Relationship Between Education and Hospital Visit

Chih-Chun Kung*

Institute of Poyang Lake Eco-Economics, Jiangxi University of Finance and Economics, Nanchang, Jiangxi, 330013, China

Abstract: The purpose of this paper is going to examine how the level of education affects their willingness to see a doctor and find whether the education is positive or negative correlated with the number of visiting a doctor based on 2 alternative hypotheses: (1) People have more years of education are more concerned about their health condition when they are ill, so the number of visiting a doctor should be positive correlated with their level of education, and (2) People with higher level of education pay more attention on their health condition by spending more time in exercise and therefore, this effort reflects that the number of visiting a doctor is negative correlated to their education level. The result shows if a person has more year of education, he is going to the hospital less frequently than the person with less education. One interesting finding is that the more exercise a person has, the more frequently he is going to the hospital because the risk of getting hurt by some equipment and joint problem may have significant contribution to the exercise. Some pitfalls of this study is we did not provide the alternative model for comparison such as binomial distribution model, and there is no marginal effect of each variable.

Keywords: Panel analysis, poisson distribution, *maximum likelihood estimates*, simulation.

INTRODUCTION

People go to hospital only when they feel ill or they got some accidents. If we feel we are healthy, we don't consider seeing a doctor or we will just buy some pills, drink lots of water, and take a rest for several days. Does this mean that we don't care about our body condition? The purpose of this paper is going to examine how the level of education affects their willingness to see a doctor [1,2]. The field around the education level and medical care has been discussed widely for decades [3-5]. There have different research studies been provided ranging from physical to mental effects [6-8]. The study is to find whether the education is positive or negative correlated with the number of visiting a doctor based on 2 alternative hypotheses: (1) People have more years of education are more concerned about their health condition when they are ill, so the number of visiting a doctor should be positive correlated with their level of education, and (2) People with higher level of education pay more attention on their health condition by spending more time in exercise. Therefore, this effort reflects that the number of visiting a doctor is negative correlated to their education level.

DATA AND DESCRIPTION

Data set is from German Socioeconomic Panel Survey. The data contains 8905 observations gathered from 1781 people with different number of years (from 1995~1999). The id is the identification number of each person, which contains 1781 people and each of person has 5 year observations. Goodh and Badh tell us how people feel about their health condition by self assessment. Pt, Ft and Unemp indicate what people's working condition and tell us whether they have full-time job, part-time job or they are currently unemployed [3]. There are three dummies that indicate the season they are interviewed because weather on different season may play an important role on health condition. The loginc is the gross monthly income of each interviewed person. The variable I am interested in is education. I want to know how this variable affects the number of going to see a doctor based on the two alternative hypotheses although there might be some unknown psychological effects [4, 5].

ECONOMETRIC MODEL AND METHODOLOGY

The model will be estimated is

$X_{it}'\beta = \beta_0 + \beta_1 Age_{it} + \beta_2 Male_i + \beta_3$ Years of education$_{it}$ + β_3 Marriage$_{it}$ + β_4Engaged in sports$_{it}$ + β_5 good health$_{it}$ + $\beta_6$bad health$_{it}$ + β_7 log(income)$_{it}$+β_8 Full time Job$_{it}$ +β_9 Part Time job$_{it}$ + β_{11}Umemploymentit + β_{12} Winter$_{it}$ +β_{13}Spring$_{it}$+β_{14}Fall$_{it}$

The standard probability distribution for count data is Poisson distribution:

$$p(y_i / \lambda_i) = \frac{\exp(-\lambda_i)\lambda_i^{yi}}{y_i!}$$

where

$$\mathrm{E}(y_i / \lambda_i) = \mathrm{Var}(y_i / \lambda_i) = \lambda_i$$

*Address corresponding to this author at the Institute of Poyang Lake Eco-Economics, Jiangxi University of Finance and Economics, Nanchang, Jiangxi, 330013, China; Tel: 8615070074808; Fax: 86079183813547;
E-mail: cckung78@hotmail.com

E-ISSN: 1929-6029/12

In the regression model, we assume the population model is heterogeneous with covariates x_i, and λ_i is specified as $\lambda_i = \exp(x_i'\beta)$ where I = 1, 2,…..,N indexes observations in the sample (Winkelmann,2004). Let y = $(y_i,\ldots..y_N)$' and x = $(x_i,\ldots..,x_N)$'. Under random sampling,

$$P(y/x) = \exp\left[-\sum_{i=1}^{N}\exp(x_i'\beta)\right]\prod_{i=1}^{N}\frac{[\exp(x_i'\beta)]^{yi}}{y_i!}$$

and we can estimate the parameters by maximum likelihood. I use Matlab to program the MLE and the hypothesis test and the program is attached in the back of this paper.

The Log-likelihood function of the Poisson model with panel data is

$L_i(\beta) = sum_{it}\,[Y_i\,Log(\,m(X_{it},\,\beta)) - m(X_{it},\,\beta)$

$= sum_{it}\,L_{it}(\beta)$ where $m(X_{it},\,\beta) = \exp(X_{it}\beta)$

Therefore, the log-likelihood function for this problem is

$L_i(\beta) = sum_{it}\,[Y_{it} * (X_{it}\beta) - \exp(X_{it}\beta)]$

Then the program files for the maximization likelihood estimation are called logla.m and main.m. To test if the parameters are significant or not, I have another file called test1.m. In order to compare my result with standard statistical tools such as STATA, I also provide the output from Matlab.

DISCUSSION

The result shows the affect of education is statistically significant (Please see Table **1**). Since the estimated model is nonlinear, the marginal effect of the education is not obtained, but from the statistical result we see the more years of education actually reduces the frequency of going to a doctor. This means if people gain more years of education, they gain more knowledge about the importance of health and have knowledge to help them maintain or even improve their health. Another interesting point is that we may usually think if people exercise more often, their body condition is better and therefore, they go to hospital less frequently. The result shows opposite way. One possible explanation for this is if we exercise more often, we may indeed have a more healthy body but the frequently exercise may also increase the chance of spraining our ankle when playing basketball or jogging or hit some sharp equipment in the weight room. Age and male follows our expectation: the older we are, the more often we are going to the hospital, and if the person is male, he goes to the hospital less often and these effects are statistical significant. Another significant variable is marriage. It shows when people get married; they are not going to the hospital as often as person who is single. This can be explained

Table 1: Statistics of Variables

	Beta	A(Var)	1-P	P-Value
Constant'	1.17274	7.81383	0.994815	0.005185
'Age'	0.00266**	7.85292	0.994926	0.005074
'Male'	-0.1919*	5.55938	0.981618	0.018382
'Education'	-0.0382*	5.16317	0.976929	0.023071
'Marriage'	-0.0276*	4.84775	0.972318	0.027682
'Enaggedinsports'	0.06537*	5.39337	0.979787	0.020213
'GoodHealth'	-0.5658	0.97217	0.675859	0.324141
'BadHealth'	0.83772**	8.66874	0.996763	0.003237
'log(income)'	0.05784**	12.1687	0.999514	0.000486
'FTjob'	-0.2147*	7.90187	0.995062	0.004938
'PTjob'	-0.2206*	4.68132	0.969508	0.030492
'Umemployment'	-0.2145	2.5542	0.889998	0.110002
'Winter'	-0.0283	2.43534	0.881372	0.118628
'Spring'	-0.058	1.9336	0.835634	0.164366
'Fall'	0.05705	1.94218	0.836568	0.163432

Table 2: LCI and UCI of the Parameters and Elasticity of the Two Subsets

		Beta21-30	Beta31-40	E21-30	E31-40
LCI	0.025	-0.54035366	-0.284807622	-0.51582	-0.30988
UCI	0.975	0.49513477	0.323715824	0.473711	0.357115

as their spouse can also take care of them and watch for each other. Good health and bad health show the opposite way and this is perfectly what we should have: not healthy people go to hospital more frequently than healthy people.

The simulation result is shown here. First we take a look of lower confidence interval and upper confidence interval of the two simulated subsets. Table **2** shows the LCI and UCI of the parameters and elasticity of the two subsets. However, we may want to the sign of the parameters being negative so our hypothesis can be maintained. This table just shows that we can be 95% confident that parameters will fall in this range.

Table **3** shows the parameters estimated for the two different groups and fortunately, the parameter interested (i.e. education) is negative in both model. This follows our hypothesis that people with more year of education is going to take more care of themselves. However, the education is not significant in the group "31-40". This may due to some unobserved effects that are not incorporated in our analysis and at age 31-40, education may play a significant role in the human health.

Table **4** indicates that the mean and variance of seeing a doctor of these two subsets may be equal or cannot be rejected that they are not equal in the statistics. This implies that the number of seeing a

Table 3: Parameters Estimated for the Two Different Groups

	21-30	31-40
	Beta	Beta
Age	6.729651	15.36709
Gender	0.04009	-0.08121
Education	-0.24405	-0.86255
Marriage	0.113743	-0.0388
Enaggedinsports	6.729651	15.36709
GoodHealth	0.04009	-0.08121
BadHealth	-0.24405	-0.86255
log(income)	6.729651	15.36709
FTjob	0.04009	-0.08121
PTjob	-0.24405	-0.86255
Umemployment	0.113743	-0.0388
Winter	0.486872	-0.21413
Spring	-0.17163	-0.07963
Fall	0.169484	0.108121

Table 4. Mean and Variance of Visiting A Doctor

Distribution Comparison of DrVisited21-30 & DrVisited31-40				
Confidence Level		95.00%		
	Test Value	Critical Value	P-Value	
2 Sample t Test	-1.58	2.24	0.114	*Fail to Reject the Ho that the Means are Equal*
F Test	1.03	1.14	0.379	*Fail to Reject the Ho that the Variances are Equal*

doctor may not have significant difference between two age groups and the effect of their level of education may play a constant role. That is, for a specific year of education, his concern of taking of himself may be constant over time, and he will follow his good or bad habit no matter how old he is.

The simulation result is shown here. First we take a look of lower confidence interval and upper confidence interval of the two simulated subsets. Table **4** shows the LCI and UCI of the parameters and elasticity of the two subsets. However, we may want to the sign of the parameters being negative so our hypothesis can be maintained. This table just shows that we can be 95% confident that parameters will fall in this range.

CONCLUSION

The explanation of this is when people gain more education, they know more about how to take care of themselves and have knowledge about how to maintain (if good health) or improve (if bad health) the current body condition. One interesting finding is that the more exercise a person has, the more frequently he is going to the hospital because the risk of getting hurt by some equipment and joint problem may have significant contribution to the exercise. Some pitfalls of this study is we did not provide the alternative model for comparison such as binomial distribution model, there is no marginal effect of each variable and some simulation techniques may not be sophisticated due to the large amount of data on hand.

ACKNOWLEDGEMENTS

This study is partially supported by the National Natural Science Foundation of China (#41161087), Art & Social Science of University Foundation of Jiangxi Province (#JJ1208) and Social Science Foundation of Jiangxi Province (11YJ53).

REFERENCES

[1] Grossman M. On the concept of health capital and the demand for health. J Politic Econ 1972; 80: 223-55. http://dx.doi.org/10.1086/259880

[2] Richardson JW. Simulation for Applied Risk Management. An Econometric Analysis. J Appl Econom 2006; 19: 455-72.

[3] Maruda NP, Jacobs FA. Determinants of Charitable Donations to Large U.S. Higher Education, Hospital, and Scientific Research NPOs: New Evidence from Panel Data. Int J Volunt Nonprofit Organ 2004; 15(2): 157-79. http://dx.doi.org/10.1023/B:VOLU.0000033179.47685.1c

[4] Dias MS, Smith K, deGuehery K, Mazur P, Li V, Shaffer ML. Preventing Abusive Head Trauma Among Infants and Young Children: A Hospital-Based, Parent Education Program. Pediatrics 2005; 115: e470 -e477.

[5] Abdulwadud O, Abramson M, Forbes A, James A, Walters EH. Evaluation of a randomised controlled trial of adult asthma education in a hospital setting. Thorax 1999; 54: 493-500. http://dx.doi.org/10.1136/thx.54.6.493

[6] Teodorczuk A, Welfare M, Corbett S. Education, hospital staff and the confused older patient. Age Ageing 2009; 38(3): 252-53. http://dx.doi.org/10.1093/ageing/afp007

[7] Osman LM, Abdalla MI, Beattie JAG, *et al*. Reducing hospital admission through computer supported education for asthma patients. BMJ 1994; 308. http://dx.doi.org/10.1136/bmj.308.6928.568

[8] Weissman DE, Block SD, Blank L, *et al*. Wheeler HB Recommendations for incorporating palliative care education into the acute care hospital setting. Acad Med J Assoc Am Med Coll 1999; 74(8): 871-77.

[9] Winkelmann R. Econometric Analysis of Count Data, 4th edn. Springer: Heidelberg 2003.

[10] Winkelmann R. Health Care Reform And The Number Of Doctor. John Wiley & Sons, Ltd. 2004.

[11] Wooldridge J. Econometric Analysis of Cross Section and Panel Data. 1 ed. The MIT Press 2001.

Received on 13-08-2012 Accepted on 11-09-2012 Published on 24-09-2012

http://dx.doi.org/10.6000/1929-6029.2012.01.01.04