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Regression Analysis

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Part I: Regression Model for the Salary Determinants of Instructor at Private School

Background

The factors that affect the salary for instructors at private schools was of our interest. The salary might be affected by years of work at current position or being a female or rank such as assistant or associate or full instructor. Also the salary might be affected by numbers of years the instructors had worked for the school or a level of degree the instructors had or numbers of years the instructors had after completion of highest degree.

In order to find the best combination of the variables that affect the salary of the instructors at private school the most, 8 of the above variables were taken from 58 observations. Intuitively, the salary of the instructors at private school could be affected by number of years worked at the current position, by rank: assistant, associate and full instructor, numbers of years the highest degree earned. Having PhD or being a female should not really impact on the salary, but could not decide until statistically justified.

Statistical Results

Of the 58 instructors at a private school, the annual salary range was minimum of $ 15000 to maximum of $40350 with a variation of $7038 around their mean salary of $25200 a year. There were 44 (75.86%) males and 14 (24.14%) females, ranked into three categories by profession: 26 (44.83%) full instructors, 14 (24.14%) associate instructors and 18 (31.03%) assistant instructors. On an average they had been working for 9.39 years in the same position with a variation of 7.74 years around mean length of service year, some started within last year while other had been working for 28 years.

Academically, 40 (68.97%) instructors had PhD as highest degree and rest 18 (31.03%) had lower than PhD, some of them got it just a year ago while others got it 37 years ago. On an average they had got their highest degree in 18.01 years ago with a variation of 11years around

the mean. There was highly significant positively correlation: between the numbers of years at current position and their salary ($r=0.82$, $p<0.001$); between the numbers of years since highest degree earned and salary ($r= 0.77$, $p<0.001$). There was significant difference in the annual average salary drawn by male and female instructors, male drew more mean annual salary $26422 and difference was $ 5065.08 ($t=2.44$, $df= 56$, $p<0.01$).

There was highly significant mean difference in the annual salary drawn by assistant instructors and associate instructors, associate instructors were paid more mean salary of $23175.93 and difference was $ 5407.26 ($F= 74.41$, $df= 57$, $p<0.001$). Similarly, there was highly significant mean difference in the annual average salary drawn by assistant instructors and full instructors: full instructors are paid more mean salary of $31433.80 and difference was $ 13565.10 ($F= 74.41$, $df= 57$, $p<0.001$). Also, there was highly significant difference in the annual mean salary drawn by full instructors and associate instructors, full instructors were paid more mean salary of $31433.80 and difference was $ 8257.88 ($F= 74.41$, $df= 57$, $p<0.001$).

Regression Model

The results in the statistical section above explained that the salary of the instructors at private school would be impacted by different ranks: assistant, associate and full instructor; numbers of years at current position, numbers of years since highest degree earned. The result also explained that salary would not depend on sex whether female or not and whether or not an instructor had PhD degree. After running a regression model by using Stata Software package, we had got following results (Table 1) so far.

From the Table 1 below, working one more year for the same position there would be an increase of annual salary by $443.95. Being upgraded to a rank of associate instructor, there would be an annual increase of salary by $4054.26. Similarly, being promoted to a full instructor, there would be an increase of yearly salary of $9214.22.

Table 1: Significant determinant of salary statistics.

Variables	**Model M1**		**Model M2**	
Variables	**Coeff**		**Coeff**	
female	1252.17			
years	545.08	***	443.95	***
degree	-922.13			
yearsdegree	-102.19			
associate01	5022.88	***	4054.26	***
full01	10562.16	***	9214.22	***
_cons	16305.36		15918.86	
R2	0.89		0.88	
Adj R2	0.88		0.88	
AIC	1075.73		1072.43	
BIC	1090.15		1080.67	
LR test			0.44	

Note: * = p<0.05, **= p<0.01, ***= p<0.001

Conclusion

After analyzing the statistical and regression result in the above table, major determinants were found as number of years at current rank, being an associate and full instructors. Being female did not really impact to the salary of the instructor at private school, however there were significant positive correlation in female sex and salary. We concluded the best model in term of lower AIC and LR test for the given variables.

Part II: Logit Model for the Determinant of Purchasing Magazine

Background

What were the factors that really matters to an individual whether or not he purchased a magazine was the subject of the study. The study was completed by using the Stata program and developing a Logit model on 18 variables from 673 respondents. Buying a magazine mainly depends on the considered variables of household income, marital status, dual income if married, minor, home ownership, resident type, race, language, previously purchased a parenting magazine, previously purchased a children's magazine. We developed a Logit model out of the above factors that most significantly increase the likelihood of buying a magazine.

Summary Statistics and their Analysis

Income of the 673 respondents ranged from $0 to maximum of $75,000, with a variation of of $23813 around the mean income of $35,078.75. Length of their stay in the city ranged from 0 to maximum of 72 years, with a variation of 13.55 years in their mean length of stay of 17.62 years. Among 673 respondents 371(55.13%) were female, 302 (44.87%) were male, 235 (34.92%) were found married and 438 (65.08%) still looking for their partner or had other alternatives. In respect of the education, 195 (28.97%) had got at most college education and rest 478 (71.03%) had no such degree.

For the employment; 230 (34.18%) were employed as professional jobs while 443(65.82%) had other job categories, 39 (5.79%) of them found retired from their job and rest 634 (94.21%) were on job or did not reach retirement age, unemployment was found low at 21 (3.12%) of the respondents compared to a very high numbers 652 (96.88%) were found in the job market or other sort of engagement. Similarly, some 156 (23.18%) of the respondents had dual income by if married and rest 517 (76.82%) might have other arrangement, 245 (36.40%) had minors under age of 18 years and rest 428 (63.60%) were found without minors, 244 (35.26%) had managed their own residential house and rest 429 (63.74%) had other alternative for living, bulk of the houses 449 (6.72%) were found single family types while remaining 224 (33.24%) had other arrangement. By race, 466 (69.24%) respondents were white compared to 207 (30.76%) non-white, substantial number of them 612 (90.94%) had their primary language as English in their house and only a few 61 (9.06%) spoke other than English language in their

house, 48 (7.13%) of them were found previously purchased a children's magazine and remaining 625 (92.87%) did have other than this arrangement. Only a few of them 57 (8.47%) had previously purchased a parenting magazine while remaining 616 (91.53%) did have other arrangement for the reading news papers.

There was highly significant mean difference in income between respondents who purchased and who did not purchase magazine. The respondents who used to purchase magazine had higher mean income of $68920 and the mean difference is $41560 (t= -23.97, p<0.001).There was also highly significant mean difference in length of residency in the current city among the respondents who purchased magazine and who did not: respondents who purchased magazine had higher mean length of stay as 22.25 years at current city; the mean difference was 5.68 years (t=- 4.28, p<0.001). There was significant different in the expected and observed frequency in of female who purchase magazine (cchi2 = 4.04, p<=0.05). Higher number of female were expected (56) to buy paper than observed (46). There was significant different in the expected and observed frequency of dual income holders' who purchase magazine (cchi2 = 63.87, p<=0.001). Lower number of dual income holders are expected (29) to buy paper than observed (63). There was significant different in the expected and observed frequency in people having own resident who purchase magazine (cchi2 = 96.64, p<=0.001). Higher number of own resident holders were observed (93) than expected (45)) to buy paper. There was significant different in the expected and observed frequency in white people who purchased magazine (cchi2 = 27.57, p<=0.001). Higher number of white people are expected (38) to buy paper than observed (14). There was significant different in the expected and observed frequency in English speaker in their house who purchase magazine (cchi2 = 4.77, p<=0.05). Higher number of English speaker in their house are expected (11) to buy paper than observed (5). There was significant different in the expected and observed frequency in people who have already purchased previous child magazine (cchi2 = 15.08 p<=0.001). Lower number of people who have purchased child magazine are expected (9) to buy paper than observed (19).

Logit Model for Determinant of Buying Magazine

The Table 1 below explains likelihood of buying magazine. Similarly, being a female, dual income holder, minor in the house, has own resident, there is increase in the likelihood of purchasing magazine. Also being white English speaker, previously purchased children

magazine, there is increase in the likelihood of purchasing the magazine. For each $1000 increase in the income of the respondents is associated with less than 1percent increase in the odd of buying magazine. Similarly, higher female increases likelihood of buying magazine. The higher the dual income holder in a family, there is higher likelihood of buying the magazine.

Table 1: Logit model for the determinants of purchasing magazine

	Model M1		**Model M2**	
Variables	**Odds**		**Odds**	
income	1.00	***	1.00	***
isfemale	5.19	***	4.46	***
ismarried	1.76			
hascollege	0.76			
isprofessional	1.25			
isretired	0.31			
unemployed	2.69			
residencelength	1.02			
dualincome	1.57		2.34	*
minors	3.10	**	2.86	**
own	2.88	*	2.60	*
house	0.40			
white	6.45	***	5.28	***
english	4.62		5.22	*
prevchildmag	4.75	*	4.87	*
prevparentmag	1.61	*		
_cons	0.00		0.00	
Other Stats				
Pseudo R2			0.70	
AIC			208.65	
BIC			249.26	
LR test (prob)			0.40	
HL GOF Prob> Chi2			0.92	

Note: Note: **=p<0.01, ***=p<0.001, LR χ^2= 8.33, p>χ^2=0.40

For the respondents, higher the own resident for a white, English speaking within family with previously purchased children magazine, there is higher likelihood of buying the magazine.

The odd of buying magazine by female is 4.46 times the odd of from the others respondents, the odd of buying magazine by dual income holder respondents is 2.34 times the odd of from the others and the odd of buying magazine by a family who has minors of less than 18 years is 2.86 times the odd of buying the magazine from the others respondents. In the similar way, the odd of buying magazine by the respondents who have their own resident is 2.60 times the odd of from the rest of the respondents and the odd of buying magazine the by respondents who are white is 5.28 times the odd of from the non-white people. The odd of buying magazine by the respondents who have English as a primary language in their house is 5.22 times the odd of from the others whose primary language in their house is other than English. Finally, we found that, the odd of buying magazine by the respondents who have purchased child magazine previously is 4.87 times the odd of from the respondents who have not opted this.

The Table 1 also shows (LR and GOF test) that the model is a good fit. After calculating the probability of buying the magazine by a respondent with above character, the probability is very very low at 0.3 percent.

Conclusion

The model is a good fit. However, there is not enough statistical evidence that a respondent will buy the magazine. The probability that a person of the given character will buy a magazine is very very low. There is only 0.3 percent probability that a given respondent will purchase the magazine with the information provided by the data.

“”””Thanks”””