



ภาคผนวก

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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ภาคผนวก ก

ตารางที่ ก-1 ค่าสัมประสิทธิ์สหสัมพันธ์ของตัวแปร

|     | X1           | X2           | X3           | X4           | X5           | X6           | X7           | X8           |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| X1  | 1.000        |              |              |              |              |              |              |              |
| X2  | <b>0.762</b> | 1.000        |              |              |              |              |              |              |
| X3  | <b>0.666</b> | <b>0.540</b> | 1.000        |              |              |              |              |              |
| X4  | <b>0.653</b> | <b>0.660</b> | <b>0.660</b> | 1.000        |              |              |              |              |
| X5  | 0.471        | 0.561        | 0.414        | 0.469        | 1.000        |              |              |              |
| X6  | 0.472        | 0.493        | <b>0.524</b> | <b>0.607</b> | <b>0.602</b> | 1.000        |              |              |
| X7  | <b>0.526</b> | 0.428        | 0.357        | 0.411        | 0.447        | 0.387        | 1.000        |              |
| X8  | 0.461        | 0.412        | 0.399        | 0.470        | <b>0.594</b> | <b>0.530</b> | 0.483        | 1.000        |
|     | X1           | X2           | X3           | X4           | X5           | X6           | X7           | X8           |
| X9  | 0.358        | 0.384        | 0.393        | 0.386        | 0.417        | 0.407        | 0.285        | <b>0.654</b> |
| X10 | <b>0.694</b> | 0.513        | <b>0.550</b> | <b>0.664</b> | 0.385        | 0.437        | <b>0.509</b> | 0.469        |
| X11 | 0.473        | 0.447        | 0.297        | 0.351        | <b>0.520</b> | <b>0.545</b> | <b>0.504</b> | <b>0.732</b> |
| X12 | 0.493        | 0.423        | 0.410        | <b>0.577</b> | 0.487        | <b>0.566</b> | <b>0.567</b> | <b>0.713</b> |
| X13 | 0.485        | 0.410        | 0.423        | <b>0.581</b> | 0.493        | <b>0.585</b> | 0.490        | <b>0.544</b> |
| X14 | 0.497        | 0.360        | 0.411        | 0.495        | 0.201        | 0.435        | 0.293        | 0.269        |
| X15 | <b>0.541</b> | <b>0.521</b> | <b>0.570</b> | 0.423        | 0.302        | 0.406        | 0.464        | 0.306        |
| X16 | <b>0.524</b> | 0.381        | 0.396        | 0.489        | 0.207        | 0.330        | 0.388        | 0.309        |
|     | X9           | X10          | X11          | X12          | X13          | X14          | X15          | X16          |
| X9  | 1.000        |              |              |              |              |              |              |              |

|     |              |              |              |              |              |              |       |              |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|-------|--------------|
| X10 | 0.327        | 1.000        |              |              |              |              |       |              |
| X11 | <b>0.637</b> | 0.397        | 1.000        |              |              |              |       |              |
| X12 | 0.493        | <b>0.526</b> | <b>0.740</b> | 1.000        |              |              |       |              |
| X13 | <b>0.523</b> | <b>0.525</b> | <b>0.553</b> | <b>0.593</b> | 1.000        |              |       |              |
| X14 | 0.318        | <b>0.528</b> | 0.300        | 0.361        | 0.494        | 1.000        |       |              |
| X15 | 0.298        | <b>0.595</b> | 0.299        | 0.352        | 0.288        | 0.435        | 1.000 |              |
| X16 | 0.371        | <b>0.527</b> | 0.351        | 0.449        | <b>0.557</b> | <b>0.748</b> | 0.451 | 1.000        |
|     | X1           | X2           | X3           | X4           | X5           | X6           | X7    | X8           |
| X17 | 0.497        | 0.429        | 0.484        | <b>0.590</b> | 0.432        | <b>0.561</b> | 0.401 | 0.480        |
| X18 | 0.360        | 0.427        | 0.378        | <b>0.503</b> | 0.474        | <b>0.535</b> | 0.177 | 0.379        |
| X19 | 0.366        | 0.356        | 0.331        | 0.279        | 0.224        | 0.295        | 0.227 | 0.091        |
| X20 | 0.444        | 0.331        | <b>0.504</b> | <b>0.506</b> | 0.493        | 0.446        | 0.367 | 0.336        |
| X21 | 0.212        | 0.168        | 0.151        | 0.262        | 0.248        | 0.403        | 0.289 | 0.340        |
| X22 | 0.270        | 0.238        | 0.191        | 0.378        | 0.349        | 0.431        | 0.447 | 0.466        |
| X23 | 0.159        | 0.019        | 0.128        | 0.035        | 0.319        | 0.227        | 0.251 | 0.258        |
| X24 | 0.248        | 0.121        | 0.207        | 0.234        | 0.204        | 0.314        | 0.163 | 0.288        |
|     | X9           | X10          | X11          | X12          | X13          | X14          | X15   | X16          |
| X17 | <b>0.532</b> | <b>0.560</b> | 0.478        | <b>0.515</b> | <b>0.606</b> | <b>0.627</b> | 0.445 | <b>0.798</b> |
| X18 | 0.443        | 0.364        | 0.354        | 0.337        | <b>0.518</b> | 0.351        | 0.211 | 0.411        |
| X19 | 0.105        | 0.222        | 0.144        | 0.154        | 0.262        | 0.363        | 0.384 | 0.411        |
| X20 | 0.249        | <b>0.540</b> | 0.265        | 0.397        | <b>0.524</b> | 0.345        | 0.275 | 0.434        |
| X21 | 0.239        | 0.260        | 0.306        | 0.401        | 0.363        | 0.233        | 0.174 | 0.253        |
| X22 | 0.350        | 0.341        | 0.437        | 0.436        | <b>0.609</b> | 0.311        | 0.204 | 0.420        |
| X23 | 0.289        | 0.130        | 0.161        | 0.203        | 0.217        | 0.108        | 0.118 | 0.140        |
| X24 | 0.264        | 0.338        | 0.183        | 0.156        | 0.394        | 0.343        | 0.145 | 0.263        |

|     |              |       |              |       |              |       |       |              |
|-----|--------------|-------|--------------|-------|--------------|-------|-------|--------------|
|     | X17          | X18   | X19          | X20   | X21          | X22   | X23   | X24          |
| X17 | 1.000        |       |              |       |              |       |       |              |
| X18 | <b>0.534</b> | 1.000 |              |       |              |       |       |              |
| X19 | 0.261        | 0.435 | 1.000        |       |              |       |       |              |
| X20 | 0.472        | 0.640 | 0.495        | 1.000 |              |       |       |              |
| X21 | 0.373        | 0.340 | 0.325        | 0.291 | 1.000        |       |       |              |
| X22 | 0.414        | 0.272 | 0.243        | 0.330 | 0.406        | 1.000 |       |              |
| X23 | 0.177        | 0.099 | 0.035        | 0.187 | <b>0.563</b> | 0.360 | 1.000 |              |
| X24 | 0.271        | 0.381 | 0.204        | 0.338 | 0.370        | 0.454 | 0.363 | 1.000        |
|     | X1           | X2    | X3           | X4    | X5           | X6    | X7    | X8           |
| X25 | 0.375        | 0.309 | 0.342        | 0.401 | 0.427        | 0.422 | 0.266 | 0.302        |
| X26 | 0.245        | 0.405 | 0.176        | 0.316 | 0.448        | 0.375 | 0.367 | 0.495        |
| X27 | 0.361        | 0.368 | 0.228        | 0.256 | 0.347        | 0.373 | 0.197 | 0.351        |
| X28 | 0.464        | 0.361 | 0.269        | 0.182 | 0.327        | 0.239 | 0.460 | 0.365        |
| X29 | 0.339        | 0.224 | 0.233        | 0.328 | 0.257        | 0.424 | 0.470 | 0.348        |
| X30 | 0.364        | 0.353 | 0.273        | 0.384 | 0.452        | 0.405 | 0.463 | <b>0.551</b> |
| X31 | 0.341        | 0.288 | 0.300        | 0.288 | 0.452        | 0.372 | 0.460 | 0.482        |
|     | X9           | X10   | X11          | X12   | X13          | X14   | X15   | X16          |
| X25 | 0.319        | 0.289 | 0.279        | 0.281 | 0.483        | 0.375 | 0.219 | 0.365        |
| X26 | 0.492        | 0.238 | <b>0.505</b> | 0.441 | <b>0.529</b> | 0.313 | 0.220 | 0.453        |
| X27 | 0.366        | 0.286 | 0.346        | 0.267 | 0.467        | 0.295 | 0.181 | 0.334        |
| X28 | 0.265        | 0.326 | 0.426        | 0.372 | 0.318        | 0.208 | 0.236 | 0.208        |
| X29 | 0.278        | 0.327 | 0.379        | 0.433 | 0.442        | 0.430 | 0.259 | 0.386        |
| X30 | 0.497        | 0.338 | <b>0.531</b> | 0.457 | <b>0.596</b> | 0.365 | 0.276 | 0.474        |

|     |              |              |              |              |              |              |       |              |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|-------|--------------|
| X31 | 0.451        | 0.332        | 0.439        | 0.406        | <b>0.529</b> | 0.317        | 0.223 | 0.399        |
|     | X17          | X18          | X19          | X20          | X21          | X22          | X23   | X24          |
| X25 | 0.381        | <b>0.555</b> | 0.459        | <b>0.558</b> | 0.449        | 0.455        | 0.387 | 0.486        |
| X26 | 0.479        | 0.437        | 0.207        | 0.296        | 0.262        | <b>0.665</b> | 0.257 | 0.277        |
| X27 | 0.384        | <b>0.583</b> | 0.430        | 0.438        | 0.395        | 0.403        | 0.287 | 0.413        |
| X28 | 0.230        | 0.407        | 0.442        | 0.423        | <b>0.544</b> | 0.307        | 0.325 | 0.334        |
| X29 | 0.440        | 0.399        | 0.335        | 0.457        | <b>0.656</b> | 0.450        | 0.421 | <b>0.526</b> |
| X30 | <b>0.526</b> | 0.378        | 0.222        | 0.319        | 0.378        | <b>0.681</b> | 0.299 | 0.297        |
| X31 | 0.430        | 0.298        | 0.194        | 0.431        | 0.324        | <b>0.670</b> | 0.402 | 0.333        |
|     | X25          | X26          | X27          | X28          | X29          | X30          | X31   |              |
| X25 | 1.000        |              |              |              |              |              |       |              |
| X26 | 0.470        | 1.000        |              |              |              |              |       |              |
| X27 | <b>0.592</b> | <b>0.572</b> | 1.000        |              |              |              |       |              |
| X28 | 0.465        | 0.394        | <b>0.673</b> | 1.000        |              |              |       |              |
| X29 | <b>0.623</b> | 0.422        | <b>0.585</b> | <b>0.620</b> | 1.000        |              |       |              |
| X30 | 0.471        | <b>0.821</b> | <b>0.516</b> | 0.454        | 0.474        | 1.000        |       |              |
| X31 | <b>0.511</b> | <b>0.759</b> | 0.458        | 0.430        | 0.430        | <b>0.776</b> | 1.000 |              |

ที่มา: จากการคำนวณ

ตารางที่ ก-2 ผลการสกัดองค์ประกอบ

| Component | Initial Eigen values |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |               |              |
|-----------|----------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
|           | Total                | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             | % of Variance | Cumulative % |
| 1         | 12.994               | 41.916        | 41.916       | 12.994                              | 41.916        | 41.916       | 6.132                             | 19.780        | 19.780       |
| 2         | 2.798                | 9.026         | 50.942       | 2.798                               | 9.024         | 50.940       | 5.497                             | 17.732        | 37.511       |
| 3         | 2.132                | 6.877         | 57.819       | 2.132                               | 6.879         | 57.819       | 5.082                             | 16.392        | 53.903       |
| 4         | 1.526                | 4.923         | 62.742       | 1.526                               | 4.923         | 62.742       | 2.740                             | 8.839         | 62.742       |
| 5         | 0.991                | 3.197         | 65.939       |                                     |               |              |                                   |               |              |
| 6         | 0.975                | 3.145         | 69.084       |                                     |               |              |                                   |               |              |
| 7         | 0.626                | 2.019         | 71.103       |                                     |               |              |                                   |               |              |
| 8         | 0.938                | 3.026         | 74.129       |                                     |               |              |                                   |               |              |
| 9         | 0.868                | 2.800         | 76.929       |                                     |               |              |                                   |               |              |
| 10        | 0.793                | 2.558         | 79.487       |                                     |               |              |                                   |               |              |
| 11        | 0.683                | 2.203         | 81.690       |                                     |               |              |                                   |               |              |
| 12        | 0.667                | 2.152         | 83.842       |                                     |               |              |                                   |               |              |
| 13        | 0.572                | 1.845         | 85.687       |                                     |               |              |                                   |               |              |
| 14        | 0.514                | 1.658         | 87.345       |                                     |               |              |                                   |               |              |
| 15        | 0.485                | 1.565         | 88.910       |                                     |               |              |                                   |               |              |
| 16        | 0.404                | 1.303         | 90.213       |                                     |               |              |                                   |               |              |

ตารางที่ ก-2 ผลการสกัดองค์ประกอบ (ต่อ)

| Component | Initial Eigen values |               | Extraction Sums of Squared Loadings |               | Rotation Sums of Squared Loadings |               |
|-----------|----------------------|---------------|-------------------------------------|---------------|-----------------------------------|---------------|
|           | Total                | % of Variance | Total                               | % of Variance | Total                             | % of Variance |
| 17        | 0.381                | 1.229         |                                     |               |                                   |               |
| 18        | 0.353                | 1.139         |                                     |               |                                   |               |
| 19        | 0.297                | 0.958         |                                     |               |                                   |               |
| 20        | 0.276                | 0.890         |                                     |               |                                   |               |
| 21        | 0.271                | 0.874         |                                     |               |                                   |               |
| 22        | 0.239                | 0.771         |                                     |               |                                   |               |
| 23        | 0.219                | 0.706         |                                     |               |                                   |               |
| 24        | 0.184                | 0.594         |                                     |               |                                   |               |
| 25        | 0.171                | 0.552         |                                     |               |                                   |               |
| 26        | 0.160                | 0.516         |                                     |               |                                   |               |
| 27        | 0.121                | 0.390         |                                     |               |                                   |               |
| 28        | 0.106                | 0.342         |                                     |               |                                   |               |
| 29        | 0.097                | 0.313         |                                     |               |                                   |               |
| 30        | 0.088                | 0.284         |                                     |               |                                   |               |
| 31        | 0.071                | 0.229         |                                     |               |                                   |               |
|           |                      | (100.0)00     |                                     |               |                                   |               |

ที่มา: จากการคำนวณ

**ภาคผนวก ข**  
**ผลการวิเคราะห์ Factor analysis**

Descriptive Statistics

|     | N   | Minimum | Maximum | Mean | Std. Deviation |
|-----|-----|---------|---------|------|----------------|
| X1  | 123 | 1       | 5       | 4.50 | .881           |
| X2  | 123 | 1       | 5       | 4.37 | .881           |
| X3  | 123 | 1       | 5       | 4.46 | .890           |
| X4  | 123 | 1       | 5       | 4.12 | 1.076          |
| X5  | 123 | 1       | 5       | 3.66 | 1.122          |
| X6  | 123 | 1       | 5       | 3.97 | 1.123          |
| X7  | 123 | 1       | 5       | 3.74 | 1.130          |
| X8  | 123 | 1       | 5       | 3.38 | 1.205          |
| X9  | 123 | 1       | 5       | 3.41 | 1.122          |
| X10 | 123 | 1       | 5       | 4.66 | .828           |
| X11 | 123 | 1       | 5       | 3.31 | 1.222          |
| X12 | 123 | 1       | 5       | 3.74 | 1.186          |
| X13 | 123 | 1       | 5       | 3.69 | 1.319          |
| X14 | 123 | 1       | 5       | 3.95 | 1.273          |
| X15 | 123 | 1       | 5       | 4.63 | .693           |
| X16 | 123 | 1       | 5       | 3.98 | 1.127          |
| X17 | 123 | 1       | 5       | 3.76 | 1.197          |
| X18 | 123 | 1       | 5       | 3.78 | 1.352          |
| X19 | 123 | 1       | 5       | 4.33 | 1.098          |
| X20 | 123 | 1       | 5       | 4.01 | 1.309          |
| X21 | 123 | 1       | 5       | 2.92 | 1.316          |



|     |     |   |   |      |       |
|-----|-----|---|---|------|-------|
| X22 | 123 | 1 | 5 | 2.81 | 1.428 |
| X23 | 123 | 1 | 5 | 2.92 | 1.340 |
| X24 | 123 | 1 | 5 | 3.00 | 1.465 |
| X25 | 123 | 1 | 5 | 3.28 | 1.232 |
| X26 | 123 | 1 | 5 | 2.79 | 1.210 |
| X27 | 123 | 1 | 5 | 3.34 | 1.396 |
| X28 | 123 | 1 | 5 | 3.27 | 1.255 |
| X29 | 123 | 1 | 5 | 2.93 | 1.371 |
| X30 | 123 | 1 | 5 | 2.76 | 1.262 |
| X31 | 123 | 1 | 5 | 2.90 | 1.308 |

## Factor Analysis

## KMO and Bartlett's Test

|  |                    |          |
|--|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .844     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 3122.382 |
|  | Df                 | 465      |
|  | Sig.               | .000     |

## Communalities

|    | Initial | Extraction |
|----|---------|------------|
| X1 | 1.000   | .782       |
| X2 | 1.000   | .740       |
| X3 | 1.000   | .694       |
| X4 | 1.000   | .751       |
| X5 | 1.000   | .742       |
| X6 | 1.000   | .666       |
| X7 | 1.000   | .702       |

|     |       |      |
|-----|-------|------|
| X8  | 1.000 | .783 |
| X9  | 1.000 | .614 |
| X10 | 1.000 | .706 |
| X11 | 1.000 | .834 |
| X12 | 1.000 | .771 |
| X13 | 1.000 | .693 |
| X14 | 1.000 | .760 |
| X15 | 1.000 | .635 |
| X16 | 1.000 | .866 |
| X17 | 1.000 | .785 |
| X18 | 1.000 | .828 |
| X19 | 1.000 | .663 |
| X20 | 1.000 | .650 |
| X21 | 1.000 | .742 |
| X22 | 1.000 | .728 |
| X23 | 1.000 | .690 |
| X24 | 1.000 | .574 |
| X25 | 1.000 | .719 |
| X26 | 1.000 | .880 |
| X27 | 1.000 | .759 |
| X28 | 1.000 | .860 |
| X29 | 1.000 | .782 |
| X30 | 1.000 | .837 |
| X31 | 1.000 | .831 |

Extraction Method: Principal Component Analysis

| Total Variance Explained |        | Initial Eigen values |               | Extraction Sums of Squared Loadings |        | Rotation Sums of Squared Loadings |              |        |               |
|--------------------------|--------|----------------------|---------------|-------------------------------------|--------|-----------------------------------|--------------|--------|---------------|
|                          |        | Total                | % of Variance | Cumulative %                        | Total  | % of Variance                     | Cumulative % | Total  | % of Variance |
| 1                        | 12.994 | 41.916               | 41.916        | 12.994                              | 41.916 | 41.916                            | 19.780       | 19.780 | 19.780        |
| 2                        | 2.798  | 9.026                | 50.942        | 2.798                               | 9.024  | 50.940                            | 17.732       | 37.511 | 37.511        |
| 3                        | 2.132  | 6.877                | 57.819        | 2.132                               | 6.879  | 57.819                            | 16.392       | 53.903 | 53.903        |
| 4                        | 1.526  | 4.923                | 62.742        | 1.526                               | 4.923  | 62.742                            | 8.839        | 62.742 | 62.742        |
| 5                        | 0.991  | 3.197                | 65.939        |                                     |        |                                   |              |        |               |
| 6                        | 0.975  | 3.145                | 69.084        |                                     |        |                                   |              |        |               |
| 7                        | 0.626  | 2.019                | 71.103        |                                     |        |                                   |              |        |               |
| 8                        | 0.938  | 3.026                | 74.129        |                                     |        |                                   |              |        |               |
| 9                        | 0.868  | 2.800                | 76.929        |                                     |        |                                   |              |        |               |
| 10                       | 0.793  | 2.558                | 79.487        |                                     |        |                                   |              |        |               |
| 11                       | 0.683  | 2.203                | 81.690        |                                     |        |                                   |              |        |               |
| 12                       | 0.667  | 2.152                | 83.842        |                                     |        |                                   |              |        |               |
| 13                       | 0.572  | 1.845                | 85.687        |                                     |        |                                   |              |        |               |
| 14                       | 0.514  | 1.658                | 87.345        |                                     |        |                                   |              |        |               |
| 15                       | 0.485  | 1.565                | 88.910        |                                     |        |                                   |              |        |               |
| 16                       | 0.404  | 1.303                | 90.213        |                                     |        |                                   |              |        |               |
| 17                       | 0.381  | 1.229                | 91.442        |                                     |        |                                   |              |        |               |

|    |       |       |         |  |  |  |  |  |  |
|----|-------|-------|---------|--|--|--|--|--|--|
| 18 | 0.353 | 1.139 | 92.581  |  |  |  |  |  |  |
| 19 | 0.297 | 0.958 | 93.539  |  |  |  |  |  |  |
| 20 | 0.276 | 0.890 | 94.429  |  |  |  |  |  |  |
| 21 | 0.271 | 0.874 | 95.303  |  |  |  |  |  |  |
| 22 | 0.239 | 0.771 | 96.074  |  |  |  |  |  |  |
| 23 | 0.219 | 0.706 | 96.781  |  |  |  |  |  |  |
| 24 | 0.184 | 0.594 | 97.374  |  |  |  |  |  |  |
| 25 | 0.171 | 0.552 | 97.926  |  |  |  |  |  |  |
| 26 | 0.160 | 0.516 | 98.442  |  |  |  |  |  |  |
| 27 | 0.121 | 0.390 | 98.832  |  |  |  |  |  |  |
| 28 | 0.106 | 0.342 | 99.174  |  |  |  |  |  |  |
| 29 | 0.097 | 0.313 | 99.487  |  |  |  |  |  |  |
| 30 | 0.088 | 0.284 | 99.771  |  |  |  |  |  |  |
| 31 | 0.071 | 0.229 | 100.000 |  |  |  |  |  |  |

Extraction Method: Principal Component Analysis.

Component Matrix(a)

|     | Component |       |       |       |
|-----|-----------|-------|-------|-------|
|     | 1         | 2     | 3     | 4     |
| X13 | .784      |       | -.113 | -.183 |
| X17 | .753      | -.188 |       | -.359 |
| X30 | .729      | .316  | -.274 | -.226 |
| X6  | .716      | -.141 |       | .127  |
| X12 | .715      | -.133 | -.356 | .141  |
| X1  | .712      | -.424 | .105  | .185  |
| X4  | .707      | -.440 |       |       |
| X8  | .706      |       | -.460 | .192  |
| X10 | .685      | -.401 |       |       |
| X11 | .683      |       | -.467 | .166  |
| X31 | .680      | .363  | -.226 | -.172 |
| X26 | .676      | .356  | -.283 | -.262 |
| X16 | .668      | -.200 | .146  | -.550 |
| X29 | .660      | .388  | .275  |       |
| X5  | .658      |       | -.207 | .340  |
| X25 | .658      | .321  | .355  |       |
| X20 | .657      |       | .359  |       |
| X18 | .652      |       | .286  |       |
| X22 | .652      | .355  | -.195 | -.255 |
| X2  | .644      | -.414 |       | .222  |
| X27 | .633      | .380  | .271  |       |
| X7  | .632      |       | -.196 | .179  |
| X9  | .627      |       | -.358 |       |
| X3  | .614      | -.469 | .139  | .133  |
| X14 | .610      | -.234 | .237  | -.465 |

|     |      |       |      |      |
|-----|------|-------|------|------|
| X28 | .592 | .332  | .231 | .410 |
| X15 | .538 | -.435 | .107 |      |
| X21 | .533 | .408  | .190 | .215 |
| X24 | .481 | .329  | .281 |      |
| X23 | .373 | .482  |      | .193 |
| X19 | .461 |       | .570 |      |

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix (a)

|     | Component |       |       |        |
|-----|-----------|-------|-------|--------|
|     | 1         | 4     | 2     | 3      |
| X12 | 0.796     | 0.631 | 0.112 |        |
| X1  | 0.786     | 0.185 | 0.201 | 0.130  |
| X4  | 0.785     | 0.233 | 0.105 | 0.304  |
| X8  | 0.780     | 0.341 | 0.139 |        |
| X13 | 0.753     | 0.532 | 0.290 | 0.389  |
| X11 | 0.751     | 0.274 | 0.117 |        |
| X6  | 0.748     | 0.390 | 0.275 | 0.116  |
| X2  | 0.734     | 0.231 | 0.123 |        |
| X10 | 0.732     | 0.207 | 0.138 | 0.286  |
| X5  | 0.714     | 0.496 | 0.261 | -0.142 |
| X3  | 0.690     |       | 0.131 | 0.159  |
| X7  | 0.663     | 0.470 | 0.196 |        |
| X9  | 0.648     | 0.533 | 0.114 | 0.148  |
| X16 | 0.376     | 0.919 | 0.161 | 0.771  |
| X17 | 0.459     | 0.877 | 0.170 | 0.586  |

|     |       |        |       |        |
|-----|-------|--------|-------|--------|
| X14 | 0.406 | 0.855  | 0.182 | 0.700  |
| X15 | 0.556 | 0.660  |       | 0.217  |
| X20 | 0.494 |        | 0.726 | 0.223  |
| X21 | 0.110 | 0.251  | 0.711 |        |
| X18 | 0.408 | 0.142  | 0.705 | 0.252  |
| X24 |       | 0.141  | 0.676 | 0.261  |
| X22 |       | -0.213 | 0.662 | 0.355  |
| X19 | 0.383 | -0.403 | 0.589 | 0.239  |
| X23 |       | 0.336  | 0.539 | -0.112 |
| X30 |       | 0.715  | 0.351 | 0.833  |
| X26 |       | 0.706  | 0.336 | 0.820  |
| X31 |       | 0.662  | 0.395 | 0.804  |
| X27 | 0.151 | 0.241  | 0.719 | 0.799  |
| X29 | 0.162 | 0.255  | 0.740 | 0.749  |
| X25 | 0.203 | 0.174  | 0.630 | 0.747  |
| X28 | 0.268 | 0.222  | 0.370 | 0.727  |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 11 iterations.

Component Transformation Matrix

| Component | 1     | 2     | 3    | 4     |
|-----------|-------|-------|------|-------|
| 1         | .584  | .552  | .502 | .319  |
| 2         | -.730 | .281  | .613 | -.111 |
| 3         | .133  | -.784 | .560 | .232  |
| 4         | .327  | -.041 | .243 | -.912 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

ภาคผนวก ค

ผลการประมาณค่าแบบจำลองโลจิสต์แบบหลายทางเลือก  
( multinomial logit model)

--> RESET

Initializing NLOGIT Version 4.0.3 (March 1, 2008).

--> READ;FILE="D:\Desktop 2011\IS\mlogit.xls"\$

--> DSTAT;Rhs=Y,F1,F2,F3,F4,X1,SCH,HO;Output=2\$

Descriptive Statistics

All results based on nonmissing observations.

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| Variable | Mean | Std.Dev. | Minimum | Maximum | Cases Missing |
|----------|------|----------|---------|---------|---------------|
|----------|------|----------|---------|---------|---------------|

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All observations in current sample

|    |              |         |          |         |     |   |
|----|--------------|---------|----------|---------|-----|---|
| Y  | .813008      | 1.14053 | .000000  | 3.00000 | 123 | 0 |
| F1 | .162602E-06  | 1.00000 | -4.43873 | 2.20569 | 123 | 0 |
| F2 | .813008E-07  | 1.00000 | -2.31770 | 3.56781 | 123 | 0 |
| F3 | -.162602E-06 | 1.00000 | -3.30527 | 1.81755 | 123 | 0 |
| F4 | -.243902E-06 | .999999 | -3.60567 | 1.83202 | 123 | 0 |
| X1 | 4.47967      | 2.17040 | 1.00000  | 12.0000 | 123 | 0 |
| D1 | .195122      | .397915 | .000000  | 1.00000 | 123 | 0 |
| D2 | .512195      | .501896 | .000000  | 1.00000 | 123 | 0 |



## Correlation Matrix for Listed Variables

|    | Y       | F1      | F2      | F3      | F4      | X1      | D1      | D2      |
|----|---------|---------|---------|---------|---------|---------|---------|---------|
| Y  | 1.00000 | -.13722 | .07717  | -.03663 | .06892  | -.00983 | .00881  | .09709  |
| F1 | -.13722 | 1.00000 | .00000  | .00000  | .00000  | .00000  | -.13393 | .02503  |
| F2 | .07717  | .00000  | 1.00000 | .00000  | .00000  | .00000  | .02694  | .04941  |
| F3 | -.03663 | .00000  | .00000  | 1.00000 | .00000  | .00000  | -.16604 | -.12284 |
| F4 | .06892  | .00000  | .00000  | .00000  | 1.00000 | .00000  | -.02811 | .01910  |
| X1 | -.00983 | -.13393 | .02694  | -.16604 | -.02811 | 1.00000 | -.01435 | -.04680 |
| D1 | .00881  | .02503  | .04941  | -.12284 | .01910  | -.01435 | 1.00000 | -.50452 |
| D2 | .09709  | -.10113 | .04566  | .12365  | -.07179 | -.04680 | -.50452 | 1.00000 |

--> **LOGIT;Lhs=Y;Rhs=ONE,F1,F2,F3,F4,X1,SCH,HO;Marginal Effects\$**

Normal exit from iterations. Exit status=0.

```

+-----+
| Multinomial Logit Model          |
| Maximum Likelihood Estimates     |
| Dependent variable               Y |
| Weighting variable              None |
| Number of observations           123 |
| Iterations completed             6  |
| Log likelihood function          -119.6426 |
| Number of parameters             24  |
| Info. Criterion: AIC =           2.33565 |
| Finite Sample: AIC =            2.43520 |
| Info. Criterion: BIC =           2.88437 |
| Info. Criterion:HQIC =           2.55854 |
| Restricted log likelihood        -132.2771 |
| McFadden Pseudo R-squared       .0955159 |

```

```

| Chi squared          25.26914 |
| Degrees of freedom    21 |
| Prob[ChiSq > value] = .2356957 |
| Model estimated: Feb 26, 2011, 01:18:40PM |
+-----+
+-----+-----+-----+-----+-----+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+-----+-----+-----+-----+-----+
+-----+Characteristics in numerator of Prob[Y = 1] |
|Constant| -1.43358    1.03479479 -1.385 .1659 |
|F1 | -0.13444   .40598452  -.331 .7405 .16260D-06|
|F2 | -0.75667*  .45430292 -1.666 .0958 .81301D-07|
|F3 | -0.16336   .40479052  -.404 .6865 -.16260D-06|
|F4 | 0.63146    .44506565  1.419 .1560 -.24390D-06|
|X1 | -0.27519   .20160145 -1.365 .1723 4.4796748|
|D1 | 1.07304    .93846916  1.143 .2529 .1951220|
|D2 | -0.09696   .86130317  -.113 .9104 .5121951|
+-----+Characteristics in numerator of Prob[Y = 2] |
|Constant| -2.88395*** .93575538 -3.082 .0021 |
|F1 | -0.06487   .28159854  -.230 .8178 .16260D-06|
|F2 | 0.41337    .26207863  1.577 .1147 .81301D-07|
|F3 | -0.07610   .24467645  -.311 .7558 -.16260D-06|
|F4 | 0.02699    .27167086  .099 .9209 -.24390D-06|
|X1 | 0.06505    .11838967  .549 .5827 4.4796748|
|D1 | 1.51465*   .91183998  1.661 .0967 .1951220|
|D2 | 1.36756*   .81900431  1.670 .0950 .5121951|
+-----+Characteristics in numerator of Prob[Y = 3] |
|Constant| -1.25580    .77124291 -1.628 .1035 |
|F1 | -0.44443*  .26650025 -1.668 .0954 .16260D-06|

```

|    |  |         |           |       |       |             |
|----|--|---------|-----------|-------|-------|-------------|
| F2 |  | .02636  | .28584614 | .092  | .9265 | .81301D-07  |
| F3 |  | -.09129 | .29439594 | -.310 | .7565 | -.16260D-06 |
| F4 |  | .30894  | .33043069 | .935  | .3498 | -.24390D-06 |
| X1 |  | -.09435 | .13107110 | -.720 | .4716 | 4.4796748   |
| D1 |  | -.26788 | .91608809 | -.292 | .7700 | .1951220    |
| D2 |  | .26872  | .62481471 | .430  | .6671 | .5121951    |

+-----+

| Note: nnnn.D-xx or D+xx => multiply by 10 to -xx or +xx. |

| Note: \*\*\*, \*\*, \* = Significance at 1%, 5%, 10% level. |

+-----+

+-----+

| Information Statistics for Discrete Choice Model. |

| M=Model MC=Constants Only M0=No Model |

| Criterion F (log L) -119.64256 -132.27713 -170.51421 |

| LR Statistic vs. MC 25.26914 .00000 .00000 |

| Degrees of Freedom 21.00000 .00000 .00000 |

| Prob. Value for LR .23570 .00000 .00000 |

| Entropy for probs. 119.64256 132.27713 170.51421 |

| Normalized Entropy .70166 .77575 1.00000 |

| Entropy Ratio Stat. 101.74330 76.47416 .00000 |

| Bayes Info Criterion 2.76700 2.97244 3.59418 |

| BIC(no model) - BIC .82718 .62174 .00000 |

| Pseudo R-squared .09552 .00000 .00000 |

| Pct. Correct Pred. 60.97561 .00000 25.00000 |

| Means: y=0 y=1 y=2 y=3 y=4 y=5 y=6 y>=7 |

| Outcome .6179 .0894 .1545 .1382 .0000 .0000 .0000 .0000 |

| Pred.Pr .6179 .0894 .1545 .1382 .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. |  
 |  $BIC = 2 * \text{criterion} - \log(N) * \text{degrees of freedom.}$  |  
 | 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 for means are All Obs. |

| A full set is given for the entire set of |  
 | outcomes,  $Y = 0$  to  $Y = 3$ . |  
 | Probabilities at the mean vector are |  
 |  $0 = .672$   $1 = .055$   $2 = .136$   $3 = .137$  |

+-----+

+-----+-----+-----+-----+-----+  
 |Variable| Coefficient | Standard Error | b/St.Er. | P[|Z|>z] | Elasticity |

+-----+-----+-----+-----+-----+

+-----+Marginal effects on Prob[Y = 0] |

|Constant| .43231\*\*\* | .11856947 | 3.646 | .0003 |

|F1 | .05173 | .04409455 | 1.173 | .2407 | .12512D-07|

|F2 | -.01239 | .04465341 | -.277 | .7815 | -.14978D-08|

|F3 | .02138 | .04436556 | .482 | .6299 | -.51705D-08|

|F4 | -.05413 | .04682967 | -1.156 | .2477 | .19639D-07|

|X1 | .01286 | .02008698 | .640 | .5222 | .0856574|

|D1 | -.15363 | .13309032 | -1.154 | .2484 | -.0445875|

|D2 | -.14635 | .10611572 | -1.379 | .1679 | -.1114943|

|  |            |           |        |       |             |  |
|--|------------|-----------|--------|-------|-------------|--|
| +-----+Marginal effects on Prob[Y = 1] |            |           |        |       |             |  |
| [Constant]                             | -.04334    | .05498900 | -.788  | .4306 |             |  |
| [F1]                                   | -.00315    | .02072963 | -.152  | .8792 | -.93479D-08 |  |
| [F2]                                   | -.04249*   | .02228274 | -1.907 | .0565 | -.63016D-07 |  |
| [F3]                                   | -.00721    | .02105859 | -.342  | .7320 | .21392D-07  |  |
| [F4]                                   | .03020     | .02284073 | 1.322  | .1861 | -.13438D-06 |  |
| [X1]                                   | -.01404    | .00932785 | -1.505 | .1323 | -1.1470851  |  |
| [D1]                                   | .04630     | .04779140 | .969   | .3327 | .1647856    |  |
| [D2]                                   | -.01725    | .04389578 | -.393  | .6944 | -.1611544   |  |
| +-----+Marginal effects on Prob[Y = 2] |            |           |        |       |             |  |
| [Constant]                             | -.30522*** | .08564336 | -3.564 | .0004 |             |  |
| [F1]                                   | .00165     | .03213436 | .051   | .9592 | .19648D-08  |  |
| [F2]                                   | .05379*    | .02944828 | 1.827  | .0677 | .32110D-07  |  |
| [F3]                                   | -.00603    | .02784002 | -.217  | .8284 | .72042D-08  |  |
| [F4]                                   | -.00729    | .03150822 | -.231  | .8170 | .13056D-07  |  |
| [X1]                                   | .01146     | .01357052 | .845   | .3982 | .3770557    |  |
| [D1]                                   | .17518*    | .09819049 | 1.784  | .0744 | .2509533    |  |
| [D2]                                   | .15662*    | .08776723 | 1.784  | .0743 | .5889636    |  |
| +-----+Marginal effects on Prob[Y = 3] |            |           |        |       |             |  |
| [Constant]                             | -.08375    | .08673969 | -.966  | .3343 |             |  |
| [F1]                                   | -.05023*   | .02927884 | -1.715 | .0863 | -.59753D-07 |  |
| [F2]                                   | .00108     | .03270568 | .033   | .9735 | .64508D-09  |  |
| [F3]                                   | -.00813    | .03374240 | -.241  | .8096 | .96731D-08  |  |
| [F4]                                   | .03122     | .03769669 | .828   | .4076 | -.55711D-07 |  |
| [X1]                                   | -.01028    | .01487201 | -.691  | .4894 | -.3369799   |  |
| [D1]                                   | -.06785    | .10478666 | -.647  | .5173 | -.0968573   |  |
| [D2]                                   | .00698     | .07234175 | .096   | .9232 | .0261452    |  |

-----+

| Note: nnnnn.D-xx or D+xx => multiply by 10 to -xx or +xx. |

| Note: \*\*\*, \*\*, \* = Significance at 1%, 5%, 10% level. |

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#### Marginal Effects Averaged Over Individuals

-----+

| Variable | Y=00   | Y=01   | Y=02   | Y=03   |
|----------|--------|--------|--------|--------|
| ONE      | .4345  | -.0586 | -.3071 | -.0688 |
| F1       | .0491  | -.0036 | .0024  | -.0480 |
| F2       | -.0022 | -.0582 | .0565  | .0038  |
| F3       | .0224  | -.0098 | -.0057 | -.0070 |
| F4       | -.0590 | .0409  | -.0091 | .0273  |
| X1       | .0155  | -.0191 | .0124  | -.0088 |
| D1       | -.1674 | .0647  | .1768  | -.0740 |
| D2       | -.1408 | -.0235 | .1598  | .0045  |

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#### Averages of Individual Elasticities of Probabilities

-----+

| Variable | Y=00   | Y=01    | Y=02    | Y=03   |
|----------|--------|---------|---------|--------|
| ONE      | .7473  | -.6863  | -2.1367 | -.5085 |
| F1       | -.0221 | -.0221  | -.0221  | -.0221 |
| F2       | -.0722 | -.0722  | -.0722  | -.0722 |
| F3       | -.0044 | -.0044  | -.0044  | -.0044 |
| F4       | -.0361 | -.0361  | -.0361  | -.0361 |
| X1       | .1022  | -1.1305 | .3936   | -.3204 |
| D1       | -.0921 | .1173   | .2034   | -.1444 |
| D2       | -.1521 | -.2018  | .5483   | -.0145 |

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Frequencies of actual & predicted outcomes

Predicted outcome has maximum probability.

|        |   | Predicted |    |   |   |       |
|--------|---|-----------|----|---|---|-------|
|        |   | 0         | 1  | 2 | 3 | Total |
| Actual | 0 | 73        | 1  | 1 | 1 | 76    |
|        | 1 | 1         | 10 | 0 | 0 | 11    |
|        | 2 | 17        | 1  | 1 | 0 | 19    |
|        | 3 | 17        | 0  | 0 | 0 | 17    |
| Total  |   | 108       | 12 | 2 | 1 | 123   |

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## ประวัติผู้เขียน

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