APPENDIX I
THEORY OF STATISTICAL SAMPLING

This Appendix gives a brief introduction to the intricacies of Statistical Sampling. There are two methods of selecting samples from populations: Nonrandom or Judgment sampling and Random or Probability sampling. In Probability sampling, all the items in the population have a chance of being chosen in the sample. In Judgment sampling, personal knowledge and opinion are used to identify those items from the population that are to be included in the sample. Judgment samples avoid the statistical analysis that is necessary to make probability samples. They are more convenient and can be used successfully despite their inability to measure validity. But, if a study uses judgment sampling and loses a significant degree of “representativeness”, it will have purchased convenience at too high a price (Levin, 1990).

In a random or probability sample, it is known about the chances that an element of the population will or will not be included in the sample. As a result, one can assess objectively the estimates of the population characteristics that result from the sample. There are four methods of random sampling:

1. Simple random sampling
2. Systematic sampling
3. Stratified sampling
4. Cluster sampling

Simple random sampling selects samples by methods that allow each possible sample to have an equal probability of being picked and each item in the entire population to have an equal chance of being included in the sample.

In systematic sampling, elements are selected from the population at an uniform interval that is measured in time, order, or space. Systematic sampling differs from simple random sampling in that each element has an equal chance of being selected but each sample does not have an equal
chance of being selected. Also in systematic sampling, there is the problem of introducing an error into the sampling process.

To use stratified sampling, one divides the population into relative homogeneous groups called strata. Then one of the two approaches may be used. Either one selects at random from each stratum a specified number of elements corresponding to the proportion of that stratum in the population as a whole (This method has been used for sampling in this study), or one draws an equal number of elements from each stratum and give weight to the results according to the stratum’s proportion of total population. With either approach stratified sampling guarantees that every element in the population has a chance of being selected.

Stratified sampling is appropriate when the population is already divided into groups of different sizes and one wishes to acknowledge this fact. The advantage of stratified samples is that when they are properly designed, they more accurately reflect characteristics of the population from which they were chosen than do other kinds of sampling.

In cluster sampling, the population is divided into groups, or clusters and then a random sample of these clusters is selected. It is assumed that these individual clusters are representative of the population as a whole. With both stratified and cluster sampling, the population is divided into well-defined groups. Stratified sampling is used when each group has small variation within itself but there is wide variation among the groups. Cluster sampling is used when opposite is the case.
APPENDIX II
SAMPLE SIZE ESTIMATION

This appendix explains a method that can be used to determine what sample size is necessary for any specified level of precision. Suppose, one wants to be 90% certain of estimating the true proportion \( \bar{p} \) within \( \pm 5\% \) error. Row \( a \) in the table below summarizes in symbolic terms how one can define the confidence limits and row \( b \) shows how one can normally express confidence limits for an infinite population.

<table>
<thead>
<tr>
<th>LOWER CONFIDENCE LIMIT</th>
<th>UPPER CONFIDENCE LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( \bar{p} - 0.05 )</td>
<td>a. ( \bar{p} \pm 0.05 )</td>
</tr>
<tr>
<td>b. ( \bar{p} - z\sigma_{\bar{p}} )</td>
<td>b. ( \bar{p} + z\sigma_{\bar{p}} )</td>
</tr>
</tbody>
</table>

\( z \) = Standardised variate at the given confidence level
\( \sigma_{\bar{p}} \) = Standard error of proportions

Comparing these two sets of confidence limits we get:

\[ z\sigma_{\bar{p}} = 0.05 \]

It is known that,

\[ \sigma_{\bar{p}} = \sqrt{\frac{pq}{n}} \]

where:

\( p \) = The binomial probability of success,

\( q \) = The binomial probability of failures = \( 1-p \) and

\( n \) = Size of the sample required for a given precision and confidence level

For 90% confidence level \( z = 1.64 \) (from the Normal distribution tables).

Substituting this yields:

\[ 1.64 \sqrt{\frac{pq}{n}} = 0.05 \]
Simplification results:

\[ n = \frac{pq}{0.0009295} \]

To find \( n \), one still needs an estimate of the population parameters \( p \) and \( q \). If one has a strong feeling about the actual proportion, he can use that as the best guess to calculate \( n \). But, if there is no idea what \( p \) is, then best strategy is to guess at \( p \) in such a way that \( n \) is chosen in a conservative manner (so that the sample size is large enough to supply at least the precision required is obtained no matter what \( p \) actually is). At this point in the problem, \( n \) is equal to the product of \( p \) and \( q \) divided by 0.0009295. The way to get the largest \( n \) is to generate the largest possible numerator of that expression, which happens if one picks \( p = 0.5 \) and \( q = 0.5 \). Then \( n \) becomes

\[ n = \frac{(0.5)(0.5)}{0.0009295} \]
\[ = 268.96 \]

Hence, to be 90% certain of estimating the true proportion within ±5% error, one should pick a random sample of approximately 270. Thus, the sample size used for the survey in this study is 270.
APPENDIX III
NSS 62ND ROUND

This Appendix gives the details of data collected from 62nd round of survey on household expenditure in India by the National Sample Survey Organisation (NSSO) which was used for obtaining income wise stratification for the study. NSSO conducted an integrated survey of households and unorganized manufacturing enterprises in the 62nd round of NSS during July 2005 – June 2006. The subjects covered were household consumer expenditure, employment and unemployment and certain characteristics of unorganized manufacturing enterprises. Surveys on consumer expenditure are being conducted quinquennially on a large sample of households from the 27th round (October 1972 – September 1973) onwards. Seven quinquennial surveys have so far been conducted. Apart from these quinquennial surveys, the NSSO collected information on consumer expenditure from a smaller sample of households since 42nd round (July 1986 – June 1987).

The report presents data on both level of consumption measured by the sum of monetary values of goods and services consumed per month by households and pattern of consumption reflected in the composition of total consumption by commodity group. The report also presents distribution of households and persons over different ranges of quantitative consumption level, separately for rural and urban areas of different States of the country.

**Monthly Per-capita Consumer Expenditure (MPCE):** For a household, this is the total consumer expenditure over all items divided by its size and expressed on a per month (30 days) basis. A person’s MPCE is understood as that of the household to which he or she belongs.

**MPCE class:** Apart from providing estimates of distribution of households and population by MPCE class for different States, this report presents some all-India results separately for population in different MPCE classes. For all these tables, 12 MPCE classes are used as shown below:
The MPCE classes are so formed that the first two and the last two classes each contain about 5% of the population and the remaining classes each contain about 10%.

Per 1000 distribution of households based on MPCE classes which was used for the income stratification for this study is shown in the next page.
Table A3.2: Per 1000 distribution of households in urban sector over MPCE classes for selected States and all-India.
APPENDIX IV
THE QUESTIONNAIRE

This Appendix shows the questionnaire which was used for eliciting information from the households during the survey by the Researcher.

SURVEY OF THE URBAN HOUSEHOLDS’ ATTITUDE IN CHOOSING ENERGY EFFICIENT TECHNOLOGIES.

A. Survey form identification.

1. Name of the head of household

2. Name of the respondent

3. Location of the household

4. Profession of the head of the household

B. Demographic and Economic background.

1. Family size:
   a) Six and above  b) Five  c) Four  d) Three  e) Two and below

2. Type of residence:
   a) Farm houses and the like b) Independent-multiple floor  c) Independent-single floor d) Apartment – above 2 bedrooms  e) Apartment – up to 2 bedrooms

3. Ownership of residence:
   a) Own  b) Long-term lease  c) Company lease  d) Rented  e) Others (Joint ownership for example)

4. Size of the house in square feet:
   a) 2600 and above  b) 2100 to 2600 sq ft  c) 1600 to 2100 sq ft  d) 1200 to 1600 sq ft.

227
e) 1200 sq ft and below

5. Educational qualification of the head of the household:
   a) Ph D   b) PG   c) Degree   d) Plus two   e) SSLC and below

6. Annual income:
   What is the approximate annual income of your household?
   a) above Rs 8lakhs   b) Rs 7-8lakhs   c) Rs 6-7lakhs   d) Rs 5-6lakhs   e) Below Rs 5lakhs

7. Ownership of energy consuming assets:

<table>
<thead>
<tr>
<th>Asset</th>
<th>Numbers</th>
<th>Daily hours of usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boilers(Geyzers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas geysers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar water heaters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incandescent bulbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cfls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas stoves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro ovens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar cookers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fans (Ceiling/Table)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desktop computers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lap tops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile phones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD TVs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio decks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two wheelers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four wheelers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invertors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vacuum Cleaners
Water lifting motors
Bore-Pumps
Ironing
Washing machines
Water filters

a) More than 35  b) 30-35  c) 25-30  d) 20-25  e) below 20

8. Monthly expenditure:

What is your monthly household expenditure?

a) Above Rs 25000  b) Rs 20000-25000  c) Rs 15000-20000  d) Rs 10000-15000  e) Below Rs 10000

C. Energy carriers and energy technologies:

1. What according to you are energy efficient technologies?
   a) Energy efficient technologies provide the same service consuming less energy.
   b) Energy efficient technologies use renewable energies.
   c) Energy efficient technologies usage results in lesser carbon emissions.
   d) Energy efficient technologies do not degrade the environment.
   e) Energy efficient technologies are sustainable.

   Awareness about energy efficient technologies:

   Excellent  Above average  Average  Below average  Extremely poor

2. Number of energy efficient technologies owned by the household:

Which one of the following energy technologies you have?

Surgical cook ware
Solar water heater
CFLs
Refrigerators with green label
Lap tops
Solar tower
Movement controlled lightings

229
Air conditioners with star rating
Induction stove

<table>
<thead>
<tr>
<th>Great deal</th>
<th>Many</th>
<th>Somewhat</th>
<th>Very little</th>
<th>None at all</th>
</tr>
</thead>
</table>

3. Degree of satisfaction derived from the existing efficient energy technologies:
   To what extent are you satisfied with the efficient energy technologies that you have?

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

4. The importance of Technology of the device:
   While investing in energy efficiency devices, how important do you think are the following factors:

i). Design aspects (quality, reliability, maintainability, etc):

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>

ii) Compatibility with other devices:

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>

iii) Aesthetics:

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>

iv) Ease of operation:

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>
v) After sales service:

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>

Overall importance:

<table>
<thead>
<tr>
<th>Unimportant</th>
<th>Of little importance</th>
<th>Moderately important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
</table>

5. Awareness about general environmental issues:

What do you know about the following environmental issues?

i) Bio-diversity:
   a) A large number of the Earth's species are formally classified as rare or endangered or threatened species.
   b) Biodiversity is the variation of life forms within a given ecosystem, biome, or for the entire Earth.
   c) Coral reef and rain forests are examples of bio-diversity on our planet.
   d) It has been argued that the present rate of extinction is sufficient to eliminate most species on the planet Earth within 100 years.
   e) Biodiversity supports a number of natural ecosystem processes and services like air quality, climate, water purification, disease control, biological pest control, pollination and prevention of erosion.

Awareness:

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

ii) Sustainable development:
   a) Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations.
   b) Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally.
   c) The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible.
   d) Sustainable energy development is 'energy produced and used in ways that support human development over the long term, in all its social, economic, and environmental dimensions'.
   e) Energy efficiency and renewable energies are the twin pillars of sustainable development.
iii) Global warming:
   a) Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation.
   b) Increasing greenhouse gas concentrations resulting from human activity such as fossil fuel burning and deforestation are responsible for most of the observed temperature increase since the middle of the 20th century.
   c) Rising sea levels, expansion of subtropical deserts and retreating glaciers are some of the effects of global warming.
   d) Mitigation to reduce further emissions, adaptation to reduce the damage caused by warming, and geoengineering to reverse global warming are some of the options available to tackle global warming.
   e) 2005 was the warmest year since reliable, widespread instrumental measurements became available in the late 1800s.

iv) Global climate change:
   a) Climate change is any long-term change in the statistics of weather over durations ranging from decades to millions of years.
   b) Variations in solar radiation, deviations in the Earth's orbit, and changes in greenhouse gas concentrations are some of the causes of climate change.
   c) With regards to human influence on global climate change, of most concern is the increase in CO$_2$ levels due to emissions from fossil fuel combustion, followed by aerosols (particulate matter in the atmosphere) and cement manufacture.
   d) Glaciers are among the most sensitive indicators of climate change, advancing when climate cools and retreating when climate warms.
   e) Analysis of ice in a core drilled from a ice sheet such as the Antarctic ice sheet, can be used to show a link between temperature and global sea level variations.

v) Ozone layer depletion:
   a) Ozone layer depletion corresponds to a slow but steady decline of total volume of ozone in the Earth's stratosphere since the late 1970s.
   b) Seasonal decrease in stratospheric ozone over Earth's polar regions is commonly referred to as the ozone hole.
   c) Chlorofluorocarbon (CFC) compounds commonly referred to as freons and bromofluorocarbon compounds commonly referred to as halons are called as ozone
depleting substances.

d) It is suspected that a variety of biological consequences such as increases in skin
cancer, damage to plants, and reduction of plankton populations in the ocean's
photic zone may result from the increased UV exposure due to ozone depletion.
e) Ozone hole is not a hole but just a depression.

Awareness:

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

Overall awareness:

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

6. Awareness about some general facts about energy consumption:

i) How do you think the per capita consumption of energy in India compares with the
rest of the world? (Say USA)

<table>
<thead>
<tr>
<th>Lowest</th>
<th>Below average</th>
<th>Average</th>
<th>Above average</th>
<th>highest</th>
</tr>
</thead>
</table>

ii) Amongst all the sectors, how much of energy you think the household sector in
India uses?

<table>
<thead>
<tr>
<th>Largest</th>
<th>More than the industry sector</th>
<th>Same as the industry sector</th>
<th>Less than the industry sector</th>
<th>Lowest</th>
</tr>
</thead>
</table>

iii) How much energy you think can be saved through energy efficiency measures?

<table>
<thead>
<tr>
<th>Large amount</th>
<th>Good lot</th>
<th>Some amount</th>
<th>Very little</th>
<th>None at all</th>
</tr>
</thead>
</table>

iv) What do you know about energy related pollution/emissions?

a) Coal is the most carbon-intensive of the fossil fuels, and it is the fastest-growing
carbon-emitting energy source.
b) China and India together accounted for 25% of the world’s CO2 emissions in
2006.
c) The Kyoto Protocol requires participating countries to reduce their greenhouse
gas emissions collectively to an annual average of about 5 percent below their
1990 level over the 2008-2012 period.
d) In recent years, many countries have begun to demonstrate an interest in
expanding their use of non-carbon-emitting renewable energy and nuclear power,
in part to stem the growth of greenhouse gas emissions.
e) Economic growth is the most significant factor underlying the projections for
growth in energy-related carbon dioxide emissions.

Awareness:

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

Overall awareness:

<table>
<thead>
<tr>
<th>To a great extent</th>
<th>Largely</th>
<th>Somewhat</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

7. Level of conservation habits

Mention some ways of efficient energy usage?

<table>
<thead>
<tr>
<th>More than 5, To a great extent</th>
<th>5, Largely</th>
<th>4, Somewhat</th>
<th>Below 4, Very little</th>
<th>Not at all</th>
</tr>
</thead>
</table>

D. Personal / Behavioral.

1. Concern for environment:
   a) Many environmental issues involve trade-offs with the economic development. Which one of the following statements best describes your view.

<table>
<thead>
<tr>
<th>1 Highest priority should be given to protecting the environment even if it hurts the economy</th>
<th>2 Both environment and economy are important but the environment should come first</th>
<th>3 They are equally important</th>
<th>4 Both environment and economy are important but economy should come first</th>
<th>5 Highest priority should be given to economic considerations even if it hurts the environment</th>
</tr>
</thead>
</table>

   b) It is worth contributing from my side towards energy efficiency, because it makes a difference to the society.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

   c) Mention some ways of reducing urban pollution.
   Concern:
5 or more, Very good  |  4, Good  |  3, Acceptable  |  2, Poor  |  1, Very poor

Overall concern:

Very good  |  Good  |  Acceptable  |  Poor  |  Very poor

2. Ego, Prestige, Status:
   a) An efficient energy technology is a status symbol.

   Strongly Agree  |  Agree  |  Undecided  |  Disagree  |  Strongly Disagree

   b) I feel proud to display my stock of efficient energy technologies.

   Strongly Agree  |  Agree  |  Undecided  |  Disagree  |  Strongly Disagree

Overall strength of agreement:

   Strongly Agree  |  Agree  |  Undecided  |  Disagree  |  Strongly Disagree

3. Attitude towards change:
   I don’t mind if I have to change my life style in order to use efficient energy technologies.

   Strongly Agree  |  Agree  |  Undecided  |  Disagree  |  Strongly Disagree

4. If the KPTCL offers you a differential tariff rate for shifting your usage of major energy consuming assets from peak period to off peak period, will you take that offer?

   Definitely  |  Very probably  |  Probably  |  Probably not  |  Definitely not

5. Liking towards technology:
   Efficient energy gadgets make life interesting.

   Strongly Agree  |  Agree  |  Undecided  |  Disagree  |  Strongly Disagree

6. Willingness to invest in energy efficient devices:
   I am willing to pay extra for energy efficient devices.
7. Willingness to adopt energy efficient methods:
   I can afford to devote some time to learn to adopt an energy efficient method.

E. Financial.
1. Income:
   If there is an increase in my income in the near future, I will proportionately increase my investment in efficient energy technologies.

2. Savings:
   Cost savings on account of energy efficiency/conservation is:

3. Initial investment:
   What do you think about the purchase cost of an energy efficient device?

4. Running cost:
   How much do you think is the maintenance cost of energy efficient devices?

F. Government policy.
1. Subsidies:
   Government subsidies are important for promoting energy efficient technologies.

2. Regulations:
Left to themselves, people do not care about energy efficiency and hence government should introduce strict regulations.

3. Incentives:
What do you think about the existing tax concessions and other incentives being provided by the government?

Great deal  Much  Somewhat  Very little  None at all

4. Facilitation (providing well structured markets, approved suppliers):
Is the present effort being put by the government in facilitating energy efficient technologies sufficient?

To a Great extent  largely  Somewhat  Very little  Not at all

5. Product information (energy labeling):
Providing product information in the form of energy labeling will help people to make right decisions about energy efficient technologies.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

6. Adequacy of information:
Is the information provided by various concerned agencies on energy efficient devices adequate?

Great deal  Much  Somewhat  Very little  None at all

7. Risk coverage (insurance coverage):
Government should intervene to ensure adequate insurance coverage for energy efficient technologies.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

G. Additional questions:
1) Mention the most important reason for your purchase of energy efficient device.
2) What should be done to make everybody give top priority for energy efficiency?
3) Mass education and social concern can drive adoption of energy efficient Technologies.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

4) I consult my friends and neighbors before I take a decision on purchase of energy technologies.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

5) From where do you get the information about energy efficient technologies?
6) Approximately by how much your income has increased in the past five years?
7) By how much your investment in efficient energy technologies has increased approximately during the same period?
8) Approximately how much you have been able to save monthly because of energy efficient devices in your house?
9) Do you think it is significant?

| Yes | No |

10) Approximately what is the total amount that you have invested in energy efficient devices?
11) Do you feel this is significant?
12) Have you purchased any energy technologies motivated by the government policy? If yes, give details.

***** Thank you!!!!! *****
APPENDIX V

FACTOR ANALYSIS METHODOLOGY

This Appendix explains the methodology involved in a multivariate analysis technique called Factor Analysis. An attempt has been made to give a simplified explanation as the detailed mathematics of the technique is beyond the scope of this research work and wherever possible an intuitive approach is taken for clarification.

Factor Analysis is typically used for analyzing survey data. In survey research, a researcher tries to obtain the description of the structure of a problem or a construct using a large number of variables (15 to 50). These variables are defined based on explanation, experience, or knowledge (Krishnaswamy et al., 2006). The researcher would, in such cases, look out for a smaller number of variables that can be used for describing the phenomena.

The relationship among these variables can be represented by a table of correlations between each pair of variables. Starting from this relationship a set of composites (linear combinations of original variables) are derived in the factor analysis such that, (i) the number of composites is smaller than the number of variables, (ii) most of the variance of the original variables are accounted for by the composites, and (iii) generally these composites are uncorrelated among themselves, that is they are orthogonal to each other. The composites are called factors and several procedures developed over time to get these factors are called factor analysis procedures.

One way of looking at factor analysis is to consider it as a kind of multiple correlation. If one may go on choosing the formation of composites one at a time in a sequence, he can impose the condition that the first composite be so formed that the average of its squared correlations with all the variables in this set is maximum. Next, the second composite is formed so that it is not correlated with the first and its average squared correlation with the remaining variables in the set is maximum. This is continued until the rank of the correlation matrix is completed. Such a process is called as the Principle Component Method of extraction of factors.
The assumptions underlying factor analysis are as follows:

1. **Postulate of factorial causation:** This imposes a particular causal order on the data – that observed variables are linear combinations of some underlying causal variables.

2. **Postulate of parsimony:** The principle of parsimony leads to a unique conclusion where there are infinite number of factor models possible, but there is only one particular configuration of factor loadings that is consistent with the one common factor model.

Most of the factor methods operate by extracting the Eigen values and Eigen vectors from a square matrix. The factor analysis exercise consists of four steps. They are:

(i). Preparation of a relevant correlation matrix to be used as input for the software used for extraction of factors.

(ii). Extraction of initial factors.

(iii). Rotation of initial set of factors to a terminal solution

(iv). Interpretation of the rotated factor solution

The details of the last three steps are given below:

**Extraction of initial factors:** Many methods of extracting factors have been developed. Some of them are listed below:

a) Principal component analysis

b) Maximum likelihood method (or canonical factoring)

c) Alpha factoring

d) Image factoring

e) Least squares method

The widely used Principal Component Analysis is discussed here.

The Principal Component Analysis (PCA) yields a mathematically unique solution of a factor problem. This method extracts the maximum amount of variance accounted for by a minimum number of factors. The factors are nothing but Eigen vectors of the variance-covariance or correlation matrix.
Suppose there are \( n \) original variables, PCA linearly transforms \( n \) original variables into \( m \) new variables, where the new variable is a linear combination of the old ones. For example, if \( X_1, X_2, \ldots, X_n \) are the original variables, they are transformed to factors \( Y_1, Y_2, \ldots, Y_m \).

\[
Y_1 = a_1 X_1 + a_2 X_2 + \ldots + a_n X_n \\
Y_2 = b_1 X_1 + b_2 X_2 + \ldots + b_n X_n \\
Y_m = m_1 X_1 + m_2 X_2 + \ldots + m_n X_n \\
\]  

\[
Y_1 \ Y_2 \ Y_3 \ \ldots \ \ Y_m \\
X_1 = a_1 \ b_1 \ c_1 \ \ldots \ \ m_1 \\
X_2 = a_2 \ b_2 \ c_2 \ \ldots \ \ m_2 \\
\ldots \ \ldots \ \ldots \ \ldots \\
\ldots \ \ldots \ \ldots \ \ldots \\
X_n = a_n \ b_n \ c_n \ \ldots \ \ m_n
\]

and so on, where \( a \)'s are the elements of the first Eigen vector and \( b \)'s are the elements of the second Eigen vector, and so on.

The values \( a_1, a_2, \ldots, a_n \) are the loadings of the original variables on the first factor. The vector \((a_1, a_2, \ldots, a_n)\) is called the Eigen vector. The Eigen value of the first Eigen vector is \( \Sigma a_i^2 \) and represents the variance explained by the first factor. The solution of factor analysis gives factors (Eigen vectors) arranged from 1 to \( m \), in a decreasing order of Eigen values.

Percentage variance accounted by the factor \( f = \frac{\text{Eigen value of } f}{\Sigma (\text{Eigen value of } i)} \)

When correlation matrix is used as input,

Percentage Variance accounted by the factor \( f = \frac{\text{Eigen value of } f}{\text{Number of Variables}} \)

It is to be noted that the correlation between any two new variables will be zero (the new variables will be orthogonal to each other). The elements of the Eigen vectors are termed as principal component loadings. With respect to factor analysis, these are known as factor
loadings. The loading of a variable on a factor (factor loading) is a simple correlation between the two. The Eigen vectors and roots are derived by an iterative process.

**Rotation of factors:** Most of the factor analytic methods produce results in a form that is difficult or impossible to interpret. In many cases, even though factor analysis reduces the dimensionality of a problem to a great extent, the meaning of factors may be difficult to deduce. This may be the result of some extraneous factors (orthogonal axes). By rotating the factors, it is possible to find a better position for them, so that a more meaningful and interpretable result can be obtained. A variety of rotational procedures are available. Some of them are as follows:

1) Kaiser’s varimax rotation
2) Oblique rotation
3) Quartimax rotation
4) Equimax rotation

Rotation does not improve the degree of fit between the data and the factor structure but attempts a possible ‘simplification’. A simple example will illustrate this point.

Consider part of a two-factor solution depicted in figure A5.1.
Two variables $V_1$ and $V_2$ are loaded on the factors (axes) as follows:

**Loadings before rotation**

<table>
<thead>
<tr>
<th></th>
<th>Factor I</th>
<th>Factor II</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_1$</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>$V_2$</td>
<td>0.5</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

**Loadings after rotation**

<table>
<thead>
<tr>
<th></th>
<th>Factor I</th>
<th>Factor II</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_1$</td>
<td>-0.2</td>
<td>0.9</td>
</tr>
<tr>
<td>$V_2$</td>
<td>0.7</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Variance explained before rotations**

\[
V_1 = 0.7^2 + 0.6^2 = 0.85
\]
\[
V_2 = 0.5^2 + 0.5^2 = 0.50
\]
Figure A5.1 Factor rotation

Variance explained after rotation

\[ V_1 = -0.2^2 + 0.9^2 = 0.85 \]
\[ V_2 = 0.7^2 + 0.1^2 = 0.50 \]

It is to be noted that (i) variance explained has remained the same, (ii) factor loading has changed, and (iii) new factor loading is easier to interpret. \( V_1 \) belongs to Factor II and \( V_2 \) belongs to factor I. This could not be interpreted from the un-rotated solution.

*Interpretation of factors:* Interpretations of a set of factors with various loadings are a subjective issue. The primary factor loadings provide a picture of the correlations to the expected, between the composite factor variates and the original variables.
| 16  | 0.033 | 0.39  | 0.022 | 0.02  | 0.008 | 0.00  | 0.045 | 0.005 | 0.056 | 0.00  | 0.023 | 0.00  | 0.042 | 0.00  | 0.035 | 0.00  | 0.081 | 0.00  | 0.031 | 0.00  | 0.043 | 0.00  | 0.043 | 0.00  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 15  | 0.048 | 0.18  | 0.008 | 0.018 | 0.016 | 0.026 | 0.004 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 14  | 0.021 | 0.08  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 13  | 0.031 | 0.31  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 12  | 0.030 | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 11  | 0.151 | 0.020 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 10  | 0.012 | 0.030 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 9   | 0.009 | 0.018 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 8   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 7   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 6   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 5   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 4   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 3   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 2   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| 1   | 0.000 | 0.000 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |

**Table A.1 - Correlation Matrix**

This appendix shows some of the output tables corresponding to factor analysis which have not been shown in the main body of the report.

**SPSS OUTPUTS OF FACTOR ANALYSIS**

**APPENDIX VI**
|   | 0.0 013 | 0.0 017 | 0.0 021 | 0.0 028 | 0.0 032 | 0.0 037 | 0.0 044 | 0.0 060 | 0.0 071 | 0.0 081 | 0.0 103 | 0.0 110 | 0.1 117 | 0.1 127 | 0.1 134 | 0.1 143 | 0.1 155 | 0.1 168 | 0.1 178 | 0.1 182 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0  | 0.0 077 | 0.0 078 | 0.0 089 | 0.0 096 | 0.0 102 | 0.0 105 | 0.0 109 | 0.0 113 | 0.0 115 | 0.0 117 | 0.0 119 | 0.0 121 | 0.0 123 | 0.0 125 | 0.0 127 | 0.0 129 | 0.0 131 | 0.0 133 | 0.0 135 | 0.0 137 |
| 0  | 0.0 027 | 0.0 018 | 0.0 011 | 0.0 133 | 0.0 191 | 0.0 193 | 0.0 194 | 0.0 195 | 0.0 193 | 0.0 191 | 0.0 189 | 0.0 183 | 0.0 178 | 0.0 172 | 0.0 167 | 0.0 162 | 0.0 157 | 0.0 152 | 0.0 147 | 0.0 142 |
| 0  | 0.0 079 | 0.0 103 | 0.0 123 | 0.0 144 | 0.0 164 | 0.0 181 | 0.0 198 | 0.0 213 | 0.0 229 | 0.0 242 | 0.0 254 | 0.0 265 | 0.0 275 | 0.0 284 | 0.0 292 | 0.0 300 | 0.0 308 | 0.0 316 | 0.0 324 | 0.0 332 |
| 0  | 0.0 089 | 0.0 111 | 0.0 133 | 0.0 153 | 0.0 173 | 0.0 193 | 0.0 213 | 0.0 233 | 0.0 253 | 0.0 273 | 0.0 293 | 0.0 313 | 0.0 332 | 0.0 351 | 0.0 370 | 0.0 389 | 0.0 408 | 0.0 428 | 0.0 448 | 0.0 468 |
| 0  | 0.0 085 | 0.0 108 | 0.0 131 | 0.0 153 | 0.0 175 | 0.0 197 | 0.0 219 | 0.0 241 | 0.0 264 | 0.0 287 | 0.0 310 | 0.0 333 | 0.0 356 | 0.0 379 | 0.0 402 | 0.0 425 | 0.0 448 | 0.0 472 | 0.0 495 | 0.0 518 |
| 0  | 0.0 082 | 0.0 104 | 0.0 126 | 0.0 148 | 0.0 170 | 0.0 192 | 0.0 214 | 0.0 236 | 0.0 258 | 0.0 281 | 0.0 303 | 0.0 325 | 0.0 347 | 0.0 369 | 0.0 391 | 0.0 413 | 0.0 435 | 0.0 458 | 0.0 480 | 0.0 502 |
| 0  | 0.0 079 | 0.0 101 | 0.0 123 | 0.0 145 | 0.0 167 | 0.0 189 | 0.0 211 | 0.0 233 | 0.0 255 | 0.0 278 | 0.0 300 | 0.0 322 | 0.0 344 | 0.0 366 | 0.0 388 | 0.0 410 | 0.0 432 | 0.0 454 | 0.0 477 | 0.0 499 |
| 0  | 0.0 077 | 0.0 099 | 0.0 121 | 0.0 143 | 0.0 165 | 0.0 187 | 0.0 209 | 0.0 231 | 0.0 253 | 0.0 275 | 0.0 297 | 0.0 319 | 0.0 341 | 0.0 363 | 0.0 385 | 0.0 407 | 0.0 429 | 0.0 451 | 0.0 473 | 0.0 495 |
| 0  | 0.0 075 | 0.0 097 | 0.0 119 | 0.0 141 | 0.0 163 | 0.0 185 | 0.0 207 | 0.0 229 | 0.0 251 | 0.0 273 | 0.0 295 | 0.0 317 | 0.0 339 | 0.0 361 | 0.0 383 | 0.0 405 | 0.0 427 | 0.0 449 | 0.0 471 | 0.0 493 |
| 0  | 0.0 073 | 0.0 095 | 0.0 117 | 0.0 139 | 0.0 161 | 0.0 183 | 0.0 205 | 0.0 227 | 0.0 249 | 0.0 271 | 0.0 293 | 0.0 315 | 0.0 337 | 0.0 359 | 0.0 381 | 0.0 403 | 0.0 425 | 0.0 447 | 0.0 469 | 0.0 491 |
| 0  | 0.0 071 | 0.0 093 | 0.0 115 | 0.0 137 | 0.0 159 | 0.0 181 | 0.0 203 | 0.0 225 | 0.0 247 | 0.0 269 | 0.0 291 | 0.0 313 | 0.0 335 | 0.0 357 | 0.0 379 | 0.0 401 | 0.0 423 | 0.0 445 | 0.0 467 | 0.0 489 |
| 0  | 0.0 069 | 0.0 089 | 0.0 111 | 0.0 133 | 0.0 155 | 0.0 177 | 0.0 199 | 0.0 221 | 0.0 243 | 0.0 265 | 0.0 287 | 0.0 309 | 0.0 331 | 0.0 353 | 0.0 375 | 0.0 397 | 0.0 419 | 0.0 441 | 0.0 463 | 0.0 485 |
| 0  | 0.0 067 | 0.0 085 | 0.0 107 | 0.0 129 | 0.0 151 | 0.0 173 | 0.0 195 | 0.0 217 | 0.0 239 | 0.0 261 | 0.0 283 | 0.0 305 | 0.0 327 | 0.0 349 | 0.0 371 | 0.0 393 | 0.0 415 | 0.0 437 | 0.0 459 | 0.0 481 |
| 0  | 0.0 065 | 0.0 081 | 0.0 103 | 0.0 125 | 0.0 147 | 0.0 169 | 0.0 191 | 0.0 213 | 0.0 235 | 0.0 257 | 0.0 279 | 0.0 301 | 0.0 323 | 0.0 345 | 0.0 367 | 0.0 389 | 0.0 411 | 0.0 433 | 0.0 455 | 0.0 477 |

**Table A6.1 Correlation matrix continued**
<table>
<thead>
<tr>
<th>0.0'0</th>
<th>0.0'3</th>
<th>32</th>
<th>0.0'30</th>
<th>0.0'30</th>
<th>0.0'26</th>
<th>0.0'0</th>
<th>0.0'31</th>
<th>0.0'37</th>
<th>0.0'26</th>
<th>0.0'0</th>
<th>0.0'40</th>
<th>0.0'38</th>
<th>0.0'0</th>
<th>0.0'43</th>
<th>0.0'33</th>
<th>0.0'26</th>
<th>0.0'0</th>
<th>0.0'46</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Table VN1 Correlation matrix continued
| 1.000 | 0.995 | 0.993 | 0.992 | 0.990 | 0.989 | 0.987 | 0.985 | 0.984 | 0.983 | 0.981 | 0.979 | 0.977 | 0.976 | 0.975 | 0.974 | 0.972 | 0.971 | 0.970 | 0.968 | 0.966 | 0.964 | 0.962 | 0.960 | 0.958 | 0.956 | 0.954 | 0.952 | 0.950 | 0.948 | 0.946 | 0.944 | 0.942 | 0.940 | 0.938 | 0.936 | 0.934 | 0.932 | 0.930 | 0.928 | 0.926 | 0.924 | 0.922 | 0.920 | 0.918 | 0.916 | 0.914 | 0.912 | 0.910 | 0.908 | 0.906 | 0.904 | 0.902 | 0.900 | 0.000 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

Table A6.1 Correlation matrix continued
<table>
<thead>
<tr>
<th></th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
<th>0.003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.220</td>
<td>0.232</td>
<td>0.247</td>
<td>0.262</td>
<td>0.278</td>
<td>0.295</td>
<td>0.313</td>
<td>0.332</td>
<td>0.353</td>
<td>0.376</td>
<td>0.401</td>
<td>0.428</td>
<td>0.458</td>
<td>0.491</td>
<td>0.527</td>
<td>0.566</td>
<td>0.608</td>
<td>0.653</td>
<td>0.701</td>
<td>0.752</td>
<td>0.806</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.031</td>
<td>0.041</td>
<td>0.053</td>
<td>0.067</td>
<td>0.084</td>
<td>0.102</td>
<td>0.121</td>
<td>0.142</td>
<td>0.164</td>
<td>0.188</td>
<td>0.213</td>
<td>0.240</td>
<td>0.270</td>
<td>0.302</td>
<td>0.338</td>
<td>0.376</td>
<td>0.417</td>
<td>0.461</td>
<td>0.508</td>
<td>0.558</td>
<td>0.611</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.034</td>
<td>0.044</td>
<td>0.057</td>
<td>0.073</td>
<td>0.091</td>
<td>0.111</td>
<td>0.133</td>
<td>0.158</td>
<td>0.185</td>
<td>0.215</td>
<td>0.247</td>
<td>0.282</td>
<td>0.321</td>
<td>0.364</td>
<td>0.413</td>
<td>0.466</td>
<td>0.523</td>
<td>0.585</td>
<td>0.650</td>
<td>0.720</td>
<td>0.793</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.037</td>
<td>0.048</td>
<td>0.061</td>
<td>0.078</td>
<td>0.097</td>
<td>0.118</td>
<td>0.141</td>
<td>0.167</td>
<td>0.195</td>
<td>0.225</td>
<td>0.258</td>
<td>0.295</td>
<td>0.336</td>
<td>0.381</td>
<td>0.430</td>
<td>0.484</td>
<td>0.542</td>
<td>0.604</td>
<td>0.671</td>
<td>0.743</td>
<td>0.819</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.040</td>
<td>0.052</td>
<td>0.066</td>
<td>0.084</td>
<td>0.105</td>
<td>0.128</td>
<td>0.154</td>
<td>0.183</td>
<td>0.214</td>
<td>0.248</td>
<td>0.285</td>
<td>0.326</td>
<td>0.372</td>
<td>0.422</td>
<td>0.477</td>
<td>0.537</td>
<td>0.602</td>
<td>0.672</td>
<td>0.746</td>
<td>0.826</td>
<td>0.911</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.043</td>
<td>0.057</td>
<td>0.072</td>
<td>0.090</td>
<td>0.111</td>
<td>0.134</td>
<td>0.160</td>
<td>0.189</td>
<td>0.220</td>
<td>0.254</td>
<td>0.292</td>
<td>0.334</td>
<td>0.382</td>
<td>0.435</td>
<td>0.492</td>
<td>0.555</td>
<td>0.624</td>
<td>0.699</td>
<td>0.780</td>
<td>0.867</td>
<td>0.960</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.046</td>
<td>0.060</td>
<td>0.076</td>
<td>0.096</td>
<td>0.118</td>
<td>0.143</td>
<td>0.171</td>
<td>0.203</td>
<td>0.237</td>
<td>0.274</td>
<td>0.316</td>
<td>0.362</td>
<td>0.413</td>
<td>0.470</td>
<td>0.532</td>
<td>0.601</td>
<td>0.676</td>
<td>0.758</td>
<td>0.846</td>
<td>0.941</td>
<td>1.043</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.050</td>
<td>0.065</td>
<td>0.082</td>
<td>0.103</td>
<td>0.127</td>
<td>0.154</td>
<td>0.184</td>
<td>0.217</td>
<td>0.253</td>
<td>0.293</td>
<td>0.337</td>
<td>0.386</td>
<td>0.440</td>
<td>0.500</td>
<td>0.566</td>
<td>0.639</td>
<td>0.719</td>
<td>0.807</td>
<td>0.903</td>
<td>1.007</td>
<td>1.120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.053</td>
<td>0.069</td>
<td>0.087</td>
<td>0.109</td>
<td>0.135</td>
<td>0.165</td>
<td>0.200</td>
<td>0.237</td>
<td>0.278</td>
<td>0.322</td>
<td>0.371</td>
<td>0.426</td>
<td>0.487</td>
<td>0.554</td>
<td>0.637</td>
<td>0.727</td>
<td>0.825</td>
<td>0.931</td>
<td>1.045</td>
<td>1.168</td>
<td>1.299</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.056</td>
<td>0.073</td>
<td>0.092</td>
<td>0.115</td>
<td>0.143</td>
<td>0.175</td>
<td>0.212</td>
<td>0.253</td>
<td>0.300</td>
<td>0.350</td>
<td>0.404</td>
<td>0.464</td>
<td>0.530</td>
<td>0.602</td>
<td>0.682</td>
<td>0.771</td>
<td>0.870</td>
<td>0.978</td>
<td>1.096</td>
<td>1.224</td>
<td>1.363</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.059</td>
<td>0.077</td>
<td>0.097</td>
<td>0.121</td>
<td>0.152</td>
<td>0.187</td>
<td>0.228</td>
<td>0.273</td>
<td>0.324</td>
<td>0.380</td>
<td>0.440</td>
<td>0.506</td>
<td>0.579</td>
<td>0.659</td>
<td>0.748</td>
<td>0.847</td>
<td>0.955</td>
<td>1.073</td>
<td>1.202</td>
<td>1.344</td>
<td>1.500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.063</td>
<td>0.082</td>
<td>0.103</td>
<td>0.128</td>
<td>0.164</td>
<td>0.204</td>
<td>0.249</td>
<td>0.300</td>
<td>0.357</td>
<td>0.420</td>
<td>0.490</td>
<td>0.565</td>
<td>0.650</td>
<td>0.747</td>
<td>0.854</td>
<td>0.968</td>
<td>1.090</td>
<td>1.221</td>
<td>1.364</td>
<td>1.524</td>
<td>1.700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.066</td>
<td>0.086</td>
<td>0.108</td>
<td>0.134</td>
<td>0.173</td>
<td>0.217</td>
<td>0.267</td>
<td>0.324</td>
<td>0.391</td>
<td>0.463</td>
<td>0.541</td>
<td>0.631</td>
<td>0.733</td>
<td>0.846</td>
<td>0.968</td>
<td>1.099</td>
<td>1.239</td>
<td>1.389</td>
<td>1.551</td>
<td>1.737</td>
<td>1.945</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.070</td>
<td>0.091</td>
<td>0.114</td>
<td>0.142</td>
<td>0.184</td>
<td>0.233</td>
<td>0.290</td>
<td>0.358</td>
<td>0.436</td>
<td>0.520</td>
<td>0.611</td>
<td>0.712</td>
<td>0.826</td>
<td>0.953</td>
<td>1.091</td>
<td>1.239</td>
<td>1.396</td>
<td>1.566</td>
<td>1.751</td>
<td>1.963</td>
<td>2.193</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.073</td>
<td>0.096</td>
<td>0.121</td>
<td>0.150</td>
<td>0.196</td>
<td>0.250</td>
<td>0.313</td>
<td>0.392</td>
<td>0.481</td>
<td>0.576</td>
<td>0.680</td>
<td>0.797</td>
<td>0.926</td>
<td>1.068</td>
<td>1.220</td>
<td>1.385</td>
<td>1.563</td>
<td>1.756</td>
<td>1.969</td>
<td>2.205</td>
<td>2.471</td>
<td></td>
</tr>
</tbody>
</table>

Table A6.2: Significance levels of correlations continued.
Table A6.2: Significance levels of correlations continued

<table>
<thead>
<tr>
<th></th>
<th>.016</th>
<th>.015</th>
<th>.014</th>
<th>.013</th>
<th>.012</th>
<th>.011</th>
<th>.010</th>
<th>.009</th>
<th>.008</th>
<th>.007</th>
<th>.006</th>
<th>.005</th>
<th>.004</th>
<th>.003</th>
<th>.002</th>
<th>.001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.030</td>
<td>.029</td>
<td>.028</td>
<td>.027</td>
<td>.026</td>
<td>.025</td>
<td>.024</td>
<td>.023</td>
<td>.022</td>
<td>.021</td>
<td>.020</td>
<td>.019</td>
<td>.018</td>
<td>.017</td>
<td>.016</td>
<td>.015</td>
<td>.014</td>
</tr>
<tr>
<td>.030</td>
<td>.029</td>
<td>.028</td>
<td>.027</td>
<td>.026</td>
<td>.025</td>
<td>.024</td>
<td>.023</td>
<td>.022</td>
<td>.021</td>
<td>.020</td>
<td>.019</td>
<td>.018</td>
<td>.017</td>
<td>.016</td>
<td>.015</td>
<td>.014</td>
</tr>
<tr>
<td>.030</td>
<td>.029</td>
<td>.028</td>
<td>.027</td>
<td>.026</td>
<td>.025</td>
<td>.024</td>
<td>.023</td>
<td>.022</td>
<td>.021</td>
<td>.020</td>
<td>.019</td>
<td>.018</td>
<td>.017</td>
<td>.016</td>
<td>.015</td>
<td>.014</td>
</tr>
<tr>
<td>.030</td>
<td>.029</td>
<td>.028</td>
<td>.027</td>
<td>.026</td>
<td>.025</td>
<td>.024</td>
<td>.023</td>
<td>.022</td>
<td>.021</td>
<td>.020</td>
<td>.019</td>
<td>.018</td>
<td>.017</td>
<td>.016</td>
<td>.015</td>
<td>.014</td>
</tr>
<tr>
<td>.030</td>
<td>.029</td>
<td>.028</td>
<td>.027</td>
<td>.026</td>
<td>.025</td>
<td>.024</td>
<td>.023</td>
<td>.022</td>
<td>.021</td>
<td>.020</td>
<td>.019</td>
<td>.018</td>
<td>.017</td>
<td>.016</td>
<td>.015</td>
<td>.014</td>
</tr>
</tbody>
</table>

---
Table A6.3 shows the communalities which are the proportions of variance of the variables extracted by their factors. Table A6.4 shows the factor loadings for the unrotated solution and the Table A6.5 shows the factor loadings for the rotated solution.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Factor 1</td>
<td>Factor 2</td>
<td>Factor 3</td>
<td>Factor 4</td>
<td>Factor 5</td>
<td>Factor 6</td>
<td>Factor 7</td>
<td>Factor 8</td>
<td>Factor 9</td>
<td>Factor 10</td>
<td>Factor 11</td>
<td>Factor 12</td>
</tr>
<tr>
<td>1</td>
<td>0.344</td>
<td>0.005</td>
<td>0.011</td>
<td>0.049</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.444</td>
<td>0.000</td>
<td>0.000</td>
<td>0.069</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.500</td>
<td>0.000</td>
<td>0.072</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.400</td>
<td>0.000</td>
<td>0.017</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.500</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.600</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>7</td>
<td>0.700</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>0.800</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>9</td>
<td>0.900</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>1.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table A6.2: Significance levels of correlations continued.
Table A6.3 Communalities

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Extraction</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of persons residing in the house.</td>
<td>1</td>
<td>0.734084 Ego factor</td>
<td>1</td>
<td>0.661813</td>
</tr>
<tr>
<td>Type of residence.</td>
<td>1</td>
<td>0.60557 Attitude towards change</td>
<td>1</td>
<td>0.658418</td>
</tr>
<tr>
<td>Ownership of residence</td>
<td>1</td>
<td>0.632933 Liking towards technology</td>
<td>1</td>
<td>0.567677</td>
</tr>
<tr>
<td>Size of the house in square feet</td>
<td>1</td>
<td>0.627592 Willingness to invest in energy efficient devices</td>
<td>1</td>
<td>0.546184</td>
</tr>
<tr>
<td>Educational qualification of the head of the household</td>
<td>1</td>
<td>0.769516 Willingness to adapt energy efficient methods</td>
<td>1</td>
<td>0.658474</td>
</tr>
<tr>
<td>Annual income of the household in lakhs of rupees</td>
<td>1</td>
<td>0.787534 Income as a factor influencing the decision</td>
<td>1</td>
<td>0.38388</td>
</tr>
<tr>
<td>Ownership of energy consuming assets</td>
<td>1</td>
<td>0.762409 Cost savings on account of energy efficiency/conservation</td>
<td>1</td>
<td>0.436705</td>
</tr>
<tr>
<td>Monthly expenditure in rupees</td>
<td>1</td>
<td>0.739529 Purchase cost of an energy efficient device</td>
<td>1</td>
<td>0.527449</td>
</tr>
<tr>
<td>Awareness about energy efficient technologies</td>
<td>1</td>
<td>0.51026 Maintenance cost of an energy efficient device</td>
<td>1</td>
<td>0.568539</td>
</tr>
<tr>
<td>Number of energy efficient technologies owned by the household</td>
<td>1</td>
<td>0.627339 Importance of government subsidies</td>
<td>1</td>
<td>0.612968</td>
</tr>
<tr>
<td>Degree of satisfaction derived from the existing efficient energy technologies</td>
<td>1</td>
<td>0.55609 Government regulations</td>
<td>1</td>
<td>0.50799</td>
</tr>
<tr>
<td>Importance of the technology of the device</td>
<td>1</td>
<td>0.564741 Government incentives</td>
<td>1</td>
<td>0.583083</td>
</tr>
<tr>
<td>Awareness about general environmental issues</td>
<td>1</td>
<td>0.564481 Government's efforts in providing well structured markets and suppliers</td>
<td>1</td>
<td>0.572975</td>
</tr>
<tr>
<td>Awareness about some general facts about energy consumption</td>
<td>1</td>
<td>0.523242 Providing product information in the form of say energy labeling</td>
<td>1</td>
<td>0.529982</td>
</tr>
<tr>
<td>Energy conservation habits</td>
<td>1</td>
<td>0.551145 Adequacy of information</td>
<td>1</td>
<td>0.518715</td>
</tr>
<tr>
<td>Concern for environment</td>
<td>1</td>
<td>0.613675 Risk coverage in the form of say insurance</td>
<td>1</td>
<td>0.622884</td>
</tr>
</tbody>
</table>

252
<table>
<thead>
<tr>
<th>Component Matrix</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.045</td>
<td>0.065</td>
<td>0.174</td>
<td>0.141</td>
<td>0.179</td>
<td>0.205</td>
<td>0.230</td>
<td>0.243</td>
<td>0.231</td>
<td>0.341</td>
<td></td>
</tr>
<tr>
<td>0.374</td>
<td>0.222</td>
<td>0.322</td>
<td>0.324</td>
<td>0.272</td>
<td>0.142</td>
<td>0.118</td>
<td>0.065</td>
<td>0.311</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>0.182</td>
<td>0.057</td>
<td>0.037</td>
<td>0.151</td>
<td>0.035</td>
<td>0.458</td>
<td>0.245</td>
<td>0.380</td>
<td>0.005</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.096</td>
<td>0.206</td>
<td>0.106</td>
<td>0.103</td>
<td>0.173</td>
<td>0.054</td>
<td>0.125</td>
<td>0.124</td>
<td>0.011</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.175</td>
<td>0.120</td>
<td>0.060</td>
<td>0.029</td>
<td>0.276</td>
<td>0.133</td>
<td>0.277</td>
<td>0.428</td>
<td>0.285</td>
<td>0.135</td>
<td></td>
</tr>
<tr>
<td>0.093</td>
<td>0.183</td>
<td>0.116</td>
<td>0.047</td>
<td>0.026</td>
<td>0.095</td>
<td>0.044</td>
<td>0.009</td>
<td>0.173</td>
<td>0.117</td>
<td></td>
</tr>
<tr>
<td>0.029</td>
<td>0.303</td>
<td>0.117</td>
<td>0.240</td>
<td>0.036</td>
<td>0.000</td>
<td>0.000</td>
<td>0.470</td>
<td>0.673</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.505</td>
<td>0.200</td>
<td>0.122</td>
<td>0.000</td>
<td>0.198</td>
<td>0.063</td>
<td>0.160</td>
<td>0.466</td>
<td>0.667</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.556</td>
<td>0.433</td>
<td>0.121</td>
<td>0.477</td>
<td>0.455</td>
<td>0.702</td>
<td>0.885</td>
<td>0.117</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.474</td>
<td>0.888</td>
<td>0.184</td>
<td>0.800</td>
<td>0.302</td>
<td>0.197</td>
<td>0.104</td>
<td>0.636</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.075</td>
<td>0.182</td>
<td>0.033</td>
<td>0.004</td>
<td>0.343</td>
<td>0.013</td>
<td>0.290</td>
<td>0.230</td>
<td>0.031</td>
<td>0.346</td>
<td></td>
</tr>
<tr>
<td>0.020</td>
<td>0.000</td>
<td>0.168</td>
<td>0.010</td>
<td>0.141</td>
<td>0.039</td>
<td>0.319</td>
<td>0.220</td>
<td>0.031</td>
<td>0.346</td>
<td></td>
</tr>
<tr>
<td>0.336</td>
<td>0.023</td>
<td>0.026</td>
<td>0.021</td>
<td>0.021</td>
<td>0.025</td>
<td>0.020</td>
<td>0.037</td>
<td>0.043</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>0.013</td>
<td>0.200</td>
<td>0.060</td>
<td>0.029</td>
<td>0.063</td>
<td>0.043</td>
<td>0.020</td>
<td>0.013</td>
<td>0.137</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Table A6.4 Component Matrix
<table>
<thead>
<tr>
<th>0.092</th>
<th>0.163</th>
<th>0.130</th>
<th>0.449</th>
<th>0.094</th>
<th>0.115</th>
<th>0.046</th>
<th>0.222</th>
<th>0.030</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.086</td>
<td>0.163</td>
<td>0.130</td>
<td>0.333</td>
<td>0.046</td>
<td>0.115</td>
<td>0.034</td>
<td>0.372</td>
<td>0.044</td>
</tr>
<tr>
<td>0.083</td>
<td>0.163</td>
<td>0.130</td>
<td>0.278</td>
<td>0.076</td>
<td>0.133</td>
<td>0.163</td>
<td>0.222</td>
<td>0.030</td>
</tr>
<tr>
<td>0.163</td>
<td>0.078</td>
<td>0.200</td>
<td>0.200</td>
<td>0.076</td>
<td>0.326</td>
<td>0.072</td>
<td>0.492</td>
<td>0.212</td>
</tr>
<tr>
<td>0.137</td>
<td>0.395</td>
<td>0.181</td>
<td>0.076</td>
<td>0.346</td>
<td>0.181</td>
<td>0.076</td>
<td>0.492</td>
<td>0.212</td>
</tr>
<tr>
<td>0.089</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
</tr>
<tr>
<td>0.097</td>
<td>0.192</td>
<td>0.024</td>
<td>0.070</td>
<td>0.031</td>
<td>0.150</td>
<td>0.024</td>
<td>0.163</td>
<td>0.070</td>
</tr>
<tr>
<td>0.029</td>
<td>0.253</td>
<td>0.097</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
</tr>
<tr>
<td>0.150</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
</tr>
<tr>
<td>0.031</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
</tr>
<tr>
<td>0.163</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
<td>0.070</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Table 6.4: Component matrix continued
<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terms about energy consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness about some general environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness about general environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of the technology of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy technology from the existing efficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of satisfaction derived</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of energy efficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness about energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly expenditure in rupees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus in rupees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership of energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual income of the household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational qualification of the householder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of house in square feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership of residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of locat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The house.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of persons residing in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Table A6.5: Rabeled component matrix
| Risk coverage in the form of say |
| Payout of information |
| Willingness to invest in equity |
| Introduce new technology |
| Willingness to adjust energy |
| Effort to adapt |
| Willingness to invest in equity |
| Introduce new technology |
| Willingness to adjust energy |
| Effort to adapt |
| Willingness to invest in equity |
| Introduce new technology |
| Willingness to adjust energy |
| Effort to adapt |
| Willingness to invest in equity |
| Introduce new technology |
| Willingness to adjust energy |
| Effort to adapt |
| Willingness to invest in equity |
| Introduce new technology |
| Willingness to adjust energy |
| Effort to adapt |

Table A6.5 Rotated component matrix continued
APPENDIX VII
MULTIPLE REGRESSION ANALYSIS

The measures generally derived in multiple regression analysis can be summarized as follows (Krishnaswamy et al., 2006):

1. A least square function fitting the data, the regressor equation is obtained.
2. An 'F' test is made for checking the significance of the overall regression model.
3. \( R^2 \), the coefficient of multiple determination (both sample based and population adjusted) is obtained.
4. Standard errors of regression coefficients are computed.
5. Partial hypotheses regarding the significance of the regression coefficients \( b_j \) (parameters) are tested using \( t- \) test.

Statistical significance of the overall regression model:

The hypotheses tested are:

Null Hypothesis: \( H_0 : \beta_1 = \beta_2 = \beta_3 = \ldots \beta_n = 0 \)

Alternative Hypothesis: \( H_a : \) Not all \( \beta_s = 0 \) (\( \beta_0 \) is not included)

F-test statistic is used.

\[
F = \frac{\text{Sum of squares due to regression}/\text{df in regression}}{\text{Sum of squares of the residuals}/\text{df in residuals}}
\]

If \( F < F_{cr} \) for stated \( \alpha \) do not reject \( H_0 \).
If \( F > F_{cr} \) for stated \( \alpha \) reject \( H_0 \).

Further \( F = \frac{R^2 (n-p)}{(1-R^2) (p-1)} \)

where \( p \) is the number of parameters estimated by the model (including \( \beta_0 \)).

Substantive significance of the model is:

(i). \( R^2 \) increases with a larger number of variables used in the regression.
(ii). \( R^2 \) increases as individual relationships \( r_{yk} \) increases.
(iii). \( R^2 \) increases as correlation between independent variables decrease.
Assumptions

Some assumptions which are made while applying the OLS procedure are as follows:

1. \( u_i \) is a random variable. (where \( Y_i = b_0 + b_{1i}X_{1i} + b_{2i}X_{2i} + \ldots + b_{ni}X_{ni} + u_i \))

2. The mean of the random variable \( u \) is zero for all \( X_i \).

3. The variance of each \( u_i \) is the same (constant) for all the \( X_i \) values (homo-scadasticity).

4. \( u_i \) is normally distributed with mean zero and variance.

5. The values of \( u_i \) (corresponding to \( X_i \)) are independent of any other \( u_j \) (corresponding to \( X_j \)) (absence of autocorrelation).

6. The explanatory variables are not perfectly linearly correlated (absence of multi-collnearity).

Problems encountered while using Multiple regression

As a pointer to the problems that may arise while using multiple regression, it is normal practice to analyze the residuals. As it is with bivariate regression analysis, it is useful to study the residuals in the case of multiple regression too. We can analyze the deviation of actual values from predicted values to determine: (i) magnitude of prediction errors, (ii) the departure from model assumptions, and (iii) whether to continue the analysis.

(i). Violation of the assumption of independence of residual terms can be identified from a plot of the residuals \((Y - \hat{Y})\) for a time series data.

(ii). A nonlinear pattern of residuals indicate the need for functional transformation.

(iii). The plots of residuals may show outliers which may be eliminated before running the regression model.

Stepwise regression methods

One of the most difficult problems in regression analysis is the selection of the set of independent variables to be employed in the model. In most of practical problems the researcher will have a large number of independent variables but the actual subset to be used in the model needs to be determined. The regression model that includes only a subset of regressors involves two conflicting conditions. One is that the model should have as many regressors as possible, which maximizes the information content of these factors, which influences the predicted value.
of the dependent variable. The other condition is that the model should include only few regressors since the variance of prediction increases with the number of variables.

The stepwise regression procedure is probably the most widely used of all automatic search procedures. This procedure employs either a forward selection or backward elimination approach for the inclusion of a best fit model based on F limits. The F limits are not determined by the significance levels but in terms of error reduction. A limitation of stepwise regression is that it presumes there is a single ‘best’ subset of independent variables.
APPENDIX VIII
QUANTILE REGRESSION OUTPUTS

This Appendix shows the outputs obtained from Quantile Regression using EasyReg software.

EasyReg International [December 3, 2011]
Session date: Wednesday April 3, 2013
Session time: 16:30:12

References:
Koenker, R., and G. Bassett (1978), Regression Quantiles,
Econometrica 46, 33-50.

Dependent variable:
Y = Eneftechsowned

Characteristics:
Eneftechsowned
First observation = 1
Last observation = 270
Number of usable observations: 270
Minimum value: 1.0000000E+000
Maximum value: 4.0000000E+000
Sample mean: 2.3888889E+000
This variable is integer valued.

A discrete dependent variable model might be more suitable!

X variables:
X(1) = FAC1_1
X(2) = FAC2_1
X(3) = FAC3_1
X(4) = FAC4_1
X(5) = FAC6_1
X(6) = FAC7_1
X(7) = FAC8_1
X(8) = FAC9_1
X(9) = FAC10_1
X(10) = 1

Quantile = 30%
Model: Y = b(1)X(1) + ... + b(10)X(10) + u,
where: P[u < 0|X(1),...,X(10)] = 0.30

30% Quantile regression results
(t-values in parenthesis)
[p-values in parenthesis]

X(1) = FAC1_1    b(1) = 0.316054 (11.177) [0.00000]
X(2) = FAC2_1    b(2) = 0.095638 (3.382) [0.00072]
X(3) = FAC3_1    b(3) = 0.209598 (7.413) [0.00000]
X(4) = FAC4_1    b(4) = 0.122428 (4.330) [0.00001]

261
\[X(5) = \text{FAC6}_1\quad b(5) = 0.190116 \quad (6.724) \quad [0.00000]\]
\[X(6) = \text{FAC7}_1\quad b(6) = 0.054006 \quad (1.910) \quad [0.05614]\]
\[X(7) = \text{FAC8}_1\quad b(7) = -0.011688 \quad (-0.413) \quad [0.67935]\]
\[X(8) = \text{FAC9}_1\quad b(8) = 0.126063 \quad (4.458) \quad [0.00001]\]
\[X(9) = \text{FAC10}_1\quad b(9) = -0.048775 \quad (-1.725) \quad [0.08453]\]
\[X(10) = 1\quad b(10) = 2.183090 \quad (77.350) \quad [0.00000]\]

[The p-values are two-sided and based on the normal approximation]

\[n = 270\]

Number of positive residuals: 186

Number of negative residuals: 84

N.B.: The t-values are based on the assumption that the error \(u\) is independent of the \(X\) variables!

The error density \(f(u)\) has been estimated by a kernel density estimator with standard normal kernel and window width \(h = c \cdot s \cdot n^{-0.2}\), where \(c = 1\) and \(s = 3.08320\cdot10^{-1}\)

-----------------------------

EasyReg International [December 3, 2011]

Session date: Wednesday April 3, 2013

Session time: 17:21:57

-----------------------------
References:

Dependent variable:
Y = Eneftechsowned

Characteristics:
Eneftechsowned
First observation = 1
Last observation = 270
Number of usable observations: 270
Minimum value: 1.000000E+000
Maximum value: 4.000000E+000
Sample mean: 2.3888889E+000
This variable is integer valued.
A discrete dependent variable model might be more suitable!

X variables:
X(1) = FAC1_1
X(2) = FAC2_1
X(3) = FAC3_1
X(4) = FAC4_1
X(5) = FAC6_1
X(6) = FAC7_1
X(7) = FAC8_1
X(8) = FAC9_1
X(9) = FAC10_1
X(10) = 1

Quantile = 60%

Model: Y = b(1)X(1) + ... + b(10)X(10) + u,

where: P[u < 0|X(1),...,X(10)] = 0.60

60% Quantile regression results

(t-values in parenthesis)

[p-values in parenthesis]

X(1) = FAC1_1       b(1) = 0.350739 (12.908) [0.00000]
X(2) = FAC2_1       b(2) = 0.072408 (2.665) [0.00770]
X(3) = FAC3_1       b(3) = 0.252353 (9.287) [0.00000]
X(4) = FAC4_1       b(4) = 0.110068 (4.051) [0.00005]
X(5) = FAC6_1       b(5) = 0.166769 (6.137) [0.00000]
X(6) = FAC7_1       b(6) = 0.058291 (2.145) [0.03193]
X(7) = FAC8_1       b(7) = -0.046647 (-1.717) [0.08603]
X(8) = FAC9_1       b(8) = 0.078038 (2.872) [0.00408]
X(9) = FAC10_1      b(9) = -0.033681 (-1.240) [0.21515]
X(10) = 1           b(10) = 2.477843 (91.360) [0.00000]

[The p-values are two-sided and based on the normal approximation]
n = 270
Number of positive residuals: 113
Number of negative residuals: 157

N.B.: The t-values are based on the assumption that the error u is independent of the X variables!
The error density f(u) has been estimated by a kernel density estimator with standard normal kernel and window width \( h = c \cdot s \cdot n^{\gamma}(-0.2) \), where \( c = 1 \) and \( s = 3.07071E-01 \)

-----------------------------

EasyReg International [December 3, 2011]
Session date: Wednesday April 3, 2013
Session time: 17:32:53
-----------------------------

References:

Dependent variable:
\( Y = \text{Eneftechowned} \)
Characteristics:

Enneftech's owned

First observation = 1
Last observation = 270
Number of usable observations: 270
Minimum value: 1.0000000E+000
Maximum value: 4.0000000E+000
Sample mean: 2.3888889E+000

This variable is integer valued.
A discrete dependent variable model might be more suitable!

X variables:
X(1) = FAC1_1
X(2) = FAC2_1
X(3) = FAC3_1
X(4) = FAC4_1
X(5) = FAC6_1
X(6) = FAC7_1
X(7) = FAC8_1
X(8) = FAC9_1
X(9) = FAC10_1
X(10) = 1

Quantile = 85%
Model: \( Y = b(1)X(1) + \ldots + b(10)X(10) + u, \)

where: \( P[u < 0|X(1),\ldots,X(10)] = 0.85 \)

85\% Quantile regression results

(t-values in parenthesis)

[p-values in parenthesis]

\[
\begin{align*}
X(1) &= \text{FAC1}_1 & b(1) &= 0.378280 \ (10.449) \ [0.00000] \\
X(2) &= \text{FAC2}_1 & b(2) &= 0.085020 \ (2.348) \ [0.01885] \\
X(3) &= \text{FAC3}_1 & b(3) &= 0.239361 \ (6.612) \ [0.00000] \\
X(4) &= \text{FAC4}_1 & b(4) &= 0.117137 \ (3.236) \ [0.00121] \\
X(5) &= \text{FAC6}_1 & b(5) &= 0.225212 \ (6.221) \ [0.00000] \\
X(6) &= \text{FAC7}_1 & b(6) &= 0.046475 \ (1.284) \ [0.19923] \\
X(7) &= \text{FAC8}_1 & b(7) &= -0.129044 \ (-3.564) \ [0.00036] \\
X(8) &= \text{FAC9}_1 & b(8) &= 0.111739 \ (3.086) \ [0.00203] \\
X(9) &= \text{FAC10}_1 & b(9) &= -0.015489 \ (-0.428) \ [0.66878] \\
X(10) &= 1 & b(10) &= 2.796134 \ (77.379) \ [0.00000]
\end{align*}
\]

[The p-values are two-sided and based on the normal approximation]

\( n = 270 \)

Number of positive residuals: 37

Number of negative residuals: 233

N.B.: The t-values are based on the assumption that the error \( u \) is independent of the \( X \) variables!

The error density \( f(u) \) has been estimated by a kernel density estimator with standard normal kernel and window width \( h = c.s.n^{(-0.2)} \), where
c = 1 and s = 3.19401E-01

EasyReg International [December 3, 2011]
Session date: Monday July 16, 2012
Session time: 23:22:19

References:
Koenker, R., and G. Bassett (1978), Regression Quantiles,
Econometrica 46, 33-50.

Dependent variable:
Y = Enerconhab

Characteristics:
Enerconhab
First observation = 1
Last observation = 270
Number of usable observations: 270
Minimum value: 1.000000E+000
Maximum value: 5.000000E+000

268
Sample mean: 2.8666667E+000

This variable is integer valued.

A discrete dependent variable model might be more suitable!

X variables:
X(1) = FAC2_1
X(2) = FAC3_1
X(3) = FAC4_1
X(4) = FAC6_1
X(5) = 1

Quantile = 30%
Model: Y = b(1)X(1) + ... + b(5)X(5) + u,
where: P[u < 0 | X(1),...,X(5)] = 0.30

30% Quantile regression results
(t-values in parenthesis)
[p-values in parenthesis]

<table>
<thead>
<tr>
<th>X</th>
<th>b</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>X(1)</td>
<td>0.181659 (3.351) [0.00081]</td>
<td></td>
</tr>
<tr>
<td>X(2)</td>
<td>0.269822 (4.977) [0.00000]</td>
<td></td>
</tr>
<tr>
<td>X(3)</td>
<td>0.600192 (11.071) [0.00000]</td>
<td></td>
</tr>
<tr>
<td>X(4)</td>
<td>-0.030392 (-0.561) [0.57505]</td>
<td></td>
</tr>
<tr>
<td>X(5)</td>
<td>2.429636 (44.901) [0.00000]</td>
<td></td>
</tr>
</tbody>
</table>

[The p-values are two-sided and based on the normal approximation]

n = 270
Number of positive residuals: 186
Number of negative residuals: 84

N.B.: The t-values are based on the assumption that the error u
is independent of the X variables!
The error density f(u) has been estimated by a kernel density estimator
with standard normal kernel and window width \( h = c.s.n^{.2} \), where
\( c = 1 \) and \( s = 6.06468E-01 \)

-----------------------------

EasyReg International [December 3, 2011]
Session date: Thursday July 19, 2012
Session time: 11:20:32
-----------------------------

References:
Koenker, R., and G. Bassett (1978), Regression Quantiles,
Econometrica 46, 33-50.

Dependent variable:
\( Y = \text{Enerconhab} \)

Characteristics:

270
Enerconhab

First observation = 1
Last observation  = 270
Number of usable observations: 270
Minimum value: 1.0000000E+000
Maximum value: 5.0000000E+000
Sample mean:  2.8666667E+000

This variable is integer valued.
A discrete dependent variable model might be more suitable!

X variables:
X(1) = FAC2_1
X(2) = FAC3_1
X(3) = FAC4_1
X(4) = FAC6_1
X(5) = 1

Quantile = 60%
Model: Y = b(1)X(1) + ... + b(5)X(5) + u,
where: P[u < 0|X(1),...,X(5)] = 0.60
60% Quantile regression results
(t-values in parenthesis)
[p-values in parenthesis]
X(1) = FAC2_1        b(1) = 0.219228 (3.794) [0.00015]
X(2) = FAC3_1   b(2) = 0.291020 (5.036) [0.00000]
X(3) = FAC4_1   b(3) = 0.724901 (12.544) [0.00000]
X(4) = FAC6_1   b(4) = -0.171596 (-2.969) [0.00298]
X(5) = 1        b(5) = 3.070667 (53.236) [0.00000]

[The p-values are two-sided and based on the normal approximation]

n = 270

Number of positive residuals: 106

Number of negative residuals: 164

N.B.: The t-values are based on the assumption that the error u
is independent of the X variables!

The error density f(u) has been estimated by a kernel density estimator
with standard normal kernel and window width h = c.s.n^(-.2), where
c = 1 and s = 5.96399E-01

--------------------------------------------------------

EasyReg International [December 3, 2011]

Session date: Monday July 16, 2012

Session time: 23:35:38

--------------------------------------------------------

References:

Koenker, R., and G. Bassett (1978), Regression Quantiles,
Econometrica 46, 33-50.

Dependent variable:

\( Y = \text{Enerconhab} \)

Characteristics:

**Enerconhab**

First observation = 1

Last observation = 270

Number of usable observations: 270

Minimum value: \( 1.0000000E+000 \)

Maximum value: \( 5.0000000E+000 \)

Sample mean: \( 2.8666667E+000 \)

This variable is integer valued.

A discrete dependent variable model might be more suitable!

\[ \text{X variables:} \]

\[ X(1) = \text{FAC2\_1} \]

\[ X(2) = \text{FAC3\_1} \]

\[ X(3) = \text{FAC4\_1} \]

\[ X(4) = \text{FAC6\_1} \]

\[ X(5) = 1 \]
Quantile = 90%

Model: $Y = b(1)X(1) + ... + b(5)X(5) + u,$

where: $P[u < 0|X(1),...,X(5)] = 0.90$

90% Quantile regression results

(t-values in parenthesis)

[p-values in parenthesis]

$X(1) = \text{FAC2}_1$ \hspace{1cm} $b(1) = 0.321584 \ (4.203) \ [0.00003]$

$X(2) = \text{FAC3}_1$ \hspace{1cm} $b(2) = 0.309957 \ (4.051) \ [0.00005]$

$X(3) = \text{FAC4}_1$ \hspace{1cm} $b(3) = 0.845145 \ (11.045) \ [0.00000]$

$X(4) = \text{FAC6}_1$ \hspace{1cm} $b(4) = -0.184652 \ (-2.413) \ [0.01581]$

$X(5) = 1$ \hspace{1cm} $b(5) = 3.892149 \ (50.962) \ [0.00000]$

[The p-values are two-sided and based on the normal approximation]

$n = 270$

Number of positive residuals: 30

Number of negative residuals: 240

N.B.: The t-values are based on the assumption that the error $u$

is independent of the $X$ variables!

The error density $f(u)$ has been estimated by a kernel density estimator

with standard normal kernel and window width $h = c.s.n^{\gamma}(-.2),$ where

$c = 1$ and $s = 6.17497E-01$