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The new trend of Canadian nursing education and baccalaureate-diploma wage differentials in Quebec

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Abstract

Recently, Canada has been experiencing a severe nurse shortage. Although increasing numbers of registered nurses (RNs) to meet the ever-growing challenge to nursing resources in Canada is a serious matter, a four-year baccalaureate degree will be required in most Canadian provinces as an initial education for entry into the nursing practice by 2010. However, Quebec does not follow this new educational trend of Canadian nursing. Based on the latest educational trend of Canadian RNs, the main purpose of this study is to find the differences in patterns of education-based wage differentials between Quebec and the rest of Canada by measuring monetary returns from a four-year baccalaureate degree compared to a three-year diploma. This paper examines the substantial differences between Quebec and the rest of Canada in discounted lifetime earnings by an empirical analysis using the 2001 Canadian Census.

1. Introduction

Recently, Canada has been experiencing a severe nurse shortage. Jones and Gates (2004) pointed out that the current nursing shortage causes a vicious cycle by an increase in nurses' job dissatisfaction and nursing turnover. Although increasing numbers of registered nurses (RNs) to meet the ever-growing challenge to nursing resources in Canada is a serious matter, a four-year baccalaureate degree will be required in most Canadian provinces as an initial education for entry into the nursing practice by 2010.

However, Quebec does not follow this new educational trend of Canadian nursing. In 1998, the Quebec government made an announcement of a new rule on the nursing education program: "All aspiring nurses must take a 3-year technical program at a CEGEP (community college) and then can decide whether to practice or go to university for specialty training….The new rule takes effect in 2002" (Sibbald, 1998).

Based on the latest educational trend of Canadian RNs, the main purpose of this study is to find the differences in patterns of education-based wage differentials between Quebec and the rest of Canada by measuring monetary returns from a four-year baccalaureate degree compared to a three-year diploma. This paper examines the substantial differences between Quebec and the rest of Canada in discounted lifetime earnings by an empirical analysis using the 2001 Canadian Census.

2. Decision Rules in Benefit-Cost Analysis and Data

Regarding the recent educational trend of nursing in Canada, the educational preparation among RNs shown in Table 1 attracts the most attention. Of the RNs employed in Quebec, 60.1% reported their highest level of nursing education as a diploma in nursing, which is 7.8% lower than the percentage of RNs with a diploma in the rest of Canada (67.9%). It is apparently in contrast to the recent trend of nursing education and poses a question: Why do more RNs have a baccalaureate degree in Quebec than elsewhere in Canada?

The main purpose of this paper is to seek the answer to the proposed question by the general and traditional methodology of human capital investment. The empirical evidence will be driven by estimating human capital equations to verify the hypothetical proposition that baccalaureate RNs compared with diploma RNs in Quebec might be more likely to receive a higher wage premium than the rest of Canada.

Basically, a prospective nurse's choice of education depends on the relative values of his or her options. Human capital theory supports the monetary value among those relative values by predicting that nurses with more education will receive higher wages (Spetz, 2002).

In order to empirically analyze the prospective nurse's choice of education between a baccalaureate degree and a diploma in Canada, I consider the net present value rule and the internal rate of return rule among general criteria for investment decision explained by Cohn and Geske (1990).

Now, the prospective nurse will face the following alternative: either getting a diploma and having a working life lasting (n+1) years as a diploma RN, obtaining a wage W_t^d; or getting a baccalaureate degree with a direct monetary cost C_0 and indirect monetary cost (or opportunity cost) W_0^d to complete one extra year of courses, and having a working life lasting n years as a baccalaureate RN for a wage W_t^b.[1]

If i denotes the rate of discount to be used and r denotes the internal rate of return (IRR), the prospective nurse will decide to get a baccalaureate degree when either of the following conditions are satisfied as an investment in human capital:

$$\sum_{t=1}^{n} \left[\frac{W_t^b - W_t^d}{(1+i)^{t-1}} \right] > C_0 + W_0^d \tag{1}$$

$$\sum_{t=1}^{n} \left[\frac{W_t^b - W_t^d}{(1+r)^{t-1}} \right] = C_0 + W_0^d , \quad r > i \tag{2}$$

Equation (1) represents the net present value rule and equation (2) represents the internal rate of return rule.

As pointed out earlier, the analytical framework used in this paper assumes that the prospective nurses in Canada will acquire a four-year baccalaureate degree only if the benefits of doing so are greater than the costs, in terms of the net present value of expected benefits. It suggests that attention should be paid to discount rates and

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[1] Regarding the remuneration of nurses in Canada, Meltz (1994) introduces:

> Registered nurses are concentrated in hospitals, where over 70 per cent are employed. A high proportion of these nurses are unionized. As a result, collective bargaining determines most of the wage rates for nurses on a province-by-province basis. With the exception of Nova Scotia, the bulk of negotiations for nurses' salaries in hospitals are between provincial nurses' associations and provincial hospital associations....Within provinces the key determinant of nurses' earnings is the wage rate per level of experience combined with the number of levels or steps between the starting or minimum salary and the maximum.

retirement age because they play roles in calculating present values of age-earnings profiles which determine whether a person chooses to attend a community college (a three-year diploma) or a university (a four-year baccalaureate degree).

According to Canadian Institute for Health Information (CIHI, 2006), there is little research that has investigated the Canadian RNs' retirement age owing to the technical difficulty of calculating an accurate national retirement age.[2] However, it illustrated three typical ages of retirement (age 55, age 60, and age 65) by demographic eligibility of Canadian RNs' retirement. In 2005, 19.7% of Canadian RNs were aged 55 years or greater, while 7.3% were aged 60 years or greater, and 1.7% aged 65 years or greater.

Based on the facts reported by CIHI (2006) and the assumption that diploma RNs begin employment at age 22 and baccalaureate RNs begin employment at age 23, equation (1) and (2) can be rewritten as

$$\sum_{t=23}^{R=55,\,60,\,65} \left[\frac{W_t^{\,b} - W_t^{\,d}}{(1+i)^{t-23}} \right] > C_0 + W_{22}^{\,d} \tag{3}$$

$$\sum_{t=23}^{R=55,\,60,\,65} \left[\frac{W_t^{\,b} - W_t^{\,d}}{(1+r)^{t-23}} \right] = C_0 + W_{22}^{\,d}\,, \quad r > i \tag{4}$$

where t is the individual RN's age, R is the expected retirement age and $W_{22}^{\,d}$ is the annual earnings of full-time diploma RNs during first year at age 22.[3]

Data

The data used in this paper are from the 2001 Canadian Census Individuals Microdata File, which are available in Minnesota Population Center (Integrated Public Use Microdata Series - International: Version 4.0, Minneapolis: University of Minnesota, 2008). There are 5,051 RN observations in the data set.[4]

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[2] CIHI (2006) introduced a study which tells that the current average age of retirement in Ontario is 55-58 years (Baumann and O'Brien-Pallas, 2001). Sibbald (1999) also mentioned that most nurses retire at age 55 in Canada.

[3] In this case, his or her work life is presumed to extend over (R-22) years from age 22 to age R for diploma RNs and (R-23) years from age 23 to age R for baccalaureate RNs.

[4] Data for individuals whose annual wage is under $10,000 are dropped in this study. Sample sizes by sex are 4,792 female RNs and 259 male RNs.

The sample means of selected variables from the 2001 Canadian Census data are presented in Table 2. It presents the existence of educational wage disparities (between baccalaureate RNs and diploma RNs) and regional wage disparities (between Quebec and the rest of Canada) among the sample RNs. The obtained values of the regional difference in sample means of annual earnings are -$2,542 for diploma RNs and $3,163 for baccalaureate RNs. The fact—that diploma RNs in Quebec were experiencing the negative regional wage differentials, while baccalaureate RNs in Quebec were facing the positive regional wage differentials—suggests that the educational wage premium paid to baccalaureate RNs in Quebec is significantly greater than in the rest of Canada. The relevant numerical results by using the empirical approach to the human capital model will be presented in Section 3.

3. Model Specification and Empirical Results

As most empirical analyses of earnings equations have been yielded by the human capital model of Mincer (1974), I employ the same wage determination equation which was used by Lee (2008) as the following:

$$\ln W_n^e = \beta_0^e + \beta_1^e X_n^e + \beta_2^e X_n^{e2} + \gamma_e' Z_n^e + u_n^e, \tag{5}$$

where lnW_n^e is the natural logarithm of average annual earnings of an individual n with an educational background e; X_n^e and X_n^{e2} are individual's age and its square; Z_n^e is a vector of labour market characteristics comprised of gender and geographical area; the β's represent coefficients to be estimated, and γ'_e is a vector of parameters to be estimated; and u_n^e is a disturbance term reflecting unobserved characteristics affecting wages.

In this specification, the age-earnings profile is assumed to be concave, with a positive coefficient for the linear term and a negative coefficient for the quadratic term (Botelho et al., 1998). The OLS (ordinary least squares) regression was used to estimate the log of wage equation for each education group of diploma, baccalaureate, and master's/doctorate. The regression results are displayed in Table 3.

Since the principal interest in this analysis is to obtain estimated wage functions that yield the wage differentials between baccalaureate RNs and diploma RNs in Quebec and the rest of Canada, the regression results only for those groups are shown in Table 4. Figure 1 and Figure 2, which are depicted by the results in Table 4, illustrate

hypothetical age-earnings profiles by education in each of Quebec and elsewhere in Canada.

In this study, the Chow test is performed to test the hypothesis that each of those 4 sub-groups is statistically different from the others and the results are given in Table 4.[5] According to the test results, it is hard to say that the age-earnings profile for diploma RNs in Quebec is statistically different from the age-earnings profile for those in the rest of Canada (P-value = 0.205). On the contrary, the profile of baccalaureate RNs in Quebec is significantly different from the profile of baccalaureate RNs in the rest of Canada (with the 1% significance level). From these two facts, the difference between Quebec and the rest of Canada on the education-based wage differentials is mostly caused by the wage gap between baccalaureate RNs in Quebec and those RNs in the rest of Canada. Also, the age-earnings profiles of baccalaureate RNs are statistically different from those of diploma RNs in both Quebec and the rest of Canada (with the 1% significance level).

Net Present Discounted Value (Net PDV) of Benefits

To measure the wage premium of baccalaureate RNs, the present-value method is used and the Net PDV of benefits can be expressed as follows:

$$\text{Net PDV} = \underbrace{\sum_{n=23}^{55,\,60,\,65} \frac{B_n}{(1+i)^{n-23}}}_{PDV \ of \ Benefits} - \underbrace{(C_0 + E_0)}_{PDV \ of \ Costs} \,, \tag{6}$$

where E_0 denotes the initial earnings which is forgone for the extra year of nursing education; C_0 is direct monetary costs for the education; i is the discount rate; B_n represents the baccalaureate-diploma wage differentials in each region (Lee, 2008).[6]

The numerical results of Net PDV with various interest rates are displayed in Table 5. Table 5 shows the existence of higher wage differentials between baccalaureate RNs and diploma RNs in Quebec compared to the rest of Canada.

At the discount rates between 3% and 5%, there is an advantage to investing in a university nursing program in both Quebec and the rest of Canada. The internal rate of

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[5] See Note (d) of Table 4 in page 15.
[6] To calculate the net PDV, it is necessary to define the direct cost (C_0) and the opportunity cost (E_0). By the method performed in my early paper, I found that the direct cost (C_0) equals to $5,014 and the opportunity cost (E_0) equals to $26,199 (Lee, 2008).

return (IRR) in Quebec and elsewhere in Canada are 12.39% and 5.53% for the RNs with the retirement age at 55; 12.66% and 6.21% for the RNs with the retirement age at 60; 12.80% and 6.62% for the RNs with the retirement age of 65 respectively. In all those cases, the IRR is greater than the average interest rate (4.37%) for the last 10 years which is reported by the Bank of Canada in 2005.

However, the results show that there are significant differences in the patterns of baccalaureate-diploma wage differentials between Quebec and the rest of Canada. The baccalaureate-diploma wage differentials in Quebec are conspicuously higher than those in the rest of Canada. The internal rate of return (IRR) with the decision of retirement age at 55 in Quebec is 12.39%, which is more than twice of the IRR in the rest of Canada (5.53%). In other words, baccalaureate RNs employed in Quebec earn much higher financial gain from a university degree in nursing compared to the baccalaureate RNs employed in the rest of Canada.

Table 5 shows another interesting result that Quebec's baccalaureate RNs have less incentive to work longer than elsewhere in Canada with considering percentage increases of Net PDV. For example, at the average interest rate (4.37%) for the last 10 years, Quebec's Net PDV with R=60 is $87,778, which is only 20.57% increase from the Net PDV with R=55 ($72,801). On the contrary, the Net PDV with R=60 in the rest of Canada is $12,189, which is 88.15% increase from the Net PDV with R=55 ($6,495). The percentage increases between Net PDV with R=60 and Net PDV with R=65 give a consistent result.[7]

4. Conclusion

To estimate empirical models in this study, the method of ordinary least squares (OLS) was applied. The OLS estimates in this study may have yielded "ability bias" caused by the differences of individual RN's abilities or commitments to nursing and "cost bias" caused by family background as Card (1995, 1999) pointed out. Unfortunately, I was unable to obtain individual qualities for nursing (such as IQ score or individual motivation) from 2001 Canadian census data that may allow me to address the bias issue. Also, as Becker (1993) and several researchers discussed earlier, the age-earnings profiles shown in Figure 1 and Figure 2, which are based on cross-section

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[7] For robustness of the computation of PDV and net PDV, polynomial regression models (a third-degree polynomial and a fourth-degree polynomial in the variable X) other than a quadratic function were tried. The results of PDV and Net PDV from polynomial regression models are numerically very close and consistent with what the results of Table 5 show (See Appendix A and Appendix B).

data (not longitudinal data), may have the problem that those estimated earnings profiles are influenced by both educational cohort effects and age effects.

Nonetheless, considering the model specifications based on human capital theory and the quality of 2001 Canadian census data, the method developed in this research reveal substantial differences between Quebec and the rest of Canada in the rate of return to Canadian nursing education. The empirical examination of the baccalaureate-diploma wage differentials for Quebec and the rest of Canada display two significant differences. First, in Quebec, diploma RNs earn less, but baccalaureate RNs are better paid than those in the other provinces. This result represents that Quebec faces a significantly higher wage premium on a university nursing degree compared with elsewhere in Canada. Second, the increase rate of wage premium (on one more year of nursing education) with a later retirement age for baccalaureate RNs is growing much less in Quebec than in the rest of Canada. I presume that baccalaureate RNs in Quebec might have a higher tendency of leaving the workforce earlier than those RNs in the rest of Canada because Quebec's baccalaureate RNs have less incentive to work longer if the percentage increases of Net PDV are considered.

Regarding the recent change in Canadian nursing education, it is important to remark that these results on the education-based wage differentials between Quebec and elsewhere in Canada may cause diploma RNs' and baccalaureate RNs' inter-regional migration, so that the wage rate in each region will be affected further by the migration. It is apparent that further research needs to be undertaken to improve our understanding into the relationship between education-based wage differentials and the labor supply side of Canadian nursing market.

Whatever the interpretation, my model specifications lead to the following conclusion: that the baccalaureate RNs who are employed in Quebec earn a greater wage premium paid for higher nursing education than those RNs in the rest of Canada.

Appendix A
Net PDV of Education-based Wage Differentials and Internal Rate of Return with a Third-degree Polynomial Model ($: Canadian Dollar)

Retirement age (R)	Interest rate (i)	Net PDV		
		Quebec	Elsewhere in Canada	Difference in Net PDV (Quebec - Elsewhere)
R = 55				
	i = 0.03	$102,248	$15,338	$86,910
	i = 0.0437	*$72,214*	*$4,978*	*$67,236*
	i = 0.05	$61,218	$1,203	$60,015
	i = 0.07	$34,764	-$7,829	$42,593
	i = 0.09	$17,257	-$13,751	$31,008
	IRR	*12.22%*	*5.22%*	
R = 60				
	i = 0.03	$128,858	$23,642	$105,216
	i = 0.0437	*$88,977*	*$10,216*	*$78,761*
	i = 0.05	$74,801	$5,449	$69,352
	i = 0.07	$41,792	-$5,628	$47,420
	i = 0.09	$20,940	-$12,596	$33,536
	IRR	*12.53%*	*5.87%*	
R = 65				
	i = 0.03	$154,479	$29,308	$125,171
	i = 0.0437	*$104,086*	*$13,566*	*$90,520*
	i = 0.05	$86,681	$8,086	$78,595
	i = 0.07	$47,384	-$4,382	$51,766
	i = 0.09	$23,612	-$11,999	$35,611
	IRR	*12.70%*	*6.18%*	

Note: The average interest rate for the last 10 years is 4.37% (Bank of Canada, 2005).

Appendix B
Net PDV of Education-based Wage Differentials and Internal Rate of Return with a Fourth-degree Polynomial Model ($: Canadian Dollar)

Retirement age (R)	Interest rate (i)	Net PDV		
		Quebec	Elsewhere in Canada	Difference in Net PDV (Quebec - Elsewhere)
R = 55				
	i = 0.03	$92,676	$10,811	$81,865
	i = 0.0437	*$65,565*	*$483*	*$65,082*
	i = 0.05	$55,601	-$3,278	$58,879
	i = 0.07	$31,494	-$12,284	$43,778
	i = 0.09	$15,365	-$18,216	$33,581
	IRR	*12.01%*	*4.45%*	
R = 60				
	i = 0.03	$115,812	$22,247	$93,565
	i = 0.0437	*$80,154*	*$7,699*	*$72,455*
	i = 0.05	$67,428	$2,573	$64,855
	i = 0.07	$37,621	-$9,249	$46,870
	i = 0.09	$18,580	-$16,623	$35,203
	IRR	*12.31%*	*5.36%*	
R = 65				
	i = 0.03	$130,538	$26,270	$104,268
	i = 0.0437	*$88,873*	*$10,103*	*$78,770*
	i = 0.05	$74,296	$4,475	$69,821
	i = 0.07	$40,872	-$8,337	$49,209
	i = 0.09	$20,142	-$16,179	$36,321
	IRR	*12.42%*	*5.59%*	

Note: The average interest rate for the last 10 years is 4.37% (Bank of Canada, 2005).

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Table 1
RN Workforce by Highest Education, Canada, 2005

	Counts			Percentage Distribution		
	Canada	Quebec	Elsewhere in Canada	Canada	Quebec	Elsewhere in Canada
Diploma	166,004	38,375	127,629	66.0%	60.1%	67.9%
Baccalaureate	79,306	23,803	55,503	31.5%	37.3%	29.6%
Master's/Doctorate	6,348	1,649	4,699	2.5%	2.7%	2.5%
Not stated	17	0	17	<0.01%	0%	<0.01%
Total	251,675	63,827	187,848	100%	100%	100%

(a) The RN Master's/Doctorate total is comprised of 5,954 RNs who earned a master's and 394 RNs who earned a doctorate as their highest level of education in nursing.
(b) <0.01% is less than 0.01%; value is replaced to prevent displaying cells of 0.00 that are not true zero values.
(c) Percentages do not always add up to 100 per cent due to rounding off numbers.

Source: Canadian Institute for Health Information, *Highlights from the Regulated Nursing Workforce in Canada, 2005*, Ottawa, 2006, Summary Tables.

Table 2
Means of Selected Variables by Education Groups ($: Canadian Dollar)

Variable	Region	
	Quebec	Elsewhere in Canada
Diploma		
Wages	$39,823 (12,859)	$42,365 (15,608)
Age	41.4 (9.6)	44.0 (9.7)
Log (Wage)	10.5287 (0.3811)	10.5729 (0.4297)
N	887	2,847
The difference in means of wages (Quebec – Elsewhere)	- $2,542	
Baccalaureate		
Wages	$47,542 (14,544)	$44,379 (17,157)
Age	40.7 (9.4)	40.3 (9.9)
Log(Wage)	10.7120 (0.3641)	10.6178 (0.4320)
N	280	898
The difference in means of wages (Quebec – Elsewhere)	*$3,163*	

(a) The wage variable represents the RNs' annual earnings by wages and salaries.
(b) The standard deviation is in parentheses.
(c) N is the number of observations.

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Table 3
Wage Regressions for Education Groups

Variable	Dependent Variable: log (Wage)		
	Diploma	Baccalaureate	Master's/Doctorate
Constant	9.1977* (82.81)	9.0732* (47.53)	9.5885* (15.55)
Age	0.0616* (11.66)	0.0685* (7.18)	0.0488 (1.67)
$Age^2/100$	-0.0661* (10.85)	-0.0694* (6.06)	-0.0469 (1.39)
Dummy=1 for Male; =0 otherwise	0.1552* (5.08)	0.0588 (1.12)	0.1944 (1.38)
Dummy=1 for Each Region; =0 otherwise			
Atlantic Canada	-0.1023* (4.41)	-0.1011* (2.60)	-0.1352 (1.07)
Quebec	-0.0421* (2.65)	0.0828* (3.04)	0.0427 (0.54)
Ontario	0.0696* (5.06)	0.0568* (2.28)	0.1110 (1.70)
Prairies	-0.0306 (1.70)	-0.0849* (2.86)	-0.1098 (1.19)
British Columbia	0.0311 (1.51)	-0.0429 (1.33)	-0.0978 (1.04)
Northern Territories	0.2494 (1.72)	0.0582 (0.29)	n.a.
Sample size	3,734	1,178	139

(a) Absolute t-statistics are in parentheses below the coefficients.
(b) * denotes significant at the 5% level.
(c) The dependent variable is the natural log of the annual earnings by wages and salaries.

Table 4
Wage Regressions for Education Groups (Dependent Variable: Natural Log of Wage)

Variable	Diploma RNs		Baccalaureate RNs	
	Quebec	Elsewhere in Canada	Quebec	Elsewhere in Canada
Constant	9.1848* (50.81)	9.2208* (65.93)	8.8139* (25.14)	9.2070* (41.14)
Age	0.0605* (6.71)	0.0612* (9.33)	0.0800* (4.48)	0.0621* (5.58)
Age^2/100	-0.0643* (5.88)	-0.0660* (8.86)	-0.0778* (3.56)	-0.0635* (4.78)
R^2	0.0763	0.0332	0.2275	0.0699
F-test	36.50*	48.76*	40.79*	33.61*
N	887	2,847	280	898

(a) Absolute t-statistics are in parentheses below the coefficients.

(b) * denotes significant at the 5% level.

(c) Regarding encountered low R^2s, Gujarati (2003) explains: "In cross-sectional data involving several observations, one generally obtains low R^2 because of the diversity of the cross-sectional units…. What is relevant is that the model is correctly specified, that the regressors have the correct (i.e. theoretically expected) signs, and that (hopefully) the regression coefficients are statistically significant."

(d) The Chow test is performed to test the hypothesis that each sub-group is statistically different from the others. To see this, consider the following regression models:

$$Sub-group\,1 : \ln W_n = \alpha_1 + \beta_1 X_n + \gamma_1 X_n^2 + u_{1n}, \quad RSS_1$$

$$Sub-group\,2 : \ln W_n = \alpha_2 + \beta_2 X_n + \gamma_2 X_n^2 + u_{2n}, \quad RSS_2$$

$$The\ pooled\ regression : \ln W_n = \alpha_p + \beta_p X_n + \gamma_p X_n^2 + u_n, \quad RSS_p$$

※ *RSS*: Residual sum of squares

Now test the null hypothesis that

$$H_0: \alpha_1 = \alpha_2 = \alpha_p, \ \beta_1 = \beta_2 = \beta_p, \ and \ \gamma_1 = \gamma_2 = \gamma_p$$

The F-ratio for Chow test is:

$$F = \frac{\left(RSS_p - (RSS_1 + RSS_2)\right)/3}{(RSS_1 + RSS_2)/(N_1 + N_2 - 6)} \sim F_{\left[3, (N_1 + N_2 - 6)\right]}$$

The computed F-ratios to test the structural stability of 4 sub-groups in this study are:

  (d1) Among diploma RNs (Quebec vs. Elsewhere in Canada): $F_{(3, 3728)} = 1.53$ (0.205)

  (d2) Among Baccalaureate RNs (Quebec vs. Elsewhere in Canada): $F_{(3, 1172)} = 4.82^{**}$ (0.002)

  (d3) Among Quebec RNs (Diploma vs. Baccalaureate): $F_{(3, 1161)} = 23.57^{**}$ (0.000)

  (d4) Among Elsewhere RNs (Diploma vs. Baccalaureate): $F_{(3, 3739)} = 7.29^{**}$ (0.000)

    ※ ** denotes significant at the 1% level and p-values are given in parentheses.

In all other cases except the case (d1), the null hypothesis (H_0) can be rejected with the 1% significance level, which tells that those earnings profiles for different subgroups are in fact statistically different.

Table 5
Net PDV of Education-based Wage Differentials and Internal Rate of Return ($: Canadian Dollar)

Retirement age (R)	Interest rate (i)	Net PDV		
		Quebec	Elsewhere in Canada	Difference in Net PDV (Quebec - Elsewhere)
R = 55				
	i = 0.03	$102,722	$16,668	$86,054
	i = 0.0437	*$72,801*	*$6,495*	*$66,306*
	i = 0.05	$61,837	$2,765	$59,072
	i = 0.07	$35,435	-$6,231	$41,666
	i = 0.09	$17,938	-$12,316	$30,254
	IRR	*12.39%*	*5.53%*	
R = 60				
	i = 0.03	$126,483	$25,704	$100,779
	i = 0.0437	*$87,778*	*$12,189*	*$75,589*
	i = 0.05	$73,976	$7,379	$66,597
	i = 0.07	$41,721	-$3,844	$45,565
	i = 0.09	$21,235	-$10,964	$32,199
	IRR	*12.66%*	*6.21%*	
R = 65				
	i = 0.03	$146,434	$34,025	$112,409
	i = 0.0437	*$99,553*	*$17,097*	*$82,456*
	i = 0.05	$83,239	$11,239	$72,000
	i = 0.07	$46,087	-$2,025	$48,112
	i = 0.09	$23,323	-$10,095	$33,418
	IRR	*12.80%*	*6.62%*	

Note: The average interest rate for the last 10 years is 4.37% (Bank of Canada, 2005).

Figure 1
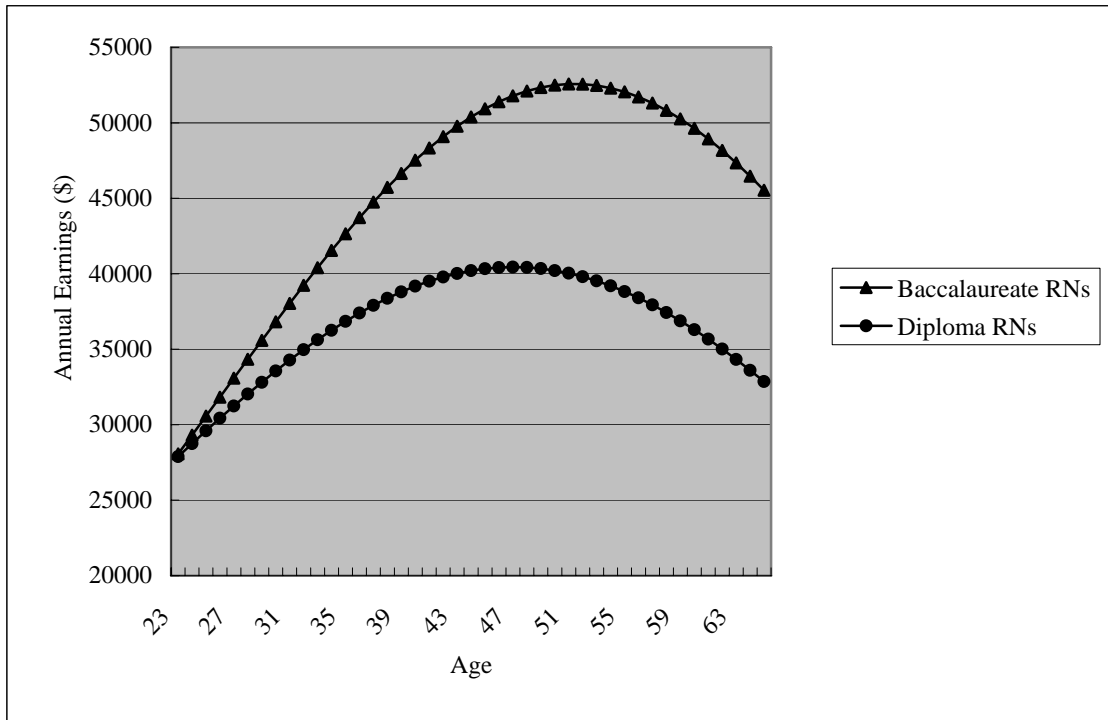Hypothetical Age-earnings Profiles for the RNs in Quebec ($: Canadian Dollar)

Figure 2
Hypothetical Age-earnings Profiles for the RNs in the rest of Canada ($: Canadian Dollar)