

**The wage gap between Anglophones, Francophones
and Allophones: the case of Ottawa-Gatineau,
Montreal and Quebec**

Ibrahim Khalil Bousmah
Candidate for the Master's of Arts in Economics
Department of Economics, University of Ottawa,
Ottawa, Canada

Supervised by
Professor David Gray

Abstract

This paper investigates the men wage difference amongst Anglophones, Francophones and Allophones in the region of Ottawa-Gatineau, Montreal and Quebec. We use for data the 2006 Public Use Microdata Files on Individuals (PUMFI) from Statistics Canada. Thereby the statistical technique employed is the ordinary least squares analysis and also the instrumental variables method. For this purpose we used the logarithm annual wage of 2005 as dependant variable and the mother tongue, the home language, the language of work for linguistic independent variables. The results show that the wages gap between Francophones and Anglophones are not important but benefit in general Anglophones. Also we found that the biggest difference between linguistic variables is when we consider the language of work variable.

Résumé

Ce travail étudie les différences salariales entre Anglophones, Francophones et Allophones dans la région d'Ottawa-Gatineau, Montréal et Québec. Dans ce but, nous avons utilisé les données individuelles du recensement public 2006 de Statistique Canada. La technique statistique employée pour l'estimation de l'effet de nos variables sur le salaire est l'analyse des moindres carrés ainsi que la méthode des variables instrumentales. Par conséquent, nous avons adopté le logarithme annuel du salaire en 2005 comme variable dépendante et la langue maternelle, la langue à la maison et la langue au travail comme variables linguistiques indépendantes. Nos résultats démontrent que la différence salariale entre Francophone et Anglophone n'est pas importante mais bénéficient les Anglophones. Nous avons aussi trouvé que la différence entre les variables linguistiques se situe surtout lorsque nous considérons le langage au travail.

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Introduction

Over the decades, when looking at the Canadian economics literature, we can see that many economists have studied the issue of the wage gap between Francophones and Anglophones. One of the traits that many of these papers have in common is when considering the province of Quebec, they found that the wage difference had significantly decreased for Francophones since 1969. In effect, the 20th century was difficult for the Franco-Canadian population due to the increase of the importance of English as a principal language in the international commerce and also from the pressure of their Anglophone neighbors. Hence many private companies from the English part of Canada and the United States of America had established their business in the province of Quebec to benefit from the large supply of workers. As a result, Francophones have witnessed the decline of French language relevance. In an attempt to resolve these issues, the Francophone leaders passed a number of laws since 1969, including: Bill 63 (1969), passed by the government of Jean-Jacques Bertrand, which promotes French by requiring students from English schools to have working knowledge of French; Bill 22 (1974), passed by the Quebec Liberals, have made French the official language of the province and also put a lot of pressure on companies to use the French language as part of their services; Bill 101 (1977), passed by political leader René Lévesque, which declares that French is the only language accepted on commercial signs; Bill 86 (1993), which continues to impose pressure on businesses to use French in their day-to-day dealings. All these laws had a common objective to constitute French as the language of work and education for the entire population of the province of Quebec. Therefore, these laws and

regulations from the Quebec government had achieved the desired objectives, and today we can observe that French is the predominant language in the province of Quebec.

Nowadays, the principal languages used by the Canadian population are French and English. Each province has its own official language- most of which use English with the exception of Quebec, whose primary language is French. In addition, New Brunswick is a completely bilingual province- the only one of its kind- listing both French and English as its official languages. For this reason, the official languages of Canada (as considered by the federal government) are English and French out of respect for all of the Canadian provinces and territories. Consequently, the labor market is definitely affected by this phenomenon. For example, the federal government requires its employees to be able to speak French and English. Furthermore, many private companies located in metropolitan areas require their workers to be bilingual. Therefore, in my research I will study the effect of language on earnings for the populations of Montreal, Quebec and Ottawa. I chose these particular cities because they are bilingual, and their labour markets are of large scope.

I found that the wage gap between Francophones and Anglophones in these three cities is moderate. In effect, I use three descriptive variables of language, which are the mother tongue, the home language, and the language of work. However, when I took into consideration the wage gap between the Foreign language group and Anglophones, I found an important difference in favor of Anglophones in all of our specifications.

This paper is structured as follows; The first part is the literature review, which covers thirteen papers; the second part gives some general background on the dataset and explains my sample restrictions with the summary measures: The third part presents my

econometric model followed by the clarification of my specifications, and the fourth part discusses the results of my empirical work.

Literature review

Grenier and Nadeau (2011) focus on the economic aspects of the languages used at work in the metropolitan area of Montreal. To analyze this effect, they employ the empirical framework of the earnings equation. They consider the mother tongue as a principal indicator, which is divided into three categories: French, English and others. Therefore, they compare these three groups: the effect of French at work for the English mother tongue, the effect of English at work for the French mother tongue, and the effect of any official language at work for other mother tongues. The data source for this paper is the 2006 Census master file, and their estimating sample is restricted to people living in the Montreal metropolitan area, Canadians and immigrants. They found that level of schooling for the French speakers is definitely correlated to the practice of English at work, but that is not the case for the English mother tongue group. Also, another interesting finding shows that the members of the English mother tongue group do not benefit from the practice of French at work. By comparison, when considering the French and the other mother tongues groups, they discern an important positive effect for the usage of English in their profession. As a result, they conclude that English is an important element for success in the Montreal area labor market.

Christofides and Swidinsky (2010) estimate the economic advantage acquired by learning a second official language in Canada. They focus on this effect for the Francophones in Quebec and the Anglophones in the rest of Canada. The data source they use is the individual file of the 2001 Census Public Use Microdata File. In their sample, they omit immigrants and only analyze their Canadian-born counterparts who speak French or English fluently. Their results reveal that in the rest of Canada, the wages of men who speak only English is 3.8 percentage points lower than the income of men who speak both official languages but work only in English, and 5.4 percentage points lower than the income of bilingual men who use exclusively French in the workplace. In the case of Anglophone women, the outcomes are quite similar with a few differences. For example, the bilingual women who use both languages at work earn 9.3 percentage points more than those who only speak English, and the women who are able to speak French but use only English at work gain 6.6 percent extra. In comparison, their findings for the province of Quebec show that bilingual men who use only French at work have a premium of 7 percentage points relative to the unilingual Francophones. Moreover, Quebec residents who are bilingual and regularly use English at work earn 20.9 percentage points more than their unilingual coworkers. These results again confirm that knowledge and use of the English language is an important factor to be successful in the Canadian labor market.

Carliner (1981) analyses wage differences amongst language groups in the French and English parts of Canada. He specifically examines the supply and demand for language skills and what kind of factors can influence them. The source of data is the 1961 Canadian Census data by Statistics Canada. One interesting result contained in this paper

is related to education- in effect, taken as reference group, the individual who speaks only English has 2.7 more years of education than the unilingual French and have 0.2 additional years of education than the bilingual French. These results suggest that Anglophones are relatively more educated than Francophones, and it also can be a reason for their higher average income. In effect, one of the findings for Montreal indicates that the group that does not speak any official language, as their native language, receives the lowest income average, and knowledge of French is more lucrative for them than English. Furthermore, unilingual Francophones in this geographical region earn less than the unilingual English workers. The human capital investment of learning English for a French native speaker in Montreal is more beneficial than English native speakers who learn French. On the other hand, the results for the English part of Canada show that bilingual English workers are the groups who have the highest income, followed by the monolingual English and bilingual French native speakers (but the gap between them is not significant). Therefore, Carliner concludes that in the English part of Canada, the economic rewards for learning French are not important compared to the case in the province of Quebec, where learning English as a second official language leads to a significantly higher wages.

Grenier and Lacroix (1986) studied wage differences by linguistic skills for men in the Ottawa-Hull region. The data source for this paper is the 1981 census. They carry out a special analysis regarding the federal government workers on account of the fact that they are an important employer in this region. One interesting feature of their sample is that they have excluded individuals whose mother tongue is neither French nor English, because they only represent a minority in the population. In their analysis, they found that

in the area of Ottawa-Hull, the unilingual French have the lowest income, and the bilingual Anglophones are the highest income group. As well, unilingual Anglophones earn higher wages than bilingual Francophones. When they compare the Ottawa-Hull region with the province of Quebec, they find that in both regions the mean income of Anglophone workers is around 15% higher than Francophone workers. Another important finding is the fact that the regression result did not show any advantage of being bilingual for Quebec Francophones; however, the authors suggest that this result may reflect a bias, and bilingualism would be expected to have a positive impact despite the results that do not support it.

Albouy (2008) focuses on the wage gap between Francophones and Anglophones in Canada from 1970 to 2000. This research investigates males born in Canada from 20 to 59 years old who speak French or English fluently. The data source is the Public Use Microdata Files on Individuals (PUMFI) from the Canadian Census for 1971, 1981, 1986, 1991, 1996 and 2001. The results suggest that from 1970 to 2000, the financial return for the French native Quebecois to learning English fell from 11% to 8%. In contrast, for the Anglophones in Quebec, the return to learning French improved from 0 to 5%. The authors suggest that this variation is due to the large number of law and provincial politics in favor of Francophones.

When examining the English part of Canada, Albouy did not find significant return to acquiring French skills for the Anglophones. But the return to learning English for French native speakers has decreased, and the authors interpret this result by the fact that the unilingual Francophones make up only a small portion of the population. Also, one

interesting approach used in this paper is the observation of the distribution of total wage difference. For example, at the 10th percentile, the findings show that Francophones have made their biggest improvement nationally in terms of changes in the Francophone gap across the wage distribution during 1970-1980 period. Also, during 1985-2000 period, Anglophones in Quebec fell by 20 points in terms of changes in the Quebec gap across the wage distribution.

Nadeau (2009) looks at the Francophone Wage Gap in Canada between 1970 and 2000. He compares the Public and Private sectors in the province of Quebec and outside Quebec. The data employed in this study is the Public Use Microdata Files on Individuals (PUMFI) from the Canadian Census for the years 1970, 1980, 1985, 1995 and 2000. He restricts the study to men aged between 20 and 64 working full-time who are native speakers of French or English. When analyzing the public sector, he finds that over this thirty-year interval, this labor market is the only one for which the wage difference benefits Francophones more than Anglophones. For example, in Quebec, the Francophones working in the public sector earned approximately the same salary than Anglophones with similar skills. Also, the economic advantage of knowing English for native French speakers fell between 1970 and 2000, which was followed by a decrease in the proportion of bilingual Francophones. In 1970, the earnings premium of Anglophones reached as far as 28.7 points, but had considerably decreased in 2000 to reach only 5.1 percentage points. On the other hand, when looking at the private sector, the Anglophones are more advantaged. For this sector, the author evaluates the return to learning English for Francophones and finds a coefficient of 11.8 percent for Quebec. In contrast, for Anglophones, the return to learning French was -2.6 points. As well, the

findings show that in the private sector outside Quebec, the average salary of Francophones improved between 1970 and 2000, with the earning differential decreasing from -13.0 to -2.8 points. Nadeau (2009) concludes that Anglophones in the Quebec private sector for 2000 were greater victims of earning discrimination than was the case for Francophones in the 1970's.

Grenier (2001) analyses the economic integration of immigrants and the relationship between language characteristics and wages in Canada over a period of 25 years. The studies cover the province of Quebec and Ontario using micro-data Canadian censuses of 1971, 1981, 1986, 1991 and 1996. The main result about language and earnings for this paper are as follows: first, the Canadian Francophone born men from Quebec have seen their salary improve during this 25 year interval. This increase was specially seen in 1970. It can probably be attributed to the efforts of Quebecois leaders to establish a policy in favor of the Francophones. Another interesting result is when considering the people who speak neither French nor English as their native tongue, they have the lowest income but the penalty was lower in Ontario than in Quebec. In effect, the result indicates that immigrants who learn French do not integrate as well in the labor market as the immigrants who learn English. To solve this problem, Grenier (2001) suggests that the federal government review its immigration policy, because the majority of immigrants choose to assimilate into the Anglophone community which, in consequence, decreases the proportion of Francophones in Canada.

Veltman, Boulet and Castonguay (1979) made a replication of the study by Boulet and Raynaud (1977). They examine the impact of language shift in Montreal and try to explain the economic return of the Francophones and Anglophones to learning another language. They use the 1971 Census of Canada, including all males with a positive wage in their sample. The results of this paper suggest that bilingual individuals have significantly higher earnings than unilingual ones. If a Francophone invests in his/her human capital by learning English, he will benefit from an average annual wage increase of \$400 (nominal value). Another interesting result indicates that allophones have a greater benefit to learning French than English in Montreal. Furthermore, bilingual residents of Montreal in 1970 earned, on average, several hundred dollars more than unilingual ones, and also the acquisition of English skills is correlated with higher wages than the acquisition of French skills. One interesting point of view suggested by the authors is to link the Anglophone advantage to the fact that they benefit from better private sector social networks. Moreover, the regression results indicate that for the case of Montreal, the human capital investment to learning English is more lucrative than is the case for French.

Aldashev, Gernandt and Thomsen (2007) estimate the effect of language ability on earnings for immigrants in Germany. The data they use is from the German Socio-Economic Panel (GSOEP) for the time interval of 1996 to 2005. This database gives information about all household members, taking into consideration recent immigrants, foreigners and Germans. They omit the years 2002 and 2004 from their estimating sample because of missing data on language variables. Their principal results clearly demonstrate that the development of language skills increase employment opportunity

and participation in the German labor market. In addition, the earnings are greater for individuals who spoke German at home in contrast to the foreigners who used their native language. The immigrants who use German in their household have on average a fourteen percent higher salary than those who only speak their native language. Also, the authors try to look at the second-generation immigrants who regularly speak German at home, but the estimated coefficient was not significant. The researchers arrive at the conclusion that language ability is a central and important factor for the prosperity and financial well-being of immigrants.

Grenier (1984) estimates the effect of language characteristics on the wage of Hispanic American males in 1975. For this purpose, he compares the Hispanic Americans with the non-Hispanic white Americans, and analyzes the wage differentials between these two groups. The dataset that he uses is the Survey of Income and Education from the U.S. Bureau of the Census for the spring of 1976. This research is relevant because there are similarities between French Canadians and Spanish Americans, as both of them represent minority language groups within the total population. Referring to the results, the authors found that the non-Hispanic whites have an average hourly wage that is 24 percent higher than Hispanics, and Hispanics have 2.6 less years of education. When comparing the Hispanics who communicate in English when young and the ones who spoke Spanish, the first group had a 15 percent higher wage and has, on average, three additional years of education. Despite this, the earnings of non-Hispanic whites were still around 15 percent higher than the wage of Hispanics who spoke English fluently. Furthermore, the researchers test the hypothesis that an English communication deficiency can affect earnings. He finds a negative significant coefficient of -0.15, which confirms the

hypothesis. The regression results demonstrate that the net effect of speaking Spanish instead of English as a principal language contributes to a 23 percent decline in wages.

In contrast, using English as a first language and conserving Spanish as a second language shows a 9 percent negative impact on salary. Consequently, the authors confirm the null hypothesis that language skills can definitely affect wages.

Lavoie and Saint-Germain (1991) focus on the linguistic disparities of income in Canada among the French and English Canadians. They want to show that income differentials between these two groups are larger when considering total income instead of labour income, and they also try to prove the importance of measuring this effect by using the language spoken at home instead of the mother tongue. For this purpose, they use the Census of Statistic Canada for 1981 to 1986, responded to by one Canadian in five for the province of Quebec and the rest of the Canada. Their basic hypothesis is that the integration in the socio-linguistic community is a more important factor than is the mother tongue for the explanation of the disparities in income. They also assume that for the purpose of comparison the use of the labor income does not fully depict reality. The results show that when using the mother tongue variable, the result for the rest of Canada shows a gap of 7.2% for men income in favor of Anglophones, but this same coefficient doubles to 16.1% when using the principal language spoken variable. Also, the disparity of the total income is 11.1% according to the mother tongue characteristic, and it doubles to 21.6% when applying the second restriction.

Another important result in this research relates to the importance of education. They find that Francophones have, on average, less education than Anglophones, - such that the

percentages of Francophones between 25-34 years who have graduated from a university is less than the percentage of Anglophones aged between 45-54 years who hold a university diploma.

In Quebec, for the same level of education, the Francophones between 45-64 years earn incomes that are on average 15% less than Anglophones. But when looking at the less-educated population, the Francophones possess an advantage of 13% higher income. When we consider the population who do not hold a university diploma, the Francophones between 25-34 years gain a higher income than Anglophones. For the rest of Canada, the findings suggest that for the 45-54 years category, the difference in favor of Anglophones is around 9% to 18% depending on the level of education. For those who are 24-34 years old, this difference is around 5%. Thereby, Lavoie and Saint-Germain (1991) affirm that at a higher level of education, the role of English becomes an important factor and also confirms the hypothesis which specifies that the use of principal language variable and total income variable give better results.

F.Vaillancourt, Lemay and L.Vaillancourt (2007) focus on the socioeconomic status of Francophones in Quebec from 1971 to 2001. For this objective, they analyse the evolution of average labor income and the net effect of French and English language skills on the wage of men and women. They use the public micro databases from the 1971, 1981, 1991 and 2001 censuses. The principal findings regarding labor income for 1970-2000 intervals reveal that the difference between Francophones and Anglophones was higher for men than women. Also, Allophones often learn more French than English, likely because of the large effort of the provincial government to preserve French. As

well, Anglophone men have seen their economic returns to speaking only English decreased to the point that it becomes negative for the 1980-2000 periods. But for the Anglophone men who are able to speak French, the return to bilingualism is positive but still did not exceed the rate for unilingual French. Also, Francophones had a positive return to bilingualism for this period, and Allophone men had a higher return to learning French than English. Another interesting finding is the fact that adding socioeconomic attributes like marital status, mobility, and ethnicity did not make a large difference on the coefficient of returns to language.

Also, another analysis performed by these searchers investigated the trends in ownership of firms in the province of Quebec over the 1961-2003 periods. For this purpose, they use the database developed by Statistics Canada under the Corporations and Labor Unions Returns Act. They found that during this period, the Francophone ownerships increased by 20 percentage points, 0.5 points per-year. Foreign ownerships decreased by 26 percent between 1961 and 2003, with a decline of 44 percent for the Anglophone ownership of Quebec Industry.

Data section

The datasets used for this paper is the 2006 Public Use Microdata Files on Individuals (PUMFI) from Statistic Canada. I chose this database because it gives a rich source of information about labor market characteristics and detailed contents about language characteristics. This is why the majority of researchers who study the wage gap between

Francophones and Anglophones had used this particular database. The 2006 PUMFI cover one-fifth of the Canadian population with a total sample size of 844,476, reflecting 2.7% of the total population. Its principal purpose is to provide descriptive data for research perspective while preserving data confidentiality.

Regarding the population of interest, they are all Canadian citizens, immigrants and non-permanent residents. The survey does not include people who live in Indian reserves, institutional residents, or members of the armed forces of another country and foreigners visiting Canada. I restricted my work to men aged between 25 and 65. In effect, I omit women, like many of the research groups on this subject (for example Grenier and Lacroix(1986), Boulet (1980), Nadeau (2009)) because of the difficulty to obtain precise measures of some of their descriptive variables. I also chose this age interval because in general people over 65 are retired, and the majority under 25 are still in school. In addition, to be able to have a more homogeneous group, I only consider full-time workers who are employed.

Moreover, the census of 2006 is a rich source of information about language characteristics; In my paper, I focus on three principal variables to estimate the effect of language on wages. The first one is the mother tongue, for which the question asked by the census is: what is the language that this person first learned at home in childhood and still understands? The second one is the home language. This variable has a part A and a part B, and they are distinct. For this research I choose to use part A because the question is exactly what I am looking for. The question is: What language does this person speak most often at home? For the last indicator of language, I will use the language of work,

which again has two parts. I will use the part A for the same reason as in the previous question. The question for this part is: In this job, what language did this person use most often? We also divide these variables into three groups (English, French and other languages) by creating dummy variables for each of these groups.¹

We present summary statistics for our principal variables in table 1, and the results found are in concordance with my expectations. In fact we can see that the mean proportion of individuals in each level of education category is very similar. This is especially true for the categories of high school (18%), college (18%), and bachelor degree (17%). For the upper and lower bound, I observe 11% for people with no diploma and again 11% for those with graduate diplomas. In addition, one can see that the proportion of immigrants in Montreal, Quebec and Ottawa-Gatineau regions is reaching one-fifth of the population (19%). Another interesting fact is when looking at the results for the language characteristic variables, I note that the French speakers are predominant for all of them.

¹ The part B for the home language variable asked the following question: Does this person speak other languages on a regular basis at home?
The part B for the language of work variable asked the following question: Did this person use any other languages on a regular basis in this job?

Econometric Model

The econometric model takes the following form:

$$\begin{aligned} \ln Wage_i = & \beta_0 + \beta_1 immigrant_i + \beta_2 mothertongue^f_i + \beta_3 mothertongue^o_i \\ & + \beta_4 immigrant_i * mothertongue^f_i + \beta_5 immigrant_i \\ & * mothertongue^o_i + \beta_6 homelanguage^f_i + \beta_7 homelanguage^o_i \\ & + \beta_8 immigrant_i * homelanguage^f_i + \beta_9 immigrant_i \\ & * homelanguage^o_i + \beta_{10} languageofwork^f_i \\ & + \beta_{11} languageofwork^o_i + \beta_{12} immigrant_i * languageofwork^f_i \\ & + \beta_{13} immigrant_i * languageofwork^o_i + \delta x_i + \epsilon_i \end{aligned}$$

My econometric equation aims to estimate the effect of languages skills on wages² by comparing immigrants and Canadian citizens in the metropolitan cities of Montreal, Quebec and Ottawa. I cannot focus only on Canadian citizens because we cannot ignore the important proportion of immigrants in these cities. In my equation, I use a semi-log regression model so the interpretation of any coefficient is a percentage effect.

The definitions of my variables are as follows: *immigrant_i* is a dummy variable which takes the value of 1 if the individual is an immigrant and the value of 0 if he is a Canadian born. Therefore, the result of the coefficient β_1 will allow me to differentiate between their wages, and the penalty or premium associated with being an immigrant, all

² This variable corresponds to the total earning. (Total wages and salaries, commissions, tips, bonuses, taxable benefits, research grants (...) before deductions.

other factors held constant. *Mothertongue^f* is also a dummy variable that flags individuals who have a French mother tongue. Those who speak foreign mother tongues comprise part of my sample. I group them all together in constructing the *mothertongue^o* variables. This coefficient variable β_3 will indicate the effects on wages of speaking another mother tongue versus one of the two Canadian official languages. The variables of interaction *immigrant_i*mothertongue^f* and *immigrant_i*mothertongue^o* will permit us to describe the joint influence of being an immigrant and of speaking a language different from English as the mother tongue.

I use different variables to estimate the effect of language on wages. I am going to consider the home language and the language of work. *Homelanguage^f* is a variable that indicates people who have French as their home language and *homelanguage^o* is for those whose home language is different from French or English. I also examine the interaction between these variables and the immigrant variable by adding the interaction between *immigrant_i*homelanguage^f* and *immigrant_i*homelanguage^o*. My last independent variable for language is the language of work; I use the same empirical strategies as the two other variables. *Languageofwork^f* indicates those who use French at work, and *languageofwork^o* indicates those who do not use French or English. Furthermore ∂x_i depicts a matrix of socioeconomic variables which includes dummy variables for education and dummy variables for cities. The last term labelled ϵ_i is the error term.

In this research I consider four principal specifications. The first one will only analyse the effect of the mother tongue and the effect of being an immigrant on wages without examining effects of interacted variables.

$$(1) \quad \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = 0$$

My second specification will be the same as equation (1) but we will add the coefficient of interaction for the mother tongue variables in order to test for the interacted effects of being an immigrant and speaking a foreign language.

$$(2) \quad \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = 0$$

In my third specification I add the home language variables and the interactions variables with the immigration variable. This inclusion is designed to see if there is an effect associated with speaking a language at home that is distinct from the effect associated with the native tongue.

$$(3) \quad \beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = 0$$

For my last specification I estimate the complete regression equation without any constraints.

Results

This section will present the results of the empirical work. I use as a reference group the Canadian citizens with a college diploma living in the city of Ottawa-Gatineau. Also, for the mother tongue, home language and language of work variables we take the English group as reference. After using the Breush-Pagen test, I conclude that our sample contains heteroscedasticity and the use of robustness in our regressions will give us better results.³

In effect, the estimates obtained in the first specification confirm my expectations. For example, we observe that immigrants living in Ottawa-Gatineau, Montreal and Quebec earn wages that are 20% lower than Canadian citizens. Also when considering the language of the mother tongue variable effect on wages, I found that individuals from the French mother tongue group have a negative coefficient of 2% compared to the English mother tongue group, and the sample with a mother tongue other than the two official languages has a negative coefficient of 23%. These results show us that the difference in wages between individuals with French and English mother tongue is not statistically significant or economically important, but in contrast, the difference with the foreign mother tongue group is much more significant.

³ The steps that I use for the test are as follow:

1. I estimated the model by OLS and I save the squared residuals.
2. I run a regression with the squared residuals as dependant variable against the independent variables.
3. I saved the R-squared from the last regression and made an F statistic test.

With regards to the effect of education on salary, we take as a reference group the college diploma categories. The findings suggest that people who do not possess a diploma are affected by a 28% decrease in their wages, individuals with a high school diploma are affected by a negative difference of 10%, those with bachelor's degrees earn 24% higher wages, and those with graduate diplomas earn a 35% higher wages. Another interesting result is the difference between the cities of Montreal, Quebec and Ottawa-Gatineau. In comparison to individuals from Ottawa-Gatineau city, inhabitants of Montreal earn 17% lower wages, and those from Quebec earn 22% lower wages. This result is not unexpected, because the cost of living is higher in the city of Ottawa-Gatineau. All my results are statistically significant at a 95% confidence level except for the French mother tongue coefficient. Likewise, when analysing the economic significance of our results, I note that the French mother tongue variable and the high school variable are the only ones that are not discernable. All other coefficients are definitely economically important, especially at higher wages.

In the second specification, I only add to the first interaction variables estimating the joint effect of being an immigrant and having a particular mother tongue. In fact the results for all categories of education and the effect of city on wages remain the same. The biggest difference between the first specification is when considering the effect of being an immigrant on wages. This coefficient fell by half of its value to reach -9%, but this phenomenon can be due to the fact that the interaction coefficients capture a part of the effect. However the *immigrant_i* mothertongue^f* variable, which represents the joint effect of being an immigrant and having French as a mother tongue, is -16%. The second

interaction coefficient, which represents the effect of being an immigrant with a foreign mother tongue, attains -13%. This means that compared to the Canadian citizen with English as a mother tongue, the immigrant in the French mother tongue category is estimated to have a negative wage difference of 16%, and the immigrant with a foreign mother tongue is estimated to have a negative wage difference of 13%.

At first sight, these results can seem unusual, but one of the explanations as to why the immigrants with a French mother tongue have a lower salary as compared to immigrants with a foreign mother tongue is the fact that the last group are, in general, more prone to learn English upon their arrival in Canada and consequently work in an Anglophone environment. On top of that, all our results for the second specification are statistically significant at a 95% confidence level except, again, for the French mother tongue variable.

In the third specification, I add another indicator to estimate the effect of language on wages. In multicultural cities like Montreal and Ottawa, we find that many people's mother tongue is not the language that they know best, and sometimes they do not even have the ability to communicate in it fluently. Therefore, I add the home language variable in my third specification to be able to differentiate the effect on wages. The result shows again that the coefficients for the effects of education and city did not really change. Also the estimates of the mother tongue effects on wages have changed, but they are not discernable. For example, the estimated coefficient of the French mother tongue variable is now positive at 5%, and still not statistically significant. On the other hand, the

estimated coefficient for the foreign mother tongue group is now -11%. By comparison, when we look at the estimated coefficient of the home language variable, we observe that individuals who have French as their home language are estimated to exhibit negative difference of 7%, and people with a foreign home language are estimated to exhibit negative coefficient of 33%. Hence, it appears that the difference between the estimated effects of the home language variable and the mother tongue indicator pertains mostly to the foreign language group. In effect, a difference of 33% in the wage is largely discernable at any wage distribution, and this result is also statistically significant. In contrast, when analyzing the interaction coefficient for the home language, both of them are not significant except if we consider a 10% level of significance. In this case, we will observe a negative coefficient of 10% for immigrants with French as their home language.

In my last specification, I add to the regression equation the language of work variables. Because we are looking at the effect on the wage, this variable should be a really good measure of the influence of language ability on wages. As was the case with the other previous specifications, the estimates of the coefficients of the socioeconomic variables on wages did not really change. But when considering the results of the linguistic variables, our findings suggest a positive coefficient of 8% for the French mother tongue variable and a negative one of 8% for the foreign mother tongue. These results are statistically significant. On the other hand, the French home language variable is not significant. The coefficient for the foreign home language is still really high with a negative effect of 29% on wages (which is statistically significant at a 5% level and also

discernable because it represents a difference of almost one third of the reference group salary).

Furthermore, for the last linguistic variable, we obtain a negative coefficient of -14% for French as the language of work. It is the largest value to explain the difference among Anglophone and Francophone wages, and also statistically significant. This coefficient is more important when we consider the upper quartile of the wages distribution, and economically less important for the lower quartile. For the foreign language of work indicator, we found a coefficient of -41%, which is not really unexpected because the majority of the work force who do not use French or English at work are working in the unskilled labor sector where salaries are in general very low overall.

In general, the foreign language (for the mother tongue variables, the home language variables, and the language of work variables) is the one that is more penalize on wages. The French language is penalized in the majority of our language variables but in general the effect does not show an important penalty and is not statistically significant. Also, my results suggest that immigrants speaking French have lower wages compared to those who speak a foreign language. This result ascribed to the fact that this group of immigrant usually learn English when they get established in Canada.

Endogeneity

Using the ordinary least squares method, one of the most common problems that econometricians face is endogeneity. In general, the causes of endogeneity arise from measurement error or simultaneity between variables, or omitted variables. In this paper, the major cause that we will focus on is the omitted variables bias. In effect, we have omitted from our model variables affecting wages that are correlated with the included exogenous variable, and are consequently embedded in the error term. One of the variables included in the error term which affects salary is Canadian experience in the labor market, and this variable is also correlated with independent variables in our econometric model. For example, the foreign mother tongue variable is correlated with the number years of Canadian experience an individual has, because the majority of the population with a foreign mother tongue are immigrants and, as a result, acquire less Canadian experience than a native born. Another omitted variable is whether schooling was done in Canada or abroad. Because Canada has one of the best education system and consequently when immigrant from developing countries came with their diploma they are often not recognized. Therefore, the solution that we use to address this endogeneity problem is the instrumental variable method (IV), which we will present below.

Instrument variable estimation

In my empirical work, I used the instrumental variable estimation technique in order to find a consistent estimator. For that matter, we consider the case listed above in which the

foreign mother tongue variable is correlated with the number of years of Canadians experience. One of the conditions for having a suitable instrumental variable is to have a variable which has an important effect on the foreign mother tongue variable and not on wages. So we decide to employ two instrumental variables, which are the place of birth of the mother and the place of birth of the father. These variables are strongly correlated with the foreign mother tongue and not with wages. So we create a binary variable taking the value of 0 if one of the parents is born in Canada or the United States and taking the value of 1 otherwise.

For the first specification, the result of the IV compared to the OLS is different. In effect, the results suggest a greater effect of the mother tongue on wages when estimating using the IV method. The estimated coefficient of the foreign mother tongue variable is -55%, while it is -11% in the case of the French mother tongue. Both results are both statistically and economically significant. These results mean that the English mother tongue group earn twice the salary of people with a foreign mother tongue. Also, when analyzing the estimated coefficients of the socioeconomic variables, I report no significant change compared to the results for the OLS method because the effect is exactly the same for the education variable. The effects of city have also decreased slightly to -12% for Montreal and -18% for Quebec.

In the second specification, there were no important changes in comparison to the OLS results, except for the immigrant and foreign mother tongue variables estimates. The estimated coefficient for the immigrant variable when applying the IV technique is now

-14% while it was -9% when the OLS technique was applied. Also the estimated coefficient for the foreign mother tongue variable passed from -13% to -47%. These results are statistically significant at a 5% level .

For the third specification, where I have added the home language variables, we observe that for the French home language variable, the magnitude of the IV and OLS coefficients are almost the same. In contrast, for the foreign home language variable, the OLS coefficient declined from -33% to -9% when using the IV method. Likewise, the interaction coefficient of being an immigrant with French as a home language did not really change.

In my last specification, the difference between OLS and IV are the same magnitude as the third specification except for the language of work variable that we add. In effect, for the French group, we practically don't notice any difference between the results generated by the two methods, but for the indicator for the foreign language of work, our coefficient declines from -41% to -31%.

Conclusion

The results of this research support the findings in the literature, but there are some new results. We can conclude that the choice of the variable for estimating the effect of language on wages can make a difference on the OLS, and IV result. In effect, the results suggest that when using the mother tongue variable, the wage gap between Anglophones and Francophones is modest and not economically important for the cities of Montreal, Quebec and Ottawa-Gatineau. In contrast, the people who have a foreign mother tongue are estimated to earn an average of 15% lower wages using the OLS method and 45% lower wages when using IV method. By comparison, the estimated difference between the coefficients the Anglophone and the francophone groups for the home language indicator is small. The last variable used to measure the effect of language on wage was the language of work and its estimates is the one that exhibited the biggest wage gap between Francophones and Anglophones. The OLS method gives a negative wage differential of 14%, and the IV method a negative wage differential of 12%. For the foreign language of work, we again find a significant coefficient reaching -41% based on the OLS method and -31% based on the IV method. To this end, we conclude that the economic return to French is still lower than English for the mother tongue variable, the language of work variable, and the home language variable. But this return for the cities of Montreal, Quebec, Ottawa is not meaningful. This could potentially be due to the effort of the provincial government of the province of Quebec to maintain French as the principal language. Nevertheless, this effort from the province of Quebec, to protect their official language should be consistent for years to come because immigrants have a bias

to assimilate to the English labour market. One of the solutions is to establish specific immigration policies to attract a target population which will increase the demographic weight of Francophones or at least keep it the same. Another solution can be to put pressure on the federal immigration policy to support greater arrivals of Francophones in Canada. In contrast, when we consider the foreign language variables, we found that their economic performance is highly inferior to the rest of the population. In fact, the negative effect on wages is economically important for all of our specifications, and consequently shows us the importance of using the two official languages in the Canadian Labor Market.

Table 1: Summary Statistics

Variable	Means	Std. Dev.
No diploma	.109	(.311)
High school diploma	.187	(.390)
College diploma	.184	(.387)
Bachelor diploma	.176	(.380)
Graduate diploma	.117	(.322)
Montreal	.652	(.476)
Ottawa	.210	(.407)
Quebec	.137	(.344)
Citizen	.800	(.399)
Immigrant	.191	(.393)
English Home language	.252	(.434)
French Home language	.673	(.468)
Foreign Home language	.099	(.299)
English Language of work	.351	(.477)
French Language of work	.699	(.458)
Foreign Language of work	.011	(.105)
English Mother tongue	.187	(.390)
French Mother tongue	.648	(.477)
Foreign Mother tongue	.177	(.382)
Wages in Logarithm	10.575	(1.131)
Immigrant*French mother tongue	.032	(.177)
immigrant*Foreign mother tongue	.140	(.347)
Immigrant*French Language of work	.099	(.298)
Immigrant*Foreign Language of work	.009	(.095)
Immigrant*French Home language	.061	(.239)
Immigrant*Foreign Home language	.088	(.284)

Note: The summary statistics are weighted (aweights), using males 25-65 years of age

Table 2: Results of the first specification

Variables	OLS (1)	IV (1)
Immigrant	-.201*** (.026)	-.044 (.051)
French mother tongue	-.023 (.019)	-.127*** (.034)
Foreign mother tongue	-.230*** (.030)	-.550*** (.093)
No diploma	-.288*** (.019)	-.281*** (.020)
High school diploma	-.108*** (.017)	-.109*** (.017)
Bachelor diploma	.239*** (.020)	.237*** (.020)
Graduate diploma	.351*** (.028)	.348*** (.028)
Montreal	-.170*** (.018)	-.122*** (.021)
Quebec	-.227*** (.023)	-.181*** (.027)
Observations	27113	27113
R ²	.046	.041

Note: The standard errors are in parentheses;
*Significant at 10%; **significant at 5%; ***significant at 1%

Table 3: Results of the second specification

Variables	OLS (2)	IV (2)
Immigrant	-.089** (.043)	.145*** (.045)
French mother tongue	-.0008 (.020)	-.065** (.025)
Foreign mother tongue	-.190*** (.044)	.477*** (.079)
No diploma	-.288*** (.019)	.289*** (.019)
High school diploma	-.107*** (.017)	.109*** (.017)
Bachelor diploma	.240*** (.020)	.238*** (.020)
Graduate diploma	.354*** (.028)	.353*** (.028)
Montreal	-.174*** (.018)	.145*** (.019)
Quebec	-.233*** (.023)	.208*** (.024)
Immigrant*French mother tongue	-.162*** (.058)	-.106* (.060)
Immigrant*Foreign mother tongue	-.136** (.062)	.144 (.090)
Observations	27113	27113
R ²	.046	.044

Note: The standard errors are in parentheses;
*Significant at 10%; **significant at 5%; ***significant at 1%

Table 4: Results of third specification

Variables	OLS (3)	IV (3)
immigrant	-.063 (.042)	-.116*** (.044)
French mother tongue	.049 (.035)	-.033 (.041)
Foreign mother tongue	-.110** (.044)	-.458*** (.094)
No diploma	-.279*** (.019)	-.281*** (.019)
High school diploma	-.107*** (.017)	-.109*** (.017)
Bachelor diploma	.238*** (.020)	.237*** (.020)
Graduate diploma	.354*** (.028)	.352*** (.028)
Montreal	-.158*** (.018)	-.133*** (.018)
Quebec	-.215*** (.024)	-.194*** (.024)
Immigrant*French mother tongue	-.085 (.080)	-.004 (.083)
immigrant*Foreign mother tongue	-.028 (.069)	.316*** (.108)
French Home language	-.068* (.035)	-.044 (.035)
Foreign Home language	-.336*** (.093)	-.094 (.113)
Immigrant*French Home language	-.103* (.061)	-.133** (.062)
Immigrant*Foreign Home language	.024 (.102)	-.218* (.122)
Observations	27113	27113
R ²	.049	.047

Note: The standard errors are in parentheses;
*Significant at 10%; **significant at 5%; ***significant at 1%

Table 5: Results of the fourth specification

Variables	OLS (4)	IV (4)
immigrant	-.068 (.046)	-.118*** (.044)
French mother tongue	.081** (.037)	-.006 (.042)
Foreign mother tongue	-.086** (.043)	-.444*** (.095)
No diploma	-.270*** (.023)	-.273*** (.019)
High school diploma	-.104*** (.018)	-.106*** (.017)
Bachelor diploma	.230*** (.019)	.230*** (.020)
Graduate diploma	.342*** (.022)	.341*** (.028)
Montreal	-.112*** (.020)	-.089*** (.020)
Quebec	-.161*** (.027)	-.144*** (.026)
Immigrant*French mother tongue	-.102 (.073)	-.015 (.084)
immigrant*Foreign mother tongue	-.032 (.067)	.324*** (.109)
French Home language	-.013 (.037)	.003 (.036)
Foreign Home language	-.292*** (.074)	-.056 (.110)
Immigrant*French Home language	-.107* (.062)	-.125* (.067)
Immigrant*Foreign Home language	.027 (.085)	-.209* (.118)
French Language of work	-.143*** (.026)	-.126*** (.026)
Foreign Language of work	-.411*** (.150)	-.310 (.226)

Immigrant*French Language of work	.026 (.044)	.002 (.047)
Immigrant*Foreign Language of work	-.183 (.169)	-.287 (.261)
Observations	27113	27113
R ²	.0530127	.05067247

Note: The standard errors are in parentheses;
 *Significant at 10%; **significant at 5%; ***significant at 1%

Figure 1: Results of OLS (1)

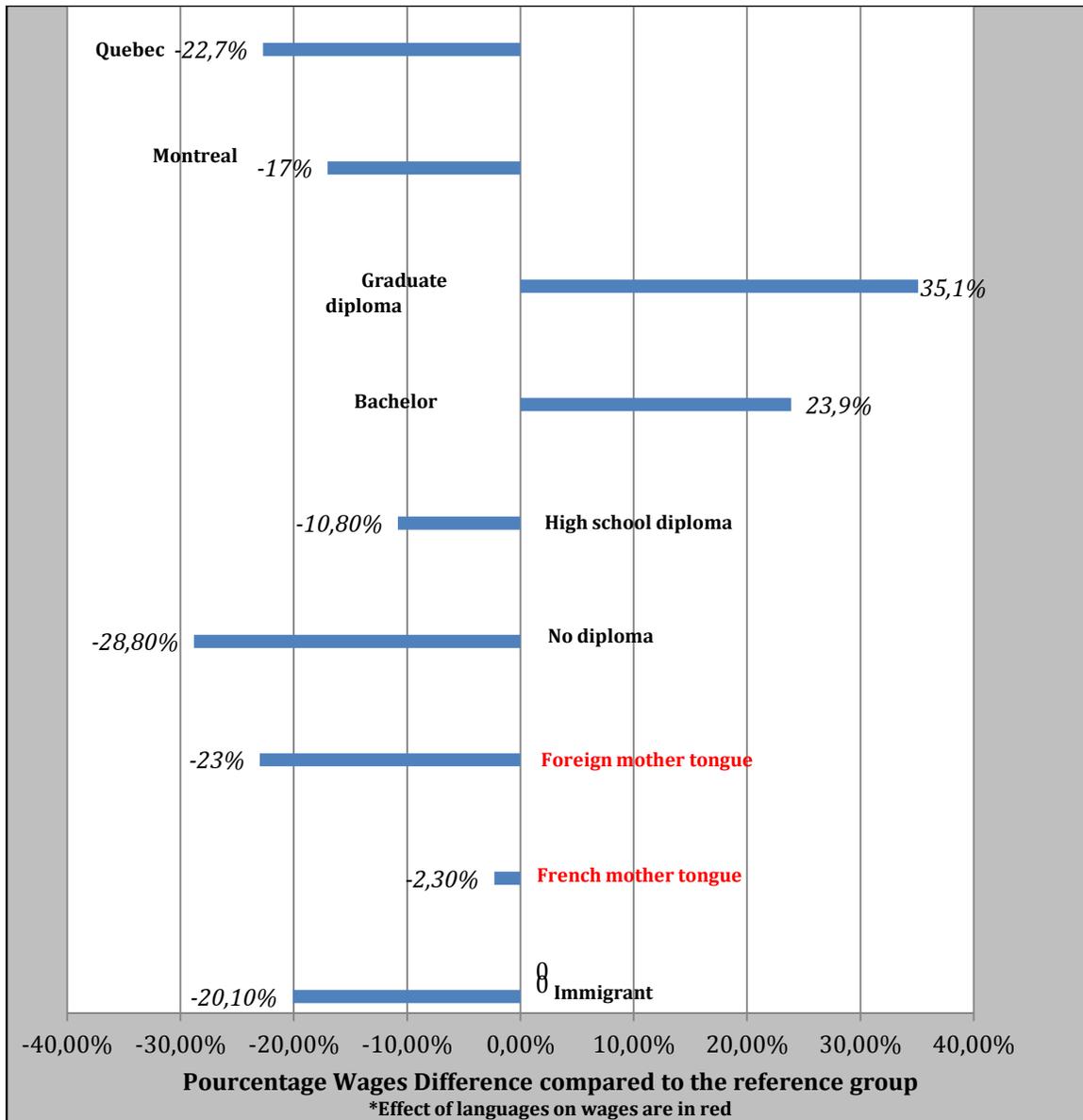


Figure 2: Results of OLS (2)

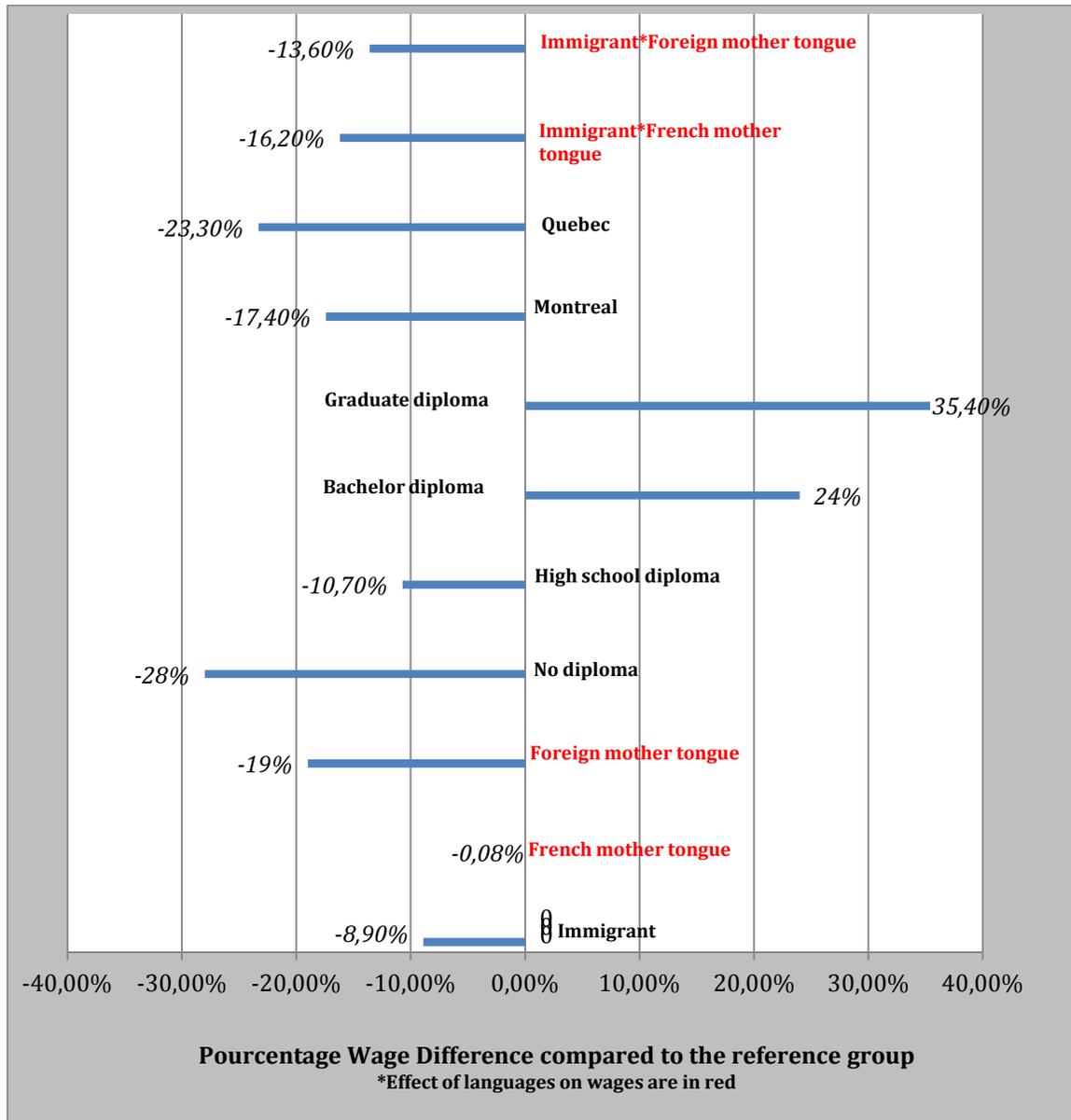


Figure 3: Results of OLS (3)

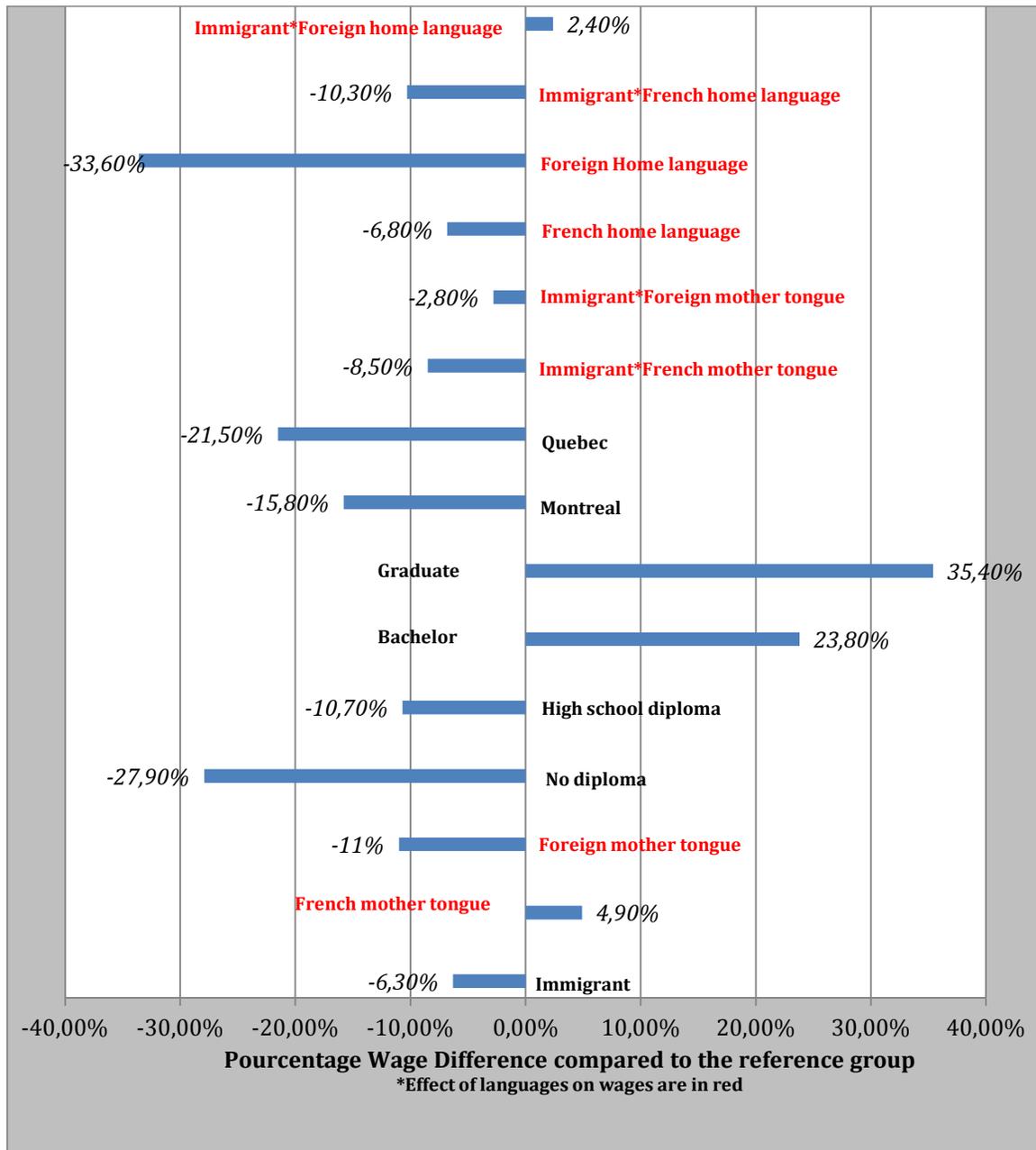
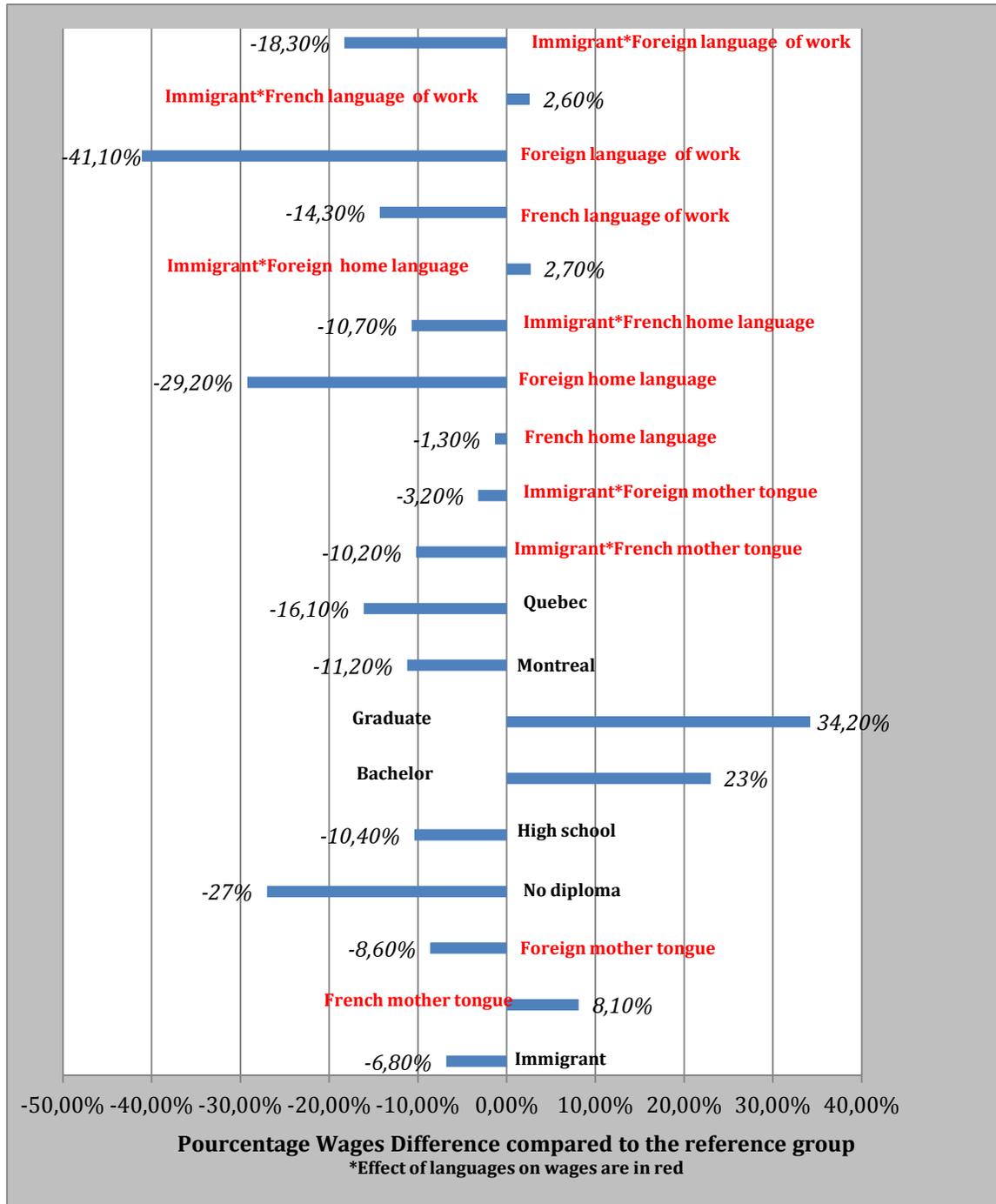


Figure 4: Results of OLS (4)



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