0003]
Present Stock	0.76*** [0.29]	0.44* [0.23]	0.54** [0.23]	0.93*** [0.40]
Past stock at 30 years ago	-0.86*** [0.27]	--	--	-1.27 [1.00]
Past stock at 70 years ago	--	-0.33*** [0.12]	--	0.56 [0.43]
Past stock at 100 years ago	--	--	-0.46*** [0.12]	-0.45* [0.23]
Years since migration	0.01** [0.006]	0.01 [0.006]	0.01 [0.006]	0.01 [0.006]
Years since migration squared	0.00002 [0.0001]	0.00002 [0.0001]	0.00004 [0.0001]	0.00004 [0.0001]
No. Obs	118126			

Table 3.21 reports the coefficient estimates and standard errors in parentheses from OLS models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.22 Coefficient estimates from OLS models of senior time use

	Endogenous variable: Senior hours spent by males			
VARIABLES	**MALES**			
Age	0.05*** [0.006]	0.05*** [0.006]	0.05*** [0.006]	0.05*** [0.006]
Age squared	-0.0004*** [0.00007]	-0.0004*** [0.00007]	-0.0004*** [0.00007]	-0.0004*** [0.00007]
Immigrant dummy	-0.35 [0.22]	-0.36*** [0.21]	-0.46** [0.08]	-0.52** [0.25]
Number of children	0.04*** [0.01]	0.04*** [0.01]	0.04*** [0.01]	0.04*** [0.01]
Child age 0-1	-0.07*** [0.02]	-0.07*** [0.02]	-0.07*** [0.02]	-0.07*** [0.02]
Child age 2-5	-0.08*** [0.01]	-0.07*** [0.01]	-0.07*** [0.01]	-0.07*** [0.01]
Child age 6-14	0.06*** [0.02]	0.06*** [0.02]	0.06*** [0.02]	0.06*** [0.02]
Child age 15-24	0.008 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]
Marriage dummy	0.11*** [0.02]	0.11*** [0.02]	0.11*** [0.02]	0.11*** [0.02]
Primary maintainer dummy	-0.02 [0.01]	-0.02 [0.01]	-0.02 [0.01]	-0.02 [0.01]
Other adults in household	-0.09*** [0.03]	-0.09*** [0.03]	-0.09*** [0.03]	-0.09*** [0.03]
High school education	0.03 [0.02]	0.03 [0.02]	0.03 [0.02]	0.03 [0.02]
Some college education	0.05** [0.02]	0.05** [0.02]	0.05* [0.02]	0.04* [0.02]
College education	0.06*** [0.02]	0.06*** [0.02]	0.06*** [0.02]	0.06** [0.02]
Bachelor degree education	-0.09*** [0.02]	-0.08*** [0.02]	-0.08*** [0.02]	-0.08*** [0.02]
Masters degree education	-0.16*** [0.04]	-0.15*** [0.04]	-0.15*** [0.04]	-0.16*** [0.04]
PhD degree	-0.35*** [0.07]	-0.39*** [0.07]	-0.39*** [0.07]	-0.40*** [0.07]
Predicted Log hourly wage	0.01*** [0.005]	0.01*** [0.005]	0.01*** [0.005]	0.01*** [0.005]
Non labour income	0.001*** [0.0001]	0.001*** [0.0001]	0.001*** [0.0001]	0.001*** [0.0001]
Present Stock	0.08 [0.22]	0.05 [0.17]	-0.10 [0.17]	0.11 [0.29]
Past stock at 30 years ago	-0.09 [0.19]	--	--	-0.38 [0.67]
Past stock at 70 years ago	--	-0.04 [0.08]	--	-0.22 [0.30]
Past stock at 100 years ago	--	--	0.08 [0.08]	0.41*** [0.15]
Years since migration	0.01*** [0.004]	0.01*** [0.004]	0.01*** [0.004]	0.01** [0.004]
Years since migration squared	0.00003 [0.0001]	0.00003 [0.0001]	0.00005 [0.0001]	0.00001 [0.0001]
No.Obs	115800	115800	115800	115800

Table 3.22 reports the coefficient estimates and standard errors in parentheses from OLS models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.23 Coefficient estimates from OLS models of housework time use

	Endogenous variable: Housework hours spent by females			
VARIABLES	FEMALES			
Age	1.02*** [0.04]	1.02*** [0.04]	1.02*** [0.04]	1.02*** [0.04]
Age squared	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]
Immigrant dummy	-1.62 [1.37]	-1.64 [1.32]	-1.62 [1.40]	-2.32 [1.56]
Number of children	2.26*** [0.06]	2.26*** [0.06]	2.26*** [0.06]	2.27*** [0.06]
Child age 0-1	3.52*** [0.18]	3.52*** [0.18]	3.52*** [0.18]	3.52*** [0.18]
Child age 2-5	3.35*** [0.12]	3.35*** [0.12]	3.35*** [0.12]	3.35*** [0.12]
Child age 6-14	1.72*** [0.12]	1.72*** [0.12]	1.73*** [0.12]	1.72*** [0.12]
Child age 15-24	-1.28*** [0.11]	-1.28*** [0.11]	-1.28*** [0.11]	-1.28*** [0.11]
Marriage dummy	3.09*** [0.12]	3.09*** [0.12]	3.09*** [0.12]	3.09*** [0.12]
Primary maintainer dummy	0.70*** [0.11]	0.70*** [0.11]	0.70*** [0.11]	0.70*** [0.11]
Other adults in household	-1.30*** [0.15]	-1.30*** [0.15]	-1.30*** [0.15]	-1.30*** [0.15]
High school education	-1.34*** [0.15]	-1.34*** [0.15]	-1.34*** [0.15]	-1.34*** [0.15]
Some college education	-0.92*** [0.19]	-0.91*** [0.19]	-0.91*** [0.19]	-0.91*** [0.19]
College education	-2.01*** [0.14]	-2.01*** [0.14]	-2.01*** [0.15]	-2.01*** [0.15]
Bachelor degree education	-4.63*** [0.17]	-4.63*** [0.17]	-4.63*** [0.17]	-4.63*** [0.17]
Masters degree education	-6.41*** [0.28]	-6.41*** [0.28]	-6.34*** [0.28]	-6.41*** [0.28]
PhD degree	-7.21*** [0.75]	-7.21*** [0.75]	-7.21*** [0.75]	-7.21*** [0.75]
Predicted Log hourly wage	0.86*** [0.02]	0.86*** [0.02]	0.86*** [0.02]	0.86*** [0.02]
Non labour income	0.003** [0.001]	0.003** [0.001]	0.003** [0.001]	0.003** [0.001]
Present Stock	3.04** [1.36]	3.03*** [1.09]	2.81*** [1.08]	1.82 [1.86]
Past stock at 30 years ago	-0.56 [1.28]			3.51 [4.62]
Past stock at 70 years ago		-0.40 [0.56]		-2.04 [2.00]
Past stock at 100 years ago			-0.22 [0.60]	0.21 [1.11]
Years since migration	-0.04 [0.03]	-0.04 [0.03]	-0.04 [0.03]	-0.04 [0.03]
Years since migration squared	0.0004 [0.0007]	0.0003 [0.0007]	0.0004 [0.0007]	0.0004 [0.0007]
No.Obs	118126	118126	118126	118126

Table 3.23 reports the coefficient estimates and standard errors in parentheses from OLS models of time use for Females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.24 Coefficient estimates from OLS models of housework time use

	Endogenous variable: Housework hours spent by males			
VARIABLES	MALES			
Age	0.83*** [0.02]	0.83*** [0.02]	0.83*** [0.02]	0.83*** [0.02]
Age squared	-0.008*** [0.0004]	-0.009*** [0.0003]	-0.008*** [0.0003]	-0.008*** [0.0003]
Immigrant dummy	-2.18* [1.06]	-2.28** [1.02]	-1.92* [1.07]	-2.00* [1.21]
Number of children	0.51*** [0.05]	0.51*** [0.05]	0.51*** [0.05]	0.51*** [0.05]
Child age 0-1	1.91*** [0.12]	1.91*** [0.12]	1.91*** [0.12]	1.91*** [0.12]
Child age 2-5	1.47*** [0.09]	1.47*** [0.09]	1.47*** [0.09]	1.47*** [0.09]
Child age 6-14	1.17*** [0.09]	1.17*** [0.09]	1.17*** [0.09]	1.17*** [0.09]
Child age 15-24	-0.79*** [0.09]	-0.79*** [0.09]	-0.79*** [0.09]	-0.79*** [0.09]
Marriage dummy	0.98*** [0.10]	0.98*** [0.10]	0.98*** [0.10]	0.98*** [0.10]
Primary maintainer dummy	-0.11 [0.09]	-0.11 [0.09]	-0.10 [0.09]	-0.10 [0.09]
Other adults in household	-1.85*** [0.16]	-1.85*** [0.16]	-1.85*** [0.16]	-1.85*** [0.16]
High school education	-0.57*** [0.11]	-0.57*** [0.11]	-0.57*** [0.11]	-0.57*** [0.11]
Some college education	0.12 [0.12]	0.11 [0.12]	0.11 [0.12]	0.11 [0.12]
College education	-0.46*** [0.11]	-0.46*** [0.11]	-0.46*** [0.11]	-0.45*** [0.11]
Bachelor degree education	-2.08*** [0.12]	-2.08*** [0.12]	-2.08*** [0.12]	-2.08*** [0.12]
Masters degree education	-2.56*** [0.19]	-2.56*** [0.19]	-2.56*** [0.19]	-2.56*** [0.19]
PhD degree	-2.68*** [0.36]	-2.68*** [0.36]	-2.68*** [0.36]	-2.68*** [0.36]
Predicted Log hourly wage	0.62*** [0.02]	0.62*** [0.02]	0.62*** [0.02]	0.62*** [0.02]
Non labour income	0.01*** [0.0007]	0.01*** [0.0007]	0.01*** [0.0007]	0.01*** [0.0007]
Present Stock	3.61*** [1.05]	3.43** [0.84]	3.67*** [0.82]	3.10** [1.39]
Past stock at 30 years ago	-0.69 [0.94]			1.37 [3.24]
Past stock at 70 years ago		-0.34*** [0.41]		-0.11 [1.44]
Past stock at 100 years ago			-0.55 [0.41]	-0.96 [0.76]
Years since migration	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]	-0.11*** [0.02]
Years since migration squared	0.002*** [0.0005]	0.001*** [0.0005]	0.001*** [0.0005]	0.002*** [0.0005]
No.Obs	115800	115800	115800	115800

Table 3.24 reports the coefficient estimates and standard errors in parentheses from OLS models of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.37 Coefficient estimates from Tobit models of childcare time use including place of birth dummies

	Coefficient estimates from Tobit models of childcare time use			
VARIABLES	**Females**		**Male**	
Present Stock	5.87*** [1.68]	14.48*** [2.54]	0.52 [1.05]	8.87*** [2.09]
Past stock at 30 years ago	--	-13.45*** [2.30]	--	-8.21*** [1.77]
US	-2.15 [1.42]	0.38 [1.49]	-0.34 [1.11]	0.56 [1.12]
UK	-5.76* [2.77]	9.08** [3.75]	-3.94** [2.08]	3.65 [2.63]
Germany	-3.68* [1.43]	-2.05 [1.46]	-4.53*** [1.11]	-3.90*** [1.11]
Poland	-12.03*** [1.30]	-11.08*** [1.31]	-6.46*** [1.08]	-6.34*** [1.08]
Italy	-10.90*** [1.79]	-5.56*** [2.00]	-6.96*** [1.32]	-4.47*** [1.42]
Portugal	-9.24*** [1.27]	-9.15*** [1.26]	-7.71*** [1.04]	-8.03*** [1.04]
China	-16.96*** [2.01]	-26.97*** [2.64]	-10.39*** [1.53]	-17.53*** [2.18]
Hong Kong	-11.15*** [1.38]	-14.33*** [1.48]	-5.67*** [1.07]	-8.14*** [1.20]
Philippines	-12.52*** [1.42]	-18.17*** [1.72]	-5.40*** [1.11]	-9.52*** [1.43]
India	-13.07*** [1.86]	-21.17*** [2.31]	-7.92*** [1.41]	-13.77*** [1.89]
Pseudo R^2	0.06		0.04	
No.Obs	118126		115800	

Table 3.37 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females and males. Estimated using data from the 2001 and 2006 Canadian Census. Variables not reported for are age; age squared, number of children, the ages of the children, marital status, a dummy for education levels, primary maintainer and other adults in household, log hourly wage, non-labour income, years since migration and years since migration squared. - - indicates result not required.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.38 Coefficient estimates from Tobit models of childcare time use including place of birth dummies

	Coefficient estimates from Tobit models of Housework time use			
VARIABLES	**Females**		**Male**	
Present Stock	1.87** [0.79]	3.02** [1.45]	2.24*** [0.56]	3.97*** [1.12]
Past stock at 30 years ago	--	-1.24 [1.31]	--	-1.69* [0.94]
US	0.04 [0.82]	0.26 [0.85]	-1.47** [0.60]	-1.29** [0.61]
UK	-2.32 [1.57]	-0.96 [2.13]	-3.51*** [1.10]	-1.97 [1.40]
Germany	2.18*** [0.82]	2.33*** [0.83]	-1.12* [0.59]	-1.00* [0.59]
Poland	-2.36*** [0.73]	-2.28*** [0.74]	-0.0003 [0.57]	0.02 [0.57]
Italy	1.17 [1.01]	1.66 [1.13]	-2.22*** [0.69]	-1.72** [0.75]
Portugal	-0.19 [0.72]	-0.19 [0.72]	-0.63 [0.54]	-0.70 [0.55]
China	-5.26*** [1.14]	-6.19*** [1.51]	-3.99*** [0.82]	-5.45*** [1.16]
Hong Kong	-3.79*** [0.78]	-4.08*** [0.84]	-2.15*** [0.57]	-2.66*** [0.64]
Philippines	-2.83*** [0.81]	-3.35*** [0.98]	0.33 [0.59]	-0.54 [0.76]
India	-0.36 [1.06]	-1.11 [1.32]	-3.54*** [0.75]	-4.76*** [1.01]
Pseudo R^2	0.009		0.006	
No.Obs	118126		115800	

Table 3.38 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females and males. Estimated using data from the 2001 and 2006 Canadian Census. Variables not reported for are age; age squared, number of children, the ages of the children, marital status, a dummy for education levels, primary maintainer and other adults in household, log hourly wage, non-labour income, years since migration and years since migration squared. - - indicates result not required.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.39 Coefficient estimates from Tobit models of childcare time use including place of birth dummies

	Coefficient estimates from Tobit models of senior time use			
VARIABLES	**Females**		**Male**	
Present Stock	-1.09** [0.58]	1.65 [1.05]	-0.76 [0.51]	0.68 [0.96]
Past stock at 30 years ago	--	-3.01 [0.96]	--	-1.49** [0.85]
US	-1.69*** [0.61]	-1.09*** [0.63]	-1.43** [0.55]	-1.21** [0.56]
UK	-1.26 [1.16]	2.14 [1.56]	-1.51 [1.00]	-0.0009 [1.30]
Germany	-1.78*** [0.61]	-1.40** [0.62]	-2.18*** [0.56]	-2.03*** [0.56]
Poland	-3.10*** [0.57]	-2.87*** [0.57]	-2.95*** [0.56]	-2.88*** [0.56]
Italy	0.62 [0.73]	1.85** [0.82]	-0.62 [0.62]	-0.1 [0.68]
Portugal	-0.67 [0.53]	-0.65 [0.53]	-0.86* [0.50]	-0.89* [0.49]
China	1.63*** [0.84]	-0.56 [1.09]	1.95*** [0.73]	0.75 [1.00]
Hong Kong	1.46* [0.57]	0.78 [0.61]	2.65*** [0.49]	2.26*** [0.54]
Philippines	-1.48* [0.61]	-2.72*** [0.72]	-0.76 [0.54]	-1.44* [0.67]
India	3.43*** [0.77]	1.67** [0.95]	3.11*** [0.67]	2.15* [0.87]
Pseudo R^2	0.01		0.01	
No.Obs	11812		115800	

Table 3.39 reports the coefficient estimates and standard errors in parentheses from Tobit models of time use for females and males. Estimated using data from the 2001 and 2006 Canadian Census. Variables not reported for are age; age squared, number of children, the ages of the children, marital status, a dummy for education levels, primary maintainer and other adults in household, log hourly wage, non-labour income, years since migration and years since migration squared. - - indicates result not required.
*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.40 Coefficient estimates from OLS models of childcare time use

VARIABLES	Endogenous variable: Childcare hours spent by females			
Age	1.28*** [0.04]	1.27*** [0.04]	1.27*** [0.04]	1.27*** [0.04]
Age squared	-0.02*** [0.0006]	-0.02*** [0.0006]	-0.02*** [0.0006]	-0.02*** [0.0006]
Immigrant dummy	-4.39*** [1.61]	-5.50*** [1.55]	-5.62*** [1.65]	-6.49*** [1.83]
Number of children	0.78*** [0.07]	0.78*** [0.07]	0.78*** [0.07]	0.79*** [0.07]
Child age 0-1	13.20*** [0.21]	13.20*** [0.21]	13.20*** [0.21]	13.20*** [0.21]
Child age 2-5	14.71*** [0.15]	14.71*** [0.15]	14.70*** [0.15]	14.71*** [0.15]
Child age 6-14	8.92*** [0.14]	8.92*** [0.14]	8.92*** [0.14]	8.91*** [0.14]
Child age 15-24	-8.68*** [0.14]	-8.68*** [0.13]	-8.67*** [0.13]	-8.68*** [0.13]
Marriage dummy	2.77*** [0.14]	2.77*** [0.14]	2.76*** [0.14]	2.77*** [0.14]
Primary maintainer dummy	2.26*** [0.13]	2.26*** [0.13]	2.27*** [0.13]	2.26*** [0.13]
Other adults in household	-2.95*** [0.18]	-2.95*** [0.18]	-2.94*** [0.18]	-2.96*** [0.18]
High school education	-0.17 [0.17]	-0.17 [0.17]	-0.16 [0.17]	-0.18 [0.17]
Some college education	0.69*** [0.22]	0.69*** [0.22]	0.69*** [0.22]	0.69*** [0.22]
College education	0.57*** [0.17]	0.57*** [0.17]	0.58*** [0.17]	0.56*** [0.17]
Bachelor degree education	-0.51** [0.20]	-0.51** [0.20]	-0.49** [0.20]	-0.51*** [0.20]
Masters degree education	-1.42*** [0.33]	-1.42*** [0.33]	-1.41*** [0.33]	-1.43*** [0.33]
PhD degree	-1.13 [0.89]	-1.13 [0.89]	-1.14 [0.89]	-1.14 [0.89]
Log hourly wage (actual or predicted)	0.93*** [0.03]	0.92*** [0.03]	0.93*** [0.03]	0.93*** [0.03]
Non labour income	-0.01*** [0.001]	-0.01*** [0.001]	-0.01*** [0.001]	-0.01*** [0.001]
Years since migration	0.11*** [0.03]	0.11*** [0.03]	0.09** [0.03]	0.12*** [0.03]
Years since migration squared	-0.0005 [0.0008]	-0.0005 [0.0008]	-0.0002 [0.0008]	-0.0007 [0.0008]
Present Stock	9.23*** [1.61]	6.96*** [1.28]	4.93*** [1.27]	9.61*** [2.20]
Past stock at 30 years ago	-7.06*** [1.51]	--	--	-10.12* [5.45]
Past stock at 70 years ago	--	-3.07*** [0.66]	--	-2.62 [2.35]
Past stock at 100 years ago	--	--	-1.33* [0.70]	4.93*** [1.30]
R-squared	0.36			
No. Obs	118126			

Table 3.15 reports the coefficient estimates and standard errors in parenthesis from OLS model of time use for females. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes ten countries of birth dummies not reported. - - indicates result not required. *** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

Table 3.41 Coefficient estimates from OLS models of childcare time use

VARIABLES	Endogenous variable: Childcare hours spent by males			
Age	1.29*** [0.04]	1.29*** [0.04]	1.29*** [0.04]	1.29*** [0.04]
Age squared	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]	-0.01*** [0.0005]
Immigrant dummy	-3.61** [1.47]	-4.53*** [1.41]	-4.26*** [1.49]	-3.81** [1.69]
Number of children	-0.04 [0.06]	-0.04 [0.06]	-0.04 [0.06]	-0.03 [0.06]
Child age 0-1	6.59*** [0.16]	6.59*** [0.16]	6.59*** [0.16]	6.59*** [0.16]
Child age 2-5	8.89*** [0.13]	8.89*** [0.13]	8.89*** [0.13]	8.89*** [0.13]
Child age 6-14	5.91*** [0.13]	5.92*** [0.13]	5.92*** [0.13]	5.92*** [0.13]
Child age 15-24	-6.75*** [0.12]	-6.75*** [0.12]	-6.75*** [0.12]	-6.75*** [0.12]
Marriage dummy	1.06*** [0.14]	1.06*** [0.14]	1.05*** [0.14]	1.06*** [0.14]
Primary maintainer dummy	-0.89*** [0.12]	-0.89*** [0.12]	-0.89*** [0.12]	-0.89*** [0.12]
Other adults in household	-4.32*** [0.22]	-4.32*** [0.22]	-4.32*** [0.22]	-4.32*** [0.22]
High school education	0.16 [0.15]	0.16 [0.15]	0.16 [0.15]	0.16 [0.15]
Some college education	0.09 [0.17]	0.09 [0.17]	0.09 [0.17]	0.09 [0.17]
College education	0.62*** [0.16]	0.62*** [0.16]	0.62*** [0.16]	0.61*** [0.16]
Bachelor degree education	-0.68*** [0.17]	-0.68*** [0.17]	-0.67*** [0.17]	-0.68** [0.17]
Masters degree education	-1.46*** [0.26]	-1.46*** [0.26]	-1.45*** [0.26]	-1.46*** [0.26]
PhD degree	-0.18 [0.51]	-0.17 [0.51]	-0.18 [0.51]	-0.17 [0.51]
Log hourly wage (actual or predicted)	0.51*** [0.04]	0.51*** [0.04]	0.51*** [0.04]	0.51*** [0.03]
Non labour income	0.005*** [0.001]	0.005*** [0.001]	0.005*** [0.001]	0.005*** [0.001]
Years since migration	0.05 [0.03]	0.05 [0.03]	0.04 [0.03]	0.05* [0.03]
Years since migration squared	0.0006 [0.0007]	0.0006 [0.0007]	0.0007 [0.0007]	0.0005 [0.0007]
Present Stock	6.02*** [1.46]	4.27*** [1.16]	3.43*** [1.14]	6.96*** [1.93]
Past stock at 30 years ago	-4.65*** [1.31]	--	--	-8.38* [4.50]
Past stock at 70 years ago	--	-1.84*** [0.57]	--	0.41 [1.99]
Past stock at 100 years ago	--	--	-1.19** [0.57]	1.49 [1.05]
R-squared	0.22			
No.Obs	115800			

Table 3.16 reports the coefficient estimates and standard errors in parenthesis from OLS model of time use for males. Estimated using data from the 2001 and 2006 Canadian Census. Both non-labour income and hourly wage are measured in Canadian dollars. Non-labour income is divided by 1000. Regression also includes ten countries of birth dummies not reported. - - indicates result not required.

*** Significant at the 1% level, ** Significant at the 5% level and * Significant at the 10% level.

The past and present stock- Tobit model of childcare time use

When the specification excludes the past stock and place of birth dummies, the coefficient on the present stock is positive. Introducing the past stock in the specification reverses the sign of the present stock. The coefficient on the present stock is now negative and the coefficient on the past stock positive. This is due to the origin composition of immigrants in the past and present stock. A large proportion of the past stock is made up of immigrants that have a similar attitude to Canadians towards childcare and so will carry out more childcare.

Introducing the place of birth dummies in the regression causes the present stock to reverse sign and turn positive again (and significant) and the past stock at 30 years ago reverses sign and becomes negative (and significant). This is because the past stock variable is strongly correlated to place of birth. Without controlling for the origins of immigrants, the higher values of past stock variable will be for Western European countries, particularly for the UK and the United States, whose emigrants will tend to be very similar in culture and attitude to Canadians, leading to the apparent positive effect of the past stock on childcare hours. Including the place of birth dummies reverses the sign on the past stock variable to negative. Consequently, the coefficient on the present stock is now positive as the origin composition of immigrants in the past and present stock is different. The ratio of Asian immigrants relative to those immigrants from developed countries is more in the present stock than in the past stock.

My preferred specification is the regression that includes both the past and present stock and controls for place of birth. This is because not controlling for country of birth may lead to omitted variable bias (as witnessed in chapter 2). The past stock measure could capture the fact that early immigrants came from countries that were-and still are – relatively developed (such as the UK and US).

Therefore, by including place of birth dummies in the specification, we capture the difference. Also, the literature has documented the significant role one's culture plays in the decision making process of unpaid activities (see for example, Balsas et al 2013; Bartley et al 2008). How much time one decides to spend on a given non-market activity is likely to be shaped by their beliefs and opinions stemming from their culture or background.

4

Payoff to official language knowledge in Quebec

4.1 INTRODUCTION

The recent history of Quebec has been characterized by important political instability with two sovereignty referenda taking place in 1980 and 1995. One of the central issues in the accompanying debates associated to these two unsuccessful referenda has been how to redesign institutions in order to account for the English-French bilingual nature of Quebec and Canada as a whole[150] and the arrival of immigrants with mostly a mother tongue other than English or French.[151]

During the period 1971-2011, there has been a steady increase in bilingualism[152] among the French and English mother tongue and allophone[153] individuals living in Quebec. For example, in 1971, around 37% of the English mother tongue population in Quebec was able to speak French, while they amounted to 70% in 2011. Similarly, 25% of the French mother tongue individuals knew English in 1971, and they were instead 39% in 2011. English-French bilingualism grew also for the allophones, going from 32% in 1971 to 51% in 2011.[154]

In this context of political instability and growing bilingualism, we study for the period 1971-2011 the wage premium associated to knowing an official language(s) other than

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[150] English and French are the official languages in Canada and Quebec.

[151] During the period of interest 1971-2011, several institutional changes in terms of language took place in Canada. For example in 1977, Bill 101 was enacted in which the Quebec government tried to impose French as the unique language of instruction in schools. This legislation was overturned by Canada in 1981 establishing that English mother tongue Canadians had the right to receive their education in English if they wish no matter where they lived in Canada. The same applied for French mother tongue Canadians. In 1993 a law was passed that required French to appear alongside other languages in commercial signs in Quebec. In 2011 the Quebec government introduced amendments to the French language charter that would have the effect of increasing the scope of regulations on the use of French to include smaller companies and strengthening the rules that steer pupils towards French rather than English speaking school. Evidently these legislations had in mind to strengthen the position of the French language in Quebec.

[152] In our paper when we refer to 'bilingualism' or 'bilingual', we imply having knowledge of both English and French. This is important, as when we look at allophone immigrants, they are considered bilingual if they know both official languages in addition to their mother tongue.

[153] Allophone individuals are individuals whose mother tongue or home language is neither French nor English.

[154] Figures are computed from Statistics Canada Public Use Microdata files (PUMF), 1971 and 2011 census.

their mother tongue for the Francophone majority, the Anglophone minority and the allophone immigrants. Francophone and Anglophone individuals are persons who speak French and English, respectively, as their mother tongue and allophone immigrants are immigrants whose mother tongue or home language is neither French nor English.

In addition, based on Church and King (1993), we study whether a higher prevalence of bilingualism among Francophone individuals lowers the pay-off associated to speaking French for the Anglophones and (symmetrically) whether more bilingualism among Anglophones lowers the returns from knowing English for the Francophones. Similarly, we check if the extent of bilingualism among the official language groups alters the payoffs of knowing English or French for the allophone immigrants.

Our study is conducted using data from the Public Use Microdata files (PUMF) of 1971, 1981, 1991, 2001 and 2011 Canadian censuses. Taking our sample, we group persons based on their mother tongue: French, English or allophone. The French and English mother tongue groups contain immigrants and natives and the allophone group contains only immigrants, as we do not include allophone Native Americans in the sample.

We choose the province of Quebec in Canada as our case study for numerous reasons. Firstly, Quebec possesses a unique linguistic character. The French-speaking population in Quebec is the majority linguistic group and there also exist a significant proportion of English speakers (particularly in the Montreal metropolitan area).[155] This linguistic duality[156] makes the study of Quebec province and in particular Montreal an interesting case in point.

[155] Implementation of the Official Languages Act takes the form of both regulatory and program measures which attempt to ensure that basic services are available to Canadians in both official languages and those opportunities are available for learning an additional official language.

[156] In our context, a situation of linguistic duality is to be understood as a situation in which two official languages are extensively used.

Secondly, Quebec has attracted many immigrants over time who must make choices over what language(s) to learn. Within Quebec, Montreal is the principal destination for immigrants. In 2016, 90.0% of the number of immigrants arriving in Quebec settled in Montreal and around 23% of the residents in Montreal are allophones (Statistics Canada, 2018). Since language skills have a significant impact on the earnings of immigrants it is paramount to study this. So that we get a significant representation of immigrants in one labour market, we choose to study Montreal separately, enticing a Quebec/Montreal comparison. Finally, unlike other multilingual countries (such as Spain or Belgium), the Canadian census includes rich information on the mother tongue of individuals and their knowledge of the two official languages.

Whilst several papers exist in the literature that study whether the size of language groups (often interpreted as networks) matters[157], this is the first paper (to the best of my knowledge) studying whether the payoff from speaking language Y for an X mother tongue individual depends on the proportion of Y mother tongue individuals knowing language X in the city. For example, we study whether the payoff for speaking English as a French mother tongue individual depends on the proportion of English mother tongue individuals that speak French in a given city. We also look at the evolution of the payoffs from language knowledge over a relatively long period (40 years).

Another contribution we make to the literature is to look at Quebec province/Montreal area dichotomy. There are many papers that study the impact of language knowledge on earnings in Canada as a whole[93], Montreal[94], Quebec province[95], Quebec versus the rest of

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[157] See, e.g., Lazear (1999), and Ortega and Verdugo (2015).

[93] See Shapiro and Stelcner (1981), Robinson (1988), Shapiro and Stelcner (1997) and Christofides and Swidinsky (1998).

[94] See Grenier and Nadeau (2016).

[95] See Grenier (1987) and Albouy (2008).

Canada (ROC)[96] and finally Montreal versus Toronto.[97] However, studies on the dichotomy of Quebec/Montreal are rare.[98]

The closest study to our work is by Grenier and Nadeau (2016) who look at the determinants and economic values of the use of different languages at work in Montreal.
Our study differs from Grenier and Nadeau (2016) because we exploit data from five Canadian census years whereas they use only one census year. Thus we have data spanning four complete decades and five repeated cross-sections to document and explain changes. Also, we study the economic values of *knowledge of official languages* whereas they rely on the use of different languages at work. Finally we look at Quebec province/Montreal area dichotomy whereas they study only Montreal. In other words, we compare two distinct labour markets whereas they focus on one multilingual market.

My results provide evidence to suggest that the payoff associated to having knowledge of two official languages is greater than having knowledge of one. For example, French mother tongue individuals that have knowledge of the English language can expect to earn significantly more than francophone individuals that do not know English. One exception to this is for Anglophone individuals residing in the Montreal area. There is no significant payoff associated to knowing French as a second official language. This is most likely due to the dual linguistic characteristic of the area making it highly probable to get by with just knowing the English language given that there is a sufficient number of Anglophones and English is the international language. The higher importance of the English language is highlighted by the fact that we find that knowing English as a second official language pays more than knowing French as second official language. In contrast, for

96 See Christofides and Swidinsky (2010) and Nadeau (2009).
97 See Pendakur and Pendakur (1998).
98 See Vaillancourt (1980) and Carliner (1981).

allophone immigrants knowing the French language pays more than knowing just the English language but once again knowing both official languages pays more than knowing one.

When we extend the analysis by studying females, we find that it pays Anglophone females in the Montreal area to know French as a second official language whereas there was no significant payoff for males. Interestingly, female allophone immigrants do not benefit from knowing only one official language. Significant economic payoffs exist only when they know both French and English. There are no differences in results between male and female French mother tongue speakers.

Finally, we find mixed evidence for the existence of network externalities. We find evidence of network externalities for Francophone individuals learning the English language. For the other two language groups, we do not find any impact of bilingualism in one group on the payoff of knowing that language for the other group. We do not find statistically significant coefficients, which might be due to the limited amount of variation we have in the data as we are only looking at two census years and we have information only on the city of residence for individuals when they live in one of the four biggest agglomerations.

The analysis proceeds as follows: in section 4.2 I go over the existing literature; in section 4.3 I give a brief overview of the language characteristics of Quebec; section 4.4 describes the data and methodology used. I present the main results and their interpretation in sections 4.5 and 4.6 followed by concluding remarks in section 4.7.

4.2 LITERATURE REVIEW

Breton (1978) and Vaillancourt (1980) were two of the first researchers to study the role of language in economic activity. Economic agents employ rational decision making to decide what language(s) to use in a particular economy. Two characteristics of a language that affect choices must be considered. Firstly, the use of a common language makes communication possible among people. In a working environment individuals will be more efficient at their task if they can communicate in a language that is known to everybody. This is known as the network externality of a language. Secondly, language represents a part of cultural identity. Individuals are generally attached to their mother tongue, and prefer to use it, if they can, even if it may be less efficient from a pure communication point of view (Grenier and Nadeau 2011). We now turn our attention to the literature on network externality and linguistic preferences in the network externality model.

4.2.1 Language Network Externality

In the presence of positive network externalities, individual utility is an increasing function of the number of people with whom one can communicate ~~with~~. Church and King (1993), Jones (2000), Grin (1992) and Caminal and di Paolo (2015) amongst others discuss this notion in their papers.[99]

Church and King (1993) propose a model in which two languages[100] exist and their main function is for communication purposes. Initially each person starts with knowing one ~~language and communication~~ between individuals can only happen if they speak a common

[99] Other papers that talk about language network externality include Selton and Pool (1991); Lazear (1991); Ginsburg et al. (2007).

[100] They assume that the two languages are perfect substitutes in the sense that both have the same benefit function but are incompatible.

language. If an individual decides to learn a second language they can do so at some cost. The greater the number of people one can communicate with, the higher the individual utility. This is essentially what creates the existence of the network externality. Depending on the cost of learning, Church and King (1993) conclude that there are three possible Nash equilibria: (i) no one learns a second language (ii) complete learning of the majority language by the minority and (iii) complete learning of the minority language by the majority. In the social optimum, the minority language speakers should learn the majority language eliminating communication barriers. The majority language speakers should remain monolingual.

Jones (2000) agrees with Church and King (1993), stating that it would be socially optimal to converge towards a single world language and the death of languages is a natural phenomenon. Likewise, Grin (1992) developed a model in which languages are prone to death due to disuse.

4.2.2 Linguistic preferences

Caminal and di Paolo (2015) build on Church and King's (1993) theory by incorporating linguistic preferences into the model.[101] They argue that alongside communicative benefits, languages serve as part of one's cultural identity and therefore individuals tend to develop some kind of emotional attachment to the language that better defines their identity. Thus, an individual may have a strong preference to retain a given language.

4.2.3 Bilingualism and Earnings

[101] Caminal (2010) and Grin (1992) also incorporate linguistic preferences in their models.

There are numerous studies in the literature studying the value of bilingualism in the Canadian labour market.[102] Starting with Boulet and Raynauld (1977), they used 1971 census data to find bilingual individuals residing in Montreal receive a wage premium compared to their unilingual counterparts.

Also using 1971 census data, Carliner (1981) studied linguistic wage differentials in Quebec province and Montreal and found bilingual premium to exist for francophone individuals but not for Anglophones.

Similarly, Vaillancourt (1980) found there were no monetary returns on bilingualism for Anglophones but that there were returns to francophone persons who learnt English. In other words, it pays more to master English than French as a second language.

Finally, using more census years (1971, 1981 and 1991), Christofides and Swidinsky (1998) found evidence of a 'bilingual wage premium' for both Francophone and Anglophones.

4.2.4 Language and Immigrant earnings

Since we consider allophone immigrants in our study, we peruse the literature on language skills and immigrants' earnings in Canada.[103] The general consensus is immigrants can receive a higher wage by acquiring proficiency in the language(s) of the host country.

Chiswick and Miller (2003) studied the complementarity between languages and other human capital. Using 1991 Canadian Census data, they found immigrants who are more proficient in an official language to have higher earnings than immigrants who lack proficiency. They also found complementarity to exist between language skills and both

[102] See for example, Shapiro and Stelcner 1997; Robinson 1988; Pendakur and Pendukur 1998; Chiswick and Miller 2003, Christofides and Swidinsky (2010); Nadeau (2009).

[103] For studies on the causes of wage of immigrants, see Schaafsma and Sweetman (2001), Frenette and Morrissette (2005), Picot and Sweetman (2005), Picot and Hou (2009), and Green and Worswick (2010).

schooling and pre-immigration experience- one reason they give to explain the lower wages received by immigrants who lack proficiency.

Li and Dong (2008) use data from the 2001 Census of Canada on language used most often at work for Chinese immigrants. They found immigrants that use official languages in the workplace had an earnings advantage over those immigrants who use non-official languages. They go on to state that immigrants who worked in a setting in which non-official languages were used, did so because many of them simply did not speak the official languages.

Likewise, Aydemir and Skuterand (2005) use data from Canadian censuses to explore the deterioration in entry earnings of immigrants. They found that one-third of the gap in entry earnings between recent immigrants and Canadians is caused by a shift in the knowledge of an official language, mother tongue and place of birth.

The closest paper we find to our study is one by Grenier and Nadeau (2016), which studies the determinants and the economic values of the use of different languages at work in Montreal. Using micro-data from the 2006 Canadian Census, they find the use of English at work by non-English native speakers is positively related to the education level of the workers, while there is no relationship for the use of French by native English speakers. They also find that for the English mother tongue group, using French at work has little or no reward, while using English at work pays a lot for the French mother tongue group. For the non-official language mother tongue group, there is a high payoff to using an official language at work, especially English.

Our paper differs from theirs firstly because we exploit data from five census years whereas they use one census year. Secondly, we focus on the whole of Quebec province and the Montreal area separately whereas they study Montreal only. In other words, we compare two distinct labour markets whereas they focus only on one. Thirdly, we study the economic values of possessing knowledge of official language(s) whereas they rely on the use of different languages at work. Finally, we test empirically whether it pays to know a second official language given that communication may already take place with individuals of a different mother tongue. This is something that they do not do.

In a society that has more than one official language such as Quebec, the languages that individuals choose to learn depends on the interaction between labour supply and demand.

On the supply side, we consider the behaviour of the individual. If the mother tongue language of the individual is the only language used in the labour market, then the individual does not need to make a choice about whether to learn an additional language. However, if the labour market uses a language that is different from the person's mother tongue, then a choice needs to be made. Two options exist; learn an additional language at a cost or do not learn an additional language.

Since our dependent variable is annual earnings, on the demand side we consider the behaviour of employers. Workers have to communicate with each other at work and a decision on the most efficient internal language of communication needs to be made. This is usually the mother tongue composition of the business owner, management and workers (Grenier and Nadeau 2016). Additionally, workers may have to communicate with the external world, for example with customers, suppliers and buyers. Thus, it is paramount to use a language that is known to the external world. A *lingua franca*, such as English, is often the language of choice when communicating with the external world (Grenier and Nadeau 2016).

Essentially the interaction between supply and demand is what determines the language(s) to learn and their relative payoff values.

4.3 LANGUAGE IN QUEBEC

Using data from the 1971, 1981, 2001 and 2011 Census of Canada PUMF, we graphically represent the degree of bilingualism for different ages, for francophone, Anglophones and allophone immigrants. Each curve on the graph represents a census year.

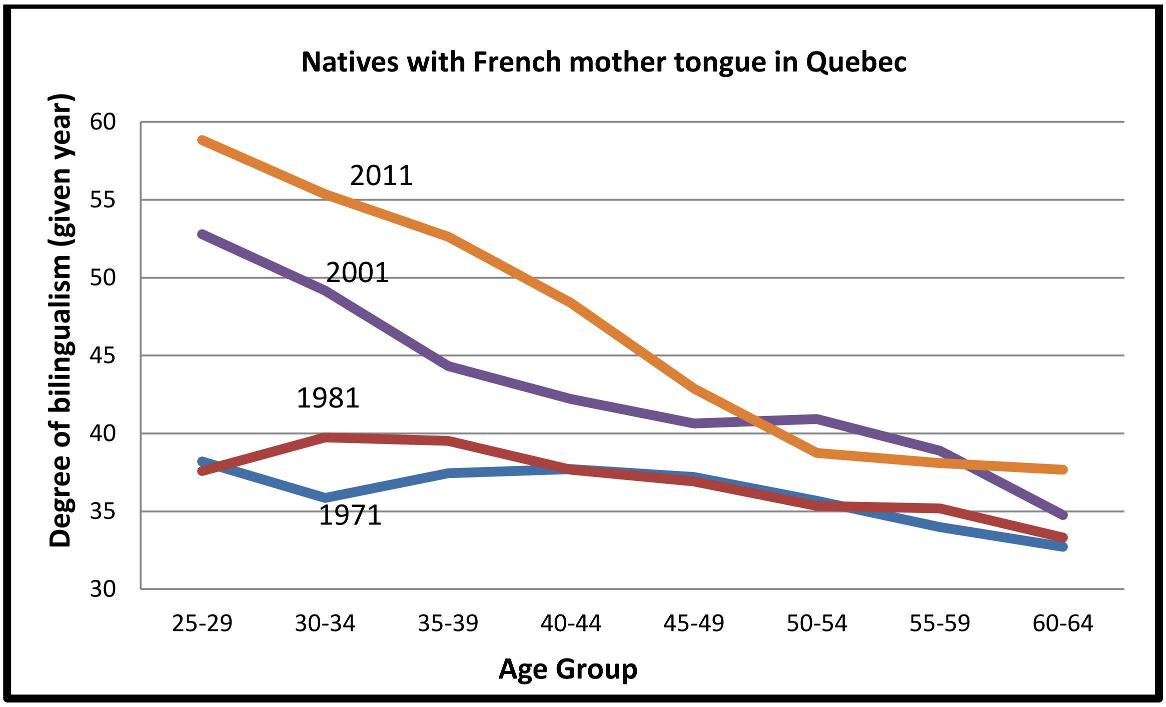
With respect to bilingualism in Quebec, we first see from figure 4.1 that bilingualism is more frequent among the young. For example, the degree of bilingualism for Francophone natives in Quebec between the ages of 25 and 29 in 2011 was just under 60% whereas for those between the ages of 50 and 54 it was around 37%. This is also the case for the other census years. According to Chiswick and Miller (1994), it is easier to learn a new language if someone is young. In addition, we see that bilingualism has increased more over time among the young and as a result the differences in bilingualism by age increase over time. For example in 1981, the difference in bilingualism between the young and the old is around 4.3 percentage points.[104] By 2011 that figure had doubled to reach around 20 percentage points.

From figure 4.2 we can see that the degree of bilingualism has also increased for mother tongue Anglophones. This increase is independent of age but we find that it is the young natives who are more likely to learn French as a second language for any given year. However, this gap between the young and old natives is less pronounced for the Anglophones compared to the Francophone natives. Once again we find that differences in bilingualism by age increase over time.[105] For example, in 1971, the difference in bilingualism between the young and old is around 14 percentage points. By the year 2001,

[104] Here, we take the young to be between the ages of 25-29 years and the old between the ages of 60-64 years.

this difference increased to around 25 percentage points. However for 2011, this figure declined to around 17 percentage points.

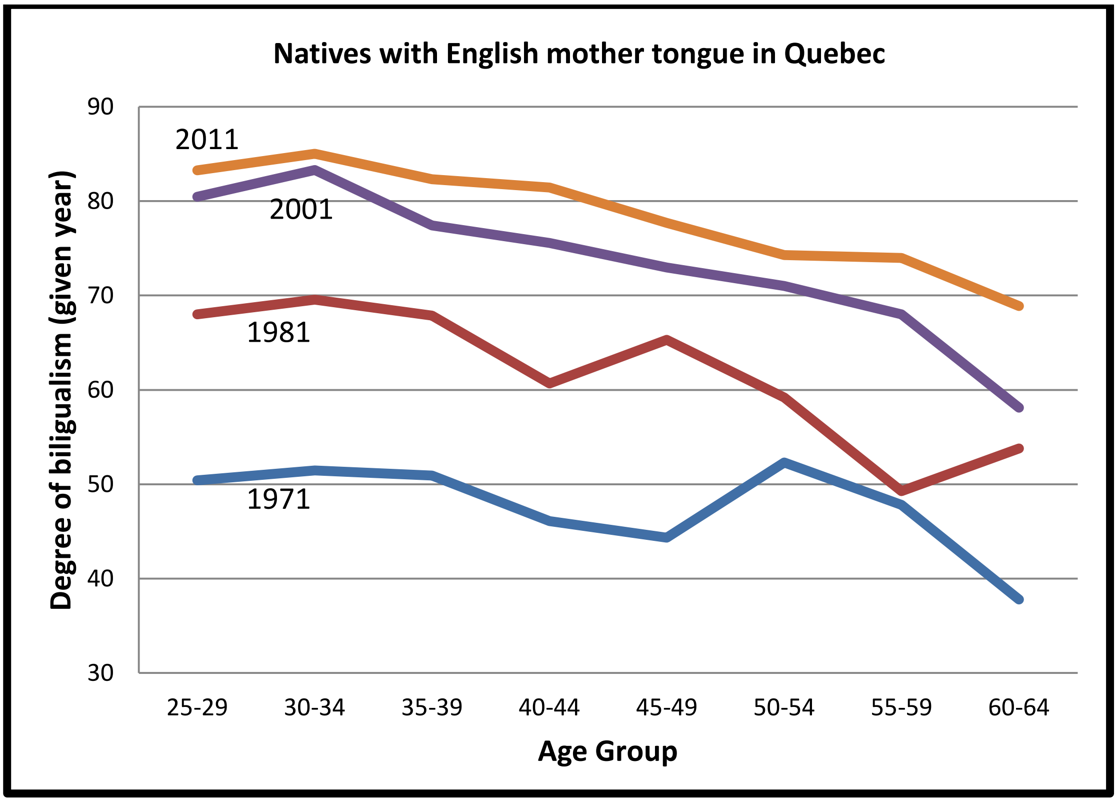
Figure 4.1 The degree of bilingualism for natives with French mother tongue in Quebec



Notes: Each curve on the graph represents a census year. There are four years, 1971, 1981, 2001 and 2011. The data is taken from Census of Canada public use microdata (individuals) files.

Differences in bilingualism by age for any given year are smaller for the French mother tongue natives than the English mother tongue speakers. Thus, the prevalence of bilingualism is higher for the minority English mother tongue group in Quebec than the majority French mother tongue group. This is true to any census year.

Figure 4.2: The degree of bilingualism for natives with English mother tongue in Quebec



Notes: Each curve on the graph represents a census year. There are four years, 1971, 1981, 2001 and 2011. The data is taken from Census of Canada public use microdata (individuals) files.

Looking at figure 4.3 the degree of bilingualism over time is also increasing for allophone immigrants. That is, over time more immigrants have knowledge of both English and French. It may be that the immigrants are learning French and English after they arrive in Quebec[106] or they are bilingual prior to migrating.[107]

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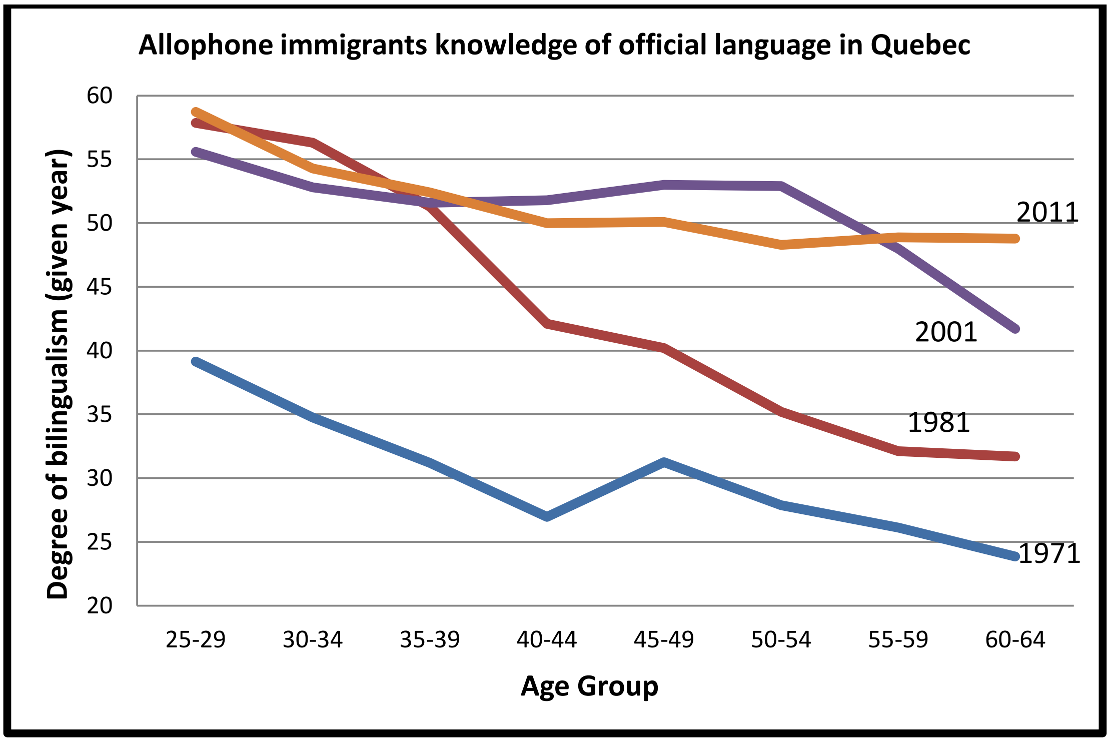
106 Bill 101 made it mandatory for children of immigrants to attend a French school and English is an attractive language to learn because it has a growing internationally high status and is commonly used in the rest of Canada (ROC).

107 The points-based system encourages this.

As expected the degree of bilingualism is higher for young people than old. With regards to the differences in bilingualism by age, it increases over time. In 1971 the difference is 15 percentage points increasing to 25 by 1981. The difference then dropped back to 13 percentage points in 2001. By 2011 the difference fell to 10 percentage points.

Figure 4.3: The degree of bilingualism for allophone immigrants in Quebec



Notes: Each curve on the graph represents a census year. There are four years, 1971, 1981, 2001 and 2011. The data is taken from Census of Canada public use microdata (individuals) files.

4.4 DATA AND MODEL

This study uses data from the 1971, 1981, 1991, 2001 and 2011 Census of Canada, PUMF (Individuals), to study the relationship between language knowledge and wages in Quebec. The 2001 and 2011 censuses represent a 2.7% random sample of the Canadian population. The 1991, 1981 and 1971 files are a 3.0%, 2.0% and 1.0% random sample, respectively, of the Canadian population. Census's are conducted in May or June and contain information on the knowledge of the official languages spoken (English and French), mother tongue, demographics, place of residence, education level and labour force activity including earnings corresponding to the year preceding the census date.

Our dependent variable is the respondent's annual earnings. Annual earnings take the form of wages and salaries, net income from self-employment, and other employment income (tips, gratuities, etc.).[108] As common in the literature (see Hatton and Leigh, 2011; Frenette and Morissette, 2005; Abbott and Beach, 1993) only those individuals who reported positive annual earnings are considered in this study.

In the census, the knowledge of the official languages question is posed as "Can this person speak English or French well enough to conduct a conversation?" The information from this question informs us whether the respondent feels they are able to speak English and/or French, as the possible responses are English only; French only, both English and French or neither official language. It is worth mentioning that responses to this question are based on the respondent's self-assessment of their ability to conduct a conversation in the given language and the census questionnaire is available in English, French and 22 other languages (including 11 Aboriginal languages) to assist those respondents respondents whose first language is neither French nor English.

[108] Other employment income cannot be separated from wages and salaries in the Census.

The Census also provides information on the mother tongue of the respondent. This gives information on the first language learned and still understood. In the census, the question is posed as: “What is the language that this person first learned at home in childhood and still understands?” Respondents can select English, French and Other-specify. We consider in turn the impact of knowledge of an official language for French mother tongue speakers, English mother tongue speakers and allophone immigrants.[109] Mother tongue plays an important role and is used to separate the data. Based on the definition of mother tongue, individuals always have knowledge of their mother tongue language. As for allophone immigrants, they are immigrants whose mother tongue is neither English nor French. It is worth mentioning that for both the French mother tongue speakers and the English mother tongue speakers, the sample consists of both natives and immigrants in the study. Instead, for allophones, we focus our attention only on immigrants, i.e. we do not include the native Americans in our sample.

Using a simple Mincer wage regression, we regress the natural logarithm of annual earnings of each individual in each mother tongue group against a series of individual characteristics of the respondents.[110] Of particular interest is whether the respondent has any knowledge of an official language (English or French). Thus, for the English mother tongue individuals, we construct a dummy variable representing ‘knowledge of French’. It takes the value of 1 if the respondent understands French and zero otherwise. By regressing this variable amongst other independent variables, it will allow us to estimate the payoff associated to knowing a second official language, French, for the English mother tongue

[109] Most researchers define linguistic groups in Canada on the basis of mother tongue. The Canadian Censuses also provides information on the respondents’ ethnicity, but this variable is not generally used to study language, as it is an error-ridden measure of language ability possibly due to the definition of ethnicity not being stable over time. Also, mother tongue is believed to capture the ethnic and human-capital dimensions of language (Vaillancourt 1980). In addition, some researchers prefer to use the variable ‘language used at home’ as opposed to ‘mother tongue’. However, we believe mother tongue is preferable to language used at home as it represents an exogenous characteristic for a person.

[110] See Mincer (1958).

individuals (given that they already know English from childhood). Similarly, for the French mother tongue individuals, a ‘knowledge of English’ dummy variable is constructed.

For the Allophone immigrants, we use a simple immigrant status variable to identify the individuals that are immigrants. Three different combinations of dummy language knowledge variables are used: Knowledge of French only, Knowledge of English only, and Knowledge of both English and French.

Along with the language dummy variables, the Census allows us to include other independent variables. These are age, educational attainment, the log of the number of weeks worked[111], dummy variables for immigration, citizenship and marital status and whether the respondent resides in the Montreal census metropolitan area (CMA). We also include dummies indicating the highest degree of education attained (high-school, some college, college, and bachelor or above). For immigrants, we also include two variables: age at immigration and the number of years since migration. These variables are commonly employed in the literature regarding earnings of foreign-born persons (see for example, Meng 1987, Hatton and Leigh 2011 and Bloom, Grenier and Gunderson 1994).

In total there are eight age groups (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60-64). With regards to the educational attainment, we use five groups (1) no certificate, diploma or degree, (2) high school graduation certificate or equivalency certificate, (3) some college or other non-university certificate or diploma, (4) college or other non-university certificate or diploma, and (5) bachelor degree or more. The education level is determined by the person’s most advanced certificate, diploma or degree. This information is obtained from the educational qualifications question in the census, which asked for all certificates, diplomas and degrees to be reported.

[111] We consider the number of weeks worked as it takes into account the work effect of the individual.

Following convention, our sample data is initially restricted to males between the ages of 25 and 64.[112] This age range is preferred to avoid problems of endogeneity of labour force participation decisions such as schooling, childcare or retirement decisions. Females are excluded from the analysis at this stage to avoid problems inherent in modelling labour supply decisions. Other sample restrictions include individuals must be employed, have a positive wage and reside in the province of Quebec. These restrictions are imposed on the sample to ensure that the individuals in the sample are more or less homogenous.

The analysis is conducted firstly for the whole of Quebec, followed by Quebec excluding the CMA of Montreal and then lastly for Montreal only. For the regressions of the whole of Quebec, we include a dummy for individuals that reside in Montreal, given its 'unique language market'. Using data from the 2001 PUMF of the Canadian census, we construct table 4.1 of the language composition by mother tongue of the population residing in Quebec, Quebec excluding Montreal and finally, Montreal. It is evident from the table that while Montreal has - as the rest of Quebec-a French mother tongue majority, it also has a much larger proportion of English mother tongue speakers and allophones (due to the high influx of immigrants that settle in Montreal). Thus, we cannot treat the whole of Quebec province as one because essentially what language 'pays' in one region may not pay in another.

[112] This is so in the first instance we avoid the complexities of modeling labour supply in analyses for women and retired men.

Table 4.1: Language composition by mother tongue of population in Quebec, Quebec excluding Montreal and Montreal, 2001 Census PUMF

Mother Tongue	Quebec Province	Quebec excluding Montreal	Montreal
English	7.58%	3.99%	11.58%
French	80.92%	93.34%	67.14%
English and French	0.64%	0.54%	0.76%
Non-official language	10.86%	2.13%	20.52%

After applying the sample restrictions mentioned above and removing all individuals with missing values in relevant variables, we get a final sample of around 150,000 individuals, including both natives and immigrants for Quebec and around 78,000 for Montreal. Of those living in Quebec, there are nearly 13,000 mother tongue Anglophones, 120,000 mother tongue Francophones and around 18,000 immigrants with a mother tongue other than French or English (allophones). For those living in the metropolitan region of Montreal, the figures are 10,000, 52,000 and 16,000 individuals, respectively.

4.5 RESULTS

We begin the empirical analysis with the estimations for Anglo and francophone (natives and immigrants) and allophone (immigrants only) men. The standard earnings regressions include variables of the individual's knowledge of official language(s). Then in section 4.5.1, results are presented for each census year. In section 4.5.2, we introduce females into our analysis and finally we test whether it pays to learn a second official language depending on the degree of bilingualism in one's own mother tongue of other groups, i.e. depending on whether communication is likely to be possible in an alternative language. We do this by introducing into our regression an interaction term between knowledge of a second official language and the proportion of individuals that one can communicate with using their first official language. This is covered in section 4.6.

The relationship between earnings and the standard determinants of earnings in the literature will be mentioned first and then the variables that are of particular interest for this study are discussed. Also, comparisons are made between the estimated impact of language knowledge, for different mother tongue groups.

Table 4.2 presents regressions on the annual earnings of mother tongue Anglophones (independently on whether they are natives or immigrants) against different individual characteristics including their knowledge of French. Results for the whole of Quebec, Quebec excluding the Montreal area and Montreal only are presented in columns 1, 2 and 3, respectively. Starting with age and age squared, they are positively and negatively correlated with annual earnings for the three regressions. As for the other individual characteristics, annual earnings are higher for individuals that are married and those that have worked for lengthier periods.[113]

Obtaining a Canadian citizenship either through birth or naturalization has no impact on earnings in all three regressions. This conflicts with what is generally found in studies. For example, Chiswick and Miller (1992, 2002) find citizenship to have a positive and significant effect on earnings.[114]

In addition, we find that immigrant Anglophones residing in Quebec or Montreal receive lower earnings than Canadian English mother tongue speakers. This result is of no surprise, as there exists an extensive literature on the assimilation of immigrants that finds immigrants to earn less than comparable natives.[115] We find immigration status to have no impact on earnings of immigrants living outside of Montreal. This may be due to the small number of observations available (2844) in this region of Quebec, as it is well known that the majority of immigrants end up living in Montreal.

Also, we find that Anglophones that live in Montreal are likely to have higher annual earnings than those that reside in other parts of Quebec. This may be because higher paid jobs are naturally located in cities, in this case, Montreal.

Turning to educational attainment, unsurprisingly, we find that it is positively correlated with annual earnings. The more educated an individual, the higher their earnings. This result is consistent with that found in the literature.[116]

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[113] The log of the number of weeks worked annually measures period of work.

[114] When we consider females in our analysis, we find citizenship to have a positive and significant impact on earnings. Therefore it may be that the impact of citizenship on earnings is gender specific.

[115] See for example, Chiswick (1978); Borjas (1985); LaLonde and Topel (1992); Bloom and Gunderson (1989).

[116] Some of the studies that reinforce this point include Meng (1987), Borjas (1991) and Hum and Simpson (2000).

Table 4.2 The determinants of the annual earnings for English mother tongue speakers residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations

	Quebec	**Quebec excluding Montreal**	**Montreal**
Age	0.08*** [0.006]	0.07*** [0.01]	0.08*** [0.006]
Age Squared	-0.0008*** [0.00006]	-0.0008*** [0.0001]	-0.0008*** [0.00007]
Married	0.26*** [0.01]	0.17*** [0.03]	0.28*** [0.01]
Log weeks worked	1.00*** [0.02]	0.90*** [0.03]	1.05*** [0.02]
Canadian Citizenship	0.008 [0.04]	0.0002 [0.13]	0.01 [0.04]
Immigrant	-0.16*** [0.04]	-0.12 [0.13]	-0.15*** [0.05]
Montreal	0.06*** [0.01]	--	--
High School education level	0.18*** [0.02]	0.20*** [0.04]	0.17** [0.02]
Some college education level	0.20*** [0.02]	0.24*** [0.05]	0.18*** [0.03]
College education level	0.37*** [0.02]	0.39*** [0.05]	0.37*** [0.03]
Bachelor degree and above education level	0.61*** [0.02]	0.58*** [0.04]	0.61*** [0.02]
Years in Canada*Immigrant	0.04*** [0.01]	0.04 [0.04]	0.03** [0.01]
Age at immigration*Immigrant	-0.002** [0.0009]	-0.0003 [0.004]	-0.002*** [0.0009]
Knowledge of French language	0.03** [0.01]	0.07** [0.03]	0.01 [0.01]
R squared	0.43	0.34	0.47
Obs	12454	2844	9610

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for given census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

Regarding the interaction terms included in the regression, ‘Years in Canada*immigrant’ is positively correlated with the annual earnings only for Quebec and Montreal. For the regression of Quebec excluding Montreal, the coefficient is positive but insignificant. Nevertheless, this is the same conclusion of the literature on the assimilation of immigrants. It is thought that the longer an immigrant has been in the host society, the more human capital- specific to the host society he will have acquired. This is then translated into receiving higher earnings.

As for the second interaction term ‘age at immigration*immigrant’, we see mixed results. For Montreal only and Quebec the result is negatively correlated with the annual earnings. Thus, older individuals at migration will receive lower wages than the younger immigrants. This is a common result in the literature. Essentially, this is due to the amount of time spent in Quebec. Immigrants that had migrated at a younger age have had more time in the host country and presumably have more host specific skills than immigrants that migrated at an older age. However, we see no impact for Quebec excluding Montreal. This may be because Montreal has a large proportion of immigrants.

As for our main explanatory variable, from table 4.2, we find that knowledge of French as a second language positively impacts earnings in all three regressions, but the effect is significant only for Quebec and Quebec excluding Montreal.[117] This may be due to the fact that the large proportion of English mother speakers in Montreal (14% in 2011) can still interact with a large number of individuals in the area even in the absence of any knowledge of French, while this is not the case in the rest of Quebec where the proportion of native English speakers is much lower (11% in 2011). In other words, Anglophones living outside

[117] Carliner (1981) finds a different result. He finds that there was no significant wage premium for native English speakers residing in Quebec, who learnt French.

of Montreal in Quebec will receive higher net earnings to knowing French than Anglophones that live in Montreal.

Despite efforts over the years by the Quebec government to reduce the use of English, it is still extensively used in public activities and concerns are regularly expressed about the future viability of the French language (Grenier and Nadeau 2011). Thus, for the case of Anglophones, the payoff associated to knowing French might be as a second language highly localized.

One may ask, given that English is a language with an internationally high status, why would an English mother tongue speaker residing in Quebec choose to learn French? There are several answers. Firstly, jobs in the federal civil service require one to be bilingual in both English and French. Hence, schools offer French as a compulsory subject and many Anglophone parents can choose to send their children to schools where French is the language of instruction.[118]

Secondly, given that it is compulsory for the children of immigrants to attend schools in which French is the language of instruction, many English mother tongue natives/children feel they too would like to benefit from this economic advantage associated with learning an additional language, and so decide to learn French as a second language.

Thirdly, there are reports that suggest that French schools in Quebec are of better quality than the English ones in teaching the French language.[119] Since English mother tongue parents have the right to choose which school systems to send their children to, many opt for the French schools due to them being better at teaching the French language

[118] The charter of the French language states that French is the mandatory language of instruction up till secondary school. However, students that come from Anglophone families can choose to receive their education in English. They may attend an English school and learn French as a second language or they may choose to attend a French school and receive their education in French.

[119] Refer to 'Rapport Larose (2001). Parts of the report can also be found in Marie-Andree Lord (2007).

than English schools. Consequently, the Anglophone children learn the French language at a proficient level.

Finally, Quebec is a bilingual province with a heterogeneous language market. Some areas such as Quebec City have an overwhelming~~ly~~ share of French speakers. Since languages are used to communicate, many Anglophones may feel the need to learn French given Quebec's unique language makeup. For all these reasons, choosing to learn French, as a second language is still popular amongst the Anglophones. This is confirmed by figure 4.2, which shows an increase in bilingualism over time amongst native Anglophones.

Results for the French mother tongue individuals are presented in table 4.3. Starting with the individual characteristics, it appears individuals that are older, married, have worked longer periods, are more educated and reside in Montreal have higher annual earnings. These results are similar to those of the Anglophones in table 4.2. In addition, those that possess Canadian citizenship have higher earnings.[120] Also, being an immigrant negatively affects earnings but only if the immigrant lives outside of Montreal. Since immigrants residing in Montreal are not negatively affected by their immigrant status, this effect may be due to jobs outside the cities paying lower. Likewise the results of the Anglophones, Francophones living in Montreal have higher earnings. We attribute this to higher paid jobs being located in cities.

With regards to the interaction terms, the years in Canada*immigrant term is positively correlated to earnings across the three regressions. The age at immigration*immigrant term, has a negative impact on earnings for both the whole of Quebec and Montreal and no impact for Quebec excluding Montreal.

120 Chiswick and Miller (2003) find a similar result.

Table 4.3 The determinants of the annual earnings for French mother tongue speakers residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations

	Quebec	**Quebec excluding Montreal**	**Montreal**
Age	0.08*** [0.001]	0.07*** [0.002]	0.08*** [0.002]
Age Squared	-0.0008*** [0.00002]	-0.0007*** [0.00002]	-0.0008*** [0.00003]
Married	0.22*** [0.005]	0.19*** [0.006]	0.24*** [0.006]
Log weeks worked	0.83*** [0.005]	0.79*** [0.008]	0.88*** [0.009]
Canadian Citizenship	0.12*** [0.03]	0.14* [0.06]	0.12*** [0.03]
Immigrant	-0.11*** [0.03]	-0.24*** [0.061]	-0.04 [0.03]
Montreal	0.06*** [0.005]	--	--
High school education level	0.16*** [0.006]	0.16*** [0.008]	0.17*** [0.009]
Some college education level	0.21*** [0.007]	0.20*** [0.009]	0.22*** [0.01]
College education level	0.33*** [0.007]	0.33*** [0.009]	0.34*** [0.01]
Bachelor degree and above education level	0.54*** [0.007]	0.53*** [0.01]	0.55*** [0.01]
Years in Canada*Immigrant	0.05*** [0.01]	0.07*** [0.02]	0.03** [0.01]
Age at immigration*Immigrant	-0.005*** [0.0006]	0.003 [0.001]	-0.007*** [0.0006]
Knowledge of English language	0.09*** [0.004]	0.09*** [0.006]	0.08*** [0.007]
R squared	0.43	0.31	0.54
Obs	120069	67472	52597

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. -- Indicates result not required.

****p*=0.01, ***p*=0.05 and **p*=0.10

As for knowledge of English, it is positively correlated with annual earnings across the three regressions.[121] Thus, there may be a positive payoff to be gained from knowing English given that one already has knowledge of French. Our result agrees with Grenier and Nadeau's (2016) result. They find a payoff associated to using English at work for French mother tongue individuals. One interpretation might be that better paid jobs are in English or knowing English on the job pays better. Also having knowledge of a second language such as English may act as a signaling effect for employers. Employers may believe that bilingual persons have greater cognitive abilities than monolinguals and therefore, make sharper, efficient and more productive workers. This usually makes them worthy of receiving higher earnings. Thus, they receive higher earnings not necessary because they can speak more than one language but rather due to other traits they posses (for example greater cognitive ability).

What is of interest is that the payoff of knowing English as a second official language is greater than knowing French as a second official language.[122] This could be due to the internationally higher status of the English language as it is commonly referred to as the *lingua franca*. Thus, we conclude the importance of knowing a second official language to be more successful in the labour market. More importantly, there exists an asymmetry between the two languages, with the English language providing a higher payoff. Clearly, the power of attraction of the English language is still very strong.[123] This asymmetry is more pronounced in the Montreal area than in the rest of Quebec. In Montreal the difference in payoff between the two languages is 0.7, greater than the difference for the rest of Quebec 0.2.[124]

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[121] The returns associated to knowing the English language is similar for the three different regions, the whole of Quebec, Quebec excluding Montreal and Montreal only.

[122] The coefficients of knowing English and knowing French are significantly different from each other at the 95% confidence interval, for Quebec.

[123] Grenier and Nadeau (2016) find similar results.

[124] However the difference between the language variables is not statistically significant.

We have to be cautious of associating bilingualism with higher earnings. Bilingualism is correlated to earnings but does not cause it. Possible section bias is likely to have played a role in causing this result. Ambitious English speaking parents send their children to French schools rather than English because they know bilingualism pays. These ambitious parents and their offspring are likely to posses' qualities, on average, (such as more able cognitive and verbal ability and higher levels of experience) other than bilingualism, which may be rewarded in the labour market, through higher earnings. In other words, self-selection leads to an exaggeration on the earnings of bilinguals. However, it cannot be ruled out that this association may also be interpreted as indicating that those with better cognition are more likely to become successful bilinguals.

Related to this, schools that employ more skilled teachers for bilingual teaching may have higher quality of education overall, inducing higher returns to schooling. We control for educational attainment as not doing so may lead to an exaggeration of estimates of bilingualism on earnings. This is because bilingualism might have a positive effect on the earnings one receives via educational attainment. Our concern stems from Portes and Rumbaut (2001) who found that bilingualism has a positive and significant effect on educational attainment and it is well documented in the literature that educational attainment has a positive impact on earnings.

Also, given that government jobs require one to be bilingual in both the English and French language, bilingual candidates may have a recruitment advantage over monolingual Anglophones with otherwise similar skills, regardless of any earnings premium for bilingualism as a skill.

Lastly, we turn to the allophone immigrants. Table 4.4 presents the impact of knowing one or both of the official languages on immigrants' annual earnings in Quebec. Analysing first the individual characteristics, the correlations found between these variables and earnings are quite stable across the three regressions, and present the expected signs.[125]

In accordance with the existing literature on immigrant assimilation,[126] the years since migration is positively correlated with annual earnings for all the three regressions.

We see a positive correlation between Canadian citizenship and the annual earnings of Allophone immigrants for both Quebec and Montreal. This result is expected because obtaining a Canadian citizenship requires one to have stayed a significant amount of time in Canada/Quebec and therefore is associated with greater investment in Canadian- specific human capital. In other words, immigrants are more likely over time to assimilate or become similar to native Canadians and natives receive higher earnings than immigrants. Additionally, individuals that are non-Canadian citizens are more likely to be disadvantaged in the labour market, as some jobs require citizenship status (Chiswick and Miller 2002).

Looking at the knowledge of French language variable, it is positively correlated with the annual earnings for both Quebec and Montreal. However, for Quebec excluding Montreal, there is no impact of knowledge of French language on annual earnings. The same pattern in results is seen for knowledge of English language variable. Thus, it pays allophone immigrants residing in Quebec or Montreal to know one official language, whether it is English or French. This result is of no surprise as there are numerous studies in the linguistic

125 The variables of age, age squared, log weeks worked, education and marriage are positively correlated with annual earnings, as expected.

126 The literature agrees that immigrant earnings rise with time spent in the host country. The years since migration variable reflect the labour market experience accumulated after arrival in host country. See for example, Chiswick and Miller 2002; Lubotsky 2000.

literature that point to a similar conclusion.[127] This is perhaps due to bilingualism opening up many employment opportunities (Borjas 1994).

This is not the case for those living in other parts of Quebec excluding Montreal in which the positive correlation is not significant. We put this down to the small sample size we have for allophone immigrants residing in areas other than Montreal in Quebec (almost all of the allophone immigrants are found in Montreal).

As expected a positive correlation exists between knowledge of both official languages and annual earnings. Knowing both official languages has a higher payoff across the three regressions as opposed to knowing only one official language.

It is worth pointing out that the payoff associated to knowing French only is slightly higher than the payoff associated with knowing English only.[128] This result differs from that of the English and French mother tongue individuals, in which we found having knowledge of the English language pays more in Quebec. In other words, if an allophone immigrant had to choose between learning either the French or English language, it pays slightly more to know French as opposed to English. As mentioned previously, it may be because of the Quebec government actively promoting the use of the French language[129] and so reward immigrants that speak French more than those that speak only English. Nevertheless, and as expected the incentive to having knowledge of both official languages is even greater than that of only knowing one of the official languages.

[127] Many studies find immigrants that are fluent in the host country's language to receive higher earnings than immigrants who are not. See, for example Carliner (1981); Chiswick and Miller (1992,2007); Chiswick (1998); Bloom and Grenier (1992).

[128] The difference is not statistically significant at the 95%, 80% or 70% confidence interval.

[129] For example, by providing free French courses to immigrants, specialized language training in selected occupations and enacting laws that require the children of immigrants to attend a French speaking school.

Table 4.4 The determinants of the annual earnings for Allophone immigrants residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations

	Quebec	Quebec excluding Montreal	Montreal
Age	0.05*** [0.006]	0.07*** [0.02]	0.05*** [0.006]
Age squared	-0.0006*** [0.00007]	-0.0008*** [0.0002]	-0.0005*** [0.00007]
Married	0.100*** [0.02]	0.07 [0.07]	0.10*** [0.02]
Log weeks worked	0.87*** [0.01]	0.98*** [0.07]	0.87*** [0.01]
Canadian Citizenship	0.11*** [0.02]	-0.002 [0.07]	0.11*** [0.02]
Montreal	-0.04 [0.02]	--	--
High school education level	0.11*** [0.02]	0.19** [0.09]	0.11*** [0.02]
Some college education level	0.19*** [0.03]	0.14 [0.11]	0.20*** [0.03]
College education level	0.33*** [0.02]	0.42*** [0.09]	0.32*** [0.02]
Bachelor degree and above education level	0.60*** [0.02]	0.61*** [0.08]	0.60*** [0.02]
Years since migration	0.11*** [0.008]	0.13*** [0.03]	0.11*** [0.008]
Knowledge of French language only	0.14*** [0.04]	0.01 [0.22]	0.15*** [0.04]
Knowledge of English language only	0.12*** [0.04]	0.14 [0.23]	0.12*** [0.04]
Knowledge of both the English and French language	0.21*** [0.04]	0.11 [0.22]	0.21*** [0.04]
R squared	0.38	0.32	0.38
Obs	11934	924	11010

Note: The dependent variable is the individual’s annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. -- Indicates result not required. ***p=0.01, **p=0.05 and *p=0.10

As the payoff of knowing English only is smaller than the payoff of knowing French only, the increase in payoff for going from English only to both English and French is larger than the increase in payoff for going from French only to both English and French.[130]

For example, for Quebec, the additional payoff to knowing English given that one already knows French is 0.05 whereas the payoff to knowing French given that one already knows English is 0.08. Similarly for Montreal, the payoff to knowing English given that one already knows French is 0.05 whereas the payoff to knowing French given that one already knows English is 0.08.

4.5.1 Comparing Results across Censuses

Given that there are important changes over time in the proportion of individuals who are bilingual and changes in other elements in the environment, it might be the case that the language coefficients are not stable over time. Therefore, in this section we provide an estimate for each census year separately, for Quebec as a whole and for Montreal.

Tables 4.5, 4.6, 4.7, 4.8, 4.9 and 4.10 in appendix 4 present, ordinary least squares (OLS) estimates of wage equations using data from 2011, 2001, 1991, 1981 and 1971 separately for the three mother tongue groups. Here we comment only on results that differ from our standard benchmark results (please refer to tables 4.2, 4.3 and 4.4).

130 The coefficients of the language variables for the whole of Quebec and Montreal are statistically significant but the difference is not statistically significant at the 95%, 80% or 70% confidence interval.

The first thing to point out is that for the 1971 data; many variables are not statistically significant, potentially due to small sample sizes. Starting with the English mother tongue individuals in Quebec (see table 4.5 in appendix 4), the impact on annual earnings of knowing French as a second official language is positive and significant for all years except for 1971 and 2011. One reason for this may be the creation of *Bill 101* in 1977. This led to an increase in francophone ownership of Quebec's private economy, resulting in the demand for French language skills to increase between 1971 and 2000.[131] Other reasons that led to higher demand for French include the decline in quality of Francophone workers between 1970 and 1985 and the increase in the proportion of bilingual Anglophones between 1970 and 2000.[132]

This could explain the insignificant coefficient of the knowledge of French variable (for the English mother tongue individuals) for the census years 1971 and 2011. The year 2011 is included in this explanation because according to Nadeau (2009), the Quebec economy after the year 2000 resembled the one in 1970.

In addition the returns associated to knowing French for English mother tongue speakers increased over time. For example, in 1981 the bilingual premium is 0.04 and by 2001 the premium increased to 0.11. The increase in demand for French language skills during the period 1970-2000 in Quebec's work sector might have caused this.

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131 There is strong evidence that there was an increase in the relative demand for French language skills in Quebec's economy during 1970 and 2000. See for example, Vaillancourt et al, (2007) and Nadeau (2009).

132 Table 4.24 in appendix 4 shows the proportion of bilingual workers increased for Anglophones at a much greater rate than for Francophone individuals over the years. This may reflect the economic returns to bilingualism.

Albouy (2008) and Nadeau (2009) suggest another explanation of 'reverse discrimination'. They argue that post 2000 is similar to pre 1970 in which Francophones controlled much of the Quebec economy and Anglophones were penalized in the labour market, not because they cannot speak French but because their mother tongue is not French.

Looking at the results for the individual census years for Anglophones in Quebec (table 4.5 in appendix 4) and Montreal (table 4.6 in appendix 4), it is apparent that this might is the case. Anglophones residing in Quebec and Montreal with knowledge of French did not receive a wage premium associated to French knowledge-which goes against the convention of an increase in wages due to bilingualism- during the documented period. In fact the coefficient sign associated with the knowledge of French language variable for the years 1971 and 2011 are negative (although not significant). This indicates that around 1970 and after the year 2000, Anglophones may have been penalized due to their mother tongue, although pinpointing the exact cause is hard to say.

In addition, from our original results in table 4.2, the interaction term 'age at immigration*immigrants' is negative and significant for the whole of Quebec and Montreal but not for the individual census years.[133] One explanation for this may be that the number of immigrants in the sample is small when looking at the individual census years in isolation.

Finally, whereas before we found that immigrants were penalized with lower wages for being an immigrant,[134] looking at the individual census years, we find that immigration status has no impact on the annual earnings earned by immigrants residing in both Quebec and Montreal for the census years 1971, 2001 and 2011.

Turning to francophone individuals (see tables 4.7 and 4.8 in appendix 4), we find two changes in the results. Firstly, becoming a Canadian citizen has no impact on the annual

[133] A similar pattern is seen for Montreal (table 4.6 in appendix 4).

[134] Of course there may be other unobservable characteristics associated to being an immigrant contributing to the lower wages.

earnings received in the years 1980 and 2000 for individuals living in the province of Quebec.[135] This is similar for those living in Montreal with the addition of the census year 1991. Secondly, the term age at immigration interacted with immigrants has no impact on the annual earnings of immigrants living in Quebec-for the census years 1981, 1991 and 2001. For the case of Montreal, this variable has a negative and significant impact with annual earnings for the census year 2011. There are no changes to the knowledge of English language variable.[136]

Regarding the allophone immigrants (see tables 4.9 and 4.10 in appendix section 4), we find that for the census years 1991 and 2001, we find no impact on annual earnings of knowing either one or both of the official languages, and this applies both to Montreal and to Quebec as a whole.

4.5.2 Women and languages

In this section women are introduced into the analysis.[137] Data on both men and women is combined with a dummy variable for the male gender.[138] The relationship between earnings and the language variables will be explored and comparisons made between the estimated impacts among these results and our benchmark results (males only). Results are presented in appendix 4 (see tables, 4.11, 4.12 and 4.13).

On the whole, including females does not alter the results of the language variables for the French mother tongue individuals and allophone immigrants. French mother tongue

135 This corresponds to the census years 1981 and 2001 as individuals report the amount they earned the year prior to the census date.

136 Knowledge of the English language has a positive and significant impact on the annual earnings of French mother tongue individuals in all the individual census years.

137 Likewise men, we only include women that report a positive wage.

138 While the male dummy variable is not our main concern, we note for the three mother tongue groups in our study, men earn significantly more than women.

individuals living in all parts of Quebec with knowledge of English receive a wage premium compared to those that do not know English. As for allophone immigrants, it pays to have knowledge of an official language and knowing two official languages pays more.

However, for the Anglophones, we find that having knowledge of French as a second official language pays in Montreal.[139] It seems that bilingual Anglophone women can benefit from living in Montreal unlike Anglophone men living in Montreal who do not receive a wage premium for being bilingual. The results for the conventional determinants of earnings are discussed in the footnote.[140]

We now calculate regressions for women separately. The results can be found below in tables 4.14, 4.15, and 4.16. Other changes in the results are for female Allophone immigrants. Interestingly, we find there is no impact to knowing one official language on their earnings. For males, we found a positive impact to knowing an official language on earnings (with the French language paying more than English). However, regardless of gender, there is a positive association to knowing both English and French on earnings in Quebec and Montreal. The results for the other remaining variables are footnoted.[141]

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[139] Prior to the inclusion of women, this variable was not significant.

[140] For the Allophone immigrants the coefficient on the Montreal dummy has a negative and significant impact with earnings for the whole of Quebec. This implies that an allophone immigrant residing in Montreal receive lower earnings than one that resides in other parts of Quebec. Prior to the inclusion of females, this dummy lacked significance. For the English mother tongue individuals, both the Canadian citizenship dummy (for Quebec) and interaction term 'years in Canada*immigrant' (for Quebec excluding Montreal) are now significant. This implies that the impact of acquiring citizenship on earnings is gender-specific to females when the person in question is an Anglophone. This is also the case for the duration of residence in Canada for immigrants.

[141] Our results indicate that being married has a negative impact on earnings for females compared to males in which the impact is positive. This result holds true over the three different mother tongue groups. It maybe that married women have kids to look after and so devote less time to market activities negatively impacting their earnings compared to non-married women. Al-Sabah (2017) finds similar results. I find that married men spend more time at work whereas married women spend less time working compared to their non-married counterparts. The number of hours one spends working can impact the earnings one receives. Also, for the French mother tongue group, immigration status has no impact on earnings earned by females residing in areas in Quebec other than Montreal. For men, being an immigrant negatively impacted earnings.

Table 4.14: The determinants of annual earnings for English Mother tongue speakers in Quebec, Quebec excluding Montreal and Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations, separately for men and female

	Quebec		**Quebec excluding Montreal**		**Montreal**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Age	0.08*** [0.006]	0.05*** [0.006]	0.07*** [0.01]	0.07*** [0.01]	0.08*** [0.006]	0.05*** [0.007]
Age Squared	-0.0008*** [0.00006]	-0.0005*** [0.00008]	-0.0008*** [0.0001]	-0.0008*** [0.0002]	-0.0008*** [0.00007]	-0.0005*** [0.00008]
Married	0.26*** [0.01]	-0.03* [0.01]	0.17*** [0.03]	-0.05 [0.04]	0.28*** [0.01]	-0.02 [0.01]
Log weeks worked	1.00*** [0.02]	1.00*** [0.01]	0.90*** [0.03]	1.02*** [0.04]	1.05*** [0.02]	0.99*** [0.02]
Canadian Citizenship	0.008 [0.04]	0.08* [0.04]	0.0002 [0.13]	0.26* [0.15]	0.01 [0.04]	0.06 [0.04]
Immigrant	-0.16*** [0.04]	-0.16*** [0.05]	-0.12 [0.13]	-0.15 [0.18]	-0.15*** [0.05]	-0.15** [0.06]
Montreal	0.06*** [0.01]	0.05** [0.02]	--	--	--	--
High School education level	0.18*** [0.02]	0.21*** [0.02]	0.20*** [0.04]	0.14** [0.05]	0.17** [0.02]	0.22*** [0.03]
Some college education level	0.20*** [0.02]	0.19*** [0.04]	0.24*** [0.05]	0.14 [0.08]	0.18*** [0.03]	0.21*** [0.04]
College education level	0.37*** [0.02]	0.39*** [0.02]	0.39*** [0.05]	0.39*** [0.06]	0.37*** [0.03]	0.38*** [0.03]
Bachelor degree and above education level	0.61*** [0.02]	0.66*** [0.02]	0.58*** [0.04]	0.74*** [0.06]	0.61*** [0.02]	0.64*** [0.03]
Years in Canada*Immigrant	0.04*** [0.01]	0.06*** [0.01]	0.04 [0.04]	0.07 [0.05]	0.03** [0.01]	0.05*** [0.01]
Age at immigration*Immigrant	-0.002** [0.0009]	-0.002 [0.001]	-0.0003 [0.004]	0.001 [0.005]	-0.002*** [0.0009]	-0.002* [0.001]
Knowledge of French language	0.03** [0.01]	0.06*** [0.01]	0.07** [0.03]	0.04 [0.04]	0.01 [0.01]	0.06*** [0.02]
R squared	0.43	0.45	0.34	0.37	0.47	0.47
Obs	12454	9841	2844	2179	9610	7662

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

Table 4.15: The determinants of the annual earnings for French Mother tongue speakers in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations, separately for men and female

	Quebec		Quebec excluding Montreal		Montreal	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Age	0.08*** [0.001]	0.06*** [0.002]	0.07*** [0.002]	0.06*** [0.003]	0.08*** [0.002]	0.06*** [0.002]
Age Squared	-0.0008*** [0.00002]	-0.0006*** [0.00003]	-0.0007*** [0.00002]	-0.0007*** [0.00003]	-0.0008*** [0.00003]	-0.0006*** [0.00004]
Married	0.22*** [0.005]	-0.03*** [0.005]	0.19*** [0.006]	-0.04*** [0.007]	0.24*** [0.006]	-0.02*** [0.007]
Log weeks worked	0.83*** [0.005]	0.93*** [0.005]	0.79*** [0.008]	0.91*** [0.007]	0.88*** [0.009]	0.96*** [0.008]
Canadian Citizenship	0.12*** [0.03]	0.16*** [0.03]	0.14* [0.06]	0.32*** [0.08]	0.12*** [0.03]	0.13*** [0.04]
Immigrant	-0.11*** [0.03]	-0.02 [0.04]	-0.24*** [0.061]	-0.005 [0.07]	-0.04 [0.03]	-0.01 [0.04]
Montreal	0.06*** [0.005]	0.08*** [0.005]	--	--	--	--
High School education level	0.16*** [0.006]	0.27*** [0.007]	0.16*** [0.008]	0.28*** [0.01]	0.17*** [0.009]	0.24*** [0.01]
Some college education level	0.21*** [0.007]	0.29*** [0.01]	0.20*** [0.009]	0.32*** [0.01]	0.22*** [0.01]	0.24*** [0.01]
College education level	0.33*** [0.007]	0.55*** [0.008]	0.33*** [0.009]	0.59*** [0.01]	0.34*** [0.01]	0.50*** [0.01]
Bachelor degree and above education level	0.54*** [0.007]	0.84*** [0.008]	0.53*** [0.01]	0.91*** [0.01]	0.55*** [0.01]	0.76*** [0.01]
Years in Canada*Immigrant	0.05*** [0.01]	0.04*** [0.01]	0.07*** [0.02]	0.001 [0.02]	0.03** [0.01]	0.04*** [0.01]
Age at immigration*Immigrant	-0.005*** [0.0006]	-0.006*** [0.0008]	0.003 [0.001]	-0.0003 [0.002]	-0.007*** [0.0006]	-0.006*** [0.0009]
Knowledge of English language	0.09*** [0.004]	0.10*** [0.005]	0.09*** [0.006]	0.10*** [0.007]	0.08*** [0.007]	0.11*** [0.007]
R squared	0.43	0.47	0.31	0.42	0.54	0.53
Obs	120069	96926	67472	53996	52597	42930

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

Table 4.16: The determinants of the annual earnings for Allophone immigrants in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations, separately for men and female

	Quebec		**Quebec excluding Montreal**		**Montreal**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Age	0.05*** [0.006]	0.04*** [0.008]	0.07*** [0.02]	0.05*** [0.03]	0.05*** [0.006]	0.03*** [0.008]
Age squared	-0.0006*** [0.00007]	-0.0004*** [0.00009]	-0.0008*** [0.0002]	-0.0005*** [0.0004]	-0.0005*** [0.00007]	-0.0004*** [0.00009]
Married	0.100*** [0.02]	-0.03* [0.02]	0.07 [0.07]	-0.11 [0.09]	0.10*** [0.02]	-0.03 [0.02]
Log weeks worked	0.87*** [0.01]	0.83*** [0.01]	0.98*** [0.07]	0.67*** [0.07]	0.87*** [0.01]	0.83*** [0.01]
Canadian Citizenship	0.11*** [0.02]	0.11*** [0.02]	-0.002 [0.07]	0.22 [0.02]	0.11*** [0.02]	0.11*** [0.02]
Montreal	-0.04 [0.02]	-0.09*** [0.03]	--	--	--	--
High school education level	0.11*** [0.02]	0.15*** [0.02]	0.19** [0.09]	0.19* [0.11]	0.11*** [0.02]	0.15*** [0.02]
Some college education level	0.19*** [0.03]	0.11*** [0.04]	0.14 [0.11]	-0.02 [0.17]	0.20*** [0.03]	0.13*** [0.04]
College education level	0.33*** [0.02]	0.38*** [0.03]	0.42*** [0.09]	0.33*** [0.11]	0.32*** [0.02]	0.39*** [0.03]
Bachelor degree and above education level	0.60*** [0.02]	0.59*** [0.03]	0.61*** [0.08]	0.68*** [0.11]	0.60*** [0.02]	0.59*** [0.03]
Years since migration	0.11*** [0.008]	0.09*** [0.009]	0.13*** [0.03]	0.05 [0.03]	0.11*** [0.008]	0.09*** [0.009]
Knowledge of French language only	0.14*** [0.04]	0.03 [0.04]	0.01 [0.22]	0.07 [0.25]	0.15*** [0.04]	0.02 [0.04]
Knowledge of English language only	0.12*** [0.04]	0.03 [0.04]	0.14 [0.23]	-0.10 [0.27]	0.12*** [0.04]	0.03 [0.05]
Knowledge of both the English and French language	0.21*** [0.04]	0.15*** [0.05]	0.11 [0.22]	0.26 [0.25]	0.21*** [0.04]	0.15*** [0.05]
R squared	0.38	0.41	0.32	0.38	0.38	0.41
Obs	11934	8406	924	555	11010	7851

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

4.6 Network Externalities

Two official languages exist in the province of Quebec, French (referred to as language F) and English (referred to as language E). Every individual has a mother tongue that they are fully competent in. This can be French (the majority mother tongue language), English, both English and French, or a non-official language.[142] Due to Quebec's unique linguistic characteristic, we test whether having knowledge of a second official language pays given that communication might already take place in the other official language. This notion stems from the work of network externality put forward by Church and King (1993).[143]

Before we proceed further, it is worth reminding the reader of the distinction between mother tongue language and having knowledge of a language. The mother tongue language is usually first learned in childhood naturally and therefore no conscious decision was made by the individual to acquire this language. However, having knowledge of a language(s) could involve learning the language. For example, an individual that has an English mother tongue would obviously have knowledge of English. They may also indicate that they have knowledge of another language, for example Spanish. This tells us that the individual made a conscious decision to learn Spanish but not English.

Likewise Church and King (1993), we view languages as a communication tool and so in order for communication to take place one individual must encounter another individual who speaks the same language as him/her.[144] An individual derives his/her utility from being able to successfully communicate with others.

[142] We do not include those individuals that have a mother tongue of both English and French. This is because we test the payoff associated to being bilingual after acquiring knowledge of an additional official language other than the mother tongue.

[143] Refer to the literature review section for more information on this paper.

[144] In reality, communication can take place between individuals with different languages. For example a translator may be present, but such activity is costly.

We test this idea empirically using data from the Canadian censuses of 2011 and 2001.[145] We focus on Quebec province and conduct the analysis at the city level. The census provides information on four cities in Quebec: Quebec City, Montreal, Sherbrooke -Trois-Rivieres and Ottawa-Gatineau. From data provided by Statistics Canada, we construct the proportions of bilingual individuals for each mother tongue group. That way, we can analyse the extent to which knowing an additional official language has a payoff[146] given that communication in another language can potentially already take place.

Specifically, we test whether it pays less for an Anglophone to have knowledge of F when there are more English speakers amongst the French mother tongue individuals, i.e. when the French mother tongue individuals are bilingual. Symmetrically, we do this for the Francophone- testing whether more bilingualism among the Anglophones lowers the returns from knowing E for the francophones. Finally, we check if the extent of bilingualism among the official language groups alters the payoffs of knowing E or F for the allophone immigrants.

Given that we attribute the role of languages to being communication devices, we expect to find a negative and significant effect of the interaction between having knowledge for example of F and the proportion of bilingual individuals that speak E in a given city. If the proportion of francophones in a given city is higher than in another, then knowing French for an Anglophone might be less important because communication is anyway possible in English. In other words the probability that a communication match between Anglophones and Francophone increases and the common language of communication is English.

145 We only use the Census years of 2011 and 2001, as they are the only years in which information on detailed mother tongue and knowledge of official languages is available at the CMA level.

146 The proportions are presented in table 4.17 and 4.17a in appendix section 4.

4.6.1 Results

The coefficients are estimated separately for men and women. Results are presented in tables 4.18, 4.19 and 4.20 for the three mother tongue language groups. The first and second columns show the results after introducing the new externality variables, for males and females, respectively. Results without the introduction of the externality variables (benchmark results) can be found in appendix section 4 (please see tables 4.21, 4.22 and 4.23). Since our prime interest is with the knowledge of official language variables, we will only comment on these variables. Results for the other remaining variables are footnoted.[147]

Starting with the French mother tongue males, after the externality variables[148] are introduced into the regression, from table 4.18 the knowledge of the English language variable loses significance and the knowledge of English variable interacted with the proportion of bilingual individuals among the English mother tongue group is positive and significant with annual earnings. The sign of this interaction term goes against the intuition provided previously. This implies that despite francophone individuals being able to communicate with the Anglophones (possibly in French), it still pays to know the English language. In addition, it also means that it pays even more for the Francophone individuals to speak English when the English mother tongue speaks French.

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[147] The coefficients signs on the conventional variables are as expected. For the French mother tongue speakers: After the introduction of the externality variables, for men, the Montreal dummy variable was no longer significant and for females, the marriage variable is no longer significant. In addition, whereas before the Montreal dummy was positive and significant, it is now negative and significant. For the English mother tongue female speakers: After the introduction of the externality variables, Citizenship dummy becomes significant and Montreal dummy loses significance.

[148] The variables are (1) The proportion of bilingual individuals among the English mother tongue speakers (2) the proportion of bilingual individuals among the English mother tongue speakers interacted with individuals that have knowledge of the English language (3) the proportion of allophones with knowledge of the French language and (4) the proportion of allophones with knowledge of the French language interacted with individuals that have knowledge of the English language. All variables are calculated at the CMA level.

One question that comes to mind is, given that communication can already take place between individuals in French, why does it pay for French mother tongue men to know English? There are several reasons for this. Firstly, languages may serve a purpose other than communication. They may serve as an indicator to employers of workers ability. Secondly, English is an international language and the majority language in the rest of Canada. Thirdly, individuals are free to choose to communicate in the language of their choice. It maybe those males prefer to communicate in English as opposed to French. All these reasons may be reflected in the higher pay received by French mother tongue males that speak English.

For females, the same interaction term is also positive and significant with annual earnings. Interestingly, the interaction term between having knowledge of English and the proportion of allophone with knowledge of French is negative and significant. This result is coherent with the theory we mentioned earlier. There seems to be a distinction in terms of who we communicate with, an allophone or a non-allophone. For women, it pays to speak English if communication takes place with an English mother tongue but the impact of knowing English goes in the opposite direction if communication is with allophones.

For the English mother tongue speakers,[149] the introduction of the externality variables in the men's regression does not alter the result for the knowledge of French variable. For females, the knowledge of French variable loses significance once the externality variables are introduced. Also, for both genders, none of the interaction variables are significant.

[149] The variables are (1) the proportion of bilingual individuals among the French mother tongue speakers (2) the proportion of bilingual individuals among the French mother tongue speakers interacted with individuals that have knowledge of the French language (3) the proportion of allophones with knowledge of the French language (4) the proportion of allophones with knowledge of the English language interacted with individuals that have knowledge of the French language. All variables are calculated at the CMA level.

Finally, for the allophone immigrants,[150] the knowledge of English, knowledge of French and knowledge of both English and French become not significant once the externality variables are introduced into the regression for men. Likewise the English mother tongue speakers, none of the interaction variables are significant, regardless of gender. These results resonate with Melitz (2008). He found no evidence of network externalities of language.

We produce a mix of results. We find evidence to support the externality hypothesis in the case of French mother tongue females. There is also evidence of externality for the mother tongue Francophone males, but the sign is the unexpected one. However, for the other two mother tongue groups there is no evidence of network externalities. It may be that there is not enough variation as we only have data from two census years and four cities in Quebec.

[150] The variables are (1) the proportion of bilingual individuals among the French mother tongue speakers (2) the proportion of bilingual individuals among the English mother tongue speakers (3) the proportion of bilingual individuals among the French mother tongue speakers interacted with individuals that have knowledge of the English language only and (4) the proportion of bilingual individuals among the English mother tongue speakers interacted with individuals that have knowledge of the French language only. All variables are calculated at the CMA level.

Table 4.18: The determinants of the annual earnings for French mother tongue speakers in Quebec using the 2001 and 2011 Census observations, separately for males and females

Wage of French mother tongue speakers	Males	Females
Age	0.09*** [0.003]	0.09*** [0.003]
Age Squared	-0.001*** [0.00004]	-0.0009*** [0.00004]
Married	0.22*** [0.009]	-0.002 [0.008]
Log weeks worked	0.80*** [0.01]	0.85*** [0.01]
Canadian Citizenship	0.09** [0.04]	0.08* [0.05]
Immigrant	-0.18*** [0.05]	-0.25*** [0.06]
Montreal	-0.02 [0.02]	-0.16*** [0.02]
High school education level	0.19*** [0.01]	0.26*** [0.01]
Some college education level	0.24*** [0.01]	0.23*** [0.02]
College education level	0.39*** [0.01]	0.54*** [0.01]
Bachelor degree and above education level	0.61*** [0.01]	0.83*** [0.01]
Years in Canada*Immigrant	0.06*** [0.01]	0.09*** [0.01]
Age at immigration*Immigrant	-0.005*** [0.00]	-0.0008 [0.001]
Knowledge of English language	0.06 [0.09]	0.29*** [0.09]
Proportion of bilingual among English mother tongue in the city	0.36 [0.26]	1.34*** [0.27]
Knowledge of English language*proportion of bilingual among English mother tongue in the city	0.06*** [0.02]	0.05*** [0.02]
Proportion of Allophones with Knowledge of French in the city	-1.25** [0.50]	-3.27*** [0.51]
Knowledge of English*proportion of allophones with Knowledge of French in the city	-0.0003 [0.11]	-0.26** [0.12]
R squared	0.25	0.31
Obs	38693	36907

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ***p=0.01, **p=0.05 and *p=0.10.

Table 4.19: The determinants of the annual earnings for English mother tongue speakers in Quebec using the 2001 and 2011 Census observations

Wage of English mother tongue speakers	Males	Females
Age	0.09*** [0.01]	0.07*** [0.01]
Age Squared	-0.0008*** [0.0001]	-0.0007*** [0.0001]
Married	0.28*** [0.02]	-0.01 [0.02]
Log weeks worked	0.97*** [0.03]	0.94*** [0.03]
Canadian Citizenship	-0.08 [0.07]	-0.14* [0.08]
Immigrant	-0.11 [0.10]	-0.26* [0.11]
Montreal	-0.03 [0.10]	-0.18* [0.11]
High school education level	0.16*** [0.05]	0.26*** [0.05]
Some college education level	0.18** [0.07]	0.09 [0.07]
College education level	0.38*** [0.05]	0.42*** [0.05]
Bachelor degree and above education level	0.68*** [0.04]	0.68*** [0.05]
Years in Canada*Immigrant	0.05* [0.02]	0.08*** [0.02]
Age at immigration*Immigrant	-0.007*** [0.003]	-0.002 [0.002]
Knowledge of French language	-0.45 [0.59]	0.79 [0.71]
Proportion of bilingual among French mother tongue in the city	0.95 [1.00]	-0.25 [1.02]
Knowledge of French language*proportion of bilingual among French mother tongue in the city	-0.87 [0.70]	0.47 [0.70]
Proportion of Allophones with Knowledge of English in the city	-0.46 [1.38]	2.18 [1.44]
Knowledge of French*proportion of allophones with Knowledge of English in the city	1.36 [1.05]	-1.27 [1.20]
R squared	0.27	0.25
Obs	4671	4248

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ****p*=0.01, ***p*=0.05 and **p*=0.10.

Table 4.20: The determinants of the annual earnings for Allophone immigrants in Quebec using the 2001 and 2011 Census observations

Wage of Allophone immigrants	Males	Females
Age	0.06*** [0.009]	0.05*** [0.01]
Age squared	-0.0006*** [0.0001]	-0.0005*** [0.0001]
Married	0.06** [0.02]	-0.05* [0.02]
Log weeks worked	0.85*** [0.03]	0.79*** [0.02]
Canadian Citizenship	0.11*** [0.03]	0.12*** [0.03]
Montreal	-0.05 [0.06]	-0.19*** [0.06]
High school education level	0.14*** [0.03]	0.19*** [0.03]
Some college education level	0.21*** [0.05]	-0.01 [0.06]
College education level	0.35*** [0.03]	0.38*** [0.04]
Bachelor degree and above education level	0.62*** [0.03]	0.59*** [0.03]
Years since migration	0.11*** [0.01]	0.09*** [0.01]
Knowledge of French language only	-0.58 [0.80]	0.47 [0.98]
Knowledge of English language only	0.29 [0.33]	0.15 [0.34]
Knowledge of both the English and French language	-0.36 [0.85]	0.81 [1.03]
Proportion of bilingual among French mother tongue speakers	-1.20 [1.48]	-0.35 [1.05]
Proportion of bilingual among English mother tongue speakers	-0.07 [1.05]	-0.09 [1.75]
Knowledge of English only* Proportion of bilingual among French mother tongue speakers	-0.33 [0.63]	-0.37 [0.66]
Knowledge of French only* Proportion of bilingual among English mother tongue speakers	1.07 [1.17]	-0.74 [1.44]
R squared	0.24	0.29
Obs	6728	5381

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ****p*=0.01, ***p*=0.05 and **p*=0.10.

4.7 CONCLUSION

Using micro-data from the 1971, 1981, 1991, 2001 and 2011 Canadian censuses, we studied the payoffs associated with knowing an official language(s) for three mother tongue groups: French, English and other. We carried this analysis for the whole of Quebec province, Quebec excluding the Montreal metropolitan area and for Montreal only. We also tested whether a higher prevalence of bilingualism among Francophone individuals lowers the pay-off associated to speaking French for the Anglophones and (symmetrically) whether more bilingualism among Anglophones lowers the returns from knowing English for them. Similarly, we check if the extent of bilingualism among the official language groups alters the payoffs of knowing English or French for the allophone immigrants.

Our results point to a few conclusions. Firstly and as expected, bilingualism pays. Individuals that have knowledge of a second official language can expect to earn more than individuals that have knowledge of only one official language. For the French mother tongue speakers, there is a positive payoff associated to knowing the English language. Similarly, for the English mother tongue speakers there is also a positive payoff to knowing French but it is small compared to the effect of knowing English by the French mother tongue group. Clearly the role of English as the *lingua franca* is fundamental. However, for the allophone immigrants, learning English only increased their wage a lot and learning French only increased the wage by slightly more. However, knowing both English and French increased the wage by far more. Thus it pays allophone immigrants more to be bilingual in English and French than unilingual in either French or English. This result is even more important for allophone immigrant females who do not receive higher wages if they know one official language but a wage premium is expected if they have knowledge of both French and English.

We also find that for francophone individuals and allophone immigrants, bilingualism pays roughly the same in the whole of Quebec and in Montreal. However, bilingualism tends to be rewarded at a higher rate in Quebec than in Montreal for Anglophone individuals.

Finally, we find mixed evidence for network externality. We find evidence of network externality for Francophone individuals but not for Anglophones or allophone immigrants.

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APPENDIX 4

Table 4.5 The determinants of the Annual earnings for English Mother tongue speakers residing in Quebec, for individual census years

English mother tongue, Quebec	2011	2001	1991	1981	1971
Married	0.29*** [0.03]	0.22*** [0.04]	0.29*** [0.03]	0.22*** [0.02]	0.31*** [0.04]
Log weeks worked	0.88*** [0.04]	1.02*** [0.04]	0.99*** [0.04]	1.14*** [0.03]	1.01*** [0.05]
Canadian Citizenship	-0.11 [0.10]	-0.01 [0.11]	0.01 [0.09]	0.05 [0.06]	0.11 [0.08]
Age	0.09*** [0.01]	0.08*** [0.01]	0.07*** [0.01]	0.09*** [0.009]	0.07*** [0.01]
Age Squared	-0.0009*** [0.0001]	-0.0008*** [0.0002]	-0.0006*** [0.0001]	-0.0009*** [0.0001]	-0.001*** [0.0001]
Immigrant	-0.18 [0.11]	-0.07 [0.22]	-0.42*** [0.13]	-0.31*** [0.10]	-0.01 [0.08]
Montreal	0.006 [0.03]	0.07* [0.04]	0.06* [0.03]	0.12*** [0.02]	-
High School education level	0.08 [0.06]	0.21*** [0.05]	0.22*** [0.04]	0.22*** [0.03]	-0.09 [0.34]
Some college education level	0.10 [0.14]	0.27*** [0.07]	0.19*** [0.05]	0.16*** [0.03]	0.15 [0.35]
College education level	0.28*** [0.06]	0.41*** [0.06]	0.41*** [0.05]	0.38*** [0.04]	0.34 [0.39]
Bachelor degree and above education level	0.58*** [0.06]	0.71*** [0.05]	0.53*** [0.04]	0.54*** [0.03]	0.31 [0.34]
Years in Canada*Immigrant	0.07** [0.03]	0.04 [0.05]	0.11*** [0.04]	0.08*** [0.03]	0.16* [0.09]
Age at immigration*Immigrant	-0.003 [0.003]	-0.008 [0.005]	0.004 [0.002]	0.002 [0.002]	0.01* [0.01]
Knowledge of French language	-0.01 [0.04]	0.11** [0.04]	0.04* [0.03]	0.04* [0.02]	-0.01 [0.03]
R squared	0.26	0.25	0.28	0.42	0.32
Obs	2765	2673	3108	2535	1373

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. For 2011, the knowledge of French language coefficient turns positive and significant when we include both females and males in the regression. ***p=0.01, **p=0.05, *p=0.10.

Table 4.6 The determinants of the Annual earnings for English Mother tongue speakers residing in Montreal for individual census years

English mother tongue, Montreal	2011	2001	1991	1981	1971
Married	0.32*** [0.04]	0.27*** [0.04]	0.26*** [0.04]	0.23*** [0.03]	0.31*** [0.04]
Log weeks worked	0.88*** [0.05]	1.05*** [0.06]	1.11*** [0.05]	1.19*** [0.04]	1.01*** [0.05]
Canadian Citizenship	-0.14 [0.11]	-0.08 [0.12]	0.11 [0.09]	0.06 [0.06]	0.11 [0.08]
Age	0.09*** [0.01]	0.08*** [0.01]	0.08*** [0.01]	0.08*** [0.01]	0.07*** [0.01]
Age Squared	-0.0008*** [0.0001]	-0.0008*** [0.0002]	-0.0007*** [0.0001]	-0.0008*** [0.0001]	-0.001*** [0.0001]
Immigrant	-0.11 [0.14]	-0.05 [0.24]	-0.43*** [0.14]	-0.31*** [0.11]	-0.01 [0.08]
High School education level	0.13 [0.08]	0.15* [0.07]	0.19*** [0.05]	0.21*** [0.03]	-0.09 [0.34]
Some college education level	0.01 [0.17]	0.23* [0.09]	0.14** [0.06]	0.18*** [0.04]	0.15 [0.35]
College education level	0.32*** [0.08]	0.35*** [0.07]	0.39*** [0.05]	0.40*** [0.04]	0.34 [0.39]
Bachelor degree and above education level	0.61*** [0.08]	0.68*** [0.06]	0.53*** [0.05]	0.57*** [0.03]	0.31 [0.34]
Years in Canada*Immigrant	0.05 [0.03]	0.03 [0.05]	0.12*** [0.04]	0.07** [0.03]	0.16* [0.09]
Age at immigration*Immigrant	-0.005 [0.003]	-0.009* [0.005]	0.004 [0.003]	0.002 [0.002]	0.01* [0.01]
Knowledge of French language	-0.0005 [0.05]	0.09* [0.05]	0.02 [0.03]	0.02 [0.02]	-0.02 [0.03]
R squared	0.26	0.25	0.31	0.44	0.32
Obs	2082	1965	2270	1920	1373

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. ***p=0.01, **p=0.05, *p=0.10.

Table 4.7 The determinants of the Annual earnings for French Mother tongue speakers residing in Quebec, for individual census years

French mother tongue, Quebec	2011	2001	1991	1981	1971
Married	0.19*** [0.009]	0.21*** [0.01]	0.21*** [0.009]	0.24*** [0.01]	0.25*** [0.01]
Log weeks worked	0.74*** [0.01]	0.83*** [0.01]	0.84*** [0.01]	0.93*** [0.01]	0.84*** [0.01]
Canadian Citizenship	0.09** [0.04]	0.13 [0.08]	0.14* [0.07]	0.08 [0.05]	0.14* [0.07]
Age	0.09*** [0.003]	0.07*** [0.004]	0.07*** [0.003]	0.07*** [0.003]	0.04*** [0.007]
Age Squared	-0.0009*** [0.00004]	-0.0008*** [0.00005]	-0.0008*** [0.00004]	-0.0008*** [0.00004]	-0.0006*** [0.00006]
Immigrant	-0.20*** [0.05]	-0.34** [0.15]	-0.33*** [0.10]	-0.35*** [0.09]	0.005 [0.08]
Montreal	0.07*** [0.008]	0.08*** [0.01]	0.06*** [0.008]	0.03*** [0.008]	--
High School education level	0.17*** [0.01]	0.16*** [0.01]	0.15*** [0.01]	0.16*** [0.01]	-0.01 [0.11]
Some college education level	0.16*** [0.04]	0.23*** [0.01]	0.21*** [0.01]	0.15*** [0.01]	0.16 [0.13]
College education level	0.35*** [0.01]	0.38*** [0.01]	0.30*** [0.01]	0.29*** [0.01]	0.18 [0.15]
Bachelor degree and above education level	0.56*** [0.01]	0.61*** [0.01]	0.50*** [0.01]	0.48*** [0.01]	0.32*** [0.11]
Years in Canada*Immigrant	0.06*** [0.01]	0.07** [0.03]	0.09*** [0.02]	0.13*** [0.02]	0.12** [0.05]
Age at immigration*Immigrant	-0.005*** [0.001]	0.002 [0.004]	0.001 [0.002]	0.001 [0.002]	0.009** [0.004]
Knowledge of English language	0.07*** [0.008]	0.10*** [0.01]	0.09*** [0.008]	0.05*** [0.008]	0.19*** [0.01]
R squared	0.22	0.20	0.27	0.37	0.32
Obs	32116	30576	31891	18485	7001

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. ***p=0.01, **p=0.05, *p=0.10.

Table 4.8 The determinants of the Annual earnings for French Mother tongue speakers residing in Montreal, for individual census years

French mother tongue, Montreal	2011	2001	1991	1981	1971
Married	0.24*** [0.01]	0.24*** [0.01]	0.21*** [0.01]	0.24*** [0.01]	0.25*** [0.01]
Log weeks worked	0.78*** [0.01]	0.92*** [0.02]	0.91*** [0.01]	0.97*** [0.02]	0.84*** [0.01]
Canadian Citizenship	0.11** [0.05]	0.11 [0.09]	0.13 [0.08]	0.06 [0.06]	0.14* [0.07]
Age	0.10*** [0.005]	0.09*** [0.006]	0.08*** [0.004]	0.07*** [0.005]	0.04*** [0.007]
Age Squared	-0.001*** [0.00006]	-0.0009*** [0.00007]	-0.0009*** [0.00006]	-0.0008*** [0.00006]	-0.0006*** [0.00006]
Immigrant	-0.07 [0.07]	-0.28* [0.16]	-0.27* [0.11]	-0.35*** [0.11]	0.005 [0.08]
High School education level	0.18*** [0.02]	0.17*** [0.02]	0.17*** [0.01]	0.17*** [0.01]	-0.01 [0.11]
Some college education level	0.17** [0.06]	0.25*** [0.02]	0.23*** [0.01]	0.14*** [0.02]	0.16 [0.14]
College education level	0.36*** [0.02]	0.41*** [0.02]	0.31*** [0.01]	0.32*** [0.02]	0.18 [0.15]
Bachelor degree and above education level	0.59*** [0.02]	0.63*** [0.02]	0.49*** [0.01]	0.49*** [0.02]	0.32*** [0.11]
Years in Canada*Immigrant	0.02 [0.02]	0.07** [0.03]	0.08*** [0.03]	0.13*** [0.03]	0.12* [0.05]
Age at immigration*Immigrant	-0.008*** [0.001]	-0.0007 [0.004]	-0.0008 [0.002]	0.0009 [0.002]	0.009** [0.004]
Knowledge of English language	0.05*** [0.01]	0.07*** [0.01]	0.08*** [0.01]	0.02** [0.01]	0.19*** [0.01]
R squared	0.24	0.24	0.29	0.35	0.32
Obs	13141	12505	12608	7342	7001

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. ***p=0.01, **p=0.05, *p=0.10.

Table 4.9 The determinants of the annual earnings for Allophone immigrants residing in Quebec, for individual census years

Allophone Immigrants, Quebec	2011	2001	1991	1981	1971
Age	0.07*** [0.01]	0.07*** [0.01]	0.04*** [0.01]	0.05*** [0.01]	0.04** [0.01]
Age squared	-0.0006*** [0.0001]	-0.0007*** [0.0001]	-0.0005*** [0.0001]	-0.0006*** [0.0001]	-0.0004** [0.0002]
Married	0.06** [0.03]	0.08 [0.05]	0.15*** [0.04]	0.12*** [0.04]	0.23*** [0.06]
Log weeks worked	0.92*** [0.03]	0.76*** [0.04]	0.85*** [0.03]	0.99*** [0.03]	1.01*** [0.06]
Canadian Citizenship	0.13*** [0.03]	0.07 [0.05]	0.14*** [0.04]	0.09** [0.04]	0.04 [0.05]
Montreal	-0.05 [0.04]	0.03 [0.07]	-0.07 [0.05]	-0.06 [0.05]	--
High school education level	0.16*** [0.04]	0.11* [0.06]	0.06 [0.04]	0.16*** [0.04]	0.25* [0.14]
Some college education level	0.29** [0.13]	0.21*** [0.07]	0.21*** [0.05]	0.15*** [0.04]	0.50** [0.19]
College education level	0.35*** [0.04]	0.36*** [0.06]	0.31*** [0.05]	0.35*** [0.05]	0.26 [0.28]
Bachelor degree and above education level	0.59*** [0.04]	0.68*** [0.05]	0.63*** [0.04]	0.52*** [0.04]	0.72*** [0.16]
Years since migration	0.09*** [0.01]	0.14*** [0.02]	0.13*** [0.01]	0.09*** [0.02]	0.05* [0.03]
Knowledge of French language only	0.18** [0.08]	0.09 [0.14]	-0.06 [0.09]	0.25*** [0.07]	0.27*** [0.09]
Knowledge of English language only	0.17** [0.08]	0.06 [0.14]	-0.10 [0.09]	0.25*** [0.07]	0.30*** [0.08]
Knowledge of both the English and French language	0.20** [0.08]	0.18 [0.14]	0.009 [0.09]	0.34*** [0.07]	0.37*** [0.08]
R squared	0.28	0.18	0.32	0.41	0.38
Obs	4091	2823	2657	1700	663

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets.
-- Indicates result not required. ****p*=0.01, ***p*=0.05 and **p*=0.10

Table 4.10 The determinants of the annual earnings for Allophone immigrants residing in Montreal, for individual census years

Allophone Immigrants, Montreal	2011	2001	1991	1981	1971
Age	0.05*** [0.01]	0.07*** [0.02]	0.04*** [0.01]	0.05*** [0.01]	0.04** [0.01]
Age squared	-0.0005*** [0.0001]	-0.0008*** [0.0002]	-0.0004*** [0.0002]	-0.0006*** [0.0001]	-0.0004** [0.0002]
Married	0.06** [0.03]	0.07 [0.05]	0.15*** [0.04]	0.13*** [0.04]	0.23*** [0.06]
Log weeks worked	0.92*** [0.03]	0.76*** [0.05]	0.84*** [0.03]	0.94*** [0.04]	1.01*** [0.06]
Canadian Citizenship	0.14*** [0.03]	0.11* [0.05]	0.14*** [0.04]	0.07* [0.04]	0.04 [0.05]
High school education level	0.15*** [0.04]	0.11* [0.06]	0.05 [0.04]	0.17*** [0.04]	0.25* [0.14]
Some college education level	0.32*** [0.13]	0.19*** [0.07]	0.22*** [0.05]	0.15*** [0.04]	0.50** [0.19]
College education level	0.34*** [0.04]	0.33*** [0.06]	0.32*** [0.05]	0.37*** [0.05]	0.26 [0.28]
Bachelor degree and above education level	0.59*** [0.04]	0.66*** [0.05]	0.63*** [0.04]	0.54*** [0.04]	0.72*** [0.16]
Years since migration	0.09*** [0.01]	0.14*** [0.02]	0.13*** [0.01]	0.11*** [0.02]	0.06* [0.03]
Knowledge of French language only	0.16* [0.08]	0.14 [0.14]	-0.05 [0.09]	0.25*** [0.08]	0.27*** [0.09]
Knowledge of English language only	0.15* [0.08]	0.10 [0.14]	-0.11 [0.09]	0.25*** [0.08]	0.30*** [0.08]
Knowledge of both the English and French language	0.18** [0.08]	0.22 [0.14]	0.001 [0.09]	0.35*** [0.07]	0.37*** [0.09]
R squared	0.29	0.19	0.30	0.38	0.38
Obs	3768	2586	2437	1556	663

Note: The dependent variable is the individual’s annual earnings. Robust standard errors are in brackets. -- Indicates result not required. ***p=0.01, **p=0.05 and *p=0.10

Table 4.11 The determinants of the annual earnings for English mother tongue speakers residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations (including females)

	Quebec	Quebec excluding Montreal	Montreal
Age	0.009*** [0.007]	0.007*** [0.001]	0.06** [0.004]
Age Squared	-0.0007*** [0.0005]	-0.008*** [0.0001]	-0.0007*** [0.0006]
Married	0.15*** [0.01]	0.06** [0.02]	0.16*** [0.01]
Log weeks worked	1.02*** [0.01]	0.97*** [0.02]	1.04*** [0.01]
Canadian Citizenship	0.06** [0.03]	0.12 [0.09]	0.05 [0.03]
Immigrant	-0.15*** [0.04]	-0.14 [0.11]	-0.13*** [0.04]
Montreal	0.06*** [0.01]	--	--
High School education level	0.19*** [0.01]	0.17*** [0.03]	0.19*** [0.02]
Some college education level	0.21*** [0.02]	0.22*** [0.04]	0.20*** [0.02]
College education level	0.38*** [0.01]	0.39*** [0.04]	0.38*** [0.02]
Bachelor degree and above education level	0.63*** [0.01]	0.66*** [0.03]	0.63*** [0.02]
Years in Canada*Immigrant	0.05*** [0.01]	0.06* [0.03]	0.03* [0.01]
Age at immigration*Immigrant	-0.001*** [0.0008]	0.0006 [0.003]	-0.002*** [0.0007]
Knowledge of French language	0.05*** [0.01]	0.06** [0.02]	0.04*** [0.01]
Male dummy	0.38*** [0.01]	0.41*** [0.02]	0.37*** [0.01]
R squared	0.44	0.37	0.47
Obs	22295	5023	17272

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ***p=0.01, **p=0.05 and *p=0.10. -- Indicates result not required.

Table 4.12 The determinants of the annual earnings for French mother tongue speakers residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations (including females)

	Quebec	Quebec excluding Montreal	Montreal
Age	0.08*** [0.001]	0.07*** [0.001]	0.07*** [0.002]
Age Squared	-0.0007*** [0.00001]	-0.0007*** [0.00002]	-0.0007*** [0.00002]
Married	0.09*** [0.003]	0.08*** [0.005]	0.11*** [0.005]
Log weeks worked	0.89*** [0.004]	0.87*** [0.005]	0.94*** [0.006]
Canadian Citizenship	0.16*** [0.02]	0.19*** [0.05]	0.14*** [0.02]
Immigrant	-0.10*** [0.02]	-0.16*** [0.05]	-0.05* [0.02]
Montreal	0.07*** [0.003]	--	--
High School education level	0.20*** [0.004]	0.20*** [0.006]	0.20*** [0.007]
Some college education level	0.25*** [0.006]	0.25*** [0.008]	0.24*** [0.009]
College education level	0.43*** [0.05]	0.45*** [0.007]	0.42*** [0.008]
Bachelor degree and above education level	0.68*** [0.005]	0.71*** [0.007]	0.66*** [0.008]
Years in Canada*Immigrant	0.05*** [0.008]	0.04*** [0.01]	0.04*** [0.009]
Age at immigration*Immigrant	-0.005*** [0.0004]	0.001 [0.001]	-0.006*** [0.0005]
Knowledge of English language	0.09*** [0.003]	0.09*** [0.004]	0.09*** [0.004]
Male dummy	0.41*** [0.003]	0.43*** [0.004]	0.38*** [0.005]
R squared	0.45	0.38	0.53
Obs	216995	121468	95527

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

Table 4.13 The determinants of the annual earnings for allophone immigrants residing in Quebec, Quebec excluding Montreal and in Montreal using 1971, 1981, 1991, 2001 and 2011 Census observations (including females)

	Quebec	Quebec excluding Montreal	Montreal
Age	0.05*** [0.005]	0.06*** [0.02]	0.04*** [0.005]
Age squared	-0.0005*** [0.00006]	-0.0007*** [0.0002]	-0.0005*** [0.00005]
Married	0.04*** [0.01]	0.02*** [0.05]	0.04*** [0.01]
Log weeks worked	0.86*** [0.01]	0.84*** [0.05]	0.86*** [0.01]
Canadian Citizenship	0.11*** [0.01]	0.09 [0.05]	0.11*** [0.01]
Montreal	-0.06*** [0.02]	--	--
High school education level	0.14*** [0.01]	0.20*** [0.07]	0.13*** [0.01]
Some college education level	0.19*** [0.02]	0.15* [0.09]	0.19*** [0.02]
College education level	0.37*** [0.01]	0.40*** [0.07]	0.36*** [0.02]
Bachelor degree and above education level	0.61*** [0.01]	0.64*** [0.06]	0.60*** [0.01]
Years since migration	0.09*** [0.006]	0.09*** [0.02]	0.10*** [0.006]
Knowledge of French language only	0.09*** [0.03]	0.06 [0.16]	0.09*** [0.03]
Knowledge of English language only	0.09*** [0.03]	0.08 [0.17]	0.09*** [0.03]
Knowledge of both the English and French language	0.19*** [0.03]	0.19 [0.16]	0.19*** [0.03]
Male dummy	0.31*** [0.01]	0.25*** [0.04]	0.31*** [0.01]
R squared	0.40	0.35	0.41
Obs	20340	1479	18861

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for four census years. ****p*=0.01, ***p*=0.05 and **p*=0.10. -- Indicates result not required.

Table 4.17 presents the proportion of bilingual persons among the English and French mother tongue and Allophone individuals in each CMA, for the 2011 Census

Census Metropolitan Area	Proportion of bilingual among the English mother tongue individuals	Proportion of Allophones with knowledge of French language	Proportion of bilingual among the French mother tongue individuals	Proportion of Allophones with knowledge of English language
Quebec City	0.92	0.9	0.35	0.45
Montreal	0.69	0.76	0.51	0.68
Ottawa-Gatineau	0.57	0.73	0.65	0.73
Sherbrooke-Trois-Riviers	0.79	0.87	0.34	0.43

Data is from tabulations from Statistics Canada

Table 4.17a presents the proportion of bilingual persons among the English and French mother tongue and Allophone individuals in each CMA, for the 2001 Census

Census Metropolitan Area	Proportion of bilingual among the English mother tongue individuals	Proportion of Allophones with knowledge of French language	Proportion of bilingual among the French mother tongue individuals	Proportion of Allophones with knowledge of English language
Quebec City	0.93	0.92	0.31	0.5
Montreal	0.67	0.74	0.5	0.71
Ottawa-Gatineau	0.59	0.72	0.66	0.43
Sherbrooke-Trois-Riviers	0.77	0.85	0.32	0.50

Data is from tabulations from Statistics Canada

Table 4.21: The determinants of the annual earnings for French mother tongue speakers in Quebec using the 2001 and 2011 Census observations, separately for males and females, excluding the externality variables

Wage of French mother tongue speakers	Males	Females
Age	0.08*** [0.003]	0.08*** [0.002]
Age Squared	-0.0009*** [0.00003]	-0.0009*** [0.00003]
Married	0.20*** [0.007]	-0.01* [0.007]
Log weeks worked	0.79*** [0.009]	0.85*** [0.008]
Canadian Citizenship	0.10** [0.04]	0.11** [0.04]
Immigrant	-0.21*** [0.05]	-0.23*** [0.05]
Montreal	0.07*** [0.006]	0.09*** [0.006]
High school education level	0.17*** [0.009]	0.27*** [0.01]
Some college education level	0.22*** [0.01]	0.27*** [0.01]
College education level	0.37*** [0.01]	0.56*** [0.01]
Bachelor degree and above education level	0.58*** [0.01]	0.87*** [0.01]
Years in Canada*Immigrant	0.06** [0.01]	0.08*** [0.01]
Age at immigration*Immigrant	-0.003** [0.001]	-0.0006 [0.001]
Knowledge of English language	0.09*** [0.007]	0.11*** [0.007]
R squared	0.21	0.31
Obs	62692	57503

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ****p*=0.01, ***p*=0.05 and **p*=0.10.

Table 4.22: The determinants of the annual earnings for Allophone immigrant speakers in Quebec using the 2001 and 2011 Census observations, separately for males and females, excluding the externality variables

Wage of Allophone immigrant speakers	Males	Females
Age	0.06*** [0.009]	0.05*** [0.01]
Age squared	-0.0006*** [0.0001]	-0.0005*** [0.0001]
Married	0.06** [0.02]	-0.05** [0.02]
Log weeks worked	0.84*** [0.02]	0.78*** [0.02]
Canadian Citizenship	0.11*** [0.02]	0.12*** [0.03]
Montreal	-0.02 [0.04]	-0.14*** [0.04]
High school education level	0.14*** [0.03]	0.19*** [0.04]
Some college education level	0.21** [0.05]	-0.02 [0.06]
College education level	0.35*** [0.03]	0.38*** [0.04]
Bachelor degree and above education level	0.62*** [0.03]	0.59*** [0.03]
Years since migration	0.11*** [0.01]	0.10*** [0.01]
Knowledge of French language only	0.14** [0.07]	-0.03 [0.07]
Knowledge of English language only	0.13** [0.07]	-0.03 [0.07]
Knowledge of both the English and French language	0.19*** [0.07]	0.11 [0.07]
R squared	0.24	0.29
Obs	6914	5478

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ****p*=0.01, ***p*=0.05 and **p*=0.10.

Table 4.23: The determinants of the annual earnings for French mother tongue speakers in Quebec using the 2001 and 2011 Census observations, separately for males and females, excluding the externality variables

Wage of English Mother Tongue speakers	Males	Females
Age	0.08*** [0.01]	0.07*** [0.01]
Age Squared	-0.0008*** [0.0001]	-0.0007*** [0.0001]
Married	0.26*** [0.02]	-0.009 [0.02]
Log weeks worked	0.95*** [0.03]	0.96*** [0.03]
Canadian Citizenship	-0.06 [0.07]	-0.11 [0.07]
Immigrant	-0.12 [0.09]	-0.25* [0.10]
Montreal	0.04 [0.02]	0.02 [0.02]
High school education level	0.17*** [0.04]	0.22*** [0.04]
Some college education level	0.22*** [0.06]	0.08 [0.06]
College education level	0.37*** [0.04]	0.42*** [0.04]
Bachelor degree and above education level	0.67*** [0.04]	0.68*** [0.04]
Years in Canada*Immigrant	0.05** [0.02]	0.08*** [0.02]
Age at immigration*Immigrant	-0.006** [0.003]	-0.003 [0.002]
Knowledge of French language	0.05 [0.03]	0.13*** [0.03]
R squared	0.25	0.26
Obs	5438	4982

Note: The dependent variable is the individual's annual earnings. Robust standard errors are in brackets. Regressions include dummies (not reported) for one census year. ****p*=0.01, ***p*=0.05 and **p*=0.10.

5

Conclusions and Recommendations

5.1 MAIN FINDINGS

In chapter two, the research question *Do immigrants in Canada assimilate as groups?*, is studied. In short, the answer is positive. Immigrants may assimilate as groups, in particular groups that are defined by country of origin. We have shown that the origin group plays a fundamental role in the assimilation process of immigrants and their labour market success. The longer the immigrant's group has been present in Canada, the higher hourly wage and annual earnings immigrants from the same group can expect to receive. Also, the larger the past stock of the origin group, the higher hourly wage immigrants receive. It is worth stressing that these results could be due to variation in the composition of immigrants over time. With regards to the current stock of immigrants from the same origin group, a negative relationship exists between the relative hours worked and the stock, possibly due to crowding out. Finally, contrary to previous findings, we do not conclude that past immigration history matters less for highly educated immigrants, as they are seen to transcend ethnic barriers more easily. Rather we find the opposite. Past immigration history matters more for the highly educated immigrants. One interpretation of this result is that highly educated immigrants may be more motivated or determined to secure employment, and given that their education is likely to be discounted in the Canadian labour market, this will push them to seek help from their network or community to a greater extent than less educated immigrants.

This tells us that if immigrants from certain groups are struggling to assimilate in the labour market due to their group minority status, governments may be able to aid their assimilation by providing individual help to these individuals. Aid for example, may be in the form of providing opportunities to learn a new language or have a mentor on hand to explain the rules and customs of the host country. Struggling to assimilate could also be due to a lack of group historical presence in the host country. One solution could be for policymakers to be more welcoming to immigrants from the same country, establishing a historical presence for future immigrants of the same community. However, this would take decades to have an impact and it may not be politically implemented unless future politicians want to promote this. Alternatively, it may be more viable for governments to help those immigrants from countries with no or limited historical presence.

The empirical analysis in chapter 2 set the stage for chapter 3, which studies the role immigrant communities in Canada play in the non-market assimilation of Canadian immigrants. We find several key findings. Firstly, our results reveal that immigrant parents spend less time on market activities and on childcare, housework and looking after elderly family members compared to native Canadian parents. Therefore, we suggest that immigrants spend their time volunteering, charity work, unpaid work, gaining experience and personal care. Secondly, the migrant's community does play a significant role in the non-market assimilation process of Canadian immigrants. Specifically, the presence and size of the migrant's community positively impacts the assimilation process. The larger the community, the more the behavior of the immigrants mirrors the behavior of comparable natives. As for the past immigration history of the migrants' community, a negative relationship exists between the size of the past stock and the time spent on non-market activities. Thus, the present stock and the past stock of the communities work in opposite direction impacting the assimilation of immigrants. Finally, we find the closer the past stock is to the present, the greater the impact on the assimilation process.

Again these results reinforce the main conclusion echoed earlier in that immigrants struggling to assimilate may benefit from receiving individual help from the government Also, since we find immigrants to spend the majority of their time on unpaid work usually in the form of non-market activities and gaining labour market experience, governments can do more to help immigrants transcend from unpaid work to paid work. Facilitating this transfer may help immigrants assimilate more into the labour market.

Finally, chapter four attempts to answer the question, What is the payoff and use of the official languages in Quebec. The key finding is that a positive correlation exists between bilingualism and earnings. Individuals that know two official languages have a higher wage than those that only have knowledge of one official language. Possible selection bias is likely to have caused this result. Our results also reveal that the Montreal metropolitan area in Quebec must be looked at separately from the rest of Quebec in language studies on Quebec. We find having knowledge of English as a second official language given that one already knows French only is associated with higher earnings in Quebec but not in Montreal. This may be because Francophone individuals are likely to get by in Montreal without knowing the English language. Finally, we find evidence to suggest uses for the English language other than direct communication. The ability to communicate in another language increases market mobility. It pays francophone individuals to have knowledge of the English language given that communication can already take place with English mother tongue individuals possibly in French.

The results of this paper indicate that having knowledge of two official languages rather than one may be advantageous in the labour market. Thus, in regions that have more than one official language, governments should enshrine and implement policies that encourage and foster the learning and use of the official language. This can be done, for example, subsidizing the cost of language classes and facilitating evening classes.

5.2 CONTRIBUTIONS

- By studying the assimilation of immigrants using group level data as opposed to the common approach of using individual data, we have extended our understanding of how the assimilation process of immigrants works.
- The first study to look at the role of the immigrant community on the non-market assimilation process
- The first study to look at the assimilation of immigrants in Canada using non-market data
- One of few studies to look at Quebec Province/Montreal area dichotomy in the context of language payoff
- The first study to test empirically the network externality theory put forward by Church and King (1993). For example, we test whether the payoff from speaking language Y for X mother tongue individuals depends on the proportion of Y mother tongue individuals knowing language X in the city.

5.3 SHORTCOMINGS OR LIMITATIONS OF THE RESEARCH

We are aware of the shortcomings or limitations of this research study. Most are related to the data. One limitation affecting chapters two and three is related to the calculation of the immigrant stock. It would have been better to calculate the immigrant stock at the city level as opposed to the regional level. However, doing this would mean a lot of our data is lost.

With regards to chapter four 'Language in Quebec', it is difficult for us to control for the quality of language skills since the information available from the Census is typically binary and based on self-assessment. Thus, this information may have significant measurement error, which will bias downward the estimator of the coefficient on knowledge of official language. Also, the additional earnings from a language should be based on its usage at work/market place not on the mere knowledge of the language. However, information on language used in the workplace has only been collected in the Census since 2006. If we chose to use this kind of information, we would lose nearly half of our observations and since we focus only on the province of Quebec, this will lead to a much smaller sample size.

5.4 FUTURE RESEARCH

The literature on the assimilation of immigrants has advanced the most regarding an immigrant's human capital accumulation and their ability to assimilate. However, in two chapters, we have shown that outcomes for current immigrants depend on the size of origin-specific immigrant communities both in the present and past. Thus, more needs to be done to study the interactions between immigrant communities and the host society and its impact on the assimilation process of immigrants. One possible avenue for future research could be to look at the role immigrant-origin communities' play in the assimilation process of second-generation immigrants. Another avenue for future research could be to study the speed of assimilation. Finally, studying the time spent on non-market activities such as childcare tells us nothing about the quality of the activity. An extension could be to include the quality of the activity taking place.

REFERENCES

Church, J., King, I., 1993. Bilingualism and network externalities. Canadian Journal of Economics 26, 337–345.