The Impact of Educational Attainment and Minimum Wage on the Employment Rate: An Analysis of Canadian Provinces from 2004- 2014

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***Abstract*—The literature on how the employment rate affects youth in Canada is sparse. Although there are news articles often sponsored by big business and business associations that suggest that an increase in minimum wage and the lack of skilled workers will hinder the youth employment rate; extensive research on the matter has not been conducted. This paper reviews existing literature and conceptualizes data to examine if an increase in post secondary educational attainment will translate to an increase in the employment rate. Using data from across 5 provinces from 2004 to 2014, I present a model to test the veracity of the question presented.**

***Index Terms*—Canada, attainment rate, education, employment rate, minimum wage, youth.**

I. Introduction

As the pressures of an aging population negatively affect the Canadian economy; a strong youth employment rate is necessary to offset the aging workforce. Government actors often emphasize post secondary education as a tool to develop human capital for the purpose of contributing to the greater national economy. Therefore post-secondary education is often promoted as a solution that increases the overall employment rate. However in 1985, the *Business Council on National Issues Discussion paper* concluded those nearly 540,000 youth between 15 to 24 years of age has been classified as unemployed [1]. At the time this number represented 50 percent of the youth labour force. A low youth employment rate is an economic problem that can burden all Canadians. Therefore this paper will test the notion that higher education leads to greater employability. Using data from the Canadian Labour Force Surveys; the following paper will use panel data to examine the impact of the youth employment rate on educational attainment and minimum wage from 2004 to 2014 across the provinces of Nova Scotia, Quebec, Ontario, Alberta, and British Columbia. Employment in Canada is affected by many factors that are not controlled for in this paper such as those affected by the supply and demand chain, the policies of various industries and governments, or unionization [2]. In this paper the term *youth*, will be regarded as individuals between 15 to 24 years old. The number of graduates will refer to individuals with college, bachelors, and above bachelors' degrees. The employment rate for the purpose of this paper is the percentage of the population between the ages of 15 to 24 working for pay and thus earning an income [3].

Moreover it is important to note that the employment rate does not explain the quality of jobs achieved through education or experience [2]. The employment rate captures the percentage of youth employed annually. Factors that affect the employment rate in Canada are; the 2008 economic recession, the aging population, and globalization which require the labour force to have skills that can adapt to new technological advancements [4]. As a result the government of Canada has enacted policies that support economic development in regional labour markets. Therefore, through an examination of youth employment rates, it will be determined that educational attainment initially has a positive impact on youth employment rates at the diploma and bachelor levels, however have negligible benefits in advanced degree programs.

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II. Literature Review

A. Educational Attainment

Post-secondary educational attainment is considered to be an investment in Canadian economy, as it will benefit the national GDP. As a result Canada spends 38 percent of its tax dollars on post secondary education [6]. The Organization for Economic Cooperation and Development (OECD) determine that high levels of education translate to a high employment rate [2]. Statistics Canada theorizes that a constant employment rate and the increase of educated people imply that the labour market has been steadily employing qualified workers [2]. OECD countries that have high university attainment rates typically have high employments rates [2]. However Canada does not share those same trends. The employment rate of university educated individuals in Canada is lower than other states where as college educated individuals have higher employment rates than any other OECD country [2]. Bowlby and McMullen's study suggests that 70 percent of youth participate in post-secondary education after high school [5]. However after graduation most literature suggests that it is difficult for Canadian youth with post secondary education to find employment in their field of study [8].

The federal and provincial government have taken an interest in providing high quality jobs to Canadians with post secondary education [4]. Canada relies on a mobile population to seize economic opportunities in regions across

the country, as there is a regional imbalance of labour and post secondary educational attainment [4]. Ontario has the highest educational attainment rate of any other province in Canada, whereas Newfoundland has the lowest educational attainment rate. In comparison to other provinces; Manitoba, Alberta, and Saskatchewan have employed a significant portion of their population with postsecondary education [2]. Moreover British Columbia and Newfoundland have the lowest employment rates for post secondary graduates [2].

Following the 2008 Economic Recession, Canadian youth with post secondary education have found it difficult to find employment after graduation [8]. In fact, the number of students that remain in post secondary education or youth that were able to secure employment, after the 2008 Economic Recession drastically decreased until 2010 [8]. The share of jobs available that remain unfilled in 2009 has created labour shortages due to an aging population [5]. The job vacancy rate reached a level of 4.2 percent in 2014 that is an indistinguishable to the vacancy rate during the 2008 economic recession [4]. This statistic indicates that despite a decrease in youth employment; the labour market still cannot resolve labour shortages in the market. This statistic can also imply that the increase in post secondary educational attainment does not align with the skills required by employers [4].

Although the Canadian market has maintained a high labour participation rate, imbalances between labour supply and demand in particular industries have increased the job vacancy rate [4]. There has been a steady decline of youth employment between the ages of 15 to 19. In contrast to youth who are 20 to 24 years of age there has been a gradual increase in the employment rate after the 2008 economic recession. Most literature and data captures the youth employment rate of students who work while in post secondary school. The labour participation of student youth demonstrates a cyclical participation rate for youth that are between 15 to 19 years of age. Youth who are 15 to 19 years of age are full time students who take part time employment when their regional labour market is strong and no employment when the regional labour market is weak [4]. In comparison to other OECD countries, Canada's youth employment rate is noted as high with a 55 percent rate in 2013 and a ranking of 5th overall [4]. Moreover educational attainment rates in Canada have progressively increased since 1990 [3]. Despite these statistics presented by the federal government, they have acknowledged the imbalance of the employment rate and job vacancies in regional labour markets that have few Canadian graduates in fields of high labour demand [4].

B. Minimum Wage

The federal and provincial governments regulate the minimum wage rate. Although provincial laws dictate minimum wage in most industries; the variation in wage rates affect youth employment [9]. Statistics Canada notes that 60 percent of minimum wage earners are youth, and nearly three fourths of the youth population is enrolled an educational program [10]. All provinces have a standard minimum wage rate for the entire labour force. However, Ontario has established a sub-minimum wage for student laborers (18 years or under) that work during the school year [11]. Corporations argue that youth sub-minimum wage policy will raise the youth employment rate by lowering the cost of youth labour [11]. This policy incentive accelerates corporate profitability by cutting the cost of labour and substituting it with a youth labour force [11]. Some studies indicate that the elimination of the sub-minimum wage rate will reduce the youth labour force in Ontario [11]. Nonetheless the increase in minimum wage can cause the decrease in the employment of unskilled youth labour. Employers may reduce the youth labour force due to increased minimum wage and instead maintain the employment of skilled labour.

Ontario has the highest minimum wage, followed by Manitoba, Nova Scotia, Prince Edward Island, Quebec, New Brunswick, Newfoundland and Labrador, British Columbia, Alberta, and Saskatchewan [12]. Some literature suggests that the increase of minimum wage will limit the number of employment opportunities available for youth workers because as the cost per workers increase and businesses absorb these costs; they decrease their labour supply to maximize their profit and offset minimum wage hikes [10]. Others argue that the increase in minimum wage will only decrease low skill employment opportunities for individuals between 15 to 19 years of age. Moreover studied conducted by Neumark in 2001 indicate that the increase in minimum wage will have no adverse effect on youth with post secondary education; however it will affect individuals who have dropped out of high-school [13]. Although there is not a lot of evidence to support that a high minimum wage encourages youth between 15 to 19 to leave secondary education; there is some research that suggests that low employment opportunities due to high minimum wage induce youth to remain in school due to lack of employment opportunities [13]. Nonetheless most literature suggests that minimum wage has a significant negative effect on youth employment. Katz and Krueger elucidate "minimum wages typically have a zero or positive impact on employment" [14]. While McDonald and Myatt's analysis delineates that minimum wage coefficients are constant across all provinces and have identical time profiles with differing intercepts from province dummy variables [15].

III. Description of Basic Data and Method

The raw data used to interpret the employment rate, the educational attainment rate, number of youth in the population (divided by 1000), and the minimum wage rate from Nova Scotia, Quebec, Ontario, Alberta, and British Columbia from 2004 to 2014 has been exported from the Canadian Socioeconomic Information and Management System (CANSIM) [16]. The youth employment rate data was seasonally adjusted by month. Therefore the data has been averaged by each year. It is important to note that the employment rate data has minute fluctuations from month to month and therefore will have little effect when converted yearly (see Appendix 1). The data was exported from several tables, some of which had incomplete information in particular years for all provinces. For example, CANSIM did not have complete information for post secondary enrolment

from the year 2013 to 2014 in all provinces examined.

CANSIM offers educational attainment data by type of degree achieved such as college diploma, bachelor degrees, and above bachelor degrees (Master degrees and above) (see Appendix 2) [17]. Since most literature constitutes 15 to 19 years of age to be when youth attain their high- school diplomas and the CANSIM data exported does not contextualize this information as the paper is focused on post secondary educational attainment. As a result the existing literature on the secondary education as part of educational attainment and minimum wage will influence the data gathered from CANSIM. Moreover the raw data on the youth employment rate exported from CANSIM may capture the effects of youth labours that are working while in school [18]. Most literature delineates this affect to be a cyclical participation rate that is guided by the employment opportunities available in regional markets. The data exported had also taken the number of youth by year into consideration when conducting research on the employment rate. The following function explains the thought process when determining the number of youth.

$$\frac{\text{number of youth with jobs}}{\text{number of youth looking for jobs}} = f\left(\frac{\text{number of youth}}{\text{total population}}\right)$$

Fig. 1.Youth employment rate formula.

The software used to analyzes the data and calculate regression models was STATA. The data was conceptualized through the use of panel data in order to compare provinces from 2004 to 2014. Panel data provided variation in the data, as each data point will be analyzed separately by time series and cross sectional data; thus providing a complete analysis. The primary econometric technique that this paper will use is Ordinary Least Square (OLS) regression to examine the relationship of each independent variable to the dependant variable; which is the employment rate of individual between 15 to 24 years old.

In order to effectively collocate the minimum wage, I adjusted the minimum wage rate per year for each province for inflation. Adjusting the minimum wage for inflation was computed in real dollars, calculated from the nominal dollars of minimum wage by each year, using the above formula with the following annual Consumer Price Index (CPI) values obtained from CANSIM:

Year	CPI
2004	104.7
2005	107
2006	109.1
2007	111.5
2008	114.1
2009	114.4
2010	116.5
2011	119.9
2012	121.7
2013	122.8
2014	125.2

Fig. 2. Annual consumer price index.

The variables are province codes captured from 2004 to 2014 which are demonstrated through categorical data (1 to 5); the employment rate is expressed as a percentage; the number of graduates in each category of post secondary educational attainment categorized by diploma, bachelors, and above bachelors degrees divided by 1000; minimum wage is expressed in real dollars, and the number of individuals still enrolled in post secondary school divided by 1000 (Fig. 2). Each *x* variable (minimum wage and educational attainment) explains the potential impact on the *y* variable (youth employment rate). The youth employment rate gives a sense to how many individuals between 15 to 24 years of age are employed from year to year and weather their educational attainment or the minimum wage during those year have influenced the employment rate.

In order to provide some context around the data being analyzed, the annual provincial employment rates for youth in each province, between 2004- 2014 are graphically plotted (Fig. 1). Since some provinces have a significant population (eg. Ontario), it is important to consider the data using rates per 100,000 of the population, so that each province is easily comparable.

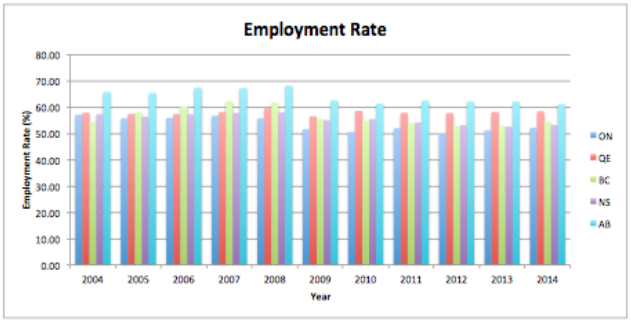


Fig. 3. Annual employment rate by province.

The data depicts the steep effects of the 2008 global financial crises, notably starting in 2009 (Fig. 3). The graph depicts that the youth employment rate of Nova Scotia has remained constant for 10 years without a significant fall, following the 2008 Economic Recession (Fig. 3). In comparison Alberta is observed to have a growing employment rate from 2004 to 2008, until the youth employment rate drops in 2009 only to gradually increase by 2011 (Fig. 3). Additionally Ontario and British Colombia has had a steady youth employment rate up until 2007 where it slightly declined until 2010 and has not significantly increased since (Fig. 3). The only unusual trend that the data captures is that Quebec seemed to rebound from the 2008 Economic Recession rapidly and much stronger than the other four Provinces (Fig. 3). Literature may cite this unusual trend as the effect of a strong regional market that was able to provide youth will employment opportunities despite the effects of a national financial crisis. Educational programs in Quebec such as *Collège d'enseignement général et professionnel* (CEGEP) allows youth to choose a technical and college career path instead of pursuing a university degree. Since the data illustrates that Quebec is economically strong, despite the 2008 financial crisis; and that Statistics Canada suggests that in some regional markets there are more technical employment opportunities available to college students; it is evident that there is a correlation between these observations.

Furthermore the data illustrated in the regression models depicted the number of graduates by program type by province from 2004 to 2014 (see Appendix 3). The model elucidated that the number of graduates in diploma programs

were consistently higher year over year in every province in this study, followed by bachelor programs, and lastly by above bachelor programs. This trend delineates that the Canadian labour market provides multiple opportunities to individuals with college training than other post secondary training. Statistic Canada suggests that in particular regional markets, there is an increase in employment opportunities that require college and technical skills than there is in a labour force that has a technical or college background.

IV. Empirical Model

The first model used in this paper estimates the employment rate through a standard Ordinary Least Square (OLS) model as shown:

$$E_t = \beta_0 + \beta_1 t + \beta_2 ln(G_d) + \beta_3 ln(G_b) + \beta_4 ln(G_a) + \beta_5 w + \beta_6 ln(Current\ Enrollment) + \beta_7 ln(Youth\ in\ Pop) + \alpha + c$$

Fig. 4. Measuring the employment rate and enrollment rate through OLS.

The model depicts *yt* as the employment rate at time, *Gd* as graduates in diploma programs, *Gb* as graduates in bachelors programs *G!* as graduates above bachelors programs, w as the minimum wage in real dollars, *alpha* as a dummy variable representing provinces, and *c* as the constant term (Fig 4). The following STATA regression table outlines the strength of the regression model and is used to examine each coefficient.

Source	SS	df	MS		Number of obs =	36
					F(8, 27) =	26.54
Model	541.812361	8	67.7265452		Prob > F =	0.0000
Residual	68.9079376	27	2.55214584		R-squared =	0.8872
					Adj R-squared =	0.8537
Total	610.720299	35	17.4491514		Root MSE =	1.5975

Emp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Yr	.626978	.2546678	2.46	0.020	.1044429	1.149513
ProvCd	.1519038	.4615586	0.33	0.745	-.7951362	1.098944
dipl	18.18872	2.290084	7.94	0.000	13.48985	22.88758
bach	3.34163	2.480464	1.35	0.189	-1.747862	8.431121
abach	-1.227462	1.297081	-0.95	0.352	-3.888853	1.433928
MinWag	-1.663702	.901207	-1.85	0.076	-3.512826	.1854215
pseanr	-38.19242	4.067288	-9.39	0.000	-46.53781	-29.84704
noy	14.95659	3.959878	3.78	0.001	6.831594	23.08159
_cons	-852.3325	496.0165	-1.72	0.097	-1870.074	165.4092

Fig. 5. STATA regression table.

The model was generated using data from all 5 provinces producing a statistically significant result. In relation to the t-statistic, the p-value of post-secondary education proved to be particularly low as college diplomas had a p-value of 0.0000, bachelor degrees had a p-value of 0.189, and above bachelors degrees had a p-value of 0.352 (Fig. 5). As each educational attainment coefficient produced a p- value below 0.5, it is evident that educational attainment has a statistically significant effect on the youth employment rate (Fig. 5). Moreover the p- value of minimum wage had also proved to have a statically significant effect on the youth employment rate (Fig. 5).

In relation to the t-statistic; individuals with bachelors' degrees, minimum wage earners, and students still in post secondary education have a negative and insignificant t-statistic as each variable is less than 1.96 (Fig. 5). Individuals with college diplomas (x-variable) have a high t-statistic of 7.94 which demonstrates a significant correlation with the youth employment rate (y-variable) as the degrees of freedom are greater than 1.96 (Fig. 5). In addition the number of youth in Canada has a significant t-statistic of 3.78, which could be the result of youth that are still in school but have also secured employment while in school (Fig. 5).

Furthermore the model has an R Squared value of 0.8872 explaining 88.72% of the variation in the variable (Fig. 5). This may seem to support the traditional wisdom that higher educational attainment leads to greater employability. Only the model of the data from Nova Scotia is statistically significant. This indicates that although the null hypothesis cannot be rejected, there is no credible evidence to accept it. The Adjusted R-Squared of 0.8537 demonstrates that the model is true to the initial data gathered as the Adjusted R-Squared explains the errors in the employment rate (*y* - variable) through the various *x* - variables well (Fig. 5).

In examining the coefficients of the independent variables, it is interesting to note that the diploma and bachelor variables have an overall positive coefficient while the above bachelor variables have negative coefficients. This would indicate that diploma programs and to a lesser extent bachelor programs in fact generate greater employment rates. Unsurprisingly, minimum wage has a negative coefficient, furthering the point that the greater the cost of labour the less demand there will be for it. Given these results, the data must be examined on a national scale, possibly to offset the fact that there is a great deal of movement between provinces for both post-secondary education and employment.

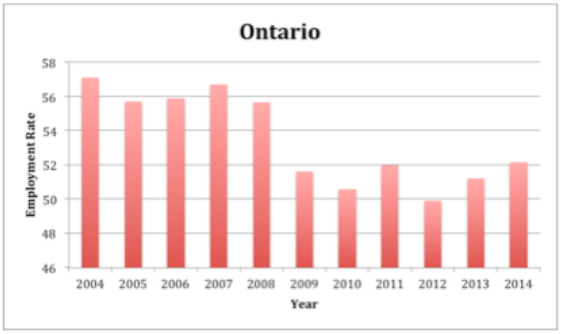
V. Conclusion

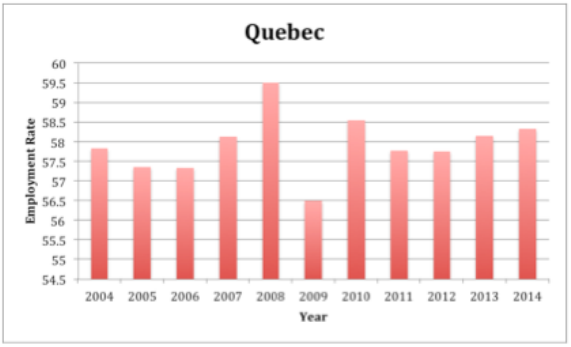
The employment rate in Canada is overrepresented as the collection of literature determines the employment rate to be generally positive in comparison to other OECD countries. When comparing the employment rate to educational attainment and the minimum wage, it is evident that the not all aspects of the employment rate favours youth. Although there is limited research on what affects the employment rate; it is evident that educational attainment (particularly college and technical diplomas) is factor that enables youth to successfully retain employment during a financial crisis and obtain employment in regional markets. While it is evident that higher educational attainment will lead to a high employment rate; the data demonstrates that graduates with college diplomas and technical skills have a greater chance to obtaining employment instead of graduates with bachelors and above bachelors' degrees. In fact, graduates with above bachelors' degrees have a lower chance of employment than graduates with a bachelor's degree as each coefficient decrease as individuals attain higher degrees of post secondary education. Given the restrictions in data; the model faced challenges due to informational gaps, because all provinces and territories could have been examined. Therefore it is not possible to conclusively state that an increase in educational attainment will translate to a high employment rate. However the literature and data presented does suggest that there is a significant correlation between the two variables.

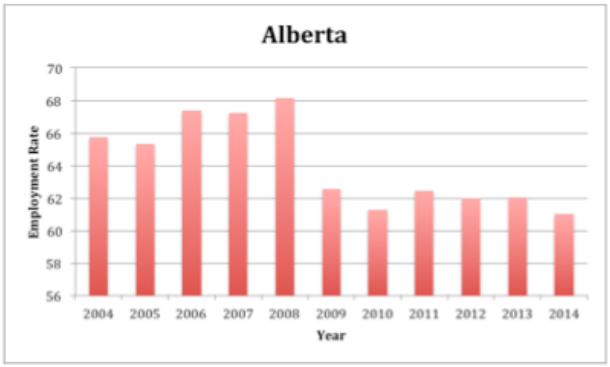
Appendix

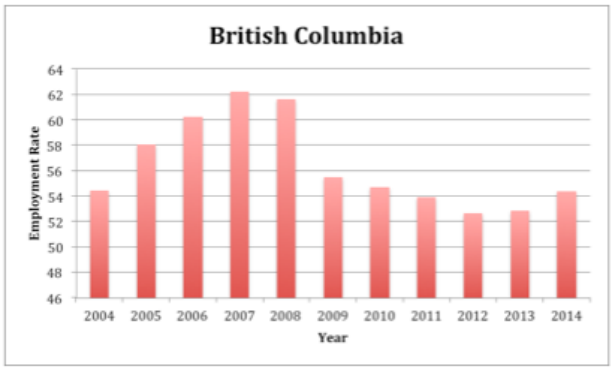
Appendix 1:

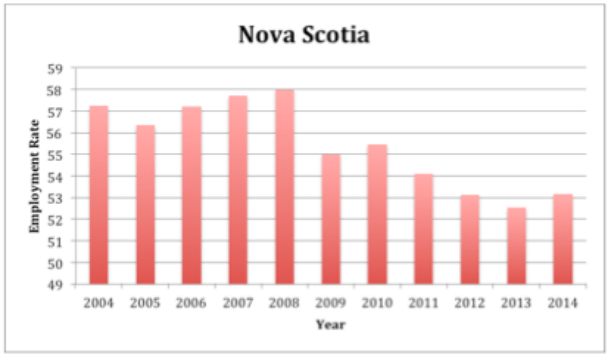
Each graph illustrates the employment per province from 2004 to 2014.





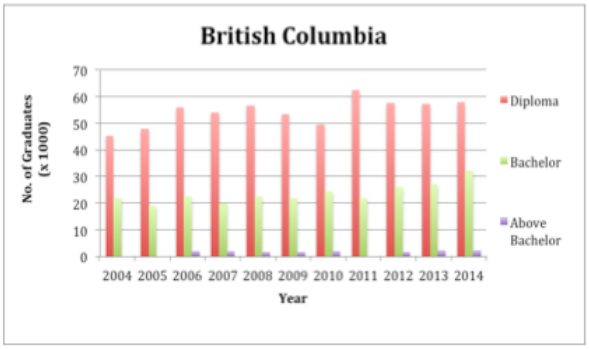


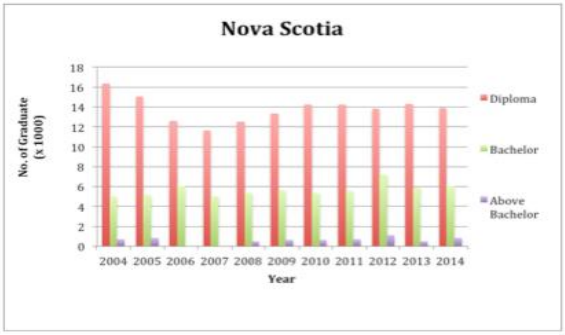


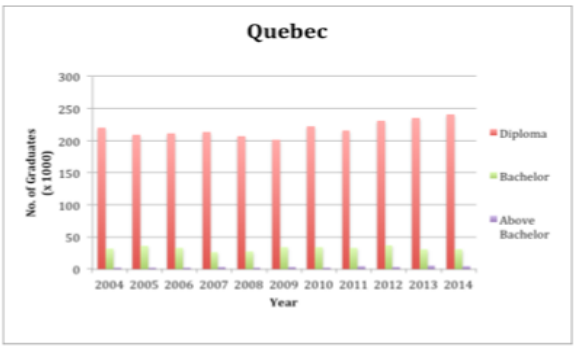


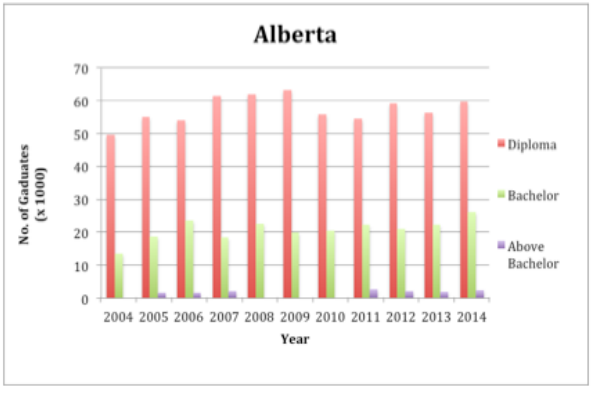
Appendix 2:

Each graph illustrates the youth graduates by province from 2004 to 2014.





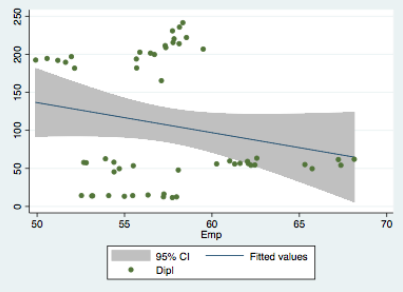




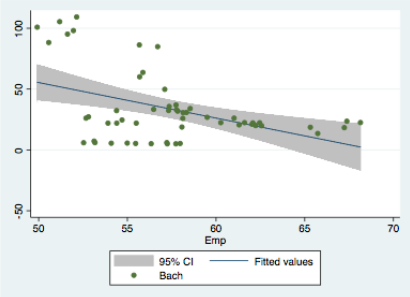
APPENDIX 3:

This a regression scatter plot of the college graduates with

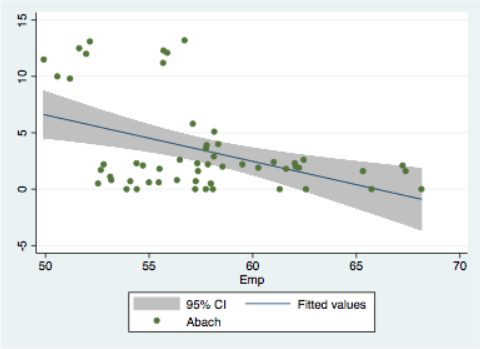
diplomas juxtaposed with the employment rate.

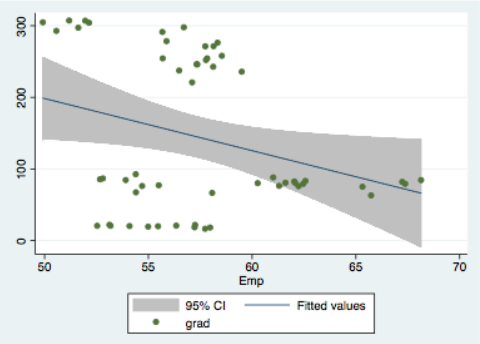


This scatter plot is a regression model that depicts graduates with Bachelor degrees juxtaposed with the employment rate.



This scatter plot illustrates the regression model of graduates with degrees above a bachelor juxtaposed against the employment rate.





This scatter plot illustrates the regression model of all post secondary graduates juxtaposed against the employment rate.

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[14] Statistics Canada, Table 282-0004 — Labour force survey estimates (LFS), by educational attainment, sex and age group, annual (persons unless otherwise noted), CANSIM (database).

[15] Statistics Canada, Table 477-0033 — Postsecondary enrolments, by program type, credential type, age groups, registration status and sex, annual (number), CANSIM (database).

[16] Statistics Canada, Table 282-0087 — Labour force survey estimates (LFS), by sex and age group, seasonally adjusted and unadjusted, monthly (persons unless otherwise noted), CANSIM (database).

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