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カナダ看護教育における卒業証書効果の存在について
－ケベック地域とそれ以外の地域に分けて－

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Abstract

Regarding a positive correlation between education and earnings, there have been a number of debates over the relevance of the human capital hypothesis versus the signaling hypothesis. This study provides some insight into the connection between more years of education and higher earnings among Canadian RNs (Registered Nurses) by employing a combined model of the human capital and signaling hypotheses. The estimated results in this paper support both the human capital and signaling hypotheses in the Canadian nursing market.

Keywords: Credential effects, Signaling model, Human capital, Registered Nurses

要旨

　教育水準と賃金の間に存在する正比例関係について、教育の経済分析における主な二つのアプローチ『人的資本論』と『シグナリング理論』は、これまで多くの議論が行われている。そこで本論文では、カナダの公認看護師（Registered Nurses）における教育期間の延長がもたらす所得上昇効果について、これら二つの理論を統合したモデルを採用し、実証分析を行った。カナダ看護師データを用いた本研究では、『人的資本論』と『シグナリング理論』それぞれに基づく両仮説を支持する結果が導き出された。

キーワード：卒業証書効果、シグナリングモデル、人的資本、登録看護

1. Introduction

When it comes to economic benefits of education, the human capital approach is one of the most well established models. Based on the seminal work of Jacob Mincer (1974), the logarithm of individual earnings can be expressed as a linear function of years of completed schooling and a quadratic function of labor market experience. However, this specification ignores that education can also perform as a signaling or a screening device. Hungerford and Solon (1987) explain screening theories of education as "individuals with more schooling tend to earn more not because schooling makes them more productive, but rather because it credentiates them as more productive" (p. 175). According to this screening theory of education, years of schooling play no role on economic success without the acquisition of a degree or a certificate. This phenomenon is referred to as the sheepskin effect.

The research by Ferrer and Riddell (2002) is an early contribution to analyze the role of credentials in the Canadian labor market. They report that the estimated sheepskin effects of a college diploma or trades certificate are 5% for men and 3% for women. For bachelor's degree holders, the estimated sheepskin effects are approximately 21% for both men and women groups. Ferrer and Riddell (2008) also investigate the evidence of sheepskin effects for immigrants by using 1981 to 2001 Canadian census data. They show that immigrants receive lower returns to years of schooling and experience, but receive higher returns to completing educational programs than native-born Canadian.

Recently in Canada, all provinces except Quebec instituted the policy that a four-year baccalaureate degree in nursing would be required as the minimum educational credential. As a result, the percentage of Registered Nurses (RNs) in Canada with a three-year nursing diploma fell from 76.2% in 1999, down to 66.0% by 2005.[1] While the percentage of three-year diploma RNs has continued to decrease each year, there has been an on-going debate as to whether an additional year of nursing education provides a good return on investment in Canada (Lee, 2009b).[2] With this change in the educational requirement for entry into nursing in Canada, the primary objective of this paper is to detect the credential effects (the so-called sheepskin effects) of a baccalaureate degree in nursing using the 1996 Canadian census data.

The results in this paper support the underlying theories behind both the screening and human capital hypotheses. Generally, Canadian RNs who had greater years in nursing education earn higher weekly earnings, regardless educational credentials. This result can be interpreted by human capital hypothesis. Additionally, however, I also find

that estimated sheepskin effects associated with a baccalaureate degree relative to a diploma can not be detected. While the estimated sheepskin effect is not statistically significant for overall Canada, I find that RNs who are employed in Quebec achieve statistically significant earnings gain associated with the acquisition of a baccalaureate degree. In contrast, the estimated effects of an additional year of nursing education on earnings are not significant for the RNs in Quebec.

The remainder of this paper is as follows. In the second section a brief review of relevant literature is presented. Then section 3 introduces the data and the empirical specification used. In section 4, the empirical results of sheepskin effects on the returns to postsecondary nursing education in Canada are presented. Section 5 contains discussion and conclusion.

2. Relevant Literature

There have been a number of previous studies on sheepskin effects with U.S. Current Population Survey (CPS) data. As Jaeger and Page (1996) point out, some of those studies (Hungerford and Solon, 1987; Belman and Heywood, 1991; Heywood 1994) are limited by the fact that prior to 1992, CPS data only provided the actual years of schooling, but not whether a degree had been received. As a result, models relying on these data can only estimate the relationship between earnings and schooling as a spline function with discontinuities at each educational certificate year (8 for elementary school, 12 for high school, and 16 for university). However, Park (1999) estimates more precise sheepskin effects on more recent CPS data, which contain information of CPS data on both years of schooling, as well as actual degrees obtained. When he runs his model using the CPS data to only estimate degree information by considering years of schooling, he reports sheepskin effects associated with high-school diploma and bachelor's degree of 3% and 13%, respectively, which are similar to the results estimated by Hungerford and Solon (1987) and Jaeger and Page (1996). However, Park finds considerably larger estimated sheepskin effects when employing the new information of the CPS (the actual degree received), of 9% for high-school diploma and 21% for bachelor's degree. Park's study illuminates the importance of having information of the degree completed, in addition to years of schooling.

Several researchers have suggested some ideas relevant to sheepskin effects in the returns to nursing education. Kane and Rouse (1995), for instance, show substantial sheepskin effects of bachelor's degree completion for men and associate's degree completion for women in USA. They note that the estimated high returns to community

college education for female workers might be reflected by the high returns to nursing education. Jeager and Page (1996) also provide estimated sheepskin effects of post-secondary degrees in the U.S. labor market, considering especially the effects of a college diploma across four different demographic groups: white men, white women, black men, and black women. They also note the possible influence of sheepskin effects of an associate's degree in nursing, stating that "the credentialling effect of an occupational Associate's degree is larger for white women than for the other three groups, possibly resulting from the fact that these degrees are used by many white women as stepping stones into relatively lucrative occupations such as nursing" (p.738).

While these studies suggest the possible significance of sheepskin effects associated with the receipt of post-secondary diplomas or degrees, and the unique patterns of women's returns to education in the field of health, none of them has undertaken a close look at the nature of returns to schooling in nursing profession. In this paper, I take advantage of the Canadian census data that contain detailed information on educational attainment obtained by each respondent, and investigate the returns to nursing education and sheepskin effects in the occupation of registered nurse. I also investigate the possibility that returns to nursing education in Canada differ across regions.

3. Data and Empirical Specification

As Park (1999) points out, for accurate estimation of sheepskin effects, it is important to obtain data that include information on both (a) years of completed schooling, and (b) receipt of degrees. The data used in this paper are from the 1996 Canadian Census Individuals Microdata Files, made available by Statistics Canada. The 1996 Canadian census data contain information on both years of nursing education in community colleges or universities and the receipt of a diploma or degrees. Total years of nursing education are calculated by the sum of years of schooling completed in a community college and in a university.

While the current minimum degree requirements for RNs has recently been increased to a four-year baccalaureate in all provinces besides Quebec, for the time period under my consideration, RNs could enter the profession in Canada with either a three-year diploma provided by community colleges, or a four-year baccalaureate (bachelor's) degree provided by universities. I consider the total number of completed years at educational institutions which are above secondary school level for each RN.

To measure the existence of sheepskin effects among Canadian RNs, I consider the degree completed and received by RNs. In this study, the following two indicators for completion of nursing programs are employed using data from the 1996 Canadian census:

    1. Diploma or certificate below bachelor level

    2. University bachelor's degree

To estimate returns to nursing education and the sheepskin effects of a baccalaureate degree in nursing, I employ a spline function (Gujarati, 2003) model in this study:

$$\ln W = f\left(EXP, EXP^2, S, D_4, D_b, X\right) \tag{1}$$

where *lnW* is the natural logarithm of weekly earnings; *EXP* and *EXP²* are individual's potential experience and its square; *S* is the years of nursing education; D_4 is a dummy variable for the RNs who have 4 or more years of post-secondary nursing education; D_b is a dummy variable for those who have a baccalaureate degree in nursing; *X* is a vector of characteristics assumed to affect wages.

In this paper, I estimate the earnings function separately for Quebec and the rest of Canada. When I include the regional dummy variables, assuming that the wage levels are different across regions but the impact of schooling or BA certificate are the same across regions, I obtain similar results as the sample from all Canada. However, when I estimate equations (1) separately for Quebec and the rest of Canada, I obtain very different estimates for returns to education. Therefore, returns to education can be quite different depending on regions.

4. Sheepskin Effects

Table 1 summarizes descriptive statistics by two education groups (diploma and baccalaureate) of Canadian RNs. I can see that RNs who have a baccalaureate degree earn more weekly earnings than RNs who have a diploma. In the 1996 census data set, there are 4,214 RNs. Although responses were taken from both male and female RNs, to investigate sheepskin effects of baccalaureate nursing degree further in this study, I only include female RNs because of the gender-based wage differentials and the lack of observations of male RNs.

The regression results are displayed in Table 2. Column 1 shows the estimates for equation (1) of the spline function to confirm the existence of sheepskin effects associated with a baccalaureate degree in nursing from the total samples of Canadian

RNs. Note first that an additional year of nursing education is seen to increase earnings by 3.5%. Second, while the estimated baccalaureate degree effect in the returns to nursing education is not statistically significant, the coefficients are in the expected direction (+0.03).

It is reported by Lee (2009a) that 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. Regarding these regional education-based wage differentials and the sheepskin effects associated with a baccalaureate degree relative to a diploma, columns 2 and 3 report the results from estimating the spline function model specification of equation (1) for RNs who are working in Quebec, compared with those working in the rest of Canada. These results show clear differences between RNs in Quebec and the rest of Canada in the effects of an additional year of nursing education on earnings, as well as sheepskin effects associated with a baccalaureate degree. The estimated sheepskin effect is statistically significant and substantial only for the RNs in Quebec; a baccalaureate degree relative to a diploma raises earnings by 13.5% (see column 2). In contrast, the effect of post-secondary schooling years on RNs' earnings in Quebec is not significant. Although estimated sheepskin effect associated with a baccalaureate degree for the RNs employed in the rest of Canada is negligible in magnitude (0.0001) and statistically insignificant, the results in column 3 highlight the fact that there is a significant negative slope change between upper segment and lower segment of the regression; the estimated differential slope coefficients is -0.0288. However, the slope in the upper segment is still positive as 0.0126 (= 0.0414 - 0.0288), which indicates that there is positive additional returns to years of nursing education, regardless of RNs' educational credentials.

Fundamentally, the results from this model specification give strong support for the hypothesis that there is a significant sheepskin effect associated with a baccalaureate nursing degree only in Quebec region. It offers the reason why baccalaureate RNs in Quebec earn higher baccalaureate-diploma wage differentials than those RNs in the rest of Canada (Lee, 2009a).

5. Discussion and Conclusion

Regarding a positive correlation between education and earnings, there have been a number of debates over the relevance of the screening hypothesis versus the human capital hypothesis. This study provides some insight into the connection between more

years of education and higher earnings among Canadian female RNs by employing a combined model of the screening and human capital hypotheses.

There have been a number of studies which have tested the relationship between earnings and educational credentials in the nursing labor market by considering various human capital models; however, research interpreting sheepskin effects of educational credentials in nursing workforce is relatively scarce. Regarding the scarcity of previous literature, the main purpose of this study is to add to the discussion of the issue. I suggest the issue by detecting the existence of sheepskin effects associated with a baccalaureate degree relative to a diploma in the Canadian nursing. In addition, it is hoped that this study will encourage others to explore further on the issue. Finally, even though Canadian census data provide a rich source of information for analyzing the role of educational credentials, this study could benefit from additional data on Canadian registered nurses to obtain more precise empirical evidence.

Notes
1. See Canadian Institute for Health Information (CIHI, 2006) for more detailed information.
2. Lee (2009b) reported that the decision to invest in one more year of nursing education is economically beneficial only for the RNs who work in Eastern Canada.

References

Belman, D. and Heywood, J. S. (1991) "Sheepskin Effects in the Returns to Education: An Examination of Women and Minorities" *Review of Economics and Statistics* 73: 720-724.

Canadian Institute for Health Information (2006) *Workforce Trends of Registered Nurses in Canada, 2005*, Ottawa: CIHI.

Ferrer, A. M. and Riddell, W. C. (2002) "The role of credentials in the Canadian labour market" *Canadian Journal of Economics* 35(4): 879-905.

―― (2008) "Education, Credentials, and Immigrant Earnings" *Canadian Journal of Economics* 41(1): 186-216.

Gujarati, D. N. (2003) *Basic Econometrics*, 4th ed., New York: McGraw-Hill Inc.

Heywood, J. S. (1994) "How Widespread are Sheepskin Returns to Education in the U.S.?" *Economics of Education Review* 13(3): 227-234.

Hungerford, T. and Solon, G. (1987) "Sheepskin Effects in the Returns to Education" *Review of Economics and Statistics* 69: 175-177.

Jaeger, D. A. and Page, M. E. (1996) "Degree Matter: New Evidence on Sheepskin Effects in the Returns to Education" *Review of Economics and Statistics* 78: 733-740.

Kane, T. J. and Rouse, C. E. (1995) "Labor-Market Returns to Two- and Four-Year College" *The American Economic Review* 85(3): 600-614.

Lee, H. (2009a) "The New Trend of Canadian Nursing Education and Baccalaureate-Diploma Wage Differentials in Quebec" *Economics Bulletin* 29(3): 2296-2313.

―― (2009b) "The Regional Education-Based Wage Differentials: The Case of Canadian Registered Nurses" *Economic Journal of Hokkaido University* Vol.38: 13-36.

Mincer, J. (1974) *Schooling, Experience and Earnings*, New York: Columbia University Press for the National Bureau of Economic Research.

Park, J. H. (1999) "Estimation of Sheepskin Effects Using the Old and the New Measures of Educational Attainment in the Current Population Survey" *Economic Letters* 62: 237-240.

Table 1
Sample Means and Standard Deviations

Census Year	Variables	Education Groups	
		Diploma	Baccalaureate
1996			
	Log (Weekly Earnings)	6.5817	6.6687
	SD	(0.3972)	(0.3646)
	Years of Nursing Education	3.19	5.33
	SD	(1.0131)	(1.4050)
	Potential Experience	26.13	21.55
	SD	(8.9202)	(8.5648)
	N	3,386	828

Note: SD is the standard deviation which is in parentheses and N is the number of observations.

Table 2
Estimated Coefficients in Log of Weekly Wage Regressions, Female RNs

Variables	The 1996 Census		
	Canada (1)	Quebec vs. the rest of Canada	
		Quebec (2)	The rest of Canada (3)
Experience (*EXP*)	0.0323**	0.0282**	0.0340**
	(0.0031)	(0.0059)	(0.0037)
Experience squared (*EXP^2*)	-0.0504**	-0.0419**	-0.0538**
(/100)	(0.0060)	(0.0115)	(0.0070)
Years of nursing education (*S*)	**0.0341****	**0.0188**	**0.0414****
	(0.0071)	**(0.0174)**	**(0.0079)**
Spline for *S* ≥ 4: (*S-4*)*D$_4$*	**-0.0165**	**0.0046**	**-0.0288***
(*D$_4$* = 1 if S≥4; *D$_4$*=0 if S<4)	**(0.0114)**	**(0.0255)**	**(0.0131)**
Baccalaureate degree dummy (*D$_b$*)	**0.0300**	**0.1265****	**0.0001**
(baccalaureate RNs = 1; diploma RNs = 0)	**(0.0171)**	**(0.0331)**	**(0.0200)**
Constant	5.9633**	6.0130**	6.0226**
	(0.0501)	(0.1177)	(0.2530)
R^2	0.254	0.305	0.248
N	4,200	893	3,307

(a) Standard errors are in parentheses below the coefficients.
(b) **, * indicate that coefficient is statistically significant at 1% and 5%, respectively.
(c) Samples are restricted to RNs (both male and female RNs) aged 22-59 with 10,000$ or more of annual earnings.