

THE EFFECT OF COGNITIVE SKILLS ON ABORIGINAL
PEOPLE'S EMPLOYMENT OUTCOMES

by

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Abstract

This paper uses the 2012 Programme for the International Assessment of Adult Competencies (2012 PIAAC) and examines how cognitive skills affect the labour market outcomes of Aboriginal people in Canada. The results show that literacy, numeracy, and solving problems in technology-rich environment skills have a significant impact on earnings, but there is no difference in the returns on these skills between Aboriginal people and non-Aboriginal people. A one point increase in literacy, numeracy or PSL skills is estimated to increase hourly wages by about 3% to 4%, when they are included in separate regressions. In addition, Aboriginal people have comparatively lower cognitive skills than non-Aboriginal Canadians as measured by 2012 PIAAC. Education attainment is an effective way to increase people's cognitive abilities. A Bachelors degree is associated with a 30 to 50 point increase in cognitive skills relative to high school education.

Keywords: Aboriginal people; Canada; 2012 PIAAC; cognitive skills; employment outcomes

List of Abbreviations and Symbols Used

2012 PIAAC	2012 Programme for the International Assessment of Adult Competencies
OECD	Organisation for Economic Co-operation and Development
2003 IALSS	2003 International Adult Literacy and Skills Survey
LSUDA	Statistic Canada Survey of Literacy Skills in Daily Use
ISCED	International Standard Classification of Education
PSL skill	Skill of problem solving in technology-rich environments
Missing skill	No records of skill of problem solving in technology-rich environments
OLS	Ordinary Least Squares
RIF	Recentered influence function

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Chapter 1

Introduction

Aboriginal people in many countries have poor earnings and employment outcomes. Recently, developed countries, such as the United States and Australia, have noted particularly poor employment outcomes for Aboriginal people¹. This problem is also true in Canada, where considerable earning inequality exists between Aboriginal and non-Aboriginal Canadians.² Aboriginal people are also more likely to be unemployed than non-Aboriginal Canadians (White et al., 2003). The poor outcomes of Aboriginal people are highlighted by the fact that in 2010, only 7% of the Aboriginal people had a Bachelor's degree or higher, while around 25% of non-Aboriginal people had attained this level of education (Canada (2010)). The low incomes of the Aboriginal population and lack of postsecondary education attainment should raise concerns for governments and academics. Given the increasing size of the Aboriginal population in Canada, these problems have become more important³.

Although there is a growing literature revealing the extent of the poor labour market outcomes of Aboriginal people, the reasons for their economic struggles have not been fully investigated (Alcorn and Levin, 1998). Some studies highlight the lower levels of educational attainment of Aboriginal people as a major contributing factor for their poor labour market performance⁴. However, the issue is much more complex than merely differences in obtained educational credentials. This paper expands on the existing literature by focusing on the importance of cognitive skills. There is

¹See for examples from (Gitter and Reagan, 2002) and (Polzin, 2004) for evidence in the United States and (Miller, 1989) and (Jones, 1993) for findings in Australia.

²The median annual income in 2005 of Aboriginal Canadians was \$22,366 less than that of non-Aboriginal Canadians and Pendakur and Pendakur (2011) find that the wage gap is 10%-20% for females and 20%-50% for males relative to non-Aboriginal Canadians.

³The similar growth rate occurred from 2005 to 2010; the number of Aboriginal workers in Canada increased by 24.7%, which is much higher than 6.8%, the increase rate of overall Canadian workers (Canada, 2010)

⁴For example, see (Jankowski and Moazzami, 1995) and (Halchuk, 2006).

a small literature examining differences in cognitive skills between Aboriginal and non-Aboriginal Canadians, which finds that with the low educational attainment, lower levels of cognitive skills of Aboriginal people is also apparent. This conclusion was initially drawn using data from 2003 International Adult Literacy and Skills Survey, and later from 2012 Programme for the International Assessment of Adult Competencies⁵. We build on this literature in several important ways. First, we begin by examining if there are differences in cognitive skills, and whether these differences can explain the lower labour market outcomes of Aboriginal people in Canada. Although previous research shows that Aboriginal people have, on average, lower levels of educational degrees, we investigate whether Aboriginal people acquire the same level of literacy, numeracy and technology usage skills as non-Aboriginal Canadians with the same level of formal education. This analysis will identify if in addition to implementing policies to encourage Aboriginal people to pursue post secondary education, whether supplementary policies are required to aid Aboriginal people when they are in college or university. We also estimate the returns on cognitive skills to determine if there is possible discrimination against Aboriginal people, where we define discrimination as receiving different returns for cognitive skills. The return on the cognitive skills is an indication of returns on productivity, so if Aboriginal people obtain different returns, this would be an indication of possible discrimination.

In general, education and cognitive skills are strongly connected, but have different effects. The study of the relationship of the Aboriginal people's educational attainment, cognitive skills and their labour market outcomes will help inform more effective policy to enable Aboriginal people to succeed economically. This analysis will bring support to the social innovations in Aboriginal people's education, working conditions, and even the development of Aboriginal communities. The results of this study will shed light on the importance of human capital in terms of labour market outcomes and inform policy makers of the importance of post secondary education and improving the literacy, numeracy and technology usage skills of the Aboriginal population. For Aboriginal people themselves, this research may raise awareness of the benefits of pursuing higher education and improving the aforementioned skills.

⁵For example see (Biswal et al., 2008) and (Hanushek et al., 2013).

Thus, the economic outcomes and likely social fabric of the Aboriginal population could be improved.

Examining the relationship between Aboriginal people's education and skill development will help inform policy for several reasons. Firstly, post secondary education is important for labour market outcomes. Given the low level of post secondary attainment, it is critical to respond to the learning and cultural needs of Aboriginal students to ensure that they are able to obtain the education and skills required to succeed in a modern economy. Thus, potential recommendations may be given to increase the capacity of the education system and provide quality programs, services, and resources to help create learning opportunities for Aboriginal people. To increase their participation, government should develop and implement strategies, and provide more educational funds for Aboriginal people in all levels of education, especially in post secondary education. Secondly, differences in literacy, numeracy and technology usage skills may suggest particular policy recommendations. These policy suggestions will be given in order to reduce gaps in student achievement and make improvements in graduation rates, self-esteem, and labour market preparation of the Aboriginal people. Government should pay more attention to and provide support for training in effective literacy, numeracy as well as technology usage skills for Aboriginal students. Also, government must collaborate with educational institutions and provide support to school boards to develop action plans in order to improve teaching of these skills to Aboriginal students in Canada.

The body of this thesis is organized as follows. Chapter 2 summarizes the main findings from the existing literature, which focuses on Aboriginal employment outcomes and the reasons for their low employment outcomes. Chapter 3 describes the data and provides some descriptive statistics. Chapter 4 presents the empirical methodologies. Chapter 5 provides the estimated results with different models. Chapter 6 concludes with a brief discussion of some findings and policy implications.

Chapter 2

Literature Review

In this section, we will briefly summarize the conditions of Aboriginal people's performance in the labour market and the low employment outcomes of Aboriginal people. We will then discuss findings of the existing literature that address the impact of education on employment outcomes. In addition, we will summarize the findings, which combine skills and earnings together and address the question: How do cognitive skills influence the performance of Aboriginal people in the Canadian labour market?

2.1 The poor employment outcomes for Aboriginal populations in Canada

Economic research has found poor employment outcomes among Aboriginal people in Canada. Using the 1986 and 1991 census data, a distinct wage gap was found between Aboriginal and non-Aboriginal Canadians¹. Pendakur and Pendakur (2011) investigated the earning disparity of Aboriginal people in Canada during 1995-2005 and found the wage gap is between 20%-50% for males and 10%-20% for females.

Maxim et al. (2001) also found a significant wage gap between Aboriginal and non-Aboriginal Canadians and gaps between Aboriginal subgroups (First Nation, Inuit and Metis). The authors found the gaps between the subgroup Aboriginal groups and non-Aboriginal Canadians are \$10,325, \$7,669 and \$8,653, respectively. This disadvantage was also observed in terms of employment outcomes. Drost and Eryou (June,1991) found that there was a serious unemployment problem among Aboriginal people. White et al. (2003) found that Aboriginal females are 17% more likely to be unemployed than non-Aboriginal females, with Registered Indians in the worst

¹See the examples from (De Silva, 1999) and (Hossain and Lamb, 2012).

condition among all subgroups.

These poorer economic outcomes of Aboriginal people are found in many developed countries such as the United States and Australia. Jones (1993) investigated two labour market outcomes: unemployment status and hourly earnings among Australian Aboriginal people, and found that Aboriginal people suffered much higher risks of unemployment, and they were confined in a narrow range of jobs with comparatively lower wages. Hunter (2003) and Miller (1989) found indigenous Australians have 2.8 and 2.5 times the probability of being unemployed when compared with non-Aboriginal Australians, respectively. Hunter and Gray (2001) found that the lack of educational attainment and difficulty in speaking English has resulted in higher levels of unemployment of Aboriginal people. Similar conditions were found in the labour market of the United States. Gitter and Reagan (2002) determined that American Indians experienced between an 11% to 14% higher of unemployment rate, and wages that are on average 17% below those of the non-Indian population. A study focusing on Montana, found that Indians in Montana had median household income that was 34% less than for the average household in the state (Polzin, 2004).

2.2 Research linking low earnings to the lack of education

There are many economic studies which start from a human capital model and focus on the disparity among different groups of people. However, these vary in their focus and explanations. Some focus on the relationship between labour market outcomes and educational attainment. One of the most typical findings is from Ferrer and Riddell (2002), who states that credentials play a significant role in the Canadian labour market. A Bachelor's degree increases earnings on average by 21%. Earnings also increases with years of schooling. Oreopoulos (2006) outlines that mandatory education laws significantly increased the earnings of adults, and also substantially decreased the likelihood of being unemployed and being below the low-income threshold. Alcorn and Levin (1998) finds similar positive effects of earning a Bachelor's degree on employment outcomes. Increased levels of education is also linked with higher participation in the labour market and decreased unemployment for the Aboriginal people².

²For example, see (Walters et al., 2004) and (Drost and Eryou, March,2000)

However, the educational attainment of the Aboriginal population is much lower on average than that of the general Canadian population. Jankowski and Moazzami (1995) investigated the Aboriginal people in Northwestern Ontario, and found the wage gap between Aboriginal and non-Aboriginal Canadians could be explained by education levels. Each year of secondary education for Aboriginal people increased their wages by an average of 7.8% and a Bachelor's degree increased wages by 31.5% for Aboriginals relative to high school graduates. However, Drost (1994) did not find that post-secondary education or professional credentials have any significant effect on the unemployment rate compared to a high school degree, but the secondary school completion rate affected the employment rate positively among Aboriginal people.

2.3 Some previous studies focus on the effect from cognitive skills on wages

There are also some findings that examine the link between cognitive skills and link labour market outcomes. Ferrer et al. (2006) compare earnings between immigrants and the native born in Canada and find that literacy differences could explain about two-thirds of the immigrant-native born earning gap among university graduates. Berman et al. (2003) study immigrant earnings in Israel and determine that improving Hebrew accounts for two thirds to three quarters of the differential in income growth between immigrants and the native born in Israel. Chiswick et al. (2003) find that the high levels of literacy and numeracy skills are associated with greater labour market success in Australia. Chiswick et al. (2000) demonstrate that there is a positive impact of language skills on career participation and earnings in Bolivia; Monolingual Spanish speakers earn 25% less than people who can also speak the local language. When focusing on the Canadian labour market, Biswal et al. (2008) reveals that level of cognitive skills plays a strong role in the employment outcomes for Aboriginal people. Additionally, people with levels 3-5 in literacy skills have 19.5% higher average earnings than in levels 1-2 based on a 5 point scale. Finnie and Meng (2002) use the Survey of Literacy Skills in Daily Use (LSUDA) to investigate minorities' earnings, and find literacy and numeracy skills play significant roles in the earnings of visible minorities. These two cognitive skills were found to explain earning gaps better than education and working experience. Hanushek et al. (2013) use the 2012 PIAAC for

over 22 countries and find that a one standard deviation increase in numeracy skills leads to an increase of 18% in wages across countries, and the estimated returns on skills are especially larger in developed countries such as the United States, Germany and Ireland than the countries with lower average employment earnings.

Studies indicate that solving the earning disparity between Aboriginal people and non-Aboriginal Canadians will bring much benefit for the Canadian labour market. Sharpe et al. (2007) find that improving the social and economic well-being of Aboriginal people would effectively improve the overall performance of Canadian labour market. Investment on Aboriginal people's education would improve the overall performance of the Canadian labour market in coming decades. Moreover, CSLS research report of Aboriginal labour market performance in Canada 2007-2011 (Gee and Sharpe, 2012) show that the Aboriginal labour market grew rapidly from 2007 to 2011 with a higher labour force growth rate, comparing to the national average. This report predicts that the Aboriginal labour force is going to grow even faster in coming decades.

As summarized above, the poor performance of Aboriginal people in the Canadian labour market should attract more attention, but only a few studies have been done, and these are limited to Aboriginal people's education. However, cognitive skills are also a vital part of human capital, which could significantly impact people's earnings and may not be fully captured by the information on education. We include cognitive skills in our study to analyze their impacts on Aboriginal people's earnings and employment outcomes in Canada. In this paper, we will talk about the poor employment outcomes of Aboriginal populations in Canada focusing on the importance of cognitive skills and education. In addition, we confirm the existing findings of the effects of education on earnings. 2012 PIAAC provides more detailed information on labour market outcomes than the 2006 Aboriginal People's Survey (APS 2006). Moreover, using the 2012 PIAAC data will enable us to enhance and build on this work since this data also contains a randomized representative sample of the Aboriginal population from different regions. Therefore, we will be able to better compare outcomes of the Aboriginal people to those of the non-Aboriginal Canadians than was possible with the 2003 IALSS. Furthermore, 2012 PIAAC contains objective measures of cognitive

skills. With this information, we will be able to firstly examine if Aboriginal people receive similar returns to non-Aboriginal Canadians for their skills, and then we will be able to determine how important differences in cognitive skills are in explaining earning and employment differentials. This research will lead to some policy suggestions in this paper. Intuitively, a lack of higher education and good cognitive abilities among Aboriginal populations may come from two sources. First, government funding is not great enough to support Aboriginal people's educational pursuits and complete their studies, especially remote locations. Second, traditional Aboriginal culture and self-dependence lifestyles may not require a high level of educational attainment or the cognitive abilities measured by the 2012 PIAAC like technology usage skills.

Chapter 3

Data Description

The data source of our study is the 2012 Programme for International Assessment of Adult Competencies (2012 PIAAC), which was developed by the Organization for Economic Co-operation and Development (OECD). The 2012 PIAAC provides uniform standardized data about cognitive skills of the adult population from age 16-65 across 24 countries as well as the labour market variables such as wages, education and labour force status. We use the Canadian subsample, which was collected by Statistics Canada from November 2011 to June 2012. To get a better estimate of the impact of cognitive skills on wages, we further restrict our sample to prime-age workers, defined as those between 24 and 59 years of age. We exclude the observations if there is no information on years of education, highest educational degree earned, or work experience. In addition, a small number of individuals who have multi-Aboriginal identities¹, or immigrants who identify themselves as having Aboriginal identity are removed. After excluding these individuals, the sample consists of 18,899 observations, of which 11,657 are non-Aboriginal Canadians, 3,659 are Aboriginal Canadians, and 3,573 are immigrants. To provide an overall comparison and analysis, we will use population survey sample weights throughout all our regressions.

Respondents were given various tasks, usually real-world problems, to assess their cognitive skills in three domains: literacy, numeracy, and problem solving in technology-rich environments (technology usage skill). In this paper, we focus on all of these three skill domains, which were defined by OECD as follows²:

A. Literacy is defined as: ‘the ability of understanding, evaluating, using and engaging with written texts to participate in society, to achieve one’s goals, and to

¹ Multi-Aboriginal identities means one individual has more than one identities of Aboriginal subgroups. For example, in our sample an individual could not have Inuit and Metis identities at the same time.

²The three cognitive skills are defined in the User Guide for The Programme for the International Assessment of Adult Competencies, 2012.

- develop one's knowledge and potential'(OECD, 2012b, P.20)
- B. Numeracy is defined as: 'ability to access, use, interpret, and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of diverse situations'(OECD, 2012b, P.34)
- C. Problem solving in technology-rich environments (technology usage skill)³ is defined as: 'ability to use digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks. Solving problems by setting up appropriate goals and plans, accessing and using information through computers'(OECD, 2012b, P.46)

Each respondent's skill was measured by test scores on a 500-point scale with 10 plausible values. We calculate the mean plausible values of literacy, numeracy and technology usage skills for each individual to represent the individual's ability in those areas. About 4000 people in our sample did not answer the technology usage skill section. As the user's guide explained, the standard survey mode required users to answer questions using a computer, but the respondents without applicable computers or computer usage experience could have a pencil-and-paper interview instead. The user guide also explains, the missing values of technology usage skill are caused by three different reasons: some individuals have never used computers, some people have no abilities in the use of information and communication technology, and some people did not attempt to take the computer-based survey test. Thus, we generate two continuous variables for technology usage skill when we examine the skills as the dependent variable. The first is *PSL skill*, which omits people with missing technology usage skills from the regression analysis. We also estimate technology usage skill quantile regressions at the median where we include people who did not perform the technology test and code the people with missing values as zero. We denote this variable as *PSL skill0*. In the wage regressions when the skills are used as independent variables, we again code people with missing technology usage skills as zero and include a dummy variable for these people called *Missing PSL*.

³'PSL skill' and 'technology usage' will be used in the following parts of this paper to represent 'problem solving in technology-rich environments'.

At the beginning of the survey, all participants also responded to a questionnaire on their demographic characteristics, including whether they have Aboriginal identity, and to which specific subgroup they belong: First Nation, Inuit or Metis. We include dummy variables for Aboriginal people and immigrants in our analysis with the reference category the non-Aboriginal Canadians. In addition, we also replace the dummy variable of Aboriginal identity with three dummy variables of Aboriginal subgroups, including First Nation, Inuit and Metis. While the main focus of our analysis is on the performance of the Aboriginal people, immigrants are included as an additional comparison group in our model.

The 2012 PIAAC data also contains information from participants about their labour market status, wages, education, and working experience. This dataset classifies employment earnings in three categories: hourly wages for employees, monthly wages for employees and monthly wages for self-employed workers. Within the dataset, monthly wages of employees and self-employed workers are separately identified and we also create an overall monthly wage variable. In this study, we will mainly focus on hourly wages for employees in our estimation part, but also analyze other categories of wages to determine if they are differently effected by our independent variables. We also estimate quantile regressions where we include people who are not currently working and assign them a value of 1\$ for their hourly wages.

The measurement of work experience refers to actual paid work experience, which was collected as the number of years with paid work up to 40 years. The highest educational degree earned was recorded in the International Standard Classification of Education (ISCED), which includes seven different levels: ISCED1- primary or less; ISCED2- lower secondary; ISCED3- upper secondary, high school degree; ISCED4- post-secondary, non-tertiary, trade or community college; ISCED5B- tertiary, professional school degree; ISCED5A- tertiary, Bachelor's degree; and ISCED6- tertiary, master's degree or higher. In regressions which we control for highest level of education, we include separate dummies for each category and use the ISCED3 upper secondary (high school degree) as the default group.

Tables 3.1 and 3.2 provide the summary statistics for cognitive skills, working experience and years of education for different identities, for both males and females. The sample size for males is 8,637 and is 10,264 for females, with a total of 18,899 observations in the pooled sample.⁴ Overall, non-Aboriginal Canadians have higher scores in literacy, numeracy and PSL skills than Aboriginal people and immigrants. For all groups, males have comparatively higher scores than females in numeracy skills, while females have better performance in literacy and PSL skills.

Non-Aboriginal Canadian males have higher average scores in all skills relative to Aboriginal people and immigrants. For males, Aboriginal people achieve the lowest average scores in literacy skill (259.4), numeracy skill (250.3) and PSL skill (202.4). For females, non-Aboriginal Canadian females have the highest average scores of literacy skill (283), numeracy skill (268.2) and PSL skill (249.2). Both Aboriginal and immigrant females have much lower scores than non-Aboriginal Canadian females, with a difference in average achievement that indicates a large gap of skills between Aboriginal and non-Aboriginal Canadians. There is also considerable variation across groups in average years of schooling, work experience, and the highest education degree earned. Both Aboriginal males and females have lower years of schooling and work experience. In particular, Aboriginal people have a much lower percentage of individuals who earned postsecondary education degrees or higher, when compared with non-Aboriginal Canadians. 29.1% non-Aboriginal Canadians versus to 18.9% of Aboriginal people earned a Bachelor's degree or higher.

For the Aboriginal subgroups of First Nation, Inuit and Metis, the Inuit show the worst performance in all scores of cognitive skills, years of education, and work experience. In terms of highest education degree earned, 50.4% Inuit males and 49.4% Inuit females do not have a high school degree, and 0% earned a master's degree or higher. In addition, 46.2% of Inuit males and 54.2% females have missing values in PSL skill, which suggests they have inadequate abilities in terms of using information

⁴For the thesis version of the paper, we use the public use data to create all summary statistics to avoid problems of residual disclosure as we revise the paper. The regression analysis is based on the confidential RDC version of the 2012 PIAAC data.

Table 3.1: Summary Statistics for Males

	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Working Experience	21.09 (0.28)	22.64 (0.14)	19.15 (0.24)	19.08 (0.46)	16.06 (0.77)	23.41 (0.39)
School Years	12.93 (0.09)	14.39 (0.05)	15.45 (0.10)	12.71 (0.14)	11.06 (0.22)	13.28 (0.12)
Literacy Skill	259.45 (1.28)	283.00 (0.62)	260.25 (1.31)	252.40 (1.96)	219.70 (3.24)	269.39 (1.85)
Numeracy Skill	250.29 (1.43)	280.51 (0.68)	261.73 (1.45)	240.30 (2.13)	205.12 (3.54)	263.45 (2.07)
PSL Skill0	202.42 (3.15)	240.57 (1.53)	212.76 (2.96)	190.82 (5.01)	110.81 (8.71)	220.93 (4.40)
PSL Skill	270.66 (1.38)	286.52 (0.64)	275.65 (1.21)	266.31 (2.13)	245.20 (4.88)	275.52 (1.93)
Missing PSL	0.25 (0.01)	0.16 (0.01)	0.23 (0.01)	0.28 (0.02)	0.55 (0.03)	0.20 (0.01)
Primary or less	0.05 (0.01)	0.03 (0.00)	0.04 (0.00)	0.06 (0.01)	0.17 (0.03)	0.04 (0.01)
Lower Secondary	0.22 (0.01)	0.10 (0.00)	0.05 (0.01)	0.25 (0.02)	0.33 (0.03)	0.20 (0.01)
High School Degree	0.23 (0.01)	0.22 (0.01)	0.16 (0.01)	0.23 (0.02)	0.19 (0.03)	0.24 (0.02)
Trade/Community College	0.19 (0.01)	0.18 (0.01)	0.08 (0.01)	0.18 (0.02)	0.15 (0.02)	0.21 (0.02)
Professional School	0.10 (0.01)	0.19 (0.01)	0.31 (0.01)	0.07 (0.01)	0.03 (0.01)	0.14 (0.01)
Bachelor's Degree	0.18 (0.01)	0.25 (0.01)	0.22 (0.01)	0.19 (0.02)	0.13 (0.02)	0.18 (0.01)
Master's Degree/Higher	0.02 (0.00)	0.05 (0.00)	0.14 (0.01)	0.02 (0.01)	0.00 (0.00)	0.01 (0.00)
AGE 25-34	0.31 (0.01)	0.29 (0.01)	0.25 (0.01)	0.34 (0.02)	0.37 (0.03)	0.28 (0.02)
AGE 35-44	0.24 (0.01)	0.26 (0.01)	0.31 (0.01)	0.23 (0.02)	0.28 (0.03)	0.24 (0.02)
AGE 45-54	0.31 (0.01)	0.31 (0.01)	0.31 (0.01)	0.29 (0.02)	0.27 (0.03)	0.33 (0.02)
AGE 55-59	0.14 (0.01)	0.14 (0.00)	0.13 (0.01)	0.13 (0.01)	0.08 (0.02)	0.15 (0.01)
Observations	1,557	5,383	1,696	634	214	713

Note: data source from 2012 PIAAC Public File; 'PSL skill0' records missing value into zero and 'PSL skill' records missing value with '.'; dummy variable 'Missing PSL' equals one if there is no record of PSL skill.

Table 3.2: Summary Statistics for Females

	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Working Experience	17.09 (0.24)	20.24 (0.13)	14.81 (0.23)	16.39 (0.36)	14.73 (0.71)	18.14 (0.36)
School Years	13.44 (0.08)	14.67 (0.04)	14.77 (0.09)	13.19 (0.11)	11.12 (0.21)	13.93 (0.11)
Literacy Skill	264.66 (1.05)	282.97 (0.53)	252.77 (1.18)	255.25 (1.61)	223.78 (3.21)	279.40 (1.32)
Numeracy Skill	243.09 (1.12)	268.23 (0.57)	240.64 (1.27)	232.04 (1.75)	198.98 (3.43)	260.11 (1.35)
PSL Skill0	217.28 (2.66)	249.22 (1.29)	194.21 (2.78)	191.06 (4.19)	134.55 (8.43)	255.97 (3.18)
PSL Skill	275.63 (1.05)	285.79 (0.54)	266.20 (1.14)	268.14 (1.65)	250.31 (3.64)	284.10 (1.35)
Missing PSL	0.21 (0.01)	0.13 (0.00)	0.27 (0.01)	0.29 (0.01)	0.46 (0.03)	0.10 (0.01)
Primary or less	0.06 (0.01)	0.02 (0.00)	0.05 (0.01)	0.08 (0.01)	0.19 (0.03)	0.04 (0.01)
Lower Secondary	0.14 (0.01)	0.07 (0.00)	0.06 (0.01)	0.17 (0.01)	0.31 (0.03)	0.09 (0.01)
High School Degree	0.20 (0.01)	0.21 (0.01)	0.18 (0.01)	0.19 (0.01)	0.13 (0.02)	0.22 (0.01)
Trade/Community College	0.22 (0.01)	0.17 (0.00)	0.08 (0.01)	0.21 (0.01)	0.19 (0.03)	0.23 (0.01)
Professional School	0.13 (0.01)	0.23 (0.01)	0.30 (0.01)	0.12 (0.01)	0.09 (0.02)	0.15 (0.01)
Bachelor's Degree	0.22 (0.01)	0.25 (0.01)	0.21 (0.01)	0.21 (0.01)	0.10 (0.02)	0.24 (0.01)
Master's Degree/Higher	0.02 (0.00)	0.06 (0.00)	0.13 (0.01)	0.02 (0.00)	0.00 (0.00)	0.02 (0.00)
AGE 25-34	0.28 (0.01)	0.27 (0.01)	0.28 (0.01)	0.27 (0.01)	0.36 (0.03)	0.28 (0.02)
AGE 35-44	0.32 (0.01)	0.25 (0.01)	0.32 (0.01)	0.31 (0.02)	0.29 (0.03)	0.33 (0.02)
AGE 45-54	0.29 (0.01)	0.32 (0.01)	0.28 (0.01)	0.30 (0.02)	0.23 (0.03)	0.29 (0.02)
AGE 55-59	0.11 (0.01)	0.15 (0.00)	0.12 (0.01)	0.12 (0.01)	0.13 (0.02)	0.10 (0.01)
Observations	1,982	6,274	2,007	918	232	832

Note: data source from 2012 PIAAC Public File; 'PSL skill0' records missing value into zero and 'PSL skill' records missing value with '.'; dummy variable 'Missing PSL' equals one if there is no record of PSL skill.

and communication technology or they did not attempt the computer-based survey test. The Metis have higher average cognitive skills and better education levels than the other two Aboriginal subgroups.

Tables 3.3 and 3.4 summarize the mean values of the three cognitive skills and probability of having missing values of PSL skill (*Missing PSL*) for Aboriginal, non-Aboriginal Canadians and immigrants by highest degrees for both males and females. For literacy skill, with the same education degree earned, both Aboriginal males and females achieved lower scores than non-Aboriginal Canadians, but somewhat higher scores than immigrants. The same relationships exist for numeracy and PSL skills. In addition, skill gaps between Aboriginal and non-Aboriginal Canadians decrease when comparing the groups with higher education degrees earned. However, we can find in Table 3.3 that the effect of higher degree earned for non-Aboriginal Canadian is still 4 to 12 points higher than the effect of the same degree earned for Aboriginal in literacy skill, 11 to 14 higher in numeracy skill and 2 to 5 points higher in PSL skill. The gaps between non-Aboriginal Canadians and immigrants are even greater. This disparity indicates that literacy, numeracy and PSL skill scores increase more for each level increase in education for non-Aboriginal Canadians than for Aboriginal people. When considering Missing PSL, Table 3.3 demonstrates that more than half of Aboriginal people who only earned an elementary school degree did not answer this part of the test. This indicates that people who lack education have difficulty with the knowledge of how to use skills to solve problems in a technology rich environment. The probability of missing PSL skills decreases for people who earn higher education degrees. As explained before, we code the PSL skill as zero if there is a missing value for the individual's PSL record. Thus, for our regressions we will not only focus on the average values of PSL skills that we summarized in Tables 3.3 and 3.4, but need to combine *PSL skill0* and *Missing PSL* together to analyze people's performance in the technology usage field.

Table 3.5 summarizes the distribution of hourly wage in different groups' identities. From the hourly wage, we know that non-Aboriginal Canadians are more likely to

Table 3.3: Mean values of cognitive skills in different education levels for Males

	Literacy skill					
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	201.71 (3.87)	212.87 (3.02)	170.83 (6.98)	188.26 (5.11)	182.20 (4.83)	228.31 (7.84)
Lower Secondary	225.40 (2.49)	236.35 (1.88)	205.05 (7.37)	220.99 (3.71)	198.62 (4.30)	234.33 (4.41)
High School Degree	254.88 (2.09)	273.07 (1.08)	234.98 (3.32)	254.07 (3.02)	231.64 (5.99)	257.18 (3.15)
Trade/Community College	263.30 (2.41)	274.92 (1.18)	255.80 (4.47)	263.42 (4.08)	227.34 (4.99)	265.40 (3.27)
Professional School	286.31 (2.42)	289.64 (1.09)	261.00 (2.56)	274.49 (3.51)	275.92 (9.38)	299.22 (3.27)
Bachelor's Degree	311.79 (2.60)	316.21 (1.10)	278.12 (1.72)	302.70 (4.74)	296.68 (12.13)	316.35 (3.07)
Master's Degree/Higher	316.52 (7.47)	324.05 (1.92)	293.27 (2.38)	315.07 (11.40)		319.63 (9.59)
	Numeracy skill					
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	189.49 (4.76)	202.85 (3.22)	168.39 (7.36)	170.36 (5.37)	164.37 (5.12)	226.39 (10.35)
Lower Secondary	211.17 (2.87)	229.50 (2.16)	199.05 (7.61)	204.13 (4.39)	179.91 (4.45)	223.81 (4.88)
High School Degree	243.63 (2.21)	267.49 (1.20)	225.79 (3.53)	240.57 (3.11)	219.51 (6.37)	248.07 (3.36)
Post Secondary	258.10 (2.64)	274.18 (1.26)	253.80 (4.88)	256.53 (3.94)	217.23 (5.38)	261.90 (3.91)
Professional School	282.04 (2.73)	289.71 (1.17)	261.80 (2.76)	266.81 (3.70)	270.15 (11.55)	298.58 (3.80)
Bachelor's Degree	305.33 (3.12)	316.19 (1.23)	284.76 (1.86)	296.22 (5.81)	269.98 (12.97)	310.29 (3.66)
Master's Degree/Higher	298.90 (7.93)	318.82 (2.34)	302.29 (2.60)	288.15 (10.37)		322.09 (11.05)

Note: data source from 2012 PIAAC public file, mean values and standard error of mean of skills in the brackets

Problem Solving Skill in Technology Rich Environment (PSL skill0)						
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	75.59 (10.31)	87.70 (7.62)	42.41 (11.43)	37.49 (11.90)	54.08 (13.12)	138.88 (24.70)
Lower Secondary	147.54 (6.67)	166.82 (5.15)	44.75 (13.26)	146.86 (10.42)	75.24 (12.06)	158.35 (11.31)
High School Degree	195.80 (6.52)	222.58 (3.34)	162.09 (8.64)	202.15 (9.78)	79.40 (23.53)	197.76 (9.19)
Trade/Community College	205.02 (6.57)	233.50 (3.24)	223.88 (9.20)	183.69 (12.15)	167.34 (17.87)	224.98 (7.93)
Professional School	254.45 (6.30)	255.58 (2.97)	227.94 (6.21)	243.92 (9.51)	227.40 (27.30)	267.01 (8.88)
Bachelor's Degree	294.46 (5.65)	293.83 (2.58)	246.28 (4.23)	282.25 (9.39)	224.48 (79.51)	301.55 (6.92)
Master's Degree/Higher	291.08 (7.31)	290.64 (5.21)	266.80 (4.65)	278.81 (8.77)		317.54 (10.29)
Missing Value in PSL skill (Missing PSL)						
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	0.65 (0.05)	0.60 (0.03)	0.77 (0.06)	0.81 (0.06)	0.70 (0.07)	0.42 (0.10)
Lower Secondary	0.37 (0.03)	0.32 (0.02)	0.81 (0.06)	0.38 (0.04)	0.66 (0.05)	0.33 (0.05)
High School Degree	0.27 (0.02)	0.19 (0.01)	0.37 (0.03)	0.25 (0.03)	0.71 (0.09)	0.25 (0.03)
Trade/Community College	0.23 (0.02)	0.15 (0.01)	0.17 (0.03)	0.31 (0.04)	0.28 (0.07)	0.15 (0.03)
Professional School	0.13 (0.02)	0.13 (0.01)	0.17 (0.02)	0.13 (0.03)	0.21 (0.09)	0.12 (0.03)
Bachelor's Degree	0.04 (0.02)	0.06 (0.01)	0.13 (0.01)	0.05 (0.03)	0.27 (0.26)	0.04 (0.02)
Master's Degree/Higher	0.00 (0.00)	0.07 (0.02)	0.07 (0.01)	0.00 (0.00)		0.00 (0.00)

Note: data source from 2012 PIAAC public file, mean values and standard error of mean of skills in the brackets

Table 3.4: Mean values of cognitive skills in different education levels for Females

	Literacy skill					
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	194.56 (3.32)	212.60 (3.29)	174.38 (5.31)	186.71 (4.84)	172.58 (3.97)	223.15 (6.85)
Lower Secondary	222.41 (2.30)	235.03 (1.68)	203.32 (5.58)	215.60 (3.33)	211.44 (4.63)	240.88 (3.85)
High School Degree	268.08 (1.98)	270.63 (1.01)	233.30 (2.88)	258.06 (3.04)	230.81 (5.40)	280.35 (2.46)
Trade/Community College	269.14 (1.59)	274.77 (1.01)	252.80 (4.08)	266.78 (2.35)	254.00 (7.62)	272.75 (2.24)
Professional School	279.07 (1.71)	285.34 (0.94)	255.26 (2.20)	272.80 (2.73)	248.74 (7.82)	286.62 (2.10)
Bachelor's Degree	301.21 (2.33)	309.70 (0.89)	271.93 (1.62)	292.60 (3.61)	278.05 (7.37)	310.23 (2.98)
Master's Degree/Higher	308.69 (3.86)	319.22 (1.72)	284.67 (2.23)	307.67 (5.86)		310.20 (4.68)
	Numeracy skill					
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	168.94 (3.73)	199.75 (3.31)	160.66 (6.06)	158.39 (5.35)	143.68 (3.87)	205.68 (7.02)
Lower Secondary	197.06 (2.37)	214.66 (1.94)	188.96 (5.70)	188.80 (3.27)	184.77 (4.62)	219.16 (4.21)
High School Degree	246.57 (2.30)	254.63 (1.08)	217.93 (3.12)	234.82 (3.69)	207.65 (6.56)	260.74 (2.64)
Trade/Community College	247.49 (1.70)	258.06 (1.08)	237.87 (4.16)	242.26 (2.58)	233.16 (8.56)	254.29 (2.26)
Professional School	261.03 (1.77)	272.04 (1.01)	241.38 (2.31)	254.00 (2.82)	224.66 (7.74)	269.58 (2.14)
Bachelor's Degree	279.92 (2.40)	297.49 (0.95)	262.90 (1.81)	273.69 (3.99)	257.33 (7.44)	286.68 (2.85)
Master's Degree/Higher	287.02 (4.85)	304.73 (1.91)	275.74 (2.52)	279.26 (7.00)		298.46 (5.83)

Note: data source from 2012 PIAAC public file, mean values and standard error of mean for skills in the brackets

Problem Solving Skill in Technology Rich Environment(PSL skill0)						
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	98.24 (9.67)	118.91 (8.94)	31.00 (8.89)	105.25 (15.00)	32.39 (10.23)	106.78 (25.99)
Lower Secondary	140.00 (7.02)	159.51 (5.64)	122.59 (14.19)	121.12 (10.00)	122.31 (13.59)	187.86 (13.06)
High School Degree	225.44 (5.81)	238.58 (2.75)	138.67 (7.64)	191.78 (9.32)	165.12 (22.64)	263.79 (6.44)
Trade/Community College	221.79 (5.47)	237.63 (2.90)	188.94 (10.77)	196.35 (9.25)	150.95 (23.21)	254.96 (5.40)
Professional School	253.51 (4.64)	258.51 (2.51)	216.12 (5.42)	239.17 (7.60)	177.54 (24.17)	270.99 (5.51)
Bachelor's Degree	267.12 (5.69)	285.39 (2.17)	230.09 (3.99)	237.76 (10.05)	276.79 (6.93)	294.05 (5.32)
Master's Degree/Higher	294.18 (9.55)	292.96 (4.31)	253.08 (5.23)	286.11 (14.18)		306.09 (11.89)
Missing Value in PSL skill (Missing PSL)						
	Aboriginal	Canadian	Immigrant	First Nation	Inuit	Metis
Primary or Lower	0.53 (0.05)	0.47 (0.04)	0.85 (0.04)	0.48 (0.07)	0.83 (0.05)	0.54 (0.11)
Lower Secondary	0.40 (0.03)	0.34 (0.02)	0.45 (0.06)	0.46 (0.04)	0.47 (0.06)	0.25 (0.05)
High School Degree	0.20 (0.02)	0.13 (0.01)	0.46 (0.03)	0.30 (0.03)	0.34 (0.09)	0.09 (0.02)
Trade/Community College	0.19 (0.02)	0.14 (0.01)	0.29 (0.04)	0.29 (0.03)	0.45 (0.08)	0.07 (0.02)
Professional School	0.11 (0.02)	0.10 (0.01)	0.17 (0.02)	0.14 (0.03)	0.29 (0.09)	0.06 (0.02)
Bachelor's Degree	0.10 (0.02)	0.06 (0.01)	0.16 (0.01)	0.18 (0.03)	0.00 (0.00)	0.03 (0.02)
Master's Degree/Higher	0.04 (0.03)	0.06 (0.01)	0.10 (0.02)	0.05 (0.04)		0.03 (0.03)

Note: data source from 2012 PIAAC public file, mean values and standard error of mean of skills in the brackets

have high hourly wages as employees than the other groups, for both males and females. Males are more likely to earn a higher wage than females. There are 36% Aboriginal males and 18% females, who earned more than \$40 per hour, compared to 23% non-Aboriginal Canadian females and 47% males. Meanwhile, the percentages of Aboriginal males and females who earned hourly wage less than \$30 are 27% and 45%, and only 20% non-Aboriginal Canadian males and 39% females have hourly wages below \$30. When comparing the Aboriginal females' hourly wage with that of immigrants, Table 3.5 indicates that Aboriginals and immigrants have similar proportions in the low hourly wage group, while a greater proportion of immigrants than Aboriginal people earned an hourly wage above \$40 per hour. In addition, the percentage of Aboriginal males without employment earnings is 26.2% and 34.3% for females, comparing the non-Aboriginal Canadians to only 11.8% for males and 18.3% for females.

The 2012 PIAAC data also contains monthly wage for employees and monthly wage for people who are self-employed. We find similar distributions of different groups of people in each wage range as the distribution of hourly wage. And the number of self-employed individuals is so small to analyze. Thus, we will focus on studying hourly wages for employees in chapter 4.

Table 3.5: Summary of Employment Outcomes for different groups

	Aboriginal	Canadian	Immigrant	Total
Males				
Hourly wage distribution of currently working workers				
less \$8	2.01%	2.50%	2.55%	2.50%
\$8 - \$10	3.25%	1.72%	2.08%	1.85%
\$10 - \$15	8.14%	6.34%	8.40%	6.94%
\$15 - \$20	14.40%	11.97%	18.45%	13.77%
\$20 - \$30	17.33%	14.51%	17.63%	15.42%
\$30 - \$40	17.58%	16.14%	13.65%	15.50%
\$40 - \$50	29.58%	37.81%	30.39%	35.61%
\$50 or more	7.71%	9.01%	6.85%	8.40%
Total	100.00%	100.00%	100.00%	100.00%
Employment distribution				
with employed earnings	73.79%	88.18%	87.12%	87.49%
without employment earnings	26.21%	11.82%	12.88%	12.51%
Total	100.00%	100.00%	100.00%	100.00%
Female				
Hourly wage distribution of currently working workers				
less \$8	4.31%	3.41%	4.55%	3.73%
\$8 - \$10	5.08%	4.46%	5.99%	4.87%
\$10 - \$15	14.76%	13.91%	20.58%	15.65%
\$15 - \$20	22.71%	20.84%	22.63%	21.35%
\$20 - \$30	22.86%	17.74%	16.19%	17.48%
\$30 - \$40	12.40%	15.12%	11.22%	14.04%
\$40 - \$50	15.88%	22.08%	16.53%	20.48%
\$50 or more	1.99%	2.44%	2.31%	2.40%
Total	100.00%	100.00%	100.00%	100.00%
Employment distribution				
with employed earnings	65.70%	81.49%	71.83%	78.29%
without employment earnings	34.30%	18.51%	28.17%	21.71%
Total	100.00%	100.00%	100.00%	100.00%

Note: data source from 2012 PIAAC public file, hourly wage distribution in each range in percentage among different group of populations

Chapter 4

Methodology

In this section, we firstly describe the model for the regressions with cognitive skills as the dependent variable, and then discuss the model in which log hourly wage is the dependent variable. We will mainly use an OLS model to estimate the differences in cognitive skills. We include the Aboriginal and immigrant dummy variables, a set of dummy variables for highest level of education earned and other demographic characteristics in the model. For our second model concerning the relationship between wage and cognitive skills, we will mainly reference the framework used by Green and Craig Riddell (2003) in a discussion of literacy and earnings. Our first model which addresses cognitive skills is as follows:

$$Skill_i = \alpha + \beta_1 Age_i + \beta_2 Exp_i + \omega_1 Aboriginal_i + \omega_2 Immigrant_i + \delta Credentials_i + u_i \quad (4.1)$$

Where $Skill_i$ captures the average plausible values of the cognitive skills of literacy, numeracy and PSL skill for individual i ; ω_1 measures the effect of Aboriginal identity dummy variable and ω_2 measures the effect of immigrant identity dummy variable. We re-estimate the model and we include separate dummy variables for the subsample of Aboriginal people: First Nation, Inuit and Metis. δ is a vector of highest education degree earned coefficients, which include elementary school or lower, lower secondary, upper secondary (high school degree), post secondary degree (trade/community college), professional degree, Bachelor's degree and master's degree or higher seven levels (see from Chapter 3). Upper secondary education (high school degree) is used as the reference category. This default education degree will be consistent in our second model of log hourly wage. β_1 and β_2 measure the impact from age and working experience on cognitive skills. u_i is the error term, which is assumed to be well behaved.

Our estimation is done separately by gender. In the simplest model, the Aboriginal dummy variable and the highest level of education dummies are the main parameters of interest. For the cognitive skill of PSL, about one third of our sample has missing values. Thus we will also conduct analysis including the missing values coded as zero using Recentered Influence Function (RIF) regressions and focus on the median.¹

For our second model with log hourly wages as the dependent variable, we follow analysis similar to the human production generation model from Ferrer et al. (2006) and Hanushek et al. (2013). Our model includes cognitive skills, highest education degree earned and other control variables. We transfer hourly wages of employees into logarithm form to analyze the change of earnings in percentage. This second model examines employment earnings is as follows:

$$\begin{aligned} \ln(\text{hourly_wage}_i) &= \alpha + \beta_1 \text{Age}_i + \beta_2 \text{Exp}_i + \omega_1 \text{Aboriginal}_i + \omega_2 \text{Immigrant}_i + \delta \text{Credentials}_i \\ &= +\sigma_1 \text{Literacy}_i + \sigma_2 \text{Numearcy}_i + \sigma_3 \text{PSL}_i + \phi \text{Regions}_i + u_i \end{aligned} \tag{4.2}$$

where $\ln(\text{hourly_wage})$ is the log of hourly wages. To control for school attainment, we include the set highest level of education dummies. Again, the key independent variables in our framework is the Aboriginal indicator variable as well as the Aboriginal subgroup indicator variables (First Nation, Inuit and Metis). We are also concerned about how cognitive skills impact employment earnings in our analysis and how much of the earning differential they explain. As noted earlier, skills could capture unobserved abilities. To control for demographic characteristics, we include a set of control variables including age, age square, years of paid work experience and experience square. In addition, we interact the cognitive skill variables with the Aboriginal and immigrant identity dummy variables to examine if they obtain different returns to cognitive skills, which could provide evidence of discrimination. Furthermore, we include regional dummies² to capture regional differences in labour

¹The quantile regression is not sensitive to this type of censored data.

²British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Atlantic provinces (New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland) and a Territories dummy.

market outcomes and cost of living. We first estimate the model with minimum control variables, and then add more independent variables step by step to incorporate their impact on employment earnings.

Chapter 5

Estimated Results

In this section, we present the results in three sections. In the first section, we estimate the effects of Aboriginal identity, highest education degree earned, and other demographic variables on three cognitive skills: literacy, numeracy and problem solving ability in a technology-rich environment (PSL) skills. These results are presented in Tables 5.1 to 5.4. In the second section, Tables 5.5 to 5.8 report the estimated differences in wages based on Aboriginal status, as well as examine the importance of education, cognitive skills and additional control variables. In the third part, we investigate the effect of cognitive skills on wages.

5.1 Estimated results of cognitive skills

In Tables 5.1 and 5.3, we separately estimate dependent variables of literacy, numeracy and PSL skills using OLS, and then problem solving skill including people who did not answer this test coded as zero (PSL skill0) by RIF for both males and females. In Tables 5.2 and 5.4, we replace the Aboriginal identity dummy with three subgroup Aboriginal dummy variables: First nation, Inuit and Metis.

Each table from Tables 5.1 to 5.4 contains four dependent skill variables. For each skill, we have a basic regression in the first column, which includes Aboriginal, immigrant, age, and age square. In the second column, we add a set of dummy variables of highest education degree earned to study the impacts from credentials on cognitive skills.

The identity of Aboriginal is our key variable of interest. We find that the coefficients of the dummy variable of Aboriginal identity are statistically significant and negative in all regressions. For the subgroups of Aboriginal people of First Nation, Inuit and Metis, all of the estimated coefficients are also significantly negative in Tables 5.2

and 5.4. Examination of these results indicates that the Aboriginal population on average has significantly lower cognitive skills than non-Aboriginal Canadians, and immigrants have a similar disadvantage. More specifically, Aboriginal people have a deficit of about 15-30 point scores for males and about 10-25 point scores for females for cognitive skills compared with non-Aboriginal Canadians. Among the three subgroups of Aboriginal people, Metis have the smallest cognitive skill gaps relative to non-Aboriginal Canadians, however, Inuit have the largest gaps. In addition, we find the skill gaps between Aboriginal and non-Aboriginal Canadians drop when adding the control variables for education in each regression, which means education plays an important role in cognitive skills. Given that the high school degree is the reference educational category, we find from the second column of each skill that people who have a lower degree than a high school degree are more likely to get lower cognitive skills scores; likewise, the people who earn higher degrees than a high school degree perform much better in this cognitive skill survey. The positive effects are especially evident among the people who earned a Bachelor's degree, master's degrees or higher. For example, from column (2) in Tables 5.1 and 5.3, we see that for literacy skill, a male with a master's degree scores 43.28 point scores higher than the male with only a high school degree, and females score 35.46 points higher. This finding is equivalent with those of Falch and Sandgren (2006), who demonstrate that education is strongly correlated with people's cognitive ability. Thus, we could conclude Aboriginal populations have comparatively lower cognitive skills than non-Aboriginal Canadians, and a higher education degree is associated with better performance in people's cognitive skills. This finding is also similar to what we found in chapter 3 from the summary statistics of Table 3.3.

Table 5.1: Skills regressions, Males

	Literacy Skill		Numeracy Skill		PSL Skill			PSL skill0	
	1	2	3	4	5	6	7	8	
Immigrant	-22.75*** [2.075]	-30.46*** [1.927]	-18.90*** [2.311]	-27.26*** [2.115]	-10.74*** [1.930]	-18.83*** [1.938]	-18.25*** [3.124]	-28.07*** [3.103]	
Aboriginal	-23.98*** [3.057]	-9.759*** [2.468]	-30.72*** [3.294]	-14.74*** [2.639]	-16.86*** [3.247]	-7.515*** [2.707]	-26.97*** [4.239]	-11.23*** [3.758]	
Age	0.712 [0.759]	-0.193 [1.014]	1.679** [0.849]	0.633 [1.129]	1.158 [0.750]	0.46 [1.097]	1.314 [1.301]	-1.219 [1.791]	
Age ² /1000	-17.75** [8.948]	-27.03* [13.91]	-28.70*** [9.986]	-42.25*** [15.50]	-25.02*** [8.900]	-32.45** [16.34]	-37.97** [15.14]	-22.28 [24.35]	
Primary or Less		-52.95*** [4.354]		-52.56*** [4.415]		-58.28*** [5.990]		-37.15*** [3.813]	
Lower Secondary		-33.13*** [3.143]		-33.26*** [3.537]		-29.15*** [3.549]		-30.97*** [4.596]	
Trade/Community College		5.325** [2.375]		10.84*** [2.581]		1.925 [2.435]		11.26** [4.440]	
Professorial School		19.05*** [2.202]		25.40*** [2.406]		17.25*** [2.359]		30.72*** [4.128]	
Bachelor		43.28*** [2.151]		51.73*** [2.354]		32.86*** [2.326]		55.72*** [3.881]	
Master or Higher		56.31*** [2.829]		64.02*** [3.253]		36.71*** [2.898]		66.75*** [4.847]	
Experience		-0.332 [0.663]		-0.435 [0.741]		-0.256 [0.759]		0.823 [1.165]	
Exp ² /1000		-41.08*** [9.406]		-58.63*** [10.38]		-28.66** [12.70]		-52.89*** [15.85]	
Age × exp		0.0645*** [0.0170]		0.0867*** [0.0193]		0.0452* [0.0232]		0.0469 [0.0296]	
Constant	286.8*** [15.40]	295.9*** [16.82]	264.2*** [17.30]	272.9*** [18.97]	284.3*** [15.17]	292.9*** [17.53]	295.6*** [26.77]	318.6*** [30.48]	
R-squared	0.072	0.364	0.051	0.361	0.064	0.25	0.073	0.215	
Observations	8,768	8,768	8,768	8,768	8,824	6,824	8,768	8,768	

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school degree) is the reference level of highest education degree.

Table 5.2: Skill regressions, Males with separate Aboriginal categories

	Literacy Skill			Numeracy Skill			PSL Skill			PSL skill0					
	1	2	3	4	5	6	7	8	1	2	3	4			
Immigrant	-22.73*** [2.076]	-30.48*** [1.928]	-18.88*** [2.311]	-27.30*** [2.115]	-10.73*** [1.930]	-18.84*** [1.939]	-18.24*** [3.124]	-28.09*** [3.104]	-30.90*** [4.016]	-13.95*** [3.192]	-40.43*** [4.162]	-21.29*** [3.228]	-11.30*** [4.415]	-30.68*** [5.772]	-12.20*** [5.144]
First nation	-65.44*** [6.183]	-33.13*** [4.905]	-77.50*** [7.091]	-41.39*** [5.134]	-43.46*** [9.658]	-23.38*** [4.964]	-66.08*** [8.480]	-32.33*** [6.873]	-65.44*** [6.183]	-33.13*** [4.905]	-77.50*** [7.091]	-41.39*** [5.134]	-43.46*** [9.658]	-66.08*** [8.480]	-32.33*** [6.873]
Inuit	-13.48*** [4.581]	-3.809 [3.717]	-17.08*** [4.949]	-6.31 [4.022]	-11.02** [4.626]	-3.311 [3.795]	-19.77*** [6.183]	-8.545 [5.379]	-13.48*** [4.581]	-3.809 [3.717]	-17.08*** [4.949]	-6.31 [4.022]	-11.02** [4.626]	-19.77*** [6.183]	-8.545 [5.379]
Metis	0.694 [0.759]	-0.175 [1.014]	1.654* [0.849]	0.655 [1.129]	1.144 [0.750]	0.471 [1.097]	1.302 [1.301]	-1.207 [1.791]	0.694 [0.759]	-0.175 [1.014]	1.654* [0.849]	0.655 [1.129]	1.144 [0.750]	1.302 [1.301]	-1.207 [1.791]
Age	-17.57** [8.948]	-27.26* [13.91]	-28.46*** [9.985]	-42.52*** [15.50]	-24.88*** [8.900]	-32.63** [16.34]	-37.86** [15.15]	-22.45 [24.35]	-17.57** [8.948]	-27.26* [13.91]	-28.46*** [9.985]	-42.52*** [15.50]	-24.88*** [8.900]	-32.63** [16.34]	-37.86** [15.15]
Age ² /1000															
Primary or Less															
Lower Secondary															
Trade/Community College															
Professional School															
Bachelor															
Master or Higher															
Experience															
Exp ² /1000															
Age × exp															
Constant	287.2*** [15.40]	295.8*** [16.83]	264.7*** [17.30]	272.7*** [18.98]	284.6*** [15.17]	292.9*** [17.53]	295.9*** [26.78]	318.5*** [30.49]	287.2*** [15.40]	295.8*** [16.83]	264.7*** [17.30]	272.7*** [18.98]	284.6*** [15.17]	292.9*** [17.53]	295.9*** [26.78]
R-squared	0.073	0.364	0.053	0.362	0.064	0.25	0.074	0.215	0.073	0.364	0.053	0.362	0.064	0.25	0.074
Observations	8,768	8,768	8,768	8,768	8,824	6,824	8,768	8,768	8,768	8,768	8,768	8,768	8,824	6,824	8,768

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school degree) is the reference level highest education degree.

Table 5.3: Skills regressions, Females

	Literacy Skill		Numeracy Skill		PSL Skill			PSL skill0	
	1	2	3	4	5	6	7	8	
Immigrant	-31.42*** [1.911]	-30.56*** [1.821]	-28.81*** [2.075]	-27.95*** [1.952]	-21.86*** [1.932]	-23.91*** [2.002]	-37.32*** [2.538]	-36.23*** [2.600]	
Aboriginal	-19.97*** [2.459]	-7.255*** [1.839]	-26.75*** [2.563]	-12.83*** [1.915]	-12.80*** [2.409]	-5.094*** [1.888]	-20.11*** [3.295]	-7.029*** [2.956]	
Age	0.725 [0.694]	-2.638*** [0.766]	1.390* [0.738]	-2.095*** [0.801]	1.997*** [0.690]	-0.781 [0.840]	1.985* [1.037]	-2.255* [1.212]	
Age ² /1000	-20.31** [8.142]	22.94** [10.11]	-27.54*** [8.652]	15.11 [10.55]	-37.52*** [8.131]	-2.386 [11.38]	-46.77*** [12.13]	7.783 [15.59]	
Primary or Less		-52.72*** [4.286]		-49.90*** [4.675]		-45.46*** [6.398]		-32.58*** [4.116]	
Lower Secondary		-31.70*** [3.035]		-34.11*** [3.318]		-31.44*** [3.143]		-38.74*** [3.727]	
Trade/Community College		5.260** [2.207]		4.718** [2.356]		-0.77 [2.335]		-4.698 [3.828]	
Professorial School		14.37*** [1.974]		16.58*** [2.148]		8.486*** [2.089]		12.88*** [3.378]	
Bachelor		35.46*** [1.983]		40.04*** [2.185]		22.02*** [2.016]		31.74*** [3.172]	
Master or Higher		47.62*** [2.587]		51.37*** [2.975]		30.47*** [2.679]		46.70*** [4.366]	
Experience		2.087*** [0.475]		2.093*** [0.518]		1.869*** [0.540]		3.238*** [0.768]	
Exp ² /1000		-16.54** [7.594]		-22.47*** [8.141]		-6.065 [9.170]		-12.09 [11.61]	
Age × exp		-0.0171 [0.0123]		-0.00926 [0.0132]		-0.0236 [0.0153]		-0.0393** [0.0189]	
Constant	291.4*** [14.17]	321.9*** [13.54]	262.2*** [15.09]	293.1*** [14.07]	272.1*** [14.04]	303.3*** [14.59]	287.7*** [21.18]	332.1*** [21.96]	
R-squared	0.126	0.374	0.099	0.357	0.12	0.26	0.121	0.224	
Observations	10,412	10,412	10,412	10,412	8,552	8,552	10,412	10,412	

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level highest education degree.

Table 5.4: Skill regressions, Females with separate Aboriginal categories

	Literacy Skill		Numeracy Skill		PSL Skill		PSL skill0	
	1	2	3	4	5	6	7	8
Immigrant	-31.38*** [1.911]	-30.59*** [1.821]	-28.78*** [2.076]	-27.99*** [1.952]	-21.83*** [1.932]	-23.91*** [2.002]	-37.29*** [2.538]	-36.27*** [2.600]
First nation	-27.89*** [3.423]	-12.86*** [2.404]	-36.75*** [3.884]	-20.31*** [2.770]	-18.91*** [3.814]	-9.729*** [2.747]	-31.40*** [4.067]	-15.96*** [3.708]
Inuit	-61.93*** [5.138]	-31.18*** [3.633]	-71.75*** [5.795]	-38.99*** [3.882]	-39.20*** [5.661]	-23.40*** [4.597]	-66.90*** [5.222]	-37.53*** [4.821]
Metis	-5.802** [2.904]	1.918 [2.463]	-10.21*** [2.393]	-1.695 [2.170]	-4.458* [2.587]	0.799 [2.374]	-1.276 [4.670]	6.728 [4.273]
Age	0.727 [0.694]	-2.617*** [0.766]	1.395* [0.738]	-2.067*** [0.801]	1.997*** [0.690]	-0.772 [0.840]	1.988* [1.036]	-2.223* [1.212]
Age2/1000	-20.32** [8.139]	22.68** [10.11]	-27.58*** [8.650]	14.77 [10.35]	-37.53*** [8.131]	-2.528 [11.38]	-46.78*** [12.12]	7.38 [15.59]
Primary or Less		-52.46*** [4.283]		-49.58*** [4.667]		-45.21*** [6.377]		-32.21*** [4.106]
Lower Secondary		-31.53*** [3.036]		-33.92*** [3.317]		-31.34*** [3.144]		-38.49*** [3.729]
Trade/Community College		5.266** [2.207]		4.728** [2.355]		-0.773 [2.335]		-4.689 [3.828]
Professorial School		14.38*** [1.973]		16.59*** [2.148]		8.503*** [2.089]		12.89*** [3.378]
Bachelor		35.47*** [1.982]		40.06*** [2.185]		22.03*** [2.016]		31.76*** [3.170]
Master or Higher		47.64*** [2.587]		51.40*** [2.974]		30.49*** [2.679]		46.73*** [4.366]
Experience		2.069*** [0.475]		2.070*** [0.518]		1.861*** [0.540]		3.210*** [0.768]
Exp ² /1000		-16.58*** [7.593]		-22.52*** [8.140]		-6.134 [9.170]		-12.14 [11.61]
Age×exp		-0.0168 [0.0123]		-0.00887 [0.0132]		-0.0234 [0.0153]		-0.0389** [0.0189]
Constant	291.3*** [14.17]	321.6*** [13.54]	262.0*** [15.09]	292.6*** [14.08]	272.1*** [14.04]	303.1*** [14.60]	287.5*** [21.18]	331.6*** [21.96]
R-squared	0.128	0.375	0.101	0.358	0.121	0.26	0.122	0.225
Observations	10,412	10,412	10,412	10,412	8,552	8,552	10,412	10,412

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school degree) is the reference level highest education degree.

5.2 Baseline results on wages

To address the questions about the effect from Aboriginal identity, cognitive skills, education and geographic regions on employment outcomes, we start with a set of baseline estimates, and then add more control variables of skills and geographic regions to investigate how these results change. Tables 5.5 to 5.8 summarize the estimated results of our regressions separately in males and females. The first column of each table includes the minimum control variables with age, age squared, experience, experience squared, an Aboriginal dummy and immigrant dummy; the second column of each table measures the impact of cognitive skills on hourly wages; the third column focuses on the impact of highest education degree earned by each individual on their hourly wages; and we put skills and credential dummy variables together in the fourth column; and in column five we include a set of geographic region dummy variables to account for differences in earnings and cost of living in various regions and provinces.

We find that the coefficients are significantly negative for Aboriginal dummy variable in the first column of each table from Table 5.5 and 5.7, with $(e^{0.109}-1 =)$ 11.5% lower hourly wages for males and 13.7% for females when compared with non-Aboriginal Canadians. Age has a significantly positive effect on wages but at a decreasing rate given that, age squared coefficients are significantly negative.

In the second column of each table, we put three skills together in one regression to investigate the returns on skills. A significantly positive effect of PSL skill has been found both for males and females. Each additional point of PSL skill is associated with a 0.6% increase for males in their hourly wages and a 0.5% increase for females. However, literacy and numeracy skills have no significant positive effects on people's hourly wages. This result is different from what we expected for returns on cognitive skills. As Biswal et al. (2008) found in their study based on the 2003 International Adult Literacy and Skills Survey (2003 IALSS), Shomos and Forbes (2014) found from their study based on 2012 PIAAC, literacy and numeracy skills are highly correlated, so they suggest to separately analyze each cognitive skill. After checking the

correlation between the skills in our dataset, we find there is a high correlation between any two cognitive skills¹. In addition, as we mentioned earlier, there are 4,000 missing values of PSL skill (with different reasons) in our sample of 2012 PIAAC, and we recoded them as zero. Thus, we will do further analysis of the returns to each skill in section 5.3 from Table 5.9 to 5.12, to investigate the effect from each cognitive skill on hourly wages of the different groups.

From the third column of each table, we find that the highest education degree plays an important role in people's hourly wages. The coefficient suggests that people who only have elementary education earn 31% less than people who have a high school degree for males, and 22% less for females. On the other hand, a Bachelor's degree is associated with an average increase in hourly wage of 44.5% for males and 55.1% for females. This finding is similar to what Ferrer and Riddell (2002) found in their research.

When we put both education and cognitive skills into the same regression, we find the R-square in column four increases from 16.7% to 22% for males in Table 5.5 and from 21% to 29% for females in Table 5.7. This output indicates that the hourly wages could be explained better when we consider both cognitive skills and education together in one regression. We also find the positive effect from PSL skill decreases for both males and females, when we introduce the dummy variables of highest education degree earned in the same regression, which means a higher education degree earned usually associate with higher PSL skill. The effect from education on hourly wage will dominate cognitive skills, when we include both education and cognitive skills.

The last columns in each table present the results with region dummies included to capture differences in cost of living and wages given that Aboriginal people have different concentration in different provinces in Canada. We use Ontario as the default category. The signs of the coefficients for the Atlantic provinces, Quebec, Manitoba, and Atlantic provinces are significantly negative, but are significantly positive for Alberta and Saskatchewan.

¹The correlation between literacy and numeracy skills is 0.91, the correlation between literacy and PSL skill is 0.89, the correlation between numeracy and PSL skills is 0.83

We observed similar disadvantage for First Nation and Metis in the labour market compared to non-Aboriginal Canadians. However, one finding that raised our attention is that some coefficients of the Inuit dummy variable in our regressions are significantly positive, and the coefficient of the dummy variable of the north region is significantly positive. When considering both variables, Inuit's advantage declines when region controls are added. These outputs indicate that Inuit have comparative higher hourly wage when compared with non-Aboriginal Canadians, but that this advantage decreases when conditioning on regional differences in location of residence. One possible reason to explain this phenomenon is that the cost of living is more expensive in the north. As a result, salaries are high to adjust for the high living cost in the north region. The high earnings for Inuit is because we only include individuals who are currently working in our sample, and this group of Inuit have an advantage over most of the local populations, because they could find a job and thus have higher wages than the average hourly wage of non-Aboriginal Canadians, due to the high price levels in the north regions. To make a more accurate estimation of the effect of Inuit identity on employment outcomes, we estimate another set of regressions with a dummy dependent variable of employment status in linear probability models from Table A.1 to A.4 in appendix. From Table A.2 and A.4, we find the coefficients of Inuit dummy variable are significantly negative, which means they have more difficulty finding a job than non-Aboriginal Canadians. For example, the first column in Table A.2 indicates that the Inuit are 23.4% less likely to be employed, which helps us understand that they, in fact, do not have more advantage in the labour market than non-Aboriginal Canadians.

We also did other estimations in which we re-estimated the same models but with employee's monthly wage, self-employee's monthly wage, and overall monthly wage as dependent variable and found similar estimates.

Table 5.5: Hourly wage regressions on skills, Males

	1	2	3	4	5
Immigrant	-0.0901*** [0.0255]	-0.0189 [0.0233]	-0.167*** [0.0255]	-0.0910*** [0.0252]	-0.0824*** [0.0266]
Aboriginal	-0.109*** [0.0283]	-0.0121 [0.0277]	-0.0354 [0.0278]	0.000855 [0.0278]	-0.0260 [0.0294]
Age	0.0541*** [0.0108]	0.0459*** [0.0107]	0.0487*** [0.0107]	0.0446*** [0.0106]	0.0159 [0.0131]
Age ² /1000	-0.551*** [0.127]	-0.419*** [0.125]	-0.476*** [0.125]	-0.408*** [0.124]	-0.161 [0.150]
Literacy Skill		-0.000683 [0.00290]		-0.000464 [0.00289]	-0.000997 [0.00304]
Numeracy Skill		-0.000331 [0.00247]		-0.000303 [0.00246]	9.73e-05 [0.00248]
PSL skill0		0.00628*** [0.00228]		0.00581** [0.00239]	0.00605*** [0.00221]
Literacy Skill ² /1000		0.00248 [0.00531]		0.000718 [0.00530]	0.00107 [0.00556]
Numeracy Skill ² /1000		0.00677 [0.00452]		0.00567 [0.00452]	0.00485 [0.00458]
PSL Skill0 ² /1000		-0.0125*** [0.00414]		-0.0112*** [0.00434]	-0.0113*** [0.00404]
Missing PSL		0.636** [0.310]		0.631* [0.327]	0.699** [0.301]
Primary or Less			-0.270*** [0.0592]	-0.0916 [0.0607]	-0.0620 [0.0558]
Lower Secondary			-0.150*** [0.0422]	-0.0608 [0.0409]	-0.0761* [0.0407]
Trade/Community College			0.0642** [0.0319]	0.0200 [0.0313]	0.0316 [0.0302]
Professorial School			0.187*** [0.0309]	0.111*** [0.0308]	0.117*** [0.0302]
Bachelor			0.368*** [0.0293]	0.223*** [0.0316]	0.262*** [0.0317]
Master or Higher			0.467*** [0.0422]	0.287*** [0.0456]	0.344*** [0.0465]
Experience					0.0257*** [0.00556]
Exp ² /1000					-0.378*** [0.111]
Province British Columbia					0.0321 [0.0336]
Province Alberta					0.187*** [0.0350]
Province Saskatchewan					0.0755** [0.0369]
Province Manitoba					-0.0333 [0.0302]
Province Quebec					-0.0728*** [0.0219]
Atlantic Provinces(NB,NS,PEI,NL)					-0.135*** [0.0252]
North Regions					0.230*** [0.0368]
Constant	2.034*** [0.221]	0.913** [0.358]	1.977*** [0.220]	1.055*** [0.367]	1.455*** [0.386]
R-squared	0.039	0.191	0.167	0.222	0.261
Observations	6,008	6,008	6,008	6,008	6,008

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school degree) is the reference level of highest education degree; Ontario is the reference province; When monthly earnings is used as the dependent variable instead of hourly wages we find that these results are not presented due to room constraints but are available upon request, same like the following regressions from Table 5.5 to 5.8

Table 5.6: Hourly wage regressions on skills, Males with separate Aboriginal categories

	1	2	3	4	5
First nation	-0.189*** [0.0371]	-0.0452 [0.0326]	-0.103*** [0.0327]	-0.0403 [0.0320]	-0.0365 [0.0312]
Inuit	0.0175 [0.0990]	0.284*** [0.0627]	0.170** [0.0828]	0.285*** [0.0647]	0.187** [0.0906]
Metis	-0.0591 [0.0387]	-0.00481 [0.0398]	0.000819 [0.0395]	0.0144 [0.0403]	-0.0283 [0.0431]
Immigrant	-0.0901*** [0.0255]	-0.0188 [0.0233]	-0.167*** [0.0255]	-0.0910*** [0.0252]	-0.0823*** [0.0266]
Age	0.0540*** [0.0108]	0.0459*** [0.0107]	0.0486*** [0.0107]	0.0445*** [0.0106]	0.0158 [0.0131]
Age ² /1000	-0.550*** [0.127]	-0.418*** [0.125]	-0.475*** [0.125]	-0.408*** [0.124]	-0.160 [0.151]
Literacy Skills		-0.000670 [0.00290]		-0.000450 [0.00289]	-0.000996 [0.00304]
Numeracy Skills		-0.000315 [0.00247]		-0.000292 [0.00246]	0.000106 [0.00248]
PSL skill0		0.00627*** [0.00228]		0.00580** [0.00239]	0.00604*** [0.00221]
Literacy Skill ² /1000		0.00246 [0.00532]		0.000696 [0.00531]	0.00107 [0.00556]
Numeracy Skill ² /1000		0.00674 [0.00452]		0.00564 [0.00452]	0.00483 [0.00458]
PSL Skill0 ² /1000		-0.0125*** [0.00414]		-0.0112*** [0.00434]	-0.0113*** [0.00404]
Missing PSL		0.635** [0.310]		0.630* [0.327]	0.697** [0.301]
Primary or Less			-0.271*** [0.0592]	-0.0922 [0.0607]	-0.0624 [0.0558]
Lower Secondary			-0.150*** [0.0422]	-0.0609 [0.0410]	-0.0764* [0.0408]
Trade/Community College			0.0640** [0.0319]	0.0197 [0.0313]	0.0315 [0.0302]
Professorial School			0.187*** [0.0309]	0.111*** [0.0308]	0.116*** [0.0302]
Bachelor			0.368*** [0.0293]	0.223*** [0.0316]	0.262*** [0.0317]
Master or Higher			0.467*** [0.0422]	0.287*** [0.0456]	0.344*** [0.0465]
Experience					0.0258*** [0.00556]
Exp ² /1000					-0.378*** [0.111]
Province British Columbia					0.0321 [0.0336]
Province Alberta					0.187*** [0.0350]
Province Saskatchewan					0.0760** [0.0369]
Province Manitoba					-0.0330 [0.0303]
Province Quebec					-0.0729*** [0.0219]
Atlantic Provinces(NB,NS,PEI,NL)					-0.135*** [0.0252]
North Regions					0.190*** [0.0427]
Constant	2.036*** [0.221]	0.911** [0.358]	1.978*** [0.220]	1.054*** [0.367]	1.455*** [0.386]
R-squared	0.040	0.191	0.167	0.222	0.261
Observations	6,008	6,008	6,008	6,008	6,008

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school) is the reference level of highest education degree; Ontario is the reference province.

Table 5.7: Hourly wage regressions on skills, Females

	1	2	3	4	5
Immigrant	-0.156*** [0.0235]	-0.0183 [0.0227]	-0.213*** [0.0219]	-0.114*** [0.0223]	-0.0994*** [0.0235]
Aboriginal	-0.128*** [0.0278]	-0.0452* [0.0241]	-0.0458** [0.0222]	-0.0224 [0.0219]	-0.0371 [0.0227]
Age	0.0701*** [0.00948]	0.0636*** [0.00897]	0.0589*** [0.00884]	0.0584*** [0.00866]	0.0449*** [0.00919]
Age ² /1000	-0.796*** [0.113]	-0.661*** [0.107]	-0.607*** [0.105]	-0.579*** [0.103]	-0.529*** [0.108]
Literacy Skill		0.00462 [0.00299]		0.00359 [0.00307]	0.00144 [0.00296]
Numeracy Skill		-0.00679*** [0.00253]		-0.00540** [0.00260]	-0.00463* [0.00246]
PSL skill0		0.00490* [0.00267]		0.00382 [0.00265]	0.00352 [0.00253]
Literacy Skill ² /1000		-0.00298 [0.00547]		-0.00385 [0.00554]	-0.000285 [0.00538]
Numeracy Skill ² /1000		0.0166*** [0.00477]		0.0124** [0.00492]	0.0111** [0.00468]
PSL Skill0 ² /1000		-0.00995** [0.00502]		-0.00662 [0.00495]	-0.00653 [0.00475]
Missing PSL		0.419 [0.355]		0.410 [0.354]	0.358 [0.336]
Primary or Less			-0.250*** [0.0512]	-0.106* [0.0569]	-0.0821 [0.0538]
Lower Secondary			-0.157*** [0.0411]	-0.0731* [0.0421]	-0.0596 [0.0428]
Trade/Community College			0.0603** [0.0262]	0.0451* [0.0255]	0.0546** [0.0248]
Professorial School			0.245*** [0.0256]	0.193*** [0.0250]	0.197*** [0.0243]
Bachelor			0.439*** [0.0255]	0.322*** [0.0274]	0.345*** [0.0264]
Master or Higher			0.621*** [0.0346]	0.469*** [0.0370]	0.518*** [0.0357]
Experience					0.0181** [0.00386]
Exp ² /1000					-0.160* [0.0847]
Province British Columbia					0.0404 [0.0294]
Province Alberta					0.0827*** [0.0307]
Province Saskatchewan					-0.00577 [0.0319]
Province Manitoba					-0.0653** [0.0267]
Province Quebec					-0.0433** [0.0189]
Atlantic Provinces(NB,NS,PEI,NL)					-0.125*** [0.0202]
North Regions					0.362*** [0.0313]
Constant	1.654*** [0.191]	0.626* [0.356]	1.556*** [0.178]	0.862** [0.366]	1.323*** [0.347]
R-squared	0.044	0.214	0.239	0.290	0.324
Observations	6,798	6,798	6,798	6,798	6,798

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province.

Table 5.8: Hourly wage regressions in Skills, Females with separate Aboriginal categories

	1	2	3	4	5
First nation	-0.214*** [0.0425]	-0.0932** [0.0363]	-0.128*** [0.0335]	-0.0849*** [0.0327]	-0.0887** [0.0348]
Inuit	-0.00802 [0.0949]	0.259*** [0.0890]	0.176* [0.0968]	0.275*** [0.0951]	0.0766 [0.0773]
Metis	-0.0522* [0.0311]	-0.0250 [0.0299]	0.0121 [0.0262]	0.0102 [0.0266]	0.00218 [0.0262]
Immigrant	-0.156*** [0.0235]	-0.0183 [0.0227]	-0.213*** [0.0219]	-0.114*** [0.0224]	-0.0998*** [0.0235]
Age	0.0702*** [0.00948]	0.0638*** [0.00897]	0.0590*** [0.00884]	0.0585*** [0.00866]	0.0449*** [0.00919]
Age ² /1000	-0.797*** [0.113]	-0.662*** [0.107]	-0.608*** [0.105]	-0.580*** [0.103]	-0.530*** [0.108]
Literacy Skill		0.00466 [0.00299]		0.00366 [0.00307]	0.00151 [0.00296]
Numeracy Skill		-0.00683*** [0.00253]		-0.00547** [0.00261]	-0.00472* [0.00246]
PSL skill0		0.00490* [0.00267]		0.00381 [0.00265]	0.00353 [0.00253]
Literacy Skill ² /1000		-0.00306 [0.00547]		-0.00397 [0.00554]	-0.000410 [0.00538]
Numeracy Skill ² /1000		0.0167*** [0.00477]		0.0126** [0.00492]	0.0113** [0.00468]
PSL Skill0 ² /1000		-0.00995** [0.00502]		-0.00661 [0.00495]	-0.00655 [0.00474]
Missing PSL		0.420 [0.354]		0.409 [0.354]	0.359 [0.336]
Primary or Less			-0.246*** [0.0511]	-0.104* [0.0568]	-0.0803 [0.0537]
Lower Secondary			-0.158*** [0.0411]	-0.0746* [0.0421]	-0.0603 [0.0428]
Trade/Community College			0.0606** [0.0262]	0.0453* [0.0255]	0.0548** [0.0248]
Professorial School			0.246*** [0.0256]	0.194*** [0.0250]	0.197*** [0.0243]
Bachelor			0.439*** [0.0255]	0.322*** [0.0274]	0.345*** [0.0264]
Master or Higher			0.621*** [0.0346]	0.469*** [0.0370]	0.518*** [0.0357]
Experience					0.0180*** [0.00386]
Exp ² /1000					-0.159* [0.0847]
Province British Columbia					0.0406 [0.0294]
Province Alberta					0.0824*** [0.0307]
Province Saskatchewan					-0.00502 [0.0319]
Province Manitoba					-0.0660** [0.0267]
Province Quebec					-0.0434** [0.0189]
Atlantic Provinces(PEI,NS,NB,NF)					-0.125*** [0.0202]
North Regions					0.348*** [0.0343]
Constant	1.652*** [0.191]	0.622* [0.356]	1.554*** [0.178]	0.860** [0.366]	1.323*** [0.347]
Observations	6,798	6,798	6,798	6,798	6,798
R-squared	0.045	0.215	0.240	0.291	0.324

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province.

5.3 Returns on skills

Tables 5.9 to 5.12 present the results of returns on skills. Given the high correlation between the skills, we separately estimate the impact of each skill on hourly wage. In addition, we also include interaction terms between Aboriginal identity and each cognitive skill, in order to investigate if there is any discrimination which would be captured by differences in returns to cognitive skills. From the first three columns of Table 5.9 to 5.12, we find there is statistically significant positive effect from each skill on people's hourly wages. More specifically, on average, an additional point score in literacy skill and numeracy skill are both associated with about a 0.37% higher hourly wages for males, conditional on the other characteristics. Similarly, the positive effects from each additional point score of literacy and numeracy skills are also statistically significant for females with about a 0.4% increase of their hourly wages. The positive impact from problem solving skills on wages is consistent with what we found above. Each additional point score people gained in their PSL skill is associated with a 0.31% increase in males' average hourly wage and a 0.38% in females' average hourly wage. Thus, we could summarize that all of the three cognitive skills have positive impacts on people's employment outcomes, but when we put them together, PSL skill will dominate the other two skills, and play the most significant role in their earnings.

The last three columns of Table 5.9 to 5.12 report estimates of returns on each cognitive skill with a set of interaction terms for Aboriginal identity. The estimated coefficients of the interaction term are mostly zero, which indicates that there is no discrimination of Aboriginal peoples' in terms of returns on their cognitive skills. This finding about the returns on skills is important for our study of the cognitive skills. Each additional point score of cognitive skills is associated with the same increase for both Aboriginal and non-Aboriginal Canadians. Thus, no matter which group an individual belongs to, one possible way to enhance their wages is trying to develop their cognitive abilities and learning how to apply the skills in their work. And importantly, given the lower cognitive skills of Aboriginal people presented earlier, this suggests higher scores of three cognitive skills could improve Aboriginal people's performance in the labour market. Aside, there is no new findings of the interaction terms between cognitive skills and dummy variable of immigrant identity. We also

tried the same regressions after removing the immigrants samples out of our sample, and we found the same negative effect of Aboriginal identity and positive effect of three cognitive skills on people's employment outcomes, and each additional point score has the same positive effect on Aboriginal and non-Aboriginal Canadians.

We again re-estimated the models replacing the dependent variable with the employee's monthly wage, self-employee's monthly wage, and over all monthly wage and the estimates the independent variables are found similar estimates of the negative effect from Aboriginal identity as well as the positive effect from highest education degree earned and cognitive skills.

Therefore, it is the disparity in cognitive skills between the Aboriginal and non-Aboriginal populations in Canada that have led to wage disparities, rather than the discrimination in terms of returns on cognitive skills. The effective way to enhance Aboriginal people's wages is helping them develop their cognitive skills.

Table 5.9: Log hourly earnings regressions on skills, Males

	<u>Literacy Skill</u>		<u>Numeracy Skill</u>		<u>PSL Skill0</u>	
	1	2	3	4	5	6
Immigrant	-0.0058 [0.0237]	-0.0844 [0.115]	-0.0191 [0.0232]	-0.0755 [0.106]	-0.0417* [0.0239]	-0.1 [0.154]
Aboriginal	-0.0349 [0.0283]	0.135 [0.185]	-0.0132 [0.0282]	0.172 [0.158]	-0.0524* [0.0279]	0.0864 [0.209]
Age	0.0513*** [0.0109]	0.0512*** [0.0109]	0.0477*** [0.0107]	0.0477*** [0.0107]	0.0499*** [0.0108]	0.0505*** [0.0107]
Age ² /1000	-0.483*** [0.127]	-0.483*** [0.127]	-0.444*** [0.125]	-0.445*** [0.125]	-0.449*** [0.126]	-0.458*** [0.125]
Skill	0.00377*** [0.000197]	0.00368*** [0.000256]	0.00375*** [0.000180]	0.00370*** [0.000240]	0.00308*** [0.000243]	0.00304*** [0.000290]
Missing PSL					0.565*** [0.0732]	0.610*** [0.0889]
Abo× skill		-0.000641 [0.000706]		-0.000721 [0.000613]		-0.000526 [0.000777]
Imm× skill		0.00029 [0.000407]		0.000208 [0.000369]		0.000314 [0.000538]
Abo×MissPSL						-0.138 [0.216]
Immt×MissPSL						-0.0774 [0.161]
Constant	0.946*** [0.234]	0.971*** [0.232]	1.036*** [0.228]	1.051*** [0.225]	1.174*** [0.235]	1.168*** [0.234]
R-squared	0.157	0.158	0.181	0.182	0.136	0.139
Observations	6,008	6,008	6,008	6,008	6,008	6,008

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; Missing PSL is a dummy variable which equals one if there is no record of PSL skill. Abo×skill is the interaction of Aboriginal identity and each cognitive skill; Imm×skill is the interaction of immigrant identity and each cognitive skill; Abo×MissPSL is the interaction of Aboriginal identity and Missing PSL; Imm×MissPSL is the interaction of immigrant identity and Missing PSL; When monthly earnings is used as the dependent variable instead of hourly wages we find that these results are not presented due to room constraints but are available upon request, same like the following regressions from Table 5.9 to 5.12

Table 5.10: Log hourly earnings regressions on skills, Males with separate Aboriginal categories

	<u>Literacy Skill</u>		<u>Numeracy Skill</u>		<u>PSL Skill0</u>	
	1	2	3	4	5	6
First nation	-0.0800** [0.0318]	0.096 [0.180]	-0.0477 [0.0326]	0.135 [0.155]	-0.114*** [0.0336]	0.0487 [0.193]
Inuit	0.242*** [0.0713]	0.396** [0.173]	0.276*** [0.0655]	0.435*** [0.149]	0.183** [0.0778]	0.329 [0.202]
Metis	-0.0179 [0.0415]	0.172 [0.179]	-0.00422 [0.0408]	0.197 [0.156]	-0.0215 [0.0398]	0.15 [0.188]
Immigrant	-0.00575 [0.0237]	-0.0838 [0.115]	-0.019 [0.0232]	-0.075 [0.106]	-0.0417* [0.0239]	-0.0995 [0.154]
Age	0.0512*** [0.0109]	0.0512*** [0.0109]	0.0477*** [0.0107]	0.0477*** [0.0107]	0.0499*** [0.0108]	0.0505*** [0.0107]
Age ² /1000	-0.483*** [0.127]	-0.482*** [0.127]	-0.443*** [0.125]	-0.444*** [0.125]	-0.448*** [0.126]	-0.457*** [0.125]
Skill	0.00377*** [0.000197]	0.00369*** [0.000255]	0.00376*** [0.000181]	0.00370*** [0.000239]	0.00308*** [0.000243]	0.00304*** [0.000290]
Missing PSL					0.565*** [0.0732]	0.611*** [0.0887]
Abo×skill		-0.000691 [0.000674]		-0.000748 [0.000592]		-0.000628 [0.000707]
Imm×skill		0.000288 [0.000406]		0.000207 [0.000369]		0.000312 [0.000537]
Abo×MissPSL						-0.166 [0.195]
Imm×MissPSL						-0.078 [0.161]
Constant	0.947*** [0.234]	0.971*** [0.232]	1.036*** [0.228]	1.051*** [0.225]	1.175*** [0.235]	1.168*** [0.234]
R-squared	0.158	0.158	0.182	0.182	0.136	0.14
Observations	6,008	6,008	6,008	6,008	6,008	6,008

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; First nation, Inuit, Metis are three dummy variables of Aboriginal subgroup identities; Missing PSL is a dummy variable which equals one if there is no record of PSL skill. Abo×skill is the interaction of Aboriginal identity and each cognitive skill; Imm×skill is the interaction of immigrant identity and each cognitive skill; Abo×MissPSL is the interaction of Aboriginal identity and Missing PSL; Imm×MissPSL is the interaction of immigrant identity and Missing PSL.

Table 5.11: Log hourly earnings regressions on skills, Females

	<u>Literacy Skill</u>		<u>Numeracy Skill</u>		<u>PSL Skill0</u>	
	1	2	3	4	5	6
Immigrant	-0.0237 [0.0229]	0.17 [0.119]	-0.0369 [0.0225]	0.16 [0.109]	-0.0490** [0.0228]	0.0951 [0.160]
Aboriginal	-0.0574** [0.0237]	0.0437 [0.153]	-0.0328 [0.0233]	-0.00722 [0.139]	-0.0843*** [0.0249]	-0.0128 [0.182]
Age	0.0652*** [0.00908]	0.0651*** [0.00907]	0.0628*** [0.00902]	0.0628*** [0.00901]	0.0660*** [0.00917]	0.0660*** [0.00913]
Age ² /1000	-0.683*** [0.108]	-0.682*** [0.108]	-0.661*** [0.107]	-0.661*** [0.107]	-0.683*** [0.109]	-0.681*** [0.109]
Skill	0.00451*** [0.000208]	0.00477*** [0.000254]	0.00423*** [0.000197]	0.00451*** [0.000241]	0.00379*** [0.000254]	0.00401*** [0.000286]
Missing PSL					0.765*** [0.0739]	0.919*** [0.0859]
Abo×skill		-0.000356 [0.000542]		-7.78E-05 [0.000529]		-0.00022 [0.000621]
Imm×skill		-0.00072 [0.000448]		-0.000769* [0.000425]		-0.000381 [0.000587]
Abo×MissPSL						-0.15 [0.196]
Imm×MissPSL						-0.325* [0.166]
Constant	0.351* [0.191]	0.276 [0.194]	0.550*** [0.188]	0.473** [0.190]	0.550*** [0.195]	0.475** [0.201]
R-squared	0.189	0.19	0.193	0.194	0.156	0.161
Observations	6,798	6,798	6,798	6,798	6,798	6,798

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; Missing PSL is a dummy variable which equals one if there is no record of PSL skill. Abo×skill is the interaction of Aboriginal identity and each cognitive skill; Imm×skill is the interaction of immigrant identity and each cognitive skill; Abo×MissPSL is the interaction of Aboriginal identity and Missing PSL; Imm×MissPSL is the interaction of immigrant identity and Missing PSL.

Table 5.12: Log hourly earnings regressions on skills, Females with separate Aboriginal categories

	<u>Literacy Skill</u>		<u>Numeracy Skill</u>		<u>PSL Skill0</u>	
	1	2	3	4	5	6
First nation	-0.106*** [0.0350]	-0.108 [0.123]	-0.0772** [0.0355]	-0.0939 [0.116]	-0.142*** [0.0379]	-0.128 [0.127]
Inuit	0.238** [0.0937]	0.244* [0.142]	0.260*** [0.0887]	0.254* [0.134]	0.168* [0.0907]	0.184 [0.145]
Metis	-0.0377 [0.0307]	-0.0462 [0.127]	-0.0138 [0.0282]	-0.0394 [0.122]	-0.0497* [0.0301]	-0.0354 [0.134]
Immigrant	-0.0238 [0.0229]	0.165 [0.119]	-0.0369 [0.0225]	0.158 [0.109]	-0.0491** [0.0228]	0.0926 [0.159]
Age	0.0653*** [0.00908]	0.0652*** [0.00907]	0.0629*** [0.00902]	0.0629*** [0.00901]	0.0661*** [0.00917]	0.0661*** [0.00914]
Age ² /1000	-0.684*** [0.108]	-0.683*** [0.108]	-0.662*** [0.107]	-0.662*** [0.107]	-0.684*** [0.109]	-0.682*** [0.109]
Skill	0.00451*** [0.000208]	0.00476*** [0.000250]	0.00423*** [0.000197]	0.00450*** [0.000238]	0.00379*** [0.000254]	0.00400*** [0.000281]
Missing PSL					0.765*** [0.0739]	0.917*** [0.0844]
Abo*Skill		3.12E-05 [0.000431]		0.000104 [0.000441]		-2.14E-05 [0.000431]
Imm*Skill		-0.000703 [0.000446]		-0.000763* [0.000423]		-0.000373 [0.000585]
Abo*MissPSL						-0.0862 [0.145]
Imm*MissPSL						-0.323* [0.166]
Constant	0.349* [0.191]	0.279 [0.194]	0.548*** [0.188]	0.472** [0.190]	0.548*** [0.195]	0.475** [0.201]
R-squared	0.189	0.19	0.193	0.195	0.156	0.162
Observations	6,798	6,798	6,798	6,798	6,798	6,798

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; Missing PSL is a dummy variable which equals one if there is no record of PSL skill. Abo×skill is the interaction of Aboriginal identity and each cognitive skill; Imm×skill is the interaction of immigrant identity and each cognitive skill; Abo×MissPSL is the interaction of Aboriginal identity and Missing PSL; Imm×MissPSL is the interaction of immigrant identity and Missing PSL.

Chapter 6

Conclusion

The main objective of this paper is to analyze how cognitive skills such as literacy, numeracy and PSL impact employment outcomes for Aboriginal populations. Similar disadvantages of Aboriginal populations in the labour market have been found in both hourly wage and employment rates when compared with non-Aboriginal Canadians. The main findings of this study indicate that literacy, numeracy and PSL skills are important components of human capital and higher levels of cognitive skills are linked to better employment outcomes in the labour market. In other words, people with higher skills are more likely to have higher wages than people with low cognitive skills. The regression outputs demonstrate that each additional point score for literacy, numeracy and PSL skills are respectively associated with 0.37%, 0.38% and 0.31% increase in hourly wages for males. The same regression outputs for females show 0.45%, 0.43%, and 0.38% increase. In addition, there is no discrimination in the returns on cognitive skills among Aboriginal people when compared with non-Aboriginal Canadians. Each additional point score of cognitive skills will bring the same increase of hourly wage both for an Aboriginal and a non-Aboriginal Canadian employee. Furthermore, from our study on human capital between Aboriginal and non-Aboriginal Canadians, Aboriginal groups have a deficiency in their cognitive skills as measured in the 2012 PIAAC.

Furthermore, this study has also confirmed the findings in the existing economics literature about relationships between education, working experience and other demographic variables both for Aboriginal people and immigrants. Earning a Bachelor's degree will increase hourly wages by 45% to 55%, and a master's degree is associated with a 60% to 65% increase in people's hourly wages, comparing with a high school degree. Also, work experience has a positive effect on people's employment outcomes.

The results presented in this paper indicate that governments should pay more attention to helping Aboriginal people to increase their cognitive abilities, because of the structural disadvantage of this group. Also, the additional comparison group of immigrants is a significant bench mark for our estimation and shows that Aboriginal people share a significant disadvantages experienced by immigrants. With similar methodology to Ferrer et al. (2006) who found that immigrants do experience any discrimination in terms of returns to cognitive skills, we find no differences in returns on cognitive skills for Aboriginal people.

Although we estimated the potential returns associated with an improvement in cognitive skills and labour market outcomes and investigate several possible reasons that could affect cognitive skills, a further question could be investigated about how to increase cognitive skills of literacy, numeracy and solving problems in technology-rich environment in addition to educational attainment. Furthermore, we could also ask how geographic regions influence the earnings for local people, especially for local Aboriginal people, when considering the out-region migration. The significant positive effect from a higher education degree is not only found in wages, but also in cognitive skills. Future research could involve an instrumental variable and try to remove the effect from educations, and only focus on the net impact from cognitive skills on employment outcomes.

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Appendix A

Tables for complete regression results

Table A.1: Employment regressions on skills, Males

	1	2	3	4	5
Immigrant	-0.0157 [0.0139]	0.00947 [0.0138]	-0.0304** [0.0142]	-0.00291 [0.0148]	0.0323** [0.0156]
Aboriginal	-0.147*** [0.0241]	-0.104*** [0.0240]	-0.116*** [0.0245]	-0.0963*** [0.0243]	-0.0884*** [0.0231]
Age	0.0379*** [0.00635]	0.0359*** [0.00628]	0.0352*** [0.00622]	0.0347*** [0.00617]	0.00969 [0.00731]
Age ² /1000	-0.471*** [0.0735]	-0.437*** [0.0729]	-0.433*** [0.0719]	-0.424*** [0.0716]	-0.282*** [0.0862]
Literacy skill		-0.00313 [0.00216]		-0.00343 [0.00211]	-0.00305 [0.00206]
Numeracy skill		0.00550*** [0.00183]		0.00493*** [0.00182]	0.00357** [0.00175]
PSL skill0		-0.000609 [0.00153]		-0.00116 [0.00156]	-0.000665 [0.00147]
Literacy Skill ² /1000		0.00540 [0.00374]		0.00564 [0.00366]	0.00470 [0.00359]
Numeracy Skill ² /1000		-0.00729** [0.00313]		-0.00640** [0.00311]	-0.00433 [0.00300]
PSL Skill0 ² /1000		0.000208 [0.00274]		0.00119 [0.00278]	0.000549 [0.00264]
Missing PSL		-0.177 [0.213]		-0.241 [0.217]	-0.144 [0.204]
Primary or Less			-0.195*** [0.0467]	-0.124*** [0.0475]	-0.0873** [0.0409]
Lower Secondary			-0.104*** [0.0291]	-0.0675** [0.0297]	-0.0758*** [0.0279]
Trade/Community College			0.0169 [0.0204]	0.000756 [0.0201]	0.00360 [0.0193]
Professorial School			0.0706*** [0.0167]	0.0436** [0.0170]	0.0498*** [0.0166]
Bachelor			0.0502*** [0.0183]	0.00225 [0.0200]	0.0456** [0.0206]
Master or Higher			0.104*** [0.0172]	0.0444** [0.0194]	0.109*** [0.0195]
Experience					0.0233*** [0.00306]
Exp ² /1000					-0.193*** [0.0670]
Province British Columbia					0.0107 [0.0187]
Province Alberta					0.00821 [0.0205]
Province Saskatchewan					0.0507*** [0.0189]
Province Manitoba					0.0372* [0.0199]
Province Quebec					-0.00905 [0.0131]
Atlantic Provinces(NB,NS,PEI,NL)					-0.0104 [0.0151]
North Regions					0.0172 [0.0213]
Constant	0.171 [0.133]	-0.154 [0.225]	0.195 [0.131]	0.0924 [0.231]	0.554** [0.229]
R-squared	0.024	0.073	0.060	0.083	0.151
Observations	8,768	8,768	8,768	8,768	8,768

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province. When monthly earnings is used as the dependent variable instead of hourly wages we find that these results are not presented due to room constraints but are available upon request, same like the following regressions from Table A.1 to A.4

Table A.2: Employment regressions on skills, Males with separate Aboriginal categories

	1	2	3	4	5
First nation	-0.224*** [0.0386]	-0.167*** [0.0390]	-0.190*** [0.0392]	-0.161*** [0.0395]	-0.135*** [0.0374]
Inuit	-0.248*** [0.0548]	-0.126** [0.0548]	-0.174*** [0.0493]	-0.113** [0.0515]	-0.0781 [0.0553]
Metis	-0.0624** [0.0271]	-0.0396 [0.0263]	-0.0382 [0.0272]	-0.0313 [0.0265]	-0.0446* [0.0250]
Immigrant	-0.0156 [0.0139]	0.00945 [0.0138]	-0.0303** [0.0142]	-0.00304 [0.0149]	0.0321** [0.0156]
Age	0.0378*** [0.00635]	0.0357*** [0.00628]	0.0350*** [0.00622]	0.0346*** [0.00617]	0.00965 [0.00731]
Age ² /1000	-0.470*** [0.0735]	-0.436*** [0.0729]	-0.432*** [0.0719]	-0.422*** [0.0716]	-0.281*** [0.0862]
literacy skill		-0.00311 [0.00216]		-0.00341 [0.00211]	-0.00304 [0.00206]
Numeracy skill		0.00547*** [0.00183]		0.00490*** [0.00181]	0.00356** [0.00175]
PSL skill0		-0.000598 [0.00153]		-0.00115 [0.00156]	-0.000659 [0.00147]
Literacy Skill ² /1000		0.00536 [0.00374]		0.00559 [0.00365]	0.00468 [0.00359]
Numeracy Skill ² /1000		-0.00726** [0.00313]		-0.00638** [0.00311]	-0.00432 [0.00300]
PSL Skill0 ² /1000		0.000196 [0.00273]		0.00118 [0.00278]	0.000542 [0.00264]
Missing PSL		-0.175 [0.213]		-0.239 [0.217]	-0.143 [0.204]
Primary or Less			-0.194*** [0.0468]	-0.124*** [0.0475]	-0.0875** [0.0409]
Lower Secondary			-0.103*** [0.0291]	-0.0671** [0.0297]	-0.0754*** [0.0279]
Trade/Community College			0.0168 [0.0204]	0.000817 [0.0201]	0.00362 [0.0193]
Professorial School			0.0708*** [0.0167]	0.0440*** [0.0170]	0.0501*** [0.0166]
Bachelor			0.0500*** [0.0183]	0.00250 [0.0200]	0.0457** [0.0206]
Master or Higher			0.104*** [0.0172]	0.0453** [0.0194]	0.109*** [0.0195]
Experience					0.0232*** [0.00306]
Exp ² /1000					-0.193*** [0.0670]
Province British Columbia					0.0111 [0.0187]
Province Alberta					0.00743 [0.0205]
Province Saskatchewan					0.0510*** [0.0189]
Province Manitoba					0.0361* [0.0199]
Province Quebec					-0.00925 [0.0131]
Atlantic Provinces(NB,NS,PEI,NL)					-0.0100 [0.0151]
North Regions					0.0183 [0.0224]
Constant	0.175 [0.133]	-0.152 [0.225]	0.198 [0.131]	0.0943 [0.230]	0.555** [0.229]
R-squared	0.026	0.074	0.061	0.084	0.152
Observations	8,768	8,768	8,768	8,768	8,768

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province.

Table A.3: Employment regressions on skills, Females

	1	2	3	4	5
Immigrant	-0.102*** [0.0166]	-0.0403** [0.0168]	-0.104*** [0.0164]	-0.0659*** [0.0177]	0.00354 [0.0167]
Aboriginal	-0.164*** [0.0233]	-0.108*** [0.0235]	-0.117*** [0.0238]	-0.0946*** [0.0240]	-0.0795*** [0.0243]
Age	0.0290*** [0.00647]	0.0262*** [0.00634]	0.0224*** [0.00629]	0.0223*** [0.00626]	-0.0103 [0.00664]
Age ² /1000	-0.364*** [0.0764]	-0.311*** [0.0751]	-0.264*** [0.0747]	-0.258*** [0.0744]	-0.0374 [0.0784]
literacy skill		-0.000681 [0.00259]		-0.00201 [0.00267]	-0.00337 [0.00241]
Numeracy skill		0.00451** [0.00215]		0.00445** [0.00218]	0.00362* [0.00194]
PSL skill0		0.000332 [0.00211]		-0.000163 [0.00208]	-0.000351 [0.00187]
Literacy Skill2/1000		0.000877 [0.00464]		0.00226 [0.00477]	0.00458 [0.00429]
Numeracy Skill ² /1000		-0.00461 [0.00396]		-0.00498 [0.00400]	-0.00391 [0.00354]
PSL Skill0 ² /1000		-0.00154 [0.00385]		-0.000217 [0.00379]	-9.75e-05 [0.00343]
Missing PSL		-0.0902 [0.290]		-0.105 [0.284]	-0.101 [0.255]
Primary or Less			-0.241*** [0.0486]	-0.149*** [0.0510]	-0.0473 [0.0429]
Lower Secondary			-0.180*** [0.0363]	-0.128*** [0.0366]	-0.0788** [0.0328]
Trade/Community College			0.0808*** [0.0227]	0.0712*** [0.0228]	0.0553*** [0.0211]
Professorial School			0.103*** [0.0208]	0.0779*** [0.0211]	0.0577*** [0.0192]
Bachelor			0.154*** [0.0197]	0.107*** [0.0212]	0.111*** [0.0192]
Master or Higher			0.152*** [0.0257]	0.0950*** [0.0279]	0.138*** [0.0264]
Experience					0.0335*** [0.00243]
Exp ² /1000					-0.358*** [0.0555]
Province British Columbia					-0.0188 [0.0230]
Province Alberta					0.0498** [0.0196]
Province Saskatchewan					0.0507** [0.0208]
Province Manitoba					0.0377* [0.0219]
Province Quebec					-0.00733 [0.0145]
Atlantic Provinces(NB,NS,PEI,NL)					-0.0117 [0.0156]
North Regions					0.0648** [0.0260]
Constant	0.280** [0.131]	-0.412 [0.294]	0.302** [0.126]	-0.0603 [0.289]	0.784*** [0.281]
R-squared	0.022	0.081	0.080	0.102	0.236
Observations	10,412	10,412	10,412	10,412	10,412

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province.

Table A.4: Employment regressions on skills, Females with separate Aboriginal categories

	1	2	3	4	5
First nation	-0.228*** [0.0310]	-0.147*** [0.0321]	-0.173*** [0.0324]	-0.136*** [0.0329]	-0.105*** [0.0317]
Inuit	-0.192*** [0.0466]	-0.0266 [0.0474]	-0.0579 [0.0434]	0.00680 [0.0461]	-0.0275 [0.0604]
Metis	-0.0842** [0.0355]	-0.0692** [0.0348]	-0.0579* [0.0352]	-0.0568 [0.0351]	-0.0548 [0.0366]
Immigrant	-0.102*** [0.0166]	-0.0405** [0.0168]	-0.104*** [0.0164]	-0.0662*** [0.0177]	0.00334 [0.0167]
Age	0.0290*** [0.00647]	0.0263*** [0.00634]	0.0224*** [0.00629]	0.0223*** [0.00626]	-0.0102 [0.00664]
Age ² /1000	-0.365*** [0.0764]	-0.311*** [0.0752]	-0.265*** [0.0747]	-0.259*** [0.0745]	-0.0379 [0.0784]
literacy skill		-0.000618 [0.00259]		-0.00194 [0.00267]	-0.00332 [0.00241]
Numeracy skill		0.00444** [0.00216]		0.00438** [0.00219]	0.00357* [0.00194]
PSL skill0		0.000314 [0.00211]		-0.000187 [0.00207]	-0.000363 [0.00187]
Literacy Skill ² /1000		0.000766 [0.00464]		0.00214 [0.00478]	0.00450 [0.00430]
Numeracy Skill ² /1000		-0.00449 [0.00396]		-0.00486 [0.00401]	-0.00383 [0.00355]
PSL Skill0 ² /1000		-0.00151 [0.00385]		-0.000178 [0.00379]	-7.64e-05 [0.00342]
Missing PSL		-0.0925 [0.289]		-0.107 [0.284]	-0.102 [0.255]
Primary or Less			-0.240*** [0.0488]	-0.149*** [0.0510]	-0.0473 [0.0429]
Lower Secondary			-0.179*** [0.0363]	-0.128*** [0.0366]	-0.0790** [0.0328]
Trade/Community College			0.0808*** [0.0227]	0.0713*** [0.0228]	0.0554*** [0.0211]
Professorial School			0.103*** [0.0208]	0.0781*** [0.0211]	0.0579*** [0.0192]
Bachelor			0.154*** [0.0197]	0.107*** [0.0212]	0.111*** [0.0192]
Master or Higher			0.152*** [0.0257]	0.0954*** [0.0279]	0.138*** [0.0264]
Experience					0.0335*** [0.00243]
Exp ² /1000					-0.358*** [0.0555]
Province British Columbia					-0.0186 [0.0230]
Province Alberta					0.0495** [0.0196]
Province Saskatchewan					0.0514** [0.0208]
Province Manitoba					0.0378* [0.0220]
Province Quebec					-0.00734 [0.0145]
Atlantic Provinces(NB,NS,PEI,NL)					-0.0114 [0.0156]
North Regions					0.0551* [0.0300]
Constant	0.279** [0.131]	-0.411 [0.294]	0.301** [0.127]	-0.0585 [0.289]	0.785*** [0.281]
R-squared	0.023	0.082	0.081	0.102	0.236
Observations	10,412	10,412	10,412	10,412	10,412

Note: regression results based on 2012 PIAAC master file date set; significance levels are indicated by (*) for 10 percent, (**) for 5 percent and (***) for 1 percent, with robust standard errors in brackets; upper secondary (high school diploma) is the reference level of highest education degree; Ontario is the reference province.