



ภาคผนวก

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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ผลวิเคราะห์ Logit Model

```
--> LOGIT;Lhs=Y;Rhs=ONE,X1,X2,X3,X4,X5,X6,X7,X8,X9;Hold;Prob=Ypro;
      Margin;Keep=Ypre;Res=Res$
Normal exit from iterations. Exit status=0.
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| Binary Logit Model for Binary Choice |
| Maximum Likelihood Estimates         |
| Model estimated: Aug 10, 2013 at 00:25:25AM. |
| Dependent variable                   Y |
| Weighting variable                   None |
| Number of observations                335 |
| Iterations completed                 6 |
| Log likelihood function               -152.8166 |
| Number of parameters                 10 |
| Info. Criterion: AIC =                .97204 |
|   Finite Sample: AIC =                .97407 |
| Info. Criterion: BIC =                1.08589 |
| Info. Criterion:HQIC =                1.01743 |
| Restricted log likelihood             -197.8790 |
| McFadden Pseudo R-squared            .2277273 |
| Chi squared                           90.12493 |
| Degrees of freedom                   9 |
| Prob[ChiSq > value] =                 .0000000 |
| Hosmer-Lemeshow chi-squared =        4.22002 |
| P-value= .83675 with deg.fr. =       8 |
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+-----+-----+-----+-----+-----+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+-----+-----+-----+-----+-----+
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+-----+Characteristics in numerator of Prob[Y = 1]
Constant| 1.17501523 | 1.51103320 | .778 | .4368
X1      | -.12881442 | .03370360 | -3.822 | .0001 | 24.8196805
X2      | -.00128038 | .03663330 | -.035 | .9721 | 41.3761194
X3      | .88437775 | .41334216 | 2.140 | .0324 | .57611940
X4      | .10660919 | .03053336 | 3.492 | .0005 | 8.11361193
X5      | -.62265692 | .34834347 | -1.787 | .0739 | .66268657
X6      | -.00550219 | .00504783 | -1.090 | .2757 | 121.755224
X7      | .20820204 | .04393895 | 4.738 | .0000 | 14.7748358
X8      | -2.99765527 | 1.29572112 | -2.314 | .0207 | .88103364
X9      | .00198103 | .03610739 | .055 | .9562 | 16.6626866
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| Information Statistics for Discrete Choice Model. |
| M=Model MC=Constants Only M0=No Model |
| Criterion F (log L) -152.81658 -197.87905 -232.20431 |
| LR Statistic vs. MC 90.12493 .00000 .00000 |
| Degrees of Freedom 9.00000 .00000 .00000 |
| Prob. Value for LR .00000 .00000 .00000 |
| Entropy for probs. 152.81658 197.87905 232.20431 |
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| Normalized Entropy          .65811          .85218          1.00000 |
+-----+-----+-----+-----+
| Entropy Ratio Stat.        158.77545          68.65052          .00000 |
| Bayes Info Criterion       1.06854          1.33757          1.54249 |
| BIC(no model) - BIC       .47396           .20493           .00000 |
| Pseudo R-squared          .22773           .00000           .00000 |
| Pct. Correct Pred.        79.70149          .00000           50.00000 |
| Means:      y=0    y=1    y=2    y=3    y=4    y=5    y=6    y>=7 |
| Outcome     .7224   .2776   .0000   .0000   .0000   .0000   .0000   .0000 |
| Pred.Pr     .7224   .2776   .0000   .0000   .0000   .0000   .0000   .0000 |
| Notes: Entropy computed as Sum(i)Sum(j)Pfit(i,j)*logPfit(i,j). |
|         Normalized entropy is computed against M0. |
|         Entropy ratio statistic is computed against M0. |
|         BIC = 2*criterion - log(N)*degrees of freedom. |
|         If the model has only constants or if it has no constants, |
|         the statistics reported here are not useable. |
+-----+-----+-----+-----+
| Partial derivatives of probabilities with |
| respect to the vector of characteristics. |
| They are computed at the means of the Xs. |
| Observations used are All Obs. |
+-----+-----+-----+-----+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]|Elasticity|
+-----+-----+-----+-----+
-----+Marginal effect for variable in probability
Constant| .19605458   .25370784   .773   .4397
X1      | -.02149305   .00543385  -3.955   .0001  -2.52046791
X2      | -.00021363   .00611181  -.035   .9721  -.04176452
-----+Marginal effect for dummy variable is P|1 - P|0.
X3      | .14197833   .06227508   2.280   .0226   .38647514
X4      | .01778804   .00507369   3.506   .0005   .68191359
-----+Marginal effect for dummy variable is P|1 - P|0.
X5      | -.10983964   .06389770  -1.719   .0856  -.34391750
X6      | -.00091806   .00084159  -1.091   .2753  -.52813346
X7      | .03473909   .00703135   4.941   .0000   2.42509150
X8      | -.50016716   .21827625  -2.291   .0219  -2.08206685
X9      | .00033054   .00602326   .055   .9562   .02602290
+-----+-----+
| Marginal Effects for|
+-----+-----+
| Variable | All Obs. |
+-----+-----+
| ONE     | .19605 |
| X1      | -.02149 |
| X2      | -.00021 |
| X3      | .14198 |
| X4      | .01779 |
| X5      | -.10984 |
| X6      | -.00092 |
| X7      | .03474 |

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| X8      | -.50017 |
| X9      | .00033 |
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+-----+
| Fit Measures for Binomial Choice Model |
| Logit model for variable Y |
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| Proportions P0= .722388 P1= .277612 |
| N = 335 N0= 242 N1= 93 |
| LogL= -152.817 LogL0= -197.879 |
| Estrella = 1-(L/L0)^(-2L0/n) = .26309 |
| Efron | McFadden | Ben./Lerman |
| .28275 | .22773 | .70771 |
| Cramer | Veall/Zim. | Rsqrd_ML |
| .27125 | .39145 | .23588 |
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| Information Akaike I.C. Schwarz I.C. |
| Criteria .97204 1.08589 |
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+-----+
| Predictions for Binary Choice Model. Predicted value is |
| 1 when probability is greater than .500000, 0 otherwise. |
| Note, column or row total percentX2s may not sum to |
| 100% because of rounding. PercentX2s are of full sample. |
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Actual Value	Predicted Value		Total Actual
	0	1	
0	219 (65.4%)	23 (6.9%)	242 (72.2%)
1	45 (13.4%)	48 (14.3%)	93 (27.8%)
Total	264 (78.8%)	71 (21.2%)	335 (100.0%)

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Analysis of Binary Choice Model Predictions Based on Threshold = .5000  
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Prediction Success

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Sensitivity = actual 1s correctly predicted 51.613%  
Specificity = actual 0s correctly predicted 90.496%  
Positive predictive value = predicted 1s that were actual 1s 67.606%  
Negative predictive value = predicted 0s that were actual 0s 82.955%  
Correct prediction = actual 1s and 0s correctly predicted 79.701%  
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Prediction Failure

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-----  
False pos. for true neg. = actual 0s predicted as 1s 9.504%  
False neg. for true pos. = actual 1s predicted as 0s 48.387%  
False pos. for predicted pos. = predicted 1s actual 0s 32.394%  
False neg. for predicted neg. = predicted 0s actual 1s 17.045%  
False predictions = actual 1s and 0s incorrectly predicted 20.299%  
=====
```

ผลวิเคราะห์ Logit Model เมื่อเลือกตัวแปรที่ไม่มีนัยสำคัญออก

```
--> LOGIT;Lhs=Y;Rhs=ONE,X1,X3,X4,X5,X7,X8;Hold;Prob=Ypro;Margin;
      Keep=Ypre;Res=Res$
Normal exit from iterations. Exit status=0.
```

```
+-----+
| Binary Logit Model for Binary Choice |
| Maximum Likelihood Estimates         |
| Model estimated: Aug 10, 2013 at 00:31:20AM. |
| Dependent variable                   Y |
| Weighting variable                   None |
| Number of observations                335 |
| Iterations completed                 6 |
| Log likelihood function              -153.5018 |
| Number of parameters                 7 |
| Info. Criterion: AIC =                .95822 |
|   Finite Sample: AIC =                .95924 |
| Info. Criterion: BIC =                1.03792 |
| Info. Criterion:HQIC =               .98999 |
| Restricted log likelihood            -197.8790 |
| McFadden Pseudo R-squared           .2242643 |
| Chi squared                          88.75440 |
| Degrees of freedom                  6 |
| Prob[ChiSqd > value] =                .0000000 |
| Hosmer-Lemeshow chi-squared =        8.37602 |
| P-value= .39763 with deg.fr. =       8 |
+-----+
```

```
+-----+-----+-----+-----+-----+-----+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+-----+-----+-----+-----+-----+-----+
-----+Characteristics in numerator of Prob[Y = 1]
Constant| 1.45525489 | .99569059 | 1.462 | .1439 |
X1      | -.12946992 | .03324775 | -3.894 | .0001 | 24.8196805
X3      | .84521485  | .36967552 | 2.286 | .0222 | .57611940
X4      | .09411056  | .02772591 | 3.394 | .0007 | 8.11361193
X5      | -.57541176 | .33997789 | -1.692 | .0906 | .66268657
X7      | .21188254  | .04299478 | 4.928 | .0000 | 14.7748358
X8      | -4.02765498 | .99297575 | -4.056 | .0000 | .88103364
```

```
+-----+
| Information Statistics for Discrete Choice Model. |
| M=Model MC=Constants Only M0=No Model |
| Criterion F (log L) -153.50185 -197.87905 -232.20431 |
| LR Statistic vs. MC 88.75440 .00000 .00000 |
| Degrees of Freedom 6.00000 .00000 .00000 |
| Prob. Value for LR .00000 .00000 .00000 |
| Entropy for probs. 153.50185 197.87905 232.20431 |
| Normalized Entropy .66106 .85218 1.00000 |
| Entropy Ratio Stat. 157.40492 68.65052 .00000 |
| Bayes Info Criterion 1.02056 1.28550 1.49043 |
| BIC(no model) - BIC .46987 .20493 .00000 |
| Pseudo R-squared .22426 .00000 .00000 |
| Pct. Correct Pred. 79.10448 .00000 50.00000 |
```

```

| Means:      y=0    y=1    y=2    y=3    y=4    y=5    y=6    y>=7 |
| Outcome    .7224   .2776   .0000   .0000   .0000   .0000   .0000   .0000 |
| Pred.Pr    .7224   .2776   .0000   .0000   .0000   .0000   .0000   .0000 |
| Notes: Entropy computed as Sum(i)Sum(j)Pfit(i,j)*logPfit(i,j). |
|           Normalized entropy is computed against M0. |
|           Entropy ratio statistic is computed against M0. |
|           BIC = 2*criterion - log(N)*degrees of freedom. |
|           If the model has only constants or if it has no constants, |
|           the statistics reported here are not useable. |

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+-----+
| Partial derivatives of probabilities with |
| respect to the vector of characteristics. |
| They are computed at the means of the Xs. |
| Observations used are All Obs. |
+-----+

```

```

+-----+-----+-----+-----+-----+-----+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]|Elasticity|
+-----+-----+-----+-----+-----+-----+
-----+Marginal effect for variable in probability
Constant| .24394902   .17069981   1.429   .1530
X1      | -.02170346   .00540649   -4.014   .0001  -2.52893517
-----+Marginal effect for dummy variable is P|1 - P|0.
X3      | .13655740   .05546292   2.462   .0138   .36935193
X4      | .01577605   .00462842   3.409   .0007   .60093182
-----+Marginal effect for dummy variable is P|1 - P|0.
X5      | -.10154379   .06228629   -1.630   .1030   -.31591786
X7      | .03551855   .00689576   5.151   .0000   2.46371502
X8      | -.67516865   .16989382   -3.974   .0001  -2.79265561

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+-----+
| Marginal Effects for |
+-----+-----+
| Variable | All Obs. |
+-----+-----+
| ONE     | .24395 |
| X1      | -.02170 |
| X3      | .13656 |
| X4      | .01578 |
| X5      | -.10154 |
| X7      | .03552 |
| X8      | -.67517 |
+-----+-----+

```

```

+-----+
| Fit Measures for Binomial Choice Model |
| Logit model for variable Y |
+-----+-----+
| Proportions P0= .722388 P1= .277612 |
| N = 335 N0= 242 N1= 93 |
| LogL= -153.502 LogL0= -197.879 |
| Estrella = 1-(L/L0)^(-2L0/n) = .25918 |
| Efron | McFadden | Ben./Lerman |
| .27481 | .22426 | .70515 |
| Cramer | Veall/Zim. | Rsqrd ML |
| .26486 | .38674 | .23275 |

```

Information Akaike I.C. Schwarz I.C.			
Criteria	.95822	1.03792	
Predictions for Binary Choice Model. Predicted value is 1 when probability is greater than .500000, 0 otherwise.			
Note, column or row total percentX2s may not sum to 100% because of rounding. PercentX2s are of full sample.			
Actual Value	Predicted Value		Total Actual
	0	1	
0	220 (65.7%)	22 (6.6%)	242 (72.2%)
1	48 (14.3%)	45 (13.4%)	93 (27.8%)
Total	268 (80.0%)	67 (20.0%)	335 (100.0%)

Analysis of Binary Choice Model Predictions Based on Threshold = .5000

Prediction Success

Sensitivity = actual 1s correctly predicted	48.387%
Specificity = actual 0s correctly predicted	90.909%
Positive predictive value = predicted 1s that were actual 1s	67.164%
Negative predictive value = predicted 0s that were actual 0s	82.090%
Correct prediction = actual 1s and 0s correctly predicted	79.104%

Prediction Failure

False pos. for true neg. = actual 0s predicted as 1s	9.091%
False neg. for true pos. = actual 1s predicted as 0s	51.613%
False pos. for predicted pos. = predicted 1s actual 0s	32.836%
False neg. for predicted neg. = predicted 0s actual 1s	17.910%
False predictions = actual 1s and 0s incorrectly predicted	20.896%

ประวัติผู้เขียน

ชื่อ - สกุล

นางสาวกาญจนา ไฝศิริ

วันเดือนปีเกิด

3 กรกฎาคม 2527

ประวัติการศึกษา

สำเร็จการศึกษาปริญญาตรี วิทยาศาสตร์บัณฑิต สาขาธรณีวิทยา
มหาวิทยาลัยเชียงใหม่ ปีการศึกษา 2549

ประวัติการทำงาน

พ.ศ. 2550

นักธรณีวิทยา สำนักสำรวจจตุทธรณีวิทยา
และแผนที่น้ำบาดาล กรมทรัพยากรน้ำบาดาล

พ.ศ.2550-2552

นักธรณีวิทยา ส่วนสำรวจและจัดทำแผนที่
ธรณีวิทยา กรมทรัพยากรธรณี

พ.ศ.2552-ปัจจุบัน

พนักงานปฏิบัติการ 5 ชนาคารออสตินสาขาเชียง
แสน จังหวัดเชียงราย