Immigrant Settlement Patterns in Canada: Does Elasticity of Substitution Between Immigrants and Native-Born Workers Matter?

By
Brett Barnes

A Research Project Submitted to
Saint Mary's University, Halifax, Nova Scotia
in Partial Fulfillment of the Requirements for
the Degree of Master of Applied Economics.

August 2021, Halifax, Nova Scotia

Approved: Dr. Ather Akbari

Supervisor

Date: August 13, 2021

Immigrant Settlement Patterns in Canada: Does Elasticity of Substitution Between Immigrants and Native-Born Workers Matter?

By: Brett Barnes

Abstract

Although the number of immigrants coming to Canada has been steady in the past two decades, their location distribution is uneven across provinces. The proportion of immigrants in each province varies from 29 percent of the total population to as low as 2.4 percent. This paper will explore the effects that elasticity of substitution has on immigrant settlement patterns. This paper adds an alternative approach to the reasoning behind the disproportionate immigrant settlement. Using a constant elasticity of substitution model and information from the 2016 Census we find that the elasticity of substitution does show similar trends to the proportion of immigrants in a population.

Keywords: Canada; Population Proportions; Perfect Substitution, Elasticity of Substitution; Immigration.

Submitted on August 13, 2021

Contents

1 Introduction

Canada's main source of population growth is from immigration. This article uses a Constant Elasticity of Substitution (CES) model to investigate if immigrants are perfect substitutes for native-born workers in each Canadian province and if this outcome has an impact on their provincial distribution in Canada. It also explores how the substitution varies across each province's major occupation groups. The percentage of immigrant population varies dramatically across provinces, from as high as 29.1 percent in Ontario to as low as 2.4 percent in Newfoundland and Labrador.[1]

The paper compares the degree of substitution between immigrants and native-born workers across each province and occupational group. Additionally, it explores if the degree of substitution can be a reason for why some provinces have much larger amounts of immigration. The main hypothesis is that immigrants are perfect, or close to perfect, substitute in provinces such as Ontario and British Columbia, that have a higher percentage of the population as immigrants, but immigrants will become less than a perfect substitute in provinces with a lower population percentage of immigrants, such as in the Atlantic provinces. The rationale is that a provinces' degree of substitution will determine immigrant settlement patterns. Therefore, a higher degree of substitution will cause a higher amount of immigrants to settle in that province. The reasoning for this

1 The proportion of immigrants in each Canadian province is recorded in Table 2 of results section.
2 Following previous literature, immigrants are all those born outside of Canada, excluding those born to Canadians residing outside of Canada. They have Canadian citizenship status at birth.

hypothesis is that immigrants will be more inclined to settle in areas where they are seen to be treated equal to non-immigrant residents.[2] In addition, this paper will also investigate if the substitution in major occupation groups can help to explain the overall substitution level variations across provinces as different provinces have different distribution of labour force by occupation.

This paper will allow researchers to see if the percentage of immigrants in a population can be an indicator of whether immigrants are perfect substitutes to native-born workers. It will further allow researchers to understand why so many immigrants are ending up in certain provinces, such as Ontario or British Columbia, as opposed to other provinces, such as Newfoundland and Labrador. Lastly, it will be able to compare the substitution effect of immigrants to native-born workers in both a large labor market and a small labor market. Furthermore, it will show specifically how the substitution of immigrants varies across not only regions but also different occupations.

The remainder of this paper is structured as follows. Section 2 will provide a comprehensive literature review which will track the topic of immigrant and native-born workers. Section 3 will introduce the Constant Elasticity of Substitution (CES) model that will be estimated using a derived equation. Section 4 describes the Statistics Canada data that will be used for estimating the model. Section 5 presents the estimation strategy and the reasons for it. Section 6 will provide the empirical results for the elasticity of substitution across occupations and provinces. As well, it will show a breakdown of the proportions of immigrants in each workforce of occupation and region. Section 7 will conclude the paper.

2 Literature review

There has been a considerable amount of research done on the substitution between native-born workers and immigrants. The most widely used way to assess the substitution of immigrant and native-born workers is to use a Constant Elasticity of Substitution (CES) production function. Uzawa (1962) writes an article introducing the CES production function and how it came to be. Uzawa (1962) starts by defining the elasticity of substitution and talks about how it is constant only if it is in the form like that of equation (2) in section 3. It shows how elasticity of substitution interacts with different scenarios. Over time the equation that has been investigated for the substitution between native-born and immigrants is similar to that of equation (4) in section 3.

Akbari and Aydede (2013) estimated a very similar equation as equation (4). But they considered if immigrants and non-immigrants are perfect substitutes across 3 education levels in Canada: high school or less, post-secondary but no university and university degree. The results show that immigrants are less than perfect substitutes and continue to become farther from perfect substitutes as education levels rise. Akbari and Aydede (2013) discuss that the results could be due to Canadian employers' lack of knowledge of foreign education systems, employers' lack of awareness of the education and training immigrants bring with them, or lastly,employers discriminate against immigrants from certain countries. A limitation of the Akbari and Aydede (2013) study is that it focuses solely on education levels and does not account for further evaluations of the substitutions, such as between industries.

Aydede (2017) looks at the impact immigrants have on native-born workers. Aydede (2017) discusses how immigrants are causing native-born workers to leave areas of higher immigrant populations and move to areas with lower immigrant numbers. Aydede (2017) shows how if immigrants become too welcomed into the labor markets this can cause native-born workers to be pushed out. My paper will provide a contrary approach and will look at the substitution between immigrants and native-born workers to see if higher immigrant levels are due to immigrants being perfect substitutes with one another.

Tossutti (2012) investigates outcomes of immigration in Canada. The findings in the article do concur with Akbari and Aydede (2013) that the recognition of immigrant's foreign education and work credentials is a common issue that fluctuates between gender, immigration class, and the country where immigrants came from. Mulatris (2010) talks about African immigrants being forced to accept work in low-paying jobs well below their competence and knowledge, this causes them to have to work more than one job to be able to support themselves.

There have also been large amounts of additional work on substitution between native and immigrant workers in other western countries. Wei (2019) looks at immigration substitution to native-born workers by legal resident status in the United States. The statuses used include unauthorized immigrants, authorized immigrants, and U.S. citizen farmworkers. Each legal status is controlled using skill level and experience which is estimated by age. The main finding is that native farmworkers do not compete with immigrant farmworkers who are at similar age and skill levels for the same jobs. In other words, the substitution possibilities between immigrant farmworkers (both

authorized and unauthorized) and native farmworkers are limited when it comes to that of similar age and skill level.

Wolla (2014) broadens the study to cover all of the United States and focuses on immigration instead of just immigrant farmworkers. Wolla (2014) states that immigrants can either be substitutes or complements for native-born workers. If immigrants are substitutes that mean that they are competing for similar jobs. This just translates in this scenario that if they are perfect substitutes there should be an increase in the supply of laborers and a decrease in wages because of it, for similar skill levels. Many immigrants are low-skilled workers, so this translates the effect onto the low-income jobs such as the ones studied by Wei (2019). Although with selective immigration there are often very much high skilled immigrants.

However, as Wolla (2014) mentions when immigrants are complements an increase in immigration will cause an increase in job opportunities and wages for the native- born workers. In low-skill jobs this results in reducing the cost of production and increasing the output of goods. The immigrants with high skills complement those native-born workers with similar high skills by filling the position and needs of the Science, Technology, Engineering and Math (STEM) fields.

Wolla (2014) concludes by stating immigration can cause winners and losers. These winners can be firms who gain lower production costs caused by lower labor costs,as well consumers who can consume goods and services at lower costs, and the complimented workers who benefit by increased job opportunities and wages. The losers consist of those native-born substitute workers who now compete with immigrants at the lower wages.

Chiswick (1985) looks to see if immigrants and native-born workers are perfect substitutes when things such as skill and demographic characteristics are held constant. The theoretical background is that immigrants are less than perfect substitutes if natives are more intensive in country-specific skills and immigrants are more favorable for characteristics that favor self-selection for migration. The results showed the income of adult male immigrants relative to non-immigrant adult males is lower with a greater supply of immigrants. The elasticity of substitution between native-born and immigrant workers is high but not infinite, implying not perfect substitutes. The limitations to these results are, although it does look at 5 countries, it does not break down into smaller sections for each country but instead generalizes the entire country. There are not any controls for different industries which could bias the results, as the range of countries used may have different major industries.

Girard and Smith (2013) look at Canada's immigration in both the regulated and unregulated markets. The article investigates the proportion of immigrant and native-born workers in each industry. The results show that being an established immigrant does not affect access to the regulated labor market but being a new immigrant does. As well foreign credential also affects access immigrants have to the regulated market. Girard and Smith (2013) only look at the proportions of immigrant and native-born workers in the regulated and unregulated market in Canada and not how they respond to changes in relative wages. The current study will investigate presence of substitution between different occupation categories and establish any patterns, not only in these occupations but also across the provinces of Canada.

3 Model

The hypothesis we wish to test in this study is that immigrants and native-born workers are perfect or close to perfect substitutes in provinces with a high proportion of immigrants, such as Ontario or British Columbia, than they are in provinces with a lower immigrant proportion of the population, such as the Atlantic provinces. This hypothesis will be tested by estimating elasticity of substitution between immigrants and non-immigrants in the labour force, at the aggregate level in each province and also within broad occupation levels and using statistical tests of significance. As well, we wish to further discuss if the results of elasticity in each occupation group are related to overall elasticity of substitution in a province.

To estimate the elasticity of substitution, we will be considering immigrant and non-immigrants labour and their wages within occupations in each province. The analyses will be done using a production function approach.

The model used assumes there are 2 types of labor, native-born labour (N) and immigrant-born labour (M). Akbari and Aydede (2013) show a "nested" production function that expresses output (q) as a function of labour and capital (K). This "nested" production function is shown below in equation (1):

$$q = f[g(M,N);K], \quad (1)$$

in equation (1) K is assumed to be separable from M and N so the function can be rewritten as q=g(M,N). A CES aggregate of M and N can be written as shown in equation (2):

$$L= (a_1 * M^{-\beta} + a_2 * N^{-\beta})^{-1/\beta} \quad (2)$$

The assumption of profit maximization is what allows $I_M/I_N = g_M / g_N$, where I_M and I_N are the annual income received by both immigrant and native-born workers, respectively and g_M and g_N are the respective marginal products. The marginal products, g_M and g_N, are written below:

$$g_m= a_1 * M^{-\beta-1} (a_1 * M^{-\beta} + a_2 * N^{-\beta})^{(-1-\beta)/\beta}$$

$$g_N= a_2 * N^{-\beta-1} (a_1 * M^{-\beta} + a_2 * N^{-\beta})^{(-1-\beta)/\beta}$$

Based on Equation (2) as well as the marginal products above, the profit maximizing condition can be rewritten as shown in equation (3):

$$(IN/IM) = (a1/a2) \ (M/N)^{(\beta+1)} \quad (3)$$

To evaluate the elasticity of substitution, we take the natural logarithm of equation (3). This gives us equation (4):

$$ln(IN/IM) = ln(a1/a2) + (\beta + 1)ln(M/N) \quad (4)$$

The estimation of our model will be a CES model with the introduction of a control for age. The model that will be used in this paper is as follows.

$$ln(IN/IM) = ln(a1/a2) + (\beta + 1)ln(M/N) + ln(AN/AM) \quad (5)$$

Where *IM* and *IN* are the annual incomes received by both immigrant and native-born workers, respectively. M and N are the total amounts of immigrants and native-born workers employed, respectively in each occupation. And lastly, *AN* denotes the average age of a native-born worker in that occupation, *AM* denotes the average age of an immigrant worker in that occupation. The reasoning for including a variable to control for age is because focusing on immigrants that have arrived in Canada between 2006-2014 poses an issue that must be addressed. The average age of a native-born Canadian, in any of the given occupations, is higher than that of the immigrant group so there must be a control for age. Otherwise, the differences in their income can be attributed to their age. We would have liked to also control for other differences in the two populations, such as marital status and education, but time limitations for this study do no permit addressing the additional differences. Age is also often considered a proxy for experience.

Model (5) will be used to calculate the elasticity of substitution between immigrants and native-born workers. The value of $1/(\beta + 1)$ is the elasticity of substitution. The value will increase as the coefficient $(\beta + 1)$ approaches zero. For statistically insignificant estimation of $(\beta + 1)$, the elasticity value will be infinity, i.e., workers in the two groups will be viewed perfect substitutes.

4 Data

The data are based on Statistics Canada, 2016 Census. The data for the percentage of a population of immigrants is shown in Table (2) below. The cross-sectional data are for all 10 Canadian provinces. Unfortunately, due to lack of data, i.e., the 3 territories, Yukon, Northwest Territories, and Nunavut are excluded from the sample. The estimation uses occupations for which data t are present across all provinces. All data are for 2015 since the 2016 census asked questions about 2015 labour market activity. The data used for immigrants are separated into those who came from 2006-2010 and those who came from 2011-2014. We exclude those arriving after 2014 as they would not have been in the country for the entire year in 2015. Furthermore, the four Atlantic provinces are grouped together in this study because there were too few observations in some provinces, due to population size.

The model is also estimated across industries. There are 4 level occupational classifications. The higher level of classification corresponds to a more specific job title. For example, Massage therapist (Occupation Classification number 3236) would be indicated as a four-level occupation classification but would be under the first level occupation classification of Health Occupation (Occupation Classification number 3). There will be 10 separate regressions for each industry, the 1st industry will be “Management Occupations”, 2nd will be “Business, Finance, and Administration occupations”, 3rd will be “Natural and Applied Sciences and related occupations”, 4th will be “Health occupation”, 5th will be “occupations in Education, Law and Social, Community, and Government Services”, 6th will be “occupations in “Art, Culture, Recreation and Sport”, 7th will be “Sales and

Service occupations", 8th will be "Trades, Transport, and Equipment Operator and related occupations", 9th will be "Natural Resources, agriculture, and related production", 10th will be "Occupations in Manufacturing and Utilities". These groups come from that first-level occupation classification.

Table 2: Proportion of Immigrants in Population.

Province	Percentage that are Immigrants
Ontario	29.1
British Columbia	28.3
Alberta	21.2
Saskatchewan	10.5
Manitoba	18.3
Quebec	13.7
Atlantic Canada	4.8
Nova Scotia	6.1
New Brunswick	4.6
Prince Edward Island	6.4
Newfoundland & Labrador	2.4

Table 2, Proportion of Immigrants in Population, Source: Statistics Canada. (2018).

Table (3) below shows the summary statistics of each variable used in the model. The variables are $ln(income)_i$, $ln(age)_i$ and $ln(labor)_I$, where i represents the ith region and, can take the form of CAN for all across Canada, Atl for the Atlantic provinces, Ont for the province of Ontario, BC for the province of British Columbia, Alb for the province of Alberta, Man for the province of Manitoba, Que for the province of Quebec, PEI for the province of Prince Edward Island, NS for the province of Nova Scotia, NB for the province of New Brunswick, NL for the province of Newfoundland and Labrador. The four individual Atlantic provinces are also shown in this table to illustrate their low observation numbers. As mentioned, Table 3 provides the summary statistics for each of the variables used. When the ratio of

ln($ln(income)_i$ is positive, it implies that the native-born income is higher than immigrant born income, on average in the sample. The results show that native-born income is higher on average then immigrant income. When the variable $ln(age)_i$ is positive, that implies that native-born workers are on average older than immigrant workers in the same occupation. On average the sample shows that native-born workers tend to be older than immigrant workers. Lastly, when the variable $ln(labor)_I$ is negative, that means that there are fewer immigrants employed in an occupation compared to native-born. On average, the sample shows that there tends to be more native-born workers in each occupation compared to immigrants.

Table 3: Descriptive Statistics for ratios of income, age and labor.

Variable	Description	Mean	St. Dev.	Min	Max	Skewness	Kurtosis	Sample Size
$ln(income)_{CAN}$	Natural log of Immigrant income over native-born income	0.22	0.01	-1.67	0.42	-0.87	4.40	479
$ln(age)_{CAN}$	Natural log of Immigrant age over native-born age	0.06	0.07	-0.28	0.38	0.83	5.08	479
$ln(labor)_{CAN}$	Natural log of number of Immigrant employed over native-born employed	-2.79	0.04	-5.71	-0.46	-0.20	0.33	479
$ln(income)_{Atl}$	Natural log of Immigrant income over native-born income	0.71	0.62	-3.28	0.32	-1.52	4.23	73
$ln(age)_{Atl}$	Natural log of Immigrant age over native-born age	2.01	1.17	-5.31	-0.09	-0.73	0.11	73
$ln(labor)_{Atl}$	Natural log of number of Immigrant employed over native-born employed	-3.79	0.83	-5.45	-1.59	0.63	-0.06	73
$ln(income)_{Ont}$	Natural log of Immigrant income over native-born income	0.33	0.01	-1.91	0.52	-1.13	4.62	419
$ln(age)_{Ont}$	Natural log of Immigrant age over native-born age	0.05	0.00	-0.28	0.29	0.63	1.45	419
$ln(labor)_{Ont}$	Natural log of number of Immigrant employed over native-born employed	-2.56	0.04	-5.38	-0.68	-0.14	0.19	419
$ln(income)_{BC}$	Natural log of Immigrant income over native-born income	0.25	0.02	-1.84	0.46	-1.22	4.28	351
$ln(age)_{BC}$	Natural log of Immigrant age over native-born age	0.07	0.00	-0.34	0.63	1.94	11.56	351
$ln(labor)_{BC}$	Natural log of number of Immigrant employed over native-born employed	-2.31	0.04	-4.78	1.28	0.24	1.45	351
$ln(income)_{Alb}$	Natural log of Immigrant income over native-born income	0.20	0.01	-1.34	0.72	-0.54	1.40	346
$ln(age)_{Alb}$	Natural log of Immigrant age over native-born age	0.05	0.00	-0.28	0.19	0.51	0.66	346
$ln(labor)_{Alb}$	Natural log of number of Immigrant employed over native-born employed	-2.30	0.05	-4.68	0.91	0.19	0.16	346
$ln(income)_{Man}$	Natural log of Immigrant income over native-born income	0.30	0.02	-1.31	0.41	-0.74	0.69	206
$ln(age)_{Man}$	Natural log of Immigrant age over native-born age	0.08	0.01	-0.36	0.14	-0.05	0.70	206
$ln(labor)_{Man}$	Natural log of number of Immigrant employed over native-born employed	-1.99	0.07	-4.07	1.95	0.54	0.59	206
$ln(income)_{Que}$	Natural log of Immigrant income over native-born income	0.37	0.01	-1.71	0.40	-0.98	2.26	365
$ln(age)_{Que}$	Natural log of Immigrant age over native-born age	0.07	0.00	-0.28	0.16	0.18	0.86	364
$ln(labor)_{Que}$	Natural log of number of Immigrant employed over native-born employed	-3.01	0.04	-6.07	-1.37	-0.41	0.67	364
$ln(income)_{PEI}$	Natural log of Immigrant income over native-born income	0.44	0.09	-1.91	0.27	-1.09	0.33	37
$ln(age)_{PEI}$	Natural log of Immigrant age over native-born age	0.08	0.01	-0.22	0.08	-0.01	-0.57	37
$ln(labor)_{PEI}$	Natural log of number of Immigrant employed over native-born employed	-3.30	0.12	-4.81	-0.53	1.29	3.93	37
$ln(income)_{NS}$	Natural log of Immigrant income over native-born income	0.28	0.03	-1.14	0.62	-0.62	1.36	53
$ln(age)_{NS}$	Natural log of Immigrant age over native-born age	0.07	0.01	-0.41	0.27	0.60	3.47	53
$ln(labor)_{NS}$	Natural log of number of Immigrant employed over native-born employed	-3.64	0.08	-5.00	-1.48	0.82	0.47	53
$ln(income)_{NB}$	Natural log of Immigrant income over native-born income	0.36	0.05	-1.29	0.58	0.01	0.29	55
$ln(age)_{NB}$	Natural log of Immigrant age over native-born age	0.08	0.01	-0.29	0.09	-0.22	0.74	55
$ln(labor)_{NB}$	Natural log of number of Immigrant employed over native-born employed	-3.78	0.10	-5.38	-1.48	0.72	1.14	55
$ln(income)_{NL}$	Natural log of Immigrant income over native-born income	0.29	0.06	-0.92	0.53	-0.06	-0.27	38
$ln(age)_{NL}$	Natural log of Immigrant age over native-born age	0.07	0.01	-0.27	0.08	-0.32	-0.11	38
$ln(labor)_{NL}$	Natural log of number of Immigrant employed over native-born employed	-3.77	0.18	-5.83	-1.52	0.31	-0.90	38

Note: All of the variables are the natural logarithm form.

5 Estimation

Model (5) shown above will be estimated. Model (5) is an expanded version of Model (4). Model (5) will be estimated using data obtained from Statistics Canada (2019). The data will include the average yearly income for employed immigrant workers and native-born workers, I_M and I_N, respectively by occupation. There will also be data on the average number of workers employed in each occupation for both immigrant and native-born workers, M and N, respectively. Average age in each occupation for both immigrants and native-born workers, AM and AN, respectively, is collected from the 2016 Census. The ratio of M/N measures the ratio of immigrant workers employed to native-born workers employed. A higher ratio reflects a higher immigrant intensity in the labour market. The ratio I_N/I_M reflects the ratio of native-born income to immigrant income.

A variety of assumptions are made while estimating an OLS model that may be violated due to the nature of data used for estimation.[3] [2]One violation that can affect the accuracy of estimates in this study is the homoscedasticity assumption which requires that regression residuals should have a constant variance. This assumption may be violated in present study due to cross sectional component of data. If homoscedasticity does not hold, referred to as presence of heteroscedasticity, then this may suggest the model needs to include additional variables to explain the dependent variable in this model. To test for presence of homoscedasticity, we perform a Breusch-Pagan(1979) test whose results are shown in Table (1). The Breusch-Pagan

[3] The assumptions that must hold include homoscedasticity, normality, and consistency.

heteroscedasticity test involves first obtaining the original regression's residual data. Then another regression equation is estimated in which the squared residual data of the previous are used as dependent variables and independent variables are the same as in the previous equation. We test if the independent variables are jointly statistically significant. Breusch-Pagan is a Lagrange multiplier test for heteroscedasticity. The equation for this test is setup like equation (6) below:

$$\hat{E}^2 = ln(a_1/a_2) + (\beta + 1)ln(M/N) + \alpha_1 ln(A_N/A_M) + \mu \qquad (6)$$

Equation (6) above is an estimate of the squared residuals, $\hat{E}^2$, and the corresponding independent variables seen in Model (5). The Breusch-Pagan results are listed in Table (1) below:

Table 1: Breusch- Pagan Test for Heteroscedasticity.

Panel A: Canada	P-Value	Decision
H_0 : variances for the errors are equal	0.39	Fail to Reject
Panel B: Ontario	P-Value	Decision
H_0 : variances for the errors are equal	0.62	Fail to Reject
Panel C: British Columbia	P-Value	Decision
H0 : variances for the errors are equal	0.95	Fail to Reject
Panel D: Alberta	P-Value	Decision
H0 : variances for the errors are equal	0.62	Fail to Reject
Panel E: Saskatchewan	P-Value	Decision
H0 : variances for the errors are equal	0.23	Fail to Reject
Panel F: Manitoba	P-Value	Decision
H0 : variances for the errors are equal	0.84	Fail to Reject
Panel G: Quebec	P-Value	Decision
H0 : variances for the errors are equal	0.87	Fail to Reject
Panel H: Atlantic	P-Value	Decision
H0 : variances for the errors are equal	0.22	Fail to Reject

The null hypothesis ($H0$) for both the Breusch- Pagan test is that the error variances are equal to each other. Whereas the alternative would be that the error variances are not equal (or not $H0$). As the test showed, the Breusch-Pagan Lagrange multiplier statistic p-values are above the significant level, 0.05, so we fail to reject $H0$ implying that our model does not suffer from heteroscedasticity.

6 Results

In model (5) estimation, the coefficient that is of most importance is the one that is associated with ln(labor) as that represents the (β+1) which is the substitution parameter. Taking 1/(β+1) will give the elasticity of substitution, in other words, 1/(β+1) gives the change in the labor ratio with respect to the ratio of their marginal products or wages. To estimate the elasticity of substitution across Canada and the elasticity in each occupation across Canada, estimates are obtained of each of the 10 major occupation categories, including: Management Occupations, Business, Finance, and Administration occupations, Natural and Applied Sciences and related occupations, Health occupation, occupations in Education, Law, and Social, Community, and Government Services, occupations in Art, Culture, Recreation and Sport, Sales and Service occupations, Trades, Transport, and Equipment Operator and relatedoccupations, Natural Resources, agriculture and lastly Occupations in Manufacturing and Utilities. The purpose of breaking down each occupation across Canada is to more accurately evaluate which occupations immigrants are seen to be more of a substitute and which occupations immigrants are seen to be a less of a substitute. This will shed light on the labour market treatment of immigrants versus native-born.

6.1 Overall Elasticity Results

Table 4: Elasticity of Substitution by Occupations.

Dependent Variable=ln(Income)	Coefficients (1)	Elasticity of Substitution (2)
Panel A: Canada		32.26
Intercept	-0.09**	
	(0.04)	
ln(Age)	0.85***	
	(0.15)	
ln(Labor)	0.03**	
	(0.01)	
Panel B: Management		Infinite
Intercept	-0.37**	
	(0.15)	
ln(Age)	0.95	
	(0.82)	
ln(Labor)	-0.04	
	(0.05)	
Panel C: Business, Finance and Administration		9.94
Intercept	-0.61***	
	(0.13)	
ln(Age)	-0.29	
	(0.55)	
ln(Labor)	0.10**	
	(0.05)	
Panel D: Natural and Applied Sciences		17.54
Intercept	-0.02	
	(0.06)	
ln(Age)	1.56**	
	(0.49)	
ln(Labor)	0.06**	
	(0.03)	
Panel E: Health		Infinite
Intercept	0.12	
	(0.16)	
ln(Age)	1.86**	
	(0.79)	
ln(Labor)	0.09*	
	-0.05	
Panel F: Education, Law and Government Services		Infinite
Intercept	-0.01	
	(0.10)	
ln(Age)	1.16***	
	(0.44	
ln(Labor)	0.06*	
	(0.03)	
Panel G: Art, Culture, Recreation and Sport		Infinite
Intercept	0.35	
	(0.51)	
ln(Age)	-0.06	
	(0.97)	
ln(Labor)	0.20	

Panel H: Sales and Service		Infinite
Intercept	0.04	
	(0.12)	
ln(Age)	1.22**	
	(0.32)	
ln(Labor)	0.03	
	(0.05)	
Panel I: Trades, Transport and Equipment Operators		Infinite
Intercept	-0.21**	
	(0.09)	
ln(Age)	0.25	
	(0.31)	
ln(Labor)	-0.01	
	(0.39)	
Panel J: Natural Resources, Agriculture		8.93
Intercept	0.29	
	(0.21)	
ln(Age)	0.01	
	(0.49)	
ln(Labor)	0.11**	
	(0.06)	
Panel K: Manufacturing and Utilities Services		Infinite
Intercept	-0.09	
	(0.08)	
ln(Age)	-0.04	
	(0.52)	
ln(Labor)	0.06*	
	(0.03)	

Note: Table (4) reports the results and elasticity of substitution across all occupations using data on the entire country of Canada. Column (1) represents the coefficients for each occupation category. Column (2) represents the elasticity of substitution for that occupation across Canada.

***, **, * suggests that the coefficient is significant at the 1 percent, 5 percent, and 10 percent significance level, respectively. The standard errors are included in the parentheses.

Table 4 presents results of the coefficients of model (5). Also presented are elasticity values, which are the inverse of coefficients. At first, Canada-wide results are presented and then separately for each occupation group. Since the elasticity of substitution is the inverse of the coefficient of ln(labor) reported in Table 4, a coefficient that is not statistically significant indicates the value of

elasticity between immigrant and native-born labor is infinity. A statistically significant coefficient implies less than perfect substitution.

As seen in Table (4), there is imperfect substitution between immigrant and non-immigrant labour in Canada-wide. However, the high magnitude of the elasticity of substitution implies that immigrants are easy to absorb in Canadian labour markets. This turns out to be true only in 3 out of the ten occupations. The strongest substitution, outside of being perfect substitutes, is found in Natural and Applied Science. There is perfect substitution in the rest of the occupations.

Table 5 below reports the overall elasticity in each province (with the Atlantic provinces being grouped together). The following section, Section 6.2, will show the occupational elasticities within each province.

Table 5: Elasticity of Substitution by province.

Dependent Variable=ln(Income)	Coefficients (1)	Elasticity of Substitution (2)
Panel A: Canada		32.26
Intercept	-0.09	
	(0.04)	
ln(Age)	0.85***	
	(0.15)	
ln(Labor)	0.031**	
	(0.01)	
Panel B: Ontario		Infinite
Intercept	-0.01	
	(0.01)	
ln(Age)	0.92***	
	(0.10)	
ln(Labor)	-0.010	
	(0.02)	

Panel C: British Columbia		17.24
Intercept	-0.08*	
	(0.05)	
ln(Age)	0.64***	
	(0.17)	
ln(Labor)	0.058***	
	(0.02)	
Panel D: Alberta		15.87
Intercept	-0.004	
	(0.04)	
ln(Age)	0.99***	
	(0.19)	
ln(Labor)	0.063***	
	(0.02)	
Panel E: Manitoba		14.49
Intercept	-0.10**	
	(0.05)	
ln(Age)	0.75***	
	(0.26)	
ln(Labor)	0.069***	
	(0.02)	
Panel F: Quebec		15.38
Intercept	-0.12*	
	(0.06)	
ln(Age)	0.76***	
	(0.22)	
ln(Labor)	0.065***	
	(0.02)	
Panel G: Saskatchewan		9.35
Intercept	0.08	
	(0.08)	
ln(Age)	0.40	
	(0.32)	
ln(Labor)	0.107***	
	(0.03)	
Panel H: Atlantic Provinces		2.34
Intercept	1.45***	
	(0.36)	
ln(Age)	0.25***	
	(0.05)	
ln(Labor)	0.428***	
	(0.08)	

***, **, * suggests that the coefficient is significant at the 1 percent, 5 percent, and 10 percentsignificance level, respectively. The standard errors are included in the parentheses.

Table (5) shows the variation in the level of substitution across provinces. Panel A shows the results for the whole country of Canada, similar to what was shown in Table (4). The purpose of including Panel A is to provide a comparison of each province's elasticity with the national value.

Panels B through H are for the 6 provinces and grouped Atlantic provinces. These results are in order of what province has the largest proportion of its population as immigrants to the province with the smallest proportion of its population as immigrants. As stated above, the closer the coefficient is to zero the more immigrants are substitutes for native workers. Column (2) shows the elasticity of substitution, which is the main value of concern in this table.The higher the value given, the more it implies that immigrants are substitutes for native-born workers. Table (5) suggests an overall trend emerging. If you were to rank each province by the elasticity of substitution the order would be Ontario as the single infinite elasticity province, followed by British Columbia, Alberta, Quebec, Manitoba, Saskatchewan, and lastly the Atlantic provinces.

According to Table (5) results, the hypothesis that the elasticity of substitution can determine immigrant percentage of the provincial population is confirmed. A higher elasticity of substitution value follows the higher immigrant percentage of a population. Ontario, which has the largest proportion of immigrants, 29 percent of population, is seen to have a perfect substitute trait between immigrants and native-born workers that was suggested. British Columbia has the second highest elasticity of substitution at 17.24 and the next highest are Alberta and Quebec at 15.87 and 15.38 respectively. Following these provinces, come the Prairie provinces of Manitoba and Saskatchewan at 14.49 and 9.35, respectively. Lastly, the Atlantic provinces

with a combined elasticity of substitution of 2.34 who also have the lowest concentration of immigrants, at 6 or less in resident population.

Panel H of Table 5 shows the results for Atlantic Canada. The purpose is to account for the limitations that are shown in Atlantic Canada due to smaller variety of occupations, Table (5) Panel: H combines all 4 Atlantic Provinces: Nova Scotia, Prince Edward Island, New Brunswick, and Newfoundland and Labrador. The reason for this combination is to help eliminate any bias that could come up due to the small population of these provinces. Statistics Canada (2018) shows that the Atlantic provinces had a combined population of 2,333,322 in 2016. This combined population brings them up to the 5th largest population group estimated. The results for Atlantic Canada show a statistically significant coefficient, and the elasticity of substitution is 2.34. This result ranks the substitution between immigrants and native-born workers to be the furthest away from perfect substitutes in the Atlantic provinces. The Atlantic Canada elasticity of substitution is shown to be the lowest and in addition, the 4 Atlantic provinces also have the lowest proportion of their populations to be immigrants varying from about 2 percent in Newfoundland and Labrador to about 6 percent in Prince Edward Island.

6.2 Occupational Elasticities Within Provinces

The previous subsection, 6.1, showed that the proportion of immigrants in a province can be a proxy for the overall elasticity of substitution between immigrant and native-born workers in a province. The present subsection will focus on comparing and dissecting the different elasticities in the 10 major occupational groups within each province. Table (6) below shows the elasticity of substitution value for each occupation in each province. Occupation 0 is Management,Occupation 1 is Business, Finance and Administration, Occupation 2 is Natural and Applied Sciences, Occupation 3 is Health, Occupation 4 is Education, Law, Social, Community and Government Services, Occupation 5 is Art, Culture, and Sports, Occupation 6 is Sales and Services, Occupation 7 is Trades, Transport and Equipment Operator, Occupation 8 is Natural Resources and Agriculture, and lastly, Occupation 9 is Manufacturing and Utilities.

Table 6: Elasticity of Substitution Across Occupation Groups.

Dependent Variable=ln(Income)	Coefficients (1)	Elasticity of Substitution (2)
Panel A: Canada		
Overall	0.03**	32.26
Occ. 0	-0.04	Infinite
Occ. 1	0.10**	10
Occ. 2	0.06**	16.67
Occ. 3	0.09*	Infinite
Occ. 4	0.06**	16.67
Occ. 5	0.20	Infinite
Occ. 6	0.03	Infinite
Occ. 7	-0.01	Infinite
Occ. 8	0.11**	9.09
Occ. 9	0.06**	16.67
Panel B: Ontario		
Overall	-0.01	Infinite
Occ. 0	-0.08**	N/A
Occ. 1	-0.18***	N/A
Occ. 2	0.01	Infinite
Occ. 3	0.01	Infinite
Occ. 4	0.03	Infinite
Occ. 5	-0.19*	Infinite
Occ. 6	-0.03	Infinite
Occ. 7	-0.02	Infinite
Occ. 8	0.25***	4
Occ. 9	0.07***	14.29
Panel D: British Columbia		
Overall	0.06***	17.24
Occ. 0	0.14	Infinite
Occ. 1	0.08	Infinite
Occ. 2	0.07	Infinite
Occ. 3	0.07	Infinite
Occ. 4	0.09**	11.11
Occ. 5	-0.05	Infinite
Occ. 6	0.03	Infinite
Occ. 7	0.10*	Infinite
Occ. 8	0.14	Infinite
Occ. 9	0.10**	10

Panel E: Alberta		
Overall	0.06***	15.87
Occ. 0	0.04	Infinite
Occ. 1	-0.04	Infinite
Occ. 2	0.05	Infinite
Occ. 3	0.16***	6.25
Occ. 4	0.13***	7.69
Occ. 5	-0.08	Infinite
Occ. 6	0.12***	8.33
Occ. 7	0.08	Infinite
Occ. 8	0.01	Infinite
Occ. 9	0.05	Infinite
Panel F: Manitoba		
Overall	0.07***	14.49
Occ. 0	0.51*	Infinite
Occ. 1	0.05	Infinite
Occ. 2	0.20**	5
Occ. 3	0.15	Infinite
Occ. 4	0.15*	Infinite
Occ. 5	N/A	N/A
Occ. 6	0.08	Infinite
Occ. 7	0.06	Infinite
Occ. 8	0.16	Infinite
Occ. 9	0.17**	5.88
Panel G: Quebec		
Overall	0.06**	15.38
Occ. 0	0.03	Infinite
Occ. 1	-0.09	Infinite
Occ. 2	0.07	Infinite
Occ. 3	0.14*	Infinite
Occ. 4	0.11**	9.09
Occ. 5	- 0.02	Infinite
Occ. 6	-0.02	Infinite
Occ. 7	0.03	Infinite
Occ. 8	0.25	Infinite
Occ. 9	0.13**	7.69

Panel H: Saskatchewan		
Overall	0.11***	9.35
Occ. 0	0.01	Infinite
Occ. 1	0.03	Infinite
Occ. 2	0.07	Infinite
Occ. 3	0.21	Infinite
Occ. 4	0.06	Infinite
Occ. 5	N/A	N/A
Occ. 6	0.11	Infinite
Occ. 7	-0.01	Infinite
Occ. 8	0.62	1.61
Occ. 9	0.09	Infinite
Panel H: Atlantic Provinces		
Overall	0.43***	2.33
Occ. 0	-0.07	Infinite
Occ. 1	0.39	Infinite
Occ. 2	0.30**	33.33
Occ. 3	0.52***	1.92
Occ. 4	0.42***	2.38
Occ. 5	N/A	N/A
Occ. 6	0.32*	Infinite
Occ. 7	0.22*	Infinite
Occ. 8	N/A	N/A
Occ. 9	0.10	Infinite

***, **, * suggests that the coefficient is significant at the 1 percent, 5 percent, and 10 percent significance level respectively. N/A is reported when there are not enough data points available or if the elasticity does not make intuitive sense.

Table 6 above shows that within a province the elasticity of substitution varies across occupations. Apart from Management (Occ. 0), Business, Finance, Administration (Occ. 1), Art, Culture and Sports (Occ. 5), Trades, Transport, Equipment Operator (Occ.7) where across all provinces there is a perfectly elastic substitution. There is no province with all 10 categories

as perfectly elastic. The results of Table 6 also show that Atlantic provinces do not have enough data for estimation of two occupation groups, both Art, Culture and Sports (Occ. 5) and Natural Resources ad Agriculture (Occ. 8). Likewise, Manitoba and Saskatchewan do not have enough for 1 occupational group, Art, Culture, and Sports (Occ. 5). But first, looking at Table 7 in Appendix we can get an idea of which occupations the largest proportion of immigrants are employed in. Starting off with Ontario we see that approximately 57% of immigrants in Ontario are employed in either Occ. 1, 3, 4 or 6. Occ. 1 had a negative coefficient which cannot be explained and can be investigated in a future research (Elasticity of Substitution should always be a positive number). In the remaining occupation groups, three are seen to be in the infinite elasticity group. What makes the Ontario results different from the overall Canada results is that Occ. 4 (Trades, Transport and Equipment Operation) is seen to be perfectly elastic in Ontario but not in Canada as a whole. British Columbia immigrants are mostly concentrated in three main occupations; Occ. 1, 4 and 6. Of which, 1 and 6 are perfectly elastic but unlike Ontario, Occ. 4 (Trades, Transport, and Equipment Operator) is not perfectly elastic. Now turning to the Prairie provinces, you can see that the same occupation groups (1,4,6) have high amounts of immigrants, but Manitoba also has Manufacturing and Utilities (Occ. 9) instead of Occ. 1. Occ. 4 and 6 in Alberta and Manitoba are not perfect substitutes as well Occ. 9 in Manitoba is also seen to not be perfectly elastic as well. Furthermore, examining Quebec results we find that immigrants and native-born workers are not perfect substitutes. Similar results are shown for Atlantic Canada as well.

Overall, by investigating into each province's occupation elasticities one can note that provinces with the higher overall elasticities appear to have

immigrants concentrated in the infinite elasticity groups. Furthermore, the larger populated provinces have a more even distribution of immigrants in the 10 occupation groups.

7 Conclusion

In this paper, the elasticity of substitution between immigrant workers and native-born workers were estimated by deriving an equation based on a CES production function. Results showed that the elasticity of substitution can be used as a valid determinant for the proportion of immigrants in a province's population Higher the elasticity of substitution, the higher the proportion of immigrants. Using this approach provides another way to explain immigration settlement patterns. The CES model showed that provinces with high elasticity such as Ontario have significantly higher proportion of immigrants when compared to other provinces, such as those in the Atlantic region. The Atlantic provinces are seen to have the lowest substitution of immigrant and native-born workers in the labor market. Atlantic Canada has a relatively small percentage of immigrants in its population compared to other provinces, it is also home to less than 6 percent of Canadians and also could have industrial sectors that are looking for workers requiring skills not possessed by resident local workers.

This paper provides an insight into each province's immigrant substitution in the labor market, across provinces and occupations. As well, it identifies a pattern between percentage of immigrants in a population and the elasticity of substitution between immigrants and native-born workers. Furthermore, this

indication of substitution can be seen as reasoning for why so many immigrants settle in certain provinces. Moreover, by analyzing the different occupation groups within a province we can identify the differences between occupation groups in a smaller immigrant province to a larger immigrant province. The limitations of this paper include using only the 2016 Census data. The substitution between immigrants and native-born in the labor market may have changed since then. A further study using the updated 2021 census data could show different results. The results could also be different when analyzing data at the municipal level. Lastly, while the present study controlled for age differences between immigrants and native-born workers, future studies could add more controls such as for differences in gender and country of origin.

8 Bibliography

Akbari, A. H., & Aydede, Y. (2013). Are the educational credentials of immigrant and native-born workers perfect substitutes in Canadian labour markets? A production function analysis. *Education Economics*, *21*(5), 485-502.

Aydede, Y. (2017). Immigration and location choices of native-born workers in Canada. *Papers in Regional Science*, *96*, S113-S134.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the econometric society*, 1287-1294.

Chiswick, B. R., Chiswick, C. U., & Miller, P. W. (1985). Are immigrants and natives perfect substitutes in production?. *International Migration Review*, *19*(4), 674-685.

Girard, M., & Smith, M. (2013). Working in a regulated occupation in Canada: An immigrant–native born comparison. *Journal of International Migration and Integration*, *14*(2), 219-244.

Mulatris, P. (2010). Disqualification professionnelle et expériences temporelles: enquête auprès des immigrants francophones africains installés en Alberta. *British Journal of Canadian Studies*, *23*(1).

Tossutti, L., Hagar, D., Kelly, P., LeBlanc, I., & Pitre, N. (2012). Literature Review: Integration outcomes citizenship and immigration Canada. *Welcoming Community Report*.

Uzawa, H. (1962). Production functions with constant elasticities of substitution. *The Review of Economic Studies*, *29*(4), 291-299.

Wei, X., Onel, G., Guan, Z., & Roka, F. M. (2019). Substitution between immigrant and native farmworkers in the United States: Does legal status matter?. *IZA Journal of Development and Migration*, *10*(1), 1-27.

Wolla, S. A. (2014). The Economics of Immigration: A Story of Substitutes and Complements. *Page One Economics*®.

9 Appendix

9.1 Tables

Table 7: Proportion of Immigrants in Each Occupation.

Occupation	Employed	Employed
	Immigrants	Population
Panel A: Canada		
Total	1.00	0.07
Management	0.08	0.006
Business, Finance and Administration	0.13	0.01
Natural and applied sciences	0.08	0.01
Health	0.08	0.01
Education, Law and Government Services	0.10	0.01
Art, Culture, Recreation and Sport	0.02	0.002
Sales and Service	0.30	0.02
Trades, Transport and Operators	0.12	0.01
Natural Resources, Agriculture	0.01	0.001
Manufacturing and Utilities	0.07	0.01
Panel B: Atlantic Canada		
Total	1.00	0.02
Management	0.10	0.002
Business, Finance and Administration	0.11	0.002
Natural and applied sciences	0.10	0.002
Health	0.09	0.001
Education, Law and Government Services	0.01	0.002
Art, Culture, Recreation and Sport	0.03	0.0004
Sales and Service	0.31	0.01
Trades, Transport and Operators	0.09	0.002
Natural Resources, Agriculture	0.01	0.0002
Manufacturing and Utilities	0.04	0.001

Panel C: Ontario		
Total	1.00	0.08
Management	0.08	0.01
Business, Finance and Administration	0.14	0.01
Natural and applied sciences	0.11	0.01
Health	0.07	0.01
Education, Law and Government Services	0.10	0.01
Art, Culture, Recreation and Sport	0.02	0.002
Sales and Service	0.21	0.02
Trades, Transport and Operators	0.11	0.01
Natural Resources, Agriculture	0.008	0.001
Manufacturing and Utilities	0.08	0.01
Panel D: British Columbia		
Total	1.00	0.10
Management	0.10	0.01
Business, Finance and Administration	0.13	0.01
Natural and applied sciences	0.08	0.01
Health	0.07	0.01
Education, Law and Government Services	0.09	0.01
Art, Culture, Recreation and Sport	0.03	0.003
Sales and Service	0.31	0.03
Trades, Transport and Operators	0.12	0.01
Natural Resources, Agriculture	0.03	0.003
Manufacturing and Utilities	0.05	0.004
Panel E: Alberta		
Total	1.00	0.10
Management	0.07	0.01
Business, Finance and Administration	0.12	0.01
Natural and applied sciences	0.10	0.01
Health	0.09	0.01
Education, Law and Government Services	0.09	0.01
Art, Culture, Recreation and Sport	0.01	0.001

Sales and Service	0.32	0.03
Trades, Transport and Operators	0.15	0.02
Natural Resources, Agriculture	0.01	0.001
Manufacturing and Utilities	0.05	0.01
Panel F: Manitoba		
Total	1.00	0.10
Management	0.05	0.01
Business, Finance and Administration	0.12	0.01
Natural and applied sciences	0.05	0.01
Health	0.10	0.01
Education, Law and Government Services	0.09	0.01
Art, Culture, Recreation and Sport	0.01	0.001
Sales and Service	0.30	0.03
Trades, Transport and Operators	0.15	0.02
Natural Resources, Agriculture	0.02	0.002
Manufacturing and Utilities	0.13	0.01
Panel G: Quebec		
Total	1.00	0.05
Management	0.07	0.003
Business, Finance and Administration	0.16	0.01
Natural and applied sciences	0.12	0.01
Health	0.08	0.004
Education, Law and Government Services	0.12	0.01
Art, Culture, Recreation and Sport	0.03	0.002
Sales and Service	0.27	0.01
Trades, Transport and Operators	0.08	0.004
Natural Resources, Agriculture	0.01	0.0003
Manufacturing and Utilities	0.07	0.004
Panel H: Saskatchewan		
Total	1.00	0.07
Management	0.06	0.004

Business, Finance and Administration	0.09	0.01
Natural and applied sciences	0.06	0.004
Health	0.10	0.01
Education, Law and Government Services	0.07	0.01
Art, Culture, Recreation and Sport	0.01	0.001
Sales and Service	0.38	0.03
Trades, Transport and Operators	0.16	0.01
Natural Resources, Agriculture	0.02	0.001
Manufacturing and Utilities	0.05	0.004
Panel I: PEI		
Total	1.00	0.02
Management	0.12	0.003
Business, Finance and Administration	0.08	0.002
Natural and applied sciences	0.10	0.002
Health	0.07	0.002
Education, Law and Government Services	0.11	0.002
Art, Culture, Recreation and Sport	0.02	0.0004
Sales and Service	0.32	0.01
Trades, Transport and Operators	0.10	0.002
Natural Resources, Agriculture	0.03	0.001
Manufacturing and Utilities	0.06	0.001
Panel J: Nova Scotia		
Total	1.00	0.02
Management	0.10	0.002
Business, Finance and Administration	0.12	0.002
Natural and applied sciences	0.12	0.002
Health	0.09	0.002
Education, Law and Government Services	0.12	0.002
Art, Culture, Recreation and Sport	0.03	0.001
Sales and Service	0.30	0.01
Trades, Transport and Operators	0.09	0.002
Natural Resources, Agriculture	0.01	0.0002

Manufacturing and Utilities	0.02	0.0004
Panel K: New Brunswick		
Total	1.00	0.02
Management	0.11	0.002
Business, Finance and Administration	0.11	0.002
Natural and applied sciences	0.07	0.001
Health	0.08	0.001
Education, Law and Government Services	0.09	0.001
Art, Culture, Recreation and Sport	0.03	0.0004
Sales and Service	0.34	0.005
Trades, Transport and Operators	0.10	0.001
Natural Resources, Agriculture	0.01	0.0002
Manufacturing and Utilities	0.07	0.001
Panel L: Newfoundland and Labrador		
Total	1.00	0.01
Management	0.07	0.001
Business, Finance and Administration	0.08	0.001
Natural and applied sciences	0.12	0.001
Health	0.11	0.001
Education, Law and Government Services	0.19	0.002
Art, Culture, Recreation and Sport	0.02	0.0002
Sales and Service	0.29	0.003
Trades, Transport and Operators	0.08	0.001
Natural Resources, Agriculture	0.02	0.0002
Manufacturing and Utilities	0.02	0.0002

Note: Table (6) show the proportion of immigrants in each occupation, separated into each province/ area.

9.2 Data Sources

Statistics Canada. 2019. Census in Brief municipalities in Canada with the largest and fastest-growing populations between 2011 and 2016. Statistics Canada Catalogue no 98-200-X2016001. Ottawa. Version updated May 2019. Ottawa.

Statistics Canada. 2018.Population ad Dwelling Count Highlight Tables, 2016 Census.Statistics Canada Catalogue no 98-402-X2016001. Ottawa. Version updated June2020. Ottawa.

Statistics Canada. 2019. Data Tables, 2016 Census. Statistics Canada Catalogue no98-400-X2016355. Ottawa. Version updated June 2019. Ottawa.